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How does gender affect the executive's overconfidence?

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ABSTRACT

This thesis examines the impact of gender on executive overconfidence within the context of financial decision-making. By utilizing data sourced from Compustat and Execucomp for the period spanning 2018 to 2022, various key variables were extracted. These variables encompassed the debt and equity levels of companies, their market capitalization in USD, the geographical location of their headquarters, the Global Industry Classification Standard (GICS) codes assigned to their respective industries, as well as the age and gender of their CEOs. Employing rigorous statistical methodologies, two regression models were constructed, using a change in debt and equity levels as dependent variables, and CEO age, gender, industry classification, and year as independent variables. The analysis explored the potential relationship between these variables and executive overconfidence. The research findings reveal an outcome that challenges prior assumptions. Irrespective of whether a company's market value exceeded or fell below the threshold of 500 million USD, the gender of the CEO demonstrated no significant influence on changes in the company's debt or equity levels. These results suggest that, within the scope of this study, the gender of an executive does not contribute to differences in their level of overconfidence when making financial decisions as a CEO. Although many other factors can determine the CEO's overconfidence, when looking from this research's perspective, the gender of the executive does not affect his or her overconfidence when making financial decisions as a company CEO. These findings deviate from earlier research that suggested a negative correlation between female gender and executive overconfidence.

Keywords: Executive, CEO, Gender, Confidence, Overconfidence.

JEL codes: G19, J16

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1. Introduction

Manuela Tomei, a leading advocate for gender equality, has emphasized that "An equal, diverse, and inclusive workplace is a key driver of resilience and recovery." Building on this important perspective, this bachelor's thesis aims to examine the relationship between an individual's gender and their confidence in making critical decisions as a company executive. In this case, gender is either male or female, and critical decisions are issuing debt, mergers, and acquisitions. Overconfidence is very crucial and can lead executives to overestimate returns and underestimate risk. This can increase the risk and create overinvestment, affecting shareholders negatively. According to Harvard Business Review, women executives can temper the overconfidence of male executives. For example, in certain industries having at least one female director on board, will lead to less aggressive investment policies and improve firms' overall performance. The findings from this study will make a significant contribution to the existing literature on this topic. According to "International Labour Organization" diversity in workplaces leads to higher productivity and better well-being of the workforce. Therefore, I expect my findings to have practical implications for companies seeking to handle gender diversification issues among executives or develop policies to address the gender-confidence gap and enhance overall company performance.

A previous study found that gender diversity in a company has a positive impact on employee performance (Krishnan, 2020). However, previous research has shown that women are generally less confident when making financial decisions and controlling investments (Estes & Hosseini, 1988). Furthermore, women face greater barriers while becoming managers and securing managerial positions in different companies (Lyness & Judiesch, 1999). As a result, women may be less likely to make critical decisions, or they may make these decisions less frequently, to avoid making mistakes that could damage their hard-won positions.

Interestingly, research has found that female executives are less likely to make acquisitions and grow companies at a slower rate than their male counterparts, but when they do make acquisitions, the announcement return on average is higher (Huang & Kisgen, 2013).

Although the research shows that the personal qualities of male and female managers do not matter significantly, still there is a chance that men are more confident while giving financial decisions as on average they have higher experience (Chung & Monroe, 2000). This experience can translate into greater confidence in their decision-making abilities. All of this research shows that women tend to make critical decisions less frequently than men, but when

they do make a decision, the outcomes are generally better than those made by males. This highlights the importance of gender diversity in the workplace and the need to support female executives in their decision-making roles.

My research will follow a similar methodology to previous studies, but with the use of the latest available data, specifically from 2019 to 2022. It is known that in recent years more attention is paid to gender diversity in companies. Given the growing attention towards gender diversity in recent years, as evidenced by an increasing trend in the number of female executives (according to an article published by Washington State University), using the latest data will provide a more precise representation of the current landscape. Furthermore, using up-to-date data enables the examination of the potential impact of newly implemented policies by public companies or regulatory authorities, thus enhancing the research's relevance and applicability. The expected findings of this study align with prior research, indicating that male executives tend to exhibit higher levels of overconfidence when making critical decisions. However, I expect to see an increase in the number of critical decisions given by female executives, leading to the gap between the overconfidence of the two genders decrease. As such, the primary research question addressed in this study is: "How does gender affect the executive's overconfidence?"

