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ABBREVIATIONS

2SLS	Two-stage least squares
3_YRA_SG	3-year annual sales growth rate
CEO	Chief Executive Officer
CEOEXP	CEO experience (in years)
CEODUAL	CEO/Chairman duality, if both positions are filled by the same individual
IV	Instrumental variable
R&D	Research & Development
ROA	Return on assets
SIC	Standard Industrial Classification
Tobin's q	A measure representing firm value
VIF	Variance Inflation Factor

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ABSTRACT

CEOs of large companies have a lot of power in the company-wide hierarchy and their actions are followed closely by the news media, financial analysts and private investors, for instance. For this reason, they are interesting targets for further investigation in the academic world as well. Especially, the influence of various characteristics related to the CEOs are of special interest. Previous academic research shows that different characteristics connected to the CEO can influence a firm's financial performance either in a positive or negative manner. This study examines the relationship between these CEO characteristics and firm financial performance through six individual measures: age, gender, experience, CEO/Chairman duality, salary and firm ownership. Firm financial performance is proxied through the profitability indicator ROA and the valuation measure Tobin's q. It is expected that certain characteristics have significant influence on firm performance.

The study examines a panel data of 291 individual S&P 500 companies and 482 CEOs of those companies through a period of seven years, 2010-2016. The individual variables are obtained from Execucomp and Datastream. Panel regressions with period-, cross-section- and industry-fixed effects are utilized in the study to form the results.

The empirical findings of the study show that female CEOs tend to affect firm performance positively. CEO experience, measured as the time the individual has held the position in the company, and CEO/Chairman duality are also shown to have a positive relationship with the financial performance of the sample firms. The remaining characteristics yield inconclusive or insignificant results in regard to firm financial performance. Due to the issue of endogeneity affecting most corporate governance studies, the results of the study should be treated as rather tentative.

KEY WORDS: Corporate governance, CEO characteristics, firm performance, endogeneity

1. INTRODUCTION

1.1. Background and motivation

In the company-wide hierarchy, CEOs are the most powerful governing body and decision-maker after the board and its chairman. They are in charge of the day-to-day operations within a company and at the end of the day it is the CEO who is mainly responsible for any wrongdoings the company might have done. On the other hand, a CEO leading a financially well performing company tends to receive lots of praise from the shareholders and market participants in general. Their powerful position in a company make them an interesting subject for further investigation in the academic world. Consequently, because of their powerful position within a company, CEOs are also extensively followed individuals in that their moves are closely observed by the shareholders, for instance. An ongoing debate also exists on whether CEOs of large corporations are actually worth what they are paid, insinuating that higher paid CEOs might not always achieve higher firm performance. The effects of different CEO characteristics on firm performance are of great interest since these characteristics can be examined and thought of more closely in the event of making a new CEO appointment, for instance. Keeping the aforementioned in mind, it is beneficial to examine certain characteristics more closely and specifically in relation to firm performance and see if there is any relationship between them. (Brealey, Myers & Allen, 2011)

More generally speaking, individual characteristics are one of the single biggest factors in many hiring decisions in the job market. Of course, some characteristics such as age and gender, should not affect the hiring decision in any company since that is a form of discrimination towards the applicants. Nevertheless, companies are also in search for the best possible candidate for each of their open positions and they want an individual who has the most well-suited and value enhancing characteristics to the job in question. Of course, other things such as previous experience and knowledge also play a large role in the decisions made by the hiring managers. Keeping the above mentioned in mind, it is clear that if hiring managers, for instance, are able to compare and evaluate how different

characteristics affect the value of a firm, they would utilize that information and make decisions accordingly. Here also lies the key idea of the whole thesis.

There exist many previous studies that examine the effect CEO characteristics have on firm financial performance. Common to many of the previous studies is that ROA and Tobin's q are used as indicators of firm financial performance, as is the case with the study in hand. For instance, Peni (2014) examines the effect multiple different characteristics, such as age, gender and experience have on firm performance measured by both ROA and Tobin's q and finds that there indeed are significant relationships with many of the examined variables. Whereas the former study examines the effect of multiple different characteristics, there are other influential studies that look at one characteristic more closely in relation to firm performance. Khan & Vieito (2013) examine the effect CEO gender has on firm financial performance and find female CEOs to exhibit higher levels of firm performance. Additionally, Serfling (2014) looks at CEO age and how that affects firm riskiness. He finds that as CEOs get older, they start taking less risk in their corporate activities. A notable study by Mehran (1995) shows that, in regard to CEO salary, the structure of the compensation provided also has significance in relation to firm financial performance. The study shows that equity-based compensation has a significantly positive effect on ROA and Tobin's q. Studies have also been made on examining the relationship between CEO/Chairman duality and firm performance, finding that different industries react to duality in different ways (Elsayed 2007). CEO experience, measured as the amount of time the individual has held the position in the company, is found to have a positive impact on firm financial performance measured both by ROA and Tobin's q (Peni 2014). In regard to the CEO's ownership stake in the firm, Griffith (1999) finds that there are certain threshold levels of ownership that either affect firm value positively or negatively. In addition to examining the previously mentioned studies in more detail further on in the literature review section of the paper, other related studies are also discussed to give the reader a comprehensive review of past research related to the topic in question.

Overall, this study examines the impact of multiple different CEO characteristics, which are age, gender, CEO/Chairman duality, experience, salary and firm ownership, in the regression models to come and thus makes it possible to draw conclusions on whether

there are some characteristic variables that are more prominent than others. The study aims at shedding more light on the different characteristics with a new dataset and -period, and additionally introduces the variable of CEO ownership stake in the firm, measured as the percentage of the total outstanding shares owned by the CEO, excluding options, which has not been used extensively in this form in previous literature.

This study also focuses on variables that are easily quantifiable since previous research has shown that difficulties can arise in corporate governance related studies when trying to measure something that is not as straightforward in its interpretation. As an example of a characteristic, which can be difficult to quantify is the concept of managerial entrenchment. Salas (2010) uses entrenchment as a proxy for explaining the stock price behavior after sudden executive deaths. Unquestionably, he manages well in explaining managerial entrenchment, but issues could arise if the measure would be left up to debate. Evidently, the results of related research depend substantially on how the characteristics themselves are measured and emphasizes the need in this study to use quantifiable measures that are not open to debate in order to keep the results robust and easily understandable.

The current academic literature regarding CEO characteristics and firm performance is ambiguous at times. There are studies, as will be shown further on in the thesis' literature review section, which achieve varying and mixed results. For this reason, any new information and knowledge received through empirical testing related to the topic is valuable to try and bridge the gap between the results to find even more common ground within the research area. Additionally, as already mentioned, there is value in the new and updated data set that examines six different characteristic measures and comprises of the most recent information available for the investigation of the issue.

As mentioned in the previous paragraph, there exists ambiguity in the results of similar research. One of the largest issues these kinds of studies face is that of endogeneity, which simply means that without proper econometric tools, we cannot say for sure whether the causation we witness is actually correct. This problem is something this paper also takes into consideration because of its large impact on the results. As Wintoki, Linck & Netter

(2012) explain in their article about corporate governance related studies having large issues with endogeneity, it can very well be that firm performance is the factor behind governance, not the other way around as we would predict. The endogeneity concern will be gone through in detail later on in the paper.

Overall, this thesis follows in the footsteps of previous related studies where the relationship between CEO characteristics and firm financial performance have been examined. The individual CEO characteristics implemented in this study are age, gender, salary, CEO/Chairman duality, experience, and firm ownership. These are evaluated in correlation with two firm performance measures, ROA and Tobin's q. Ultimately, this paper can be used as a valuable resource in examining the relationship between the mentioned CEO characteristics and firm performance and possibly used as valuable input in certain hiring decisions.

1.2. Research questions

The two main research questions related to the firm performance measures of the study are formulated below. The specific research hypotheses regarding each CEO characteristic variable are presented later on in chapter 3, after going over the previous literature in the field.

RQ 1: Do CEO characteristics, such as age, gender, salary, experience, CEO/Chairman duality, and ownership have a significant impact on a firm's financial performance measured by the profitability indicator ROA?

RQ 2: Do CEO characteristics, such as age, gender, salary, experience, CEO/Chairman duality, and ownership have a significant impact on a firm's financial performance measured by the firm value indicator Tobin's q?

1.3. Structure of the study

The thesis starts with this introduction, where the author gives background and motivation for the study. After this, the theoretical framework related to the topic will be introduced and gone through in detail in chapter 2. Previous empirical evidence related to the topic in question are introduced in the third part. Thereafter, the thesis shifts its focus on to the methodological section of the paper, as the data samples, hypotheses and results are introduced in chapters 4 and 5. In the end, a final discussion of the results is presented, and a final conclusion made.

2. THEORETICAL FRAMEWORK

The theoretical framework consists of an introduction to basic firm-level hierarchy to further strengthen and understand the importance of the CEO in the hierarchy of the firm as the decision maker. After this, four independent but related theories in corporate governance are introduced in order to form a better understanding of the underlying forces in corporate governance and its implications on firm financial performance, for instance. Common to all four theories is the fact that they have existed for decades and have not changed significantly along the way. There also exists no affirmative proof of one of these being far superior to the other ones.

The most basic definition of the term corporate governance is that it could be thought of as a structure or regime which is in place to govern and control a firm. The main principle is to lay the ground for the relationships between the board of directors, CEO and other executives, and the shareholders of the company in a way that everyone knows their responsibilities and rights. One of the underlying principles of corporate governance is that it acts as reinforcement for procedures written down in law. Corporate governance practices can differ slightly geographically from country to country, but the main principles are the same in order to have uniform procedures across large listed companies around the world, for instance. (Securities Market Association 2018)

2.1. Firm-level hierarchy

To understand the issue on how corporate governance and CEO characteristics are related to a firm's financial performance, it is crucial to understand the basic hierarchy of a firm and examine the relationship the CEO has with his/her superior, the board of directors. The board of directors is the highest governing body of any company, which makes the chairman of the board of directors the highest ranked individual in the firm-level hierarchy. The shareholders of a company elect the board of directors; thus, the board represents the shareholders and tries to maximize their value (ownership of the firm) to the best of their ability. All major decisions have to be ultimately accepted by the board of directors.

They are also in charge of appointing a new CEO for the company and other top-level executives. (Brealey, Myers & Allen 2011)

Board size depends greatly on the company, usually larger firms have more members on their board, and vice versa. Privately-owned sole proprietor -type of businesses can only have a few people on the board, consisting usually of the entrepreneur him- or herself and someone else, for example a business partner. On the other hand, large corporations such as Nokia, have a board composition of roughly 10 people.

Although the composition of the board or its chairman and the relationship between firm performance is not examined in this thesis, it is important to understand that it is in fact the highest governing body of any company. Since the board of directors plays such an important role within the company, as it is optimal to find the most suited CEO for the position, it is also beneficial to find the optimal board composition. Through understanding, for instance, how multicultural boards with nationalities from all over the world and various age compositions of the board help in providing financial value for the company, the whole institution benefits.

The Chief Executive Officer, commonly referred to as the CEO, is the highest-ranking executive a company has. He or she is in charge of managing the company's overall operations and making key strategic business decisions and evaluating the successful allocation of company resources. The CEO is the one most in contact with the board of directors and updating them on company-wide issues on a regular basis. Proper corporate governance dictates the fact that the CEO must have the board of directors' approval and trust. This is possibly the most vital aspect of the relationship between the CEO and the board of directors. Without trust and confidence in the CEO, he or she does not have the requirements that are needed to continue in the position successfully. Through the years, we have seen numerous CEO dismissals simply because the most sacred aspect of business, trust, has been blatantly jeopardized. Ultimately, the board of directors is always the one responsible for deciding on the possible termination of a CEO's contract.

