

Does CEO Gender Affect The Performance of Swedish Firms?

A Quantitative Study on the Impact of CEO Gender on Firm Financial Performance in Sweden: Exploring the Moderating Role of Industry

Abstract

This study examines whether the gender of the CEO affects firms' financial performance and whether industry context moderates this relationship. Using a quantitative panel design, we analyze data from 221 medium to large Swedish companies over the period of 2014-2023. Financial performance is measured through return on assets (ROA), profit margin (PM), and current ratio (CR), which capture profitability, efficiency, and liquidity dimensions of firms. Firm fixed-effect models are used to control for time-invariant firm characteristics to find any association between CEO gender and financial outcomes. The results show no systematic performance differences between male- and female-led firms across the chosen metrics. CEO gender does not affect firm financial outcomes in the Swedish context, and we do not find any effect in any industry. These findings suggest that gender, in itself, is not a decisive factor of financial performance. The study contributes to the ongoing debate by providing evidence from Sweden, a country with strong gender equality traditions. The managerial implications highlight that promoting female CEOs is consistent with firms' performance goals, meaning that firms should prioritize competence over the demographic characteristic of gender in executive appointments.

Keywords: CEO gender, financial performance, leadership diversity, Sweden, industry moderation, upper echelons theory, firm performance metrics, panel data analysis, gender equality, executive leadership

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1. Introduction

Female CEOs remain strikingly underrepresented at companies worldwide. As of 2023, women only account for 5.4% of CEOs globally, which underscores a significant gender gap in corporate leadership (The CEO Magazine, 2024). In Sweden, which is a country known for its commitment to gender equality, the corporate sector also reflects this inequality. Only 14% of Sweden's publicly listed companies were led by female CEOs in 2023, and only 36% occupied board seats (Global Woman Leader, 2024). These figures are alarming and raise an important question: does it matter for a firm's outcomes who sits in the CEO chair, especially when it comes to gender?

Noland, Moran and Kotschwar (2016) found that female executives are likely to perform better in more gender-equal countries. This suggests that context matters when evaluating the potential impact of CEO gender on a firm's performance. Sweden, which consistently ranks among the most gender-equal countries in the world, offers a relevant environment for such an investigation. According to the European Institute for Gender Equality (2022), Sweden scored 83.9 out of 100 on the Gender Equality Index, which is the highest in the EU. This highly egalitarian environment makes Sweden a meaningful case to study whether CEO gender is linked to financial outcomes.

1.1 Background

Upper echelons theory suggests that outcomes of an organization are shaped by the characteristics of its top managers, which include their values, experiences and demographic traits (Hambrick & Mason 1984). The gender of a CEO represents an attribute that could influence decision-making and leadership behaviors, which could affect financial performance. While gender on its own does not determine management style, prior research shows that on average, female and male executives show significant differences in their leadership, which may affect organizational outcomes (Eagly, Johannesen-Schmidt and van Engen, 2003).

There is also evidence that highlights ways in which CEO gender could influence financial performance. Studies have shown that female executives in general tend to be more risk-aware and perform more conservative strategies, therefore achieving more stable earnings, which benefits long-term financial stability (Faccio et al., 2016). An example of this

is how female CEOs navigated the Covid-19 pandemic through more conservative strategic decisions, which increased stability (Thornton & Vasilakis, 2024). These patterns suggest that CEO gender can shape financial outcomes through different decisions related to risk management.

The broader literature, however, offers a more mixed perspective. Some studies report significant differences in financial performance between the genders in managerial positions (Post & Byron, 2015), while others suggest that any advantage that can be observed among female CEOs may be grounded in selection effects, where only the most capable females can reach the top managerial positions (Betton, 2023).

While CEO gender can influence financial outcomes, the effect is not the same for all firms. Upper Echelon Theory also emphasizes that the relationship between characteristics of top managers and financial outcomes relies on external factors (Hambrick & Mason, 1984). Characteristics like level of competition, regulations, and gender norms could react together with CEO gender to affect financial performance. In industries where the environment values collaboration, long-term planning and stakeholder engagement, which are all associated with transformational leadership styles, female CEOs could be more effective (Dezső and Ross, 2012). On the other hand, in sectors where aggressive growth and risk-taking are more highly valued, female executives could face further challenges.

1.2 Research Purpose and Contributions

Given the considerations above, the purpose of this research is to further investigate if CEO gender actually influences financial performance in a Swedish context. Furthermore, the research will determine whether the industry context in which the firm operates is relevant to the outcome. So the two research questions are

1. *Does the gender of the CEO affect a firm's financial performance in Sweden?*
2. *Does the industry moderate this relationship between CEO gender and performance?*

This thesis contributes to the existing research in several ways. By focusing on Sweden, a country that is often considered a global leader in gender equality, we add evidence to a field that has primarily centered on the U.S. or a global perspective. Furthermore, despite Sweden's strong reputation for gender equality, the share of women in the CEO position

remains low. This makes Sweden especially interesting, taking into account that recent studies conducted in Sweden show that stock markets react more positively to male CEO announcements as compared to female ones, indicating that gender bias may be present. Market reactions are according to efficient market theory a result of the market adapting to information being released, and in this case a lower stock price reaction indicates an expectation of lower future profits following the CEO announcements (Investopedia, n.d.). This observation, highlighting a difference in Sweden's equality structures and the observed market behavior makes it a valuable case to observe in this study.

We apply a panel data approach with firm-fixed effects over a ten-year period, allowing us to control for unobserved firm-level characteristics and increase the isolation of the effect of CEO gender. Furthermore, we explore whether the relationship between CEO gender and firm performance varies across different industries, which provides a more nuanced understanding of when gender might play a role in leadership outcomes. In doing so, our study not only adds to the academic conversation but also provides insights that can inform decision-making for boards and policymakers.

1.3 Focus and Delimitations

This study focuses mainly on whether CEO gender influences a firm's financial performance and whether the surrounding industry moderates the relationship. The analysis is conducted on Swedish companies over the period of 2014-2023, which enables both short-term and long-term effects to be analyzed throughout different economic situations. The financial performance measures used are three commonly accepted indicators: Return on Assets (ROA), Profit Margin (PM) and Current Ratio (CR). These three indicators capture the dimensions of profitability, efficiency and liquidity. The focus of the study is specifically on medium to large companies where a female CEO is currently in the CEO chair to ensure that the firms have at least one financial year under a female CEO.

For the delimitations, several deliberate choices have been made to narrow down the study's scope. Firstly, only Swedish companies are included, which means that the findings may not be directly applicable to other countries with different cultural and corporate structures. Secondly, the financial indicators that have been selected do not cover all aspects of financial performance. Thirdly, the study does not look at other leadership characteristics beyond gender, such as age, educational background and experience, even though these are also

factors that could affect the output. Finally, since the study focuses on firms that have already demonstrated some level of gender diversity at their top management level, it therefore excludes firms that have never appointed a female as CEO.