To conduct this research, I will make a regression with the overconfidence of the individual as a dependent, age of the executive as an independent variable, and gender as a categorical variable. The overconfidence of the executive is determined by his or her behavior, like the number of projects made or the number of critical financial decisions they took. In my case, overconfidence will be determined by the change in equity and debt levels. Additionally, my regression models will include some other control variables. This will help to differentiate gender explanation from other executive characteristics that are potentially correlated. The data sample for the study will include CEOs, as they are in charge of giving critical financial decisions. I will use the 2 data samples, one with all of the firms and the other one with the firms with a book value of assets greater than \$500 million. It is also important that the firms are listed on NYSE, AMEX, or Nasdaq. I will use the ExecuComp data available from 2019 to 2022. From this database, I will take the name, gender, age, and rank of the executive. If the data for the firm is not fully available, I will extract it manually from the SEC EDGAR system. If the gender of the executive is not available, I will take it from other available sources like the company's website, or Forbes.com. I will take the data for acquisitions, debt,

and equity offerings from Compustat. The data for the earnings forecast will be taken from IBES.

It is expected that there will be a gap between the overconfidence of male and female executives. However, I anticipate that the difference will be smaller than that found in previous research. I think because of higher attention to gender diversity in the last couple of years, I will observe an increase in the number of CEOs and CFOs and an increase in the number of critical decisions they make. I also expect that younger firms will pay even more attention to gender equality among employees, which will also increase the confidence of their female executives. I expect I will come up with the result at the end. This outcome can be valuable for future research and for companies seeking to reduce gender diversity issues.

The remainder of this paper will follow a certain structure. Section 2 discusses relevant literature and previous research. Section 3 discusses data and methodology. Section 4 discusses the results, followed by the conclusion.

2. Theoretical Framework

2.1 CEO overconfidence

According to the Cambridge Dictionary overconfidence is the quality of being too certain of your abilities or chances of your success. The academic literature shows that overconfidence can be defined in several ways. According to paper Moore & Healy (2008), overconfidence can be defined as excessive certainty regarding the accuracy of one's beliefs, or it can be a situation in which people value themselves higher than others and rate themselves higher than the median.

Overconfidence can be defined as a personality trait. Although overconfidence is a phenomenon in a wide range of human behaviors like decision-making, problem-solving, and judgment. There is a connection between personality, the Big Five, and overconfidence which affects an individual's behavior (Schaefer et al., 2004). The Big Five is the basic dimensions of personality that contemporary personality psychologists accept. These are extraversion, agreeableness, openness, conscientiousness, and neuroticism. This shows that overconfidence can be seen as a trait connecting with other factors under the umbrella of personality.

It is important to note that a company executive's confidence can be very important for the company. The previously written research shows that CEO's overconfidence can increase a company's innovation level, especially when competition is intense (Galasso & Simcoe, 2011). To show that indeed CEO overconfidence can increase innovation, the authors use a simple career concern model. They used panel data containing the companies that are largely publicly traded in the US between 1980 and 1994. Indeed, innovations and different strategies can help to compete in the market thus creating an opportunity to grow the firm in the future. Executives with lacking confidence can stick with old and proven methods, which can make the company harder to compete, especially in industries where the market is very intense, and innovation is necessary to survive.

2.2 Gender and overconfidence

The second thing that needs to be clear for the sake of research is gender. Although it seems straightforward at the beginning, defining gender is highly complex, as it can differ from context to context. According to the Cambridge Dictionary gender is a group of people in a society who share particular qualities or ways of behaving which society associates with

being male, female, or another identity. The literature approaches from a different point suggesting that the quantitative researcher should address this definition from a performative perspective to deconstruct the gender concept. Societal norms continually influence the performance of gender, shaping it as a recurring category. (Morgenroth & Ryan, 2018). According to Stewart & McDermott (2004), the importance of gender as an empirical factor (or variable) in understanding various aspects of behavior is widely recognized. It can also be used as an analytical tool in research.

Gender, race, ethnic are part of people's identity. The individual's psychological connection to these social category systems defines their identity. (Sherif, 1982). Frable (1997) suggests that although an individual's relationship to gender as a social category is always involved in gender identity, its interpretation can vary across different literature within the field of psychology's subspecialties. This shows that gender can be shown as a social category.

The research written before shows that gender can affect an executive's risk-taking attitudes (Byrnes et al,1999). In this research to compare the risk-taking tendencies of male and female participants, the authors did a meta-analysis of 150 studies. Then they coded the studies according to the type of task, the task's content, and 5 age levels. According to Altarawneh (2020), companies led by women demonstrate a lower emphasis on earnings management compared to firms managed by men. It is observable that the gender of the company executive can affect his or her characteristics and decisions, which can also affect the company's overall performance.

