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The rationale behind the glass cliff - Are female executives better leaders than male executives during economic crisis times?

Evidence from large public US firms

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Preface

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Abstract

This thesis delves into the rationale behind the glass cliff phenomenon, which refers to firms' tendency to promote women to top leadership positions in times of crisis. The study analyzed the impact of a higher share of females on the executive board on key strategic decisions, firm performance and cumulative abnormal returns (CARs) of acquisition and equity issuance announcements during economic crisis times using a large sample of public US firms from 1993 to 2021. Additionally, the study examined the difference in executive turnover rates between genders and roles during an economic crisis.

The findings of this thesis substantiate the rationale behind the glass cliff, indicating that it is strategically advantageous to maintain a higher proportion of female representation on the executive board during an economic crisis, supported by a set of robustness tests. Firms with a higher fraction of female executives have higher quick ratios, make fewer acquisitions, and enjoy higher Tobin's Q valuations. Additionally, female CEOs and CFOs are less likely than males to experience a turnover during an economic crisis, which confirms the "think crisis – think female" phenomenon. However, the fraction of female executives does not seem to influence the abnormal returns of acquisitions and equity issuances announced during an economic crisis.

Keywords: Corporate governance, corporate policies, crisis management, financing policies, gender diversity, mergers and acquisitions, overconfidence

JEL Classification: G01, G30, G32, G34, J16

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List of abbreviations

Capex	Capital expenditures
CAR	Cumulative abnormal return
IMR	Inverse Mills ratio
IV	Instrumental variable
PPE	Property, plant, and equipment
ROA	Return on assets
SIC	Standard industrial classification
WRDS	Wharton Research Data Services

1. Literature review

This section provides an overview of the relevant literature and theory covering the glass cliff phenomenon, male and executive overconfidence, and its impact on firms during economic crisis times. In addition, the expected results and hypotheses are presented.

1.1. The glass cliff Phenomenon

Although society has significantly advanced women's participation in executive boards worldwide, their representation in such positions is still considerably low. As of 2023, women held only eight percent of CEO positions in the S&P 500, although they comprise over fifty percent of the US population (Huerta, 2024). This phenomenon is known as the glass ceiling, which describes a perceived barrier preventing women from advancing to top leadership positions despite an increasing number of women entering prestigious industries, professions, and managerial positions (Acker, 2009). Nevertheless, research has observed that women are more likely to rise above the glass ceiling and reach top positions in precarious situations, a phenomenon referred to as the glass cliff. In other words, the glass cliff indicates that firms tend to promote women to top positions in times of crisis or poor performance. (Bechtoldt et al., 2019).

There are several explanations for the rationale behind the glass cliff provided by academic literature. Ryan et al. (2016) stated a few reasons in their paper that reviewed a decade of research into this phenomenon. One major reason why women are preferred in crisis times may be due to gender stereotypes. While women tend to be perceived as communal (e.g., warm, good-natured, understanding, and caring), more skilled in balancing risks, and more pragmatic when dealing with failure (Ryan et al., 2007), males are seen as agentic (e.g., competent, independent, competitive, and confident). Such male stereotypes are more aligned with the stereotypes about a good leader than the stereotypically feminine traits, which might explain why males are regarded as more suitable leaders than females, a phenomenon called “think manager - think male”. However, in times of crisis, preferred leader attributes may change, which may result in increased demand for commonality, a stereotype often associated with women, which creates the “think crisis – think female” association. Both “think manager – think male” and “think

crisis – think female" associations have also been supported by experimental research by Bruckmüller and Branscombe (2010) that showed that in crisis times, participants preferred female leaders due to their stereotypically feminine traits, while in successful companies, male candidates were favoured due to their masculine traits.

Additionally, Ryan et al. (2016) proposed that crisis times, which involve substantial uncertainty, encourage organizations to explore new approaches or challenge the status quo, which, as a result, may promote a desire for change in management and a preference for female leaders if having male executives is the standard leadership practice in non-crisis times. Moreover, Ryan et al. (2016) asserted that the glass cliff may be present due to the preferences and decisions of women themselves. For instance, females may be more likely than men to accept leadership roles during crises due to the glass ceiling limiting their opportunities to attain top positions. Finally, another experimental study by Ryan et al. (2011) suggested that the preference towards women in crisis times is not solely attributed to their abilities to improve company performance but rather because they are viewed as suitable scapegoats or because they are perceived to have the appropriate skills to manage people during a crisis.

The first to present empirical evidence for the glass cliff phenomenon were Ryan and Haslam (2005), who found in their UK-based study that during a stock market downturn, firms that appoint women to their board of directors face poorer performance in the months before their appointment. Further archival research has shown that the glass cliff phenomenon extends beyond the UK. For instance, a study by Brady et al. (2011) of US Fortune 500 companies examined their board composition from 2001 to 2005 and found a positive association between the likelihood of female board members being present and declining accounting performance or organizational scandals in the year of the appointment. Similar results were obtained by Elsaid and Ursel (2018) in their analysis of CEO transitions in a broad set of North American firms between 1992 and 2014. By the same token, Cook and Glass (2014) conducted a study of Fortune 500 companies over 15 years and found that occupational minorities, which they defined as white women and men and women of colour, were more likely than white men to be promoted to CEO positions of weakly performing firms, which provides additional support for the glass cliff.

On the other hand, although the existence of the glass cliff has been empirically confirmed, not all studies support the validity of this phenomenon. Studies such as Bechtoldt et al. (2019) claimed that some of the previous research had not handled endogeneity concerns appropriately, and by controlling for omitted variables and exploring executives other than CEOs, the authors found no evidence for a glass cliff in the German and UK markets. Likewise, Adams et al. (2009) analyzed firms' market-based performance (measured by raw and market-adjusted returns) during the 120 trading days prior to CEO appointments in US companies over the period 1992 to 2004 and found that female CEO appointments were preceded by higher (instead of lower) stock returns than male appointments, and found no evidence of gender differences when looking at objective, accountancy-based measures of company performance, such as return on assets (ROA). However, they highlighted that additional research is needed to explore where and for what types of positions this phenomenon is prevalent, as their study did not examine the possibility that women could be promoted to CEO positions through high-risk situations. Partly consistent results were revealed by Haslam et al. (2010), who analyzed the presence of women on the boards of FTSE 100 firms from 2001 to 2005 and found no relationship between women's presence on boards and accounting-based measures of performance but a negative relationship with subjective stock-based performance measures.

1.2. Executive overconfidence

The term overconfidence has several manifestations. Malmendier and Tate (2005) described overconfidence as the individuals' tendency to overestimate their skills relative to the average, also known as the "better-than-average" effect. Ben-David et al. (2013) suggested that miscalibration, or overprecision, is another manifestation of overconfidence, defined as excessive confidence about having accurate information, which results in underestimation of the volatility of their firm future cash flows. Thus, overconfident executives believe they can control their projects' outcomes, tend to underestimate the likelihood of a failure and overestimate their company's value. As a result, they are less likely to issue equity, as they find external funding too expensive, tolerate high leverage as they underestimate the risk involved with leverage (Ben-

David et al., 2013), overinvest if they have sufficient internal funds (Malmendier & Tate, 2005), which implies lower liquidity levels, and engage in more acquisitions (Malmendier & Tate, 2008).

Literature provides evidence that men tend to be more overconfident than women. For example, Barber and Odean (2001) researched the online trading behaviours of men and women as a measure of overconfidence and found that men trade nearly one and a half times more actively than women, which supports male overconfidence. Their explanation for the results is that overconfidence leads men to overestimate the precision of their information and the expected gains from trading, resulting in more frequent online trading. In the context of executive overconfidence, Huang and Kisgen (2013) found that male CEOs and CFOs are more overconfident in their corporate decision-making than female executives by conducting several analyses. Among others, they observed that female executives are associated with lower leverage, male executives engage in more acquisitions and debt issuances, and that such decisions announced by firms with male executives resulted in lower announcement returns than those undertaken by firms with female executives.

1.3. Male executive overconfidence in crisis times

Ho et al. (2016) found in their analysis of the banking industry during the Global Financial Crisis that managerial overconfidence is associated with lower performance during the crisis as overconfident executives pursue more aggressive strategies that increase their firm's vulnerability to the crisis. Chen et al. (2019) added to the findings of Ho et al. (2016) and discovered that higher representation of females on the board of directors reduced the negative impact of the Global Financial Crisis on firm performance, as firms with higher representation of females adopted less aggressive strategies that made them less vulnerable to the crisis. Taken together with the results of Huang and Kisgen (2013), who provided empirical evidence that male executives are more overconfident relative to female executives in strategic corporate decisions, these papers support the idea that executive overconfidence is suboptimal during an economic crisis and that male executives tend to be more overconfident relative to their female counterparts, suggesting that,

on average, male executives, who are more overconfident relative to female executives, are less skilled in leading firms during economic crisis times.

