

Gender, Professional Certification, and Higher Education's Effects on
Firm Performance within the United States:

A Thesis

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By

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Abstract

This study examines the effect of female board representation, specifically women with CPA certifications and advanced degrees, on firm performance, measured by Return on Assets (ROA) and Tobin's Q. Using regression analysis with control variables such as firm size, growth, and leverage, the study finds that the number of female directors does not have a significant impact on either performance metric. While the presence of female directors with a CPA showed a significant negative effect on ROA, there was no statistically significant relationship with Tobin's Q. Similarly, female directors with advanced degrees had no notable effect on either performance measure. Interaction terms exploring the combined effect of female directors with advanced qualifications showed weak or insignificant results. These findings contribute to the literature by highlighting the limited impact of gender diversity in board composition on firm performance, particularly when considering specific qualifications. The results suggest that further research may be needed to investigate other factors influencing board effectiveness, and that the mere presence of female directors or their qualifications may not directly enhance financial performance.

1. Introduction

Gender diversity and its impact on corporate performance is currently a heavily discussed and debated topic. Women have increasingly entered the workforce over the last century but are underrepresented in corporate leadership (The Rise of Women Executives, n.d.). Overseas, there have been efforts to address these inequalities. European Union countries have introduced quotas and requirements for female participation in corporate boards (France: 40 percent; Austria: 35 percent; Belgium, Italy, Greece: 33 percent and Germany: 30 percent). However, the United

States has passed no legislation relating to this topic (Desvaux et al., 2017). While European Union countries have implemented board quotas to improve gender balance, the U.S. has yet to enact similar legislation. To ensure that such a policy is effective before implementation, it is important to investigate the relationship between female board representation and a company's success.

This study examines how the presence of women on corporate boards within the United States, specifically those with Certified Public Accountant (CPA) status and advanced degrees (master's or higher), impacts financial performance. Financial performance will be assessed using two key metrics: return on assets (ROA) and Tobin's Q. To ensure robust results, the study includes controls for variables known to influence these financial indicators. My hypothesis is that the presence of female identifying executives, higher education, and professional certification will have a positive impact on firm performance.

This study uses return on assets (ROA) and Tobin's Q as the measures of financial performance. Using two metrics of performance, such as ROA and Tobin's Q, acts as a robustness test by providing a more comprehensive assessment of the impact of female board representation on firm success. ROA (Return on Assets) focuses on a company's operational efficiency and profitability, while Tobin's Q measures market valuation relative to asset replacement costs. By examining both accounting-based and market-based metrics, this study can verify whether findings hold consistently across different dimensions of performance. If similar results appear for both ROA and Tobin's Q, it strengthens the reliability of the findings and reduces the likelihood that results are driven by biases or specific limitations inherent in any single metric.

The data that will be used to investigate this topic covers all publicly listed companies in the United States from 2000 to 2018, listed in the S&P index and their financial information is from Compustat. The data set has demographic information such as gender, higher education (master's degree or PhD), and professional certification (Certified Public Accountant). The financial data includes Tobin's Q and ROA. The analytical method used is a statistical regression analysis using interaction terms to see how gender, higher education, and professional certification have a combined effect on firm performance measured by ROA and Tobin's Q.

Educational attainment and professional certification are key demographic factors in this study, as they may signal skill sets and expertise that impact corporate decision-making and consequently firm performance. Higher education, particularly master's degrees or doctorates, can enhance critical thinking, specialized knowledge, and analytical skills that may prove advantageous in navigating complex business environments. Likewise, CPA certification is a mark of advanced financial acumen and regulatory knowledge-- competencies that could help companies optimize financial strategies and improve governance. Including these factors allows this study to explore whether these specific qualifications amplify the value female directors bring to firm performance, offering insights into whether expertise, alongside diversity, plays a role in improving corporate outcomes.

This research builds on existing yet mixed literature: some studies show there is a positive relationship between female executives and firm performance (Khan & Vieito, 2013), others found no relationship (Mukherjee & Sen, 2022), and others found a negative relationship (Casteublea et al., 2023). Given these varying findings, this study aims to shed light on how specific demographic factors, particularly gender, educational attainment, and professional qualifications, affect corporate performance.

Understanding the effect of gender, professional certification, and higher education is important for several reasons. First, stakeholders such as investors, regulators, and customers are increasingly prioritizing demographic diversity within leadership teams because they often believe that different perspectives can drive innovation and offer more balanced decision-making (Lorenzo et al., 2018). However, without a clear understanding of the link between executive demographics and performance, firms may struggle to optimize leadership structures for better financial outcomes.

Second, clarifying this relationship is essential for informing policies related to executive recruitment, promotion, and corporate governance. Companies will benefit from knowing how demographic factors such as gender, educational background, and professional certification can influence strategic decision-making and firm outcomes. Additionally, answering this question helps address broader concerns about equality and representation in the corporate world, aligning performance goals with social and ethical considerations.