1.4 Disposition

The study begins by reviewing previous research on CEO influence on financial performance, gender-related differences in leadership, and the importance of industry context. A theoretical framework is developed based on these insights, leading to the formulation of the study's research questions. The methodology section outlines the research design, data collection process, sample selection, variable definitions, and the statistical techniques used to analyze the data. This is followed by the empirical analysis, where regression results are presented and interpreted in relation to the research questions. The thesis concludes with a discussion of the findings, implications for theory and practice, limitations of the study, and suggestions for future research.

2. Literature Review

This chapter reviews the current literature on how CEOs influence financial performance metrics, explores past findings on how gender and leadership affect outcomes, and discusses the role of industry environment and how it moderates this relationship. The literature review provides a theoretical foundation for the construction and analysis of the study.

2.1 CEO Influence on Firm Financial Performance Metrics

Chief Executive Officers (CEOs) have a significant impact on a firm's financial performance. The Upper Echelon Theory (Hambrick & Mason, 1984) shows that top executives and their characteristics shape an organization's results through their leadership. An example of a characteristic that affects firm performance is having a PhD. Recent research confirms this since having a PhD could increase a firm's performance by up to 4.6% (Urquhart & Zhang, 2022). CEOs have a substantial impact on financial outcomes, which is shown in a study using variance decomposition methods that pointed towards CEOs accounting for a substantial part of differences in profitability metrics across different firms (Mackey, 2008; Noël et al., 2003). CEOs explained about 15% of the variance in profitability and also up to 29% of the variance in return on assets (ROA).

The way that CEOs affect metrics like profit margins, ROA and current ratio is different. The CEO is in charge of strategic direction and operational priorities that affect the different measures. A capable CEO can increase, for example ROA and profit margins by resource allocation, cost control and innovation (ibid.). CEOs also have an impact on risk-taking and financial policy for their company, therefore affecting liquidity measures such as the firm's current ratio (Elyasiani et al. 2015). CEOs can also imprint their management on the corporate decisions, which affects the capital structure, dividend policy and investments. All of these decisions have an impact on measures such as ROA and profit margins (Bertrand & Schoar, 2003). To conclude, the literature shows that who is in charge of the company has a significant impact on financial outcomes.

2.2 Gender and CEO Performance

Over the past decades, researchers have investigated whether CEO gender plays a role in firms' financial performance. The findings, however, have been nuanced. A global survey found no evidence that firms having a female CEO alone increases their profitability (Noland et al. 2016). However, in their data on 22,000 firms across 91 countries, the companies with

female CEOs did show higher profit margins when women were also represented in other top management positions. This suggests that a lone female CEO has the same qualifications as a male CEO. Consistent with this finding, a study conducted in Denmark showed that a higher proportion of women in top management tends to increase firm performance (Smith et al. 2006).

On the other hand, there are some studies showing that female CEOs tend to outperform males, often in terms of risk-adjusted returns. A study that examined a set of US firms came to the conclusion that the gender of the CEO matters in terms of the firm's performance (Khan & Vieito, 2013). In the study, they showed that firms led by females were less risky than those led by males, and female CEOs also performed better in terms of financial performance measures. This aligns with a common theme of female CEOs using more conservative financial strategies, which, in result, yield more stable results. Another study showed that firms run by female CEOs tend to have lower leverage, less volatile earnings and a higher chance of survival (Faccio et al. 2016). The study showed that the average volatility of ROA for firms run by female CEOs was substantially lower, and they were less likely to go bankrupt. However, the lower risk-taking also resulted in slightly lower risk-weighted returns than their male counterparts. Overall, this shows that firms led by female CEOs perform roughly the same as the ones led by males but with greater financial stability.

There is also evidence that female CEOs are superior at handling firms during crises and high stress. A recent study conducted on U.S. firms during the COVID-19 pandemic found that the firms with female CEOs outperformed the ones with males (Thornton & Vasilakis, 2024). The firms with a female CEO had an 8% higher ROA on average than the male-led firms. The study showed that female CEOs deliver better results under high pressure by keeping more conservative strategies and focusing on efficiency. However, the same study did not show any significant difference between the genders in “normal” times. This goes to show that context is important when comparing gender differences in managerial positions.

Another perspective on the topic is that most of the observed female CEOs that outperform males do so due to the selection effects instead of the different gender traits. Female CEOs usually face more difficult barriers to reach their top position, so in order to succeed, they need to be exceptionally skilled (Betton et al., 2023). An analysis based on CEOs by their gender and ethnicity found that the female CEOs, and especially those who were women of

color, tended to be the best performers, while the white males were the worst performers on average. The authors conclude that “female CEOs demonstrate superior performance because they are subjected to discriminatory entry barriers whereby only above-average women make it to the CEO position.” (Ibid.). This discrimination-driven selection hypothesis is consistent with the pattern that female-led firms rarely underperform and sometimes excel.

2.3 Contextual factors

While some of the previously mentioned studies focus on effects across all firms, other contexts can also affect the relationship between CEO gender and firm performance. Noland et al. (2016) found that the extent of gender diversity in firms impacts profitability, implying that female executives may be more enabled to perform well in more diverse environments.

A study on European firms (La Rocca et al. 2024) discovered that there is an interaction between gender and the structure of leadership. When a woman contains both the role of a CEO and gets a board chair, the firm performs significantly higher on average. The author of the study means that the increased decision-making authority allows for more optimal resource use and improved outcomes. The findings also point out that general CEO duality does not have a statistically significant effect, highlighting the female's role in this relationship.

Additionally, a study of U.S. firms concluded that female CEOs could have a higher positive impact on firm performance if the firm's workforce includes a bigger share of women (Flabbi et al., 2016). The firms with a higher share of women tended to be more efficient and profitable. This could be interpreted as an industry or workforce composition effect; for instance, service industries or education-oriented sectors, which often employ more women, might see a larger boost from female leadership relative to heavily male industries.