2.2. Agency theory

Agency theory is one of the main and probably the most well-known theories related to corporate governance and is inherently connected to the issue of CEO characteristics, such as executive compensation and how it possibly affects the company's value, thus affecting also the value for the shareholders as well. As Brealey, Myers & Allen (2011) explain, it is the theory of the existing, and often problematic, relationship between the company's top managers and its shareholders. Shareholders are seen as the "principals" and top managers as "agents" of the principal. Another key aspect to note here are that of agency costs, that are losses that can arise if and when the manager of the company does not act in a way that is increasing the value for the shareholder. Fundamentally, the theory states that there is a large problem in that not everyone within the firm is working for the same common goal, which should always be the increase of shareholder value. As Brealey, Myers & Allen (2011) discuss, the issue is not only in the relationship between the top managers and shareholders of the firm but there is also an evident problematic relationship within the relationships inside the firm itself since middle managers and other employees act as agents for the very top of management. Fama (1980) also examines the issue in his seminal work related to agency problems and motivates that ownership of the firm and control should be separated, which can lead to a highly effectual economic organizational structure.

Just as Brealey, Myers & Allen (2011) tell, in simple terms, a business is always looking for projects with a positive net present value. By doing this, the company will continue on making a profit, *ceteris paribus*. The question is about motivating your employees and managers to perform in a way that maximizes not only the value for the shareholders but for the individual employee and manager as well. As Brealey, Myers & Allen (2011) discuss, incentives and performance management are two main issues to take into consideration here. This is strongly connected to the issue of this thesis itself, since by understanding that there are different incentive structures and performance management tools put in place to measure the performance of top managers within a company, we get a more comprehensive idea of what it actually is that is driving the financial performance of individual firms.

2.3. Stewardship theory

Agency theory can be seen as trying to find motivation and reasoning to separate the roles of the chairman of the board and the CEO, insinuating that CEO/Chairman duality is not ideal since it raises a conflict between the interests of the shareholders and the “agents”. Contrary to this, the stewardship theory suggests that the interests of the “principals” (=shareholders) are looked after when CEO/Chairman duality is present (Donaldson & Davis 1991). The underlying idea behind having the same individual as chairman and CEO is that the duality brings more power to the individual, which allows for immediate and effective reaction to different circumstances and thus be more valuable to the shareholders as well, granted that the overall organizational structure of the firm is designed correctly. To examine the issue of which theory is better for the shareholders, Donaldson & Davis (1991) take the approach of comparing the two rival theories in a set of empirical tests to find evidence in favor of one over the other.

With a sample of 321 US-based firms, they find CEO/Chairman duality to be highly persistent, with 76% of the total sample firms having the same individual as CEO and board chairman. Return on equity and shareholder gains are used as dependent variables when evaluating the financial performance of the firm in relation to CEO/Chairman duality. Interestingly, the study finds rather mixed results since ROE is found to be lower for firms with no duality in regard to the two positions. On the other hand, CEO/Chairman duality was found to have a positive relationship between the returns experienced by the shareholders, indicating proof towards the stewardship theory.

2.4. Resource dependence theory

The resource dependence theory is the third separate theory, which differs in many ways from the previous two. Although it may not be as well-known in comparison to the agency theory, for instance, it has been described as being a major and highly influential theory related to organizational and strategic management. As the name tells, it is about organizations and companies being dependent from one another in regard to different necessary resources needed to conduct business (Drees & Heugens 2013). The theory most notably

tries to explain why it is that companies that operate separately from one another sometimes form alliances, as well as mergers and acquisitions, for example. The decisions to partake in any of the activities mentioned previously usually starts from the highest level of the company hierarchy, mainly the CEO. Keeping this in mind, we understand better the interconnectedness of the individual CEO characteristics and what kind of a role they play in relation to the theory itself.

2.5. Stakeholder theory

The stakeholder theory in corporate governance examines the moral background of organizational management. It looks at the values and drivers behind the business, and especially the ethical side of managing an enterprise. By stakeholders are meant both internal and external ones that have an effect on how the company is run and what kind of ethical and organizational guidelines are practiced in the business, in order to satisfy the needs of all stakeholder groups. Examples of internal stakeholders are, for instance, the owners, managers and employees of a firm. They all have a unique role inside the company hierarchy and organizational structure in delivering value to the business. On the other hand, external stakeholders are the shareholders, customers, suppliers, creditors and the society as a whole, for instance. (Stakeholder Map, 2018)

Bridoux & Stoelhorst (2014) discuss stakeholder theory and examine the implications of managing different types of stakeholders effectively, and especially in terms of firm performance. As the authors suggest, stakeholder theory implies that there exists a positive correlation between the ethical fairness in regard to each individual stakeholder and firm financial performance. Indicating that by being fair towards all respective stakeholders of the company, financial performance of the firm tends to increase. The main idea behind the theory is that stakeholders are more inclined towards value creation when treated with respect and fairness. The problem lies in the fact that how do you manage all the different stakeholders in a firm performance maximizing way, since not all stakeholders respond to the same set of principles and ideas. The authors explain this through two separate approaches: the fairness approach and the arms-length approach. The former simply means, as is described in the name, that you should treat stakeholders fairly, whereas the

latter focuses solely on the bargaining power of each individual stakeholder. The study finds that in order to attract the so-called complementary stakeholders to help in increasing firm performance, a fairness approach is recommended. For retaining and getting value out of the more self-centered stakeholders, the authors suggest using the arms-length approach, since it is focused on the bargaining power possessed by the stakeholders.

2.6. Conclusions on the theoretical framework

As can be noted from the aforementioned four individual theories related to the general theoretical framework of the thesis and its subject, there exist multiple distinct approaches in respect to examining the relationships between companies and their stakeholders. For instance, whereas some theory is in favor of CEO/Chairman duality, another is the exact opposite, highlighting the importance of separating these two influential roles inside the company and its hierarchy. In regard to actual firm financial performance, the four theories gone through try to explain the origins of it from different perspectives, with each theory emphasizing as important something that might be overlooked by another theory. Overall, the theoretical framework of the study aims at providing the reader information on the basic fundamental forces behind corporate governance and how it is inherently connected to firm financial performance.

3. PREVIOUS EMPIRICAL EVIDENCE

Empirical evidence regarding the topic is presented in the following section. The section looks at prominent studies within the field. An illustration of the main studies and their results is presented at the very end of the section.

3.1. CEO age

Multiple previous studies have been made regarding the relationship between the age of the CEO and firm financial performance. As mentioned earlier in the introduction, the study by Peni (2014) also examines the effect of Chairperson characteristics on firm financial performance, in addition to the CEO characteristics. The sample of the study and methodology are similar to that of this one, as S&P500 firms and their CEOs are used to examine the relationships with cross-sectional panel regressions. The study finds that CEO age does not seem to have an effect on the firm valuation measure Tobin's q . On the other hand, Peni (2014) finds a positive impact between CEO age and ROA. Interestingly, the study found a negative relationship between a Chairperson's age and Tobin's q . The result is also backed up by previous studies where age has been found to have a negative impact on risk aversion, meaning that as executives get older they tend to take less risk, which can at times weaken the financial performance of the individual firm.

Closely related to CEO age is also the age of the Chairman, which has also been studied in relation to firm performance. Waelchli & Zeller (2013) find a negative relationship between Chairman age and firm financial performance. Comparing this study to the one of Peni (2014), it is an example of how similar studies achieve varying results. Of course, it has to be noted that the prime target of the examination is different (CEO vs. Chairman) and the samples are different as well. Waelchli & Zeller (2013) used nearly 10 000 Chairmen of unlisted firms in Switzerland as their sample. As their main firm financial performance measures, they use ROA and ROE and show that there is a significant decline in performance as Chairmen get older. The economic significance of the issue is also rather substantial, since the study reports that an estimated one standard deviation increase in the Chairman age results to a roughly 0,79% decrease in ROA. The results clearly indicate

that the Chairman of a firm, as well as the CEO, has an important role in delivering performance. The study also points out a very common feature of humans, that of deteriorating cognitive abilities as one grows older. In fact, they imply that this can even be considered as the main driver behind the decreasing financial performance of the examined firms.

3.2. CEO gender

CEO gender has also been the subject of many corporate governance related articles where the aim is set on identifying whether gender has an effect on the financial performance of firms. Previous literature related to investment behavior between males and females has shown that, on average, females take less risk and earn higher returns than males. For instance, a study by Davydov, Florestedt, Peltomäki & Schön (2017) concludes that female investors exhibit less risk in their portfolios with higher performance compared to males. The study was done on individual private investors in Sweden on the use of Exchange Traded Products. The result has great economic significance as well, since the females' portfolios showed a median rate of return of 1,68% higher than that of the males' portfolios. Even though females exhibited much higher portfolio performance, the corresponding risk was in fact considerably lower in comparison to males. This finding is just to illustrate that when looking at gender and firm financial performance, as is the case with this thesis, one must first understand the smaller picture on an individual person scale and the characteristics driving the behavior of certain individuals. In a broad picture, the results of the study by Davydov et al. (2017) can have some implications on the study in question as well.

More specifically, Khan & Vieito (2013) examine the relationship between CEO gender and firm performance by looking at a panel set of companies situated in the United States during 1992-2004. Their initial hypotheses, similar to that of Davydov et al. (2017), is also that female CEOs exhibit stronger firm financial performance on average, compared to their male counterparts. In addition to this, they also hypothesize female-led companies to exhibit lower risk levels. Both these hypotheses were proven to be correct since the coefficient for a female CEO is both positive and statistically significant.

Related to the characteristic of gender and firm financial performance is also the study by Erhardt, Werbel & Shrader (2003) where the diversity among the board of directors is examined in relation to financial performance of the specific firm. As their sample they use 127 large companies from the United States between the years 1993-1998. As the dependent variables measuring firm financial performance the study uses return on assets and return on investment. At the end, the study finds that a high level of diversity within the board of directors' results in higher firm financial performance. By diversity here is meant the percentage of females and different minorities on the board of directors.

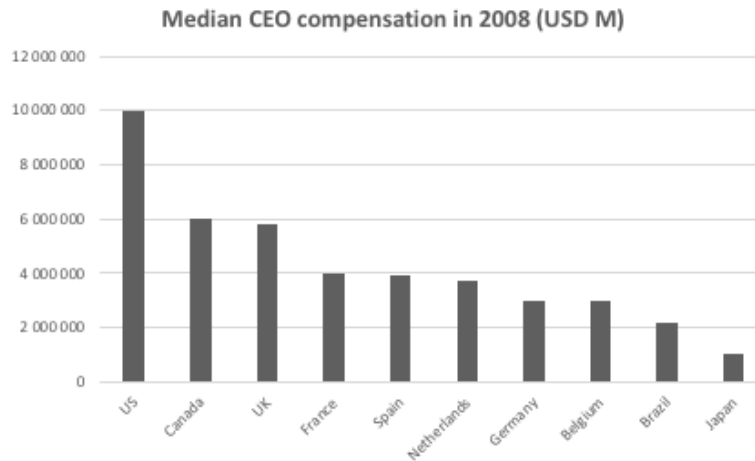
3.3. CEO salary

The salaries paid to CEOs, especially those in charge of large publicly listed companies, are under constant debate within the eyes of the general public. People think that CEOs get paid too much in comparison to the results they are able to achieve. For instance, relating to figures from the FTSE 100, the ratio of CEO salary to a normal worker is roughly around 120:1 (Management Today 2018). In addition, based on a study made in the UK by the CIPD (Chartered Institute of Personnel and Development) in 2015, 71% of the respondents to the survey see that CEO salaries are too high in the UK and a majority of respondents see this as a demotivating aspect to work (Management Today 2018). The aspects mentioned above give good reasoning to study the effects CEO salaries have on firm financial performance.

There also exists an ongoing debate on whether CEOs are actually driving value to the business and whether or not they are worth what they are actually paid. Let us examine the issue more closely from the point of view of one of the key variables of this research: compensation. The following figure depicts the median CEO compensation for large companies in 2008. It includes the base salary, target bonuses and long-term incentive plans. As can be clearly seen, the US has an incredibly high level of CEO pay compared to the rest. Comparing the compensation of CEOs in the US to ones in Germany, we notice that CEOs in Germany earn about three times less, based on data from 2008. An even more dramatic case is that of comparing CEOs in the US to ones in Japan. The

difference is roughly tenfold. Is it accurate to say that CEOs in the US are ten times better and deliver ten times more value to the company than ones in Japan? (Brealey, Myers & Allen (2011))

Figure 1. Median CEO compensation in 2008 for large companies. (Brealey, Myers & Allen, 2011).