Finally, understanding the demographic influence on firm performance allows for a more tailored approach in different industries and business environments. The effects of executive demographics may not be uniform across sectors, and identifying these nuances can help firms design leadership teams that better match their specific challenges and opportunities, ultimately enhancing their competitive advantage.

Section 2 provides a review of the literature, section 3 outlines this study's methodology, section 4 will cover the analysis and results of the methodology, section 5 will have the conclusion and section 6 holds the references mentioned in this study.

2. Settings and Context/Literature Review

This review will discuss the theory this study is following, the financial metrics by which this study measures firm performance, and the existing literature on the variables of interest: gender, professional certification, and higher education and their effects on firm performance. Gender can be defined by the presence of women on boards and executive teams. Professional certification can be defined by a Certified Public Accountant designation, a certification that must be obtained through education hour requirements and the passing of licensure tests. Higher education will be defined as obtaining a degree higher than a four-year bachelor's undergraduate degree.

The demographics of high-level executives, particularly in the areas of gender, higher education, and professional certification, have increasingly been recognized as key factors influencing firm performance. Theoretical frameworks like the Upper Echelons Theory provide a foundation for understanding how these traits shape strategic decision-making. As firms find their competitive edge, the makeup of executive leadership can be a defining factor. Particularly, the areas of gender, higher education, and professional certification have recently been of increased interest in academic literature.

One theoretical framework, the Upper Echelons Theory (Hambrick & Mason, 1984) suggests that the characteristics and experiences of upper-level executives mold their strategic choices which in turn affect firm performance. The theory argues that managers' cognitive bases, values, and experiences are influenced by their demographic traits, and these traits influence their choices regarding strategy, innovation, risk-taking behavior, and overall firm direction. For example, they argue educational background can shape strategic decision-making by providing different knowledge bases, technical skills, and problem-solving approaches. They also argue gender and other personal experiences can affect leadership styles, communication, and decision-

making processes, potentially bringing diverse perspectives that influence corporate strategies. Thus, Upper Echelons Theory suggests that these demographic characteristics act as filters through which executives process information, ultimately shaping the strategic choices they make for their organizations. Many studies looking into the interaction between characteristics of board members and their effects on firm performance have used the upper echelon theory as the basis of their studies.

Studies also commonly use Tobin's Q and ROA as markers of firm performance. Tobin's Q is a utilized metric in academic research due to its versatility and predictive capabilities across industries, though its application has yielded inconsistent findings. It is a ratio between a physical asset's market value and its replacement value, in other words, it is the market value of assets divided by the replacement cost of capital (CFI Team, n.d.). Tobin's Q is an accepted metric among scholars because it can be used on firms across industries and for forecasting (Anderson et al., 2004). It has been featured consistently in literature regarding board structure and its effect on firm performance (Adams & Mehran, 2012). Studies examining the impact of gender diversity on firm performance have yielded mixed results, with some finding positive effects on Tobin's Q, while others report neutral or negative long-term outcomes.

The first demographic of interest is the number of women on the board of directors, a topic that has yielded mixed conclusions in academic research. One study's empirical findings based on 639 firm-year observations and piecewise linear regressions clearly show a relationship between sample management teams and firm performance (Gröschl, S., & Arcot, S., 2014). This study was based on critical mass theory, which is the idea that a certain threshold of individuals within a group needs to be reached to create a meaningful impact within that group. The study found that increased gender diversity has a positive impact on Tobin's Q up to a threshold,

and once it reaches that threshold, those performance markers start to decrease. Their findings indicate that when female representation among executive managers is below 10%, the impact on firm performance is negative, between 10%-20%, the impact is positive, and above 20%, the impact becomes negative again. A significant majority of observations in this category (over 65%) involve firms with no female managers in their executive teams. Therefore, the data from this study suggests that the absence of women in executive management is detrimental to the performance of hotel firms.

Another study investigated the impact of gender quotas on firm performance using countries worldwide that have introduced a gender quota as a quasi-natural experiment (Casteublea et al., 2023). This study also used Tobin's Q and ROA as financial measurements to judge firm performance. By treating the introduction of gender quotas as an exogenous policy change, the authors apply a generalized Difference-in-Differences (DID) approach to compare performance changes between firms affected by the reform (treated firms) and those that are not (control firms). The methodology follows multi-event studies and is designed to account for firms facing different timing of the quota implementation. They hypothesized that there would be positive and significant effects if gender quotas enhance performance, and negative effects would indicate that increased gender diversity costs outweigh its benefits. Their empirical analysis found that adding women to the board of directors due to gender quotas caused Tobin's Q to significantly increase while their ROA and operating profit significantly decreased (Casteublea et al., 2023). This suggests that increased gender diversity may have positively influenced the firm's strategic outlook and long-term value creation. However, the decrease in ROA indicates the shift may have introduced adjustments in the companies' operational dynamics which might initially reduce efficiency or increase costs.