Literature Review Table

Author(s) & Year	CEO Gender	Financial Performance	Contextual Factors	Sweden
Hambrick & Mason (1984)		X	X	
Urquhart & Zhang (2022)	X	X		
Mackey (2008)	X	X		
Noël et al. (2003)	X	X		
Elyasiani & Zhang (2015)	X	X		
Bertrand & Schoar (2003)	X	X		
Noland et al. (2016)	X	X	X	
Smith et al. (2006)	X	X		X
Khan & Vieito (2013)	X	X		
Faccio et al. (2016)	X	X		
Thornton & Vasilakis (2024)	X	X	X	
Betton et al. (2023)	X	X		
Dezsö & Ross (2012)	X	X	X	
La Rocca et al. (2024)	X	X	X	
Flabbi et al. (2016)	X	X	X	
Azizsson & Stankovic (2025)	X	X	X	X

3. Methodology

3.1 Overview of Research Design

The study investigates whether female CEOs have different financial performance compared to their male counterparts and whether the effect differs across industries. With the background that the same company can appear under both male and female leadership, a longitudinal panel is the natural design. It enables us to control for time-invariant traits specific to each firm, such as business model, corporate strategy or organizational culture. Addressing whether the gender of the CEO has an impact, observing the same company under different leadership is a requirement - something the panel allows us to do. Consisting of 221 companies over the ten-year timeframe 2014-2023, our panel includes 2,210 observations of financial performance retrieved from the Retriever Business database (Retriever Business, n.d.).

To identify effects from our dataset, we use a two-stage econometrics strategy. Stage 1 uses pooled ordinary least square regressions to provide a descriptive baseline and paint the landscape to answer whether firms led by females are systematically above or below their industry's median performance in terms of capital efficiency, profitability and liquidity management. In stage 2, we apply firm-fixed effects models (FE) that compare each firm to itself over time, thus accounting for all time-invariant heterogeneity. We also apply industry interaction terms to assess whether industry belonging moderates the effects. These FE estimates form the basis for answering our research question on whether performance differs across genders and whether industry is a moderator in the effect. Several studies on CEOs approach this similarly; for instance Smith, Smith and Verner (2006) analyzed over 2500 Danish firms from 1992 to 2001 with panel models to link top management gender to performance. Their longitudinal dataset enables controlling for firm age, size, industry, and more, inferring how CEO characteristics affect performance across years. This exemplifies the value of a quantitative longitudinal design in CEO research.

3.2 Data Generation and Sample

3.2.1 Data Source

The Retriever Business database is our primary source for data collection. It is a comprehensive business intelligence platform that provides access to detailed financial and organizational data for Swedish companies. It includes information on key financial metrics, executive leadership, industry classification and more. By utilizing Retriever Business, we can obtain reliable and standardized data that supports our quantitative analyses.

3.2.2 Industry and Firm Selection

250 Swedish companies have been analyzed, stemming from the five largest sectors in Sweden based on net revenue (Tillväxtverket, n.d.). No specific filtering has been made in regard to whether companies are public or not. Within each sector, the 50 largest companies in terms of revenue have been included in the analyses, on the condition that the current CEO is a female. This ensures that each company has at least one observation where the CEO is a female. The chosen sectors are presented below:

Sector	Share of net revenue
Trade	31%
Manufacturing	22%
Construction	9%
Information and Communication	8%
Legal, Financial, Scientific, and Technical Services	6%

Table 1, Industries.

Constituting roughly 76% of the net revenue of Swedish companies' revenue, these sectors provide a holistic and diversified coverage of the economy. Retriever Business allows us to filter for companies based on their SNI code, allowing for an objective assessment and industry classification (Statistiska Centralbyrån, n.d.). An adjustment has been made to the

sector of Legal, Financial, Scientific and Technical Services where the subcategory “*Activities of head offices*” was excluded, as these entities typically serve administrative or strategic functions rather than engaging in core revenue-generating business activities. Including them would reduce the comparability of financial performance within the sector.

3.2.3 Time Frame and Panel Structure

Financial data between the years 2014 and 2023 was collected, meaning that each company has ten distinct years of observations. This leads to an initial number of observations of 2500, made up by ten financial years of 250 companies.

3.2.4 Data Cleaning and Exclusions

Before running the analyses, all rows with missing CEO gender data or incomplete financial information were set to system-missing. System-missing is justified when the missingness is assumed to be completely at random (MCAR) or when the percentage of missing data is very low (Allison, 2014).

Observations with missing values on a key financial metric variable (ROA, PM, CR) have also been excluded from the analyses by being set to system-missing. This approach was taken as extrapolating the dataset could introduce bias to the dataset. The instances of missing values are less than 1%, and the missingness is assumed to be completely at random, indicating a minimal impact on the overall results.

Upon merging and cleaning the data, some duplicates were identified as certain companies appeared in more than one industry filter. Following an evaluation of the company's primary SNI code, we kept the duplicate that belonged to the primary industry and removed the duplicates that were assigned to the industries that are less aligned with the companies' actual business. This reduced the total number of observations to 2210 spread across 221 companies. The sample left after removing duplicates is the one used for the OLS and FE models.

The chosen methodology supports a clear analysis of how CEO gender may influence financial outcomes, with attention to both specific sectors and how it changes over time.

3.3 Variable Construction

3.3.1 Financial Performance Metrics

For the analysis of financial performance and management, the considered dimensions are *capital efficiency*, *profitability* and *liquidity*. These are represented by the financial metrics return on assets (ROA), operating profit margin (PM), and current ratio (CR).

The chosen financial metrics are well-established proxies for different aspects of firm performance. ROA is a common overall measure of financial performance and is often interpreted as a measure of capital efficiency, showing how effectively a firm's assets generate profits (Iowa State University Extension and Outreach, 2023). Operating profit margin is a classic profitability ratio that reflects the percentage of profit derived from core operations (Corporate Finance Institute, n.d.). The current ratio is a liquidity indicator, measuring the firm's ability to meet short-term obligations with short-term assets (Iowa State University Extension and Outreach, 2023). These exact indicators are often used both in literature and practice to represent profitability and liquidity. For instance, the Iowa State University's Financial Ratio's guide lists ROA under profitability measures and current ratio under liquidity measures. Thus, ROA, operating profit margin and current ratio are appropriate choices to capture capital efficiency, profitability and liquidity, and their use can be justified by accounting and finance literature.

3.3.2 Industry Adjusted Dependent Variables

To remove macroeconomic and sector-wide noise, a median has been derived for all industries of each of the stated performance metrics and for all years to be able to isolate an individual firm's performance in a specific year. For example, adjusting ROA by subtracting the median ROA of the firm's industry isolates the firm's relative performance. A study on earnings management in accounting defines industry-adjusted ROA as "the yearly industry median ROA subtracted from the firm's ROA" (Vorst, 2016). Using industry year medians to create adjusted financial metrics thus enables controlling for temporal and sectoral variation, ensuring that performance is evaluated relative to peers within the same industry.

