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How do female CEOs affect the corporate capital structure in Norwegian private firms

Navn:	Kine Lunde, Silje Løset

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"How do female CEOs affect the corporate capital structure in Norwegian private firms"

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ABSTRACT

The effect of managerial characteristics on corporate financing policies has gained a growing attention during the last years. Thus, this thesis aims at investigating how the gender of the CEO affects the corporate capital structure in Norwegian private firms. In short, within a behavioural perspective, males and females are perceived to be different from each other. These differences are presumed to be reflected in their financing behaviour and therefore assumed to influence decisions regarding the corporate capital structure. Using panel data of Norwegian private firms over the time period 2001-2017 obtained from the *Centre of Corporate Governance Research* (CCGR) database, this thesis examines how female CEOs shapes the firm´s financing decisions in terms of debt levels, debt maturity and cost of borrowing. By categorising the sample by firm size, we find that female CEOs of smaller Norwegian private firms adopt a capital structure with higher amounts of leverage, with a shorter maturity, at a lower cost. These findings are proven to be robust for several model specifications. Our results provide evidence of female- and male CEOs differing in their financing choices, hence adopting capital structures with different amounts of leverage, different maturities and at a different cost. However, compared to previous studies of listed US companies, our study suggests that considering the geographical patterns in gender equality and diversity might prove important when studying the effect of female CEOs in future research.

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1.0 INTRODUCTION

Damodaran (2015) emphasized that the overall objective in traditional corporate finance is to maximise firm value, which is consistent with maximising stockholders´ wealth. The objective of maximising firm value is closely related to the firm's investment-, financing- and dividend decisions where the financing decision concerns finding the optimal capital structure. Hence, determine the optimal mix of debt and equity that maximises the value of the firm. In general, capital structure can be defined as "the relative proportion of debt, equity and other securities that a firm has outstanding" (Demarzo & Berk, 2017). Due to its importance, corporate capital structures have gained a lot of attention both from managers and researchers. Thus, the topic has become one of the most researched areas within the field of corporate finance.

Ever since Modigliani and Miller published t*he irrelevance theory* in 1958, an extensive amount of theory has emerged. Most of these theories highlight the effect of firm-, industry- and market level characteristics on corporate capital structure (Malmendier, Tate, & Yan, 2011). However, these factors have proven to be unable to explain the entire variation in firms´ leverage ratios. Thus, researchers in more recent times have tried to determine whether managerial characteristics such as age, tenure, experience, gender, overconfidence and education potentially could explain some of the remaining variation. Although, more systematic and theoretical analysis is required for managerial characteristics such as the gender of the Chief Executive Officer (CEO).

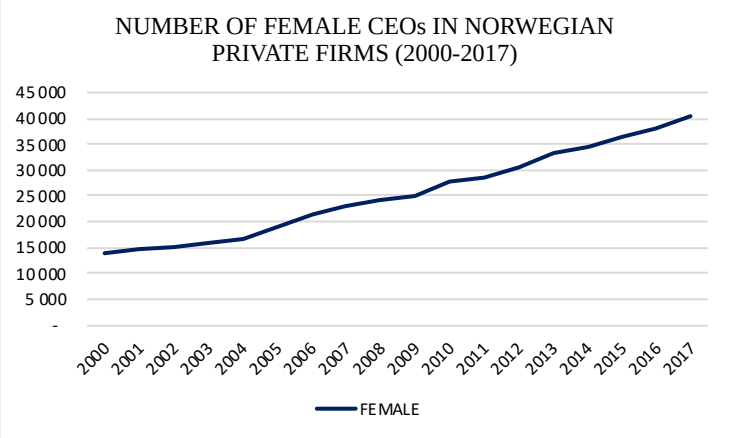
Within a behavioural perspective, males and females are perceived to be different from each other. These differences are presumed to be reflected in their financing behaviour and therefore assumed to influence decisions regarding the corporate capital structure. In short, research within the field of behavioural finance have suggested that females in general are more risk averse and less confident (Barber and Odean, 2001; Harris & Jenkins, 2006; Eckel & Grossman, 2008). Thus, this thesis aims at explaining how female CEOs affect the firm´s capital structure. In particular, this thesis tries to establish how female CEOs shape the firm's financing decisions in terms of debt levels, debt maturity and cost of borrowing.

The topic has not yet been extensively researched due to most CEO positions being occupied by men, which makes it hard to statistically compare the effects. According to Hymowitz and Schellhardt (1986), the lack of females in top leader positions is a result of corporate prejudice rather than lack of education and experience. In short, they argue that women who climb the corporate ladder eventually would crash into an invisible barrier, also defined as the glass ceiling. Some studies have in fact found that females score better than males in education, experience and career choices (Keloharju, Knüpfer and Tåg, 2017). Thus, recent research has emphasized that having a larger gender diversity might improve firm performance (Ross & Dezsö, 2012; Zhang, 2019). As a consequence, firms have worked on improving gender diversity at their firm, hence helping women break through the glass ceiling. Subsequently, the number of female executives has increased steadily over the past years, which have enabled researchers to start studying managerial behavioural gender differences.

Only a few previous studies have tried to establish how female CEOs shapes the corporate capital structure. However, the majority of these uses accounting data for US listed companies, such as the *Fortune 500 companies* or *Standard & Poor´s 500 companies*. According to Zhang (2019), the influence of managers´ gender and gender diversity may be related to a broader social context such as the acceptance of gender diversity in the specific country. Thus, we have chosen to limit the scope to Norwegian private firms in order to see whether previous findings are generalisable to private firms in Norway. According to The World Economic Forum (2019), Norway is ranked as the second most gender equal country in the world, which is a direct consequence of Norway having worked tremendously on improving gender equality and gender diversity for the last 50 year. For instance, by implementing gender quotas in 2005, which requires at least 40% female presence on company boards for all listed companies, Norway has managed to help women climb the corporate ladder. These initiatives, as well as the women´s rights movement, have created stronger norms for gender diversity and gender equality in the society and in corporations. According to Regjeringen (2019), 22% of the senior executive positions and 10% of the chief executive positions in the 200 largest Norwegian companies are filled by a female.

According to SSB (2020) and Brønnøysundregistrene (2020), 340 823 out of 590 810 Norwegian firms are registered as AS-companies. Thus, instead of using a sample of listed firms, we find it beneficial to limit the scope to Norwegian private firms since they make up the majority of all registered firms in Norway. Private firms do not have the same reporting requirements as listed firms, which in general makes the data availability limited. However, we were able to extract a large data sample on AS-firms and non-listed ASA-firms using the Corporate Governance Research (CCGR) database. As shown in *illustration 1*, the number of female CEOs in Norwegian private firms is observed to increase steadily over the time period 2000-2017, which reinforce our interest in examining the influence of female CEOs in these types for firms.

ILLUSTRATION 1: *Number of female CEOs in Norwegian private firms (2000-2017)*



Using panel data of Norwegian private firms over the time period 2001- 2017, our empirical results show that female- and male CEOs differ significantly in their financing choices. In brief, the study finds evidence of female CEOs of smaller Norwegian private firms issuing higher amounts of leverage, and in particular short-term debt, at a lower cost compared to male CEOs. These results are proven to be robust for several model specifications.

The thesis is organised in the following way. *Section 2* provides a literature review on previous research, which constitutes the theoretical framework for this thesis. Further, the research question and the following hypotheses are presented in *section 3*. *Section 4* provides a description of the data sample and some descriptive statistics. *Section 5* contains an elaboration on the methodology applied and the estimated model. *Section 6* reports and discusses the empirical results. Finally, a final conclusion is provided in *section 7*.

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The theory on corporate capital structure has gained a great deal of attention ever since *the irrelevance theory* proposed by Modigliani and Miller in 1958, which claimed that in a perfect market "the market value of any firm is independent of its capital structure" (Modigliani & Miller, 1958). However, the proposition received various criticism on the grounds that a perfect market does not exists. Thus, theories based on less restrictive assumptions emerged[1]. These traditional theories have mainly emphasized how taxation, bankruptcy costs, agency costs and asymmetric information determine the optimal capital structure. By contrast, more recent empirical research has shifted their focus to examine the effect of firm- and industry specific characteristics on corporate capital structure. For instance, a recognised framework called *the core model of leverage,* developed by Frank and Goyal in 2009, argued that 30% of the variation in firms´ leverage ratios could be explained by factors such as *industry median leverage, asset tangibility, profitability, firm size* and *market-to-book asset ratio.*

A majority of these fundamental theories focus on firm-, industry- and market level explanations (Bertrand & Schoar, 2003; Malmendier, Tate, & Yan, 2011). Most of these are in general based on the assumption of rational managers, hence their personal characteristics do not influence the corporate capital structure (Kuo & Wang, 2015). However, it is argued that these theories alone are unable to explain the entire variation in firms´ leverage ratios. Hence, more recent research has shifted their focus to investigate how the CEO´s own characteristics affects the corporate capital structure. These types of studies have suggested that managerial characteristics such as age, gender, tenure, experience, education, overconfidence and risk aversion may explain some of the unexplained variation in corporate debt levels. Anyhow, literature on managerial characteristics such as the CEO´s gender is both limited and conflicting. However, the following sections will give a short overview of the most central literature on this particular topic.

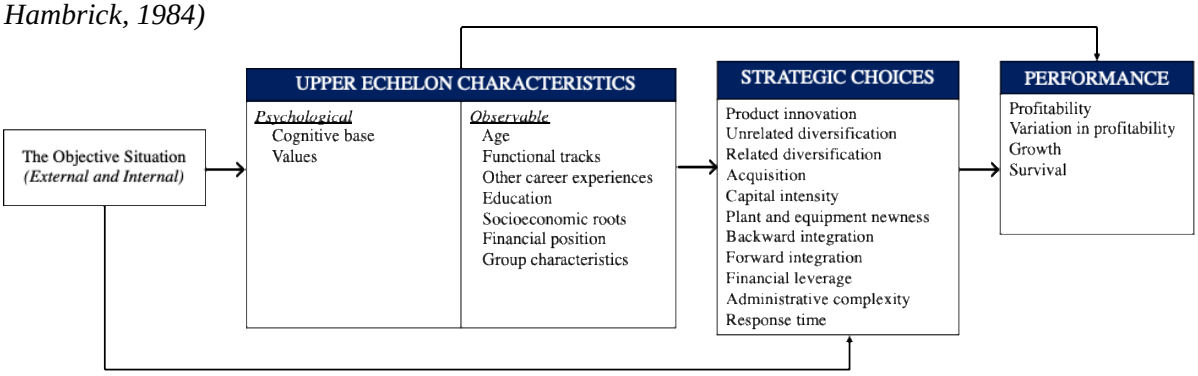
[1] See *The Irrelevance Theory* (Modigliani & Miller, 1958), *The Trade-Off Theory* (Myers, 1984), *The Agency Theory* (Jensen & Meckling, 1976), *The Signalling Theory* (Ross, 1977), *The Pecking Order Theory* (Myers & Majluf, 1984), *The Market Timing Theory* (Baker & Wurgler, 2002)

2.1 EFFECT OF CEOs ON FINANCING DECISIONS

Modern corporations today are based on a separation between ownership and control, due to a widely dispersed share ownership. In practice, this implies that the owners delegate their control to the firm´s management. The highest ranking individual in the executive management is the CEO. In the view of traditional neoclassical models, the CEO´s primary responsibility and concern is to maximise shareholders wealth (Walker, 2018). "Under this quite narrow view, different managers are regarded as perfect substitutes for one another" (Bertrand & Schoar, 2003). However, more recent managerial models claim that the CEO and the shareholders may have divergent interests. Thus, an increasing amount of research have studied the relation between the CEO´s personal characteristics and corporate decisions. In short, research have shown that the CEOs are essential factors in the determination of corporate practices (Bertrand and Schoar, 2003), hence managerial characteristics may influence the firm's investment, financing and other strategic decisions.

Among the first management theories to suggest that corporate decisions indeed are influenced by managerial characteristics was the *Upper echelons theory*, developed by Mason and Hambrick in 1984. The model emphasizes that a firm´s strategic choices, such as financial leverage, and performance are affected by the manager´s; *values, age, functional track, experience, education, socioeconomic roots* and *financial position*. Mason and Hambrick did not present evidence supporting this model themselves. On the contrary, the authors encouraged further research to be conducted by providing suggestions regarding the variables of interest, hypotheses and methodology. Hence, the topic has in more recent times been discussed by a great number of authors.

ILLUSTRATION 2: *An Upper Echelons Perspective of Organisations (Mason and Hambrick, 1984)*



A recent study by Bertrand and Schoar (2003) contributed to the *Upper echelons theory* by investigating how much of the variation in firms´ practices could be explained by managerial characteristics, after controlling for both firm fixed effects and time-varying effects. They indeed found strong evidence confirming that the managerial characteristics influence corporate investment- and financing decisions. In general, they discovered that older managers often adopt a more conservative capital structure, hence issue less debt. These findings were later supported by Serfling (2014), which concluded that older CEOs undertake less risky investments and maintain lower amounts of leverage. Further, Bertrand and Schoar (2003) concluded that managers with an MBA degree often adopt a more aggressive policy with a higher level of leverage.

Another contribution was made by Frank and Goyal in their published article from 2006, where they tried to determine the significance of the managers on a firm´s financing decision. The evidence provided suggested that managers have a significant impact on corporate leverage. In fact, they found that the CEO´s personal characteristics matter more than firm fixed effects. These results were later supported by Malmendier, Tate and Yan (2011), which argued that "managerial characteristics have significant explanatory power for corporate financing decisions beyond other traditional capital structure determinants". In general, they found that the CEO´s experience and beliefs influence their incentives to issue debt. In particular they claimed that overconfident managers would issue 33% more debt since they perceive equity as costly. Further, their results suggested that CEOs with military experience often pursued a more aggressive financing policy, thus adopted a higher level of leverage.

The literature presented above provides strong evidence confirming that the CEO indeed has an important impact on corporate financing policies. However, identifying the causality has been a major concern in these types of studies. Meaning that there may be questionable whether the CEO´s personal traits determine the firm's financing decisions, or whether firms hire CEOs whose personal preferences match those of the firm (Korkeamäki, Liljeblom, & Pasternack, 2017). As a consequence, most of the literature focuses on providing evidence for the correlation between managerial characteristics and corporate financing decisions, rather than estimating the causal effect.

2.2 EFFECT OF CEOs´ GENDER ON FIRM LEVERAGE

Questions regarding the influence of behavioural gender differences in the executive management have been relatively unexplored. The main reason is that the number of female executives has been quite low, which creates challenges when trying to statistically compare the effects. However, there has been an increasing focus on the topic as more females have climbed the corporate ladder. The topic specifically started to attract more attention worldwide after Norway in 2005 implemented gender quotas, which requires at least 40% female presence on company boards for all listed companies. Anyhow, only a few papers demonstrate the effect of the CEO´s gender alone and these studies are mainly focusing on behavioural gender differences in risk aversion and overconfidence.

2.2.1 *RISK AVERSION*

Leverage is often used as a measure for corporate risk taking. Thus, studies have emphasized that the CEO´s own incentives to take risk have an important impact on corporate financing policies (Graham, Harvey and Puri, 2013). In general, a more risk seeking manager would prefer a higher debt level in order to maximise their benefit from the tax shield, while a risk averse manager would prefer a lower debt level in order to minimise the risk of default. One essential question that arises in the discussion on how the CEO´s gender affects firm leverage is whether there exist some risk taking behavioural gender differences.

In short, a considerable amount of literature within the field of corporate finance and psychology argue that females in general are more risk averse than males (Harris & Jenkins, 2006; Eckel & Grossman, 2008). However, the research is both conflicting and inconclusive when limiting the study to the top executives at the firm. Earlier studies have emphasized that having a higher gender diversity in the boardroom would reduce the firm´s incentives to take risk and increase firm performance (Yang , Riepe, Moser, Pull, & Terjesen, 2019). On the contrary, Adams and Funk (2012) have argued that females´ risk aversion may disappear once they have broken through the glass ceiling. Thus, the presence of females in boardrooms may not necessarily result in more risk averse decision making.

Under the assumption that females are more risk averse, Graham, Harvey and Puri (2013) argued that female CEOs often adopt a more conservative capital structure with lower amounts of leverage. An additional study by Chen, Liu and Zhang (2014) suggested that low leveraged Chinese companies often are run by a female. These conclusions were later supported by Faccio, Marchica and Mura (2016), which studied the relation between the CEO´s gender and corporate financing decisions in both listed and non-listed European companies. They found that firms run by female CEOs often are less leveraged, thus female CEOs are associated with less risky firms.

2.2.2 *OVERCONFIDENCE*

Overconfidence refers to an overestimation of own abilities and a perception of being above average, also called the *better-than-average* effect (Alicke, 1985). In general, overconfidence has proven to translate into excessive risk taking (Ben-David, Graham, & Harvey, 2013). Thus, the relation between a manager´s overconfidence and corporate decision making has attracted a growing attention. A study by Malmendier, Tate and Yan (2011) reported that the manager´s overconfidence is closely related to corporate financing decisions. In fact, their study showed that overconfident managers on average issue 33% more debt.

Having this in consideration, the question that arises is whether one specific gender is more prone to overestimate their abilities, hence being more overconfident. In short, a number of studies within the field of finance have concluded that females in general are less overconfident than males. For instance, a study by Barber and Odean (2001) reported that females trade less excessively than males, indicating that males are more subject to overconfidence than females. A more recent study by Huang and Kisgen (2013) found that the difference in level of overconfidence applies to the executive management as well. Thus, they concluded that as a result of being less confident, female CEOs often adopt lower amounts of leverage, issue debt less frequently and undertake fewer acquisitions. However, another branch of the literature has emphasized that females are discriminated in the credit market, hence face larger challenges when issuing external financing. For instance, a study by Galli and Rossi (2015) showed that females face a higher rejection rate than males. Thus, females apply for bank loans less frequently, due to the fear of rejection. Females are therefore more likely to use internal funds.

2.3 EFFECT OF CEOs´ GENDER ON DEBT MATURITY

In general, corporate financing decisions involve choices regarding the source of capital, length of maturity and cost of borrowing. The decision regarding the length of maturity can be referred to as the selection between short-term and long-term debt. Following accounting conventions, short-term debt is defined as debt that is due within 1 year, while long-term debt is defined as debt that is due within more than 1 year. In short, firms should strive to find the optimal debt maturity structure, meaning a well-balanced mix of short- and long-term debt, since this may mitigate agency conflicts (Myers, 1977), minimise taxation (Brick & Ravid, 1985) and reduce asymmetric information (Fama, 1990). As a consequence, a large number of studies have tried to identify the determinants of firms´ debt maturity structure (Antoniou, Guney, & Paudyal, 2006).

However, most of the studies have focused on firm- and industry-specific factors. Thus, ignoring the possibility that the managers own characteristics influence the debt maturity decision. Of the exceptions, a few studies have examined the impact of the CEO´s overconfidence, but the results are conflicting. For instance, a study by Ben-David, Graham and Harvey (2013) suggested that overconfident managers adopt a riskier capital structure, thus issue more long-term debt. On the contrary, Huang, Tan and Faff (2016) found that overconfident CEOs tend to issue more short-term debt, since they overestimate their ability to refinance short-term debt with lower costs. As previously mentioned, females are generally assumed to be less overconfident than males. As a result, some studies have expanded to investigate the relation between the gender of the CEO and corporate debt maturity.

Under the assumption that females are less subject to overconfidence, Graham, Harvey and Puri (2013) found that male CEOs often adopt a capital structure with higher amounts of short-term debt compared to females. On the contrary, Myers (1977) argued that short-term debt provides a more flexible capital structure since renegotiations takes place more frequently. Thus, it mitigates the debt overhang problem. Studies have therefore suggested that females in general will adopt higher amounts of short-term debt, because they prefer a more conservative and flexible capital structure (Rocca, Neha & Rocca, 2019).

2.4 EFFECT OF CEOs´ GENDER ON COST OF BORROWING

When focusing on corporate financing decisions, one important aspect to consider is the cost of borrowing. In general, cost of borrowing can be defined as the total charge for issuing debt, meaning interest payments and other financing fees. Previous studies have almost exclusively focused on how banking relationships affect the overall cost of borrowing. In brief, these traditional theories have mainly emphasized that banks gain from building a lending relationship with its borrowers. In fact, several empirical studies have argued that borrowers with longer banking relationships pay lower interest rates (Petersen & Rajan 1994; Berger & Udell 1995). Hence, the borrower benefits from a durable bank relationship (Boot & Thakor, 1994).

On the other hand, more recent financial theory has started to examine the effect of managerial characteristics on firms´ overall cost of borrowing. In short, these theories mainly emphasize that banks evaluate the CEO´s risk incentives when pricing loans. For instance, Beladi and Quijano (2013) found that banks charge a higher interest rate to firms whose CEOs have higher risk incentives. Their conclusion was later supported by Chen and Qui (2017) which argued that "firms with greater CEO risk-taking incentives have a higher cost of bank loans". Most of the previous research support the notion that females are more risk averse than males. Thus, it would be reasonable to assume that female CEOs enjoy a lower cost of borrowing compared to male CEOs. However, research on how the CEO´s gender affects the cost of borrowing is both limited and conflicting.

An exception is the study by Miah (2019), which used a sample of Australian listed companies to examine whether the CEO´s gender affects the cost of external financing. His findings showed that firms with a female CEO perform better, are less risky and have a higher capital allocation efficiency. Thus, female CEOs benefit from a lower cost of borrowing compared to male CEOs. A similar study was conducted by Francis, Hasan and Wu (2013) which emphasized that female CFOs often provide more reliable accounting information, hence have a lower default risk. As a consequence, female CFOs often achieve more favourable contract terms which includes lower loan prices. In fact, their sample showed that firms run by female CFOs enjoy on average 11% lower bank loan prices compared to firms run by male CFOs. However, a number of conflicting studies have suggested that females in general are discriminated in the credit market. Hence,

female CFOs and CEOs are subject to higher loan prices since banks are biased against women (Muravyev, Talavera & Schäfer, 2009; Galli & Rossi, 2015).

3.0 RESEARCH QUESTION AND HYPOTHESES

3.1 RESEARCH QUESTION

The firm's investment-, financing- and dividend decisions should contribute to the overall goal of maximising firm value, hence create value for the company´s shareholders. However, since managers and shareholders may have divergent interests, it becomes crucial to understand how the CEO´s personal characteristics may influence corporate decision making. This particular thesis aims at explaining some of the unexplained variation in firms´ capital structures, by controlling for the gender of the CEO. We therefore define our research question as:

How do female CEOs affect the corporate capital structure in Norwegian private firms?

The effect of managerial characteristics, such as the gender of the CEO, has gained a growing attention during the last years. In general, previous literature have suggested that female- and male CEOs finance their companies differently. However, the amount of literature is both limited and inconclusive. Our thesis will therefore contribute to the existing literature on how female CEOs shape the firm's financing decisions in terms of debt levels, debt maturity and cost of borrowing.

We have chosen to limit the scope of this thesis to Norwegian private firms for several reasons. Firstly, most of the previous empirical research uses accounting data for listed companies since private firms do not have the same reporting requirements. However, by using the *Centre of Corporate Governance Research* (CCGR) database, we are able to investigate whether previous findings in listed firms are generalisable to private firms. We believe this would be interesting since listed and private firms are argued to finance their firms differently[2], and since private firms make up the majority of all registered firms in Norway. Secondly, we find it interesting to see whether previous findings are generalisable to different countries with different geographical patterns in gender equality and diversity. Thus, we are interested in seeing whether previous findings are generalisable to

[2] Private firms are argued to issue more leverage compared to listed firms because of limited access to capital markets (Brav, 2009).

Norway where gender equality and gender diversity has been on the agenda for a long time.

3.2 HYPOTHESES

A majority of the research presented above emphasize that managerial gender differences in risk appetite and overconfidence may influence the firms financing decisions. In general, females are suggested to be more risk averse and less prone to overconfidence. Hence, female CEOs are argued to adopt a more conservative capital structure with lower amounts of leverage. We therefore hypothesise that firms run by female CEOs will adopt a capital structure with less leverage compared to firms run by male CEOs, since they are more concerned with reducing the risk of default.

H1: *Firms managed by female CEOs are less leveraged than firms managed by male CEOs.*

Recent research has further suggested that the managers´ own characteristics, such as the gender of the CEO, may have a significant influence on the firm´s debt maturity structure. Hence, male- and female CEOs may have different preferences when it comes to issuing short-term or long-term debt. According to Myers (1977), short-term debt contributes to a more flexible capital structure, since renegotiations occur more frequently. Under the assumption that females in general are more risk averse and less overconfident, hence makes more conservative decisions, we hypothesise that firms run by female CEOs will issue more short-term debt compared to firms run by male CEOs.

H2: *Firms managed by female CEOs issue more short-term debt relative to long-term debt than firms managed by male CEOs*.

Furthermore, a few studies have argued that the gender of the CEO may affect the cost of external financing. In general, companies led by female CEOs are assumed to provide more reliable accounting information and be less risky, hence have a lower default risk. We therefore hypothesise that firms run by female CEOs will enjoy a lower cost of borrowing compared to firms run by male CEOs.

H3: *Firms managed by female CEOs will enjoy a lower cost of borrowing than firms managed by male CEOs.*

4.0 DATA AND DESCRIPTIVE STATISTICS

The following sections contain a brief description of the database from where the data is retrieved, as well as an elaboration of the steps undertaken to obtain the final data sample. Further follows a description of the dependent- and control variables used in this particular study. Finally, some descriptive statistics will be presented.