1.4. Current gap in the literature

There has been relatively extensive research on the validity of the glass cliff phenomenon, male executive overconfidence, and its implication on decision-making. Nonetheless, current literature lacks insights into the relationship between the presence of females on executive boards and consecutive firm profitability and key corporate decisions and policies during times of economic crisis. Hence, this thesis aims to fill this gap in the literature and test the rationale behind the idea of the glass cliff by analyzing the impact of a higher fraction of female executives on key strategic decisions as well as on accounting and stock-based returns in economic crisis times, with additional instrumental variable analysis, Heckman selection model and placebo tests for robustness. Additionally, the thesis explores the difference in executive turnover rates between genders during crisis times as an indication of how female leaders are perceived in crisis management compared to their male counterparts using the bivariate probit model.

This thesis aims to address this gap in the literature by covering three major areas. In the first part, the study examines the impact of the fraction of female executives on five key strategic corporate decisions, objective accounting-based performance (using ROA), and subjective stock-based performance (using Tobin's Q). This part explores whether firms with a higher proportion of women on the executive boards are even more cautious in their decision-making in times of an economic crisis and studies whether hiring more female executives during an economic crisis positively influences firm returns, which would support the rationale behind the glass cliff. The strategic decisions included are the annual level of debt and equity issuance, leverage, liquidity preference (measured by quick ratio), and acquisitions. In the second part, the thesis analyzes whether the announcement abnormal returns of acquisitions and equity issuances made by executive boards with a higher share of female executives are higher in crisis times to examine whether the market reacts more positively to decisions made by such boards during crisis times.

In the third part, the study researches whether the turnover of male executives is higher than female executives during economic crisis times, as a higher turnover of males would indicate that females are better at crisis management.

1.5. Expected results based on literature

In line with the findings of Ho et al. (2016), Chen et al. (2019), and Huang and Kisgen (2013) on male overconfidence during crisis times, I expect firms with female executives to have higher accounting and stock-based profitability during an economic crisis and to be less risky than men when it comes to significant strategic and financial decisions. Therefore, I expect firms with a higher share of female executives to issue less debt and more equity, have lower leverage, make fewer acquisitions, and hold higher liquidity positions during such turbulent times. The reason is that male executives, who are, on average, more overconfident than female executives (Huang & Kisgen, 2013), may overestimate their abilities to handle the crisis by taking a higher risk than female executives. My expectations on strategic decisions are also supported by the findings of Malmendier and Tate (2005), who revealed that overconfident CEOs tend to overinvest when they have enough internal funds. This behaviour should lead to lower liquidity levels and more acquisitions (the latter is also supported by Malmendier and Tate (2008)). At the same time, such overconfident CEOs are reluctant to issue new equity since they perceive their firm's stock as undervalued by the market.

Additionally, consistent with the findings of Huang and Kisgen (2013) on market reactions, I expect the announcement CARs of acquisitions and equity issuances of firms led by female executives to be higher than those made by male executives in crisis times. The reason is that if the market perceives female executives as better managers during an economic crisis, it should react more positively to events and decisions made by firms with a higher fraction of female executives. Finally, consistent with the glass cliff phenomenon, I expect the turnover of male executives to be higher than female executive turnover during times of economic crisis.

1.6. Research hypotheses

As explained above, this thesis aims to research two main hypotheses:

H1: An economic crisis influences the relationship between the executive board composition and the firm's strategic decisions, announcement returns and performance, such that:

> *H1a: Companies with a higher fraction of female executives issue less debt during an economic crisis.*
>
> *H1b: Companies with a higher fraction of female executives issue more equity during an economic crisis, and these issuance announcements are associated with higher CARs.*
>
> *H1c: Companies with a higher fraction of female executives have lower leverage during an economic crisis.*
>
> *H1d: Companies with a higher fraction of female executives have higher quick ratio levels during an economic crisis.*
>
> *H1e: Companies with a larger fraction of female executives engage in fewer acquisitions during an economic crisis, and these acquisition announcements are associated with higher CARs.*
>
> *H1f: Companies with a higher fraction of female executives experience higher ROA during an economic crisis.*
>
> *H1g: Companies with a higher fraction of female executives experience a higher Tobin's Q valuation during an economic crisis.*

H2: Female executives are less likely than male executives to experience a turnover during an economic crisis.

2. Data and summary statistics

The dataset comprises a large sample of listed US firms accessible via ExecuComp through Wharton Research Data Services (WRDS). The executive data was retrieved from 1993, when the data became available, to 2021. The following executive data were collected on ExecuComp: the executive's gender, unique firm-executive identifier, an indication of whether the executive role was CEO or CFO, and the CUSIP of the executive's firm. The financial firm data was retrieved from Compustat, which is also available on WRDS. The financial firm data from Compustat needed for the analysis is the firm's CUSIP, year, annual level of acquisitions, equity and debt issuance, current assets, inventories and current liabilities (to compute the quick ratio), total revenues and total assets (to determine ROA), and all financial data used for computing the control variables in the analysis. After collecting and sorting both the executive and financial-firm datasets, I merged them using a unique CUSIP-year identifier using a 1:m merger. The acquisition and equity issuance announcement data was collected from Securities Data Company (SDC) Platinum. To determine the market response to equity issuances and acquisitions, I used the market-adjusted CARs around the 3-day window of the events' announcement dates, as done by Huang and Kisgen (2013), which was calculated using the US event study tool available on WRDS.

Furthermore, I adjusted the datasets to ensure more reliable and representative results. First, I excluded firms with book assets below 500m USD and financial firms from the datasets (Standard Industrial Classification (SIC) codes between 6000 and 6999), consistent with the approach of Huan and Kisgen (2013). In addition, I excluded firm-years with over twelve executive members and below two members to remove outliers. Furthermore, as proposed by Huang and Kisgen (2013), I only included executives who served for at least three years (the year he or she was hired and two years following) to ensure that they had sufficient time to make an impact on corporate policy. Finally, I winsorized all financial ratios and announcement CARs at 2.5% to exclude significant outliers and ensure more reliable and representative findings.

Moreover, as explained above, I incorporated the dummy variable Crisis indicating whether the year is a year of an economic crisis. The identification of crisis years was based on the recession indicators provided by the National Bureau of Economic Research (n.d.). The analysis

encompasses three significant economic crises: the Dotcom Bubble (2001), the Global Financial Crisis (2008–2009), and the COVID-19 pandemic (2020). For an illustration of the recession waves, please refer to Appendix B.

On top of that, in order to ensure multicollinearity did not lead to biases in the analysis, the correlation table between all the variables can be found in Appendix D. The highest correlation coefficient from this table is of property, plant and equipment (PPE), which has a correlation coefficient of 0.69 with the variable Size. However, PPE was still included as a control variable in the analysis, consistent with Huang and Kisgen (2013), because while Size measures the market value of a firm, PPE focuses on the book value of a firm's tangible assets, which helps isolate the impact of tangible asset investments on the dependent variables. For instance, high levels of tangible asset investments can significantly affect a firm's leverage by increasing the collateral value for loans. Moreover, as outlined by Shrestha (2020), a correlation coefficient of less than 0.8 indicates that multicollinearity is unlikely to exist.

Table 1 shows the summary statistics of the dataset. The table indicates that, on average, the fraction of females is 21% of the entire executive board and that the average age of an executive is around 54. Furthermore, the table suggests that the average announcement CARs are positive for acquisitions but negative for equity issuances. Moreover, we can observe that around 30k firm-year observations and around 175k executives were included in the dataset. On top of that, the acquisitions dataset include ca. 9700 announcement events and the equity issuance dataset 1900, which is relevant for the announcement CAR analysis.

Table 1 - Summary statistics

Table 1 presents the descriptive statistics on the examined announcement CARs, decision-making, executive-specific, return, and firm-financial variables. The decision-making variables include Debt Issuances, Equity Issuances, Leverage, Quick Ratio, and Acquisitions. The two executive-specific variables used are Executive Age and Executive Tenure. The firm financial variables serving as control variables are Capex to PPE, Market to Book, PPE, ROA, PPE to Total Assets and Size. The return metrics examined in this thesis are Return on Assets and Tobin's Q. The three-day cumulative abnormal return surrounding announcements of acquisitions and equity issuances are described as Acquisition CARs and Equity Issuance CARs, respectively. The variable Index Value presents the state-level gender equality index proposed by Sugarman and Straus (1988). The variable Female displays the share of females on the executive board for a specific firm-year. For the definitions of the firm-financial variables, please refer to Appendix A.