It is only logical that the figure above raises the question of whether CEOs in the US are substantially more valuable to the business, solely based on their compensation. Empirical evidence suggests the opposite in some cases. Brealey, Myers & Allen (2011) give an example of two CEOs in the US who received massive compensation packages worth over \$200 million as they left the financially underperforming companies.

Jeppson, Smith & Stone (2009) analyze whether there is any relationship between the compensation provided to CEOs and the financial performance of the firm. The study looks at 200 publicly traded companies from the US and finds that there is no strong relationship between the mentioned variables. The authors do point out that this might be the result of a limited sample and period of estimation. On the other hand, and in an older study by Mehran (1995), the effect executive compensation structure has on firm financial performance is studied. Although the data is from the 1980s, crucial evidence can still be brought up from the study. For instance, the study shows that the two firm financial performance measures, Tobin's q and ROA, have a positive and significant relationship with equity-based compensation and the overall percentage of outstanding stock held by managers within the very top of the company. This result indicates that the CEO

compensation, more particularly the structure of it, has a considerable effect on a firm's financial performance measured with Tobin's q and ROA. In addition, the study also concludes that in companies where the compensation of the CEO is sensitive to the financial performance of the firm, the overall returns produced for the shareholders are higher than in companies where the firm's financial performance and CEO salary are only remotely connected.

Related to CEO salary is an interesting concept referred to as "CEO pay slice". Developed by Bebchuk, Cremers & Peyer (2011), it examines the total compensation of a company's five most senior and important executives in relation to the pay of the CEO. Initially, it tells how big of a portion (%) of the total compensation of the five mentioned executives is captured by the CEO. The study uses Tobin's q as a proxy for firm value and finds that a higher portion of the total five-person executive team compensation going to the CEO leads to a decrease in firm value measured by Tobin's q. In addition to this, a high CEO pay slice is also negatively connected to many other measures as well, such as accounting profitability, the quality of M&A decisions and CEO turnover, to mention a few. Bebchuk, Cremers & Peyer (2011) explain that the reasoning behind the negative relationship with firm value can be found in the agency problem where the executives of a firm tend to also think about what actions bring the best outcome, compensation wise, for themselves, not only for the shareholders. The economic significance of the negative effect the CEO pay slice measure has on firm value measured by Tobin's q is substantial. For instance, an approximately 12% change (one standard deviation) in the CEO pay slice results, on average, to a decrease of 5,5% in the Tobin's q for next year.

Brick, Palmon & Wald (2006) find a unique finding in their research that looks at CEO and director compensation in relation to firm financial performance. They state that there is evidence of excess compensation being linked to the financial underperformance of a firm. The economic impact of the finding is large, since the regression results of the study show that a 10% rise in excess compensation given to the CEO results, on average, to a 0,8% decrease in the returns of the specific company. Going further, Brick, Palmon & Wald (2006) also examine the impact via excess holding period returns through the Fama-

French model with fixed effects and find that an increase of 10% in the compensation of the CEO results to a 1,09% equity value decrease.

3.4. CEO/Chairman duality

Continuing on the topic related to CEO/Chairman duality mentioned in the literature review of the paper and examined through the empirical work of Donaldson & Davis (1991), the following gives more insight on other related studies within the subject. As already mentioned earlier in the paper, CEO/Chairman duality is found to be rather common, especially among the S&P500 companies and large companies in general in the US. As Yang & Zhao (2014) conclude, during 1970-1990 CEO/Chairman duality was present in more than 80% of all large companies in the US. After increased regulation and partly because of the Dodd-Frank Act of 2010, where the SEC ordered that listed companies must explain the reasoning behind a certain board structure, especially if the CEO and Chairman are the same individual, the duality figure decreased to 54%. As can be noted later on in this paper, the sample used follows the same lines of having the duality at around 60%. In regard to firm performance, Yang & Zhao (2014) find that firms with CEO/Chairman duality perform better than their counterparts where duality is not present, when using the Canada-United States Free Trade Agreement as an exogenous shock. More precisely, they find that the CEO/Chairman duality results to an increase in Tobin's q by nearly 4%, on average.

Elsayed (2007) also examines the relationship between CEO/Chairman duality and firm financial performance and finds there to be no connection between the two before taking into consideration an interaction term among firm industry and duality. Adding the interaction term shows that there are differences across industries, some reacting positively to CEO/Chairman duality as compared to others reacting more negatively.

Closely related to CEO/Chairman duality is also the issue of executive business. Ahn, Jiraporn & Kim (2010) study the effect holding multiple directorships, especially outside the company, have on acquirer returns. The authors show that when it comes to the directors in the acquiring companies that hold many board seats outside that specific company,

there are significantly more negative abnormal returns. The reason for this is that executives are too busy and do not have enough time to focus on the matters at hand in the respective company properly.

3.5. Experience

As is the case with some of the other examined characteristics, experience is found to have mixed results in relation to firm performance. Hamori & Koyuncu (2015) find a negative relationship between CEO experience and firm financial performance. By experience they mean whether or not the CEO has prior experience being the head of another company. An alternative way of measuring CEO experience is to measure how long the individual has been the CEO of the company he/she currently works for (Peni 2014). This study finds that more experienced CEOs tend to have a positive effect on the financial performance of the firm, measured both by ROA and Tobin's q . The reasoning for this lies in the fact that not only have more experienced CEOs been able to grow their professional network and contacts to a much higher level than less experienced ones, but in addition they tend to have significantly more knowledge about the firm and the different tasks designated to the CEO. An interesting aspect from the study by Peni (2014) is that it is not necessarily the age of the CEO that affects firm performance, but moreover the actual experience gained as CEO. Meaning that a younger individual with more experience being the top executive in a company most likely will have a more positive effect on a firm's financial performance than an individual who is older but has less experience in holding the CEO position in the firm. Li & Patel (forthcoming) find similar results when they study the effect generalist CEOs have on firm financial performance and conclude that although the experience gained as a generalist CEO is associated negatively with firm performance, this is mitigated substantially with a long tenure in the position.

3.6. CEO ownership stake in a firm

Studies related to examining CEO ownership of the firm and its relationship with firm financial performance provide interesting results. For instance, Griffith (1999) finds that when using Tobin's q as a proxy for firm value, it tends to increase when the total share

ownership of the CEO is somewhere in the range of 0-15%. Consequently, there is a negative effect if the CEO owns more than 15% but at most 50%. Going beyond the 50% threshold of firm ownership, firm value is expected to increase again. The explanation behind the findings is that when CEO ownership of the firm is at a low level, the management are more interested and keener on maximizing shareholder wealth. CEO entrenchment, as also discussed by Salas (2010), starts showing when the ownership exceeds the 15% threshold and increases towards the 50% mark. High levels of ownership tell that the CEO has lots of power and authority, which can partly be reasons for why the CEO might become too self-righteous. Similar results are found by Tan et al. (2001), as they also conclude that CEO ownership has an inherent positive relationship with the financial performance of the firm. In addition to this, they also find that firm financial performance is positively correlated with the ownership variable, meaning that CEOs of companies with better financial performance tend to own more of the company stock.

Related to the formerly mentioned study by Griffith (1999), Tong (2008) investigates the impacts of deviating from the perceived optimal CEO ownership level and whether or not this has an effect on firm performance. The results indicate that a deviation, whether it being on either side of the ownership spectrum, results to a decrease in the value of the firm measured by Tobin's q .

Additionally, Lilienfeld-Toal & Ruenzi (2014) include the estimation of the effect on stock market performance. The authors find that a high level of share ownership by the CEO is connected with significantly higher stock market returns in comparison to instances where the overall ownership of the firm by the CEO is relatively small. In their study they employ an investment strategy, which is solely focused on available public information. The economic magnitude of the finding is also rather substantial, since the authors manage to show that an investment strategy in which you go long on companies where the CEO owns more than 10% of the total outstanding shares and short companies in which the CEO of that specific company has no ownership, can result in yearly abnormal returns of around 5% during the sample period in question.

3.7. Executives and risk

Firm risk has also been studied extensively in relation to certain CEO and board chairman characteristics. Although different risk measures are not part of this paper's scope, since it solely focuses on firm financial performance measured by either ROA or Tobin's q , it is still worthwhile to examine the issue more closely since many of the same variables and characteristics are used in these studies as well and similarities can be drawn between the studies and their conclusions. For instance, Serfling (2014) examines the riskiness of corporate policies and CEO age and concludes that as CEOs get older, their risk-taking activities decrease significantly. This is also in line with the psychological aspect that as people get older, they become less willing to take risks since the gap between risk and reward, combined with the expected life-expectancy becomes too large (Deakin, Aitken, Robbins & Sahakian (2004)). The economic significance of his finding is of great magnitude since the models he constructed imply that as CEO age increases by 25%, it results into a decrease of nearly 5% in the volatility of the total stock returns. Simultaneously, idiosyncratic risk also decreases by around 4% on average. Although the results are statistically significant, there still remain issues and concerns on whether the results are robust. First of all, it could be some specific industry, which acts as the driving force behind the observed results. Secondly, the scenario could be that firms with high risk levels choose younger CEOs to manage the company. If this were the case, it is clear that it is not the age of the CEO driving the results but rather the firm itself. This strongly relates to the endogeneity problem that studies in this field face and have to resolve. Despite the concerns, Serfling (2014) finds the results to be robust by controlling for the factors causing the concerns in the first place.

Another study, which factors in the risk-taking of executives is that of Peltomäki, Swidler & Vähämaa (forthcoming). Thus far, they have achieved similar results to that of Serfling (2014) in that they also counter a negative relationship between CEO age and the volatility of stock returns, concluding that as age increases, the stock return volatility tends to decrease. This is also in line with previous literature indicating that people become more risk averse as they age and that might be factored into the decision-making processes on a corporate level as well. An interesting issue arises when the article tests whether there

are differences in firm riskiness based on the gender of the top executives (CEO and CFO). Systematic risk is reported to be substantially lower for firms where the CEO and CFO are female, whereas idiosyncratic risk is considerably higher for these kinds of firms. From this point of view, the study is yet to arrive to a solid conclusion on why this relationship exists in the first place. All in all, based on the results of the study by Peltomäki et al. (forthcoming), there seems to be an inherent effect on how the age and gender of a firm's top executives affect the volatilities of the companies' stock returns and overall idiosyncratic risk levels.

3.8. Endogeneity concerns

As mentioned earlier in the introduction of the paper, endogeneity is a major concern in many corporate governance related studies, which try to explain the effect different executive characteristics have on a firm's financial performance, for instance. Not only present in corporate governance related studies, but in econometric analysis in general, endogeneity is always a serious concern and can be described as having an endogenous explanatory variable in the model (Wooldridge 2013). This means that the independent variable on the right-hand side of the equation in a multiple regression model, such as the one explored in this study, is found to be correlated with the error term. Wooldridge (2013) gives three main reasons for this: measurement error, an omitted variable or simultaneity.

An article by Wintoki, Linck & Netter (2012) addresses the issue of endogeneity in corporate governance studies. More specifically, they try to decrease the problems with a generalized method of moments (GMM) model when investigating the effect that the composition of the board of directors has on firm performance. In relation to the serious concerns of endogeneity in corporate finance literature and research, Wintoki et al. (2012) argue that due to endogeneity, it is close to impossible to infer any reliable relationship between the measures. Ultimately, and in stark contrast to previous studies, by using the GMM model, the authors find no causal relationship between the composition of the board of directors and firm financial performance. A similar result is found by Schultz, Tan & Walsh (2010) as well. There is often simply no way of knowing with certainty that

the observed relationship and causality is correct, since it can very well be reversed (firm financial performance driving governance factors).

3.9. Conclusions on previous empirical evidence

The previous empirical evidence related to the field of CEO characteristics and firm financial performance is driven by a few main aspects. Firstly, the lack of women as CEOs indicates that when examining the relationships regarding gender, one has to be aware that large generalizations cannot be made. Secondly, although you could argue that some sort of unity is found within the subject, research results still sometimes deviate from another, which may be caused by different samples and time periods, for instance. Finally, the consistent problem of endogeneity is something that has to be considered upon examining the empirical results of the studies. Although there exist several possible methods of alleviating endogeneity concerns in academic literature, none of them can be proven to be completely accurate and correct in their methodology and how they interpret the results. The limitations related to endogeneity will be gone through later on in the paper in more detail.