4.1 DESCRIPTION OF THE DATA SOURCE

This thesis uses secondary data retrieved from *The Centre for Corporate Governance Research* (CCGR) database. The CCGR database provides detailed accounting and governance information for both listed and private Norwegian firms within the time period 1994-2017. The database also contains information from *Statistisk Sentralbyrå* (SSB). The aim of this thesis is to investigate the effect of female CEOs on corporate capital structures in Norwegian private firms. In general, private firms do not have the same reporting requirements as listed firms, which makes the data availability limited. However, using the CCGR database enabled us to extract a large data sample on AS-firms and non-listed ASA-firms.

4.2 DATA SAMPLE AND PROCESSING

The data received from CCGR is classified as panel data which consists of repeated observations over a given time period for the same firms (Wooldridge, 2012). Panel data is argued to have a "greater capacity for capturing the complexity of human behaviour" (Hsiao, 2006), which would be beneficial when investigating the behaviour of female CEOs. The initial data sample received from *CCGR* contained repeated observations on 538 239 different firms over the time period 2000-2017. Hence, the initial sample contained a total of 4 108 823 observations. However, to reach the final sample a series of filters was added.

The aim of this thesis is to study the effect of female CEOs on corporate capital structure in Norwegian private firms. We therefore started the data cleaning process by excluding all firms that were listed on the *Oslo Stock Exchange* and *Oslo Axess*. Further, we only kept firms registered as *aksjeselskap* (AS) or *allmennaksjeselskap* (ASA) since these enterprise types have limited liability. We also excluded all financial- and insurance firms to mitigate the effect of their unique capital requirements and accounting rules (Bertrand & Schoar, 2003; Malmendier, Tate & Yan, 2011; Huang & Kisgen, 2013).

According to Madura (2017), the capital structure of subsidiaries is often influenced by the parent company[3]. Thus, to avoid biased results due to the influence of the parent company, all subsidiaries were removed from the sample. We also removed all non-independent firms that were not parent companies. Furthermore, since the CCGR database contained both consolidated and non-consolidated numbers, we replaced all accounting numbers when consolidated numbers where available. To deal with the problem of extreme outliers in our data and to avoid eliminating a number of firms, we winsorized the accounting variables at the 1st and 99th percentiles[4].

Further, we removed all inactive firms, meaning firms with both zero in *total assets* and zero in *total operating revenues*. Although, we initially would prefer to omit companies with zero employees as well, this is not convenient since our data do not contain information on the number of employees after 2006. We also excluded firms with inconsistent accounting. Meaning firms with negative *total fixed assets*, negative *total current assets*, negative *total current liabilities*, negative *total long-term liabilities*, negative *dividends* and negative *depreciation*. We further removed firms with negative *equity*. Negative equity might occur in scenarios when a firm has negative retained earnings and as a consequence eat up the shareholders´ capital. However, these firms are likely to go bankrupt, so they might introduce noise to our data. In addition, we removed firms where the *accounting equation* did not hold, meaning firms where *total assets* did not equal the sum of *total equity* and *total liabilities*.

Following Huang and Kisgen (2013), we also excluded CEOs that had held the position for less than 2 years, meaning CEOs with tenure[5] less than 2. By requiring that the CEO has been in power for at least two years, we ensure that the CEO has had significant time to influence the corporate financing policy. Finally, we constructed a balanced data sample by excluding firms where some year or years

[3] If the subsidiary issue more financial leverage, the parent company would have more internal funds available. Hence, the parent company can reduce its own reliance on debt financing. However, if the subsidiary issue less leverage, the parent company may experience reduced internal funds. As a consequence, the capital structure of a subsidiary should be made in consultation with the parent (Madura, 2017).

[4] Winsorizing is a method to limit outliers by replacing extreme values by a certain percentile.

[5] According to the CCGR database, tenure is the number of consecutive years that the current CEO has been employed as CEO.

of information are not available (Alstadsæter & Fjærli, 2009; López, 2014). The final sample contained repeated observations on 185 733 firms. Hence, the final sample contained a total of 1 123 684 observations over the time period 2001-2017.

Researchers have detected significant differences between the financing decisions of small and large companies (Frank & Goyal, 2003). In addition, it is argued that studies of larger firms are less generalisable to smaller firms, since the organisational structure and the influence of the CEO differ significantly (Gudmundson, 2016). Thus, we have chosen to divide our final sample into *micro firms, small-medium enterprises (SMEs)* and *large firms*. Following Bøhren (2011), *large firms* are defined as having at least 80 million NOK in total operating revenues and at least 80 million NOK in total assets. This categorisation result in a quite skewed distribution between SMEs and large firms; 219 571 and 1 636 respectively. The skewed distribution of the number of firms document that most of the private firms in Norway are small and that few are relatively large (Bøhren, 2011). According to NHO (2018), SMEs account for more than 99% of all companies in Norway. However, to easily observe how financing decisions differ across firm sizes, the smallest companies in the sample are categorized as micro firms. Following the classification developed by The European Union, a micro firm is defined as having a maximum of 2 million NOK in total operating revenues and a maximum of 2 million NOK in total assets (Næringskomiteen, 2012).

TABLE 1: *Classification of firm size*

FIRM SIZE	TOTAL ASSETS	TOTAL OPERATING REVENUE	NO. FIRMS	NO. OBS
Micro firms	≤ 2 mill NOK	≤ 2 mill NOK	90 323	361 066
SMEs	> 2 mill NOK, < 80 mill NOK	> 2 mill NOK, < 80 mill NOK	129 248	758 249
Large firms	≥ 80 mill NOK	≥ 80 mill NOK	1 636	4 369

4.3 VARIABLES

The following sections contain an elaboration of the dependent variables *(leverage, short-term debt* and *cost of borrowing)* and the control variables *(profitability, tangibility, firm size, growth, risk* and *industry leverage, CEO age* and *CEO ownership).* A more detailed specification of the items obtained from the CCGR database and the variables are presented in *appendix A1-A2*.

4.3.1 DEPENDENT VARIABLES

When analysing the effect of female CEOs on corporate capital structure, we have chosen the dependent variable *leverage* to reflect the firm´s capital structure. Following Malmendier, Tate and Yan (2011), leverage is measured as *total current liabilities* plus *total long-term liabilities*, divided by *total current liabilities* plus *total long-term liabilities* plus *total equity*[6]. This measurement reflects the company´s total liabilities-to-capital ratio and indicates how firms finance their operations. High levels of this ratio indicate that the firm has adopted a larger proportion of debt compared to equity in their capital structure. To clarify, all items retrieved from CCGR are measured at book value.

$$\text{Leverage} = \frac{\text{Tot. Current liabilities} + \text{Tot. Long term liabilities}}{\text{Tot. Current liabilities} + \text{Tot. Long term liabilities} + \text{Tot. Equity}}$$

Further, when analysing the effect of female CEOs on corporate debt maturity, we have chosen the dependent variable *short-term debt* to reflect the firm´s debt maturity structure. In accordance with accounting conventions, short-term debt is defined as debt that is due within 1 year. Following Huang, Tan and Faff (2016), short-term debt is measured as *total current liabilities* divided by *total current liabilities* plus *total long-term liabilities*. This ratio measures the percentage of total current liabilities to total liabilities.

$$\text{Short term debt} = \frac{\text{Tot. Current liabilities}}{\text{Tot. Current liabilities} + \text{Tot. Long term liabilities}}$$

The last dependent variable *cost of borrowing* reflects the total charge for issuing debt as a ratio, and is measured as *total interest expenses* plus *total other financial expenses* divided by *total current liabilities* plus *total long-term liabilities* minus *total provisions*. According to the CCGR database, provisions include pension liabilities, deferred tax and other types of provisions, which is classified as non-interest-bearing debt. Thus, provisions are excluded. In the income statement the

[6] According to the variables obtained from CCGR, *long-term liabilities* is defined as *total provisions (item 91)* plus *total other long-term liabilities (item 98)*.

interest expenses refer to the total amount of interest paid by a firm on all its borrowings, meaning bonds, loans, credit lines and convertible debt. Other financial expenses on the other hand concerns brokerage fees etc.

$$\text{Cost of borrowing} = \frac{\text{Tot. Interest expenses} + \text{Tot. Other financial expenses}}{\text{Tot. Current liabilities} + \text{Tot. Long term liabilities} - \text{Tot. provisions}}$$

4.3.2 CONTROL VARIABLES

Previous empirical research has devoted a lot of time to examine the determinants of corporate capital structures. In short, a number of these have concluded that both firm-, industry- and managerial characteristics may explain some of the variation in firms´ leverage ratios. Thus, to control for the influence of other external factors that may influence the firm's capital structure, we have chosen to construct several firm-, industry- and CEO control variables. Following previous research, we propose these control variables to be; *profitability, tangibility, firm size, growth, risk, industry leverage, CEO age* and *CEO ownership*.

Profitability is here used as a proxy for the economic performance of a firm. Following Malmendier, Tate and Yan (2011), profitability is measured as *return-on-assets* (ROA). In short, previous studies have suggested that there exists a negative relationship between the economic performance of a firm and their leverage ratio (Titman & Wessels, 1988; Baker & Wurgler, 2002). Meaning, firms with high ROA issue less debt because they are able to finance their operations from internally generated funds. These empirical findings support *the pecking order theory* (Myers & Majluf, 1984), which argue that firms will prefer to use internal funds such as retained earnings before resorting to external financing[7]. On the contrary, *the trade-off theory* (Myers, 1984) assumes a positive relationship between profitability and leverage. Hence, profitable firms would increase debt levels to take advantage of higher tax shields. However, these findings are not supported in the empirical research.

$$\text{Profitability} = \text{ROA} = \frac{\text{Operating income before depreciation}}{\text{Tot. Assets}}$$

[7] See *Preliminary Thesis section 2.1.5* and *2.2.3* in appendix A8

T*angibility* represents a measure for the level of collateral a firm can offer to its debtors (Baker & Martin, 2011). Following Malmendier, Tate and Yan (2011), tangibility is measured as *total fixed assets* over t*otal assets*. High levels of collateral lower the required return on debt, since debtors can liquidate assets in the case of bankruptcy. Thus, empirical studies have emphasized that firm leverage is positively related to tangibility (Harris & Raviv, 1991; Titman & Wessels 1988; Baker & Wurgler, 2002). These findings support *the trade-off theory* (Myers, 1984), as higher tangibility reduces the potential cost of distress.[8]

$$\text{Tangibility} = \frac{\text{Tot. Fixed assets (tangible)}}{\text{Tot. Assets}}$$

Empirical research argue that small and large companies differ in their financing choices (Frank & Goyal, 2003). Hence, *firm size* is argued to be positively related to leverage (Baker & Wurgler, 2002). Larger firms have often better access to capital markets and are often more diversified compared to smaller firms. Hence, they have smaller cash flow volatility, lower cost of financial distress and lower probability of bankruptcy (Baker & Martin, 2011), which provides better conditions for borrowing and a stronger negotiating force[9]. Following Malmendier, Tate and Yan (2011), firm size is measured as the natural logarithm of sales[10].

$$\text{Firm size} = \ln(\text{Sales})$$

Empirical research has further argued that another determinant of a firm´s corporate capital structure is firm *growth*. In short, *the trade-off theory* by Myers (1984) propose that firms have significant incentives to avoid the problem of underinvestment and asset substitution. Thus, suggesting a negative relationship between firm growth and leverage. On the contrary, *the pecking order theory* by Myers and Majluf (1984) proposes that firms will use internal funds or external debt to finance new investments before resulting to equity. Hence, it predicts a positive relationship between firm growth and leverage. These findings have later

[8] See *Preliminary Thesis section 2.1.2* and *2.2.5* in appendix A8
[9] See *Preliminary Thesis section 2.2.1* in appendix A8
[10] According to the variables obtained from CCGR, sales is defined as *Total Operating Revenue*

been supported by Harris and Raviv (1991). Since this thesis focuses on private firms, firm growth is measured as the *change in log of total assets*.

$$\text{Growth} = \frac{\ln(\text{Tot. Assets})_t - \ln(\text{Tot. Assets})_{t-1}}{\ln(\text{Tot. Assets})_{t-1}}$$

Further, studies have emphasized that a firm´s capital structure is affected by the firm´s operating risk, which is dependent on the environment that the firm operates in. Hence, operating risk is inescapable. In short, it is suggested that firms with high operating risk will be more reluctant to issue debt, especially long-term debt, since issuing debt will add financial risk and increase the probability of insolvency (Francis, Stickney, Weil, & Schipper, 2009). Thus, according to *the trade-off theory* by Myers (1984), operating risk is suggested to be negatively related to firm leverage. Following López (2014), the firm´s operating risk is measured as *risk in sales*, hence the *standard deviation of the growth in sales*.

$$\text{Risk} = \text{Standard deviation of the growth in sales}$$

Empirical research has further suggested that factors such as *industry median leverage* have significant explanatory power for a firm´s capital structure (Frank & Goyal, 2009). In short, researchers have emphasized that companies can use industry median leverage as a proxy for the optimal capital structure, hence managers may use it as a benchmark. Thus, "firms that compete in industries in which the median firm has high leverage tend to have high leverage" (Frank & Goyal, 2009). To control for such industry effects, we measure industry median leverage as the *median of total liabilities-to-capital ratio per sector* at the aggregated level. Industry median leverage is here calculated per sector due to the lack of information on industry classification in our data sample.

$$\text{Industry Leverage} = \text{Median of the total liabilities to capital ratio per sector}$$

Further, previous studies have emphasized that there is a negative relationship between the CEO´s age and leverage. In short, CEOs from older generations appear to be more conservative in their decision making. Thus, they undertake less risky investments and tend to issue less debt (Bertrand & Schoar, 2003; Frank & Goyal, 2006; Serfling, 2014). To control for the influence of managerial characteristics, we have included *CEO age* as a control variable, which indicates the age of the CEO in the current year t, and therefore represents the executive´s biographical information.

$$\text{CEO age} = \text{Time period t} - \text{CEO birth year}$$

The last control variable *CEO ownership* is measured as the shares owned ultimately by the CEO and reflects the CEO´s personal investment in the company. Previous research has suggested that the CEO´s equity ownership drives their risk-taking incentives and as a consequence affects corporate investment- and financing decisions (Agrawal & Mandelker, 1987). This statement is supported by *the agency theory* by Jensen and Meckling (1976) which argues that CEO ownership aligns the manager´s interest with those of the outside shareholders. Hence, Faccio, Marchica and Mura (2016) suggested that including CEO ownership as a control variable would be beneficial, since it controls for agency conflicts.

$$\text{CEO ownership} = \text{Shares owned utimately by the CEO}$$

4.4 DESCRIPTIVE STATISTICS

This section aims at presenting the basic features of the data used in this thesis. *Table 2* summarises the descriptive statistics of the firm-, industry- and CEO control variables, divided by firm size (*panel A*) and gender (*panel B*). By dividing the sample by firm size, it becomes easier to examine how the basic features of our data vary with the size of the firm. However, what may be even more interesting for this particular thesis is how the basic features of our data vary with the gender of the CEO. We have therefore in *panel B* summarised the same descriptive statistics for the male- and female CEOs separately. We will below comment on the most important observations.

TABLE 2: *Descriptive statistics*

The tables below present the descriptive statistics of the firm-, industry- and CEO control variables used divided up by firm size (*panel A*) and gender (*panel B*). The information provided concerns the number of observations (N), the estimated mean values (MEAN), standard deviation (SD) and the minimum- and maximum value of each variable (MIN/MAX). *Leverage* is measured as total current liabilities plus total long-term liabilities, divided by total current liabilities plus total long-term liabilities plus total equity. *Short-term debt* is measured as total current liabilities divided by total current liabilities plus total long-term liabilities. *Cost of borrowing* reflects the total charge for issuing debt as a ratio and is measured as total interest expenses plus total other financial expenses divided by total current liabilities plus total long-term liabilities minus total provisions. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO.

Panel A:

	MICRO FIRMS					SME					LARGE FIRMS					ALL FIRMS				
	N	MEAN	SD	MIN	MAX	N	MEAN	SD	MIN	MAX	N	MEAN	SD	MIN	MAX	N	MEAN	SD	MIN	MAX
DEPENDENT VARIABLE:																				
Leverage	361 064	0,45	0,30	0	1	758 249	0,58	0,28	0	1	4 369	0,59	0,19	0	1	1 123 682	0,54	0,29	0	1
Short-term debt	339 212	0,82	0,32	0	1	753 834	0,70	0,35	0	1	4 368	0,66	0,24	0	1	1 097 414	0,74	0,35	0	1
Cost of borrowing	338 524	0,23	7,35	0	1840	753 540	0,26	13,37	0	3087	4 368	0,03	0,02	0	0,35	1 096 432	0,25	11,81	0	3078
VARIABLE OF INTEREST																				
Female CEO	337 319	0,16	0,37	0	1	745 562	0,14	0,36	0	1	4 369	0,07	0,25	0	1	1 087 215	0,15	0,35	0	1
FIRM CONTROL VARIABLE:																				
Profitability	361 066	0,03	1,58	-311	415,67	758 249	0,13	1,08	-855	344,39	4 369	0,12	0,06	-0,04	0,28	123 684	0,10	1,26	-855	415,67
Tangibility	361 066	0,16	0,27	0	1	758 249	0,24	0,30	0	1	4 369	0,27	0,20	0	0,80	123 684	0,21	0,29	0	1
Firm size	271 773	12,96	1,37	6,91	14,51	665 020	15,29	1,58	6,9	19,16	4 369	18,83	0,30	18,20	19,16	941 162	14,57	1,85	6,91	19,16
Growth	285 059	-0,00	0,04	-0,50	0,96	649 078	0,01	0,03	-0,52	1,53	3 812	0,01	0,03	-0,04	0,76	937 949	0,00	0,03	-0,52	1,53
Risk	268 455	0,78	1,01	0,05	3,85	654 101	0,57	0,89	0,05	3,85	3 925	0,69	1,19	0,05	3,85	926 481	0,63	0,93	0,05	3,85
Industry Leverage	360 757	0,59	0,03	0,43	0,60	758 144	0,59	0,03	0,03	0,60	4 367	0,59	0,03	0,48	0,60	1 123 268	0,59	0,03	0,03	0,60
CEO CONTROL VARIABLE:																				
CEO age	337 324	51,82	11,53	19	99,00	745 567	50,95	10,58	19	101,00	4 334	52,40	8,87	26	83,00	1 087 225	51,22	10,88	19	101,00
CEO ownership	361 066	63,34	39,34	0	100,00	758 249	55,20	38,87	0	100,00	4 369	30,02	36,99	0	100,00	1 123 684	57,72	39,24	0	100,00

Panel B:

	FEMALE CEO					MALE CEO					ALL FIRMS				
	N	MEAN	SD	MIN	MAX	N	MEAN	SD	MIN	MAX	N	MEAN	SD	MIN	MAX
DEPENDENT VARIABLE:															
Leverage	158 594	0,55	0,28	0	1	928 620	0,54	0,29	0	1	1 123 682	0,54	0,29	0	1
Short-term debt	155 746	0,77	0,33	0	1	908 544	0,73	0,35	0	1	1 097 414	0,74	0,35	0	1
Cost of borrowing	155 509	0,18	12,09	0	3053	907 788	0,26	11,73	0	3078	1 096 432	0,25	11,81	0	3078
VARIABLE OF INTEREST															
Female CEO	158 594	1	0,00	1	1	928 621	0	0	0	0	1 087 215	0,15	0,35	0	1
FIRM CONTROL VARIABLE:															
Profitability	158 594	0,10	0,38	-62,40	33,13	928 621	0,11	0,88	-311	416	123 684	0,10	1,26	-855	415,67
Tangibility	158 594	0,19	0,27	0	1	928 621	0,22	0,30	0	1	123 684	0,21	0,29	0	1
Firm size	138 365	14,49	1,61	6,91	19,16	776 758	14,62	1,87	6,91	19,16	941 162	14,57	1,85	6,91	19,16
Growth	131 781	0,00	0,03	-0,46	0,74	778 009	0,00	0,03	-0,49	1,53	937 949	0,00	0,03	-0,52	1,53
Risk	133 589	0,49	0,82	0,05	3,85	773 169	0,66	0,95	0,05	3,85	926 481	0,63	0,93	0,05	3,85
Industry Leverage	158 571	0,59	0,03	0,43	0,60	928 548	0,59	0,03	0,03	0,60	1 123 268	0,59	0,03	0,03	0,60
CEO CONTROL VARIABLE:															
CEO age	158 594	49,29	10,76	19	97	928 621	51,55	10,87	19	101	1 087 225	51,22	10,88	19	101,00
CEO ownership	158 594	51,2	39,42	0	100	928 621	60,70	38,27	0	100	1 123 684	57,72	39,24	0	100,00

From *Panel A,* we observe that the average leverage ratio increases with firm size. The average leverage ratio for micro firms, SMEs and large firms are 45%, 58% and 59% respectively. As previously mentioned, larger firms have better access to capital markets and are often more diversified than smaller firms, which provides better conditions for borrowing. Thus, empirical research has emphasized that firm size is positively related to leverage (Baker & Wurgler, 2002; Baker & Martin, 2011). We further observe that the larger the firm the higher the tangibility, implying that larger firms on average can offer a higher level of collateral to its debtors. Thus, it may become easier for larger firms to issue debt. However, the leverage ratio for all firms, regardless of size, is on average 54%. Furthermore, the average short-term debt ratio for micro firms, SMEs and large firms are 82%, 70% and 66% respectively, indicating that smaller firms on average tend to issue more short-term debt compared to larger firms. According to Titman and Wessels (1988), small firms may prefer short-term debt due to lower fixed costs. In addition, smaller firms are often more dependent on trade credit, which is one of the most used types of short-term financing.

From the descriptive statistics in *panel A,* we also observe that on average only 15% of the CEOs in our sample is female. Female CEOs are mostly represented in the smaller firms. On average 16% and 14% of the CEOs in micro firms and SMEs respectively are female, compared to 7% in large firms. Although the skewness between male- and female CEOs is expected, the observations are interesting because they may indicate that breaking through the glass ceiling is even more difficult in larger firms. When it comes to the age of the CEO, we observe that the age spectrum for CEOs of larger firms are narrower than for micro firms and SMEs. This may imply that CEOs of larger firms are required to have more experience before getting hired and retire when reaching a certain age. As previously mentioned, the sample is unbalanced. Hence, several of the variables have a lower amount of observations than the total sample size.

From *Panel B,* we observe that female CEOs and male CEOs on average have almost the same leverage ratio, 55% and 54% respectively. However, we observe that female CEOs on average tend to enjoy an exceptionally lower cost of borrowing. Further, we see that female CEOs on average tend to issue 4% more short-term debt compared to male CEOs. According to Myers (1977), short-term debt contributes to a more flexible capital structure, since renegotiations occur more

frequently. We further observe that firms, regardless of the CEO´s gender, have an average short-term leverage ratio of 74%, implying that firms on average issue more short-term debt compared to long-term debt. When it comes to our control variables, profitability, tangibility and firm size, we see no significant differences between male CEOs and female CEOs.

Furthermore, we observe in *panel B* that female CEOs on average tend to be younger than male CEOs. In addition, male CEOs own on average 9,5% more shares in the company compared to female CEOs, which may indicate that male CEOs often are more personally invested in the company. In general, females are argued to be less invested in the stock market compared to males, hence they own less non-listed and listed shares (DNB, 2019). However, regardless of gender, the CEO owns on average 51,22% of the firm´s shares, which may indicate that Norwegian non-listed firms have a quite concentrated ownership structure.

ILLUSTRATION 3: *Number of female- and male CEOs in the final sample of Norwegian private firms, for the time period 2001-2017*

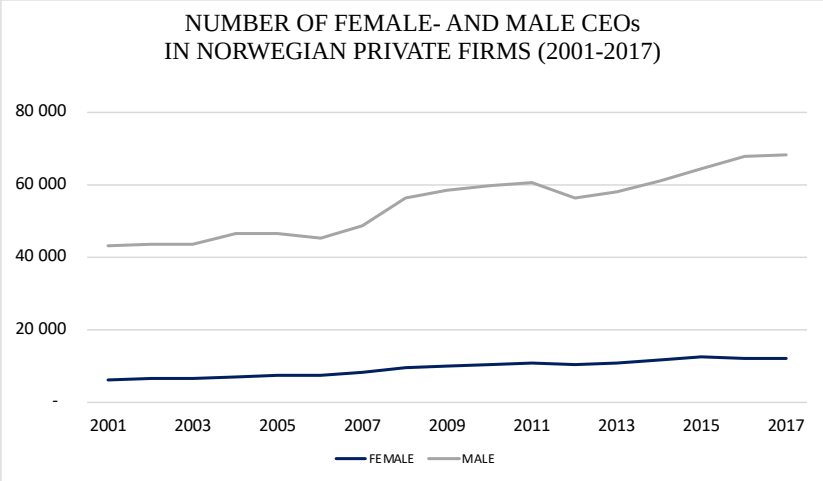


Illustration 3 graphs the number of female- and male CEOs over time in our final sample. In total, our final sample consists of 158 594 observations on female CEOs and 928 621 observations on male CEOs. This skewness indicates that there exists a gender gap among the CEOs of Norwegian private firms, which is clearly visible from the lines in *Illustration 3* above. However, as expected, the number of female CEOs has increased consistently over the time period. One exception is the period after 2015, where the number of female CEOs may seem to have stalled. Compared to previous studies focusing exclusively on listed firms, our sample contains a higher proportion of female CEOs. Indicating that the percentage of female CEOs is higher among private companies than publicly traded firms.