Variable	N	Mean	SD	p25	p50	p75
Acquisition CARs	9689	0.007	0.046	-0.015	0.004	0.028
Acquisitions	30061	0.241	0.594	0.000	0.004	0.144
Capex to PPE	31934	0.256	0.233	0.117	0.187	0.303
Debt Issuance	22205	5.596	1.958	4.605	5.838	6.908
Equity Issuance	25925	2.674	2.014	1.390	2.721	4.071
Equity Issuance CARs	1909	-0.021	0.054	-0.050	-0.020	0.009
Executive Age	122151	53.793	7.553	49	54	59
Executive Tenure	174838	5.580	4.338	2	4	8
Female	32171	0.210	0.079	0.167	0.200	0.200
Index Value	32171	0.428	0.082	0.356	0.423	0.497
Leverage	29657	0.439	0.275	0.239	0.431	0.626
Market to Book	29651	1.560	1.147	0.831	1.187	1.843
PPE	32112	6.540	1.738	5.355	6.396	7.680
PPE to Total Assets	32111	0.318	0.241	0.118	0.246	0.489
Quick Ratio	30692	1.506	1.172	0.804	1.187	1.773
Return on Assets	31048	0.153	0.092	0.096	0.140	0.199
Size	32038	8.336	1.348	7.305	8.164	9.220
Tobin's Q	32038	1.601	1.135	0.881	1.230	1.888

3. Methodology

The thesis covers three main topics: strategic decisions and return metrics, executive turnover, and announcement CARs. This chapter presents the methodology applied for the two main hypotheses tested and their corresponding statistical models.

3.1. Hypothesis *H1*

To test hypothesis *H1*, I applied a panel regression with an interaction term between the fraction of female executives and economic crisis years to determine the effect of having a higher share of female executives during crisis times on key corporate and financial decisions and return metrics: debt issuance, equity issuance, leverage, quick ratio, acquisitions, return on assets, and Tobin's Q. In addition, this model was used for the announcement CARs analysis. The model can be estimated as follows:

$$(1) \quad Y_{i,t} = \beta_0 + \mu + \beta_1 * Female_{i,t} + \beta_2 * Crisis_t + \beta_3 * Female_{i,t} \times Crisis_t + \theta * \boldsymbol{X_{i,t}} + \varepsilon_{i,t}$$

Where $Y_{i,t}$ is the decision variable of interest (e.g., leverage, quick ratio or announcement CARs) of firm i at time t, μ are industry-fixed effects, $Female_{i,t}$ represents the ratio of female executives on the executive board to the executive board size of firm i at time t, $Crisis_t$ is an indicator variable for whether year t is a year of an economic crisis, and $\boldsymbol{X_{i,t}}$ is a set of control variables for firm i at time t. The industry fixed effects refer to the first 3-digit SIC code, which identifies and categorizes specific industries within the broader two-digit major industry group.

3.2. Hypothesis *H2*

To test *H2*, I used a probit regression, which is used to model the probability of a binary outcome based on one or more predictor variables. Unlike in *H1*, this test is done on an executive-year level instead of firm-year. The model can be estimated as follows:

$$(2) \quad Prob(Turnover) = standard\ normal\ CDF\ \{ Z_{i,t} \},$$

$$\text{for which } Z_{i,t} = \beta_0 + \mu + \beta_1 * FemaleExec_j + \beta_2 * Crisis_t + \beta_3 * FemaleExec_j \times Crisis_t + \theta * \boldsymbol{X_{j,t}} + \varepsilon_{j,t}$$

Where $Turnover_{j,t}$ is a dummy variable indicating whether executive j experienced a turnover at year t (1 if year t is the last year that executive j is observed in the sample) and if the year is not 2021 (necessary not to mistakenly assign a value of 1 to all executives serving in the last year of the time horizon considered), μ are industry-fixed effects as described above, $FemaleExec_{j,t}$ is a dummy variable equal to 1 if executive j is a female, $Crisis_t$ is an indicator variable for whether year t is a year of an economic crisis, and $\boldsymbol{X_{j,t}}$ is a set of control variables for executive j and his/her firm's financial metrics at year t. The industry fixed effects refer to the first 3-digit SIC code, which identifies and categorizes specific industries within the broader two-digit major industry group.

4. Initial baseline regressions

The empirical analysis starts by running panel regressions to test hypotheses *H1a-H1g* and evaluate whether firms with a higher share of females on the executive board make different corporate decisions and experience different accounting and stock-based performance during an economic crisis, as reported in Table 2.

Table 2 indicates that during an economic crisis, firms with a higher share of female executives have higher leverage and lower quick ratio levels, as evidenced by the coefficients of the interaction term. In addition, firms with a higher fraction of female executives reach lower ROA, an objective-based performance, but a higher Tobin's Q, a subjective performance metric dependent on market valuation. However, the coefficients of quick ratio and ROA are significant only at the 10% level, which is too weak to draw strong conclusions about the effects. Overall, these results contradict my initial hypotheses stating that firms with a higher ratio of female executives should be more conservative (i.e., make fewer acquisitions and have a higher quick ratio) and enjoy higher accounting and stock-based returns during an economic crisis. Additionally, the table suggests that firms with a higher share of female executives are more risk-taking in all five strategic decisions during non-crisis times, except for the quick ratio, which correlates negatively with Female. However, as discussed later in the thesis, the initial baseline results are likely biased as the initial models suffer from endogeneity issues.

The model includes six control variables to account for firm characteristics that might otherwise confound the relationship between the fraction of females, the interaction term, and the outcomes measured, most of which were applied by Huang and Kisgen (2013). ROA is included as it can substantially influence financial decisions such as debt or equity issuance, and leverage. Similarly, firm size can affect access to capital markets, borrowing costs, and investment opportunities, potentially affecting strategic decisions and performance. The capital expenditures (Capex) to PPE ratio measures how much is reinvested into the company. Firms with a high ratio might be in an expansion phase, which increases their financing and liquidity needs. The PPE to Total Assets ratio indicates the asset structure of a firm. A firm with a high ratio, i.e., an asset-heavy firm, may have different financing needs and risk profiles. The market-to-book ratio is a

proxy for growth opportunities and market perceptions. This ratio influences debt raising and leverage through its impact on borrowing costs (Chen & Zhao, 2006). Excluding this control could lead to misinterpretation, where the growth potential and valuation differences would be wrongly assigned to the presence of female executives. Lastly, as explained above, the absolute level of PPE focuses on the book value of a firm's tangible assets, which likely influences firms' borrowing capacity and investment needs.

Table 2 - Strategic decisions and return metrics

*Table 2 displays the results of the strategic decisions and return metrics analysis using a panel regression with an interaction term. The dependent variables are Debt Issuance, Equity Issuance, Leverage, Quick Ratio, Acquisitions, Return on Assets, and Tobin's Q. This table reports the results from the main regression as described by equation (1). The variable Female represents the fraction of female executives at a specific firm-year. The interaction term Female*Crisis is equal to the share of females on the executive board if the year is a year of an economic crisis. The definitions for the dependent and control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.*

Variable	Debt Issuance (1)	Equity Issuance (2)	Leverage (3)	Quick Ratio (4)	Acquisitions (5)	Return on Assets (6)	Tobin's Q (7)
Female * Crisis	-0.390	0.042	0.144***	-0.348*	0.160	-0.038*	0.481**
	(1.08)	(0.10)	(2.86)	(1.87)	(1.39)	(1.92)	(2.26)
Female	1.390***	-0.948***	0.074***	0.240***	0.081*	-0.048***	0.465***
	(8.68)	(6.71)	(3.52)	(2.90)	(1.65)	(7.41)	(6.05)
Crisis	0.240***	-0.093	-0.033***	0.180***	-0.059**	-0.008*	-0.097**
	(2.85)	(1.08)	(2.97)	(4.17)	(2.41)	(1.87)	(2.12)
ROA	-0.513***	0.270*	-0.251***	-0.796***	0.784***		5.182***
	(3.21)	(1.75)	(11.50)	(7.29)	(14.94)		(50.51)
Size	0.796***	0.926***	0.020***	0.105***	0.306***	0.008***	
	(27.67)	(35.72)	(5.46)	(5.52)	(25.44)	(5.80)	
Capex to PPE	0.723***	0.762***	-0.090***	0.186***	0.214***	0.076***	0.598***
	(10.47)	(12.50)	(10.43)	(3.60)	(7.63)	(17.41)	(12.60)
PPE to Total Assets	-0.530***	-0.119	-0.024	-0.252***	0.220***	0.093***	-0.504***
	(4.28)	(0.92)	(1.40)	(3.47)	(5.76)	(16.82)	(12.18)
Market to Book	-0.383***	-0.035**	-0.024***	0.173***	-0.200***	0.035***	
	(17.46)	(2.34)	(9.55)	(13.20)	(27.24)	(39.09)	
PPE	0.031	0.019	0.017***	-0.283***	-0.319***	-0.005***	0.015***
	(1.10)	(0.77)	(4.57)	(13.74)	(25.41)	(3.51)	(3.18)
No. of observations	19,793	22,965	28,501	27,246	26,774	28,501	30,786
Adj. R-squared	0.350	0.452	0.3458	0.3857	0.248	0.360	0.430