One of the earliest studies on the relationship between gender and confidence is from Lenney (1977), which states that women were reported to have self-confidence in many studies. She states that there is a high chance that distinct cultural influences, likely experienced during early childhood, result in women having lower confidence in their investment choices. As evidence Lenney (1977), shows the results of other literature. Estes & Hosseini (1988) also has consistent result. According to Estes & Hosseini (1988), it is not possible to show that women are worse at giving financial decisions. Even though the quality of their decisions is not lower than male counterparts, still they show lower confidence. In this research, the authors used four groups which are: shareholders, institutional investors, security analysts, and general businesspersons. In total, there were 1359 participants. As a method, they used multiple regression and particularly paid attention to possible nonlinearity. Although the

relationship between gender and confidence was studied many times, in all of them it was studied from different perspectives. Huang & Kisgen (2013) was one of the first papers that studied gender differences in the corporate setting. Huang & Kisgen in their research examined the relationship between gender and overconfidence by looking at the difference in the confidence intervals of the earnings forecast for the two genders. They assumed that if men are overconfident, then narrow confidence intervals will imply that they provide narrower ranges for earnings forecasts than women. As a data source, they used several publicly available data sources, such as Compustat, Execucomp, SDC platinum, and etc. After gender diversity started to increase in companies, especially on the executive level, the studies related to gender difference and overall confidence started to increase.

The relationship between gender and overconfidence has been studied before in different business settings like stock trading behavior, the mutual fund industry, and start-up firms. Although this is a little bit different context, still a lot of critical financial decisions are taken in these fields. For example, Barber & Odean (2001) examined the relationship from a stock trading perspective. The results are similar though, in that men are more prone to overconfidence than women, particularly so in male-dominated realms such as finance. That is why, I expect that gender will have an effect on the overconfidence of CEOs. I think the results will be similar to the research done before, and females on average will be less confident while making their decisions.

2.3 Other determinants of overconfidence

It is important to define the concept of age. It could be explained differently as well, like, one of the stages of life (Merriam-Webster). The literature most frequently conceptualizes age in terms of chronological age, or the duration since a person's birth (Schwall, 2012). As chronological age is a continuous variable, the value at which someone can be considered an "older worker" is not clear (Bohlmann, Rudolph, & Zacher, 2018).

Age can be defined as a general framework to understand a person better. According to Zacher et al. (2018), age is part of social identity. Still, age alone is insufficient to fully grasp the diverse nature of an individual's experiences, capabilities, and points of view. Even among people of the same age category, there exists a wide range of diverse backgrounds, interests, and life paths.

For an executive age can be very important. It can affect his or her decisions, way of thinking, point of view, manners, etc. As an example, according to the literature executives who have higher age read complicated financial reports easier (Xu et al., 2018). They examine this by using different readability proxies. They also use widely used English text readability measures such as Fog Index (FOG), Flesch reading ease level (FLESCH), and Flesch-Kincaid grade level score (KINCAID). To test the hypothesis authors used a multivariate regression technique. They used a model with a readability score as dependent, and several variables such as length, words, and dimensions as independent variables. Nowadays the world of financial reports can be very complicated, and that is why it is crucial to understand even the smallest detail.

Another concept that is important to define is experience. In my case experience will be highly connected with age, which will make it very important. According to Merriam-Webster experience is practical knowledge, skill, or practice derived from direct observation of or participation in events or a particular activity. The definition from the academic literature is similar as well. Work experience is the amount of job-related experience acquired by an individual throughout their professional journey (Tesluk & Jacobs, 1998). Quinones et al. (1995) suggest that work experience comprises the range of events that an individual encounters in the context of job performance. In general, people get more experienced when they work more, but this is not always the case.

Experience can be part of knowledge or education. Based on the general perception, individuals with higher education are believed to be capable of performing certain tasks easily and efficiently compared to the uneducated or those who are educated lesser (R. Kotur et al., 2014). They examine this by using questionnaires. The result follows the dictum "knowledge is power". So, a person with certain knowledge in that job can perform that job better and more efficiently. Experience can also be considered as a part of human capital. It has been proved that human capital is the most important component of intellectual capital in influencing organizational performance in some industries (Khalique et al., 2011). The research is conducted in Malaysia, by using a questionnaire. The variables examined are human capital, customer capital, structural capital, social capital, technological capital, and spiritual capital. Research has demonstrated that within certain industries, human capital is the most important component of intellectual capital in influencing organizational performance (Rahman, 2012).

This human capital, including experience, has a positive significant relationship with firms' performance (Seleim et al., 2007). Some studies show how senior executives' demographics and experience can influence their company's performance positively (Boal and Hooijberg 2001; House et al. 2014). Also, according to You et al. (2020) there is a link between CEO experience and stock returns. The authors prove this by showing the results from other literature and focusing mainly on CEO's experience, compensation, and innovation level.