ILLUSTRATION 4: *Average leverage ratio for female- and male CEOs in the time period 2001-2017.*

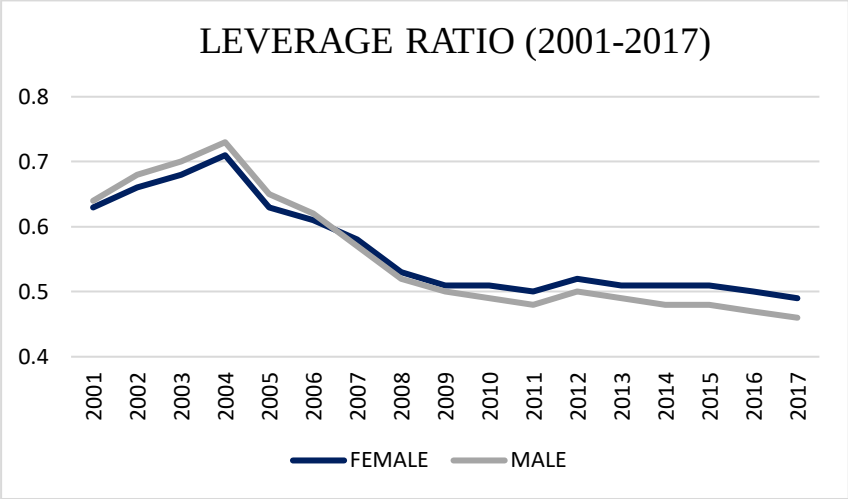


Illustration 4 graphs the average leverage ratio over time for firms led by female- and male CEOs separately. Until 2007, we observe that firms with male CEOs on average tend to have a higher leverage ratio, compared to firms run by female CEOs. Anyhow, this relationship is reversed after 2007. However, we would not argue that the difference is significantly large. Overall, we observe that the leverage ratio, regardless of gender, follows the same fluctuations, which may reflect some market- or policy chocks. For instance, the dot-com bubble burst in 2002, the Norwegian taxation reform in 2006 and the financial crises in 2008.

ILLUSTRATION 5: *Average short-term debt ratio for female- and male CEOs in the time period 2001-2017.*

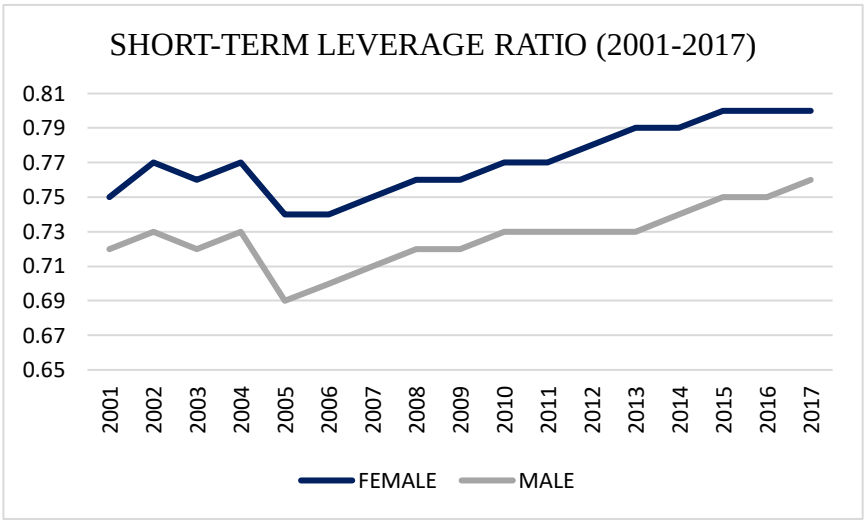


Illustration 5 graphs the average short-term debt ratio over time for firms led by female- and male CEOs separately. In short, we observe that firms led by female CEOs have a consistently higher short-term leverage ratio over time, compared to firms run by male CEOs. This may indicate that male- and female CEOs have different maturity preferences when issuing debt. Overall, the amount of short-term debt, regardless of gender, has increased since 2005. However, there might seem that the average amount of short-term debt has stabilised around 80% in the time period after 2015 for female CEOs.

ILLUSTRATION 6: *Average cost of borrowing for female- and male CEOs in the time period 2001-2017*

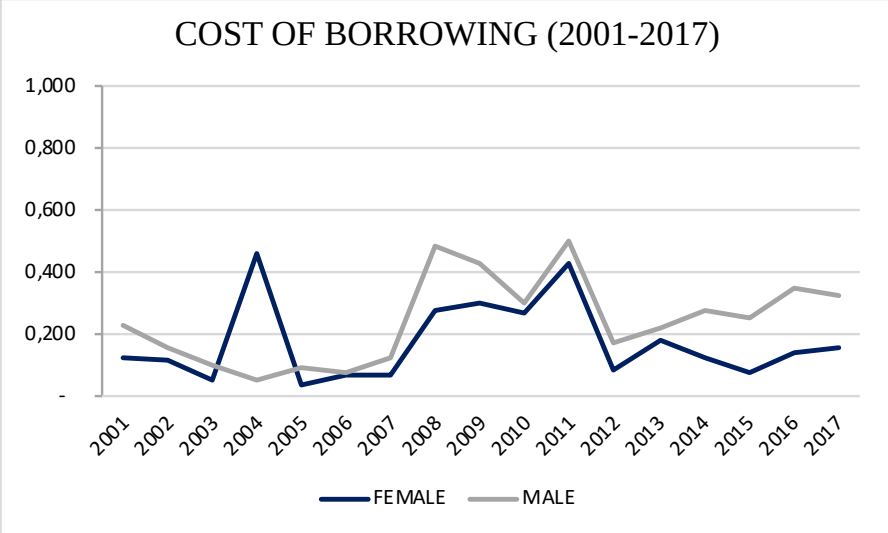


Illustration 6 shows the average cost of borrowing over time for firms led by female- and male CEOs separately. Overall, it is observed that firms led by female CEOs have on average a lower cost of borrowing over time compared to firms led by male CEOs, except in the year 2004. Female CEOs even have a lower cost of borrowing in the years where their average leverage ratio is higher than male CEOs (see *illustration 4*). In addition, regardless of gender, we notice that the cost of borrowing is extremely volatile, which may reflect some market- and policy chocks[11]. However, such special events and unexpected fluctuation will be controlled for in our estimated models.

[11] Events such as the introduction of *handlingsregelen* in 2001, *the inflation target for money policy* in 2001, *the tax reform* in 2006 and *the financial crisis* in 2008.

ILLUSTRATION 7: *The correlation matrix*

	LEVERAGE	SHORT-TERM DEBT	COST OF BORROWING	FEMALE CEO	PROFITABILITY	TANGIBILITY	FIRM SIZE	GROWTH	RISK	INDUSTRY LEVERAGE	CEO AGE	CEO OWNERSHIP
LEVERAGE	1,000											
SHORT-TERM DEBT	-0,241	1,000										
COST OF BORROWING	-0,021	0,003	1,000									
FEMALE CEO	-0,003	0,051	-0,001	1,000								
PROFITABILITY	0,062	0,093	-0,006	-0,017	1,000							
TANGIBILITY	0,192	-0,658	-0,004	-0,055	-0,026	1,000						
FIRM SIZE	0,311	0,129	-0,017	-0,026	0,206	-0,124	1,000					
GROWTH	0,078	-0,018	-0,010	-0,010	0,225	-0,015	0,092	1,000				
RISK	-0,146	-0,066	0,012	-0,066	-0,091	-0,013	-0,296	0,058	1,000			
INDUSTRY LEVERAGE	0,064	-0,007	0,000	-0,010	0,020	0,011	0,011	0,011	-0,009	1,000		
CEO AGE	-0,174	-0,028	0,002	-0,077	-0,055	0,042	-0,174	-0,067	0,047	-0,022	1,000	
CEO OWNERSHIP	-0,059	0,070	0,004	-0,087	0,023	-0,078	-0,180	-0,003	0,049	-0,018	0,015	1,000

Illustration 7 presents the correlations among the dependent variables, the variable of interest and the firm-, industry- and CEO control variables. Overall, most values are observed to be in in perfectly normal ranges, meaning that they have no linear relationship or very weak linear relationship. Female CEOs are negatively correlated to leverage, cost of borrowing and all the control variables. Suggesting that female CEOs issue less leverage, enjoy a lower cost of borrowing and manage smaller firms that are less risky, have lower growth and are less profitable. However, female CEO is observed to be positively correlated to short-term debt, which implies that female CEOs tend to issue more short-term debt. Firm size is observed to be positively correlated to leverage and short-term debt, hence larger firms issue more leverage and especially more short-term debt.

A high absolute correlation value between the coefficients indicates that there might be a collinearity problem in the data (James, Witten, Hastie, & Tibshirani, 2013). According to James et al. (2013), collinearity refers to the situation where two or more of the independent variables are highly correlated. This collinearity may reduce the accuracy of the estimated coefficient due to inflated standard errors. Since all of the values are in normal ranges, we assume that we have no problem with multicollinearity. However, the correlation matrix does not always capture the problem of multicollinearity. Hence, a better way to detect this problem is to use the *Variance Inflation Factor* (VIF)[12] test. The VIF-test presented in *Appendix A3* indicates that our analysis is not threatened by the problem of multicollinearity.

[12] Variance Inflation Factor (VIF) is the "ratio of the variance $\hat{\beta}_j$ when fitting the model divided by the variance of $\hat{\beta}_j$ if fit on its own" (James, Witten, Hastie, & Tibshirani, 2013). As a rule of thumb, a VIF value larger than 5 or 10 indicates a problem of multicollinearity.

5.0 METHODOLOGY

The following sections will elaborate on the empirical methodology applied in this particular thesis. Hence, the section will start by addressing the endogeneity issue before estimating the necessary models.

5.1 ENDOGENEITY

A major concern for empirical research within the field of corporate finance is the problem of endogeneity (Parsons & Titman, 2007). The occurrence of potential endogeneity issues will be particularly important to consider in this thesis, since female CEOs are not randomly assigned to firms. (Bertrand & Schoar, 2003; Huang and Kisgen, 2013). The problem of endogeneity occurs when at least one of the independent variables are correlated with the error term, which may result in biased coefficient estimates (Wooldridge, 2016)[13]. In short, the endogeneity issue can potentially distort the impact of the CEO in our results due to *reverse causality*, *self-selection* or *omitted variables* (Parsons and Titman, 2007).

According to Bertrand and Schoar (2003), CEOs may be specifically selected based on their observable managing style so that they match the strategy of the firm. This is referred to as the problem of reverse causality, also called simultaneity, which raise the question whether the gender of the CEO determines the firm´s financing decisions, or whether firms hire CEOs with personal traits which match the firm´s financing policy (Korkeamäki, Liljeblom, & Pasternack, 2017). A second problem to consider is the chance of female CEOs self-selecting into particular types of businesses (Huang and Kisgen, 2013). For instance, females may self-select into low-risk firms (Faccio, Marchica and Mura, 2016)[14]. Further, the problem of omitted variables, also called unobserved heterogeneity, may occur if the estimated model excludes relevant variables either because of ignorance or limited data (Wooldridge, 2016). For this particular thesis, the problem of omitted variables may appear because of some unobservable factors that may determine the firm's capital structure.

[13] The assumption of *zero conditional mean* states that the error term has an expected value of zero given any values of the independent variables: $E(u|x_1, x_2, \dots, x_k) = 0$. When the assumption holds, we argue to have exogenous explanatory variables. However, when the error term (u) correlates with at least one of the independent variables we argue that we have a endogenous independent variable, which may result in biased OLS estimators (Wooldridge, 2016).

[14] Executives at a high-risk firm have proven to have less flexible timetables and longer working hours, which may be harder to combine with family life (Goldin & Katz, 2010)

5.2 MODEL ESTIMATION

The problem related to endogeneity will clearly be an important momentum to consider when estimating the appropriate model. In short, there are several approaches which mitigate the endogeneity problem. One of the most used methods is the instrument variable approach. However, finding an instrument variable that fulfil both the relevance- and exogeneity condition may be rather hard[15]. We have therefore chosen to mitigate the endogeneity issue by adopting a panel data regression model. One way to deal with panel data is by estimating a pooled regression. However, this method is likely to suffer from heterogeneity due to unobserved effects in our study. In general, the benefit of using panel data regression is its ability to control for both unobserved unit-specific and time-invariant cofounders, as well modelling the direction of the causal relationship (Allison, Williams, & Moral-Benito, 2017). In general, there are two methods for estimating unobserved effects: *Fixed Effects estimation* (FE) and *Random Effects estimation* (RE) (Wooldridge, 2016).

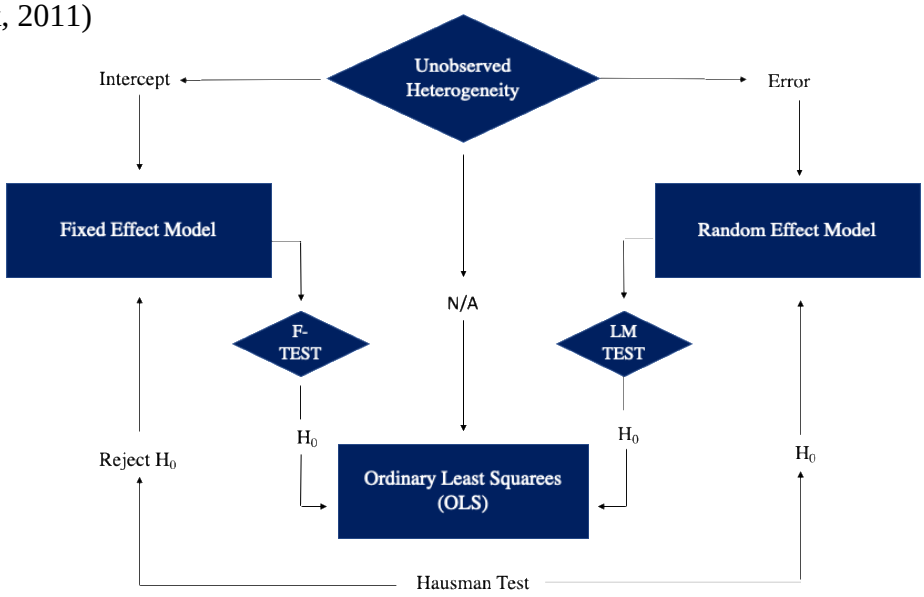
A common approach to decide between fixed effects and random effects is to conduct *The Hausman test* (Verbeek , 2012). In short, if the null hypothesis is not rejected, a *random effects model* would be appropriate. While if the null hypothesis is rejected, a *fixed effects model* would be appropriate[16]. The result, presented in *Appendix A4*, indicates that a fixed effects model would be appropriate. However according to Verbeek (2012), the result from the Hausman test should be interpreted with caution. The aim of this thesis is to estimate the impact of female CEOs on corporate capital structure. Hence, it is necessary to include a dummy variable for the gender of the CEO. Wooldridge (2016) argues that such time-invariant variables, meaning variables that are constant over time for all *i,* would be omitted in a fixed effects model. We have therefore chosen to estimate a random effects model instead, which has the benefit of allowing time-invariant variables such as gender. Further, to test whether a random effects model would be better to deal with the heterogeneity issue than pooled OLS, we conducted a *Breusch-Pagan Lagrange-multiplier Test for random effects (LM-test).* In short, the null hypothesis specifies that the individual or time-specific error variance components are zero,

[15] The instrument variable approach requires us to create an instrument variable (z_i), which satisfy two different conditions; *instrument exogeneity* and *instrument relevance*. *Instrument exogeneity* argues that the instrument variable (z_i) should have no effect on the dependent variable (y). On the other hand, *instrument relevance* argues that the instrument variable (z_i) should be relevant for explaining variation in the independent variable (x_i).

[16] The Hausman test specify the null hypothesis as "α_i are not correlated with X_{it}" and the alternative hypothesis as "α_i are correlated with X_{it}" (Maddala & Lahiri, 2009)

meaning that there are no random effects in our data and pooled OLS is preferred. While the alternative hypothesis specifies that the individual or time-specific error variance components are not zero, hence the random effects model is preferred. From the LM-test, presented in *Appendix A5*, we reject the null hypothesis. Thus, we propose to estimate a two-way random effects model.

ILLUSTRATION 8: *A modified version of the panel data modelling process* (Park, 2011)



We propose to estimate the following two-way random effect model:

$$Y_{it} = \beta_0 + \beta_1 FEMALE_{it} + \beta_2 X_{it} + \gamma_t + u_{it}$$

The dependent variables in our study (*leverage*, *short-term debt* and *cost of borrowing*) are represented by Y_{it}. The managerial trait of interest in this study is represented by the variable $FEMALE_{it}$, which is a dummy variable taking the value of 1 if the CEO is a female, and 0 otherwise. Furthermore, the X_{it} represents a vector of firm-, industry- and CEO control variables. Following previous research, we propose these control variables to be; *profitability*, *tangibility*, *firm size*, *growth*, *risk*, *industry leverage*, *CEO age* and *CEO ownership*. Further, γ_t represents a vector of time dummies. Finally, u_{it} represents the composite error term $u_{it} = (\alpha_i + \varepsilon_{it})$, where α_i is the unobserved firm effects and ε_{it} is the error term. To specify the notation used in the model, *i* represents the firm index while *t* represents the time-period.

The random effects model is based on a strict assumption, which requires the composite error term to be uncorrelated with all explanatory variables (Brooks, 2015). Since α_i is treated as a random variable, the composite error term is subject to serial correlation meaning that we have to use generalized least squares (GLS) to get efficient estimates (Verbeek, 2012; Wooldridge, 2016)[17]. In short, this serial correlation occurs since α_i is included in the composite error term for each time-period *t*. Further, to control for potential heteroscedasticity and serial correlation, we choose to cluster the standard errors at firm level. Hence, the GLS estimator will provide more consistent and efficient estimates.

Further, to tackle the problem of endogeneity we included several firm-, industry- and CEO control variables, which is described in detail in *section 4.3.2*. These variables are included to control for the effect of other external factors that may influence the firm´s capital structure. Furthermore, to mitigate the omitted variable bias, the sample is divided into subgroups after firm size as defined in *section 4.2*. Finally, the model also includes time fixed effects. The time fixed effects control for variables that are constant across entities but vary over time (Stock & Watson, 2006). Such time fixed effects are often included in panel data regressions to account for unexpected variations or special events (Sojli, Tham , & Wang, 2018), such as financial crises, tax law regulations, interest rate fluctuations and changes in governmental policies. However, by including these we assume that firms react homogenously to these changes.

[17] One of the assumptions for obtaining efficient estimates when using Ordinary Least Squares (OLS) is that the error terms do not correlate. In order to obtain efficient estimates when the error terms correlates, which they often do in panel data, is to use *Generalized Least Squares* (GLS) (Verbeek, 2012).

6.0 EMPIRICAL RESULTS AND DISCUSSION

The following sections present the main results obtained from the regression analysis using the estimated two-way random effects model. The main results are presented in *table 3, 9* and *15.* Each of the defined hypotheses are tested and discussed separately. Further, all regression outputs are presented after the classification justified in *section 4.2,* meaning *micro firms, SMEs, large firms* and *all firms.* As a final step, a series of robustness tests are performed before some limitations regarding this particular study is presented.

6.1 EFFECT OF FEMALE CEOs ON FIRM LEVERAGE

Previous research demonstrates that there are several factors affecting a firm's financing decisions. Following Malmendier, Tate and Yan (2011), we first begin by estimating the random effects model in stages using the entire sample for comparison with previous existing literature and to examine how much of the variation in the firm´s leverage ratio the added controls are able to explain. The output is presented in *appendix A6.*

In *Column 1* we estimate a simple one-way random effects model, including all the defined firm- and industry control variables; *profitability, tangibility, firm size, growth, risk* and *industry leverage*. The added controls explain 22,61% of the variation in a firm´s leverage ratio. In *column 2,* we add all the defined CEO-controls; *CEO age* and *CEO ownership*. As expected, R-squared increases when adding these controls. In *column 3,* we estimate the original two-way random effects model, which includes the dummy variable of interest *female CEO* and year fixed effects. By adding the year fixed effects and *female CEO,* R-squared improves by additionally 2,59%. Consistent with the findings of Harris and Raviv (1991), Bertrand and Schoar (2003) and Frank and Goyal (2009), we find that the control variables have the typical directional effect; *(-) profitability, (+) tangibility, (+) firm size, (+) growth, (-) risk, (+) industry leverage, (-) CEO age* and *(+) CEO ownership.*

In the first hypothesis, we proposed that firms run by female CEOs would adopt a capital structure with less leverage compared to firms run by male CEOs, since they are more concerned with reducing the risk of default. *Table 3* presents the main results of the effect of female CEOs on firm leverage.

TABLE 3: *Main results for the effect of female CEOs on firm leverage*

Table 3 presents the regression analysis of the effect of female CEOs on firm leverage. The results are obtained by running the estimated two-way random effects model with *leverage* as the dependent variable. *Leverage* is here measured as total current liabilities plus total long-term liabilities, divided by total current liabilities plus total long-term liabilities plus total equity. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	-0,1932**	0,1231***	-0,7696***	0,0101
	(0,0979)	(0,0327)	(-0,3061)	(0,0340)
Female CEO	0,0087***	0,0035	-0,0020	0,0049***
	(0,0029)	(0,0024)	(0,0235)	(0,0020)
Profitability	-0,0651***	-0,0171	-0,2704***	-0,0167
	(0,0163)	(0,0123)	(0,0414)	(0,0114)
Tangibility	0,1818***	0,1947***	0,1630***	0,1983***
	(0,0039)	(0,0026)	(0,0243)	(0,0023)
Firm size	0,0565***	0,0330***	0,0601***	0,0406***
	(0,0014)	(0,0007)	(0,0127)	(0,0007)
Growth	0,6103***	0,5816***	0.3818***	0,5778***
	(0,0517)	(0,0158)	(0,0762)	(0,0224)
Risk	-0,0098***	-0,0215***	0,0041	-0,0188***
	(0,0011)	(0,0009)	(0,0039)	0,0007
Industry Leverage	0,2414	0,2857***	0,6603**	0,2798***
	(0,1622)	(0,0523)	(0,2956)	(0,0552)
CEO age	-0,0018***	-0,0019***	-0,0019***	-0,0020***
	(0,0001)	(0,0001)	(0,0007)	(0,0001)
CEO ownership	0,0001***	0,0000	0,0002	0,0001***
	(0,0000)	(0,0000)	(0,0001)	(0,0000)
Year fixed effects	✓	✓	✓	✓
R-squard	0,2328	0,2318	0,0751	0,2696
No. of observations	196 517	548 714	3614	748 845
No. of firms	43 797	86 630	1230	110 459

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

Column 4 shows that for all firms, regardless of size, *female CEO* is statistically significant at the 0,01 level. The coefficient is positively related to firm leverage with an estimated effect of 0,0049. Indicating that firms run by female CEOs issue 0,49% more leverage than firms run by male CEOs. However, as already discussed, most of the private firms in Norway are small. Thus, concluding using the sample *all firms* may not be representative due to a biased sample frame. As a consequence, the main results should mostly emphasize the estimated effect in the smaller firms of the sample.

Starting by micro firms in *column 1*, *female CEO* is statistically significant at the 0,01 level with an estimated coefficient of 0,0087. The coefficient indicates that micro firms run by female CEOs issue 0,87% more leverage than micro firms run by male CEOs. The effect of *female CEO* is observed to decrease as firm size increases. Hence, it is arguable that CEOs of micro firms may have a greater influence on a firm´s decisions. According to Gudmundson (2016), the role of the CEO differs significantly across firm sizes. For instance, smaller firms are often more closely managed by the CEO, hence the CEO may make most of the decisions.

The same positive effect is observed for SMEs, where *female CEO* has an estimated coefficient of 0,0035. However, the coefficient is not statistically significant. Thus, we would argue that there is not sufficient evidence to conclude that there for SMEs exist significant differences in the financing decisions of female- and male CEOs. On the contrary, the result for large firms in *column 3* proposes a negative relationship between female CEOs and leverage. The estimated coefficient is -0,0020, but this negative effect is not statistically significant. Thus, we cannot with certainty conclude that female CEOs of large firms issue less leverage than male CEOs of large firms. However, the weak result may propose that there in larger firms is less room for the influence of managerial traits, such as the gender of the CEO. Hence, this topic would be interesting for future research.

In sum, the results do not support our hypothesis of female CEOs issuing less leverage compared to male CEOs. In accordance with Adams and Funk (2012), our findings may in fact imply that female CEOs´ risk aversion disappears once they have broken through the glass ceiling. Thus, the presence of a female CEO may not necessarily lead to more conservative financing decisions.

Further, from *table 3,* the control variable *profitability* is observed to be negatively related to firm leverage with an estimated effect of -0,0651, -0,0171, -0,2704 and -0,0167 for micro firms, SMEs, large firms and all firms respectively. Except for SMEs and all firms, the coefficients are statistically significant at the 0,01 level. These results support *the pecking order theory* and suggest that profitable firms prefer to finance their operations using internally generated funds, hence issue less debt. The control variables *tangibility* and *firm size* are both estimated to be positively related to firm leverage. By increasing tangibility by one per cent, firm

leverage increases by 18,18%, 19,47%, 16,3% and 19,83% for micro firms, SMEs, large firms and all firms respectively. Tangibility represents the level of collateral a firm can offer to its debtors. Higher level of tangibility lowers the required return on debt, hence it is positively related to leverage (Harris & Raviv, 1991; Titman & Wessels 1988; Baker & Wurgler, 2002).