First, for each year t and industry i , we calculate the median of the raw performance metrics (ROA, PM and CR) across all firms in industry i . The reason for choosing the median rather than the mean is because it is robust against extreme outliers and more accurately reflects the

typical industry performance for each given year, in accordance with the measures of central tendency (Australian Bureau of Statistics, n.d.). Next, for every firm j in year t we subtract that industry-year median from the firm's own absolute performance. This derives the three variables, denoted as follows:

$$ROA_diff_{jt} = ROA_{jt} - [Median(ROA)]_{industry(i),t}$$

$$PM_diff_{jt} = PM_{jt} - [Median(PM)]_{industry(i),t}$$

$$CR_diff_{jt} = CR_{jt} - [Median(CR)]_{industry(i),t}$$

The above “diff” variables capture each firm's deviation from its industry's typical performance in each year. These relative performance measures are the dependent variables in both our pooled OLS and FE regressions. This approach follows established accounting research practice for industry-median adjustment (Vorst, 2016) and ensures that the estimated impact of CEO gender is not confounded by industry-wide or temporal factors.

3.3.3 Main Independent Variable

Our key independent variable is *CEO_Female*, which is a binary variable that equals 1 if firm j is led by a female CEO in year t , and 0 otherwise. We flag each CEO's gender by inspecting the name recorded in Retriever Business; any firm-year in which the CEO is female receives a value of 1. Firms retain the value of *CEO_Female* across all years they have a female CEO and revert to the value 0 in years under male leadership. This binary coding is standard in the gender and performance literature (Wooldridge, 2010; Khan & Vieito, 2013) and allows us to estimate the average difference in performance attributable to a change in CEO gender.

3.3.4 Control Variable

To account for and measure the cross-industry differences, a control variable has been created called *IndustryID*. A numerical value has been assigned to each industry where the numeric labels are treated as strictly categorical codes, according to the following terms:

- 1 = Trade
- 2 = Manufacturing
- 3 = Construction
- 4 = Information and Communication

5 = Legal, Financial, Scientific, and Technical Services

Hence, all companies belonging to the trade sector have the value 1 in the categorical industry variable, all companies within the manufacturing sector are assigned the value 2, etc. This ensures that observed performance deviations can be attributed to a certain industry, as characteristics differ across different industries.

In the OLS stage, we run a regression on each sector individually by using the *Select Cases* function in SPSS to (e.g., IndustryID=1, IndustryID=2, etc.). Running the models on these industry-specific sub-samples allows us to isolate each sector and give a coefficient for CEO_Female that is specific to each sector.

In the FE models, we keep the full panel of 2,210 observations and instead create five industry dummy variables to run five separate FE models. Each specification contains CEO_Female, the dummy for that sector, and their interaction. The sector dummy itself is time-invariant and is therefore absorbed by the FE model (shown as “omitted because of collinearity”), while the interaction remains. In this setup, the baseline coefficient called 1.CEO_Female represents the gender effect in the *other* four sectors, while the interaction term captures how the coefficient changes inside the focal sector. To recover the within-sector coefficient, we use the *lincom* command in STATA, which sums the baseline coefficient and the interaction term for each industry separately, in the end giving us the sector-specific gender effect that we compare to the OLS estimates.

3.3.5 Sample and Descriptive Statistics

Table 2 (Panel A) summarizes the continuous variables. As expected, both ROA_diff and PM_diff have means close to 0, since they measure deviations from industry medians. By contrast, CR_diff is highly skewed to the right tail (mean = 130.75; max = 21,422.5), motivating why we chose to trim the top 2.5% of CR values, as we elaborate on in the following section 3.4. Panel B shows that 44.9% of observations are firms led by a female CEO and that observations are fairly balanced across the five sectors.

Panel A: Continuous variables:

Variable	N	Mean	Std.dev.	Min	Max
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ROA_diff	2 210	2.55	15.75	-53.7	99.5
PM_diff	2 210	-0.71	39.8	-846.7	232.3
CR_diff (pre-trim)	2 210	130.75	1188.3	-137.3	21 422.5
CR_diff (post-trim)	2 157	12.23	87.5	-137.3	671.75

Table 2, Continuous variables.

Panel B: Categorical frequencies:

Variable	Category	n	% of total
CEO_Female	Male	1,163	52.6 %
	Female	994	44.9 %
	Missing	53	2.4 %
Industry	Trade	470	21.3 %
	Manufacturing	460	20.8 %
	Construction	480	21.7 %
	Information & Communication	440	19.9 %
	LFST	360	16.3 %

Table 3, Categorical Frequencies.

3.4 Statistical Methods

Stage 1: Ordinary least squares

To conduct the stage 1 descriptive analysis, we estimated OLS regressions in IBM SPSS Statistics for each of our three dependent variables (ROA_diff, PM_diff, CR_diff). First we did this across all industries and all 2,210 observations, and then separately for each industry. In every regression, we regress the industry-adjusted performance measure on the CEO_female dummy. Year-dummies have not been included, as the effects of potential economy-wide or industry-wide shocks in a certain year are already accounted for through creating the relative performance measures that make up the dependent variables (the diff variables).

For the initial pooled OLS, we estimate:

$$Y_{jt} = \beta_0 + \beta_1 CEO_Female_{jt} + \varepsilon_{jt}$$

Where Y is each of the dependent variables ROA_diff, PM_diff and CR_diff, β_0 is the global intercept, β_1 is the average gender effect across all industries and the error term is included.

From the above regressions, we report the coefficient β and its p-value to describe the raw association between appointing a female CEO and relative firm performance.

We then run OLS regressions separately for each industry i , we filter the data to IndustryID = i and run the following for each industry:

$$Y_{jt} = \beta_{0,i} + \beta_{1,i} CEO_Female_{jt} + \varepsilon_{jt}, \text{ for IndustryID} = i$$

In the industry-specific OLS above, Y still represents the three dependent variables. $\beta_{0,i}$ is the intercept in industry i and $\beta_{1,i}$ is the coefficient for CEO_Female in industry i . The error term is added, and we use the models to derive coefficients and p-values for each dependent variable in every industry.

Stage 2: Firm-fixed effects

In stage 2, firm-fixed effects models (FE) estimated in STATA to isolate the within-firm variation over time. To start off, we declare our panel:

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xtset company_id year
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We first estimate a pooled FE model without explicit consideration of industry differences. The formulation is as follows:

$$Y_{jt} = a_j + \beta CEO_Female_{jt} + \varepsilon_{jt}$$

Above, Y_{jt} denotes each dependent variable (ROA_diff, PM_diff, or CR_diff) for firm j and time t . a_j represents the firm-specific fixed effects, controlling for any time-invariant firm characteristics. β captures the average effect of having a female CEO in any industry and ε_{jt} is the error term. The model is estimated using cluster robust-standard errors at the firm level to correct for any potential serial correlation or heteroskedasticity.