The relationship between age and overconfidence is similar as well. There are many examples in the literature that shows age has an effect on the confidence of the executive. Some of the papers even show that age can affect even an employee's confidence. Xu et al. (2018) show that executives with higher age can read financial documents better. In this research, authors used a multivariate regression technique, with a readability score as dependent, and several variables such as length, words, and dimensions as independent variables. As they can see even the smallest details in the documents, they become more confident in their decisions. I expect that age will have an effect on the overconfidence of executives. I think the results will be similar to the research done before, and age will have a positive effect on the overconfidence of both male and female CEOs.

3. Data

As a source of data, I will be using Compustat North America and Execucomp. These databases are provided by Wharton Research Database. Compustat North America provides data on annual and quarterly balance sheets and income statement data of companies located worldwide. These companies, for example, are in Japan, Great Britain, Türkiye, Korea, France, Spain, etc. This database contains the data of both active and inactive companies. Execucomp provides different types of data including, information related to CEOs, CFOs, board members, and other executives. These data include their gender, age, the data they enter the company, the date they become CEO (if they were CEO), the date they left CEO (if they stopped working as CEO), and their salary and bonus.

First, I took the data showing the full name, age, gender, and unique number of the CEO and the unique number of the company for the years from 2019 till and including 2022 from Execucomp. Then from Compustat, I took the data needed to calculate the change in debt and change in equity level of the company for each year starting 2019 till 2022. From Compustat, I also took the data with the unique number of each company, the company's total market capitalization value, the country where the company's headquarters is located, and the company's Global Industry Classification Standard (GICS). As a result, I had the data sample containing the unique number of the company, the total amount of debt and equity for each year, the location of its headquarters, its total market capitalization for that year, and the GICS code. I created two data samples, the first one containing all firms and the second one containing the companies only with a market value of over 500 million a USD. After that, I cleaned the data from missing values and outliers. These outliers are the companies that demonstrated very high increases in debt or equity levels. In total, there were 11 outliers. These companies demonstrated a very high change in debt or equity level from 2019 to 2022. As an example, there was a company that showed an increase in debt 1681 times. I deleted that company's data for that year, as this increase would affect the reliability of the model negatively. I also deleted companies with zero debt or equity as zero division error occurred, when calculating next year's debt or equity change number. Of course, if the debt of the company decreased to zero but it was not zero in the previous year that company is not deleted from the sample, as in this case, zero-division error does not occur. After that, I filtered the data to only include the companies whose headquarters are located within the United States. Then by using the unique numbers of the companies located in the United

States taken from Compustat, I filtered the data from Execucomp to only include the data for the CEOs of US companies. Then I merged these data samples using each company's unique number. As a result, I got two data samples with all the relevant data needed. The sample with all companies has 2996 observations, and the sample with only large companies (that have a market capitalization of at least 500 million) has 2775 observations.

I will be using several variables for this research. These variables are: *ceo_gender*, *ceo_age*, *company_debt*, *company_equity*, *change_debt*, *change_equity*, *industry*, *year*, *market_cap*.

ceo_gender is a dummy variable. In my case, it can be either Male or Female. During the research for calculations, I will consider male gender as 0, and female gender as 1.

ceo_age is a variable that shows the age of the CEO at the time he or she worked. If the CEO was 40 years old when working in company X in 2020, and 41 years old when working in company X in 2021, the variable *ceo_age* will take the value of 40 in 2020 and 41 in 2021.

company_debt is the variable that shows the amount of debt the company had in that year. This variable includes both current and long-term debts. The amount is shown in USD currency and formatted as millions of USD.

company_equity is the variable that shows the amount of stockholders' equity the company had in that year. This variable includes capital surplus, common/ordinary stock (capital), nonredeemable preferred stock, redeemable preferred stock, retained earnings, treasury stock - total dollar amount (reduces stockholders' equity), and nonredeemable noncontrolling interest. The amount is shown in USD currency and formatted as millions of USD.

change_debt is the variable I will use to show the change in the amount of debt the company had from the previous year. The change is calculated by dividing the amount of total debt the company had in year X by the amount of total debt the company had in years X-1. In my case, this variable will be used to show the CEO's overconfidence. For the 2019, results the data from 2018 was used. If the variable *change_debt* has a value of 1.2 the level of debt increased by 20% from the previous year. A value of 0.7 will indicate a 30% the decrease in level of debt.

change_equity is the variable I will use to show the change in the amount of stockholders' equity the company had from the previous year. The change is calculated by dividing the amount of total stockholders' equity the company had in year X by the amount of total debt the company had in year X-1. In my case, this variable will be used to show the CEO's overconfidence as well. For the 2019 results, the data from 2018 was used. If the variable *change_equity* has a value of 1.1 the level of debt increased by 10% from the previous year. A value of 0.85 will indicate a 15% the decrease in level of debt.