The firm control variable *firm size* is statistically significant at the 0,01 level for all sub-samples and ranges from 0,0330 to 0,0601. In short, these results support the notion that larger firms often have better access to capital markets than smaller firms, which provides better conditions for issuing debt (Baker & Martin, 2011). Further, firm *growth* is observed to be statistically significant at the 0,01 level for all sub-samples. The results propose that firm growth is significantly positively related to firm leverage, which supports *the pecking order theory* by Myers and Majluf (1984). Hence, firms will use internally generated funds and external debt to finance new investments before resulting to equity. Further, it is observed that *risk* in sales is statistically significant at the 0,01 level for micro firms and SMEs, which suggest that the more operational risk the smaller firms have, the less leverage they will issue in order to avoid adding financing risk. Finally, the control variable *industry leverage* is statistically significant at the 0,01 and 0,05 level for SMEs and large firms. The positive coefficients indicate that the higher the industry leverage is, the more debt the firm issue. Thus, reinforcing the findings of firms using the industry leverage as a benchmark.

Further, the control variable *CEO age* is statistically significant at the 0,01 level for all four sub-samples. The estimated coefficients are negative, which indicate that older CEOs adopt a more conservative capital structure with less leverage. Apart from large firms, the estimated R-squared ranges from approximately 23% to 27%, which indicates that our model offers a good explanatory power of a firm´s leverage ratio.

6.1.1 ROBUSTNESS TEST: ALTERNATIVE MEASURE FOR LEVERAGE

Our initial findings did not support our hypothesis of female CEOs issuing less leverage compared to male CEOs. Thus, in order to conclude, further examinations are required.

TABLE 4: Effect of female CEOs on interest-bearing debt

Table 4 presents the result from the robustness test using an alternative variable definition for leverage. The results demonstrate the effect of female CEOs on firm's leverage ratio, when excluding non-interest-bearing debt. The results are obtained by running the estimated two-way random effects model with *leverage* as the dependent variable where *Leverage* is measured as total debt divided by total assets. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	0,1827***	0,1910***	0,4389**	0,1430***
	(0,0757)	(0,0347)	(0,2237)	(0,0319)
Female CEO	0,0144***	0,0026	0,0034	0,0049***
	(0,0029)	(0,0021)	(0,0159)	(0,0018)
Profitability	-0,0772***	-0,0391	-0,2992***	-0,0279
	(0,0197)	(0,0315)	(0,0405)	(0,0214)
Tangibility	0,3414***	0,4070***	0,4030***	0,3986***
	(0,0040)	(0,0033)	(0,0215)	(0,0025)
Firm size	0,0062***	-0,0019	-0,0179*	0,0025***
	(0,0016)	(0,0014)	(0,0106)	(0,0011)
Growth	0,3734***	0,2859***	0,3021***	0,3001***
	(0,0613)	(0,0302)	(0,0594)	(0,0393)
Risk	-0,0045***	0,0023***	0,0063**	0,0000
	(0,0011)	(0,0008)	(0,0031)	(0,0007)
Industry Leverage	0,0599	0,2390***	0,3270***	0,2008***
	(0,1238)	(0,0518)	(0,1225)	(0,0496)
CEO age	-0,0011***	-0,0009***	-0,0010*	-0,0009***
	(0,0001)	(0,0001)	(0,0005)	(0,0001)
CEO ownership	0,0001***	-0,0001***	0,0002	-0,0000
	(0,0000)	(0,0000)	(0,0001)	(0,0000)
Year fixed effects	✓	✓	✓	✓
R-squard	0,2036	0,3116	0,3251	0,3170
No. of observations	196 517	548 714	3 614	748 845
No. of firms	43 797	86 630	1 230	110 459

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

Initially, the leverage ratio is measured as *total current liabilities* plus *total long-term liabilities*, divided by *total capital*[18]. Recall that *total long-term liabilities* is defined as *total provisions* plus *total other long-term liabilities*. Thus, our measure for leverage consists of both operational- and financial debt. Operational debt

[18] Total capital is measured as *total current liabilities* (item 109) plus *total long-term liabilities* (item 98 + item 91) plus *total equity* (item 87).

occurs due to the firm´s primary business activities and includes non-interest-bearing elements such as deferred tax, pension liabilities, other provisions, accounts payable and tax payable. On the contrary, financial debt includes interest-bearing elements such as current- and non-current debt to financial institutions and bonds. To examine the robustness of our initial result, an alternative variable definition of leverage was adopted where all non-interest-bearing elements was excluded. Hence, *leverage* is here measured as *total debt to assets*[19].

From *table 4* it is observed that when excluding non-interest-bearing debt, the effect of female CEOs of micro firms continues to be statistically significant at the 0,01 level. In addition, the estimated effect increases from 0,0087 to 0,0144. Implying that micro firms led by a female CEO issue 1,44% more interest-bearing debt than micro firms led by a male CEO. However, for SMEs and large firms, no big changes are observed. In sum, the trend of female CEOs of micro firms issuing more leverage compared to male CEOs remains when excluding non-interest-bearing debt. Thus, our initial hypothesis of female CEOs issuing less leverage compared to male CEOs is still not supported.

Only small differences are observed for the control variables. For instance, the estimated effect for tangibility increases for all sub-samples, indicating that firms with higher tangibility often issue more interest-bearing debt. In short, the more collateral a firm can provide, the easier it will be to obtain financing from financial institutions. In addition, we observed that R-squared is higher for all sub-samples than in the original model, expect for micro firms where it decreases from 23,28% to 20,36%.

6.1.2 ROBUSTNESS TEST: ADDITIONAL CONTROL VARIABLES

As a further robustness test, we added two additional control variables: *cash holdings* and *female presence* on corporate boards[20]. In short, we were interested in seeing whether our initial results of female CEOs of micro firms issuing more

19 *Total debt* represents only interest-bearing current- and non-current debt. Thus, *total debt* is defined as *other long-term liabilities (item 98)* plus *short-term liabilities to financial institutions (item 101)* plus *other short-term liabilities (item 108).* Meaning that elements such as provisions, trade credit and tax payable are excluded.

20 *Cash Holdings* is measured as *cash and cash equivalent (item 76)* divided by *total assets (item 63 + item 78),* while *Female presence* is measured as *total female board members (item 605)* divided by *total board members (item 602).*

leverage compared to male CEOs of micro firms were robust to the inclusion of other control variables. Empirical research has emphasized that cash holdings are negatively related to leverage (Opler, Pinkowitz, Stulz & Williamson, 1999; Ferreira & Viela, 2004). Following *the pecking order theory*, firms only issue debt when their internally generated funds are insufficient to finance new investments.

After Norway first introduced gender quotas in 2005, requiring at least 40% female presence on corporate boards for all listed companies, the topic on the effect of higher female presence on corporate boards have attracted much attention. Previous studies have emphasized that females in general are more risk averse than males. Thus, some argue that higher female presence on corporate boards would lead firms to take more risk averse decisions, such as adopting a capital structure with less leverage (Yang, Riepe, Moser, Pull, & Terjesen, 2019). On the contrary, other authors such as Adams and Funk (2012) have emphasized that females´ risk aversion may disappear once they have broken through the glass ceiling. Thus, the presence of females in boardrooms may not necessarily result in more risk averse decision making.

From *table 5*, it is observed that when adding the two additional control variables, the effect of female CEOs changes from being statistically significant at the 0,01 level to being statistically significant at the 0,05 level. However, *female CEO* is still estimated to have a positive effect on firm leverage, but the coefficient decreases from 0,0087 to 0,0079. More interestingly, female CEOs of SMEs changes from being statistically insignificant to now being statistically significant at the 0,01 level. Thus, there is now sufficient evidence to argue that female CEOs of SMEs have a positive effect upon firm leverage. The estimated coefficient of 0,0078 implies that SMEs led by female CEOs issue 0,78% more leverage than SMEs led by male CEOs. In sum, our initial findings that female CEOs of smaller firms issue more leverage compared to male CEOs is robust to the inclusion of other control variables. Thus, our hypothesis is still not supported.

TABLE 5: *Effect of female CEOs on leverage with additional control variables*

Table 5 presents the result from the robustness test when adding *Cash Holdings* and *Female Presence* on boards as additional control variables. The results demonstrate the effect of female CEOs on firm's leverage ratio. The results are obtained by running the estimated two-way random effects model with *leverage* as the dependent variable. *Leverage* is measured as total current liabilities plus total long-term liabilities, divided by total current liabilities plus total long-term liabilities plus total equity. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. *CEO ownership* is measured as the shares owned ultimately by the CEO. The additional control variable *Cash Holdings* is measured as cash and cash equivalent divided by total assets. *Female Presence* refers to the percentage of female board members and is measured as the total number of female board members divided by the total number of board members. Column (1), (2), (3) and (4) reports the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	-0,1977**	0,1526***	-0,6043*	0,0420
	(0,0959)	(0,0323)	(0,3097)	(0,0337)
Female CEO	0,0079**	0,0078***	0,0111	0,0083***
	(0,0038)	(0,0027)	(0,0220)	(0,0023)
Profitability	-0,0626***	-0,0127	-0,2106***	-0,0147
	(0,0156)	(0,0090)	(0,0419)	(0,0099)
Tangibility	0,1353***	0,1470***	0,1373***	0,1512***
	(0,0044)	(0,0027)	(0,0254)	(0,0024)
Firm size	0,0569***	0,0333***	0,0530***	0,0399***
	(0,0014)	(0,0006)	(0,0126)	(0,0001)
Growth	0,6087***	0,5971***	0,3849***	0,5852***
	(0,0499)	(0,0139)	(0,0753)	(0,0199)
Risk	-0,0106***	-0,0238***	0,0036	-0,0207***
	(0,0011)	(0,0009)	(0,0038)	(0,0007)
Industry Leverage	0,2924*	0,2924***	0,6322**	0,3001***
	(0,1589)	(0,0520)	(0,3044)	(0,0547)
CEO age	-0,0016***	-0,0018***	-0,0017**	-0,0018***
	(0,0001)	(0,0001)	(0,0007)	(0,0001)
CEO ownership	0,0001***	0,0000**	0,0001	0,0001***
	(0,0000)	(0,0000)	(0,0001)	(0,0000)
Cash Holdings	-0,0940***	-0,1244***	-0,1635***	-0,1113***
	(0,0036)	(0,0031)	(0,0316)	(0,0025)
Female Presence	0,0073*	0,0033	-0,0409	0,0043
	(0,0000)	(0,0029)	(0,0212)	(0,0025)
Year fixed effects	✓	✓	✓	✓
R-squard	0,2547	0,2525	0,1019	0,2868
No. of observations	193 905	544 007	3 600	741 512
No. of firms	43 239	86 127	1 228	109 685

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

Only small differences are observed for the control variables, hence only the new additional variables are discussed. *Cash holdings* is observed to be negatively related to firm leverage with an estimated effect of -0,0940, -0,1244 and -0,1635

for micro firms, SMEs and large firms respectively. The coefficients are statistically significant at the 0,01 level for all sub-samples, implying that as cash holdings increase by one per cent, the leverage ratio decreases by 9,40%, 12,44% and 16,35% for micro firms, SMEs and large firms respectively. On the contrary, *female presence* on corporate boards is only statistically significant at the 0,10 level for micro firms. In finance, the general accepted limit is at the 0,05 level. Thus, at the 0,10 level we would argue that there is not sufficient evidence to conclude on the influence of higher female presence on boards, for corporate leverage ratios. In addition, we observed that R-squared is higher for all sub-samples than in the original model.

6.1.3 ROBUSTNESS TEST: FAMILY FIRMS

As a further robustness test, we limit the sample to only contain family firms. Following Bøhren (2011), we defined *family firms* as firms where the majority of shares, meaning where at least 50%, is owned by the family. The final sample contained 946 516 repeated observations on 161 129 family firms. According to Bøhren (2011), family firms are the dominating organisational form in Norway, especially among smaller private firms. In short, Norwegian family firms are argued to have a higher ownership concentration than other firms, and it is a widespread practice that the owners´ function as both CEO and as a board member. Thus, several researchers have emphasized that family firms often are managed differently than non-family firms and that the decision making is much more centralised (Halkias & Adendorff, 2016). For instance, private family firms may have lower risk incentives since the owners´ wealth and income are closely related to firm performance. Hence, private family firms often adopt a strategy which tries to limit risk through their financing- and investment policies.

From *table 6,* it is observed that when limiting the sample to only containing family-owned firms, the effect of female CEOs of micro firms continues to be statistically significant at the 0,01 level with a coefficient that slightly decreases from 0,0087 to 0,0081. Thus, our initial findings of female CEOs of micro firms issuing more leverage than male CEOs of micro firms is robust to the exclusion of non-family-owned firms. However, the effect of *female CEOs* on a firm´s leverage ratio in SMEs continues to be statistically insignificant.

TABLE 6: *Effect of female CEOs on leverage in Norwegian private family firms*

Table 6 presents the result from the robustness test of the effect of female CEOs on firm's leverage ratio, when limiting the sample to only family-owned firms. *Family firms* is here defined as firms where the majority of shares is owned by the family (>50%). The results are obtained by running the estimated two-way random effects model with *leverage* as the dependent variable. *Leverage* is here measured as total current liabilities plus total long-term liabilities, divided by total current liabilities plus total long-term liabilities plus total equity. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	-0,1922*	0,1275***	-1,0890***	0,0111
	(0,1005)	(0,0338)	(0,2833)	(0,0368)
Female CEO	0,0081***	0,0029	-0,0434*	0,0049**
	(0,0029)	(0,0025)	(0,0233)	(0,0020)
Profitability	-0,0896***	-0,0148	-0,3080***	-0,0184
	(0,0087)	(0,0110)	(0,0521)	(0,0133)
Tangibility	0,1822***	0,1956***	0,2015***	0,1990***
	(0,0041)	(0,0027)	(0,0299)	(0,0024)
Firm size	0,0587***	0,0330***	0,0629***	0,0410***
	(0,0010)	(0,0007)	(0,0139)	(0,0008)
Growth	0,6576***	0,5717***	0,2509***	0,5654***
	(0,0260)	(0,0161)	(0,0648)	(0,0261)
Risk	-0,0103***	-0,0228***	0,0036	-0,0199***
	(0,0011)	(0,0009)	(0,0041)	(0,0008)
Industry Leverage	0,2109	0,3007***	0,2542***	0,2905***
	(0,1674)	(0,0544)	(0,0748)	(0,0598)
CEO age	-0,0017***	-0,0019***	-0,0028***	-0,0020***
	(0,0001)	(0,0001)	(0,0007)	(0,0001)
CEO ownership	0,0001***	-0,0000	0,0000	0,0000*
	(0,0000)	(0,0000)	(0,0001)	(0,0000)
Year fixed effects	✓	✓	✓	✓
R-squard	0,2419	0,2571	0,1348	0,2885
No. of observations	176 082	465 925	2 365	664 372
No. of firms	40 975	78 898	816	101 679

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

More interestingly are the changes observed for large firms in *column 3*. In short, when limiting the sample to only include family firms, the estimated effect of female CEOs changes from being statistically insignificant to being statistically significant at the 0,10 level. Further, compared to the smaller firms, the estimated effect of female CEOs is negative, with an estimated coefficient of -0,0434,

proposing that large family firms led by a female CEO issue 4,34% less leverage than large family firms led by a male CEO. These results would in general support our initial hypothesis of female CEOs being more risk averse, hence issuing less leverage. However, at the 0,10 level we would argue that there is not sufficient evidence to conclude that female CEOs of larger family firms issue less leverage. Only small differences are observed for the control variables. There should also be noted that R-squared is higher for all sub-samples compared to the original model.

6.1.4 ROBUSTNESS TEST: STRUCTURAL BREAK

According to Antoch, Hanousek, Horváth , Husková, and Wang (2017), one general concern when working with panel data in finance research is that the data may contain a structural break[21] due to policy changes or market chocks. Such structural breaks may reduce the validity of a study and its conclusion. In general, *illustration 4* and *5* suggest the occurrence of a structural break around 2004. The data sample used in this study contained repeated observations on 538 239 Norwegian private firms over the time period 2001-2017. Thus, one concern is the existence of a structural break due to the Norwegian tax reform of 2006, which was announced in 2004. To test for the existence of a known structural break, the chow test was applied[22]. In short, the null hypothesis proposes that the estimated parameters are stable (no structural break), while the alternative hypothesis proposes a difference in the estimated parameters (structural break). The chow test indeed supports the notion of a structural break around 2004.

Prior to the taxation reform in 2006, Norwegian private firms had in practice been exempted from dividend taxation. Hence, giving owners that function as a CEO incentives to indulge in income shifting between labour and capital, by classifying labour income as dividends. (Alstadsæter A, 2007; López, 2014). In brief, the main objective of the Norwegian tax reform of 2006 was to minimise such opportunities of income shifting by increasing tax rates on dividend income from 0% to 28% (Alstadsæter & Fjærli, 2009; Finansdepartementet, 2011). Thus, the announcement of the taxation reform in 2004 gave private firms larger incentives to distribute

[21] In the case of time series, a structural break is an unexpected change in means or parameters at a particular point in time (STATA, 2020).

[22] *The chow test* uses a F-test to examine whether a pooled regression or two separate regressions fits the underlying data better (Gould, 2020). In general, the formula can be expressed as:

$$\text{Chow test} = \frac{\frac{SSE_C - (SSE_1 + SSE_2)}{K}}{\frac{SSE_1 + SSE_2}{N_1 + N_2 - 2*K}}$$

earnings before the implementation took place in order to avoid taxation. According to Alstadsæter and Fjærli (2009), as a direct consequence, smaller Norwegian private firms issued higher amounts of leverage until 2005 before drastically reducing it in the following years. Which reinforce our concern about the influence of a structural break on our results.

Thus, as a further robustness test we divided the initial sample into two time periods in order to examine how sensitive our initial results are to the inclusion of the years prior to the Norwegian taxation reform in 2006. In short, the first period represents the full sample (2001-2017), while the second period represent a reduced sample where the years up and until the announcement in 2004 is excluded (2005-2017).

TABLE 7: *Effect of female CEOs on leverage after the announcement of the Norwegian taxation reform*

Table 7 presents the result from the robustness test of the effect of female CEOs on firm's leverage ratio, when dividing the sample into full sample (2001-2017) and reduced sample (2005-2017). The results are obtained by running the estimated two-way random effects model with *leverage* as the dependent variable. *Leverage* is here measured as total current liabilities plus total long-term liabilities, divided by total current liabilities plus total long-term liabilities plus total equity. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS		(2) SMEs		(3) LARGE FIRMS		(4) ALL FIRMS	
	Full sample (2001-2017)	Reduced sample (2005-2017)	Full sample (2001-2017)	Reduced sample (2005-2017)	Full sample (2001-2017)	Reduced sample (2005-2017)	Full sample (2001-2017)	Reduced sample (2005-2017)
Constant	-0,1932**	-0,1853**	0,1231***	0,1161***	-0,7696***	-0,8051**	0,0101	0,0074
	(0,0979)	(0,0901)	(0,0327)	(0,0323)	(0.3061)	(0,3160)	(0,0340)	(0,0326)
Female CEO	0,0087***	0,0124***	0,0035	0,0035	-0,0020	0,0019	0,0049***	0,0057***
	(0,0029)	(0,0032)	(0,0024)	(0,0024)	(0,0235)	(0,0246)	(0,0020)	(0,0020)
Profitability	-0,0651***	-0,0682***	-0,0171	-0,0219	-0,2704***	-0,3029***	-0,0167	-0,0177
	(0,0163)	(0,0184)	(0,0123)	(0,0163)	(0,0414)	(0,0438)	(0,0114)	(0,0125)
Tangibility	0,1818***	0,1889***	0,1947***	0,2054***	0,1630***	0,1638***	0,1983***	0,2076***
	(0,0039)	(0,0044)	(0,0026)	(0,0029)	(0,0243)	(0,0247)	(0,0023)	(0,0025)
Firm size	0,0565***	0,0516***	0,0330***	0,0322***	0,0601***	0,0630***	0,0406***	0,0387***
	(0,0014)	(0,0016)	(0,0007)	(0,0009)	(0,0127)	(0,0133)	(0,0007)	(0,0007)
Growth	0,6103***	0,6216***	0,5816***	0,5963***	0.3818***	0,3807***	0,5778***	0,5827***
	(0,0517)	(0,0627)	(0,0158)	(0,0195)	(0,0762)	(0,0754)	(0,0224)	(0,0256)
Risk	-0,0098***	-0,0113***	-0,0215***	-0,0236***	0,0041	0,0041	-0,0188***	-0,0206***
	(0,0011)	(0,0012)	(0,0009)	(0,0009)	(0,0039)	(0,0038)	(0,0007)	(0,0008)
Industry Leverage	0,2414	0,2565*	0,2857***	0,2511***	0,6603**	0,6388**	0,2798***	0,2593***
	(0,1622)	(0,1482)	(0,0523)	(0,0506)	(0,2956)	(0,2999)	(0,0552)	(0,0523)
CEO age	-0,0018***	-0,0018***	-0,0019***	-0,0018***	-0,0019***	-0,0021***	-0,0020***	-0,0019***
	(0,0001)	(0,0001)	(0,0001)	(0,0001)	(0,0007)	(0,0007)	(0,0001)	(0,0001)
CEO ownership	0,0001***	0,0001***	0,0000	-0,0000	0,0002	0,0002	0,0001***	0,0000*
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0001)	(0,0001)	(0,0000)	(0,0000)
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
R-squard	0,2328	0,1867	0,2318	0,2003	0,0751	0,0663	0,2696	0,2443
No. of observations	196 517	162 144	548 714	465 647	3614	3 368	748 845	631 159
No. of firms	43 797	39 023	86 630	80 547	1230	1 162	110 459	102 941

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

In our initial results, our main finding was that female CEOs of micro firms issue 0,87% more leverage than male CEOs of micro firms. When reducing the sample to only concerning the years after the announcement of the taxation reform in 2004,

we observe that the estimated positive effect for female CEOs of micro firms continues to be statistically significant at the 0,01 level. Further, it is observed that the estimated effect for *female CEOs* significantly increases from 0,87% to 1,24% when reducing the sample to the years after the announcement in 2004. It may therefore seem reasonable to argue that the estimated positive effect of female CEOs of micro firms issuing more leverage compared to male CEOs of micro firms in fact is higher when excluding the influence from a structural break. In sum, our initial results of female CEOs of micro firms issuing more leverage than male CEOs seems robust to the exclusion of the years prior to 2005.

In our initial results, we were unable to conclude on the effect of female CEOs of SMEs and large firms due to insignificant results. When using the reduced sample, we observe that this still is the case. Further, the coefficients for SMEs and large firms is estimated to be almost exactly the same as in the initial model. These findings underline the fact that the smallest private firms, here referred to as micro firms, were most likely to take advantage of the arbitrage opportunity that existed before the taxation reform. Thus, being more affected by the change in dividend taxation. Only smaller variations are observed for the control variables.

6.1.5 ROBUSTNESS TEST: LAGGED VARIABLES

As already discussed, one concern for this study is that the CEO may be selected based on their observable managing style so that they match the strategy of the firm. Thus, a question that arises is whether the gender of the CEO determines the firm´s financing decisions, or whether firms hire CEOs with personal traits which match the firm´s financing policy (Bertrand & Schoar, 2003; Korkeamäki, Liljeblom & Pasternack, 2017). This is referred to as the problem of reverse causality, also called simultaneity. According to Reed (2015), one approach to mitigate the problem of simultaneity is to replace endogenous variables with lagged values. Thus, as a last robustness test to tackle the problem of endogeneity, the independent accounting variables were lagged by one period.