3.10. Hypotheses development

Although previous studies in the field have received varying and mixed results, the null hypothesis can be formed on the basis of the research done before and following the lines of the research questions formed earlier in the paper.

H₀: During the sample period 2010-2016, CEO age, gender, salary, CEO/Chairman duality, experience and ownership have no impact on firm performance measured by ROA and Tobin's q.

In the case of rejecting the null hypothesis, additional hypotheses can be formed on the basis of previous empirical evidence on the six different characteristic measures to evaluate the relationship between CEO characteristics and firm performance more carefully.

Although the previous research regarding CEO age exhibits different results, on the basis of Peni (2014) and Waelchli & Zeller's (2013) findings, firm performance is expected to deteriorate with older CEOs.

H₁: CEO age is expected to have a negative impact on firm performance measured by ROA or Tobin's q.

Regarding CEO gender, previous empirical evidence is rather unambiguous as female CEOs are seen to improve firm performance in most studies. As mentioned earlier, Davydov et al. (2017) show how already at the private investor level, women are exhibiting higher portfolio performance with less risk, in comparison to men. Khan & Vieito (2013) apply the discussion in relation to CEOs and find similar results.

H₂: Female CEOs are expected to have a positive impact on firm performance measured by ROA or Tobin's q.

CEO experience measured by the amount of time the individual has acted in the position in the specific company is expected to act in a firm performance increasing way, since previous research shows that CEOs gain a significant amount of company-specific information and knowledge through their time as CEO, which can be used for the benefit of the company (Li & Patel, forthcoming & Peni 2014).

H₃: The amount of time the CEO has served in that position is expected to have a positive effect on firm performance measured by ROA or Tobin's q.

Following the results of Yang & Zhao (2014), the fact that the CEO also acts as the Chairman of the board is seen as a positive aspect in relation to firm performance since this allows the CEO to respond to urgent decisions quickly and be in control of the outcome.

H₄: The presence of CEO/Chairman duality is expected to have positive impact on firm performance measured by ROA or Tobin's q.

Based on Tan et al. (2001) and Lilienfeld-Toal & Ruenzi (2014), for instance, a larger ownership stake in the firm is expected to have a positive impact on firm financial performance. This is implied by the fact that the CEO him/herself has a large incentive to increase the performance as it often leads to gains in stock market returns as well.

H₅: The CEO's ownership of the firm is expected to have a positive impact on firm performance measured by ROA or Tobin's q.

Although Brick et al. (2006) find excess compensation to be negatively associated with firm financial performance, studies such as Jeppson et al. (2009) examine solely the effect of CEO compensation and firm performance and find no significant results between the variables.

H₆: The amount of compensation to the CEO is expected not to have a significant impact on firm performance measured by ROA or Tobin's q.

After forming the six hypotheses described above, they are to be examined and tested with the regression models to be introduced in the following sections of the paper.

Table 1. Prior empirical evidence.

Prior empirical evidence related to CEO/Board chairman characteristics and firm financial performance				
Paper	Sample	Period	Performance measure	Relationship
Mehran, H. (1995)	153	1979-1980	Tobin's Q & ROA	Tobin's Q and ROA positively related to equity-based compensation
Brick et al. (2006)	1441	1992-2001	Tobin's Q & ROA	Positive relation between CEO and director compensation Excess compensation associated with firm underperformance
Adams et al. (2009)	8253	1996-2003	Tobin's q & ROA	Females have an impact on board structure Better firm performance with female directors
Schultz et al. (2010)	973	2000-2007	Total return, Tobin's Q, ROA	No relation after GMM specification
Wintoki et al. (2012)	6000	1991-2003	Tobin's q & ROA	No causal relationship between board size/independence and firm performance
Waelchli, U. & Zeller, J. (2013)	9443	2007	ROA, ROE, NPM, ROEMP, Sales to assets	Negative relation between Chairman age and firm performance
Khan, W. & Vieito, J. (2013)	11315	1992-2004	Compensation, ROA, VOL	Female positive effect; females exhibit smaller risk
Serfling, M. (2014)	20973	1992-2010	Measures of risk	CEO age negatively related to risk
Peni, E. (2014)	1525	2006-2010	Tobin's q & ROA	Female positive effect / CEO age positively related to ROA Chairman age negatively to Tobin's q

4. DATA AND METHODOLOGY

The following section of the paper describes the data and methodological steps used in the study to achieve the results.

4.1. Sample description and descriptive statistics

The gathered data are retrieved from Compustat's ExecuComp and Datastream databases. The sample period of the research extends through 2010-2016 and the data consists of S&P500 companies as of 2017 and their respective CEOs from the period in question, with the additional requirement of the company having been on the index for the whole sample period between 2010-2016 in order for the dataset to be uniform. This means that companies which were components of the S&P500 index in 2017 but have been included or excluded between the sample period of 2010-2016 are removed from the final sample. Additionally, and in line with previous academic research, such as Peni (2014) and Serfling (2014), financial firms and institutions (SIC codes 6000-6999) are excluded from the sample because of their special features. S&P500 firms were chosen as the subject of the study because they represent such an extensive overlook of stock markets as a whole, representing around 80% of the US stock market, which is the largest stock market in the world. The extensive information accessible through databases of S&P500 companies and their CEOs is also unmatched by any other similar index or overall stock market around the world. Overall, the study and its final sample comprise of an unbalanced panel of 291 individual companies, after excluding 105 financial firms and 102 firms that were either excluded or included to the S&P500 index during the sample period. The number of individual CEOs for the sample period is 482, finally amounting to a total of 2036 observations for each individual variable.

The descriptive statistics are presented below in table 2. As already mentioned earlier in the paper, the study includes 291 individual companies and 482 individual CEOs, amounting to 2036 observations per variable across 7 years. The average market valuation of a company within the sample is USD 38 billion with around 58000 employees. Average

total assets of the sample firms are slightly under USD 34 billion. It is already clear from this that sample firms are relatively large in size. The leverage figure tends to be around 60%. Regarding ROA, the average is ~7%, which means the firms have done rather well on average during the sample period. Still, there is a large difference between the highest and lowest values, ranging from 22,5% on the positive side to -12,2% on the negative side. As to the firm valuation measure Tobin's q , the average is 1,51, meaning that the companies tend to be overvalued since Tobin's $q > 1$. The three-year annual sales growth rate of the sample firms is on average slightly less than 5% with minimum values being highly negative and the highest value over 38%.

In relation to the individual CEOs, the average age is around 57 years with nearly 7 years of experience being the CEO. There is also a significant difference in the number of male and female CEOs, since male CEOs make up for 96% of the sample. In line with previous research, such as Yang & Zhao (2014), CEO/Chairman duality is also noted to be high, around 60%. On average, the sample CEOs own slightly less than 1% of the total outstanding shares of the company, excluding options. There are large differences in share ownership since some CEOs do not own company stock at all, whereas few CEOs own around 20% of the outstanding shares. In the exceptionally high cases of share ownership, the CEO tends to be the founder of the company as well. Examples of this being Amazon and Oracle, for instance. The mean base salary for the examined individuals during the sample period is roughly around 1,17 MUSD.

Table 2. Descriptive statistics for each variable for the sample period 2010-2016.

Descriptive statistics							
	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
3_YRA_SG	0,048	0,038	0,380	-0,253	0,101	0,427	4,838
ASSETS	23,558	23,487	26,527	21,367	1,135	0,320	2,608
AGE	57,067	57,000	74,000	43,000	5,996	0,095	3,022
CEODUAL	0,601	1,000	1,000	0,000	0,490	-0,413	1,171
CEOEXP	6,746	5,000	34,000	0,000	6,056	1,773	7,380
GENDER	0,961	1,000	1,000	0,000	0,193	-4,776	23,813
EMPL	58708	25486	431513	1017	84325	2,570	9,794
LEV	0,597	0,600	1,165	0,167	0,182	0,229	3,411
MKTVAL	23,734	23,5497	26,527	21,902	1,032	0,685	2,952
%SHARES	0,007	0,001	0,183	0,000	0,026	5,169	30,959
R&D	0,037	0,009	0,266	0,000	0,060	2,034	6,529
ROA	0,070	0,066	0,225	-0,122	0,056	0,011	4,450
SALARY	1178250	1128372	3471334	1	464918	1,632	10,085
TOBIN'S Q	1,505	1,202	5,356	0,246	1,062	1,433	4,976

n = 2036 observations

The table reports descriptive statistics for the whole sample of yearly observations from 2010-2016 of S&P500 companies. SIC codes 6000-6999 (financial institutions) are excluded from the sample, as well as companies that have been included/excluded from the index within the sample period. In addition, all variables are winsorized at the 1% and 99%. The variables are defined as follows: 3_YRA_SG is the 3-year annual sales growth rate for the company, ASSETS represents the natural logarithm of total assets for the firm, AGE is the CEO's age in year t, CEODUAL signifies that the CEO is both the CEO and Chairman of the board, CEOEXP is the amount of time the CEO has been the CEO, GENDER is either male or female, EMPL signifies the total amount of employees a firm has, LEVERAGE represents the % amount of total liabilities/total assets, MKTVAL is the natural logarithm of total end-of-year market capitalization of the company, %SHARES is the percentage of total shares the CEO owns in the company, R&D measures research and development expenses to sales, ROA is the dependent variable measuring firm profitability (net income/total assets), salary is the dollar denominated value of the CEO's base salary for the fiscal year and TOBIN'S Q is the dependent variable measuring firm value (total market value of firm/total asset value).

4.2. Data diagnostics

In order to achieve reliable results, the used variables are winsorized at the 1 and 99 percentiles to limit the possibility of outliers affecting the results of the regression models. In addition to winsorizing the outliers of the data set, two additional tests are computed to examine whether there is correlation among the independent variables of the regressions (multicollinearity) and to choose whether a fixed or random effects model is appropriate in regard to the cross-sectional (firm-fixed) effects.

4.2.1. Test of multicollinearity

Multicollinearity is a problem multiple regression models can face and Wooldridge (2013) describes it as “correlation among the independent variables”. In order to test for the presence of multicollinearity, the Variance Inflation Factor (VIF) is used. The results are presented below. Following O’Brien (2007) and Salmerón, García & García (2018), a threshold level of VIF below 10 is acceptable and indicates that high levels of multicollinearity are not present in the study. As can be seen from table 3 below, all variables show values far below the threshold value of 10, which indicates that multicollinearity is not present in such form that it would bias the results to a significant extent. The greatest VIF-factor is observed for CEOEXP (CEO experience) with slightly over 1,6.

Table 3. Test for multicollinearity using the Variance Inflation Factor (VIF).

Multicollinearity tests using the Variance Inflation Factor (VIF)

Variable	ROA		TOBIN'S Q	
	Coefficient variance	Centered VIF	Coefficient variance	Centered VIF
C	0,001	N/A	0,283	N/A
<i>Characteristic variables</i>				
AGE	5,87E-08	1,337	1,67E-05	1,337
GENDER	4,65E-05	1,031	0,013	1,031
CEOEXP	7,28E-08	1,686	2,07E-05	1,686
CEODUAL	7,68E-06	1,151	0,002	1,151
%SHARESOWNED	0,003	1,413	0,891	1,413
SALARY	9,72E-18	1,326	2,76E-15	1,326
<i>Control variables</i>				
3_YRA_SG	0,000	1,097	0,051	1,097
ASSETS	1,53E-06	1,244	0,000	1,244
LEVERAGE	5,99E-05	1,217	0,017	1,217
R&D	0,001	1,155	0,148	1,155

4.2.2. Fixed effects testing

Period-fixed effects are always to be included in the regression models of similar research, but in order to choose between fixed or random effects at the cross-sectional level, the Hausman (1978) test is performed. It tests the fixed effects estimates and their joint significance in a least squares regression. By running the models with fixed and random firm effects and comparing the significance of the coefficient, the appropriate specification can be chosen to fit the regression. As Wooldridge (2013) explains, when the interest is in a time-varying variable, the use of a fixed-effect model is most of the time proven to be the correct method.

According to the Hausman test below, the null hypothesis of the random effects model to be suitable is rejected ($p < 0,05$) in both occasions and thus, a fixed-effect approach is utilized in regard to the cross-sections as well.