Next, we investigate whether there is a difference in any of the covered sectors by estimating FE models with interaction terms between CEO_Female and each industry. It is generally specified as follows:

$$Y_{jt} = a_j + \beta CEO_Female_{jt} + \sum_i \delta_i (CEO_Female_{jt} \times 1\{IndustryID_j = i\}) + \varepsilon_{jt}$$

In this model, β represents the baseline gender effect in the omitted industry, which is the reference industry. δ_i , the interaction term, captures the incremental differences in the gender effect for each industry included in the model relative to the omitted baseline industry. To derive clear and industry-specific coefficients and p-values, we rotate the reference industry across regressions. Each industry is the baseline once, meaning its corresponding dummy variable is omitted due to collinearity with the firm-fixed effects. For each model, we then use STATA's *lincom* command, which explicitly computes the total CEO_Female coefficient and p-value for the industry that was initially omitted as baseline by combining the baseline coefficient (β) with the respective interaction term (δ_i). This approach ensures that each industry gender effect is estimated explicitly.

A robustness check has been conducted on the CR_diff variable. The reason for doing so is that the current ratio, unlike ROA and PM, can not have a negative value but has no upper bound, leading to extreme right-tail skewness as visualized in chapter 3.2.1. Such outliers can disproportionately influence coefficients and p-values. To check for this, we re-estimate each OLS and FE model for the CR_diff variable: once on the full sample and once after trimming the top 2.5 % of raw CR observations. Comparing these results confirms whether our liquidity findings hold when extreme values are excluded.

3.5 Data Exclusions and Cleaning

Before running the analyses, all rows with missing CEO gender data or incomplete financial information were set to system-missing. System-missing is justified when the missingness is assumed to be completely at random (MCAR) or when the percentage of missing data is very low (Allison, 2014).

Observations with missing values on a key financial metric variable (ROA, PM, CR) have also been excluded from the analyses by being set to system-missing. This approach was taken as extrapolating the dataset could introduce bias to the dataset. The instances of missing values are less than 1%, and the missingness is assumed to be completely at random, indicating a minimal impact on the overall results.

The chosen methodology supports a clear analysis of how CEO gender may influence financial outcomes, with attention to both specific sectors and how it changes over time.

4. Results

4.1 Pooled OLS Findings

4.1.1 Full-sample OLS (All Industries)

Table 4 provides the pooled OLS estimates for the entire sample of 2,210 firm-year observations. Note that the OLS findings are not to be interpreted causally but rather descriptively to paint the landscape of the financial performance of any firm, at any year, that has a female CEO without adjusting for time-invariant firm characteristics.

Industry	ROA_diff	PM_diff	CR_diff (pre-trim)	CR_diff (post-trim)
All Industries	1.393 (<i>p</i> =0.043)**	3.654 (<i>p</i> =0.394)	83.55 (<i>p</i> =0.010)*	4.892 (<i>p</i> =0.201)

Table 4, Coefficients and *p*-value across all industries.

**Significant at the 5% level, *Significant at the 10% level

The results of the OLS for all industries combined show that CEO gender has a significant impact on financial performance on two measures. The coefficient for ROA_diff is positive and statistically significant ($\beta = 1.393$, $p = 0.043$), this suggests that the firms led by female CEOs, on average, have a 1.393 percentage point ROA compared to those that are male-led. Furthermore, the coefficient for CR_diff is also positive and significant ($\beta = 83.55$, $p = 0.010$), which indicates that female CEOs perform stronger liquidity short-term. No significant effect for CEO gender was found for profit margin ($\beta = 3.654$, $p = 0.394$) or for the trimmed current ratio ($\beta = 4.892$, $p = 0.201$)

4.1.2 Industry-specific OLS

Table 5 below expands on the full sample OLS by presenting the coefficients and *p*-values for each industry separately. Again, these findings are of a descriptive nature. The associational inference is evaluated in the FE models, which are presented in the following sections.

Industry	ROA_diff	PM_diff	CR_diff (pre-trim)	CR_diff (post-trim)
1	1.677 (p=0.332)	0.820 (p=0.29)	15.912 (p=0.011)**	15.912 (p=0.011)**
2	-1.175 (p=0.319)	-0.846 (p=0.528)	-6.62 (p=0.827)	1.0375 (p=0.328)
3	-0.041 (p=0.974)	-11.732 (p=0.026)**	516.144 (p<0.01)**	16.382 (p=0.056)*
4	5.641 (p=0.002)**	21.333 (p=0.28)	-56.067 (p=0.177)	-9.651 (p=0.182)
5	0.907 (p=0.583)	9.504 (p=0.17)	22.929 (p=0.348)	-13.766 (p=0.186)

Table 5, Coefficients and p-values for each industry.

**Significant at the 5% level, *Significant at the 10% level

In Industry 1, no significant associations were found for ROA ($\beta = 1.677$, $p = 0.332$) or profit margin ($\beta = 0.820$, $p = 0.290$). A positive and statistically significant association is found for the current ratio ($\beta = 15.912$, $p = 0.011$), which indicates higher liquidity for companies with female CEOs within this sector. This result remains consistent after the robustness check of trimming the top 2,5% of CR values ($\beta = 15.912$, $p = 0.011$).

For Industry 2, none of the financial measures show statistical significance with the CEO gender. The coefficients for ROA ($\beta = -1.175$, $p = 0.319$), profit margin ($\beta = -0.846$, $p = 0.528$), current ratio ($\beta = -6.62$, $p = 0.827$), and trimmed CR ($\beta = 1.037$, $p = 0.328$) all indicate non-significant differences between companies with male and female CEOs.

In Industry 3, the association between CEO gender and ROA is not significant ($\beta = -0.041$, $p = 0.974$). A significant negative association is found for profit margin ($\beta = -11.732$, $p = 0.026$), suggesting lower profits for female CEOs in this sector. At the same time, the current ratio shows a significant and positive association ($\beta = 516.144$, $p < 0.01$), indicating much higher liquidity among female-led firms. The trimmed CR also shows a positive association ($\beta = 16.382$, $p = 0.056$), which is insignificant at the 5% level but would be considered significant at the 10% level.

In Industry 4, there is a significant positive association between CEO gender and ROA ($\beta = 5.641$, $p = 0.002$), which suggests that companies with female CEOs achieve higher profitability relative to their assets. No significant associations were found for profit margin ($\beta = 21.333$, $p = 0.280$), current ratio ($\beta = -56.067$, $p = 0.177$), or the trimmed CR ($\beta = -9.651$, $p = 0.182$).

For Industry 5, none of the associations between CEO gender and financial performance indicators are statistically significant. The coefficients for ROA ($\beta = 0.907$, $p = 0.583$), profit margin ($\beta = 9.504$, $p = 0.170$), current ratio ($\beta = 22.929$, $p = 0.348$), and the trimmed CR ($\beta = -13.766$, $p = 0.186$) show no significant differences between companies led by female or male CEOs.