In addition to the strategic decisions and performance analysis, exploring executive turnover during an economic crisis could help validate the "think crisis – think female" phenomenon. Higher turnover rates of males during a crisis would indicate that the market prefers to keep females in the lead or that men themselves prefer to step down from their leadership positions during crisis times. Thus, to test hypothesis *H2*, I ran a probit regression presented in Table 3 to identify whether male executives are more likely than female executives to experience a turnover during an economic crisis, expressed by the interaction term of Crisis and FemaleExec. Furthermore, I included an additional analysis focusing exclusively on CEOs and CFOs in accordance with the methodology proposed by Huang and Kisgen (2013). The reason stems from the fact that CEOs and CFOs play an integral role in the strategic decisions examined in this study, which consequently impacts firm performance. Thus, it may be posited that non-CEO or CFO executives may experience different turnover rates during an economic crisis. For example, it may be the case that only female CEOs and CFOs experience lower turnover during an economic crisis, as they are perceived as being most crucial to leading the firm during a crisis.

Table 3 suggests no significant difference in turnover between the genders in crisis times, as observed by the insignificant coefficients of the interaction terms. Additionally, female executives experience higher turnover rates during non-crisis times when using the entire sample, while this effect is not significant for female CEOs and CFOs. A higher turnover rate in non-crisis times validates the "think manager-think male" phenomenon since males are more likely to stay in leadership in normal times. On top of that, Crisis seems to reduce executive turnover when considering both the CEO and CFO sample and the entire sample. This may be the case since during a crisis, firms may prefer to avoid excessive risk and replace a major part of their top management, which may lead to unstable management and inefficient decision-making ability. Nonetheless, just like the results in Table 2, this table's results also likely suffer from endogeneity issues and should therefore be interpreted cautiously.

In this model, five control variables were included. The first three were also used in Table 2 and follow similar logic. ROA can affect executive turnover as, on the one hand, more profitable firms might have more stable management teams. On the other hand, pressure from shareholders to increase firm profitability might increase executive turnover rates. Firm size may also impact

executive turnover rates as larger firms may have more established management practices and corporate governance monitoring the management. Firms with high market-to-book ratios have high market valuations and are likely to experience less turnover due to the positive market perceptions. However, the control variables PPE to Total Assets, Capex to PPE, and PPE were not included in this analysis as they should not influence executive turnover directly. For example, a more asset-heavy firm, expressed by a high PPE to Total Assets ratio, should not necessarily experience different executive turnover rates solely due to its asset structure. The last executive-specific controls included in the model are executive age and tenure. Controlling for age ensures that age-related turnover related to retirement or career stage considerations does not confound the studied effects. Additionally, executive tenure may impact its turnover since executives with longer tenures typically have more job security and are more likely to stay at the firm.

Table 3 - Executive turnover

*Table 3 presents the results of the executive turnover analysis using a probit regression with an interaction term. In Column (1), the entire executive sample is used, while Column (2) depicts the results when considering only CEOs and CFOs. The dependent variable in both columns is Exec. Turnover, a dummy variable that equals 1 if the executive did not continue to serve at the firm in the following year. This table reports the results from the main regression as described by equation (2). The interaction term FemaleExec*Crisis equals 1 if the executive is a female and if the year is a year of an economic crisis. Executive tenure is defined as the number of years the executive has served on the executive board at the same firm as of year t. The definitions for the other control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.*

	No role distinction	**CEOs and CFOs**
Dependent variable	**Exec. Turnover**	**Exec. Turnover**
Variable	**(1)**	**(2)**
FemaleExec * Crisis	0.005	-0.156
	(0.11)	(1.27)
FemaleExec	0.064***	0.067
	(3.16)	(1.49)
Crisis	-0.036***	-0.14***
	(2.57)	(5.05)
ROA	-0.776***	-1.123***
	(11.49)	(8.70)
Size	-0.024***	-0.06***
	(5.53)	(7.00)
Market to Book	-0.026***	-0.028**
	(4.31)	(2.43)

Executive Age	0.016***	0.012***
	(21.73)	(8.23)
Executive Tenure	0.022***	0.014***
	(21.01)	(7.55)
No. of observations	111,160	43,001
Chi-squared (df)	6341.98 (225)	673.85 (214)
[P-value]	0.00	0.00
Pseudo R-squared	0.085	0.033

In the next step, to better understand the market perception of female executives' presence, I analyzed the effect of the fraction of female executives on CARs of acquisition and equity issuance announcements during economic crises. In accordance with the second parts of *H1b* and *H1e*, I expect higher announcement CARs for firms with a higher share of female executives during an economic crisis. However, Table 4 shows no significant effect of the interaction term on both acquisition and equity issuance announcement CARs. On top of that, in non-crisis times, the fraction of female executives has no significant effect on acquisition announcement returns but a statistically significant negative effect on equity issuances at the 1% level. Additionally, Crisis seems to impact announcement CARs of equity issuances negatively (but only at the 10% significant), but not announcement CARs of acquisitions. Nevertheless, as explained later, the sample is subject to selection bias, and endogeneity concerns likely affect the results. Consequently, the results of this table should not be considered reliable.

The model includes four control variables that may otherwise influence the studied relationships: ROA, size, PPE to total assets ratio, and market-to-book ratio. The analysis controls for ROA since it measures the firm's profitability and operational efficiency to generate profits from their assets, which can significantly influence investor confidence. For acquisitions, a high ROA can lead to higher announcement CARs, as investors may be more likely to anticipate successful integration and synergy realization. In the context of equity issuances, companies with high profitability may face less negative market reactions due to positive perceptions of the firm future and equity value. Size and market-to-book ratios are controlled for as firms that already enjoy a higher market valuation are likely to experience more positive market reactions to their actions, leading to higher announcement CARs. Lastly, an asset-heavy firm, indicated by a high PPE to total assets ratio, may experience different announcement CARs because of its higher tied up capital in long-

term assets, which influences the financing needs and terms of firms. For example, an asset-heavy firm may have more collateral to finance an acquisition at cheaper rates, which would lead to higher acquisition announcement CARs. PPE and Capex to PPE are excluded as they should not directly impact investor reactions to these announcements.

Table 4 - Acquisition and equity issuance announcement CARs

*Table 4 displays the acquisition and equity issuance announcement CARs analysis results using a panel regression with an interaction term. The dependent variables are the three-day market-adjusted announcement CARs of acquisitions and equity issuances, named Acquisition CARs and Equity Issuance CARs, respectively. This table reports the results from the main regression as described by equation (1). The interaction term Female*Crisis is equal to the share of females on the executive board if the year is a year of an economic crisis and 0 otherwise. The definitions for the control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.*

Variable	Acquisition CARs (1)	Equity Issuance CARs (2)
Female * Crisis	-0.011	0.046
	(0.66)	(0.88)
Female	0.010	-0.086***
	(1.51)	(3.91)
Crisis	0.005	-0.022*
	(1.32)	(1.82)
ROA	0.012	0.004
	(1.63)	(0.20)
Size	-0.002***	0.005***
	(6.04)	(4.11)
PPE to Total Assets	0.002	0.002
	(0.42)	(0.14)
Market to Book	0.001**	0.003
	(2.31)	(1.37)
No. of observations	8,701	1,697
Adj. R-squared	0.0162	0.0376

5. Instrumental variable analysis

In order to study the causal relationship between the fraction of female executives and the variables of interest during economic crises, it is essential to use a methodological approach that accounts for a potential endogeneity bias present in the data. Specifically, the issue of omitted variable bias in this study can distort the initial regression results. For instance, unobserved factors like firm ethical standards might influence both the proportion of female executives and firm performance, leading to omitted variable bias. A firm with higher ethical standards should be more inclusive and fairer in hiring females for executive positions, resulting in a higher share of female executives. At the same time, a firm with higher ethical standards should avoid taking excessive risk to avoid the risk of losing significant shareholder value, which, for example, may increase market valuation (Tobin's Q) and result in lower leverage and higher quick ratio levels. However, such a variable is difficult to measure and quantify in practice.