Table 4. Hausman test.

Correlated Random Effects - Hausman Test			
Test cross-section random effects			
<u>Dependent variable: Tobin's Q</u>			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	46,426	10	0,0000
<u>Dependent variable: ROA</u>			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	42,456	10	0,0000

4.3. Regression variables and their description

As the main dependent variables, the study uses return on assets (ROA) as the variable indicating profitability, and Tobin's q, which is a variable focused on explaining firm value. The decision for choosing these is based on previous studies in the field, such as Peni (2014), Mehran (1995), Adams & Ferreira (2009) and other corporate governance related studies. The CEO characteristics acting as independent variables are age, gender, salary, CEO/Chairman duality, experience and firm ownership. Age is simply the age of the CEO during the fiscal year and gender is a binary variable which equals 1 for male and 0 for female. Salary is measured as the dollar denominated value of the CEO's base salary for the fiscal year in question. CEO/Chairman duality signifies whether the CEO is also the Chairman of the board of directors of the company (1=yes, 0=no). CEO experience is measured as the amount of years the CEO has been in that post in the firm, and finally firm ownership is measured as a percentage of the total outstanding shares owned by the CEO, excluding options.

Control variables that are used here are also based on and proven to be useful in earlier studies, such as the ones already mentioned earlier in the paragraph and additionally also in Bebchuk et al. (2009). The control variables include factors representing firm sales growth, leverage, R&D costs and overall firm size. The variable representing firm sales growth is the three-year annual sales growth in percentages. Leverage is calculated from the balance sheet as total liabilities divided by total assets, and it is defined as a percentage. R&D costs to sales is a measure indicating the R&D expenditures, and overall firm size is measured by the natural logarithm of total assets, an item also found from the balance sheet of each company.

4.4. Regression models

The regression models are constructed to capture the effect that the different examined independent variables possibly have on firm financial performance. The baseline regression model often used in the previous literature is the following (Peni 2014, Elsayed 2007):

$$PERFORMANCE = \beta_0 + \beta(CHARACTERISTICS) + \gamma(CONTROLS) + \epsilon$$

Continuing from here and based on evidence gathered from previous studies in the field, such as Brick et al. (2006), the right-hand-side variables in all specified equations to come are lagged by one period to reduce the concerns that endogeneity causes. The firm performance measurement variables are also added to the equations below, as well as a more detailed description of the independent variables used, including the control variables. SIC industry-groups and years are also controlled for in the model specifications. In accordance with Peni (2014), the independent CEO characteristic variables signify demographic features, such as age and gender and educational/career features such as experience and CEO/chairman duality. In addition to these, monetary measures of share ownership and salary are included as well.

Each of the three mentioned features of two characteristics are examined first independently with the control variables, before employing all variables in the same

regression. The following models are thus estimated to capture the differences in the characteristics and their effect on firm financial performance:

$$\begin{aligned}
 (1, 2) \text{ } ROA_{i,t} \text{ or } TOBIN'S Q_{i,t} & \\
 &= \beta_0 + \beta_1 AGE_{i,t-1} + \beta_2 GENDER_{i,t-1} + \beta_3 3_YRA_SG_{i,t-1} \\
 &+ \beta_4 ASSETS_{i,t-1} + \beta_5 LEVERAGE_{i,t-1} + \beta_6 R\&D_{i,t-1} + \sum_{k=1}^{n-1} \alpha_k SIC_i^k \\
 &+ \sum_{y=2010}^{2016} \varpi_y YEAR_i^y + \varepsilon_{i,t}
 \end{aligned}$$

$$\begin{aligned}
 (3, 4) \text{ } ROA_{i,t} \text{ or } TOBIN'S Q_{i,t} & \\
 &= \beta_0 + \beta_1 CEOEXP_{i,t-1} + \beta_2 CEODUAL_{i,t-1} + \beta_3 3_YRA_SG_{i,t-1} \\
 &+ \beta_4 ASSETS_{i,t-1} + \beta_5 LEVERAGE_{i,t-1} + \beta_6 R\&D_{i,t-1} + \sum_{k=1}^{n-1} \alpha_k SIC_i^k \\
 &+ \sum_{y=2010}^{2016} \varpi_y YEAR_i^y + \varepsilon_{i,t}
 \end{aligned}$$

$$\begin{aligned}
 (5, 6) \text{ } ROA_{i,t} \text{ or } TOBIN'S Q_{i,t} & \\
 &= \beta_0 + \beta_1 \%SHARESOWNED_{i,t-1} + \beta_2 SALARY_{i,t-1} \\
 &+ \beta_3 3_YRA_SG_{i,t-1} + \beta_4 ASSETS_{i,t-1} + \beta_5 LEVERAGE_{i,t-1} \\
 &+ \beta_6 R\&D_{i,t-1} + \sum_{k=1}^{n-1} \alpha_k SIC_i^k + \sum_{y=2010}^{2016} \varpi_y YEAR_i^y + \varepsilon_{i,t}
 \end{aligned}$$

After these have been estimated, the effects of all six independent variables and the respective controls are examined in the following manner in models 7 and 8:

(7, 8) $ROA_{i,t}$ or $TOBIN'S Q_{i,t}$

$$\begin{aligned}
&= \beta_0 + \beta_1 AGE_{i,t-1} + \beta_2 GENDER_{i,t-1} + \beta_3 CEOEXP_{i,t-1} \\
&+ \beta_4 CEODUAL_{i,t-1} + \beta_5 \%SHARESOWNED_{i,t-1} + \beta_6 SALARY_{i,t-1} \\
&+ \beta_7 3_YRA_SG_{i,t-1} + \beta_8 ASSETS_{i,t-1} + \beta_9 LEVERAGE_{i,t-1} \\
&+ \beta_{10} R\&D_{i,t-1} + \sum_{k=1}^{n-1} \alpha_k SIC_i^k + \sum_{y=2010}^{2016} \varpi_y YEAR_i^y + \varepsilon_{i,t}
\end{aligned}$$

Models 9 and 10 are otherwise similar to the prior model, except for the fact that instead of firm fixed-effects, industry fixed-effects are employed to examine the differences on the industry level and how that affects the results of the models.

Models 11 and 12 include all six examined independent variables, with the difference being to previous models that age has now been divided into quantiles of the highest and lowest 25% of values, in order to further investigate whether there are differences in regard to performance in old CEOs and young CEOs.

(11, 12) $ROA_{i,t}$ OR $TOBIN'S Q_{i,t}$

$$\begin{aligned}
&= \beta_0 + \beta_1 AGE(high25\%)_{i,t-1} + \beta_2 AGE(low25\%)_{i,t-1} \\
&+ \beta_3 GENDER_{i,t-1} + \beta_4 CEOEXP_{i,t-1} + \beta_5 CEODUAL_{i,t-1} \\
&+ \beta_6 \%SHARESOWNED_{i,t-1} + \beta_7 SALARY_{i,t-1} + \beta_8 3_YRA_SG_{i,t-1} \\
&+ \beta_9 ASSETS_{i,t-1} + \beta_{10} LEVERAGE_{i,t-1} + \beta_{11} R\&D_{i,t-1} + \sum_{k=1}^{n-1} \alpha_k SIC_i^k \\
&+ \sum_{y=2010}^{2016} \varpi_y YEAR_i^y + \varepsilon_{i,t}
\end{aligned}$$

Again, in models 13 and 14, industry fixed-effects are used instead of firm fixed-effects in regard to examining the differences in the high and low quantiles of CEO age.

5. EMPIRICAL RESULTS

The following chapter examines the results of the study. Firstly, the correlation matrix is presented and thereafter the focus is put on examining the actual results. Before the regression results are presented, univariate tests are introduced to further understand if there are differences between mean values of certain groups within the sample.

5.1. Correlation matrix

As can be seen from the correlation matrix in table 5 below, the individual variables tend not to be highly correlated with one another, which means that strong multicollinearity should not be a problem, as was proven with the variance inflation factor results earlier in the chapter. Of course, a few exceptions should be noted to be correlated with each other rather significantly. Firstly, the dependent variables ROA and Tobin's q have a positive correlation of 0,6553, which is logical and will not cause problems since the variables are used as dependent variables in different models. In addition, assets and market value are highly correlated, hence only assets is used as a control variable in depicting firm size. This is also in accordance with previous research from the field. In general, different firm financial performance indicators seem to be more highly correlated with one another than that of CEO characteristics, which is reasonable since often a change in a financial indicator has an effect elsewhere as well. All in all, it can be said that the correlations are not troubling, when examining them from the point of view of multicollinearity.

Table 5. Correlation matrix.

Correlation matrix														
Correlation	3_YRA_SG	ASSETS	AGE	CEODUAL	CEOEXP	GENDER	EMPL	LEV	MKTVAL	%SHARES	R&D	ROA	SALARY	TOBIN'S Q
3_YRA_SG	1,0000													
ASSETS	-0,0921	1,0000												
AGE	-0,0547	0,0856	1,0000											
CEODUAL	-0,0651	0,1432	0,2509	1,0000										
CEOEXP	0,1473	-0,0554	0,4259	0,2022	1,0000									
GENDER	0,0274	-0,1088	0,0252	-0,0286	0,1071	1,0000								
EMPL	-0,0288	0,4289	0,0996	0,1241	0,0488	-0,1584	1,0000							
LEV	-0,2075	0,1688	0,0520	0,1571	-0,0601	-0,0779	0,1550	1,0000						
MKTVAL	0,0534	0,7988	0,0630	0,1272	0,0129	-0,1063	0,4972	0,0168	1,0000					
%SHARES	0,1248	0,0144	0,2318	0,0486	0,5071	0,0519	0,1040	-0,0626	0,0860	1,0000				
R&D	0,1445	-0,0420	-0,1516	-0,1809	-0,0164	0,0589	-0,1382	-0,2991	0,1793	0,0113	1,0000			
ROA	0,2033	-0,2736	0,0101	-0,0097	0,0384	-0,0197	0,1079	-0,1882	0,1546	0,0036	0,1437	1,0000		
SALARY	-0,1689	0,4020	0,2011	0,1989	0,0230	-0,0388	0,1792	0,2249	0,3501	-0,1192	-0,1090	-0,0310	1,0000	
TOBIN'S Q	0,2603	-0,4324	-0,0667	-0,0718	0,1115	-0,0025	0,0113	-0,2093	0,1415	0,1015	0,2990	0,6553	-0,1682	1,0000

The table reports the correlation matrix for the whole sample of yearly observations from 2010-2016 of S&P500 companies. SIC codes 6000-6999 (financial institutions) are excluded from the sample, as well as companies that have been included/excluded from the index within the sample period. In addition, all variables are winsorized at the 1% and 99%. The variables are defined as follows: 3_YRA_SG is the 3-year annual sales growth rate for the company, ASSETS represents the natural logarithm of total assets for the firm, AGE is the CEO's age in year t, CEODUAL signifies that the CEO is both the CEO and Chairman of the board, CEOEXP is the amount of time the CEO has been the CEO, GENDER is either male or female, EMPL signifies the total amount of employees a firm has, LEVERAGE represents the % amount of total liabilities/total assets, MKTVAL is the natural logarithm of total end-of-year market capitalization of the company, %SHARES is the percentage of total shares the CEO owns in the company, R&D measures research and development expenses to sales, ROA is the dependent variable measuring firm profitability (net income/total assets), salary is the dollar denominated value of the CEO's base salary for the fiscal year and TOBIN'S Q is the dependent variable measuring firm value (total market value of firm/total asset value).

5.2. Univariate analysis

Before examining the actual regression results, we look at the univariate analysis performed. Many noticeable and interesting differences between groups within the sample can be noticed in the univariate setting below in table 6. Firstly, the sample CEOs are split into two groups based on gender: male and female. In addition to this split, CEOs are also split according to their age where young CEOs are the lowest quartile (25%) of the sample and the oldest are the highest quartile (25%) of the sample. The two different subsets are examined in relation to the other variables of the study.