4.3 Fixed-Effects Results

4.3.1 Pooled FE (All Industries)

Table 6 reports the within-firm estimates from the pooled FE model, pooling all industries and regresses each performance measure on the CEO_Female variable. Because the firm fixed effect accounts for all and removes any time-invariant characteristics of each firm, the beta coefficient represents the change in performance that occurs inside the same firm when leadership switches from male to female. Both the pooled FE and the industry-specific FE models with interaction are used to assess associational inference and to evaluate the research questions.

	ROA_diff	PM_diff	CR_diff (pre-trim)	CR_diff (post-trim)
All Industries	-0.326 ($p=0.715$)	-3.500 ($p=0.186$)	-64.128 ($p=0.393$)	2.552 ($p=0.507$)

Table 6, Coefficients and p-values across all industries.

**Significant at the 5% level, *Significant at the 10% level

As for capital efficiency, the coefficient for ROA_diff is slightly negative, implying that women slightly underperform the industry in terms of ROA performance. PM_diff is also negative, suggesting the same, however none of the coefficients are associated with a significant p-value and do hence not imply any systematic performance difference when shifting from switching to a female CEO. CR_diff has a negative difference that is large in

magnitude yet not significant prior to trimming 2.5% of the top CR values. Post-trimming, the beta coefficient magnitude is decreased but remains insignificant.

The above results show no systematic difference in either performance metric between a male and female CEO. Consequently, the research question “*Does the gender of the CEO affect a firm’s financial performance in Sweden?*” is not supported in the full sample within-firm analysis. The following section explores whether this masks meaningful insights into the different industries.

4.3.2 Industry-specific FE (Interactions)

Table 7 below presents the coefficients and associated p-values obtained for each sector after interacting the CEO_Female variable with IndustryID. With the exception of the manufacturing sector prior to the robustness trim, none of the sectors show any significant difference when the CEO switches from male to female.

Industry	ROA_diff	PM_diff	CR_diff (pre-trim)	CR_diff (post-trim)
Trade	-0.135 (p=0.950)	-5.001 (p=0.129)	-78.054 (p=0.193)	-4.524 (p=0.577)
Manufacturing	-0.561 (p=0.724)	-6.502 (p=0.211)	-168.842 (p=0.050)**	-2.205 (p=0.696)
Construction	-1.017 (p=0.574)	-4.668 (p=0.407)	164.603 (p=0.453)	-0.059 (p=0.993)
Information and Communication	-1.461 (p=0.38)	-1.880 (p=0.769)	-148.649 (p=0.113)	9.431 (p=0.327)
LFST	1.816 (p=0.365)	1.111 (p=0.797)	-57.663 (p=0.474)	0.464 (p=0.953)

Table 7, Coefficients and p-values for each industry.

**Significant at the 5% level, *Significant at the 10% level

ROA_diff shows no significance in the difference for any sector, indicating that there are not any systematic differences across sectors depending on the CEO being male or female.

Although, coefficients in manufacturing and construction are noticeably more to the negative side compared to other industries.

PM_diff does not show any systematic differences in any sector either, as no coefficient reports a p-value within the intervals for significance. The beta coefficients, however, still seem to be the most negative

CR_diff in the manufacturing sector shows a large difference in the beta coefficients ($\beta = 168.842$) prior to the 2.5% trim of the top outliers, following a switch to a female CEO. This is statistically significant ($p=0.050$), giving an initial impression of systematic underperformance by women. However, post-trim of the top 2.5% tail, the magnitude of the coefficient reduces to a great extent ($\beta = -2.205$) and significance is lost ($p=0.696$). Because the post-trim coefficient is small and insignificant, the robustness check confirms that apparent underperformance is driven by a handful of extreme observations. The post-trim results will hence be the basis for our analysis, as the robustness check proves the above skew.

Taken together, the firm-fixed effects analysis on an industry level shows no significant findings. The absence of consistent, statistically significant differences across the five sectors means that the data does not support that industry context systematically moderates the relationship between CEO gender and financial performance. Accordingly, the second research question “Does the industry moderate this relationship between CEO gender and performance?” is not supported either.

5. Discussion

5.1 Theoretical Implications

This study's findings offer implications for leadership and the literature on gender and corporate performance. We specifically examined one demographic characteristic, CEO gender, and found no significant performance differences between male- and female-led firms. This reinforces the consensus that gender by itself may not be a decisive factor in firms' financial outcomes. In other words, having a female versus a male chief executive does not automatically translate into better or worse financial performance. Indeed, many large-sample studies have reported little to no systematic performance gap by CEO gender, like findings that suggest that female CEOs neither improve nor worsen firm performance on average (Wolfers, 2006). Our evidence adds weight to this neutral view and suggests that top female and male leaders are equally capable of delivering financial results in a Swedish context.

At the same time, our study highlights the complexity and context dependency that have been emphasized by recent research. The literature does not unanimously conclude gender irrelevance; some scholars have documented performance nuances and contingencies. For instance, a study found that greater female representation in top management was associated with improved firm performance, but only in firms having innovation-focused strategies (Dezsö and Ross, 2012). This indicates that the benefits of gender diversity may appear under specific strategic contexts. This is something that could have implications on our study, where a more granular selection of industries and sub industries where innovation is more rapidly increasing could have been something worth looking into.

Similarly, a meta-analysis of women on boards reported a modest positive relationship between female board representation and financial performance, especially in more gender-equal societal contexts (Post and Byron, 2015). And while our results did not show a female performance advantage, prior work found that U.S. firms led by female CEOs had lower stock return volatility and performed on par or better than those led by males (Khan and Vieito, 2013). They attributed this to female CEOs adopting more conservative financial policies, yielding more stable outcomes. Such findings suggest that female leadership might influence the quality or characteristics of performance even if the average profitability is fairly similar. Our study, focused on conventional accounting metrics, and may not capture

these finer aspects of performance. Theoretically, this underscores that “performance” is multidimensional; CEO gender might matter more for risk management or long-term sustainability than for short-term profits and liquidity.

Another key implication of our work is the absence of any systematic industry-level moderation of the gender-performance relationship. The literature pointed towards industry context conditioning the effect of CEO gender, expecting that female executives could thrive more in certain sectors and face greater barriers in others. However, our panel analysis detected no consistent interaction between CEO gender and industry; the performance of female-led firms was statistically indistinguishable from their male-led peers across the spectrum of industries examined. This null finding is theoretically interesting. It suggests that whatever small performance effects CEO gender can have, they do not markedly depend on broad industry characteristics such as the sector’s gender norms or operating environment.