To counter these issues, the IV approach in this study uses the US state-level gender equality index proposed by Sugarman and Straus (1988) as an instrument for the fraction of female executives (Female) and for the dummy variable indicating whether an executive is female (FemaleExec). This approach is backed by existing research, such as the work by Huang and Kisgen (2013), who used this instrument to study the effect of gender transitions in CEO and CFO positions on strategic decision-making.

The underlying concept is that the more female-friendly a state is, the higher the fraction of female executives of firms in that state and the higher the likelihood of a given executive being female. For example, firms located in Oregon, the highest-ranked state, should have a higher share of female executives than firms in Mississippi, the lowest-ranked state.

The index encompasses several economic, political, and legal factors. For instance, the economic aspect includes gender-income equality metrics, the political element measures the representation of women in the state senate and judicial positions, and the legal aspect covers fair employment and anti-discrimination laws. The full index ranking is displayed in Appendix C.

According to Wooldridge (2020), an instrumental variable has to fulfil two conditions: exogeneity and relevance. The former implies that the instrument must not be correlated with the error term in the outcome equation, which ensures that the instrument does not introduce bias. In other words, the instrument should affect the dependent variable only through the endogenous explanatory variable and not through any other channel. The latter suggests that the instrument must be relevant for explaining variation in the regressor, i.e., correlated with the regressor, in this case, the fraction of female executives. Since the index should be correlated with the fraction of female executives and at the same time should not directly affect the dependent variables examined, such as firm financial decisions or announcement CARs, this instrument reasonably meets both the exogeneity and relevance conditions required to define an instrumental variable. Furthermore, using an older index from 1988 as an instrument provides an additional clear advantage in terms of exogeneity. As the index precedes the sample period, starting in 1993, it is unlikely to have been affected by the dependent variables considered, such as quick ratio or Tobin's Q. Thus, it can be considered exogenous to the study's dependent variables.

The IV analysis is divided into two stages. In the first stage, the endogenous variable $Female$ is regressed on the instrument $Index\ Value$ to obtain the predicted values of $Female$. This regression isolates the variation in $Female$ that is correlated with the dependent variables but not with the error term. In the second stage, the instrumented values of $Female$ from the first stage regressions are used as the explanatory variables in the initial regression equations (Wooldridge, 2020). This provides the IV estimate of the effect of $Female$ on the examined dependent variables.

The 2SLS model for the IV analysis is estimated as follows:

First stage:

$$(3) \quad Female_i = \beta_0 + \mu + \beta_1 * Index\ Value_{i,t} + \theta * \boldsymbol{X_{i,t}} + \varepsilon_{i,t}$$

Second stage:

$$(4) \quad Y_{i,t} = \beta_0 + \mu + \beta_1 * Fitted\ Female_{i,t} + \beta_2 * Crisis_t + \beta_3 * Fitted\ Female_{i,t} \times Crisis_t + \theta * \boldsymbol{X_{i,t}} + \varepsilon_{i,t}$$

Where $Female_{i,t}$ represents the share of females on the executive board of firm i at time t, μ are industry-fixed effects, $Crisis_t$ is an indicator variable for whether year t is a year of an economic crisis, and $\boldsymbol{X_{i,t}}$ is a set of control variables for firm i at time t. $Y_{i,t}$ is the decision variable of interest (e.g., level of acquisitions or equity issuance) of firm i at time t. $Fitted\ Female_{i,t}$ refers to the instrumented value of the female variable from the first-stage regression. The industry fixed effects refer to the first 3-digit SIC code, which identifies and categorizes specific industries within the broader two-digit major industry group.

It is striking from all first-stage IV regressions in the tables below that the F-statistic of the first-stage IV regressions is consistently well above the thumb threshold of 10, suggesting that the state-level gender equality index has high explanatory power as an instrument. Hence, it can be considered a strong instrument, as proposed by Stock et al. (2002). Furthermore, the coefficients of the index in all first-stage regressions are also consistently statistically significant at the 1% level, indicating a strong relation between state-level gender equality and the fraction of female executives. As a result, because the IV analysis should correct for the potential endogeneity bias present in the initial panel regressions, we can disregard the initial results and consider the IV regression results more reliable when discrepancies arise.

The IV analysis started with the strategic decisions and return metrics using the instrumented Female values, as reported in Table 5. As discussed, Panel A shows that, when regressing the fraction of female executives on the gender equality index (with control variables and industry fixed effects), the index coefficients are significant at the 1% level and the F-statistic is well above 10 in all cases.

Additionally, Panel B presents the second stage IV regression and suggests that in non-crisis times, firms with a higher fraction of female executives tend to issue more equity, have lower leverage, a higher quick ratio, and experience lower accounting-based returns but higher stock-based returns, all statistically significant at 1%. All strategic decision results are contradictory to the initial regression results except from quick ratio, while the coefficients of Female on both ROA and Tobin´s Q are consistent with those of Table 2. The significant effects of the IV estimates are consistent with male overconfidence, as a higher share of females on the executive board results

in a more conservative management style, and although it leads to lower objective performance, the market seems to perceive this management style positively.

Moreover, as can be perceived from the interaction term coefficients, the presence of an economic crisis amplifies some of these effects. During an economic crisis, firms with a higher proportion of female executives maintain higher liquidity levels and engage in fewer acquisitions, both statistically significant at the 5% level. Furthermore, such firms achieve higher Tobin's Q valuations, significant at the 1% level. The interaction term coefficients contradict those of the initial panel regression, which suggested that a firm with a higher fraction of females increases leverage and decreases quick ratio. However, as discussed, the initial panel regressions likely suffer from endogeneity issues.

On top of that, the independent effect of an economic crisis is statistically negative on Tobin's Q at 1%, as expected, but positive on acquisitions. This may be explained by the distressed market conditions, which create opportunities for stronger firms to acquire undervalued and financially distressed targets at lower prices. The quick ratio is also somewhat negatively affected by an economic crisis, which may be caused by the difficulty in obtaining short-term financing due to market illiquidity during crisis times. However, the significance level of 10% is too weak to draw conclusions about the effect on quick ratio.

Nevertheless, despite the highly statistically significant coefficients for the instrument and a high F-statistic in the first-stage regression, the inflated IV estimates in the second stage suggest the instrument may not be as strong as it initially appears. For example, the coefficient of Fitted Female on Tobin's Q is 21.75, implying an implausibly high valuation increase of 21.75 times for firms with only female executives compared to those with none. Therefore, we need to exercise caution when interpreting the IV results. While the direction of the relationship might still be informative, the magnitude of the coefficients should not be taken at face value. A potential reason for the inflated coefficients could be insufficient variation in the instrument, leading to an overstated effect through the regressor. Another reason could be that some US states' economic, political, or legal landscape has evolved and changed since 1988, which would limit the relevance

assumption of the index as an instrument since the index might not be able to predict observations in more recent years correctly.

Overall, the findings from Table 5 confirm hypotheses *H14d*, *H1g*, and the first part of *H1e*. A higher share of female executives indeed leads to more conservative leadership during an economic crisis, expressed by fewer acquisitions and higher liquidity, which is viewed positively by the market and results in higher Tobin's Q valuations.