Overall, the univariate analysis shows that female-led companies within the sample are significantly larger, measured by the total assets of the firm. Regarding firm financial performance measures, companies led by female CEOs have a higher ROA and Tobin's q within the sample period and its companies, although the differences between the means are not statistically significant. Leverage also tends to be higher within companies with a female CEO, with the difference between means also being statistically significant. On the other hand, firms with male CEOs have over 1% higher sales growth rates and they also invest more on research & development, as indicated by the table below. Male CEOs also tend to be slightly older and more experienced than their female counterparts. CEO/Chairman duality is found to be more persistent within female-led companies. Base salaries are slightly higher for female CEOs, whereas the ownership of company stock is around 1% higher on average for male CEOs than female CEOs. Regarding the differences between these two groups, we must acknowledge the fact that, as mentioned earlier, female CEOs only account for roughly around 4% of the sample CEOs, which means that large generalizations cannot be made based on the sample alone.

In addition to dividing the CEOs by gender, the sample is also divided into the lowest and highest 25% of values based on age to examine the differences between these two individual groups of young and old CEOs. Regarding the firm performance measure ROA, there is no major difference between the two groups. When looking at Tobin's q , on the other hand, we notice a significant difference where companies led by younger CEOs exhibit higher firm valuation. Also, sales growth rates seem to be higher for companies

with younger CEOs, whereas companies with older CEOs tend to be more heavily leveraged and larger when measuring size with total assets of the firm. Young CEOs also seem to be more heavily invested into R&D, since the difference is statistically significant and nearly 2,5% larger for young CEOs. An interesting dynamic between a change in culture can be found when examining the CEO/Chairman duality between the two groups of young and old CEOs. It is over 30% more prominent that the CEO and Chairman of the board are the same person in companies led by old CEOs. Naturally, older CEOs are far more experienced on average and also earn more as their base salary is around \$250000 more than their younger counterparts. They also own a larger portion of the outstanding shares of the company on average.

Table 6. Univariate analysis within the sample.

Univariate analysis			
Comparison of mean values			
	MALE CEO	FEMALE CEO	Difference
ROA	7,01 %	7,58 %	-0,006
TOBIN'S Q	1,50	1,52	-0,014
LEVERAGE	59,00 %	66,77 %	-0,08***
SALES GROWTH	4,82 %	3,38 %	0,014
ASSETS \$B	33,10	49,30	-16,2***
R&D	3,78 %	1,96 %	0,018***
CEO/CHAIRMAN DUALITY	59,83 %	67,09 %	-0,073
SALARY \$M	1,17	1,27	-0,1*
AGE	57,10	56,32	0,78
EXPERIENCE	6,88	3,52	3,36***
SHARES OWNED	0,77 %	0,07 %	0,01**
	YOUNG CEOS	OLD CEOS	Difference
ROA	6,95 %	6,99 %	-0,0004
TOBIN'S Q	1,65	1,47	0,18***
LEVERAGE	56,90 %	58,11 %	-0,0121
SALES GROWTH	6,07 %	4,94 %	0,0113**
ASSETS (\$B)	25,40	35,60	-10,2***
R&D	5,32 %	3,02 %	0,023***
CEO/CHAIRMAN DUALITY	40,64 %	72,17 %	-0,3153***
SALARY	1,01	1,26	-0,256*
AGE	49,12	64,93	-15,805***
EXPERIENCE	4,52	10,68	-6,159***
SHARES OWNED	0,65 %	1,67 %	-0,0102***

***, ** and * indicate statistical significance at the 1%, 5% and 10% level.

5.3. CEO characteristics and firm performance

This chapter and the following subchapters focus on the actual regression results of the study in relation to each individual characteristic variable. The main results are reported in tables 7 and 8.

5.3.1. CEO age

By examining the results from the models with the firm profitability measure ROA as the dependent variable, we notice that in the model specifications used in the study, there seems to be no significant relationship between CEO age and ROA. Regarding the results in relation to the firm value measure Tobin's q, mixed results are reported. Whereas age seems to have a statistically significant positive effect on the valuation of the firm when only examining the set of two demographic variables in connection to the control variables, a negative and highly statistically significant effect of CEO age on Tobin's q is reported in model 10 where industry fixed-effects are utilized instead of firm fixed-effects. The results mean that when controlling for industry, a significant difference can be noted in the relationship between the variables.

In addition to the main regressions, tables 9 and 10 report the results for models 11-14, in which the CEO age variable is split into high and low quartiles in order to examine the impact on the extreme ends of the sample. Interestingly, the lowest quartile signifying the 25% youngest CEOs exhibit a much more pronounced and significantly negative effect on both firm performance measures ROA and Tobin's q. Meaning that the youngest CEOs are associated with significantly lower firm performance, in comparison to older ones. This finding is interesting, since it seems to possibly have some relation to the experience the respective CEOs have serving in their current position as the top executive of the company, as will be indicated later on when going over the results based on the CEO experience variable.

Regarding the specific hypothesis related to CEO age, we cannot confirm the hypothesis that an increase in the age of the CEO results in a decrease in firm financial performance measured by ROA or Tobin's q since the results are rather mixed.

5.3.2. CEO gender

As both tables 7 and 8 depict, the gender dummy is found to be statistically significant and negative in all of the models where it is employed in regard to ROA. In the models with Tobin's q as the dependent variable, the gender dummy is still negative but significantly so only in model 10. The results indicate that companies that have women as CEOs tend to perform better than companies with male CEOs. Since female CEOs only account for around 4% of all the CEOs within the sample of the study, large generalizations cannot be made but still previous research done, such as Peni (2014), find similar results. The fundamental reasons behind female CEOs outperforming their male counterparts can be difficult to establish but Eagly & Carli (2003) explain it through women having to prove more and exhibit more talent throughout their careers to achieve high positions in a company since there still exists prejudice towards female CEOs. Based on the previously mentioned, those women who do become CEOs are more talented and have a larger skill-set to drive firm performance in a prosperous direction.

Contrary to the first hypothesis of the study, the second one of female CEOs having a positive effect on firm performance is accepted. Results regarding this hypothesis are also rather robust, since a large majority of the models where CEO gender is employed yields a significant and negative outcome.

5.3.3. CEO experience

Continuing the analysis on the educational and career related characteristics, we note that experience, measured by how long the CEO has held that position in the company, is positively related to firm performance measured by both ROA and Tobin's q. For the models with ROA as the dependent variable, CEO experience is only statistically significant in model 9 with industry fixed-effects in addition to period fixed-effects, whereas

for the models in regard to Tobin's q , CEO experience is statistically significant in all models where the respective variable is employed. The results are similar to that of Peni (2014) and are explained through the fact that as CEOs gain more experience from the firm they are leading and managing, they also achieve a substantial amount of firm-specific knowledge which can be utilized in order to improve firm financial performance. As mentioned earlier, results regarding CEO age were rather mixed, which tells us that the financial performance of the firm does not necessarily improve with more general life experience the CEO has, the question is more about how experienced the CEO is in the current position in the current company. The results are also backed by research done by Li & Patel (forthcoming) where they find that, in regard to generalist CEOs, a longer CEO tenure is associated with less of a negative effect on firm performance than if the CEO has recently started in the position.

In relation to the third hypothesis of CEO experience affecting firm financial performance positively, we can clearly accept the initial hypothesis as it is shown that the amount of time the CEO has held the position in the company seems to influence financial performance in a positive manner.

Table 7. Regression results for models with ROA as the dependent variable.

Dependent variable	(1) ROA	(3) ROA	(5) ROA	(7) ROA	(9) ROA
C	0,879*** (13,818)	0,869*** (13,210)	0,87*** (13,267)	0,88*** (13,205)	0,37*** (11,397)
<i>Characteristic variables</i>					
<i>Demographic</i>					
AGE	0,0002 (0,784)			-0,0001 (-0,52)	0,0002 (1,255)
GENDER	-0,017** (-2,458)			-0,018** (-2,49)	-0,014*** (-5,111)
<i>Educational/career</i>					
CEOEXP		0,0002 (0,476)		0,001 (1,159)	0,0004** (2,36)
CEODUAL		0,005*** (2,814)		0,004** (2,392)	0,003* (1,764)
<i>Monetary</i>					
%SHARESOWNED			-0,05 (-0,756)	-0,166*** (-3,081)	-0,142*** (-2,713)
SALARY			0,000 (-0,172)	0,000* (-1,837)	0,000*** (4,073)
<i>Control variables</i>					
3_YRA_SG	0,075*** (4,154)	0,074*** (4,019)	0,076*** (3,986)	0,074*** (4,093)	0,029*** (2,62)
ASSETS	-0,035*** (-12,188)	-0,035*** (-12,303)	-0,035*** (-12,132)	-0,034*** (-11,773)	-0,012*** (-15,442)
LEVERAGE	0,024 (0,819)	0,023 (0,774)	0,023 (0,784)	0,024 (0,805)	-0,036*** (-4,015)
R&D	-0,076 (-0,701)	-0,082 (-0,766)	-0,088 (-0,809)	-0,084 (-0,787)	0,03* (1,906)
Period fixed-effects	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	No
Industry fixed-effects	No	No	No	No	Yes
Adjusted R-squared	0,66	0,66	0,66	0,66	0,25
n	1745	1745	1745	1745	1745

The t-statistic is reported in parentheses.

***, ** and * indicate statistical significance at the 1%, 5% and 10% level.

White heteroskedasticity-consistent standard errors and covariance.

Table 8. Regression results for models with Tobin's q as the dependent variable.

Dependent variable	(2) TOBIN'S Q	(4) TOBIN'S Q	(6) TOBIN'S Q	(8) TOBIN'S Q	(10) TOBIN'S Q
C	12,313*** (4,99)	12,413*** (5,298)	12,523*** (5,388)	12,574*** (5,283)	11,332*** (31,553)
<i>Characteristic variables</i>					
<i>Demographic</i>					
AGE	0,006* (1,911)			0,000 (0,016)	-0,007*** (-4,400)
GENDER	-0,137 (-1,208)			-0,159 (-1,529)	-0,297*** (-4,86)
<i>Educational/career</i>					
CEOEXP		0,006* (1,73)		0,008** (2,184)	0,006** (2,156)
CEODUAL		0,038 (1,266)		0,031 (1,006)	0,135*** (4,52)
<i>Monetary</i>					
%SHARESOWNED			0,731 (0,547)	-0,914 (-0,553)	1,465*** (3,11)
SALARY			0,000 (1,036)	0,000 (0,306)	0,000*** (4,163)
<i>Control variables</i>					
3_YRA_SG	0,441*** (2,685)	0,44** (2,508)	0,462*** (2,628)	0,442** (2,488)	1,336*** (16,787)
ASSETS	-0,477*** (-4,895)	-0,475*** (-4,916)	-0,481*** (-4,991)	-0,477*** (-4,856)	-0,379*** (-29,17)
LEVERAGE	0,003 (0,015)	-0,006 (-0,035)	0,003 (0,014)	0,004 (0,023)	-0,552*** (-3,75)
R&D	5,46*** (4,398)	5,407*** (4,623)	5,427*** (4,393)	5,48*** (4,36)	3,772*** (8,909)
Period fixed-effects	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	No
Industry fixed-effects	No	No	No	No	Yes
Adjusted R-squared	0,87	0,87	0,87	0,87	0,41
n	1745	1745	1745	1745	1745

The t-statistic is reported in parentheses.

***, ** and * indicate statistical significance at the 1%, 5% and 10% level.

White heteroskedasticity-consistent standard errors and covariance.

Table 9. Regression results with ROA as the dependent variable and where AGE is divided into high/low quartiles.

Dependent variable	(11) ROA	(13) ROA
C	0,874*** (13,030)	0,387*** (16,607)
<i>Characteristic variables</i>		
<i>Demographic</i>		
AGE (high 25%)	0,001 (0,402)	-0,001 (-0,438)
AGE (low 25%)	-0,009*** (-3,761)	-0,01*** (-3,06)
GENDER	-0,017** (-2,435)	-0,012*** (-4,407)
<i>Educational/career</i>		
CEOEXP	0,0002 (0,463)	0,0004** (2,484)
CEODUAL	0,004** (2,261)	0,002 (1,413)
<i>Monetary</i>		
%SHARESOWNED	-0,135** (-2,507)	-0,128** (-2,44)
SALARY	0,000*** (-2,874)	0,000*** (3,89)
<i>Control variables</i>		
3_YRA_SG	0,071*** (3,901)	0,03*** (2,71)
ASSETS	-0,034*** (-11,837)	-0,012*** (-16,03)
LEVERAGE	0,022 (0,748)	-0,036*** (-3,916)
R&D	-0,085 (-0,82)	0,033** (2,191)
Period fixed-effects	Yes	Yes
Firm fixed-effects	Yes	No
Industry fixed-effects	No	Yes
Adjusted R-squared	0,66	0,25
n	1745	1745

The t-statistic is reported in parentheses.