The contrasting conclusions in these two studies may be due to differences in the contexts and methods used to introduce and measure gender diversity on boards. In the study by Gröschl and Arcot (2014), the analysis focuses on a voluntary, natural variation in female representation across firms within a single sector (the hotel industry) and applies critical mass theory to examine how performance is impacted at varying levels of female board participation. Their findings suggest an optimal range for female representation (10-20%) beyond which performance markers decline, potentially indicating that the structure and specific needs of the industry might influence how gender diversity affects performance.

In contrast, the study by Casteublea et al. (2023) investigates gender quotas as a policy intervention across multiple industries and countries, which introduces a more exogenous, standardized approach to board gender diversity. The quota-driven increase in female board members—essentially mandated and non-optional—may have created different dynamics than voluntary representation. The significant increase in Tobin's Q reflects a potentially stronger strategic vision or enhanced decision-making process, but the negative effect on ROA and operating profit suggests that some firms may face operational disruptions as they adjust to this new board structure. Additionally, because the DID approach measures firms across countries with varying regulatory and cultural contexts, the findings may capture broader economic adjustments rather than industry-specific dynamics. These results may explain why the outcomes differ from those found in the hotel industry study.

In summary, these two studies highlight how industry context, the nature of diversity (voluntary vs. quota-mandated), and the operational and strategic adjustments required may all influence whether and how female board representation affects firm performance.

The next demographic of interest is higher education: educational attainment among executives is a key demographic factor influencing firm outcomes. One study analyzing Chief Executive Officers (CEOs) and their higher education, focusing on CEOs in the banking sector, used a unique dataset of 149 U.S. banks from 1992 to 2011 (King et al., 2016). The researchers collected detailed information on CEO educational qualifications, including the type of degree (undergraduate, MBA, or PhD) and the ranking of the awarding institution. To analyze these effects, they constructed a "CEO Education Index" via factor analysis, categorizing education levels into undergraduate, MBA, and PhD factors to assess their distinct impact on bank performance. The methodology accounted for potential biases by employing propensity score matching to ensure comparability among CEOs, with additional controls for endogenous CEO-firm matching and CEO characteristics like firm experience and equity ownership.

Results indicated that MBA education positively correlated with superior bank performance, with CEOs holding MBAs from top-ranked institutions driving stronger results, particularly when following riskier or innovative business models. The study also found that CEOs with higher MBA scores were more responsive to risk-taking incentives in their compensation packages, especially those related to stock volatility. This aligns with broader findings that business-educated CEOs effectively navigate complex business environments and are more adept at leveraging high-risk strategies to enhance profitability. The robustness of these findings was reinforced through various checks, including alternative performance measures and adjustments for compensation structures. The study suggests that educational background, particularly MBA qualifications, plays a crucial role in shaping CEO impact on firm outcomes in complex, deregulated sectors like banking (King et al., 2016).

Another study investigating higher education and its effect on firm performance found little to no impact when compared to executives without master's degrees or higher (Gottesman & Morey, 2006). This study examines the impact of CEO education, whether they have obtained an undergraduate or graduate degree—on firm performance and CEO compensation among NYSE-listed companies. The researchers evaluate CEO educational attainment by categorizing whether CEOs possess advanced degrees, such as MBAs, law degrees, or other types of graduate education. Using regression analyses, the study investigates how CEO education level, regardless of the institution's prestige, correlates with firm performance metrics like Tobin's Q and Return on Assets (ROA).

The findings reveal that holding a graduate degree, specifically an MBA or law degree, does not significantly improve firm performance compared to CEOs without these degrees. In fact, there was limited evidence suggesting that CEOs with other types of graduate degrees—likely in technical fields—may contribute to slightly better risk-adjusted market performance, potentially due to a stronger focus on research and development. In terms of compensation, however, CEOs with higher educational attainment, particularly those with graduate degrees, are generally able to secure higher salaries. These results suggest that while higher education might help CEOs negotiate better compensation, it has minimal or inconsistent effects on firm performance, implying that companies should be cautious about emphasizing graduate degrees when selecting CEOs if improved performance is the main objective.

The two studies offer contrasting conclusions about the impact of higher education on CEO effectiveness and firm performance, largely due to differences in sample focus, sector context, and methodological approach. The first study by King et al. (2016) examined CEOs in the banking sector, a field known for its complexity and regulatory challenges, and found a

positive correlation between MBA education and bank performance. By constructing a "CEO Education Index" and employing factor analysis, King et al. could differentiate the effects of various educational levels on performance. Additionally, they applied propensity score matching and controlled for endogeneity, ensuring that CEO-firm matching biases were minimized. This approach, paired with the sector's focus on risk management and strategic adaptability, may explain why MBA-trained CEOs, particularly those from prestigious institutions, were linked to better outcomes in the banking sector. Their ability to navigate complex and high-risk strategies likely resonated in an industry that demands frequent adjustments to regulatory and market shifts.