Table 5 - IV analysis of strategic decisions and return metrics

Table 5 displays the results of the IV analysis on strategic decisions and return metrics using the state-level gender equality index proposed by Sugarman and Straus (1988) as an instrument for the fraction of female executives. Panel A shows the first-stage IV regression results for the five strategic decisions analyzed in Panel B, Return on Assets, and Tobin's Q. The dependent variables in Panel A are the fraction of female executives, as expressed by the Female variable in the previous tables. Panel B presents the results of the second-stage IV regressions, where the dependent variables are Debt Issuance, Equity Issuance, Leverage, Quick Ratio, Acquisitions, Return on Assets, and Tobin's Q. This table reports the results from the IV regressions as described by equations (4) and (5). The definitions for the control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

Panel A: First stage IV regression

	Strategic decisions	**Return on Assets**	**Tobin's Q**
Dependent variable	**Female**	**Female**	**Female**
Variable	**(1) - (5)**	**(6)**	**(7)**
Index Value	0.032***	0.031***	0.039***
	(4.70)	(4.70)	(6.13)
ROA	-0.059***		-0.033***
	(8.80)		(5.67)
Size	0.010***	0.009***	
	(8.13)	(7.50)	
Capex to PPE	-0.022***	-0.017***	-0.019***
	(7.81)	(8.15)	(7.56)
PPE to Total Assets	0.018***	0.013**	-0.017***
	(3.06)	(2.36)	(4.58)
Market to Book	0.001	-0.002**	
	(0.64)	(2.54)	
PPE	-0.01***	-0.01***	-0.002***
	(8.68)	(8.31)	(4.31)
No. of observations	28,501	29,433	30,901
F-statistic	44.07***	30.51***	41.82***
[P-value]	0.00	0.00	0.00
Adj. R-squared	0.081	0.076	0.080

Panel B: Second stage IV regression

Variable	Debt Issuance (1)	Equity Issuance (2)	Leverage (3)	Quick Ratio (4)	Acquisitions (5)	Return on Assets (6)	Tobin's Q (7)
Fitted female * Crisis	-2.336	0.728	0.458	4.411**	-2.534**	0.163	9.118***
	(0.73)	(0.26)	(1.18)	(2.03)	(2.32)	(0.79)	(4.79)
Fitted female	-4.839	26.175***	-1.849***	8.996***	-1.400	-1.403***	21.75***
	(0.93)	(5.58)	(3.00)	(3.38)	(0.96)	(6.75)	(12.13)
Crisis	0.659	-0.243	-0.098	-0.824*	0.511**	-0.051	-1.915***
	(0.99)	(0.42)	(1.20)	(1.83)	(2.26)	(1.17)	(4.78)
ROA	-0.911***	1.913***	-0.364***	-0.212	0.662***		5.925***
	(2.59)	(5.89)	(8.46)	(1.11)	(6.49)		(50.47)
Size	0.861***	0.657***	0.039***	0.011	0.324***	0.019***	
	(14.71)	(12.38)	(5.43)	(0.35)	(17.74)	(8.65)	
Capex to PPE	0.585***	1.333***	-0.129***	0.388***	0.173***	0.055***	1.016***
	(4.50)	(11.51)	(8.32)	(5.06)	(4.19)	(9.77)	(17.57)
PPE to Total Assets	-0.422***	-0.58***	0.008	-0.420***	0.255***	0.109***	-0.097**
	(2.82)	(3.87)	(0.41)	(4.80)	(5.68)	(17.90)	(1.95)
Market to Book	-0.377***	-0.054***	-0.022***	0.165***	-0.197***	0.033***	
	(16.75)	(3.54)	(8.86)	(12.53)	(26.61)	(34.37)	
PPE	-0.038	0.305***	-0.003	-0.184***	-0.339***	-0.017***	0.056***
	(0.63)	(5.54)	(0.38)	(5.23)	(17.56)	(7.29)	(9.87)
No. of observations	19,793	22,965	28,501	27,246	26,774	28,501	30,786
Adj. R-squared	0.348	0.452	0.3451	0.386	0.248	0.359	0.432

In the second step, I repeated the executive turnover analysis using the gender equality index as an instrument for FemaleExec, conjecturing that an executive serving at a firm in a higher-ranked state is more likely to be female. In this analysis, I employed the bivariate probit model, a maximum likelihood 2-stage probit regression that simultaneously estimates the relationship between two correlated binary dependent variables. This method accounts for the potential correlation between the error terms of the two equations (Chiburis et al., 2012). The bivariate probit model is necessary here as both stages include a binary dependent variable, a situation known as a forbidden regression. Wooldridge (2010) explains this situation as "a phrase that describes replacing a nonlinear function of an endogenous explanatory variable with the same nonlinear function of fitted values from a first-stage estimation" (p. 236). The analysis was performed using the 'rbiprobit' command on Stata, which is designed to estimate a recursive bivariate probit model, i.e. when both dependent variables are binary, and one serves as an endogenous explanatory variable of the other.

The results are illustrated in Table 6. Columns (1) and (3) show the first stage regressions using the entire sample and the sample consisting of CEOs and CFOs, respectively, and suggest that the equality index is a valid instrument also for predicting FemaleExec, as perceived by the statistically significant coefficients of the index at the 1% level. Additionally, because there is no weak IV test available for bivariate nonlinear estimations, I used OLS for the first stage IV regression to test the instrument's validity, as displayed in Appendix E. As Appendix E shows, the instrument also seems valid for estimating FemaleExec, demonstrated by the high F-statistic and the significant coefficient of Index Value.

Furthermore, the second-stage regression results in Columns (2) and (4) of Table 6 demonstrate that while female CEOs and CFOs are less likely to leave their firms during an economic crisis, the effect of an economic crisis on female executives disappears when considering the entire executive sample, while the interaction term was insignificant for both samples in the initial panel regression in Table 3. The significant negative coefficient of the interaction term in Column (4) validates the "think crisis – think female" phenomenon, indicating that female CEOs and CFOs are more likely to retain their positions during economic crises than males, potentially due to superior crisis management skills. As discussed above, this effect might be significant only for CEOs and CFOs due to their critical responsibility and importance in major strategic decisions. These findings confirm the validity of hypothesis *H2.* Moreover, consistent with the initial panel regression results, the presence of an economic crisis has a negative impact on the likelihood of experiencing an executive turnover. However, unlike in Table 3, the coefficients of FemaleExec indicate a lower likelihood of female executives experiencing a turnover in non-crisis times.

Table 6 - IV analysis of executive turnover

Table 6 presents the two-stage IV bivariate probit placebo test of executive turnover analysis using the state-level gender equality index proposed by Sugarman and Straus (1988) as an instrument for FemaleExec, a dummy variable equal to 1 if the executive is a female. While Columns (1) and (2) display the first -and second-stage results using the entire executive sample, Columns (3) and (4) depict the two stages' results when considering only the sample consisting of CEOs and CFOs. The dependent variable of Columns (1) and (3) is FemaleExec, and the dependent variable of Columns (2) and (4) is Exec. Turnover, a dummy variable equals to 1 if the executive did not continue to serve at the firm in the following year. Executive tenure is defined as the number of years the executive has served on the executive board at the same firm as of year t. The definitions for the control variables included in the regression

can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	No role distinction		**CEOs and CFOs**	
	1st stage	**2nd stage**	**1st stage**	**2nd stage**
Dependent variable	**FemaleExec**	**Exec. Turnover**	**FemaleExec**	**Exec. Turnover**
Variable	**(1)**	**(2)**	**(3)**	**(4)**
Index Value	0.500***		0.631***	
	(5.56)		(4.27)	
Fitted FemaleExec * Crisis		-0.021		-0.291**
		(0.53)		(2.47)
Fitted FemaleExec		-1.015***		-0.417*
		(3.08)		(1.90)
Crisis		-0.034***		-0.139***
		(2.59)		(5.04)
ROA	-0.619***	-0.853***	-0.234*	-1.127***
	(8.35)	(12.89)	(1.72)	(8.78)
Size	0.060***	-0.009	0.101***	-0.053***
	(12.29)	(1.08)	(11.70)	(5.61)
Market to Book	0.014**	-0.02***	-0.014	-0.029**
	(2.20)	(2.86)	(1.12)	(2.46)
Executive Age	-0.016***	0.011***	-0.021***	0.01***
	(17.22)	(4.35)	(14.73)	(6.42)
Executive Tenure	-0.024***	0.016***	-0.014***	0.013***
	(12.95)	(4.61)	(6.11)	(6.73)
No. of observations	111,171	111,171	43,403	43,403

Finally, the gender equality index was employed to estimate the impact of the fraction of female executives on announcement CARs of acquisitions and equity issuances, as illustrated in Table 7. Consistent with the findings of Tables 5 and 6, the first-stage regression results also indicate that the index is a strong instrument for predicting the variable Female, as evidenced in Columns (1) and (3) by the high F-statistic and significant coefficient of Index Value at 1%. In addition, it is apparent from Columns (2) and (4), which present the second-stage IV regressions, that when a firm announces an acquisition or equity issuance during an economic crisis, the fraction of female executives does not seem to impact the 3-day CAR around the announcement of both events, consistent with the initial regression Table 4. However, neither the independent presence of an economic crisis nor the fraction of female executives during non-crisis times influence announcement CARs for both acquisitions and equity issuances, unlike the initial panel regression, where Female negatively impacted CARs of equity issuance announcements. Although it might seem counterintuitive that an economic crisis on its own does not impact

announcement CARs, one possible explanation is that firms are particularly cautious during an economic crisis, resulting in less wasteful acquisitions such as diversifying acquisitions, which are often value-destructing (Malmendier & Tate, 2008), or unnecessary equity issuances that would lead to negative announcement CARs. Hence, the analysis does not provide evidence for the validity of the second parts of hypotheses *H1b* and *H1e*.