***, ** and * indicate statistical significance at the 1%, 5% and 10% level.

White heteroskedasticity-consistent standard errors and covariance.

Table 10. Regression results with Tobin's q as the dependent variable and where AGE is divided into high/low quartiles.

Dependent variable	(12) TOBIN'S Q	(14) TOBIN'S Q
C	12,53*** (5,454)	11,031*** (43,01)
<i>Characteristic variables</i>		
<i>Demographic</i>		
AGE (high 25%)	-0,031 (-1,346)	-0,102*** (-4,052)
AGE (low 25%)	-0,141*** (-7,007)	-0,059** (-2,067)
GENDER	-0,136 (-1,362)	-0,277*** (-4,366)
<i>Educational/career</i>		
CEOEXP	0,006 (1,603)	0,004 (1,461)
CEODUAL	0,03 (0,986)	0,126*** (4,284)
<i>Monetary</i>		
%SHARESOWNED	-0,518 (-0,334)	1,523*** (3,02)
SALARY	0,000 (0,055)	0,000*** (3,714)
<i>Control variables</i>		
3_YRA_SG	0,404** (2,379)	1,369*** (16,719)
ASSETS	-0,472*** (-5,115)	-0,381*** (-31,472)
LEVERAGE	-0,022 (-0,131)	-0,561*** (-3,787)
R&D	5,478*** (4,301)	3,841*** (9,14)
Period fixed-effects	Yes	Yes
Firm fixed-effects	Yes	No
Industry fixed-effects	No	Yes
Adjusted R-squared	0,87	0,41
n	1745	1745

The t-statistic is reported in parentheses.

***, ** and * indicate statistical significance at the 1%, 5% and 10% level.

White heteroskedasticity-consistent standard errors and covariance.

5.3.4. CEO/Chairman duality

As can be seen from tables 7 and 8, the presence of CEO/Chairman duality affects firm performance positively. In the regressions where the dependent variable is the firm profitability measure ROA, all models that employ the duality variable are statistically significant. For the Tobin's q regressions, only the last model with period -and industry fixed-effects shows statistical significance within the conventional thresholds. The results being in line with previous research, such as Yang & Zhao (2014) and Peni (2014), the reason for the positive effect of CEO/Chairman duality in the majority of the models examined can be explained by the fact that when a CEO is also the Chairman of the board, it offers a unique opportunity to develop the firm in a positive, value and profitability enhancing way. The results also give more evidence to the fact that when the question is about multiple inside directorships within the same company, there seems to be a positive association with firm financial performance. As opposed to holding multiple outside directorships, which is documented to lead to worse firm performance resulting from the fact that the executives are too busy and do not have enough time to delve into the issues at hand in the respective companies properly (Ahn et al. 2010).

Noticeable from the regressions in tables 7 and 8 is also the fact that CEO/Chairman duality seems to have a more profound impact on Tobin's q, since the coefficient is significantly larger in comparison to the coefficient in the regressions where ROA is the dependent variable. The reason for this might be the fact that CEO/Chairman duality can rather be seen more of as a value enhancing driver, than a profitability increasing measure.

Regarding the characteristic of CEO/Chairman duality, the fourth hypothesis can also be accepted, especially in regard to the firm profitability measure ROA, since all main models from table 7 confirm the initial hypothesis of CEO/Chairman duality influencing firm financial performance in a positive way.

5.3.5. CEO firm ownership

The results regarding CEO ownership in the firm are mixed. In relation to ROA, ownership has a statistically significant negative relationship in two of the three models examined, meaning that a higher level of CEO firm ownership of the outstanding shares in the company is associated with lower profitability measured by ROA. On the other hand, the regressions with Tobin's q as the dependent variable show a positive association between the variables in the model where industry fixed-effects are utilized instead of cross-sectional firm fixed-effects. The other two models yield statistically insignificant results in connection with CEO firm ownership. As Tong (2008) argues, a deviation from the optimal CEO firm ownership level can be associated with lower firm performance, whether the deviation is on either side of the optimal level. Analysis similar to that of Griffith (1999), where he examines different threshold levels (0, 15%, 15-50%) of CEO ownership in a firm and how that affects firm performance is not reasonable to conduct in this study since there are only very few CEOs in the sample who own more than 15% of the outstanding shares of the company.

The fifth hypothesis of the thesis states that CEO firm ownership is expected to have a positive effect on the financial performance of the firm. This can be attributed to the fact that a CEO owning a portion of the company is motivated to increase the financial performance of the firm since that also results in stock market gains for the CEO him-/herself. Regardless of the previously mentioned and based on the results, the hypothesis cannot be accepted since the majority of the models employed show a negative effect on firm performance.

5.3.6. CEO salary

Although CEO compensation, measured as the base salary, seems to have some statistically significant effect on firm performance proxied both by ROA and Tobin's q , the magnitude of the effect is small, indicating that the compensation received by the CEOs of the sample does not seem to have an economically significant effect on firm performance measured either by ROA or Tobin's q .

The final hypothesis of the paper stating that the salary of the CEO is expected not to yield significant results in relation to the two firm performance measures, ROA and Tobin's q, cannot be fully accepted. The majority of the models show statistically significant results, although the coefficients of the variable are very small, to the extent that the results do not have much economic significance.

5.4. Tests for robustness

As mentioned earlier, financial firms operating with SIC codes 6000-6999 are excluded already from the original sample. As an additional robustness test, and similar to Peni (2014), utilities (SIC codes 4000-4999) are also excluded since it has been shown that they are subject to unique regulation which could drive the results. The results are shown for the same main regression models in tables 11 and 12 below. As can be seen from the tables, there are no significant differences between the models employing utilities firms and the ones excluding them, indicating that utilities firms are not driving the results of the study.

Table 11. Robustness test for ROA regressions, where also utilities (SIC codes 4000-4999) are excluded.

Dependent variable	(1) ROA	(3) ROA	(5) ROA	(7) ROA	(9) ROA
C	0,881*** (14,329)	0,873*** (12,871)	0,873*** (13,348)	0,9*** (14,351)	0,346*** (9,353)
<i>Characteristic variables</i>					
<i>Demographic</i>					
AGE	0,0002 (0,678)			-0,0003 (-1,082)	0,0002 (0,829)
GENDER	-0,02*** (-3,103)			-0,023*** (-2,981)	-0,016*** (-5,078)
<i>Educational/career</i>					
CEOEXP		0,0003 (0,656)		0,0008 (1,426)	0,0007*** (2,744)
CEODUAL		0,006*** (3,293)		0,006** (2,549)	-0,002 (-0,916)
<i>Monetary</i>					
%SHARESOWNED			-0,033 (-0,379)	-0,202** (-2,352)	-0,159** (-2,376)
SALARY			0,000 (-0,553)	0,000 (-1,599)	0,000*** (3,836)
<i>Control variables</i>					
3_YRA_SG	0,086*** (4,453)	0,085*** (4,259)	0,086*** (4,134)	0,086*** (4,441)	0,035** (2,38)
ASSETS	-0,035*** (-11,891)	-0,035*** (-11,891)	-0,035*** (-12,136)	-0,034*** (-12,228)	-0,011*** (-13,768)
LEVERAGE	0,028 (0,876)	0,027 (0,84)	0,026 (0,818)	0,028 (0,877)	-0,025*** (-2,589)
R&D	-0,087 (-0,858)	-0,092 (-0,919)	-0,101 (-0,988)	-0,094 (-0,953)	0,034** (2,262)
Period fixed-effects	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	No
Industry fixed-effects	No	No	No	No	Yes
Adjusted R-squared	0,63	0,63	0,63	0,63	0,20
n	1445	1445	1445	1445	1445

The t-statistic is reported in parentheses.

***, ** and * indicate statistical significance at the 1%, 5% and 10% level.

White heteroskedasticity-consistent standard errors and covariance.

Table 12. Robustness test for Tobin's q regressions, where also utilities (SIC codes 4000-4999) are excluded.

Dependent variable	(2) TOBIN'S Q	(4) TOBIN'S Q	(6) TOBIN'S Q	(8) TOBIN'S Q	(10) TOBIN'S Q
C	12,14*** (5,072)	12,317*** (5,421)	12,435*** (5,629)	12,671*** (5,577)	11,257*** (26,088)
<i>Characteristic variables</i>					
<i>Demographic</i>					
AGE	0,006* (1,816)			-0,002 (-0,706)	-0,008*** (-3,867)
GENDER	-0,158 (-1,162)			-0,206 (-1,613)	-0,355*** (-4,815)
<i>Educational/career</i>					
CEOEXP		0,008** (1,966)		0,01*** (2,841)	0,006* (1,849)
CEODUAL		0,033 (0,957)		0,024 (0,638)	0,093** (2,543)
<i>Monetary</i>					
%SHARESOWNED			1,112 (0,678)	-0,942 (-0,482)	1,745*** (2,841)
SALARY			0,000 (1,162)	0,000 (0,675)	0,000*** (5,072)
<i>Control variables</i>					
3_YRA_SG	0,438** (2,40)	0,438** (2,206)	0,464** (2,322)	0,454** (2,233)	1,468*** (11,87)
ASSETS	-0,467*** (-5,017)	-0,469*** (-5,039)	-0,477*** (-5,192)	-0,475*** (-5,149)	-0,376*** (-26,376)
LEVERAGE	0,082 (0,397)	0,078 (0,364)	0,079 (0,373)	0,094 (0,447)	-0,403** (-2,517)
R&D	4,863*** (4,01)	4,827*** (4,199)	4,873*** (4,008)	4,943*** (4,019)	3,873*** (8,863)
Period fixed-effects	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	No
Industry fixed-effects	No	No	No	No	Yes
Adjusted R-squared	0,85	0,85	0,85	0,85	0,35
n	1445	1445	1445	1445	1445

The t-statistic is reported in parentheses.

***, ** and * indicate statistical significance at the 1%, 5% and 10% level.

White heteroskedasticity-consistent standard errors and covariance.

As a second robustness test, industry-adjusted ROA and Tobin's q measures are also used as the dependent variable instead of the regular ROA and Tobin's q in tables 13 and 14 below. The reasoning behind using industry-adjusted measures of financial performance as a robustness test is that results could be driven by a certain industry bias, which should be accounted for. In addition, previous research has shown that there exists significant variation in the mentioned measures in respect to different industries (Lindenberg & Ross (1981) and Dybvig & Warachka (2015)). Following Chidambaran, Palia & Zheng (2007),

the industry-adjusted figures are calculated by first taking the average ROA and Tobin's q for each of the SIC-industries for each year used in the study and then subtracting that from the firm's actual ROA or Tobin's q. A closer examination of the results regarding the ROA regressions below indicate that the majority of the results adhere to the original regression results, although some deviations can be noted. For instance, the gender and duality characteristic lose statistical significance in some of the models, but the signs of the coefficients stay the same.

Table 13. Robustness test for industry-adjusted ROA regressions.