In contrast, the study by Gottesman and Morey (2006) examined CEOs across NYSE-listed companies without focusing on any particular industry, which may have diluted the influence of education in specific contexts where it matters more, such as banking or tech. This study used a broader regression analysis to assess the impact of CEO educational attainment on general performance metrics like Tobin's Q and ROA but found no significant advantage for CEOs with MBAs or law degrees compared to those without. The lack of a sector-specific lens could explain these findings, as general firm performance might be less sensitive to education in sectors where technical expertise or adaptive management skills (not directly related to formal education) hold more weight. Furthermore, Gottesman and Morey's findings that graduate degrees did not consistently correlate with firm performance imply that an MBA or similar qualifications may not universally benefit all industries. This difference suggests that educational background may be contextually relevant, benefiting CEOs in sectors that require specialized financial or strategic expertise, while being less critical in others.

The last demographic that this study will investigate is professional certification, a critical but underexplored factor in understanding firm performance. Certifications like the Certified Public Accountant (CPA) and Chartered Financial Analyst (CFA) signify advanced expertise in accounting, finance, and risk management, areas that are crucial for effective corporate governance and financial decision-making. While there is extensive research on the impact of externally imposed or obtained certifications—such as ISO, HTE or HACCP certifications—on firm performance (Cândido & Ferreira, 2021; She et al., 2021; Liu et al., 2021), there is a gap in the literature regarding the effects of individual professional certifications on firm performance.

One of the few studies in this area, focusing on Chief Financial Officer (CFO) characteristics, found that CFOs holding CPA certifications are less likely to restate earnings, the process of revising a company's financial statements for reasons such as accounting mistakes or noncompliance with generally accepted accounting principles. They are more inclined to employ conservative financial practices, reduce firm risk, and improve reporting accuracy (Aier et al., 2005). This study examines the relationship between Chief Financial Officer (CFO) characteristics and the likelihood of financial restatements, using data on restatements filed with the SEC from 1997 to 2002. The sample includes 456 firms, split equally between 228 restating and 228 non-restating companies, matched by size, industry, and year of the accounting error. The researchers employed a logistic regression model where the dependent variable is a binary indicator for restatement status. CFO characteristics analyzed include years of experience, experience at another company, possession of an MBA, and CPA certification, alongside control variables related to firm financials. These controls accounted for factors influencing earnings

management, such as external financing needs, earnings per share growth, and leverage, based on prior studies that established their relevance to financial reporting behaviors.

The findings reveal that CFOs with MBAs, CPA certifications, and longer tenure as CFOs are significantly less likely to be associated with restatements, highlighting a link between professional qualifications and reduced restatement risks. The study also found that restating companies are generally smaller, less profitable, and have lower market valuations than their non-restating counterparts, though these differences were not statistically significant. Interestingly, high leverage was marginally associated with a greater likelihood of restatements, aligning with previous studies on leverage as a restatement determinant. However, experience at other companies showed no significant impact, suggesting a limited influence of external experience on financial reporting quality. The results suggest a potential protective effect of financial expertise in CFOs against financial restatements but caution that the data may not clarify whether inexperienced CFOs cause restatements or whether struggling companies attract less experienced CFOs.

In light of the growing recognition of executive demographics as a driver of firm success, this review underscores the motivation to explore how gender diversity, advanced education, and professional certification contribute to corporate performance. Although the literature presents mixed findings on each factor's effect, the ongoing inclusion of diverse perspectives and skillsets in leadership holds promise for influencing firms' adaptability and innovation in competitive markets. This study aims to build on this foundation, investigating the nuanced roles these characteristics have, individually and in combination, thereby offering a richer understanding of how they shape firm outcomes and inform future approaches to board composition and executive recruitment.

3. Methods

This study investigates the effect of female board representation on two measures of firm performance, Return on Assets (ROA) and Tobin's Q, utilizing a dataset of publicly listed U.S. firms from 2006 to 2015. The sample was filtered to exclude financial and utility firms due to their unique regulatory environments and liability exposures. Companies without complete data on the presence of female directors with Certified Public Accountant (CPA) qualifications were also removed, resulting in a final sample size of 1,900 firms. This study draws from the dataset created by Yami and Alshurafat (2024), which includes board composition and financial data from sources such as Compustat and BoardEx.