Table 7 - IV analysis of announcement CARs

Table 7 displays the results of the IV analysis on announcement CARs of acquisitions and equity issuances using the state-level gender equality index proposed by Sugarman and Straus (1988) as an instrument for the fraction of female executives. Columns (1) and (3) present the first-stage IV regression of acquisition and equity issuance CARs, respectively. The dependent variable in both columns is the fraction of female executives, as expressed by the Female variable in the previous tables. Columns (2) and (4) are the regressions from the second-stage IV, where the dependent variables are the three-day market-adjusted announcement CARs of acquisitions and equity issuances, respectively. This table reports the results from the IV regressions as described by equations (4) and (5). The definitions for the control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	Acquisition CARs analysis		**Equity Issuance CARs analysis**	
	First stage	**Second stage**	**First stage**	**Second stage**
Dependent variable	**Female**	**Acquisition CARs**	**Female**	**Equity issuance CARs**
Variable	**(1)**	**(2)**	**(3)**	**(4)**
Index Value	0.036***		0.030***	
	(5.76)		(4.56)	
Fitted Female * Crisis		-0.335		0.166
		(1.35)		(0.39)
Fitted Female		-0.030		-0.143
		(0.13)		(0.20)
Crisis		0.075		-0.048
		(1.41)		(0.54)
ROA	-0.059***	0.007	-0.066***	0.001
	(9.77)	(0.43)	(10.19)	(0.03)
Size	0.001	-0.002***	0.000	0.005***
	(1.49)	(5.63)	(0.50)	(4.28)
PPE to Total Assets	-0.019***	0.001	-0.017***	0.000
	(5.31)	(0.11)	(4.66)	(0.03)
Market-to-Book	0.002***	0.001*	0.004***	0.003
	(3.00)	(1.91)	(6.61)	(0.78)
No. of observations	33,400	8,701	29,015	1,697
F-statistic	36.39		35.81	
[P-value]	0.00		0.00	
Adj. R-squared	0.070	0.016	0.077	0.028

6. Heckman selection model

As described above, the results from Table 7 indicate that neither the fraction of female executives, the presence of an economic crisis, nor their interaction have a significant effect on the announcement CARs of both acquisitions and equity issuances. Nonetheless, it is important to be cautious when interpreting the table's findings since the sample might suffer from selection bias. Firms that choose to issue equity or engage in acquisitions may not represent a random selection from the entire population of firms. For instance, it is possible that only firms whose executives believe their firm shares are overvalued issue equity. Additionally, firms may only conduct acquisitions if they believe the shareholders will react positively to the acquisition. To solve this issue, I applied the Heckman selection model, a statistical technique used to correct for sample selection bias on both acquisition and equity issuance CARs (Wooldridge, 2020).

The Heckman model consists of two stages: the selection and the outcome equations. The selection equation models the probability of an observation being included in the sample using a probit regression, i.e., the probability of a firm deciding to issue equity or conduct an acquisition, which determines whether an observation is observed or not. The outcome equation models the dependent variable for the selected sample (i.e., with equity issuance or acquisition events) and includes the inverse Mills ratio (IMR) derived from the first stage to correct for selection bias (Wooldridge, 2020).

The two stages of the Heckman model are estimated as follows:

Selection equation:

$$\text{(5)} \quad \text{Prob(Inclusion)} = \text{standard normal CDF } \{ Z_{i,t} \},$$

$$\text{for which } Z_{i,t} = \beta 0 + \beta_1 * Fitted\ Female_{i,t} \times Crisis_t + \beta_2 * Fitted\ Female_{i,t} + \beta_3 * Crisis_t + +\beta 4 * ROA_{i,t} + \beta 5 * SIZE_{i,t} + \beta 6 * CapextoPPE_{i,t}, +\beta 7 * PPEtoTotalAssets_{i,t} + \beta 8 * Market\ to\ book_{i,t} + \beta 9 * PPE_{i,t}$$

Outcome equation:

(6) $$CAR_{i,t} = \beta_0 + \mu + \beta_1 * Fitted\ Female_{i,t} \times Crisis_t + \beta_2 * Fitted\ Female_{i,t} + \beta_3 * Crisis_t + \theta * \boldsymbol{X_{i,t}} + \lambda * IMR_{i,t} + \varepsilon_{i,t}$$

Where $Inclusion$ is a dummy variable indicating whether firm i conducted an acquisition (or issued equity) at time t, $CAR_{i,t}$ is the three-day market-adjusted cumulative abnormal return of an acquisition or equity issuance made by firm i at time t, $Fitted\ Female_{i,t}$ refers to the instrumented value of the $Female$ variable, $Crisis_t$ is an indicator variable for whether year t is a year of an economic crisis, μ are industry-fixed effects, and $\boldsymbol{X_{i,t}}$ is a set of control variables in the outcome equation for firm i at time t, $IMR_{i,t}$ is the inverse Mills ratio of firm i at time t. The industry fixed effects refer to the first 3-digit SIC code, which identifies and categorizes specific industries within the broader two-digit major industry group.

Wooldridge (2020) asserts that all control variables included in the outcome equation should be employed in the selection equation. In addition, at least one control variable in the selection equation that does not affect announcement CARs should be excluded from the outcome equation to meet the exclusion restriction. Hence, all four control variables in the initial CAR analysis were included in the selection equation, as all four may affect the likelihood of conducting an acquisition and issuing equity. The two additional control variables, PPE and Capex to PPE, may also affect the likelihood of these event occurrences, but not directly their announcement CARs. Firms reinvesting heavily in their company, expressed by a high Capex to PPE ratio, may need to issue more equity to fund their expansion plans and acquisitions. In addition, firms with substantial PPE levels are more likely to raise money to fund their investment assets and machinery, inter alia through equity issuances, or engage in more acquisitions to leverage their solid asset base.

From Table 8, which shows the Heckman model using the instrumented Female estimates from Table 7, we can infer from the low significance level of 10% of the IMR coefficient in the acquisitions sample that the model did not detect selection bias, implying that we can rely on the original model results presented in Column (2) of Table 7. However, it is striking that a selection bias is present in the equity issuances sample, which can be concluded from the statistically significant IMR coefficient at the 1% level in the outcome equation displayed in Column (4).

Nonetheless, although controlling for sample selection bias, the results remain insignificant and consistent with the IV results in Table 7. During an economic crisis, the fraction of female executives does not affect the equity issuance announcement CARs, also in non-crisis times, as can be perceived by the non-significant coefficients of the interaction term and instrumented Female variables in the outcome equation. Additionally, an economic crisis on its own also does not appear to impact announcement CARs, even after controlling for selection bias.

Table 8 - Heckman correction model for announcement CARs

Table 8 displays the results of the Heckman selection model applied to announcement CARs of acquisitions and equity issuances. This analysis used the instrumented values predicted in Columns (1) and (3) of Table 7 by the state-level gender equality index proposed by Sugarman and Straus (1988) as an instrument for the fraction of female executives. Columns (1) and (3) present the selection regression of acquisition and equity issuance analyses, respectively. The dependent variable in both columns is Inclusion, a dummy variable indicating whether the firm conducted an acquisition (in Column (1)) or issued equity (in Column (3)) in year t. Columns (2) and (4) show the results of the outcome equation, where the dependent variables are the three-day market-adjusted announcement CARs of acquisitions and equity issuances, respectively. This table reports the results from the Heckman model as described by equations (6) and (7). The definitions for the control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	Acquisition CARs analysis		**Equity Issuance CARs analysis**	
	First stage	**Second stage**	**First stage**	**Second stage**
Dependent Variable	**Inclusion**	**Acquisition CARs**	**Inclusion**	**Equity Issuance CARs**
Variable	**(1)**	**(2)**	**(3)**	**(4)**
Fitted Female * Crisis	4.130	-0.348*	5.913*	0.096
	(1.36)	(1.69)	(1.80)	(0.32)
Fitted Female	43.047***	-0.315	-25.974***	0.410
	(14.58)	(1.16)	(5.17)	(0.60)
Crisis	-0.923	0.078*	-1.147*	-0.035
	(1.42)	(1.77)	(1.65)	(0.55)
ROA	3.047***	-0.013	-3.105***	0.068
	(14.87)	(0.69)	(8.51)	(1.35)
Size	0.113***	-0.002***	0.202***	0.005***
	(7.20)	(4.88)	(8.77)	(3.96)
Capex to PPE	0.728***		0.628***	
	(19.82)		(11.15)	
PPE to Total Assets	-0.196**	0.004	0.63***	0.002
	(2.04)	(0.56)	(4.65)	(0.10)
Market to Book	0.049***	0.001	0.079***	-0.002
	(4.31)	(1.42)	(2.96)	(0.52)
PPE	-0.115***		-0.164***	

	(7.88)		(7.30)	
IMR		-0.007*		-0.029***
		(1.70)		(3.04)
No. of observations	33,292		28,911	
Chi squared		8,695		1,719
Degrees of freedom		308.61		225.47
[P-value]		153		169

7. Placebo tests

The last part of the study consists of a set of placebo tests to ensure the robustness of the IV findings and enhance the validity of the results that confirm hypotheses *H1* and *H2*. Testing the validity of the announcement CARs analysis results is unnecessary since no significant effects could be observed.