industry is the variable that shows the company's industry type. In my case to determine to which industry group the company belongs, I will use the GICS code. The GICS structure consists of 11 sectors, which are energy, materials, industrials, consumer discretionary, consumer staples, health care, financials, information technology, communication services, utilities, and real estate. *industry* is a categorical variable that can be one of these 11 groups as a value.

year is the variable to show the fiscal date of debt, equity, change in debt, change in equity, or to show who was CEO at that time. The format will only consist of years, not including months or days. In my case years will vary from 2018 to and including 2022.

market_cap is the variable that shows the market capitalization of the company in a certain year. The amount is shown is in USD currency and formatted as millions of USD.

The summary statistics for the sample containing the companies with a market value higher than 500 million USD are in Table 1 and 2. There are 2775 observations in total. Table 2 shows there are 202 female CEOs in total, which is around 7,3 percent of the whole sample. The mean age for the CEO is 57,5. The youngest CEO is 27 and the oldest CEO is 91 years old. According to Table 1, the level of debt on average increased by around 37 percent. The highest increase was almost 38 times. The stockholder's equity, on average increased by 13 percent. There was a company that showed an increase of 58 times and a company that demonstrated a decline of around 52 times in equity value. The data is roughly equally distributed over 4 years. Additionally, the industrials group is the most common industry type in the sample, and utilities are the least.

Table 1: Descriptive statistics for CEO's age, change in company's debt and equity level.

	mean	sd	min	max
ceo_age	57.54	6.95	27	91
change_debt	1.37	1.99	0	38
change_equity	1.13	2.38	-52	58
Observations	2775			

Table 2: Descriptive statistics for CEO's gender, year, and company's industry type.

ceo_gender	Frequency	Percent
Female	202	7.28
Male	2573	92.72
2019	660	23.78
2020	721	25.98
2021	787	28.36
2022	607	21.87
Communication Services	97	3.50
Consumer Discretionary	432	15.57
Consumer Staples	218	7.86
Energy	141	5.08
Financials	145	5.23
Health Care	337	2.14
Industrials	617	22.23
Information Technology	326	11.75
Materials	245	8.83
Real Estate	193	6.95
Utilities	24	0.86
Total	2775	100.00

The summary statistics for the sample containing the companies are in Tables 3 and 4. There are 2996 observations in total. Table 4 shows there are 209 female CEOs in total, which is less than 7 percent of the sample. The mean age for the CEO is 57,5. The youngest CEO is 27 and the oldest CEO is 91 years old. According to Table 3, the level of debt increased on average by around 35 percent. The highest increase was around 38 times, and the lowest paid all of their debt. The stockholder's equity, on average increased by 11 percent. There was a company that showed an increase in the equity value of 58 times and a company that showed a decline of around 52 times. Around 22 percent of the data is from 2019 and 2022, 26

percent is from 2020, and 28 percent from 2021. Additionally, the industrials group is the most common industry type in the sample, and utilities again are the least popular one.

Table 3: Descriptive statistics for CEO's age, change in company's debt and equity level.

	mean	sd	min	max
ceo_age	57.55	7.04	27	91
change_debt	1.35	1.93	0	38
change_equity	1.11	2.33	-52	58
Observations	2996			

Table 4: Descriptive statistics for CEO's gender, year, and company's industry type.

ceo_gender	Frequency	Percent
Female	209	6.98
Male	2787	93.02
2019	664	22.16
2020	801	26.74
2021	859	28.67
2022	672	22.43
Communication Services	115	3.84
Consumer Discretionary	494	16.49
Consumer Staples	227	7.58
Energy	165	5.51
Financials	154	5.14
Health Care	359	11.98
Industrials	651	21.73
Information Technology	350	11.68
Materials	260	8.68
Real Estate	197	6.58
Utilities	24	0.80
Total	2996	100.00

4. Methodology

To analyze the collected data, I will use the linear regression method. In this case, I will have a dependent variable of the CEO's confidence. In my case change in debt level and a change in equity, level will show the overconfidence of the executive. As an independent variable, I will use CEO's age and CEO's gender, the company's industry group, and year. CEO's age and CEO's gender, the company's industry group, and year will be categorical variables in this case. As a result, the following models will be used to estimate the overconfidence of the executive:

Model 1:

$$\text{change_debt} = B_0 + B_1 * \text{ceo_age} + B_2 * \text{ceo_gender} + B_3 * \text{industry} + B_4 * \text{year} + \text{Error}$$