Ordinary least squares (OLS) regression was used to analyze the data, with standard errors clustered by firm to address potential correlations within firms over time. Clustering the standard errors by firm accounts for firm-specific factors that might bias the error terms, enhancing the robustness of the model. Regression analyses were conducted separately for ROA and Tobin's Q, allowing a comparison of the effects of female board representation on operational efficiency (ROA) versus market valuation (Tobin's Q).

Two regression models were estimated. The ROA model analyzed the effect of FemaleDirectorsNumber, FCPA, FMPHD, and their interaction terms on ROA, controlling for Firm Growth, Firm Size, Firm Age, Capital Expenditures, Leverage, and Board Size. Tobin's Q model examined the same set of predictors and controls as in the ROA model but used Tobin's Q as the dependent variable. Each model's results were summarized in Table 1, which includes coefficients, standard errors, and significance levels for each predictor. The focus on these

models provides insight into the differential impacts of female board representation and qualifications on various dimensions of firm performance.

4. Analysis and Results

This analysis examines the effect of female board representation on two financial performance measures, Return on Assets (ROA) and Tobin's Q, while controlling for Firm Growth, Firm Age, Firm Size, Capital Expenditures, Board Size, and Leverage. Table 1 presents the regression results for the ROA and Tobin's Q dependent variables, showing the coefficients, standard errors, and statistical significance of each predictor. The models were assessed using ordinary least squares (OLS) regression, with standard errors clustered by firm to account for any firm-specific effects. The statistical model has been adjusted to recognize that observations from the same firm might be more similar to each other than to observations from different firms. This approach, called "clustering standard errors," helps to correct for possible correlations within each firm's data over time or across observation.

There were 11 variables examined in this study: two dependent variables, three independent variables, and six control variables. The two dependent variables are ROA and Tobin's Q. ROA is net income before extraordinary items to total assets. Tobin's Q is total assets minus equity plus the market value of equity over total assets. The three independent variables are the number of women on the board overall (FemaleDirectorsNumber), the number of women on the board who are a Certified Public Accountant (FCPA) and the number of women who hold a master's degree or higher (FMPHD). Lastly, the six control variables are Firm Growth, Firm Size, Firm Age, Leverage, Capital Expenditures, and BoardSize. FirmGrowth is the percentage growth between year t and t-1. Firm Size (FirmSize) is the logarithm of total assets. Firm Age

(FirmAge) is the number of years of total assets reported by Compustat since 1977. Leverage is total liabilities to total assets. Capital expenditures (CapitalExp) is total capital expenditures (money spent by a business or organization on acquiring or maintaining fixed assets, such as land, buildings, and equipment) scaled by total assets. Board Size (BoardSize) is the logarithm of the total number of directors on the firm's board. Additionally, two interaction terms were included. The first term looks at how the effect of the number of female directors on ROA and Tobin's Q might vary depending on whether those directors have CPA certifications (FemaleDirectorsNumber:FCPA). The second term examines whether the impact of female directors on the outcome variables changes if the female directors also have a master's degree or PHD (FemaleDirectorsNumber:FMPHD).

The variables used are from the dataset described in the article *Gender diversity, corporate governance and firm-specific data of all public listed US firms during 2000–2019* by Nafisah Yami and Hashem Alshurafat (2024). This dataset covers all publicly listed companies in the United States from 2000 to 2018 which are listed in the S&P index. The starting point of 2000 is due to the minimal data available in the BoardEX database before this time in relation to board directors' information. Compustat is the source of financial data. As previous research indicates, financial and utilities firms are excluded from the sample due to their distinct regulations, which expose their directors to liability risks that non-financial firms are not subject to (Adams and Mehran, 2012; Sila et al., 2016). Due to missing year data, for the purpose of this study, it has been edited to include companies' that had data from the years 2006-2015. Also due to interest in the number of women with a CPA, all companies that did not have data for that variable were excluded. After editing the sample size used in this study was 1900.

4.1 Table 1: Return on Assets and Tobin's Q

	Regression Results for ROA and Tobin's Q	
	<i>Dependent variable:</i>	
	ROA (1)	TobinQ (2)
FemaleDirectorsNumber	-0.001 (0.004)	0.031 (0.046)
FCPA	-0.019*** (0.007)	0.033 (0.073)
FMPHD	-0.010 (0.007)	-0.021 (0.074)
FirmGrowth	0.078*** (0.011)	1.283*** (0.116)
FirmAge	0.001 (0.001)	0.029*** (0.007)
Leverage	-0.068*** (0.012)	-0.884*** (0.127)
FirmSize	0.003* (0.002)	-0.035** (0.017)
CapitalExp	0.155*** (0.040)	0.673 (0.425)
BoardSize	0.039*** (0.011)	0.263** (0.115)
FemaleDirectorsNumber:FMPHD	0.004 (0.003)	0.017 (0.030)
FemaleDirectorsNumber:FCPA	0.005* (0.003)	-0.017 (0.028)
Constant	-0.014 (0.032)	0.887*** (0.343)
Observations	1,900	1,900
R ²	0.072	0.110
Adjusted R ²	0.067	0.105
Residual Std. Error (df = 1888)	0.083	0.895
F Statistic (df = 11; 1888)	13.389***	21.259***
<i>Note:</i>	* p<0.1; ** p<0.05; *** p<0.01	