Prior literature offers mixed expectations here. Some argue that female leaders might excel in female-friendly industries while facing extra challenges in male-dominated fields. Our evidence did not show this in the Swedish context. A female chief executive in manufacturing, for example, was just as effective (in financial terms) as a female chief executive in retail or services. This could imply that, at least in a relatively egalitarian business culture, industry is not a barrier to female leadership effectiveness. It may also reflect that the broad industry categories used in our study do not capture smaller contextual factors that matter, such as an industry’s rate of change, customer demographics, or labor intensity.

Theoretically, this finding encourages a refinement of contingency views; rather than industry-wide effects, more specific situational moderators like, for example firm crisis conditions, corporate culture, or stakeholder attitudes, might influence when CEO gender makes a difference. For instance, one recent study found that during the COVID-19 crisis, firms led by women CEOs outperformed those led by men, suggesting women leaders may shine in high-pressure downturns (Thornton & Vasilakis, 2024). Overall, our results support the notion that gender alone has a negligible main effect on firm financial performance, aligning with meta-analyses that find at most a slight positive effect of women in leadership (Hoobler et al., 2018). Any performance influence of CEO gender likely interacts with situational factors in complex ways. This contributes to theory by neutralizing broad generalizations; neither the most optimistic claims that female leaders automatically boost

performance nor the most pessimistic that women are not suited for top roles are supported in general. Instead, our study gives a more nuanced theoretical perspective in which leader gender is just one piece of a much larger puzzle of firm performance, and its impact may emerge only under certain conditions.

5.2 Managerial Implications

The lack of a performance gap between male- and female-led companies means that boards and shareholders should base CEO selection on merit and strategic fit instead, rather than ungrounded concerns about gender. Our results add to a growing body of evidence that CEO gender is irrelevant for financial outcomes. This implies that companies that overlook qualified women for top leadership do so at no gain and potentially at a cost, since they shrink the pool of talent available for the role. In short, there is no business-related excuse for excluding women from CEO positions. On the contrary, given that some studies have found female CEOs tend to adopt prudent strategies leading to more stable performance for example, lower leverage and higher survival rates, firms may benefit from the unique leadership approaches women often bring. For example, the study observed that female-led firms achieved comparable profitability with significantly lower risk levels than male-led firms (Khan and Vieito, 2013). Managers and boards focused on long-term sustainability and risk management might therefore particularly value diversity in their top management. Likewise, during periods of crisis or rapid change, having women at the helm can be advantageous, as the evidence from the COVID-19 pandemic showed that companies with female CEOs weathered the crisis with higher ROA, attributed to more proactive strategies and efficiency measures (Thornton and Vasilakis, 2024).

Our finding that industry does not moderate the effect of CEO gender also has practical implications. It suggests that women can succeed in leading companies in any sector, even in traditionally “male-coded” industries like manufacturing and construction or more gender-balanced fields. Corporate stakeholders should therefore avoid the stereotype that women leaders are only suited for certain types of businesses. The performance of female CEOs in our Swedish sample showed that they were on par with males across industries, underscoring that with the right skills and experience, a leader’s gender is irrelevant to outcomes, whether the firm is a bank, a tech company, or an industrial firm. This insight encourages firms in male-dominated industries to review any bias in their succession planning processes; there is no empirical basis to assume a female chief executive would

underperform. Indeed, organizations might consider that a capable female leader brings the same potential for success as a male leader and focus on creating inclusive cultures that support leaders of either gender in all departments. Removing artificial barriers will enlarge the talent pool and could improve corporate governance.

It is also worth noting that fostering gender diversity at the top can have broader organizational benefits beyond the narrow financial metrics studied here. A female CEO often serves as a powerful role model and can help attract and retain other talented women throughout the company. Research shows that when women break through to senior corporate roles, it creates positive “spillover” effects in the leadership pipeline, increasing opportunities for other women in the organization (Matsa and Miller, 2011). In this way, appointing a female CEO could contribute to an increased diversity in management teams and boards over time. Additionally, companies with diverse leadership may enjoy reputational advantages and better alignment with a diverse customer base, an aspect that is not measured in our study but highlighted in the broader diversity literature. Managers should therefore view the promotion of women to top roles as part of a positive diversity and talent strategy, not only as an equality initiative but as a move that is fully compatible with and potentially beneficial to business performance. Therefore, the absence of any performance penalty means firms can pursue their equity in leadership with confidence that it will not affect shareholders’ interests negatively.

Finally, our findings reinforce the importance of equitable support and evaluation of CEOs regardless of gender. Since women are often scrutinized more harshly or put under a microscope as one of few in their position, boards should ensure female CEOs receive the same resources, mentoring, and patience that are afforded to male CEOs. Awareness of the “glass cliff” phenomenon is also key; research noted that women are more likely to be appointed to precarious leadership positions in times of crisis or decline (Ryan and Haslam, 2005). Boards and decision-makers must be mindful not to unintentionally set female leaders up to fail by only assigning them to troubled firms or impossible turnarounds. Instead, they should give female CEOs opportunities to lead in stable or growth scenarios and back them through both good and challenging times, which will allow a fair assessment of their contributions. In summary, the practical message is that female CEOs are a viable and valuable part of the leadership in companies, and companies should continue to open doors to talented women, knowing that firm performance will still be in capable hands.

Key Managerial Takeaways:

- *CEO gender does not affect financial performance in Sweden. Firms led by women perform on par with those led by men.*
- *Boards should focus on qualifications and strategic fit, not gender when hiring or promoting CEOs.*
- *Female leadership performs equally well across all industries, including traditionally male-dominated sectors.*
- *Promoting women to top roles supports diversity and brings potential reputational benefits.*

5.3 Limitations and Future Research

While this study provides new evidence on CEO gender and firm performance for Sweden, it still has limitations. Our analysis is restricted to publicly listed companies in Sweden over 2014-2023. Sweden and its institutional and cultural environment differ from other countries. It is possible that the impact of CEO gender on performance varies by national context. For example, a study found that in Chinese-listed enterprises, firms with female CEOs actually outperformed those led by males (Lam et al., 2013). This contrast with our findings suggests that cultural, economic, or ownership differences also moderate the gender-performance relationship. Future studies could conduct cross-country comparisons or examine different institutional settings to see if and why CEO gender effects emerge in some contexts and not others. Understanding whether factors such as societal gender norms, investor attitudes, or corporate governance systems moderate the influence of female CEOs would enrich the literature. It may be that in environments where women face greater barriers to reach the top, those who do become CEOs are an especially high-performing subset. In contrast, in contexts like Sweden with more equal opportunities, the performance of female and male CEOs might be more equal. Investigating these perspectives requires bigger and broader samples and potentially qualitative insights into the challenges faced by female leaders in different regions.