Model 2:

$$\text{change_equity} = B_0 + B_1 * \text{ceo_age} + B_2 * \text{ceo_gender} + B_3 * \text{industry} + B_4 * \text{year} + \text{Error}$$

The dependent variables *change_debt*, and *change_equity* are numerical variables. The dependent variable *ceo_age* is a variable that will take any integer value between 27 and 91. The variable *ceo_gender* is a categorical variable that can take only values of zero and one. If the CEO is male, it will take the value of 0, else it will be 1. *industry* is a categorical variable that will take one of the 11 industry groups as a value. *year* is also a categorical variable that will be either 2019, 2020, 2021, or 2022. It is assumed that age can have a significant effect on the change in debt level and change in equity level. Industry type and year can also affect a company's debt level. That is why these variables will play the role of control variables.

I will observe from this regression if the variable *ceo_gender* is significant in either of the 2 models. If the results will show that *ceo_gender* is indeed significant in either of these models, then I will be able to conclude that gender is related to the change in debt and equity levels. As a result, this will show that CEO's gender affects his or her overconfidence level. An increase in the debt or equity level shows the confidence of the executive, the decline in these levels shows that the executive is not overconfident. I will also perform a White test to check whether the variance of the errors in a regression model is constant. If the p-value of the test will be significant the regression results will be adjusted for robustness. Of course, it

is also important to check the R^2 (R-squared). It will help to see the percentage of variance in the outcome that can be explained by the predictor variables. Normally when the R^2 is low, the regression model is not able to explain the relation, even when the variables will be significant. In my case, though there are a lot of other factors that can influence a company's debt and equity level, that is why R^2 can be low, but this will not make my analysis related to gender useless.

The same applies to the age of the CEO. If the regression results for the variable *ceo_age* will be significant, I will be able to conclude executive's age is related to his or her confidence. Additionally, if the regression results of *ceo_gender* will be significant only in the sample containing all firms, this will show that gender has an effect on the overconfidence of the CEO in smaller firms.

5. Results & Discussion

The tables below show the coefficient of each variable and the standard error in the brackets below. For every categorical variable in this case *ceo_gender*, *industry*, and *year* there is one base category. For the variable *ceo_gender* male is considered as a base category. For the variable *industry*, the industrials group, and for the variable *year* 2019 are taken as a base category. Below each table, there is a legend showing the number of observations, R^2 , and Adjusted R^2 . Stars on the coefficient show the significance level of the coefficient. 3 stars mean the variable is significant at 1 percent level, 2 stars mean significant at 5 percent level, 1 star means significant at 10 percent level and zero stars mean it is not significant. The results of model 1 are adjusted for robustness because of the White test results (see Appendix A). These adjustments are not necessary for Model 2 (see Appendix A).

Table 5 below shows the regression results for Model 1. In this case, neither *ceo_age* nor *ceo_gender* is significant. The table shows that some of the industry groups affect change in the company's debt level. For this case, the industrials type is taken as the base industry. Industry types such as communication services, consumer staples, energy, financials, information technology, materials, real estate, and utilities are insignificant in this model. The only industry types that had a significant effect are consumer discretionary and health care. According to Table 5, consumer discretionary has a positive coefficient of 0.28, significant at a 5% significance level. This means that being in the consumer discretionary industry on average increased the change in debt level of the company by 0.28 million USD when compared to the industrials group when keeping other variables constant. Another industry type that had a significant effect on debt level is healthcare. According to Table 5, the healthcare variable has a positive effect with a coefficient of 0.62, at a 1% significance level. This means that being in the health care industry on average increased the change in debt level of the company by 0.62 million USD when compared to the industrials group when keeping other variables constant. The years are also significant, at a 1% level. This means that when compared to 2019 change in debt level decreased in 2020, 2021, and 2022, by 0.55, 0.67, and 0.49 respectively. The R^2 is 3 percent, which is a very low value.

Table 5: The table present the regression results for the Model 1, with the sample containing only the firms with the market value higher than 500 million USD.

	(1) change_debt
ceo_age	0.01 (0.01)
FEMALE	0.13 (0.12)
Communication Services	0.25 (0.32)
Consumer Discretionary	0.28** (0.12)
Consumer Staples	-0.10 (0.07)
Energy	-0.14 (0.09)
Financials	-0.06 (0.09)
Health Care	0.62*** (0.22)
Information Technology	0.01 (0.08)
Materials	-0.04 (0.12)
Real Estate	-0.09 (0.08)
Utilities	-0.06 (0.10)
year=2020	-0.55*** (0.13)
year=2021	-0.67*** (0.12)
year=2022	-0.49*** (0.15)
Constant	1.28*** (0.43)
Observations	2775
R^2	0.03
Adjusted R^2	0.02