4.2 Variables of Interest

The main independent variables in this study include number of women on the board overall, the number of women on the board who are a Certified Public Accountant (CPA) and the number of women who hold a master's degree or higher. Also of interest were the two interaction terms described above. These variables aim to explore not only the individual effect of gender diversity in board composition but also the potential moderating effect of specialized qualifications among female directors.

The number of female directors on the board was not statistically significant in either model, suggesting that the presence of female directors, in and of itself, does not have a strong impact on ROA or Tobin's Q. While previous studies have indicated mixed results regarding gender diversity's effect on firm performance, the findings here suggest that mere numbers may not translate directly into higher firm performance.

It was found that female directors with a CPA in the ROA model exhibited a significant negative effect ($p < 0.01$). This could suggest that, contrary to some assumptions, female directors with a CPA designation might not contribute positively to ROA, potentially due to conservative accounting practices often associated with CPAs (Chi et al., 2009). In the Tobin's Q model, however, the female directors with a CPA coefficient was not statistically significant. These results align with the study previously mentioned in the review of literature in which ROA was decreased with the addition of women on the board and found the results of the effect on Tobin's Q to be statistically insignificant (Casteuble et al., 2023).

The number of women on the board with a master's degree or higher was not statistically significant in either model, suggesting that the presence of female directors with doctoral qualifications does not have a notable impact on ROA or Tobin's Q. This result aligns with some

literature suggesting that higher education qualifications alone may not influence performance metrics directly (Gottesman & Morey, 2006).

The interaction between the number of female directors and those with PhDs was not statistically significant in either model, indicating no observed moderating effect of PhD qualifications on firm performance through ROA or Tobin's Q. This interaction term was marginally significant in the ROA model ($p < 0.1$), suggesting a weak positive effect. This indicates a slight interaction effect between the number of female directors and those with CPA credentials on ROA, though the effect is relatively minor. Again, this is potentially due to conservative accounting practices often associated with women who are CPAs (Chi et al., 2009).

4.3 Control Variables

Control variables in the analysis were chosen to account for other firm characteristics that might influence ROA and Tobin's Q. These include Firm Growth, Firm Age, Firm Size, Capital Expenditures, Board Size, and Leverage. Firm growth was highly significant ($p < 0.001$) and positively associated with both ROA and Tobin's Q, indicating that growing firms tend to have higher performance metrics. This is consistent with the literature suggesting that growth opportunities are closely related to improved financial performance (Jang & Park, 2011).

Firm age was positively associated with both ROA and Tobin's Q in the Tobin's Q model, reflecting the idea that older firms may benefit from experience and market presence (Mansikkamäki, 2023). However, it was not significant in the ROA model, suggesting that age alone might not directly impact operational efficiency as measured by ROA. Firm size had a significant positive effect on ROA but a significant negative effect on Tobin's Q. This outcome may reflect economies of scale that benefit operational efficiency (ROA) yet indicate potential

market concerns regarding firm growth limitations associated with size in the Tobin's Q model (Mansikkamäki, 2023).

Capital expenditures were significant only in the ROA model, showing a positive effect, which suggests that investment in long-term assets can contribute to improving operational performance. This is in accordance with a study done on Albanian construction firms which found capital expenditures have a positive correlation to financial performance, also measured by ROA (Taipi & Ballkoci, 2017). Leverage represents the firm's debt levels relative to its equity, indicating financial risk and capital structure. Leverage is significantly negative in both models, suggesting that higher debt levels are associated with poorer financial performance and lower market valuation. This is in agreement with a study done analyzing Albanian firms in the construction sector, finding that an improved leverage ratio (lower debt to equity) will improve firm performance (Taipi & Ballkoci, 2017).

Board size had a positive and significant effect on both ROA and Tobin's Q, suggesting that larger boards, potentially due to a wider diversity of perspectives and expertise, contribute to better overall firm performance. This control variable was chosen based on a 1999 study in which it was found that the performance of a company improves if the board size increases, but the contribution of an additional board member decreases as the size of the corporation increases. This study also used ROA as a measure of profitability (Kathuria & Dash, 1999).

4.4 Summary of Findings

The results indicate that while firm growth, leverage, and board size are significant contributors to firm performance, the mere presence of female directors or female directors with advanced qualifications does not necessarily enhance ROA or Tobin's Q. Notably, the control

variables exhibit the expected effects, with firm growth and leverage acting as strong positive and negative predictors, respectively. Future research could further investigate the moderating effects of gender diversity with a focus on board dynamics rather than individual qualifications alone.