Dependent variable	(1) ROA	(3) ROA	(5) ROA	(7) ROA	(9) ROA
C	0,805*** (9,125)	0,790*** (8,225)	0,780*** (8,097)	0,771*** (7,982)	0,265*** (11,54)
<i>Characteristic variables</i>					
<i>Demographic</i>					
AGE	0,000 (-0,087)			0,0001 (0,512)	0,0003 (1,612)
GENDER	-0,007 (-1,185)			-0,006 (-0,99)	-0,011*** (-5,033)
<i>Educational/career</i>					
CEOEXP		-0,0002 (-0,611)		-0,0001 (-0,321)	0,0002** (2,051)
CEODUAL		0,004 (1,473)		0,005* (1,783)	0,003* (1,67)
<i>Monetary</i>					
%SHARESOWNED			-0,028 (-0,509)	-0,029 (-0,577)	-0,12** (-2,39)
SALARY			0,000*** (-4,019)	0,000*** (-3,923)	0,000*** (2,995)
<i>Control variables</i>					
3_YRA_SG	0,063*** (4,532)	0,062*** (4,479)	0,062*** (4,486)	0,06*** (4,505)	0,022** (2,338)
ASSETS	-0,034*** (-8,393)	-0,034*** (-8,523)	-0,033*** (-8,354)	-0,032*** (-8,428)	-0,011*** (-17,906)
LEVERAGE	0,011 (0,543)	0,01 (0,512)	0,01 (0,481)	0,009 (0,488)	-0,039*** (-4,713)
R&D	-0,184 (-1,548)	-0,189 (-1,617)	-0,200* (-1,800)	-0,199* (-1,765)	0,028 (1,568)
Period fixed-effects	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	No
Industry fixed-effects	No	No	No	No	Yes
Adjusted R-squared	0,59	0,59	0,59	0,59	0,07
n	1745	1745	1745	1745	1745

The t-statistic is reported in parentheses.

***, ** and * indicate statistical significance at the 1%, 5% and 10% level.

White heteroskedasticity-consistent standard errors and covariance.

Regarding the regressions in table 14 below where the industry-adjusted Tobin's q acts as the dependent variable, the only noticeable difference in comparison to the original regression results is that of CEO age losing its statistical significance in the second model. All other results follow in the lines of the results achieved earlier.

Table 14. Robustness test for industry-adjusted Tobin's Q regressions.

Dependent variable	(2) TOBIN'S Q	(4) TOBIN'S Q	(6) TOBIN'S Q	(8) TOBIN'S Q	(10) TOBIN'S Q
C	10,834*** (5,021)	10,923*** (5,319)	11,04*** (5,405)	11,117*** (5,152)	8,999*** (25,843)
<i>Characteristic variables</i>					
<i>Demographic</i>					
AGE	0,005 (1,609)			-0,001 (-0,352)	-0,007*** (-3,637)
GENDER	-0,112 (-0,861)			-0,132 (-1,053)	-0,291*** (-4,225)
<i>Educational/career</i>					
CEOEXP		0,006** (2,174)		0,007*** (4,736)	0,005* (1,663)
CEODUAL		0,034 (1,277)		0,029 (1,047)	0,136*** (4,524)
<i>Monetary</i>					
%SHARESOWNED			1,069 (0,816)	-0,367 (-0,262)	1,516*** (3,207)
SALARY			0,000 (0,987)	0,000 (0,375)	0,000*** (4,335)
<i>Control variables</i>					
3_YRA_SG	0,667*** (4,826)	0,665*** (4,595)	0,685*** (4,585)	0,671*** (4,595)	1,438*** (25,292)
ASSETS	-0,474*** (-5,591)	-0,474*** (-5,569)	-0,48*** (-5,606)	-0,476*** (-5,491)	-0,378*** (-25,947)
LEVERAGE	-0,081 (-0,488)	-0,088 (-0,509)	-0,079 (-0,452)	-0,077 (-0,465)	-0,571*** (-4,069)
R&D	5,064*** (3,813)	5,033*** (3,998)	5,066*** (3,778)	5,100*** (3,764)	3,713*** (8,828)
Period fixed-effects	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	No
Industry fixed-effects	No	No	No	No	Yes
Adjusted R-squared	0,84	0,84	0,84	0,84	0,26
n	1745	1745	1745	1745	1745

The t-statistic is reported in parentheses.

***, ** and * indicate statistical significance at the 1%, 5% and 10% level.

White heteroskedasticity-consistent standard errors and covariance.

Overall, the use of industry-adjusted ROA and Tobin's q measures as an additional robustness test show that the results are rather robust in regard to the differences in the two financial performance indicators across industries. Regardless of the previously

mentioned, the results of the robustness test still indicate that there is some industry-bias associated with the characteristics under evaluation in the study.

5.5. Endogeneity and the results

The results of corporate governance related studies, such as this one, are often subject to endogeneity. As discussed earlier in the literature review section of the paper, multiple studies have examined the issue and made the argument that without proper econometric methods, the relationship and causation between the characteristic variables and the firm financial performance measures cannot be adequately measured (Wintoki et al. 2012) (Schultz et al. 2010).

The instrumental variable (IV) approach is a method most commonly used to alleviate endogeneity concerns in academic research. As Wooldridge (2013) explains, the method is usable through the two-stage least squares estimation, when there is an endogenous independent variable in the regression. In the context of this paper, an instrumental variable would be a variable that is related to a CEO characteristic variable but not the firm financial performance measures acting as the dependent variables. For instance, the consumer price index in the year the CEO was born could act as an instrumental variable for CEO age, as used by Peltomäki et al. (forthcoming).

Although being one of the most commonly used practices to alleviate endogeneity, the method described above has its problems. Firstly, it is highly demanding to find variables that can act as instruments in the equation, especially in a study like the author's where there are several independent variables examined simultaneously. Secondly, even though one would find the perfect instrumental variable, the question of where to find the data remains. Additionally, there also exists the issue of employing weak instruments. As Larcker & Rusticus (2010) argue, weak instruments can lead to exceedingly biased estimates and incorrect results. They even suggest that the results obtained by models using weak instruments are more likely to be severely biased than ones that do not correct for endogeneity at all. The study also finds that researchers dealing with the issue of endogeneity generally do not give enough reasoning behind their choice of an instrumental

variable and why that variable is presumed to be exogenous. In fact, Larcker & Rusticus (2010) found that almost 80% of the scientific papers they looked at give no explanation for the instrumental variable chosen.

Weak instruments also cause problems in deciding between fixed or random effects to be utilized in the models. Hahn, Ham & Moon (2011) provide proof on the fact that the Hausman test, which is known for being used as the decider between the different effects mentioned, is not a viable option when the used instruments are weak. Even though the authors provide a modified version of the Hausman test for weaker instruments, they conclude by stating that the modified version is not entirely consistent since full consistency can never be achieved with a weak set of instruments.

Coles, Lemmon & Meschke (2012) examine the issue of endogeneity in corporate finance by looking at the relationship between the financial performance of a corporation and managerial ownership. Although using a structural model in their study and controlling for endogeneity through the use of different instrumental and proxy variables, as well as fixed effects estimations, the authors conclude that the methods used typically do not help in alleviating the endogeneity concern significantly.

As we can see from the previous research, endogeneity causes severe limitations to corporate governance related studies, such as the thesis in question. Based on the reasons given above, meaningful and reasonable econometric testing of endogeneity could not be conducted in this thesis. The issues regarding data availability, strength of the instruments, and insufficient econometric methods are too persistent and thus the empirical results should be considered preliminary.

5.6. Conclusions and summary of empirical results

Firstly, and based on the empirical results achieved, the null hypothesis of CEO characteristics having no effect on a firm's financial performance measured by ROA and Tobin's q can be rejected. The achieved results are shortly depicted once again in the following table below.

Table 15. Summary of results.

Characteristic	Performance measure	Relationship
<i>Demographic</i>		
Age	ROA Tobin's q	Inconclusive Inconclusive
Gender	ROA Tobin's q	Female positive Female positive
<i>Educational/career</i>		
Experience	ROA Tobin's q	Positive Positive
CEO/Chairman duality	ROA Tobin's q	Positive Positive
<i>Monetary</i>		
Firm ownership	ROA Tobin's q	Negative Inconclusive
Salary	ROA Tobin's q	Inconclusive Inconclusive

Although some variables yield inconclusive or insignificant results, there are still multiple variables that are of interest as they are proven to show a significant association with the study's dependent variables ROA and Tobin's q. Regarding the demographic variables, female CEOs are shown to be positively affecting firm financial performance measured both by ROA and Tobin's q. From the educational/career related characteristics, both experience and CEO/Chairman duality are shown to have a positive relationship with firm financial performance. Lastly, the monetary measures of firm ownership and salary give mostly inconclusive results.

5.7. Limitations and suggestions for further research

As most studies, also this one has limitations that should be considered when evaluating the results. In addition to the limitations regarding endogeneity discussed earlier, the following aspects should also be considered, upon evaluating the empirical results of the study.

First of all, regarding the sample, it has to be noted that it consists of only companies from the S&P500 so for smaller companies, the results might differ substantially. Additionally, all examined companies are from the US, leaving the effect these characteristics have on companies from elsewhere undetermined. Although the study includes six individual characteristic variables, there can still exist other variables that affect the financial performance of firms as well. The small number of female CEOs also poses a problem in respect to the generalization of the results, since when the sample only includes 4% of them in total, large generalizations cannot be made because the results could be driven by this unique sample.

In respect to further research, it would be beneficial to try and overcome the obstacle of endogeneity in a way that would suit the scientific community as a whole. Currently, there are large deviations in results achieved by the academic community, depending on whether endogeneity is controlled for or not. Also, since the study examines the effects on rather large companies, an area of interest could be to see if the results hold with smaller companies as well. Given that data would be available, a longer study period could be another way of continuing the study to see whether there are differences in respect to time. For instance, recession periods could be examined in depth, followed by an examination of whether certain characteristics prevail in economic downturns in comparison to other. Finally, the study at hand has shown that limitations arise when examining several characteristic variables at once. Future studies should focus on a maximum of few characteristic variables at a time, as has been done in the majority of cases in academic literature, since the issues related to similar studies are much simpler to overcome with a more detailed characteristic approach.

6. CONCLUSION

The purpose of the thesis was to provide evidence on the issue of different CEO characteristics affecting a firm's financial performance measured by ROA and Tobin's q. The employed characteristics of the study include demographic variables of age and gender, educational/career related variables of experience and CEO/Chairman duality, and finally monetary measures of firm ownership and salary. The study includes seven years of data, starting from 2010 and ending in 2016. From a sample of nearly 300 unique S&P 500 companies and over 480 individual CEOs spanning a period of seven years, results indicate that some CEO characteristics do in fact have an effect on the financial performance of firms.

Previous literature shows that the results of similar studies can sometimes come to a different conclusion, indicating that there is some ambiguity in the field. Therefore, it is important to provide more empirical evidence to narrow the gap between the results of different studies. Regardless of the ambiguous results at times, it can still be said that the results of the study in question are generally in line with previous research done in the field.

Regarding the six different CEO characteristic measures, the thesis found multiple significant relationships between many of the characteristics under examination and firm financial performance. Female CEOs are shown to increase firm financial performance in comparison to their male counterparts, proxied by both ROA and Tobin's q. The finding is consistent with previous studies and shows that, although only a small portion of S&P 500 companies' CEOs are women, female CEOs can be considered highly skilled because of the prejudice they have had to overcome to become a top leading executive in the first place, for instance. The experience of the CEO, measured as the amount of time the individual has served in that position in the company, is also found to affect firm performance positively. The result indicates that during their tenure, CEOs gather an extensive amount of firm-specific knowledge and skills that help them improve the financial performance of the firm and make better decisions. This result also shows that it is not necessarily the life experience, measured as age, that helps in improving firm financial

performance, but rather the experience gained from the CEO position itself. CEO/Chairman duality is another characteristic that is shown to be positively associated with firm performance, possibly insinuating that powerful CEOs have an advantage in that they can make decisions in a rapid manner and thus have an immediate response to different issues.

The troubling aspect with studies similar to this one is that of endogeneity. Especially the question of reverse causality is something one has to consider when examining the results of the study. Without the use of proper econometric tools and instruments, it can be difficult to determine the correct outcome of the models. As discussed earlier in the paper regarding the limitations on testing endogeneity, the tests themselves might not be of large value because of the weak fundamentals behind them. The issues related to data availability, strength of the instruments, and insufficient econometric methods are something also this study faced. Due to these issues, specific tests for endogeneity were not performed in the study. As Larcker & Rusticus (2010) also state, not controlling for endogeneity most likely gives a more accurate and less biased outcome than controlling for it by using weak instruments and methods.

Ultimately, understanding the effect different CEO characteristics have on firm financial performance is highly relevant information, especially for people who are in charge of hiring decisions inside a company, for instance. Through building on the existing literature, the thesis has successfully managed to find more common ground in relation to the results and provide insights on the dominant issues related to corporate governance studies.

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