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6 below shows the regression results for Model 1. In this case both companies with the market value above 500 million and below 500 million. Again, both the `ceo_age` and `ceo_gender` variables are not significant. According to Table 6, some of the industry groups affect change in the company's debt level. In this case, the industrials type is taken as the base industry as well. Industry types such as communication services, consumer staples, energy, financials, information technology, materials, real estate, and utilities are insignificant in this model. The only industry types that had a significant effect are consumer discretionary and health care. Consumer discretionary type has a positive coefficient of 0.22, significant at a 5% significance level. This means that being in the consumer discretionary industry group on average increased the change in debt level of the company by 0.22 million USD when compared to the industrials group (base group) when keeping other variables constant. Another industry type that had a significant effect on debt level is health care. According to Table 6, the health care variable has a positive effect with a coefficient of 0.58, at a 1% significance level. This means that being in the healthcare industry on average increased the change in the debt level of the company by 0.58 million USD when compared to the industrials group (base group) when keeping other variables constant. The years are also significant, at a 1% level. This means that when compared to 2019 change in debt level decreased in 2020, 2021, and 2022, by 0.56, 0.68, and 0.51 respectively. The R^2 is 3 percent, which is a very low value.

Table 6: The table present the regression results for the Model 1, with the whole sample containing the firms with the market value higher than 500 million USD and lower than 500 million USD.

	(1) change_debt
ceo_age	0.01 (0.01)
FEMALE	0.15 (0.11)
Communication Services	0.17 (0.27)
Consumer Discretionary	0.22** (0.11)
Consumer Staples	-0.10 (0.07)
Energy	-0.16** (0.08)
Financials	-0.07 (0.09)
Health Care	0.58*** (0.20)
Information Technology	0.01 (0.08)
Materials	-0.01 (0.12)
Real Estate	-0.09 (0.08)
Utilities	-0.06 (0.10)
year=2020	-0.56*** (0.13)
year=2021	-0.68*** (0.12)
year=2022	-0.51*** (0.14)
Constant	1.28*** (0.39)
Observations	2996
R^2	0.03
Adjusted R^2	0.02

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7 below shows the regression results for Model 2. In this case, again neither `ceo_age` nor `ceo_gender` is significant. The table shows that one of the industry groups affects change in the company's debt level. For this model industrials type is taken as base industry type. Industry types such as communication services, consumer discretionary, energy, financials, health care, information technology, materials, real estate, and utilities are insignificant in this model. The only industry type that had a significant effect is consumer staples. According to Table 7, consumer staples has a negative coefficient of 0.37, significant at a 10% significance level. This means that being in the consumer staples industry on average decreased the change in the equity level of the company by 0.37 million USD when compared to the industrials group when keeping other variables constant. The only year that is significant according to Table 7 is 2021, with a coefficient of 0.26. This means that when compared to 2019 change in equity level increased by 0.26 million USD. The R^2 is 1 percent, which is a very low value.

Table 7: The table present the regression results for the Model 2, with the sample containing only the firms with the market value higher than 500 million USD.

	(1) change_equity
ceo_age	0.00 (0.01)
FEMALE	0.26 (0.18)
Communication Services	-0.15 (0.26)
Consumer Discretionary	-0.05 (0.15)
Consumer Staples	-0.37* (0.19)
Energy	-0.13 (0.22)
Financials	-0.03 (0.22)
Health Care	-0.09 (0.16)
Information Technology	-0.26 (0.16)
Materials	-0.10 (0.18)
Real Estate	-0.15 (0.20)
Utilities	-0.10 (0.50)
year=2020	0.05 (0.13)
year=2021	0.26** (0.13)
year=2022	0.16 (0.13)
Constant	1.37*** (0.40)
Observations	2775
R^2	0.01
Adjusted R^2	0.00

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8 below shows the regression results for Model 2. In this case, again neither `ceo_age` nor `ceo_gender` is significant. Table 8 shows that one of the industry groups has an effect on change in the company's debt level. For this model industrials type is taken as base industry type. Industry types such as communication services, consumer discretionary, energy, financials, health care, information technology, materials, real estate, and utilities are insignificant in this model. The only industry type that had a significant effect is consumer staples. According to Table 8, consumer staples has a negative coefficient of 0.36, significant at a 5% significance level. This means that being in the consumer staples industry on average decreased the change in the equity level of the company by 0.36 million USD when compared to the industrials group when keeping other variables constant. The only year that is significant according to Table 8 is 2021, with a coefficient of 0.23. This means that when compared to 2019 change in equity level increased by 0.23 million USD. The R^2 is zero percent, which is very low.