5. Conclusion

This study examined the effect of female board representation on firm performance, specifically focusing on Return on Assets (ROA) and Tobin's Q. The research sought to determine whether the presence of female directors, particularly those with specific qualifications such as Certified Public Accountants (CPAs) or advanced degrees, influences firm performance. The analysis utilized ordinary least squares (OLS) regression with clustered standard errors to account for firm-specific effects, while controlling for various factors including firm growth, age, size, leverage, capital expenditures, and board size.

The results revealed that neither the overall number of female directors nor their qualifications (CPA certifications or advanced degrees) showed a significant or consistent positive impact on ROA or Tobin's Q. Specifically, female directors with CPA qualifications were associated with a negative effect on ROA, which may reflect the conservative accounting practices typically associated with CPAs, potentially limiting profit-maximizing strategies. However, no significant relationship was found between female directors with a CPA qualification and Tobin's Q, suggesting that the market does not assign value to these conservative practices. Likewise, female directors holding advanced degrees did not exhibit any significant impact on either ROA or Tobin's Q, suggesting that higher education alone does not necessarily translate into improved firm performance.

These findings challenge the assumption that gender diversity or additional qualifications automatically lead to better financial outcomes, and they contribute to the literature by suggesting that the effect of female board representation is more complex than previously thought. While some prior studies have indicated positive effects of gender diversity on firm performance, this study shows that these effects may not be universal and could be contingent on other factors such as the role of female directors within the organization or the specific characteristics of the firms in question. This underscores the importance of considering the broader context when examining the relationship between gender diversity and firm performance.

The results also open the door for future research. Future studies could delve deeper into the dynamics of board composition, particularly how female directors' roles and experiences interact with overall board decision-making and firm performance. Additionally, exploring the effect of gender diversity across different firm types, industries, and geographical contexts could provide more comprehensive insights into the conditions under which gender diversity has a meaningful impact. Examining the role of board dynamics and corporate culture in shaping the effects of gender diversity on performance would also be a valuable avenue for future inquiry.

For practitioners, these findings suggest that gender diversity initiatives should be reevaluated. Rather than focusing solely on increasing the number of female directors, it may be more effective to prioritize selecting directors whose qualifications and expertise align with the firm's strategic goals. This approach could potentially lead to more meaningful improvements in firm performance, as opposed to relying solely on diversity metrics.

In conclusion, this study provides a nuanced understanding of the relationship between female board representation and firm performance. Incorporating the qualifications of female

directors contributes to a more detailed discussion of the factors influencing board dynamics and performance outcomes. The results suggest that while gender diversity is an important aspect of corporate governance, its impact on financial performance may depend on a variety of factors, including the specific qualifications and roles of directors. Future research could further explore these dynamics to refine the understanding of how gender diversity can effectively contribute to firm success.

6. References

Adams, R. B., & Mehran, H. (2012). Bank board structure and performance: Evidence for large bank holding companies. *Journal of Financial Intermediation*, 21(2), 243–267. <https://doi.org/10.1016/j.jfi.2011.09.002>

Aier, J. K., Comprix, J., Gunlock, M. T., & Lee, D. (2005). The Financial Expertise of CFOs and Accounting Restatements. *Accounting Horizons*, 19(3), 123–135. Business Source Complete. <https://web.p.ebscohost.com/ehost/detail/detail?vid=0&sid=5437761c-0f17-42e3-bce6-88329f013658%40redis&bdata=#db=bth&AN=18236575&anchor=AN0018236575-11>

Anderson, E. W., Fornell, C., & Mazvancheryl, S. K. (2004). Customer satisfaction and shareholder value. *Journal of Marketing*, 68(4), 172–185. <https://doi-org.coloradocollege.idm.oclc.org/10.1509/jmkg.68.4.172.42723>

A. Khan, W., & Paulo Vieito, J. (2013). CEO gender and firm performance. *Science Direct*. https://www.sciencedirect.com/science/article/pii/S014861951300012X?casa_token=dnFN1LbmHb0AAAAA:2V6A64h7z7pNk1MOnyecMwhHnZLS6dfaYJY1Br-n6m7Npln2Z_SfkqeoFrc5uO1BdVxMyRT5Vw

Bhagat, S., & Bolton, B. (2008). Corporate governance and firm performance. *Journal of Corporate Finance*, 14(3). Science Direct. <https://www-sciencedirect-com.coloradocollege.idm.oclc.org/science/article/abs/pii/S0929119908000242>

Cândido, C. J. F., & Ferreira, L. M. F. R. (2021). Determinants of expected performance after ISO 9001 certification withdrawal. *Total Quality Management & Business Excellence*, 33(15/16), 1–27. Business Source Complete. <https://doi.org/10.1080/14783363.2021.1997142>

Casteublea, C., Lepetitb, L., & Tran, T. H. (2023). Board gender quotas: can women realistically boost firm performance? *Association Francaise de Finance France*, 44(1). Business Source Complete.