TABLE 8: *Effect of female CEOs on leverage with lagged variables*

Table 8 presents the result from the robustness test of the effect of female CEOs on firm's leverage ratio, when lagging the independent accounting variables by one period. The table compares the initial model (initial model RE) with the model with lagged accounting variables (Lagged model RE). The results are obtained by running the estimated two-way random effects model with *leverage* as the dependent variable. *Leverage* is here measured as total current liabilities plus total long-term liabilities, divided by total current liabilities plus total long-term liabilities plus total equity. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS		(2) SMEs		(3) LARGE FIRMS		(4) ALL FIRMS	
	Initial model RE	Lagged model RE	Initial model RE	Lagged model RE	Initial model RE	Lagged model RE	Initial model RE	Lagged model RE
Constant	-0,1932**	-0,0305	0,1231***	0,1532***	-0,7696***	0,5900***	0,0101	0,0508
	(0,0979)	(0,1075)	(0,0327)	(0,0351)	(0,3061)	(0,1598)	(0,0340)	(0,0362)
Female CEO	0,0087***	0,0177***	0,0035	0,0017	-0,0020	-0,0107	0,0049***	0,0038*
	(0,0029)	(0,0032)	(0,0024)	(0,0026)	(0,0235)	(0,0269)	(0,0020)	(0,0021)
Profitability	-0,0651***	-0,0509***	-0,0171	-0,0495***	-0,2704***	-0,1876***	-0,0167	-0,0445***
	(0,0163)	(0,0065)	(0,0123)	(0,0182)	(0,0414)	(0,0512)	(0,0114)	(0,0123)
Tangibility	0,1818***	0,1491***	0,1947***	0,1582***	0,1630***	0,0943***	0,1983***	0,1674***
	(0,0039)	(0,0042)	(0,0026)	(0,0027)	(0,0243)	(0,0231)	(0,0023)	(0,0023)
Firm size	0,0565***	0,0348***	0,0330***	0,0256***	0,0601***	0,0010	0,0406***	0,0327***
	(0,0014)	(0,0009)	(0,0007)	(0,0009)	(0,0127)	(0,0038)	(0,0007)	(0,0001)
Growth	0,6103***	0,2184***	0,5816***	0,1429***	0.3818***	0,1837***	0,5778***	0,2314***
	(0,0517)	(0,0216)	(0,0158)	(0,0189)	(0,0762)	(0,0648)	(0,0224)	(0,0226)
Risk	-0,0098***	-0,0198***	-0,0215***	-0,0256***	0,0041	0,0023	-0,0188***	-0,0238***
	(0,0011)	(0,0012)	(0,0009)	(0,0010)	(0,0039)	(0,0044)	0,0007	(0,0008)
Industry Leverage	0,2414	0,4636***	0,2857***	0,5243***	0,6603**	0,2620	0,2798***	0,4905***
	(0,1622)	(0,1792)	(0,0523)	(0,0558)	(0,2956)	(0,2389)	(0,0552)	(0,0590)
CEO age	-0,0018***	-0,0020***	-0,0019***	-0,0023***	-0,0019***	-0,0017**	-0,0020***	-0,0024***
	(0,0001)	(0,0001)	(0,0001)	(0,0001)	(0,0007)	(0,0008)	(0,0001)	(0,0001)
CEO ownership	0,0001***	0,0002***	0,0000	0,0000	0,0002	0,0002	0,0001***	0,0000*
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0001)	(0,0001)	(0,0000)	(0,0001)
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
R-squard	0,2328	0,1885	0,2318	0,2122	0,0751	0,0323	0,2696	0,2499
No. of observations	196 517	160 408	548 714	485321	3614	2920	748 845	621 649
No. of firms	43 797	39 638	86 630	82661	1230	1087	110 459	106 719

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

In our initial model in *column 1*, our main finding was that female CEOs of micro firms issue 0,87% more leverage than male CEOs of micro firms. When lagging the independent accounting variables by one period, we observe that the estimated positive effect for female CEOs of micro firms significantly increase from 0,87% to 1,77%. Both models are statistically significant at the 0,01 level. Thus, the model with lagged independent accounting variables reinforce our initial findings of female CEOs of micro firms issuing more leverage than male CEOs of micro firms. Further, the estimated effect for SMEs and large firms when using lagged independent accounting variables have the same estimated directional effect as in the initial model. However, *female CEO* is statistically insignificant in both models. Only small changes are observed for the control variables. The largest change is observed for *industry leverage* in micro firms which becomes statistically significant at the 0,01 level for micro firms with a significantly higher estimated effect. R-squared is also lower for all sub-samples compared to the original model.

6.2 EFFECT OF FEMALE CEOs ON DEBT MATURITY STRUCTURE

Based on the assumption that females in general are more risk averse and less overconfident, hence makes more conservative decisions, we hypothesised that firms run by female CEOs would issue more short-term debt compared to firms run by male CEOs. *Table 9* presents the main results of the effect of female CEOs on short-term debt.

TABLE 9 *Main results for the effect of female CEOs on debt maturity structure*

Table 9 presents the regression analysis of the effect of female CEOs on firm's debt maturity structure. The results are obtained by running the estimated two-way random effects model with *short-term debt* as the dependent variable. *Short-term debt* is measured as total current liabilities divided by total current liabilities plus total long-term liabilities. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	0,5502***	0,5651***	-0,4049	0,6646***
	(0,1008)	(0,0601)	(0,4449)	(0,0018)
Female CEO	0,0086**	0,0132***	0,0040	0,0151***
	(0,0034)	(0,0024)	(0,0206)	(0,0021)
Profitability	0,0085***	0,0805***	0,1359***	0,0373***
	(0,0014)	(0,0091)	(0,0512)	(0,0048)
Tangibility	-0,4943***	-0,5994***	-0,7056)***	-0,5790***
	(0,0056)	(0,0034)	(0,0292)	(0,0030)
Firm size	0,0116***	0,0209***	0,0465***	0,0098***
	(0,0008)	(0,0007)	(0,0157)	(0,0005)
Growth	-0,2844***	-0,3164***	-0,0688	-0,3905***
	(0,0147)	(0,0169)	(0,0695)	(0,0129)
Risk	-0,0022*	-0,0240***	-0,0102***	-0,0172***
	(0,0012)	(0,0010)	(0,0038)	(0,0009)
Industry Leverage	0,2865*	-0,0010	0,7262	0,1312
	(0,1674)	(0,0990)	(0,5424)	(0,0846)
CEO age	0,0006***	-0,0000	-0,0000	0,0001**
	(0,0001)	(0,0001)	(0,0006)	(0,0001)
CEO ownership	0,0001***	0,0001***	0,0003**	0,0001***
	(0,0000)	(0,0000)	(0,0001)	(0,0000)
Year fixed effects	✓	✓	✓	✓
R-squard	0,3448	0,5468	0,5063	0,4954
No. of observations	193 876	548 213	3 614	745 703
No. of firms	43 520	86 605	1 230	110 249

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

Column 4 shows that for all firms, regardless of size, *female CEO* is statistically significant at the 0,01 level. The result proposes that *female CEO* is positively related to short-term debt with an estimated coefficient of 0,0151. Indicating that firms led by female CEOs will issue 1,51% more short-term debt than firms run by male CEOs. However, concluding using the sample all firms may not be representative. Thus, we will mainly emphasize the results of the sub-samples. Starting by micro firms in *column 1, female CEO* is statistically significant at the 0,05 level with an estimated coefficient of 0,0086. Further, for SMEs in *column 2, female CEO* is statistically significant at the 0,01 level with an estimated coefficient of 0,0132. These results imply that female CEOs of micro firms and SMEs will issue 0,86% and 1,32% more short-term debt than smaller firms led by a male CEO. Compared to large firms in *column 3*, the influence of the CEO is significantly higher for the smaller firms. The effect of female CEOs on short-term debt for large firms is estimated to 0,0040, but the coefficient is not statistically significant. Thus, we cannot with certainty conclude on the relationship between female CEOs at larger firms and their short-term debt ratio. However, as previously discussed, the weak result may propose that there in larger firms is less room for the influence of managerial traits such as the gender of the CEO.

Our result provides evidence for the influence of the CEO´s gender on a firm´s debt maturity structure for smaller firms. Hence, male- and female CEOs of smaller firms are here proven to differ in their preference of issuing short-term or long-term debt. In short, the results support the hypothesis of female CEOs issuing more short-term debt compared to male CEOs. Without speculating, this may imply that female CEOs prefer a more flexible capital structure where they easily can shift back to equity financing or other sources of capital when necessary (Myers, 1977).

Profitability is statistically significant at the 0,01 level for all sub-samples. *Profitability* is estimated to be positively related to short-term debt with an estimated effect of 0,0085, 0,0805, 0,1359 for micro firms, SMEs and large firms respectively. This implies that the more profitable the firm is, the more short-term debt they issue. Further, *tangibility* and *firm size* is statistically significant at the 0,01 level. *Tangibility* is estimated to have a significant negative effect on short-term debt, regardless of size. The biggest effect of -0,7056 is observed in the case of large firms, indicating that when tangibility increases by one per cent the short-

term debt ratio for large firms decreases by 70,56%. Higher tangibility implies that the firm has more collateral to offer for its bank debt, which makes them less dependent on using short-term financing such as trade credit. Hence, higher tangibility is associated with more long-term debt (Chongvilaivan & Thangavelu, 2012). On the contrary, *firm size* is observed to have a positive effect on a firm´s short-term debt ratio with coefficients ranging between 0,0116 and 0,0465.

The control variable firm g*rowth* is statistically significant at the 0,01 level with an estimated negative effect of -0,2844, -0,3164 and -0,0688 for micro firms, SMEs and large firms respectively. Further, except of micro firms, *risk* in sales is observed to be statistically significant at the 0,01 level. The coefficients are observed to have a negative relationship with short-term debt. Indicating that firms with high operating risk will issue less short-term debt in order to avoid adding financial risk. The estimated R-squared ranges between 34,48% and 54,68%, which indicates that our model offers good explanatory power of the firm´s short-term debt ratio.

6.2.1 ROBUSTNESS TEST: ALTERNATIVE MEASURE OF SHORT-TERM DEBT

The short-term debt ratio is measured as *total current liabilities* divided by *total current liabilities* plus *total long-term liabilities.* Thus, our measure for short-term debt consists of both operational- and financial debt. In short, operational debt occurs due to the firm´s primary business activities. Hence, it includes non-interest-bearing elements such as account payables, taxes and other amounts owed that will be repaid within the year. On the contrary, financial debt includes interest-bearing elements such as debt to financial institutions with a maturity less than a year.

A firm´s account payable, also referred to as trade credit, represents the amount owed to suppliers for products or services purchased on credit. According to Werner and Stoner (2000), trade credit may make up a large part of smaller firms´ financing, due to their limited access to capital markets. By redefining the dependent variable as *account payable* divided by *total current liabilities*, we were able to investigate the effect of female CEOs on the proportion of trade credit. The additional analysis tries to determine whether female CEOs are estimated to have higher amounts of short-term debt due to higher proportions of trade credit. From the results presented in *appendix A7*, it is observed that *female CEO* has a negative impact on the firm´s

trade credit, regardless of size. This implies that firms led by a female CEO use smaller proportions of trade credit compared to firms led by a male CEO.

As a further robustness check, we used an alternative variable definition of short-term debt. Specifically, we redefined short-term debt to be measured as *interest-bearing short-term debt* to *total assets*[23]. Meaning that non-interest-bearing elements such as account payable and tax payable are excluded. *Table 10* shows that the effect of female CEOs continues to be statistically significant for all sub-samples except for large firms, when excluding non-interest-bearing short-term debt. For micro firms, female CEOs become statistically significant at the 0,01 level compared to 0,05 previously. In addition, the estimated effect increases from 0,0086 to 0,0184. Implying that female CEOs of micro firms will issue 1,84 % more interest-bearing short-term debt compared to male CEOs of micro firms. On the other hand, the estimated effect for SMEs decreases from 0,0132 to 0,0126. In sum, the trend of female CEOs issuing more short-term debt compared to male CEOs remains, even when excluding non-interest-bearing items such as account payable and tax payable. Small differences are also observed for the control variables. For instance, *growth* for micro firms, *profitability* and *CEO ownership* for SMEs, and *firm size* and *CEO ownership* for large firms become statistically insignificant when only including interest-bearing debt. In addition, *industry leverage* becomes statistically significant at the 0,05 and 0,01 level for micro firms and SMEs respectively. Further, the estimated effect for *tangibility* decreases significantly. It should also be noticed that R-squared are significantly higher for all sub-samples in the original model.

[23] Interest-bearing short-term debt is defined as *short term liabilities to financial institutions (item 101)* plus *other short-term liabilities (item 108).*

TABLE 10: *Effect of female CEOs on interest-bearing short-term debt*

Table 10 presents the result from the robustness test using an alternative variable definition for short-term debt. The results demonstrate the effect of female CEOs on firm's debt maturity structure, when excluding non-interest-bearing debt. The results are obtained by running the estimated two-way random effects model with *short-term debt* as the dependent variable. *Short-term debt* is here measured as interest bearing short-term debt divided by total assets. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	-0,0292	-0,0140***	-0,0675	0,0090
	(0,0023)	(0,0364)	(0,1896)	(0,0309)
Female CEO	0,0184***	0,0126***	0,0087	0,0155***
	(0,0023)	(0,0014)	(0,0075)	(0,0023)
Profitability	-0,0568***	-0,0170	-0,0554**	-0,0156
	(0,0170)	(0,0141)	(0,0217)	(0,0128)
Tangibility	-0,0235***	-0,0835***	-0,0793***	-0,0684***
	(0,0030)	(0,0017)	(0,0093)	(0,0015)
Firm size	0,0082***	0,0059***	0,0025	0,0036***
	(0,0012)	(0,0006)	(0,0054)	(0,0006)
Growth	0,0671	-0,0660***	0,1175***	-0,0720***
	(0,0533)	(0,0159)	(0,0428)	(0,0243)
Risk	-0,0009	-0,0048***	-0,0026*	-0,0040***
	(0,0009)	(0,0006)	(0,0014)	(0,0005)
Industry Leverage	0,2011**	0,2021***	0,3130	0,2275***
	(0,0863)	(0,0599)	(0,2682)	(0,0505)
CEO age	-0,0002***	-0,0001***	-0,0003	-0,0002***
	(0,0001)	(0,0000)	(0,0002)	(0,0000)
CEO ownership	0,0001***	0,0000	-0,0000	0,0000***
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Year fixed effects	✓	✓	✓	✓
R-squard	0,0325	0,0733	0,0994	0,0684
No. of observations	196 517	548 714	3 614	748 845
No. of firms	43 797	86 630	1 230	110 459

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

6.2.2 ROBUSTNESS TEST: ADDITIONAL CONTROL VARIABLES

As a further robustness test for the effect of female CEOs on a firm´s debt maturity structure, we added the additional control variables *cash holdings* and *female presence*. The variables are defined in *section 6.1.2*.

TABLE 11: *Effect of female CEOs on debt maturity structure with additional control variables*

Table 11 presents the result from the robustness test when adding *Cash Holdings* and *Female Presence* on board as additional control variables. The results demonstrate the effect of female CEOs on a firm's debt maturity structure. The results are obtained by running the estimated two-way random effects model with *short-term debt* as the dependent variable. *Short-term debt* is measured as total current liabilities divided by total current liabilities plus total long-term liabilities. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. *CEO ownership* is measured as the shares owned ultimately by the CEO. The additional control variable *Cash Holdings* is measured as Cash and cash equivalent divided by total assets. *Female Presence* refers to the percentage of female board members and is measured as the total number of female board members divided by the total numbers of board members. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	0,5660***	0,5211***	-0,5836	0,6224***
	(0,0980)	(0,0593)	(0,4570)	(0,0506)
Female CEO	0,0127***	0,0073***	-0,0008	0,0104***
	(0,0044)	(0,0027)	(0,0198)	(0,0024)
Profitability	0,0066***	0,0586***	0,0848	0,0282***
	(0,0015)	(0,0068)	(0,0522)	(0,0034)
Tangibility	-0,4653***	-0,5560***	-0,6823***	-0,5352***
	(0,0058)	(0,0036)	(0,0296)	(0,0032)
Firm size	0,0115***	0,0216***	0,0545***	0,0108***
	(0,0008)	(0,0006)	(0,0160)	(0,0005)
Growth	-0,2835***	-0,3137***	-0,0712	-0,3841***
	(0,0149)	(0,0154)	(0,0697)	(0,0117)
Risk	-0,0016	-0,0215***	-0,0100***	-0,0152***
	(0,0012)	(0,0010)	(0,0038)	(0,0009)
Industry Leverage	0,2244	-0,0053	0,7542	0,1155
	-0,1627	(0,0978)	(0,5609)	(0,0838)
CEO age	0,0005***	-0,0001*	-0,0002	0,0000
	(0,0001)	(0,0001)	(0,0006)	(0,0001)
CEO ownership	0,0001***	0,0001***	-0,0003	0,0001***
	(0,0000)	(0,0000)	(0,0001)	(0,0000)
Cash Holdings	0,0636***	0,1284***	0,1363***	0,1166***
	(0,0031)	(0,0032)	(0,0334)	(0,0023)
Female Presence	-0,0104**	0,0019	0,0072	0,0001
	(0,0048)	(0,0030)	(0,0309)	(0,0027)
Year fixed effects	✓	✓	✓	✓
R-squard	0,3584	0,5713	0,5214	0,5245
No. of observations	191 316	543 512	3 600	738 428
No. of firms	42 967	86 102	1 228	109 477

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

From *table 11*, it is observed that when adding the two additional control variables, the effect of female CEOs of micro firms changes from being statistically significant at the 0,05 level to being statistically significant at the 0,01 level. The estimated coefficient has also increased from 0,0086 to 0,0127 for micro firms. Thus, we have now stronger evidence to conclude that female CEOs of micro firms issue more short-term debt compared to male CEOs of micro firms. Further, the estimated effect for SMEs continues to be statistically significant at the 0,01 level, but the coefficient decreases from 0,0132 to 0,0073. However, no substantial differences are observed for the effect of female CEOs in large firms. In sum, the trend of female CEOs of smaller firms issuing more short-term debt compared to male CEOs remains when adding the two additional control variables. Thus, our hypothesis of female CEOs issuing more short-term debt compared to male CEOs is still supported.

Only small differences are observed for the control variables. *Cash holdings* are statistically significant at the 0,01 level for all sub-samples with an estimated effect of 0,0636, 0,1284 and 0,1363 for micro firms, SMEs and large firms respectively. According to Saddour (2006), firms with higher levels of short-term debt should have a greater proportion of cash holdings in order to mitigate the risk of financial distress. Further, *female presence* is only statistically significant at the 0,05 level for micro firms with an estimated coefficient of -0,0104. Indicating that when female presence increases by one per cent the firm´s short-term debt ratio declines by 1,04%, which contradicts a lot of previous studies and our findings of the CEO. In addition, we observed that R-squared are higher for all sub-samples than in the original model.

6.2.3 ROBUSTNESS TEST: FAMILY FIRMS

As a further robustness test for the effect of female CEOs on a firm´s debt maturity structure, we once again limit the sample to only contain family firms. *Family firms* is still defined as firms where the majority of shares is owned by the family (>50%).

From *table 12*, it is observed that when limiting the sample to only containing family-owned firms, the effect of female CEOs of micro firms continues to be statistically significant at the 0,05 level. Further, the coefficient for micro firms slightly decreases from 0,0086 to 0,0082. For SMEs, female CEOs continues to be statistically significant at the 0,01 level. However, here the coefficient increases from 0,0132 to 0,0154. Implying that female CEOs of family-owned SMEs issue

1,54% more short-term debt compared to male CEOs. The estimated effect for female CEOs on larger firms´ debt maturity structure continues to be statistically insignificant. In sum, our initial findings of female CEOs of smaller firms issuing more short-term debt compared to male CEOs are robust to the exclusion of non-family-owned firms. Only minor differences are observed for the control variables. R-squared is observed to be almost equal to the original model.

TABLE 12: *Effect of female CEOs on debt maturity structure in Norwegian private family firms*

Table 12 presents the result from the robustness test of the effect of female CEOs on firm´s debt maturity structure, when limiting the sample to only family-owned firms. *Family firms* is here defined as firms where the majority of shares is owned by the family (>50%). The results are obtained by running the estimated two-way random effects model with *short-term debt* as the dependent variable. *Short-term debt* is measured as total current liabilities divided by total current liabilities plus total long-term liabilities. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	0,5420***	0,6152***	-1,3975***	0,6898***
	(0,1094)	(0,0536)	(0,3517)	(0,0484)
Female CEO	0,0082**	0,0154***	0,0076	0,0168***
	(0,0035)	(0,0025)	(0,0236)	(0,0022)
Profitability	0,0087***	0,0994***	0,0626	0,0491***
	(0,0020)	(0,0027)	(0,0652)	(0,0034)
Tangibility	-0,4938***	-0,5975***	-0,6942***	-0,5792***
	(0,0058)	(0,0035)	(0,0337)	(0,0032)
Firm size	0,0120***	0,0208***	0,0430**	0,0097***
	(0,0009)	(0,0006)	(0,0175)	(0,0005)
Growth	-0,2733***	-0,3581***	0,0521	-0,4199***
	(0,0159)	(0,0149)	(0,0643)	(0,0121)
Risk	-0,0023*	-0,0242***	-0,0076*	-0,0174***
	(0,0013)	(0,0011)	(0,0040)	(0,0009)
Industry Leverage	0,2770	-0,0990	2,4240***	0,0738
	(0,1818)	(0,0879)	(0,0853)	(0,0797)
CEO age	0,0008***	-0,0000	0,0004	0,0002***
	(0,0001)	(0,0001)	(0,0006)	(0,0001)
CEO ownership	0,0001***	0,0002***	-0,0001	0,0002***
	(0,0000)	(0,0000)	(0,0001)	(0,0000)
Year fixed effects	✓	✓	✓	✓
R-squard	0,3406	0,5376	0,4906	0,4862
No. of observations	173 988	465 531	2 365	641 884
No. of firms	40 734	78 877	816	101 485

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

6.2.4 ROBUSTNESS TEST: STRUCTURAL BREAK

As a further robustness test for the effect of female CEOs on a firm´s debt maturity structure, we once again divided the sample into two time periods, *full sample* (2001-2017) and *reduced sample* (2005-2017).

TABLE 13: *Effect of female CEOs on debt maturity structure after the announcement of the Norwegian taxation reform*

Table 13 presents the result from the robustness test of the effect of female CEOs on firm´s debt maturity structure, dividing the sample into full sample (2001-2017) and reduced sample (2005-2017). The results are obtained by running the estimated two-way random effects model with *short-term debt* as the dependent variable. *Short-term debt* is measured as total current liabilities divided by total current liabilities plus total long-term liabilities. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS		(2) SMEs		(3) LARGE FIRMS		(4) ALL FIRMS	
	Full sample (2001-2017)	Reduced sample (2005-2017)	Full sample (2001-2017)	Reduced sample (2005-2017)	Full sample (2001-2017)	Reduced sample (2005-2017)	Full sample (2001-2017)	Reduced sample (2005-2017)
Constant	0,5502***	0,5520***	0,5651***	0,5406***	-0,4049	-0,5411	0,6646***	0,6427***
	(0,1008)	(0,1006)	(0,0601)	(0,0565)	(0,4449)	(0,4544)	(0,0018)	(0,0487)
Female CEO	0,0086**	0,0076**	0,0132***	0,0127***	0,0040	0,0029	0,0151***	0,0141***
	(0,0034)	(0,0035)	(0,0024)	(0,0024)	(0,0206)	(0,0217)	(0,0021)	(0,0022)
Profitability	0,0085***	0,0049***	0,0805***	0,0640***	0,1359***	0,1225**	0,0373***	0,0279***
	(0,0014)	(0,0016)	(0,0091)	(0,0087)	(0,0512)	(0,0522)	(0,0048)	(0,0037)
Tangibility	-0,4943***	-0,4997***	-0,5994***	-0,6064***	-0,7056)***	-0,6994***	-0,5790***	-0,5861***
	(0,0056)	(0,0062)	(0,0034)	(0,0037)	(0,0292)	(0,0306)	(0,0030)	(0,0033)
Firm size	0,0116***	0,0112***	0,0209***	0,0203***	0,0465***	0,0510***	0,0098***	0,0096***
	(0,0008)	(0,0008)	(0,0007)	(0,0007)	(0,0157)	(0,0164)	(0,0005)	(0,0005)
Growth	-0,2844***	0,2567***	-0,3164***	-0,2942***	-0,0688	-0,0412	-0,3905***	-0,3634***
	(0,0147)	(0,0164)	(0,0169)	(0,0177)	(0,0695)	(0,0667)	(0,0129)	(0,0129)
Risk	-0,0022*	-0,0031**	-0,0240***	-0,0265***	-0,0102***	-0,0'06***	-0,0172***	-0,0197***
	(0,0012)	(0,0014)	(0,0010)	(0,0011)	(0,0038)	(0,0039)	(0,0009)	(0,0010)
Industry Leverage	0,2865*	0,2674	-0,0010	-0,0118	0,7262	0,7396	0,1312	0,1161
	(0,1674)	(0,1668)	(0,0990)	(0,0926)	(0,5424)	(0,5418)	(0,0846)	(0,0802)
CEO age	0,0006***	0,0006***	-0,0000	-0,0001***	-0,0000	-0,0002	0,0001**	-0,0001
	(0,0001)	(0,0001)	(0,0001)	(0,0001)	(0,0006)	(0,0006)	(0,0001)	(0,0001)
CEO ownership	0,0001***	0,0001***	0,0001***	-0,0001***	0,0003**	-0,0003**	0,0001***	0,0001***
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0001)	(0,0001)	(0,0000)	(0,0000)
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
R-squard	0,3448	0,3298	0,5468	0,5335	0,5063	0,0667	0,4954	0,4838
No. of observations	193 876	159 796	548 213	465 177	3 614	3 369	745 703	628 341
No. of firms	43 520	38 732	86 605	80 518	1 230	1 163	110 249	102 709

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

In our initial model our main finding was that female CEOs of SMEs issue 1,32% more short-term debt compared to male CEOs of SMEs. After reducing the sample, we observe that the estimated positive effect for female CEOs of SMEs continues to be statistically significant at the 0,01 level. However, the estimated effect for female CEOs on short-term debt is observed to decline from 1,32% to 1,27% in the reduced model. Additionally, our initial results show that female CEOs of micro firms continues to be statistically significant at the 0,05 level when using a reduced sample. However, it is also observed that the effect for female CEOs on short-term

debt decreases from 0,86% to 0,76%. Based on these findings, it seems like the taxation reform only affects our findings insignificantly. Thus, our initial results of female CEOs of micro and SMEs issuing more short-term debt seems robust to the exclusion of the years prior to 2005. Only smaller variations are observed for the control variables and they are therefore not elaborated on any further.

6.2.5 ROBUSTNESS TEST: LAGGED VARIABLES

As a last robustness test for the effect of female CEOs on a firm´s debt maturity structure, we once again lagged the independent accounting variables by one period.