Table 8: The table present the regression results for the Model 2, with the whole sample containing the firms with the market value higher than 500 million USD and lower than 500 million USD.

	(1) change_equity
ceo_age	0.00 (0.01)
FEMALE	0.27 (0.17)
Communication Services	-0.22 (0.24)
Consumer Discretionary	-0.09 (0.14)
Consumer Staples	-0.36** (0.18)
Energy	-0.18 (0.20)
Financials	-0.03 (0.21)
Health Care	-0.06 (0.15)
Information Technology	-0.23 (0.15)
Materials	-0.09 (0.17)
Real Estate	-0.13 (0.19)
Utilities	-0.08 (0.48)
year=2020	0.03 (0.12)
year=2021	0.23* (0.12)
year=2022	0.15 (0.13)
Constant	1.29*** (0.37)
Observations	2996
R^2	0.00
Adjusted R^2	0.00

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

For the results of the first model, I was expecting to see a negative effect of being a woman on change in the company's debt level. However, the results were insignificant in this case, meaning that it is not possible to say that being female has a negative effect on an executive's confidence. I was also expecting that the results will be a little bit different for the sample which contained all companies (both the ones that have market value above 500 million USD and below 500 million USD). I expected that as this sample will contain younger companies, the confidence gap will be smaller. However, the results were insignificant in this case, as well. My results are different from the paper by Barber & Odean (2001), which states that women on average are less confident while giving decisions. There is a difference with this research though, as that research looks more from a stock trading perspective and risk-taking rather than giving critical financial decisions as company CEO. My results differ from Huang & Kisgen (2013) as they also found that men CEOs on average are more confident in their decisions. Still, they also look at the relationship between gender and confidence from a different perspective by mainly focusing on earnings forecasts.

There was an increase in debt level for the healthcare sector. This could be mainly because of COVID-19, as a lot of companies that focused on producing medicine or medical equipment invested in their facilities, production, or research.

For the results of the second model, I was expecting to see a negative effect of being a woman on change in the company's equity level as well. However, the results were insignificant in this case, meaning that it is not possible to say that being female has a negative effect on an executive's confidence. I was also expecting that the results will be different for the sample which contained all companies. I expected that as this sample will contain younger companies, the confidence gap between genders will be smaller. However, the results were insignificant in this case, as well.

The R^2 is very low for all the models. In my case, this could be the case as the change in debt and equity level is determined by many other factors such as the company's market cap, number of employees, revenue, costs of goods sold, etc. Even though the R^2 is low, I believe this does not make my results unreliable.

The results are different from the previous research, as they showed that change in debt or equity level shows that the confidence of male and female executives differ. I think the results

of this research show that changes in debt and equity levels cannot show the relationship between executives' gender and their confidence. It does not mean that there is not any difference between the overconfidence of these genders but means that change in debt and equity levels in nowadays conditions is not able to show this difference. It could be also the case that the gender gap between the two genders is significantly low, at least on the CEO level.

6. Conclusion

In this study, I analyzed the relationship between an executive's gender and his or her overconfidence while giving financial decisions. Previous research showed that on average women executives are less confident in their decisions, however, the data used was quite old and was related to periods in which the number of woman executives was very small. Additionally, several other policies were implemented in this period that could lead to different results in the end. Additionally, previous research did not take into account small firms, focusing instead on bigger companies. Therefore, the question that was studied in this dissertation was: "How does gender affect the executive's overconfidence?".

To answer this question the data containing the information on executives' gender, and age as well as a sample containing the company's debt and equity level as well as the market value was used. The regression analysis showed that there is not a significant effect of being male or female on change in the company's debt and equity level, thus CEO's overconfidence level.

This study, therefore, concludes that, although literature shows that being a female executive has a negative effect on decision-making, it is not possible to show in my case that male counterparts are more overconfident in their decisions. This is the case both for large and small companies. This suggests that when looking at the corporate perspective and assuming that changes in a company's debt and equity level are a demonstration of an executive's overconfidence level, it is not possible to say that being either female or male has a positive or negative effect on the overconfidence level.

A possible limitation of this research can be that the sample containing the smaller firms is small. It would be interesting to see the results with a larger sample. In the end, I suggest other researchers to use other factors when examining the relationship between an executive's gender and overconfidence. I think as an option, the researchers can examine this relation from a risk-taking perspective, as I believe the level of risk the executive takes is also a demonstration of their confidence level.

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APPENDIX A

Table 9: White test results for model 1.

Sample	General test statistic	P-value
Small sample	116.00	0.00
Large sample	119.88	0.00

Table 10: White test results for model 2.

Sample	General test statistic	P-value
Small sample	42.11	0.99
Large sample	42.11	0.99