Chi, W., Liu, C., & Wang, T. (2009). What affects accounting conservatism: A corporate governance perspective. *Journal of Contemporary Accounting & Economics*, 5(1), 47–59.
<https://doi.org/10.1016/j.jcae.2009.06.001>

Desvaux, G., Devillard, S., Labaye, E., Sancier-Sultan, S., Kosseff, C., & Zelicourt, A. (2017). Women matter: Time to accelerate. Ten years of insights into gender diversity.
<https://www.mckinsey.com/>

Doan, T., & Iskandar-Datta, M. (2021). Does Gender in the C-Suite Really Matter? *Journal of Accounting, Auditing & Finance*, 36(1). Business Source Complete.

Fry, R. (2022, September 26). Women now outnumber men in the U.S. college-educated labor force. *Pew Research Center*. <https://www.pewresearch.org/short-reads/2022/09/26/women-now-outnumber-men-in-the-u-s-college-educated-labor-force/>

Gröschl, S., & Arcot, S. (2014). Female hospitality executives and their effects on firm performance. *Tourism and Hospitality Research*, 14(3), 143–151.
<http://www.jstor.org/stable/43575093>

Hambrick, D. C., & Mason, P. A. (1984). Upper Echelons: The Organization as a Reflection of Its Top Managers. *The Academy of Management Review*, 9(2), 193–206.
<https://doi.org/10.2307/258434>

Jang, S. (Shawn), & Park, K. (2011). Inter-relationship between firm growth and profitability. *International Journal of Hospitality Management*, 30(4), 1027–1035.
<https://doi.org/10.1016/j.ijhm.2011.03.009>

Kathuria, V., & Dash, S. (1999). Board Size and Corporate Financial Performance: An Investigation. *Vikalpa: The Journal for Decision Makers*, 24(3), 11–17.
<https://doi.org/10.1177/0256090919990303>

King, T., Srivastav, A., & Williams, J. (2016). What's in an education? Implications of CEO education for bank performance. *Journal of Corporate Finance*, 37. Science Direct.
<https://www-sciencedirect-com.coloradocollege.idm.oclc.org/science/article/abs/pii/S0929119916000043?via%3Dihub>

Lorenzo, R., Voigt, N., Tsusaka, M., Krentz, M., & Abouzahr, K. (2018, January 23). How diverse leadership teams boost innovation. *BCG Global*.
<https://www.bcg.com/publications/2018/how-diverse-leadership-teams-boost-innovation>

Liu, F., Rhim, H., Park, K., Xu, J., & Lo, C. K. Y. (2021). HACCP certification in food industry: Trade-offs in product safety and firm performance. *International Journal of Production Economics*, 231, 107838. Business Source Complete. <https://doi.org/10.1016/j.ijpe.2020.107838>

Mansikkamäki, S. (2023). Firm growth and profitability: The role of age and size in shifts between growth–profitability configurations. *Journal of Business Venturing Insights*, 19, e00372. <https://doi.org/10.1016/j.jbvi.2023.e00372>

Mukherjee, T., & Sen, S. S. (2022). Impact of CEO attributes on corporate reputation, financial performance, and corporate sustainable growth: evidence from India. *Financial Innovation*, 8(1). <https://doi.org/10.1186/s40854-022-00344-7>

Schaeffer, K. (2023, September 27). The Data on Women Leaders. *Pew Research Center's Social & Demographic Trends Project*. <https://www.pewresearch.org/social-trends/fact-sheet/the-data-on-women-leaders/#fortune-500-ceos>

She, M., Wang, Y., & Hu, D. (2021). Effect of HTE certification on external resource acquisition and firm performance: evidence from China. *Technology Analysis & Strategic Management*, 34(6), 1–16. <https://doi.org/10.1080/09537325.2021.1915475>

Sila, V., Gonzalez, A., & Hagendorff, J. (2016). Women on board: Does boardroom gender diversity affect firm risk? *Journal of Corporate Finance*, 36(0929-1199), 26–53.

Taipei, E., & Ballkoci, V. (2017). Capital Expenditure and Firm Performance Evidence from Albanian Construction Sector. *European Scientific Journal*, *ESJ*, 13(28), 231. <https://doi.org/10.19044/esj.2017.v13n28p231>

The Rise of Women Executives | Washington State University. (n.d.). *Onlinemba.wsu.edu*. <https://onlinemba.wsu.edu/blog/the-rise-of-women-executives>