TABLE 14: *Effect of female CEOs on debt maturity structure with lagged variables*

Table 14 presents the result from the robustness test of the effect of female CEOs on firm´s debt maturity structure, when lagging the independent accounting variables by one period. The table compares the initial model (initial model RE) with the model with lagged variables (Lagged model RE). The results are obtained by running the estimated two-way random effects model with *short-term debt* as the dependent variable. *Short-term debt* is measured as total current liabilities divided by total current liabilities plus total long-term liabilities. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS		(2) SMEs		(3) LARGE FIRMS		(4) ALL FIRMS	
	Initial model RE	Lagged model RE	Initial model RE	Lagged model RE	Initial model RE	Lagged model RE	Initial model RE	Lagged model RE
Constant	0,5502***	0,6390***	0,5651***	0,6179***	-0,4049	0,2762	0,6646***	0,7066***
	(0,1008)	(0,0953)	(0,0601)	(0,0609)	(0,4449)	(0,3164)	(0,0018)	(0,0515)
Female CEO	0,0086**	0,0124***	0,0132***	0,0178***	0,0040	0,0239	0,0151***	0,0193***
	(0,0034)	(0,0036)	(0,0024)	(0,0026)	(0,0206)	(0,0249)	(0,0021)	(0,0023)
Profitability	0,0085***	0,0140***	0,0805***	0,0769***	0,1359***	0,1472***	0,0373***	0,0483***
	(0,0014)	(0,0026)	(0,0091)	(0,0027)	(0,0512)	(0,0537)	(0,0048)	(0,0038)
Tangibility	-0,4943***	-0,3723***	-0,5994***	-0,4917***	-0,7056)***	-0,5237***	-0,5790***	-0,4711***
	(0,0056)	(0,0055)	(0,0034)	(0,0033)	(0,0292)	(0,0282)	(0,0030)	(0,0030)
Firm size	0,0116***	0,0067***	0,0209***	0,0175***	0,0465***	0,0112**	0,0098***	0,0067***
	(0,0008)	(0,0008)	(0,0007)	(0,0006)	(0,0157)	(0,0054)	(0,0005)	(0,0005)
Growth	-0,2844***	-0,2681***	-0,3164***	-0,4432***	-0,0688	-0,2442***	-0,3905***	-0,4618***
	(0,0147)	(0,0167)	(0,0169)	(0,0145)	(0,0695)	(0,0898)	(0,0129)	(0,0121)
Risk	-0,0022*	-0,0039***	-0,0240***	-0,0231***	-0,0102***	-0,0083*	-0,0172***	-0,0178***
	(0,0012)	(0,0014)	(0,0010)	(0,0011)	(0,0038)	(0,0046)	(0,0009)	(0,0010)
Industry Leverage	0,2865*	0,1876	-0,0010	-0,0655	0,7262	0,5188	0,1312	0,0711
	(0,1674)	(0,1577)	(0,0990)	(0,1006)	(0,5424)	(0,5003)	(0,0846)	(0,0851)
CEO age	0,0006***	0,0007***	-0,0000	-0,0001	-0,0000	-0,0001	0,0001**	0,0001*
	(0,0001)	(0,0001)	(0,0001)	(0,0001)	(0,0006)	(0,0007)	(0,0001)	(0,0001)
CEO ownership	0,0001***	0,0001***	0,0001***	0,0001***	0,0003**	-0,0004***	0,0001***	0,0002***
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0001)	(0,0001)	(0,0000)	(0,0000)
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
R-squard	0,3448	0,3228	0,5468	0,5159	0,5063	0,4222	0,4954	0,4698
No. of observations	193 876	157 596	548 213	457 808	3 614	2 920	745 703	618 324
No. of firms	43 520	39 168	86 605	82 609	1 230	1 087	110 249	106 312

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

In our initial model in *column 1,* our main finding was that female CEOs of micro firms issue 0,86% more short-term debt than male CEOs of micro firms. When lagging the independent accounting variables by one period, we observe that the

estimated positive effect for female CEOs of micro firms significantly increases from 0,86% to 1,24%. Both models are statistically significant at the 0,01 level. Thus, the model with lagged independent accounting variables reinforces our initial findings of female CEOs of micro firms issuing more short-term debt than male CEOs of micro firms.

Using the initial model, we were able to generalise these findings of female CEOs of micro firms to SMEs. In short, our initial findings proposed that female CEOs of SMEs issue 1,32% more short-term debt than male CEOs of SMEs. When lagging the independent variables by one period, we observe that this positive effect still is statistically significant at the 0,01 level. The coefficient is also observed to significantly increase from 1,32% to 1,78%. Hence, the findings of female CEOs of micro and SMEs issuing more short-term debt than male CEOs of micro and SMEs seems robust to the inclusion of lagged independent accounting variables. The effect is still statistically insignificant for large firms, meaning that we are unable to conclude whether female CEOs of large firms issue more short-term debt than male CEOs of large firms. Only smaller changes are observed for the control variables. Further, R-squared is lower for all sub-samples compared to the initial model.

6.3 EFFECT OF FEMALE CEOs ON COST OF BORROWING

Based on the assumption that companies led by female CEOs provide more reliable accounting information and in general are assumed to be less risky, hence have a lower default risk, we hypothesised that firms run by female CEOs will enjoy a lower cost of borrowing compared to firms run by male CEOs. *Table 15* presents the main results of the effect of female CEOs on cost of borrowing.

TABLE 15 *Main results for the effect of female CEOs on cost of borrowing*

Table 15 presents the regression analysis of the effect of female CEOs on the firm´s cost of borrowing. The results are obtained by running the estimated two-way random effects model with *cost of borrowing* as the dependent variable. *Cost of borrowing* reflects the total charge for issuing debt as a ratio and is measured as interest expenses plus other financial expenses divided by total current liabilities plus total long-term liabilities minus total provisions. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	6,3079	-1,4558	0,0329	-0,5098
	(5,8083)	(1,5789)	(0,0449)	(1,7000)
Female CEO	-0,0381***	0,0230	0,0001	0,0041
	(0,0099)	(0,0720)	(0,0022)	(0,0521)
Profitability	0,0421*	0,0846	-0,0061	0,0524*
	(0,0247)	(0,0662)	(0,0061)	(0,0279)
Tangibility	-0,0870***	-0,1408***	0,0092***	-0,0950***
	(0,0177)	(0,0282)	(0,0026)	(0,0220)
Firm size	-0,0547***	-0,1041***	-0,0007	-0,0696***
	(0,0094)	(0,0243)	(0,0015)	(0,0134)
Growth	-1,7395***	-1,9207***	-0,0371***	-1,749***
	(0,2014)	(0,3602)	(0,0106)	(0,2071)
Risk	0,0391***	0,0574**	0,0015***	0,0550***
	(0,0099)	(0,0275)	(0,0005)	(0,0213)
Industry leverage	-9,1060	5,2571**	0,0186	2,7314
	(9,7921)	(2,6616)	(0,0575)	(2,8601)
CEO age	-0,0010**	-0,0004	-0,0001	-0,0005
	(0,0005)	(0,0005)	(0,0001)	(0,0004)
CEO ownership	-0,0001	-0,0000	0,0000**	-0,0001
	(0,0001)	(0,0002)	(0,0000)	(0,0002)
Year fixed effects	✓	✓	✓	✓
R-squard	0,0088	0,0011	0,0758	0,0007
No. of observations	193 675	548 143	3614	745 432
No. of firms	43 507	86 599	1230	110 245

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

Column 1 in *table 15* shows that for micro firms, *female CEO* is statistically significant at the 0,01 level. *Female CEO* is negatively related to cost of borrowing, with an estimated coefficient of -0,0381. Indicating that female CEOs of micro firms pay approximately 3,81% less for their borrowings compared to male CEOs of micro firms. On the contrary, female CEOs of SMEs and large firms is estimated to have a positive effect on cost of borrowing. However, the coefficients for large firms and SMEs are not statistically significant. Thus, we cannot with certainty conclude that female CEOs of large firms and SMEs pay more for their borrowings compared to male CEOs.

In sum, our results provide evidence for the influence of the CEO´s gender on a firm´s cost of borrowing for micro firms. In short, the results support the hypothesis of female CEOs enjoying a lower cost of borrowing compared to firms run by male CEOs. The observations are even more interesting since we in *section 4.5* observed that female CEOs of micro firms indeed issue more debt than male CEOs. Without speculating, our findings may indicate that female CEOs of micro firms achieve more favourable contract terms, which include lower loan prices or that female CEOs issue cheaper forms of capital. However, the results seem less generalizable to other firm sizes.

From *table 15*, *tangibility* is observed to be statistically significant at the 0,01 level for all sub-samples. The estimated coefficients are -0,0870 and -0,1408 for micro firms and SMEs respectively, implying that tangibility has a negative effect on cost of borrowing. In general, higher tangibility implies that the firm has more collateral to offer its lenders. Hence, higher tangibility may lower the required return on debt as the debtors can liquidate assets in the case of bankruptcy (Harris & Raviv, 1991; Titman & Wessels 1988; Baker & Wurgler, 2002; Baker & Martin, 2011). Nonetheless, tangibility has a positive effect on cost of borrowing for large firms. The control variable *firm size* is statistically significant at the 0,01 level for both micro firms and SMEs. The estimates indicate that firm size is negatively related to cost of borrowing, with the coefficients -0,0547 and -0,1041 for micro firms and SMEs respectively. According to Baker and Martin (2011), larger firms may have a lower cost of financial distress and a lower probability of going bankrupt, which provides better conditions for borrowing and a stronger negotiating force. In addition, larger firms tend to have higher credit ratings, and as a result, they benefit

from lower interests. Further, it is observed that *risk* is statistically significant at the 0,01- or 0,05 level for all sub-samples. In short, the coefficients propose that riskier firms pay more for their borrowings, which is reasonable since lenders may charge premiums to firms with high operating risk due to the concern of insolvency.

6.3.1 ROBUSTNESS TEST: ADDITIONAL CONTROL VARIABLES

As a robustness test for the effect of female CEOs on a firm´s cost of borrowing, we added the two additional control variables *cash holdings* and *female presence.*

Column 1 in *table 16* shows that female CEOs of micro firms still is estimated to have a negative effect upon a firm´s cost of borrowing, but the estimated effect increases from -0,0381 to -0,0258. However, when including the two additional control variables, *female CEO* changes from being statistically significant at the 0,01 level to now being statistically insignificant. Thus, we cannot argue that our initial findings of female CEOs of micro firms paying less for their borrowings compared to male CEOs are robust to the inclusion of additional control variables. Further, the estimated effect of female CEOs of SMEs and large firms continues to be statistically insignificant.

From *table 16*, only small differences for the control variables are observed. The additional control variable c*ash holdings* is not statistically significant for micro firms or SMEs. However, the coefficient is statistically significant at the 0,01 level for large firms with a negative coefficient of -0,0203. From *column 2*, we observe that *female presence* is statistically significant at the 0,05 for SMEs. The coefficient is negatively related to cost of borrowing, with an estimated effect of -0,0792. These findings support the notion that firms with higher gender diverse boards will pay less for their borrowings due to reduced default risk (Usman, Farooq, Zhang, Makki, & Khan, 2019).

TABLE 16: *Effect of female CEOs on cost of borrowing with additional control variables*

Table 16 presents the result from the robustness test when adding *Cash Holdings* and *Female Presence on Boards* as additional control variables. The results demonstrate the effect of female CEOs on the firm's cost of borrowing. The results are obtained by running the estimated two-way random effects model with *cost of borrowing* as the dependent variable. *Cost of borrowing* reflects the total charge for issuing debt as a ratio and is measured as interest expenses plus other financial expenses divided by total current liabilities plus total long-term liabilities minus total provisions. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. *CEO ownership* is measured as the shares owned ultimately by the CEO. The additional control variable *Cash Holdings* is measured as cash and cash equivalent divided by total assets. *Female Presence* refers to the percentage of female board members and is measured as the total number of female board members divided by the total number of board members. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	6,3158	-1,4653	0,0599	-0,5029
	(5,8294)	(1,5851)	(0,0424)	(1,7060)
Female CEO	-0,0258	0,0563	0,0008	0,0346
	(0,0165)	(0,0846)	(0,0023)	(0,0634)
Profitability	0,0407	0,0756	0,0013	0,0519*
	(0,0248)	(0,0763)	(0,0063)	(0,0296)
Tangibility	-0,0839***	-0,1264**	0,0059**	-0,0978**
	(0,0254)	(0,0495)	(0,0026)	(0,0393)
Firm size	-0,0542***	-0,1033***	-0,0018	-0,0694***
	(0,0095)	(0,0243)	(0,0015)	(0,0134)
Growth	-1,7555***	-1,9414***	-0,0380***	-1,7695***
	(0,2045)	(0,3653)	(0,0110)	(0,2108)
Risk	0,0390***	0,0586**	0,0014***	0,0550**
	(0,0101)	(0,0277)	(0,0004)	(0,0214)
Industry Leverage	-9,1338	5,2556**	0,0131	2,7272
	(9,8341)	(2,6642)	(0,0505)	(2,8670)
CEO age	-0,0010**	-0,0004	-0,0000	-0,0005
	(0,0005)	(0,0005)	(0,0001)	(0,0004)
CEO ownership	-0,0001	0,0000	0,0000***	-0,0001
	(0,0001)	(0,0002)	(0,0000)	(0,0002)
Cash Holdings	0,0078	0,0394	-0,0203***	-0,0055
	(0,0288)	(0,0987)	(0,0042)	(0,0605)
Female Presence	-0,0211	-0,0792**	-0,0015	-0,0646**
	(0,0199)	(0,0374)	(0,0020)	(0,0288)
Year fixed effects	✓	✓	✓	✓
R-squard	0,0087	0,0011	0,1125	0,0008
No. of observations	191 117	543 445	3 600	738 162
No. of firms	42 954	86 096	1 228	109 473

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

6.3.2 ROBUSTNESS TEST: FAMILY FIRMS

As a further robustness test for the effect of female CEOs on a firm´s cost of borrowing, we once again limit the sample to only contain family firms. *Family firms* is still defined as firms where the majority of shares is owned by the family (>50%).

TABLE 17: *Effect of female CEOs on cost of borrowing in Norwegian private family firms*

Table 17 presents the result from the robustness test of the effect of female CEOs on the firm´s cost of borrowing, when limiting the sample to only family-owned firms. *Family firms* is here defined as firms where the majority of shares is owned by the family (>50%). The results are obtained by running the estimated two-way random effects model with *cost of borrowing* as the dependent variable. *Cost of borrowing* reflects the total charge for issuing debt as a ratio and is measured as interest expenses plus other financial expenses divided by total current liabilities plus total long-term liabilities minus total provisions. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets (tangible) over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	6,8400	-1,7561	-0,0284	-0,5256
	(6,3775)	(1,8203)	(0,0362)	(1,9867)
Female CEO	-0,0366***	0,0292	0,0053*	0,0078
	(0,0108)	(0,0877)	(0,0029)	(0,0629)
Profitability	0,0537	0,0116	-0,0093	0,0404
	(0,0378)	(0,0360)	(0,0069)	(0,0271)
Tangibility	-0,0847***	-0,1575***	0,0056*	-0,0942***
	(0,0187)	(0,0315)	(0,0031)	(0,0241)
Firm size	-0,0591***	-0,1119***	-0,0014	-0,0745***
	(0,0105)	(0,0272)	(0,0018)	(0,0149)
Growth	-1,7724***	-1,8945***	-0,0287***	-1,7219***
	(0,2225)	(0,3881)	(0,0106)	(0,2165)
Risk	0,0362***	0,0564*	0,0010**	0,0548**
	(0,0104)	(0,0291)	(0,0004)	(0,0223)
Industry Leverage	-9,8938	5,9780*	0,1522***	2,8782
	(10,7510)	(3,0892)	(0,0104)	(3,346)
CEO age	-0,0012**	-0,0006	-0,0000	-0,0006
	(0,0005)	(0,0006)	(0,0001)	(0,0004)
CEO ownership	-0,0001	0,0002	(0,0000)	-0,0000
	(0,0002)	(0,0004)	(0,0000)	(0,0002)
Year fixed effects	✓	✓	✓	✓
R-squard	0,0085	0,001	0,0778	0,0007
No. of observations	173 843	465 469	2 365	641 677
No. of firms	40 722	78 872	816	101 479

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

Our initial findings indicated that female CEOs of micro firms enjoy a lower cost of borrowing compared to male CEOs of micro firms. From *table 17,* it is observed that when limiting the sample to only containing family-owned firms, the effect of female CEOs of micro firms continues to be statistically significant at the 0,01 level with only a slight decrease in the coefficient. Thus, we may argue that our initial findings for micro firms are robust to the exclusion of non-family-owned firms. However, due to insignificant results for SMEs and large firms in our initial model, we could not argue that this was the case for these sub-samples. When limiting the sample to only containing family firms, we observe that this still is the case. In short, SMEs continues to be statistically insignificant and large firms become statistically significant at the 0,10 level, which still is outside the general accepted limit. Overall, our initial findings do not differ substantially when limiting the sample to only including family firms. In addition, only minor differences are observed for the control variables. The R-squared do not differ substantially from the original model.

6.3.3 ROBUSTNESS TEST: STRUCTURAL BREAK

As a further robustness test for the effect of female CEOs on a firm´s cost of borrowing, we once again divided the sample into the two time periods, *full sample* (2001-2017) and *reduced sample* (2005-2017).

In our initial model our main findings were that *female CEOs* of micro firms pay 3,81% less for their borrowings compared to male CEOs of micro firms. After reducing the sample, we observe that the estimated negative effect for female CEOs of micro firms continues to be statistically significant at the 0,01 level. However, the estimated negative effect for female CEOs on cost of borrowing is observed to slightly decrease from -3,81% to -3,84%. Thus, our initial results of female CEOs of micro firms enjoying a lower cost of borrowing seems robust to the exclusion of the years up and until the announcement of the taxation reform. Furthermore, in our initial model, female CEOs of SMEs is estimated to be statistically insignificant. However, when using the reduced sample, the coefficient becomes statistically significant at the 0,05 level. Only smaller variations are observed for the control variables and they are therefore not elaborated on any further.

TABLE 18 *Effect of female CEOs on cost of borrowing after the announcement of the Norwegian taxation reform*

Table 18 presents the result from the robustness test of the effect of female CEOs on the firm´s cost of borrowing, when dividing the sample into full sample (2001-2017) and reduced sample (2005-2017). The results are obtained by running the estimated two-way random effects model with *cost of borrowing* as the dependent variable. *Cost of borrowing* reflects the total charge for issuing debt as a ratio and is measured as interest expenses plus other financial expenses divided by total current liabilities plus total long-term liabilities minus total provisions. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS		(2) SMEs		(3) LARGE FIRMS		(4) ALL FIRMS	
	Full sample (2001-2017)	Reduced sample (2005-2017)	Full sample (2001-2017)	Reduced sample (2005-2017)	Full sample (2001-2017)	Reduced sample (2005-2017)	Full sample (2001-2017)	Reduced sample (2005-2017)
Constant	6,3079	6,3744	-1,4558	-0,2818	0,0329	0,0259	-0,5098	0,5235
	(5,8083)	(5,8092)	(1,5789)	(0,8716)	(0,0449)	(0,0460)	(1,7000)	(1,4218)
Female CEO	-0,0381***	-0,0384***	0,0230	-0,0570***	0,0001	-0,0002	0,0041	-0,0538***
	(0,0099)	(0,0109)	(0,0720)	(0,0118)	(0,0022)	(0,0022)	(0,0521)	(0,0088)
Profitability	0,0421*	0,0356	0,0846	0,0588	-0,0061	-0,0016	0,0524*	0,0362
	(0,0247)	(0,0260)	(0,0662)	(0,0865)	(0,0061)	(0,0059)	(0,0279)	(0,0332)
Tangibility	-0,0870***	-0,0931***	-0,1408***	-0,2007***	0,0092***	0,0097***	-0,0950***	-0,1294***
	(0,0177)	(0,0209)	(0,0282)	(0,0324)	(0,0026)	(0,0027)	(0,0220)	(0,0166)
Firm size	-0,0547***	-0,0573***	-0,1041***	-0,0885***	-0,0007	-0,0009	-0,0696***	-0,0563***
	(0,0094)	(0,0104)	(0,0243)	(0,0144)	(0,0015)	(0,0016)	(0,0134)	(0,0081)
Growth	-1,7395***	-1,8066***	-1,9207***	-1,9610***	-0,0371***	-0,0333***	-1,749***	-1,8002***
	(0,2014)	(0,2380)	(0,3602)	(0,3411)	(0,0106)	(0,0101)	(0,2071)	(0,2146)
Risk	0,0391***	0,0413***	0,0574**	0,0637***	0,0015***	0,0012***	0,0550***	0,0625***
	(0,0099)	(0,0103)	(0,0275)	(0,0197)	(0,0005)	(0,0004)	(0,0213)	(0,0159)
Industry Leverage	-9,1060	-9,2205	5,2571**	2,9005*	0,0186	0,0212	2,7314	0,6624
	(9,7921)	(9,7995)	(2,6616)	(1,5329)	(0,0575)	(0,0570	(2,8601)	(2,3993)
CEO age	-0,0010**	-0,0009	-0,0004	-0,0004	-0,0001	-0,0000	-0,0005	-0,0005
	(0,0005)	(0,0005)	(0,0005)	(0,0006)	(0,0001)	(0,0001)	(0,0004)	(0,0005)
CEO ownership	-0,0001	-0,0001***	-0,0000	-0,0001	0,0000**	0,0000**	-0,0001	-0,0002
	(0,0001)	(0,0001)	(0,0002)	(0,0002)	(0,0000)	(0,0000)	(0,0002)	(0,0001)
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
R-squard	0,0088	0,0083	0,0011	0,0023	0,0758	0,0808	0,0007	0,0019
No. of observations	193 675	159 623	548 143	465 112	3614	3 368	745 432	628 103
No. of firms	43 507	38 718	86 599	80 513	1230	1 162	110 245	102 703

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

6.3.4 ROBUSTNESS TEST: LAGGED VARIABLES

As a last robustness test for the effect of female CEOs on cost of borrowing, we lagged the independent accounting variables by one period. In our initial model in column 1, our main finding was that female CEOs of micro firms pay 3,81% less for their borrowings compared to male CEOs of micro firms. When lagging the independent accounting variables by one period, we observe that the negative effect for female CEOs of micro firms get significantly stronger, hence decrease from -3,81% to -7,54%. Both models are statistically significant at the 0,01 level. Thus, the model where the independent accounting variables are lagged by one period reinforces our initial findings of female CEOs of micro firms enjoying a lower cost of borrowing than male CEOs of micro firms. Further, estimated effect for female

CEOs of SMEs and large firms are still not statistically significant. Only small changes are observed for the control variables. Additionally, R-squared is observed to be higher for all sub-samples compared to the original model, except for micro firms where R-squared decrease from 8,8% to 8,3%.

TABLE 19: *Effect of female CEOs on cost of borrowing with lagged variables*

Table 19 presents the result from the robustness test of the effect of female CEOs on the firm´s cost of borrowing, lagging the independent accounting variables by one period. The table compares the initial model (initial model RE) with the model with lagged variables (Lagged model RE). The results are obtained by running the estimated two-way random effects model with *cost of borrowing* as the dependent variable. *Cost of borrowing* reflects the total charge for issuing debt as a ratio and is measured as interest expenses plus other financial expenses divided by total current liabilities plus total long-term liabilities minus total provisions. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) report the estimated results for micro firms, SMEs, large firms and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS		(2) SMEs		(3) LARGE FIRMS		(4) ALL FIRMS	
	Initial model RE	Lagged model RE	Initial model RE	Lagged model RE	Initial model RE	Lagged model RE	Initial model RE	Lagged model RE
Constant	6,3079	6,4855	-1,4558	0,6858	0,0329	0,0563*	-0,5098	1,7842
	(5,8083)	(6,3439)	(1,5789)	(1,0937)	(0,0449)	(0,0300)	(1,7000)	(1,5875)
Female CEO	-0,0381***	-0,0754***	0,0230	-0,0024	0,0001	0,0011	0,0041	-0,0222
	(0,0099)	(0,0155)	(0,0720)	(0,0648)	(0,0022)	(0,0023)	(0,0521)	(0,0485)
Profitability	0,0421*	0,0711*	0,0846	-0,1078***	-0,0061	-0,0226***	0,0524*	-0,0038
	(0,0247)	(0,0414)	(0,0662)	(0,0346)	(0,0061)	(0,0063)	(0,0279)	(0,0326)
Tangibility	-0,0870***	-0,0900***	-0,1408***	-0,2180***	0,0092***	0,0078***	-0,0950***	-0,1417***
	(0,0177)	(0,0247)	(0,0282)	(0,0419)	(0,0026)	(0,0024)	(0,0220)	(0,0235)
Firm size	-0,0547***	-0,0552***	-0,1041***	-0,0971***	-0,0007	0,0005	-0,0696***	-0,0670***
	(0,0094)	(0,0135)	(0,0243)	(0,0196)	(0,0015)	(0,0004)	(0,0134)	(0,0113)
Growth	-1,7395***	-0,2679	-1,9207***	-0,5076	-0,0371***	0,0061	-1,749***	-0,3220
	(0,2014)	(0,2340)	(0,3602)	(0,5312)	(0,0106)	(0,0076)	(0,2071)	(0,3476)
Risk	0,0391***	0,0422**	0,0574**	0,0744***	0,0015***	0,0011**	0,0550***	0,0708***
	(0,0099)	(0,0170)	(0,0275)	(0,0282)	(0,0005)	(0,0005)	(0,0213)	(0,0220)
Industry Leverage	-9,1060	-9,3319	5,2571**	1,5327	0,0186	-0,0573	2,7314	-1,1498
	(9,7921)	(10,5895)	(2,6616)	(1,8700)	(0,0575)	(0,0480)	(2,8601)	(2,6462)
CEO age	-0,0010**	-0,0016	-0,0004	-0,0004	-0,0001	-0,0000	-0,0005	-0,0010
	(0,0005)	(0,0011)	(0,0005)	(0,0010)	(0,0001)	(0,0001)	(0,0004)	(0,0007)
CEO ownership	-0,0001	-0,0000	-0,0000	0,0004	0,0000**	0,0000***	-0,0001	0,0003
	(0,0001)	(0,0002)	(0,0002)	(0,0003)	(0,0000)	(0,0000)	(0,0002)	(0,0002)
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
R-squard	0,0088	0,0032	0,0011	0,00115	0,0758	0,0699	0,0007	0,0012
No. of observations	193 675	157 394	548 143	457 740	3614	2 920	745 432	618 054
No. of firms	43 507	39 148	86 599	82 604	1230	1 087	110 245	106 299

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

6.4 LIMITATIONS

This thesis focuses on the effect of female CEOs on firms´ capital structures in Norwegian private firms. In general, private firms do not have the same reporting requirements as listed firms. Thus, using secondary data retrieved from *The Centre for Corporate Governance Research* (CCGR) database has been very beneficial by getting us access to accounting information that we initially would not have had access to, at least not to the same extent. However, using secondary data have its limitations. According to Saunders, Lewis and Thornhill (2016), some limitations of using secondary data is that the aggregations and definitions may be unsuitable to the purpose of the research and the user may have low control over the quality of the data and how it is presented. In regards of this particular thesis, one limitation is the lack of item descriptions in the CCGR database. Thus, some assumptions have been made about the accounting items when processing and defining variables, for instance when distinguishing between interest-bearing and non-interest-bearing items.