Our research also looks at a limited set of performance measures, primarily accounting profitability and liquidity, within a relatively short-run panel. It does not capture other dimensions such as stock market performance, firm growth, innovation outcomes, or long-term value creation. It would be premature to conclude that CEO gender “never” matters

for any aspect of firm success. Indeed, prior work hints at some effects outside of basic profitability. For example, a study reported that analysts' expectations and stock returns might be influenced by CEO gender, potentially reflecting biases in market perception (Wolfers, 2006). Other studies have found gender-related differences in strategic decisions; male executives are often associated with higher risk-taking, whereas female managers tend to be more cautious (Huang and Kisgen, 2013; Faccio et al., 2016). Differences like that can impact measures like stock volatility, debt levels, or investment in innovation. Our data did not include these outputs, so any CEO gender effect on them would go undetected. Future research could broaden the scope by looking at the risk-adjusted performance, like Sharpe ratios and bankruptcy rates under male vs. female leadership. Similarly, the question of whether female-led firms are valued differently by investors remains open; a comparative event study of stock market reactions to female vs. male CEO appointments in Swedish listed companies could give insights into market biases or expectations.

Although we tested industry as a moderator, our approach used broad industry classifications and may not have captured more subtle factors. It is possible that the effect of CEO gender materializes under specific conditions that are not fully accounted for in our analysis. For instance, the "female leadership advantage" might surface primarily in times of crisis, as suggested by recent findings that female-led firms had superior performance during the COVID-19 downturn (Ibid.). Our study period does include the pandemic years, but a dedicated analysis of crisis periods versus stable periods could shed more light on this. Future studies could interact CEO gender with situational variables like economic cycles, competitive intensity, or firm turnaround scenarios. If women are more likely to be appointed during troubled times, like mentioned by the glass cliff scenario, performance comparisons need to account for the different initial conditions. Although our fixed-effects models control for time-invariant firm traits, they do not fully eliminate endogeneity concerns around *when* a female CEO is chosen. A promising direction for future work is to examine performance trajectories before and after CEO successions involving a gender change. This could help disentangle whether any observed performance patterns are due to the leader's gender or the context of their appointment.

Another limitation relates to the precision of the CEO data. The dummy variables in this study are based on annual reports, which do not specify the exact dates of CEO transitions. As a result, if a CEO change occurred during a calendar year, it is not clear if the financial

performance for that year should be attributed to the incoming or outgoing CEO. Since no public database provides consistent information on the exact dates of CEO appointments for all firms in Sweden, there is a risk of temporal mismatch in some observations.

5.4 Conclusion and Final Remarks

This thesis set out to investigate whether CEO gender affects firm financial performance and whether industry context moderates this relationship. Based on a panel of medium and large Swedish companies over nearly a decade, we find no evidence of a performance gap between female-led and male-led firms on key financial indicators. Firms run by women CEOs achieved similar profitability, efficiency, and liquidity outcomes as those run by men, after controlling for firm-specific factors. We also find that this null relationship holds across industries; a company led by a female CEO does not perform significantly differently than one led by a male CEO in the same sector. In answering our research questions, the clear implication is that gender, in and of itself, is not a determinant of corporate financial success in the contexts examined.

This conclusion has practical resonance in the push for greater diversity in corporate leadership. It undercuts any lingering justification for excluding women from the CEO suite based on performance myths. If anything, combining our results with the wider research suggests that increasing gender diversity at the top is at least performance-neutral and at times possibly performance-enhancing. Firms should therefore feel assured that promoting equality in leadership is consistent with their fiduciary duty to maximize performance.

In final remarks, we emphasize that the absence of a gender performance gap should itself be viewed as an important finding. It highlights the progress made toward meritocratic leadership in contexts like Sweden; once women are given the opportunity to lead, they perform on par with men. It invites reflection on how many capable female leaders might be contributing similarly strong results if given the chance. The challenge going forward is less about proving that women can lead. The data increasingly shows they can, and it is more about removing the barriers that prevent equal representation at the top. By focusing on competence and context rather than demographic characteristics, companies can appoint the best leaders and then support them to succeed.

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AI Disclosure:

This thesis was produced with assistance from the generative AI tool (ChatGPT) to assist in language refinement, feedback on structuring and proofreading, and learning purposes. All content, analyses, and conclusions are the original work of the authors. The AI was used as a writing, editing and learning aid and did not generate any research findings or arguments.

Grammar and flow

We have used Open AI's model ChatGPT o3-mini-high to improve the grammatics and flow of our text. The purpose of this is to make the text more readable and understandable for the readers. To do this, we have used prompt similar to the one below:

*"Please look for grammatical errors or spelling mistakes for me to correct in this text: *paste part of essay*. Also, give me suggestions on how I can improve the readability and flow of the text. Make sure to not exclude or add anything new to the text"*

The model would return the factual errors we have made in grammar and spelling, and also give suggestions for sentence restructuring to improve readability. No changes or additions to the content of the text have been made, it has simply been used to improve the language. This benefits the reader as the thesis becomes more consistent and easy to read, improving the reader experience.

Reference list

We have used Open AI's model ChatGPT o3-mini-high to create our reference list in accordance with the Harvard system. The reason for doing this is because the task of creating a reference list requires minimal reasoning and is a simple practical task. Also, using the AI

model we can easily and quickly create a synchronized list where the format is the same for each reference. The prompt used was:

*“These are the sources we have used: *paste source links*. Please help me write a reference list in accordance with the Harvard system. Also list them in alphabetical order.”*

All written references have been manually cross-checked by the authors to ensure that the reference is correct and in accordance with our reference structure. This because the risk of a faulty reference is presence, a risk we mitigate by cross-checking the references.

Statistical analysis

Open AI’s ChatGPT has been used to guide us through the statistical analysis, and its purpose has been to teach us to use the statistical software STATA, in which we as authors do not have prior experience. The reason for choosing generative AI is that we can ask specific question on certain parts we do not understand, and retrieve detailed, tailored answers as compared to using a search engine like Google and manually searching for what we want to know. As always, the risk of inaccuracies is present when using generative AI, and for that reason we have cross-checked all information about how to use the program and models, specific commands like *lincom*, etc. To cross check, we have turned to Google to verify the info we get from the AI engine. Also, upon understanding what we need to build and run our models, we have used the AI engine to generate the scripts that go into STATA. This contributes to our thesis by enabling us to learn, and apply a statistical method (Fixed-effects) and program which we otherwise were not familiar with. In the case where it would have been totally forbidden to use AI for learning purposes, we would have turned to Google which would have increased the risk of us missing some important aspect and also make our work less effective.