Furthermore, as illustrated in *illustration 1*, the number of female CEOs has increased steadily over the past years. Nonetheless, there is still a quite large gender gap, which in our data sample has resulted in a skewed distribution of 85% male CEOs compared to 15% female CEOs. One concern with this unequal distribution of gender is the risk of obtaining biased results (Lewis-Beck, Bryman, & Liao, 2003). Nevertheless, this study should not be considered as a final result on the effect of female CEOs on capital structures, but rather a contribution to further research as the number of female CEOs increase in the future. The skewness is also observed in our sub-samples categorised by firm size, but this was expected as most of the Norwegian private firms are small (Bøhren, 2011). However, when interpreting our results, we mainly emphasize the findings in the sub-samples for the smaller firms.

As previously mentioned, an additional limitation to this particular thesis is the endogeneity issue that might occur due to potential reverse causality, self-selection and omitted variables. However, even if several measures are undertaken, the endogeneity problem may only be mitigated to some degree. For further elaboration on the endogeneity problem see *section 5.1*.

7.0 CONCLUSION

Contributing to the existing literature on how managerial characteristics affects a firm´s financing decisions, this study investigates the effects of female CEOs on corporate capital structures in Norwegian private firms. In general, the thesis seeks to examine how female CEOs shape the firm's financing decisions in terms of debt levels, debt maturity and cost of borrowing. Previous research has mainly emphasized that female CEOs are more risk averse and less prone to overconfidence. Thus, female- and male CEOs are argued to finance their companies differently. However, most studies focus on listed US companies. Thus, by extending the focus to private firms in one of the most gender equal countries in the world, we hope to contribute to the topic in a new and beneficial way.

Consistent with previous findings by Huang and Kisgen (2013) and Faccio, Marchica and Mura (2016), we initially proposed that firms run by female CEOs would adopt a capital structure with less leverage compared to firms run by male CEOs, since they are more concerned with reducing the risk of default. However, this hypothesis was not supported by our findings. On the contrary, we find evidence of female CEOs of micro firms, firms with a maximum of 2 million NOK in total operating revenues and a maximum of 2 million NOK in total assets, to issue more leverage compared to male CEOs of micro firms. In conclusion, it would appear that females´ risk aversion disappear once they have broken through the glass ceiling in the smallest companies. Thus, having a female CEO would not necessarily result in more risk averse financing decisions being undertaken. These findings are proven to be robust for several model adjustments. However, our results on the influence of the CEO´s gender is observed to vary between firm sizes and firm types, hence suggesting that there might be less room for managerial traits in larger firms and that the influence vary between private and listed firms. Thus, for future studies investigating how the influence of managerial traits, such as the gender of the CEO vary between firm size and type, might prove to be rather interesting.

In regards of debt maturity, our study provides evidence of female CEOs of smaller Norwegian private firms issuing more short-term debt than male CEOs. In general, our findings are consistent with the previous literature of females preferring a more conservative and flexible capital structure, meaning a capital structure where the

CEO easily can shift to other sources of capital such as equity (Myers, 1977; Rocca, Neha & Rocca, 2019). Further, Ben-David, Graham and Harvey (2013) suggested that overconfident CEOs issue higher amounts of long-term debt. Thus, our findings may suggest that female CEOs in general are less overconfident compared to male CEOs. Our results are proven to be robust for several model specification such as excluding non-interest-bearing elements.

In general, previous research on how the CEO´s gender affects the overall cost of borrowing is both limited and conflicting, which makes it an interesting topic to study. Contributing to this topic, our findings provide evidence of female CEOs of micro firms enjoying a lower cost of borrowing than male CEOs of micro firms, despite the fact that female CEOs of micro firms previously in our study is suggested to issue more leverage, especially interest-bearing debt. These results are proven to be robust to different model specifications. Without speculating, these findings may be considered as a further validation of female-led firms to obtain more favourable contract terms due to the perception of being more risk averse (Miah, 2019), the perception of providing more reliable accounting information (Francis, Hasan and Wu, 2013) or choosing cheaper forms for financing. However, further research is needed to conclude on this reasoning. More interestingly when comparing the estimated effect of female CEOs on leverage and cost of borrowing, we observe that even if females are assumed to be more risk-averse and therefore are expected to issue less leverage, the effect of female CEOs on leverage might be balanced by the access to cheaper borrowings. Implying that small firms led by female CEOs issue higher amounts of leverage because they are able to obtain a lower cost of borrowing. However, large firms often have more tangible assets to provide as collateral. Hence, the effect of female CEOs on cost of borrowing disappears, which reinforce our findings of female CEOs of large firms to issue less leverage.

In conclusion, we find that female CEOs of smaller Norwegian private firms adopt a capital structure with higher amounts of leverage, with a shorter maturity, at a lower cost. Thus, this thesis firstly contributes to the existing literature on the influence of the CEO´s personal traits on corporate financing policies, specifically on behavioural gender differences. We contribute to the topic by providing evidence of male- and female CEOs differing in their financing choices, hence

adopting capital structures with different amounts of leverage, different types of maturities and at a different cost. Secondly, the thesis adds to the existing literature on managerial gender differences in risk appetite and overconfidence. However, from our results of female CEOs issuing more debt but with a shorter maturity, we are unable to conclude whether female- and male CEOs of Norwegian private firms significantly differ in their risk appetite and level of confidence. By using leverage as a proxy for corporate risk taking, it would appear as females´ risk aversion disappears once they have broken through the glass ceiling. However, preferring a higher amount of short-term debt would indicate that female CEOs are more conservative and prefer having a higher flexibility, which indicate the opposite. Thus, we propose further research to be conducted in order to determine whether previous findings of female CEOs being more risk averse and less prone to overconfidence are generalisable to all types of firms and countries. Thirdly, the thesis adds to the existing literature on the effect of managerial characteristics on the cost of borrowing by providing evidence of female CEOs enjoying more favourable contracting terms when issuing leverage, which may be argued to balance the effect of female CEOs´ risk aversion.

The theory on corporate capital structures has gained a great deal of attention ever since *the irrelevance theory* proposed by Modigliani and Miller in 1958. However, a majority of these emphasize firm-, industry and market level explanations. Thus, this thesis opens for further research on the topic in several ways. Firstly, our findings propose that further research in general should explore how different managerial characteristics influence the corporate capital structure. Secondly, this thesis shows that the gender of the CEO in particular explains some of the unexplained variations in a firm´s leverage, maturity structures and cost of borrowing. However, future research is needed to confirm these findings, especially as the number of female CEOs are likely to increase in the future. Thirdly, compared to previous research on the effect of female CEOs on leverage using US data, our study obtains some new and unexpected results. Thus, for further research we propose to investigate how the results vary between geographical patterns in gender equality and diversity. The thesis also detects significant differences between financing decisions of small and large firms. Thus, it would for further research be interesting to see how managerial behaviour vary between firm sizes as well as firm types. Finally, for further research it would be interestingly to study

the reasoning behind why female CEOs might obtain more favourable contract terms when issuing debt and how this may balance the effect of female CEOs´ risk aversion on corporate debt levels.

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9.0 APPENDIX

A1: VARIABLES RETRIEVED FROM CCGR

Item	Decription
Item_2	CEO gender
Item_4	CEO birth year
Item_6	Enterprise type
Item_11	Total operating revenue
Item_15	Depreciation
Item_19	Operating Income
Item_30	Other interest expenses
Item_31	Other financial expenses (such as brokerage fees)
Item_39	Net income
Item_41	Dividends
Item_51	Total fixed assets (tangible)
Item_63	Total fixed assets
Item_76	Cash and cash equivalents
Item_78	Total current assets
Item_86	Retained earnings
Item_87	Total equity
Item_91	Total provisions
Item_92	Convertible loans
Item_94	Liabilities to financial institutions
Item_98	Total other long-term liabilities
Item_99	Convertible loans
Item_101	Liabilities to financial institutions
Item_102	Account payable
Item_107	Bank overdraft (flexible as credit line)
Item_108	Other short-term liabilities
Item_109	Total current liabilities
Item_113	Number of employees
Item_122	Debt level
Item_127	ROA
Item_15002	CEO gender
Item_15004	CEO birth year
Item_15006	Enterprise type
Item_15011	Total operating revenue
Item_15015	Depreciation
Item_15019	Operating Income
Item_15030	Other interest expenses
Item_15031	Other financial expenses (such as brokerage fees)
Item_15039	Net income
Item_15041	Dividends
Item_15051	Total fixed assets (tangible)
Item_15063	Total fixed assets
Item_15076	Cash and cash equivalents
Item_15078	Total current assets
Item_15086	Retained earnings
Item_15087	Total equity
Item_15091	Total provisions
Item_15092	Convertible loans
Item_15094	Liabilities to financial institutions
Item_15098	Total other long-term liabilities
Item_15099	Convertible loans
Item_15101	Liabilities to financial institutions
Item_15102	Account payable
Item_15107	Bank overdraft (flexible as credit line)
Item_15108	Other short-term liabilities
Item_15109	Total current liabilities
Item_15113	Number of employees
Item_15122	Debt level
Item_15127	ROA
Item_602	Board size
Item_605	Number of female directors
Item_14002	Number Of Owners (ultmate ownership)
Item_14006	Number Of Personal Male Owners (ultmate ownership)
Item_14007	Number of Personal Female Owners (ultmate ownership)
Item_14020	Aggregated Farction held by Personal Male Owners (ultmate ownership)
Item_14021	Aggregated Farction held by Personal Female Owners (ultmate ownership)
Item_14022	Aggregated Farction held by Personal State Owners (ultmate ownership)
Item_14502	Group ID (ultmate ownership)
Item_14503	Is Parent (ultmate ownership)
Item_14504	Is Subsidiary (ultmate ownership)
Item_14505	Is JointControl (ultmate ownership)
Item_14506	Is Associated (ultmate ownership)
Item_14507	Is Independent (ultmate ownership)
Item_15305	Largest family has Chair (ultmate ownership)
Item_15311	Ultimate ownership held by families
Item_17002	Listing status on Oslo Børs of Oslo Axcess
Item_18011	The share owned ultimately by the CEO
Item_18013	CEO Tenture
Item_50111	Sector code
Pcid	Firm ID
Yr	Year
Currency	Currency

A2: VARIABLE DEFINITIONS

Leverage is defined as total *current liabilities* (item 109) plus total *long-term liabilities* (item 91+ item 98), divided by total *current liabilities* (item 109) plus total *long-term liabilities* (item 91+ item 98) plus *total equity* (item 87)

Short-Term Debt is defined as total *current liabilities* (item 109) divided by total *current liabilities* (item 109) plus total *long-term liabilities* (item 91+ item 98)

Cost of Borrowing is defined as *interest expenses* (item 30) plus *other financial expenses* (item 31) divided by total *current liabilities* (item 109) plus total *long-term liabilities* (item 91+ item 98) minus *total provisions* (item 91)

Female CEO is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise

Profitability is defined as total *operating income before depreciation* (item 19 – item 15) divided by *total assets* (item 63 + item 78)

Tangibility is defined as *total fixed assets* (item 51) divided by t*otal assets* (item 63 + item 78)

Firm Size is defined as the natural logarithm of *sales* (item 11)

Growth is defined as the change in log of *total assets* (item 63 + item 78)

Risk is defined as the standard deviation of the growth in *sales* (item 11)

Industry Leverage is defined as the median of the *total liabilities* (item 109 + item 91 + item 98) *to total capital* (item 109 + item 91 + item 98 + item 87) per *sector* (item 50111)

CEO Age is defined as the current time period *t* (yr) minus *the CEO birth year* (item 4)

CEO Ownership is defined as *the shares owned ultimately by the CEO* (item 18011)

Cash Holdings is defined as *cash and Cash equivalent* (item 76) divided by *total assets* (item 63 + item 78)

Female Presence is defined as *total female board members* (item 605) divided by *total board members* (item 602)

***Alternative Leverage* =** *Total debt* (item 98 + item 101+ item 108) divided by *total assets* (item 63 + item 78)

***Alternative Short-Term Debt* =** *Interest-bearing short-term debt (item 101 + item 108)* divided by *total assets* (item 63 + item 78)

A3: VARIANCE INFLATION FACTOR (VIF) TEST

Collinearity Diagnostics

Variable	VIF	SQRT VIF	Tolerance	R-Squared
LEVERAGE	1.26	1.12	0.7939	0.2061
SHORT_LEVERAGE	1.87	1.37	0.5338	0.4662
COST_BORROWING	1.00	1.00	0.9993	0.0007
FEMALE	1.03	1.01	0.9716	0.0284
PROFITABILITY	1.11	1.05	0.9004	0.0996
TANGIBILITY	1.81	1.34	0.5532	0.4468
FIRM_SIZE	1.37	1.17	0.7305	0.2695
GROWTH	1.07	1.04	0.9307	0.0693
RISK	1.13	1.06	0.8847	0.1153
INDUSTRY_LEVERAGE	1.01	1.00	0.9948	0.0052
CEO_AGE	1.06	1.03	0.9420	0.0580
CEO_OWNERSHIP	1.06	1.03	0.9415	0.0585
Mean VIF	1.23			

	Eigenval	Cond Index
1	7.5307	1.0000
2	1.0870	2.6321
3	0.9989	2.7457
4	0.8773	2.9298
5	0.7536	3.1611
6	0.6927	3.2972
7	0.5459	3.7142
8	0.2677	5.3043
9	0.1474	7.1485
10	0.0635	10.8900
11	0.0269	16.7332
12	0.0073	32.1779
13	0.0011	81.6393

Condition Number 81.6393
Eigenvalues & Cond Index computed from scaled raw sscp (w/ intercept)
Det(correlation matrix) 0.3167

A4: HAUSMAN TEST

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
FEMALE	-.0045051	.004953	-.0094582	.0015123
PROFITABIL~Y	-.0169328	-.0167179	-.0002149	.000072
TANGIBILITY	.1969176	.1983122	-.0013946	.0008373
FIRM_SIZE	.0370141	.0405534	-.0035394	.0001481
GROWTH	.5980137	.5777755	.0202382	.0012232
INDUSTRY_L~E	.0901048	.2797649	-.18966	.0101113
CEO_AGE	-.0010991	-.0019789	.0008798	.0000372
CEO_OWNERS~P	-.0000415	.0000588	-.0001003	4.98e-06
yr				
2003	.0112945	.0123144	-.0010199	.0001039
2004	.0458654	.0477235	-.0018581	.0001459
2005	-.0418737	-.0385068	-.0033669	.0001778
2006	-.0714804	-.0653906	-.0060898	.0002313
2007	-.1006252	-.0955854	-.0050398	.0002324
2008	-.1204619	-.1147682	-.0056937	.0002583
2009	-.1387608	-.1326495	-.0061113	.000285
2010	-.1462669	-.1394263	-.0068407	.0003113
2011	-.1532425	-.1450701	-.0081724	.0003391
2012	-.1658085	-.1566869	-.0091215	.000367
2013	-.1670207	-.1345967	-.0324239	.0012426
2014	-.1885847	-.176987	-.0115977	.00043
2015	-.1919006	-.178558	-.0133427	.0004652
2016	-.203168	-.1879475	-.0152206	.0005023
2017	-.2123656	-.1959135	-.0164521	.000536

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(23) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 3141.67
Prob>chi2 = 0.0000

A5: BREUSCH-PAGAN LM TEST FOR RANDOM EFFECTS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        LEVERAGE[pcid,t] = Xb + u[pcid] + e[pcid,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                LEVERAGE |     .068805       .2623072
                       e |    .0201548       .1419676
                       u |    .0337163       .1836201

        Test:   Var(u) = 0
                                    chibar2(01) =  1.0e+06
                                Prob > chibar2 =   0.0000
```

A6: COMPARISON OF CONTROL VARIABLES TO EXISTING LITERATURE ON THE EFFECT ON LEVERAGE

The control variables in the estimated two-way random effects model are theoretically motivated. Thus, this *table* presents the regression analysis of the effect of firm-, industry- and CEO control variables on firm leverage. *Leverage* is here measured as total current liabilities plus total long-term liabilities, divided by total current liabilities plus total long-term liabilities plus total equity. *Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. *Profitability* is measured as return on assets, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. All standard errors are clustered at firm level and presented in parentheses.

	(1)	(2)	(3)
Constant	-0,2441***	0,1895***	0,0101
	(0,0069)	(0,0089)	(0,0340)
Female CEO			0,0049***
			(0,0020)
Profitability	-0,0024	-0,0119	-0,0167
	(0,0020)	(0,0074)	(0,0114)
Tangibility	0,2480***	0,2336***	0,1983***
	(0,0023)	(0,0023)	(0,0023)
Firm size	0,0413***	0,0377***	0,0406***
	(0,0004)	(0,0005)	(0,0007)
Growth	0,7076***	0,6346***	0,5778***
	(0,0110)	(0,0165)	(0,0224)
Risk	-0,0204***	-0,0189***	-0,0188***
	(0,0007)	(0,0008)	0,0007
Industry Leverage	0,3133***	0,2450***	0,2798***
	(0,0054)	(0,0054)	(0,0552)
CEO age		-0,0066***	-0,0020***
		(0,0001)	(0,0001)
CEO ownership		0,0000	0,0001***
		(0,0000)	(0,0000)
Year fixed effects			✓
R-squard	0,2261	0,2437	0,2696
No. of observations	765 309	748 848	748 845
No. of firms	111 423	110 459	110 459

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

A7: EFFECT OF FEMALE CEOs ON THE PROPORTION OF TRADE CREDIT

Table A7 presents the regression analysis of the effect of female CEOs on firm's proportion of trade credit. The results are obtained by running the estimated two-way random effects model with *account payable* as the dependent variable. *Account payable* is measured as *account payable* divided by *total current liabilities. Female CEO* is defined as a dummy variable taking the value of 1 if the CEO is female, and 0 otherwise. Further, all models include firm-, industry- and CEO control variables as well as year fixed effects. *Profitability* is measured as *return on assets*, meaning operating income before depreciation divided by total assets. *Tangibility* is measured as total fixed assets over total assets. *Firm size* is measured as the natural logarithm of sales. *Growth* is measured as the change in log of total assets. *Risk* is measured as the standard deviation of the growth in sales. *Industry leverage* is measured as the median of total liabilities-to-capital ratio per sector. *CEO age* indicates the age of the CEO in the current year *t*. The last variable, *CEO ownership* is measured as the shares owned ultimately by the CEO. Column (1), (2), (3) and (4) reports the estimated results for micro firms, SMEs, large and all firms respectively. All standard errors are clustered at firm level and presented in parentheses.

	(1) MICRO FIRMS	(2) SMEs	(3) LARGE FIRMS	(4) ALL FIRMS
Constant	0,0489	-0,3507***	0,0667	-0,2353***
	(0,0825)	(0,0362)	(0,3679)	(0,0323)
Female CEO	-0,0175***	-0,0178***	-0,0179	-0,0210***
	(0,0025)	(0,0016)	(0,0135)	(0,0014)
Profitability	-0,0656***	-0,2122***	-0,1466***	-0,1281***
	(0,0058)	(0,0214)	(0,0434)	(0,0084)
Tangibility	0,0049	-0,0067*	0,1192***	-0,0058**
	(0,0031)	(0,0038)	(0,0184)	(0,0028)
Firm size	0,0057***	0,0406***	0,0104	0,0303***
	(0,0008)	(0,0001)	(0,0105)	(0,0005)
Growth	0,1105***	0,0485***	-0,1067	0,3283***
	(0,0377)	(0,0348)	(0,0715)	(0,0224)
Risk	-0,0004	-0,0119***	-0,0006	-0,0086***
	(0,0010)	(0,0007)	(0,0029)	(0,0006)
Industry Leverage	0,1819	0,0887	0,0074	0,1374**
	(0,1376)	(0,0584)	(0,5211)	(0,0534)
CEO age	-0,0013***	-0,0013***	-0,0002	-0,0013***
	(0,0001)	(0,0000)	(0,0004)	(0,0000)
CEO ownership	-0,0004***	0,0000*	0,0001	-0,0001***
	(0,0000)	(0,0000)	(0,0001)	(0,0000)
Year fixed effects	✓	✓	✓	✓
R-squard	0,0472	0,1800	0,0546	0,1546
No. of observations	192 430	547 059	3 614	743 103
No. of firms	43 390	86 540	1 230	110 136

*Significance at 10%, 5% and 1% are repoted as *, ** and *** respectively*

A8: PRELIMINARY THESIS

PRELIMINARY MASTER THESIS

"How do female CEOs affect the corporate capital structure in Norwegian private firms"

Name of students:
Silje Løset
Kine Lunde

Program
Master of Science in Business - Major in Accounting and Business control

Assigned supervisor:
Ignacio Garcia de Olalla

Submission date:
15.01.2020

Campus:
BI OSLO

TABLE OF CONTENT

1.0 INTRODUCTION

In general, capital structure can be defined as "the relative proportion of debt, equity, and other securities that a firm has outstanding" (Demarzo & Berk, Corporate Finance - Global Edition, 2017). Corporate capital structures have for decades attracted a lot of attention, since choosing the optimal capital structure is a way to maximise firm value. Said in another way, the objective of maximising firm value can be achieved by choosing the optimal proportion of debt and equity. Hence, finding the optimal capital structure. As a consequence, managers are continuously searching for the optimal capital structure and it has therefore become one of the most researched areas within corporate finance.

The starting point of the theory on corporate capital structure was the irrelevance theory developed by Modigliani and Miller in 1958. Since then, a considerable amount of literature has emerged. Most of the previous literature has mainly focused on the effect of taxation, bankruptcy costs, agency costs and asymmetric information. Regardless, recent studies have argued that these theories alone are unable to explain the entire variation in firms´ leverage ratios. As a result, more recent studies have shifted their focus to how firm- and managerial characteristics affect the corporate capital structure. In general, studies on managerial characteristics have argued that factors such as time in position, education and age may explain some of the variations in firms leverage ratios.

However, even if managerial differences such as gender have been heavily researched within the field of psychology, this is not the case for the corporate finance field. One explanation is that women are severely underrepresented in top leader positions, all around the world. However, different studies have argued that companies with a larger gender diversity are more profitable, productive, innovative and has a greater chance of survival. As a consequence, more and more companies are focusing on reducing their gender gap.

According to SSB (2019), the women's labour force participation rate in Norway has increased from 45% to 67.3% in the time period 1973-2018. These numbers imply that the workforce in Norway today consist of almost as many females as males. This is a result of Norway having worked tremendously on gender equality for the last 30 years. Further, Norway has focused on helping females break through

"the glass ceiling", meaning getting more females to the top of the corporate ladder. For instance, Norway implemented in 2005 gender quotas, which requires at least 40% female presence on company boards. This legal requirement has according to The Economist (2005) made Norway one of the leading countries when it comes to gender diversity on corporate boards. However, only 6% of the market value on the Norwegian Stock Exchange in 2019 was controlled by companies with female managers, an increase from 1.5% in 2018 (E24, 2019). The increase reflects that larger listed companies, such as Schibsted, Norsk Hydro and DNB, recently has appointed female CEOs. This implies that there may be an increasing trend in females taking a leading position in Norwegian companies. However, only 36% of all managers and 25% of all CEOs in Norway today are female, which indicates that there still is room for improvements (SSB, 2017).

Motivated by the slight increase in number of female managers, this thesis aims at explaining how female CEOs affect the firm´s capital structure in Norwegian private firms. Most of the previous research uses US data such as; *Fortune 500 companies* and *Standard & Poor´s 500 companies*. However, only 5% of these companies have a female CEO and almost 80% of the board members are males (Wang, Holmes, Devine, & Bishoff, 2018). We therefore believe that it will be interesting to examine how the characteristics of a female leader affects the firm's financial decisions, in one of the most gender equal countries in the world.

The first part of this preliminary thesis concerns a comprehensive literature review on capital structure. The objective of this review is to show the development of literature over time, as well as identifying the knowledge gaps. However, we would like to highlight that the most relevant literature for our thesis is presented in section 2.3. Further, we have clarified the research question and developed hypotheses based on our findings. The last section describes the methodology as well as the plan going forward.

2.0 LITTERATEUR REVIEW

This section contains a comprehensive literature review on capital structures. The literature review is divided into three parts in order to show the development of literature over time. The first part is a review of traditional corporate capital structure theories. While the last two parts concerns more recent studies, which tries to determine the effect of specific firm- and managerial characteristics.

2.1 CAPITAL STRUCTURE THEORY

Modern corporate finance states that the overall objective of firms is to maximise firm value, which includes finding the optimal capital structure. Capital structure can be defined as "the relative proportions of debt, equity, and other securities that a firm has outstanding" (Demarzo & Berk, Corporate Finance - Global Edition, 2017). Decisions regarding capital structure is viewed as one of the most important decisions a firm must make, due to its crucial role in a business survival. The topic *Capital Structure* is therefore heavily researched, and as a consequence extensive theoretical framework have emerged.

2.1.1 IRRELEVANCE THEORY

One of the first and most recognised theories on capital structure was *the irrelevance theory* developed by Modigliani and Miller in 1958. The theory claims that "the market value of any firm is independent of its capital structure" (Modigliani & Miller, 1958). The irrelevance model is based on the assumption of perfect capital markets, meaning; *no transaction costs, no taxes, no bankruptcy costs, no arbitrage opportunities* and *financial choices do not affect investment.*

"However, in the real-world taxes exist and they have a significant influence on a firm's capital structure and on firm value" (Aljamaan, 2018). As a result, Modigliani and Miller published the article *Corporate Income Taxes and the cost of Capital; A correction* in 1963. This article included the effect of corporate taxation, thus stating that the value of a levered firm equals the value of an unlevered firm plus the tax shield.

2.1.2 TRADE-OFF THEORY

From Modigliani and Miller´s introduction of corporate taxation it may seem that all firms should be 100% debt financed. However, this is not the case, because as the amount of debt increases so does the probability of bankruptcy and financial distress. The risk of bankruptcy is related to high legal costs, liquidations costs and other indirect costs.

One spinoff of Modigliani and Miller´s model, which include corporate taxation and bankruptcy costs, is *the trade-off theory* developed by Myer's in 1984. The trade-off theory states that the optimal capital structure is the mix of debt and equity that will maximise firm value. Meaning where the tax benefit from leverage is completely offset by the costs of potential financial distress.

2.1.3 THE AGENCY THEORY

The agency theory by Jensen and Meckling (1976) argued that the optimal capital structure is where the total agency costs are minimised. The agency costs arise due to divergent interest between the equityholders, debtholders and the manager. The two most discussed inefficiencies that arise from agency conflicts is; *Asset substitution* and *Debt overhang.*

The asset substitution problem was first discussed by Jensen and Meckling (1976) who argued that higher amounts of debt increase the equityholders incentives and willingness to undertake riskier projects. Myers (1977) on the other hand argued that firms financed with high levels of debt would reject investment opportunities with positive NPV, which would mostly benefit the debtholders. Thus, the optimal debt ratio is where the cost of these inefficiencies is minimised.

The previous theories have not taken information asymmetry into account. However, information asymmetry exists between the manager and the investors. As a result, "investors try to incorporate indirect evidence in their valuation of firm performance by analysing information revealing actions including capital structures choice" (Miglo, 2011). Two theories that discuss the relationship between financial leverage and asymmetric information are the; *Signalling theory* and *Pecking order theory*.

2.1.4 THE SIGNALLING THEORY

The signalling theory by Ross (1977) suggests that issuing debt is seen as a positive sign, because it implies that managers are confident about future earnings. Issuing debt requires that managers commits to pay interest payments, which signals the managers belief on having sufficient cash to service their debt. Contradictory, issuing equity will be interpreted as bad sign, because it implies that managers have lower confidence in future earnings.

2.1.5 PECKING ORDER THEORY

The *pecking order theory* by Myers and Majluf (1984) suggests that corporations prefer to use internal sources of funds, such as retained earnings. If external financing is required, firms prefer debt to equity, meaning that a firm only issue equity as a last resource. The theoretical justification behind is that the cost of financing increases with the degree of asymmetric information. As a consequence, the optimal capital structure will be determined by firm´s preferences for the different kinds of financing available.

2.1.6 THE MARKET TIMING THEORY

One of the newest theories concerning capital structure is the *Market Timing Theory* by Baker and Wurgler (2002). This theory discusses the relationship between the current capital structure and historical market values. “Their results suggest that the capital structure is the cumulative outcome of attempts to time the equity market” (Baker & Wurgler, 2002)**.** This implies that firms will issue stocks when the stock is overvalued and repurchase shares when stock prices undervalued**.**

2.2 FIRM CHARACTERISTICS AND CAPITAL STRUCTURE

Once the theoretical framework was defined, several researchers started conducting empirical studies that tests whether these theories holds in practice. The most discussed research specifically investigates how firms’ characteristics may explain differences in firms leverage ratios. A number of authors have recognised that factors such as *firm size, growth, profitability, cash flow- and earnings volatility* and *asset tangibility* explain differences in capital structures. Frank and Goyal published in 2009 *The core model of leverage,* which argues that some of these firm characteristics actually explains over 30% of the variation in firms leverage ratios.

2.2.1 FIRM SIZE

Several studies suggest that large firms tend to be more diversified, meaning that they have smaller cash flow volatility, lower cost of financial distress and lower probability of bankruptcy compared to smaller companies (Baker & Martin, 2011). This implies better conditions for borrowing, a stronger negotiating force, and an easier access to funds. Therefore, the trade-off theory defines a negative relationship between size and bankruptcies, hence predicts that large firms are more leveraged (Titman & Wessels, 1988). The pecking order theory on the other hand argues that there is a negative relationship between leverage and size, due to lower information asymmetry.

2.2.2 GROWTH

The firm's growth could potentially indicate that the firm has a sufficient number of financial sources, which allows them to invest in future growth and development. The trade-off theory suggests a negative relationship between growth opportunities and debt, due to stronger incentives to avoid the problem of underinvestment and asset substitution (Jensen & Meckling, Theory of the firm: Managerial behavior, agency cost and ownership structure, 1976). The pecking order theory on the other hand is conflicting, meaning that it both predicts a positive- and negative relationship between growth opportunities and leverage.

2.2.3 PROFITABILITY

The trade-off theory assumes a positive relationship between profitability and leverage, due to bankruptcy costs, taxes and agency costs. First, bankruptcy costs decline as profitability increases. Second, profitable firms prefer debt financing to increase their benefits from the tax shield. Finally, leverage reduces the agency problem between stockholders and the management by reducing the excess cash available to management (Jensen & Meckling, Theory of the firm: Managerial behavior, agency cost and ownership structure, 1976). The findings are supported by Ross´ (1977) signalling model, where managers can use higher level of debt to signal an optimistic future for the firm. However, the pecking order model assumes a negative relationship between leverage and profitability, as internal resources are the preferred funding sources (Myers, 1984).

2.2.4 CASH FLOW- AND EARNINGS VOLATILITY

The trade-off theory implies a negative relationship between leverage and volatility, since volatility increase the cost of bankruptcy and financial distress. Large fluctuations of cash flows impose stricter conditions in bond and credit markets by inducing higher interest rates. Also, more volatile cash flows reduce the profitability that the tax shield will be fully utilized (DeAngelo & Masulis, 1980). Additionally, the pecking order theory allows for the same predictions. According to DeAngelo and Masulis (1980), large earnings fluctuations unable investors to accurately predict future earnings growth.

2.2.5 ASSET TANGIBILITY

Asset tangibility can be interpreted as a measure for the level of collateral a firm can offer to its debtors. A high ratio of fixed-to-total assets provides debtors with high level of security since they can liquidate assets in case of bankruptcy. The trade-off theory therefore suggests that a firm's debt is positively related to the level of tangibility, as higher tangibility reduces the potential cost of distress (Myers, 1977; Myers & Majluf, 1984). According to Harris and Raviv (1991), "firms with few tangible assets suffer from greater asymmetric information problems." The pecking order theory suggests a negative relationship between asset tangibility and leverage, since issuing equity becomes cheaper. Thus, leverage should be lower for firms with higher tangibility (Frank & Goyal, Capital Structure Decisions: Which Factors Are Reliably Important?, 2009).

2.3 MANAGERIAL CHARACTERISTICS AND CAPITAL STRUCTURE

Since Modigliani and Miller first published their work on the irrelevance theory, extensive amount of literature has emerged. In general, these traditional corporate financial theories assume that managers are rational, thus their personal behaviour and characteristics do not influence corporate capital structure (Wang & Kuo, 2015). However, the assumption of rational behaviour has been extensively debated among researchers within behavioural economics and behavioural finance.

2.3.1 EFFECT OF CEOs ON FINANCING DECISIONS

One of the first management theories to argue that firms' decisions in general is affected by managerial background characteristics was the *Upper echelons theory*, proposed by Mason and Hambrick in 1984. This theory emphasizes that the managers age, experience and education affect the firm´s strategic choices as well as performance. Recent papers have supported this theory by stating that "organisations are a reflection of its top managers" (Carpenter, Geletkanycz, & Sanders, 2004).

A recent study by Bertrand and Schoar (2003) found strong evidence confirming that CEOs affect firms' decisions regarding capital structures. Some authors have suggested that managerial characteristics have "significant explanatory power for corporate financing decisions beyond other traditional capital structure determinants" (Malmendier, Tate, & Yan, 2011). As the previous research has emphasized, Chen, Liu, & Zhang (2014) argued that the CEO act as the primary decision makers in a company, and states that they have significantly influence for the firm´s investment and financing decision.

Grounded in the published literature, there is reasonable to assume that the CEO has an important impact on corporate financing policies. In the light of the reported findings, several researchers within behavioural finance have taken "the leading role in explaining the unexplained variation in firms financial leverage by controlling for managers characteristics" (Rocca, Neha, & Rocca, 2019). One of the characteristics that has gotten an increasing interest lately is the gender of the CEO. However, the amount of available research is limited.

2.3.2 EFFECT OF CEOs GENDER ON FIRM LEVERAGE

"Behavioural differences in gender have been studied extensively in psychology and other fields, but not in corporate finance" (Huang & Kisgen, Gender and Corporate Finance: Are males executives overconfident relative to female executives ?, 2013). However, there is a growing amount of research, which tries to examine the effect of the CEOs gender on firms leverage ratio. This may be related to the fact that the number of female CEOs has increased to the point which it is possible to statistically compare the effects. Recent studies on capital structure by Jalbert and Jalbert (2013) found that female CEOs finance their firms different

than male CEOs. Huang and Kisgen (2013) emphasized that female executives are less likely to issue debt compared to male executives.

Risk preference and firm leverage

A number of authors have recognised that the managers risk aversion has an important impact on the capital structure (Ye & Zhang, 2019). Risk aversion can be defined as the attitude of an individual to make decisions that reduce uncertainty. In short, "the literature shows that the CEOs attitude and risk preference influence the corporate leverage policy" (Chen, Liu, & Zhang, 2014). A risk averse manager is mainly concerned about reducing the firm's probability of default. As a consequence, "risk averse managers tend to use a lower amount of leverage, compared to non-risk averse managers" (Abdeldayem, 2018).

Studies within the behavioural finance field has shown that having a larger gender diversity in the boardroom is a way to reduce risk and increase firm performance (Yang , Riepe, Moser, Pull, & Terjesen, 2019). In general, a large number of questionnaire and experimental studies have documented the existence of gender differences to take risk (Harris & Jenkins, 2006). Most of these studies suggest that females in general are more risk averse than males (Eckel & Grossman, 2008). However, Adams and Funk (2012) have argued that "the presence of females in boardrooms do not necessary lead to more risk averse decision making, because females' risk aversion may disappear once they have broken through the glass ceiling."

Under the assumption that females are less confident and more risk averse, researchers have found that female CEOs often adopt a lower amount of leverage compared to male CEOs (Chen, Liu, & Zhang, 2014). Recent studies by Faccio, Marchica and Mura (2016) argued that "firms run by female CEOs are less leveraged, have less volatile earnings and are more likely to remain in operations than firms run by male CEOs".

Overconfidence

Several researchers have studied the fact that managers overconfidence affect corporate capital structure decisions. Malmendier, Tate and Yan (2011) found that overconfident managers overestimate future cash flows and as a result perceive

external financing, particularly equity, as costly. Their study showed that overconfident managers choose a higher leverage ratio, thus have 33% more debt than their peers. These findings were later supported by Huang and Kisgen (2013), which found that an overconfident manager tend to issue more debt.

Overconfidence refers to when individuals overestimate their own abilities and consider themselves above average, also called the *better-than-average* effect (Alicke, 1985). Present studies suggest that managers determine their ability based on prior experiences. However, they often overestimate their ability in the early stages of their career, which cause them to become overconfident. Anyhow, with additional experience, managers become better at recognising their true ability (Gervais & Odean, 2001). These findings are in line with previous theoretical work, which argues that incentives toward risk taking behaviour decrease as the CEOs gets older (Elsaid & Ursel, 2012). Bertrand and Schoar (2003) found that "CEOs from older generations appear to be less aggressive on average, choosing a lower level of capital expenditures, lower financial leverage, and higher cash holdings".

"Considering that overconfidence translate into excessive risk-taking and females are more risk-averse than males, females are suggested to be in nature less overconfident than males" (Rocca, Neha, & Rocca, 2019). This statement was already discussed back in 2001 by Barber and Odean, which argued that the females are less overconfident than males. As a consequence, females are perceived to be more conservative, thus choosing lower levels of firm leverage.

2.3.3 EFFECT OF CEOs GENDER ON DEBT MATURITY

Despite the fact that an increasing amount of research investigate how managerial characteristics affects corporate financial decisions, the influence on debt maturity remains pretty unexplored. The debt maturity decision can be defined as the choice between short-term and long-term debt (Rocca, Neha, & Rocca, 2019).

Short-term debt is defined as debt that is due within 12 months, and is often referred to as current liabilities on the company´s balance sheet. The most common short-term debt are short-term bank loans, accounts payable, wages, lease payments and income taxes payable. According to Myers (1977), short-term debt has the advantage of being more flexible, since renegotiate happens more frequently. Short-

term debt can therefore be a solution to the problem of underinvestment, since the debt may mature before an investment option is exercised.

Long-term debt on the other hand is defined as debt that is due within more than 12 months, and is often referred to as non-current liabilities on the company´s balance sheet. The most common long-term debt are credit lines, bank loans and bonds. Compared to short-term debt, long term financing provides more stability to the firm. In addition, long-term loans are often cheaper.

To our knowledge, there is just a few studies that have examined the relation between the CEOs gender and debt maturity choices. Anyhow, these studies predict conflicting results. Francis, Hasan and Wu (2013) argued that the gender of the CEOs and other top executives do not affect the maturity of bank loans. However, they found that a female CFO has about 3.8 months longer maturities than loans given to firms with male CFOs.

Other researchers have argued that male CEOs issue more debt, specifically long-term debt, relative to female CEOs (Huang & Kisgen, 2013). A recent study by Rocca, Neha, and Rocca (2019) used panel data for European companies to study the relationship between female CEOs and debt maturity. Their results showed that female CEOs in particular tend to have a larger amount of short-term debt, than male CEOs. These findings are based on the assumption that females are more conservative and prefer a more flexible capital structure.

A conflicting study by Huang, Tan and Faff (2016) suggested that firms with overconfident CEOs tend to use a higher proportion of short-term debt, since overconfident managers overestimate their future ability to refinance it. Under the assumption that female CEOs are less overconfident, female CEOs should choose a lower level of short-term debt. These findings are also supported by Hernandez-Nicolas, Martin-Ugedo, and Minguez-Vera (2015) which found that companies run by females and groups with larger gender diversity have debt with longer maturity compared to males.

2.3.4 EFFECT OF CEOs GENDER ON COST OF BORROWING

In general, corporate financial decision making refers to decisions regarding the source of capital, length of maturity and cost of borrowing. Borrowing costs can be defined as interest and other costs associated with the borrowing of funds. The overall goal of a manager is to choose the optimal capital structure, which includes minimising the cost of borrowing. Traditional research emphasizes that managers have incentives to maintain a long-term relationship with their lenders, since a stronger bank relationship may lead to lower borrowing costs. However, more recent studies have argued that firms with female CEOs or larger gender diversity has a significant impact on the cost borrowing.

Hernandez-Nicolas, Martin-Ugedo and Minguez-Vera (2015) provided evidence that having a larger gender diversity affect the debt cost. These findings were later supported by Miah (2019) which concluded that firms with female CEOs enjoy a lower interest when issuing debt. Similarly, other researchers have investigated the relation between the gender of the CFO and cost of borrowing. Francis, Hasan and Wu found back in 2013 that "firms under the control of a female CFOs on average enjoy about 11% lower bank loan prices than firms under the control of a male CFOs." One explanation is that female CFOs and CEOs have greater incentives to reduce firms´ leverage and make less risky investments, which indicate a lower default risk (Strahan, 1999). Similarly, Beladi and Quijano (2013) suggested that firms borrow at higher rates when having CEOs with higher risk incentives.

However, some conflicting papers shows that females are discriminated in the credit market. The discrimination hypothesis implies that "banks charge higher loan price and require tighter nonprice terms when lending to female CFO-led companies because they are biased against women" (Francis, Hasan, & Wu, 2013).

3.0 RESEARCH QUESTION AND HYPOTHESIS

3.1 CLEAR SPECIFICATION OF RESEARCH QUESTION

Recent theoretical developments have revealed that the managerial characteristics are central for the firms financing decisions. As a consequence, an increasing amount of studies have tried to determine the effect of the CEO´s age, education,

experience and tenure. However, only a few studies have tried to determine the effect of the CEOs gender.

Grounded in the reviewed literature, this thesis aims at explaining the unexplained variation in firms financial leverage by controlling for the gender of the CEO. However, our thesis does not seek to prove which gender are better at choosing the optimal capital structure. On the contrary, our thesis aims at investigating how the involvement of a female CEO shapes the firm's financial decision in terms of debt levels, debt maturity and cost of debt. We therefore define our research question as: *How do female CEOs affect the corporate capital structure in Norwegian private firms*

3.2 POSSIBLE HYPOTHESIS

Grounded in the findings from the literature review, we propose the following possible hypotheses:

Based on the assumption that females are more risk averse and less overconfident, we expect firms that is run by a female CEO to adopt a capital structure with less leverage than firms run by a male CEO.

H1: *Firms managed by female CEOs are less leveraged than firms managed by male CEOs.*

The literature that investigate the relationship between the gender of the CEOs and debt maturity is conflicting. However, based on Myers (1977) we expect females to choose a more flexible capital structure, meaning that they issue short-term debt more often than male CEOs.

H2: *Firms managed by female CEOs issue more short-term debt relative to long-term debt compared to firms managed by male CEOs*.

Since the firms managed by female CEOs are perceived to be less risky, we expected firms that are run by female CEOs to have a lower cost of borrowing.

H3: *Firms managed by female CEOs will enjoy a lower cost of borrowing than firms managed by male CEOs.*

3.3 GOAL OF THE THESIS – OUR CONTRIBUTION

Our thesis will contribute to the existing literature in multiple ways. First, our study will contribute to the literature on gender effects within the field of corporate finance. Even if managerial differences such as gender have been heavily researched within the field of psychology, this is not the case for corporate finance.

In addition, most of the available research on corporate capital structure is based on studies of listed companies. The main reason is that the available data on private companies is limited, since private companies do not have the same reporting requirements as listed firms. However, the *Centre of Corporate Governance Research (CCGR)* database makes it possible for us to fill this knowledge gap.

Moreover, the thesis will contribute to the literature by only considering the effect for Norwegian private companies. Most of the previous research is based on US data such as accounting data for the 500 fortune companies or Standard & Poor´s 500 companies. However, we believe that it will be interesting to study the effect in Norway, since this is one of the most gender equal countries in world.

4.0 RESEARCH METHODOLOGY

This section contains a small description of the chosen research methodology for this particular thesis. The section will cover the two topics; *Research strategy* and *Data collection.*

4.1 RESEARCH STRATEGY

The research strategy can be defined as "the general plan of how you will go about answering your research question" (Saunders, Lewis, & Thornhill, 2016). There are two possible research strategies; *qualitative* or *quantitative.* Qualitative research is a methodology which concerns collection and analysis of non-numerical data, while the quantitative method concerns collection and analysis of numerical data.

The objective of our thesis is to provide evidence for the effect of the CEO´s gender on corporate capital structure. We therefore rely on collecting numerical data in order use statistical regression models to investigate the validity of our hypotheses. Thus, it will be beneficial for us to use a quantitative approach.

4.2 DATA COLLECTION

Data collection refers to the process of gathering relevant information and data. To carry out our research, we will be using secondary data retrieved from CCGR database. The database contains corporate governance and accounting data for listed and non-listed Norwegian firms from 1994-2015. Our dataset will therefore consist of both time series data and cross section data, which implies that it will be appropriate to use a panel data regression model. "Panel data can be defined as a dataset with repeated observations over time for the same individuals *(i.e. individuals, firms, countries, names)"* (Arellano, 2004).

We assume to do some data cleaning before using the dataset. We have chosen to limit the scope of this thesis to focus on *Norwegian private firms* in the time period 2000 – 2017. Further, we plan to delete observations on firms in the financial sector, due to different regulatory requirements. We also plan to drop all unreasonable observations such as; *negative liabilities* and *negative assets*. In order to see the effect of the CEO, we will also drop all observations where the CEO had held the position for less than one year. The final dataset will most likely be defined as an unbalanced panel, since the dataset does not contain observations for all firm every period.

4.3 ENDOGENEITY

A great concern, in the study of gender effects, is the problem of endogeneity (Rocca, Neha, & Rocca, 2019). "Endogeneity refers to the problem when the error term is correlated with at least one explanatory variable" (Croissant & Millo, 2018). The problem of endogeneity can result in biased and inconsistent parameter estimates (Roberts & Whited, 2013). Endogeneity is often caused by omitted variables, measurements errors, selection bias or simultaneity.

The problem of endogeneity could potentially occur in our study because of some self-selection effect or omitted variables that might distort the impact of the CEO. Put in another way, some individuals may become CEO at a firm due to some other unobservable characteristics that match the firm's financial strategy. "As a result, the gender of the CEO may be related to some unobservable factors that could be an apart of the error term" (Rocca, Neha, & Rocca, 2019).

One method to mitigate the problem of endogeneity is to estimate an instrumental variable regression. However, finding an appropriate instrument variable that both satisfy the relevance- and exogeneity assumption is difficult. Another approach is to use panel data regression with either fixed effects or random effects. We have chosen to mitigate the problem of endogeneity by using a two-way fixed effect model.

4.4 MODEL ESTIMATION

The objective of our thesis is to provide evidence for the effect of the CEO´s gender on corporate capital structure. We therefore rely on running several statistical regression models to investigate the validity of our hypotheses. We have chosen to base our model on Malmendier, Tate and Yan (2011) and Bertrand and Schoar (2003). However, we will make some smaller adjustments to the model, which makes it more applicable to our study. We propose to estimate the following regression model:

$$Y_{it} = \beta_1 X_{it} + \beta_2 FEMALE_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

The Y_{it} represent the dependent variable. In our study, the dependent variable will be; *(1) Leverage, (2) Short term debt* and *(3) Cost of borrowing*. The *i* represent the firm index, while the *t* represents time. The X_{it} consists of a vector of firm- and CEO control variables. Following Malmendier, Tate and Yan (2011) we suggest these control variables to be; *profitability, tangibility, size, CEO age and CEO ownership*. The variable $FEMALE_{it}$ is the managerial trait of interest in this study. The variable will be a dummy variable taking the value of 1 if the CEO is a female, and 0 otherwise. α_i represents firm fixed effects, while γ_t are the time fixed effects. The final term ε_{it} is the error term. Further, we plan to cluster the standard errors at the firm level. However, this is just a suggested model. Meaning that we may have to do smaller/larger adjustment before estimating the model in the final thesis.

5.0 PLAN FOR THESIS PROGRESSION

ACTIVITY	DESCRIPTION	DEADLINE
ESTABLISH THE THEORETICAL FRAMEWORK	*Define the relevant theoretical framework based on our comprehensive literature review presented above.*	January 2020
MEETING WITH SUPERVISOR		
COLLECT DATA AND START THE DATA CLEANING	*Receive the data from CCGR*	January 2020
START ANALYSING DATA	*Start with descriptive statistics and run regressions*	Feb- March 2020
MEETING WITH SUPERVISOR		
COMMENT UPON RESULTS	*Interpret and comment upon results. NB: Some of the commenting will happen simultaneously as we analyse data*	March-April 2020
FIRST DRAFT FINISHED	*We will have the first draft of the thesis finished.*	April 2020
MEETING WITH SUPERVISOR		
REVIEW AND PROOFREADING	*Make the necessary changes proposed by supervisor. Improve language and precision.*	May – June 2020
HAND IN FINAL VERSION	*Hope to be able to deliver at the beginning of June. However, final deadline is 1. July 2020*	1.july 2020

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