In the first part, the IV analysis is repeated, while Crisis is used as the placebo variable. This approach helps verify that the effect of the Crisis variable is not attributed to an arbitrary choice of years but rather specific to and explained by the actual economic crisis years. In the Crisis Placebo tests, the binary values 0 or 1 were randomly assigned to the variable Crisis Placebo.

Table 9 depicts the results of the placebo test of strategic decisions and return metrics using the instrumented Female values predicted in Panel A of Table 5 and Crisis Placebo. It is apparent that the coefficients of the interaction term are insignificant for all strategic decisions and performance variables, among them the quick ratio, acquisitions, and Tobin´s Q, which were significant in the IV analysis in Table 5. Taken together with the insignificant coefficients of Crisis Placebo and the significant effects of Crisis in the IV analysis, this placebo test provides additional support for the validity of hypotheses *H1d*, *H1g,* and the first part of *H1e,* and verifies that the presence of an economic crisis indeed influences strategic decisions and performance of firms with different levels of female representation in their executive boards.

Table 9 – Placebo test of strategic decisions and return metrics using Crisis Placebo

Table 9 illustrates the second-stage IV regression results of the placebo test of strategic decisions and return metrics analysis using the Crisis variable as the placebo variable and the instrumented values predicted by the state-level gender equality index proposed by Sugarman and Straus (1988) as an instrument for the fraction of female executives. For the first stage IV estimates, please refer to Panel A of Table 5. The dependent variables are Debt Issuance, Equity Issuance, Leverage, Quick Ratio, Acquisitions, Return on Assets, and Tobin's Q. Crisis Placebo is a binary variable that randomly received the values either 0 or 1. The definitions for the control variables included in the regression can be found in Appendix A. The regression controls for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

Variable	Debt Issuance (1)	Equity Issuance (2)	Leverage (3)	Quick Ratio (4)	Acquisitions (5)	Return on Assets (6)	Tobin's Q (7)
Fitted Female * Crisis Placebo	2.762	-1.499	-0.247	1.060	0.736	0.067	1.326
	(1.25)	(0.75)	(0.86)	(0.69)	(0.85)	(0.49)	(1.00)
Fitted Female	-6.625	26.966***	-1.658***	9.245***	-2.159	-1.435***	22.475***
	(1.25)	(5.64)	(2.64)	(3.37)	(1.45)	(6.63)	(11.90)
Crisis Placebo	-0.580	0.310	0.047	-0.210	-0.153	-0.012	-0.278
	(1.26)	(0.73)	(0.79)	(0.66)	(0.86)	(0.40)	(1.00)
ROA	-0.984***	1.938***	-0.364***	-0.256	0.677***		5.924***
	(2.80)	(5.97)	(8.48)	(1.34)	(6.64)		(50.60)
Size	0.855***	0.661***	0.039***	0.006	0.325***	0.02***	
	(14.62)	(12.47)	(5.43)	(0.19)	(17.77)	(9.01)	
Capex to PPE	0.566***	1.337***	-0.13***	0.38***	0.176***	0.056***	1.017***
	(4.35)	(11.55)	(8.33)	(4.96)	(4.26)	(10.03)	(17.58)
PPE to Total Assets	-0.447***	-0.565***	0.009	-0.432***	0.256***	0.112***	-0.093*
	(2.98)	(3.77)	(0.43)	(4.94)	(5.69)	(18.41)	(1.85)
Market to Book	-0.374***	-0.056***	-0.022***	0.168***	-0.199***	0.033***	
	(16.68)	(3.63)	(8.83)	(12.71)	(26.79)	(34.03)	
PPE	-0.031	0.301***	-0.003	-0.179***	-0.34***	-0.018***	0.056***
	(0.51)	(5.47)	(0.39)	(5.08)	(17.59)	(7.64)	(9.82)
No. of observations	19,793	22,965	28,501	27,246	26,774	28,501	30,786
Adj. R-squared	0.347	0.451	0.345	0.385	0.248	0.355	0.432

Similarly, Table 10 displays the results of the IV bivariate probit analysis of executive turnover using Crisis as the placebo variable. We can observe that the coefficients of Index Value in the first stage are statistically significant at the 1% level and almost identical to those of the IV analysis presented in Table 6. Additionally, consistent with the previous Table, the coefficients of the interaction term and Crisis Placebo in the second stages are statistically insignificant when using both the entire sample and only the sample consisting of CEOs and CFOs, as can be seen in Columns (2) and (4). Therefore, this placebo test provides additional support for the validity of hypothesis *H2* and verifies that the presence of an economic crisis indeed influences executive turnover rates depending on the executive gender.

Table 10 – Placebo test of executive turnover using Crisis Placebo

Table 10 presents the two-stage IV bivariate probit placebo test of executive turnover analysis using Crisis as the placebo variable and the state-level gender equality index proposed by Sugarman and Straus (1988) as an instrument

for FemaleExec, a dummy variable equal to 1 if the executive is a female. Crisis Placebo is a binary variable that randomly received the values either 0 or 1. While Columns (1) and (2) display the first -and second-stage results using the entire executive sample, Columns (3) and (4) depict the two-stage results when considering only CEOs and CFOs. The dependent variable of Columns (1) and (3) is FemaleExec, and the dependent variable of Columns (2) and (4) is Exec. Turnover, a dummy variable equals to 1 if the executive did not continue to serve at the firm in the following year. Executive tenure is defined as the number of years the executive has served on the executive board at the same firm as of year t. The definitions for the control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	No role distinction		**CEOs and CFOs**	
	1st stage	**2nd stage**	**1st stage**	**2nd stage**
Dependent variable	**FemaleExec**	**Exec. Turnover**	**FemaleExec**	**Exec. Turnover**
Variable	**(1)**	**(2)**	**(3)**	**(4)**
Index Value	0.502***		0.632***	
	(5.67)		(4.27)	
Fitted FemaleExec * Crisis Placebo		0.030		-0.011
		(0.99)		(0.14)
Fitted FemaleExec		-1.021***		-0.435*
		(3.27)		(1.93)
Crisis Placebo		-0.010		-0.006
		(1.06)		(0.33)
ROA	-0.619***	-0.839***	-0.235*	-1.058***
	(8.34)	(12.71)	(1.73)	(8.35)
Size	0.06***	-0.010	0.101***	-0.053***
	(12.30)	(1.15)	(11.70)	(5.57)
Market to Book	0.014**	-0.02***	-0.014	-0.028**
	(2.20)	(2.91)	(1.12)	(2.44)
Executive Age	-0.016***	0.011***	-0.021***	0.011***
	(17.43)	(4.66)	(14.74)	(6.57)
Executive Tenure	-0.024***	0.016***	-0.014***	0.013***
	(13.08)	(4.91)	(6.11)	(6.65)
No. of observations	111,171	111,171	43,403	43,403

Finally, the last placebo test examines the robustness of the IV findings on strategic decisions, return metrics and executive turnover using Female and FemaleExec as the placebo variables. In this test, the Female Placebo variable was assigned random values between 0 and 1, while the FemaleExec Placebo variable was assigned binary values of either 0 or 1. The random assignment of values verifies that the original results represent a real effect of Female and FemaleExec on the dependent variables.

Table 11 presents the first-stage IV regression results using the gender equality index as the instrument for the dependent variables Female Placebo and FemaleExec Placebo. The low F-

statistic values ranging from 0.89 to 1.31 in Columns (1) – (3), the insignificant coefficients of the Index Value variable in all columns, and the low F-statistics and insignificant Index Value coefficients in Appendix F, which displays the first-stage OLS IV regression of executive turnover using FemaleExec Placebo, all together indicate that the instrument loses its predictive power and that the index is a weak instrument for the randomly assigned values of the share of female executives and executive gender. This finding confirms the relevance of the index for predicting the actual fraction of female executives and the actual executive gender. Since the results of the first IV stage were all insignificant, the second stage results are not presented as they would be unreliable regardless of the outcome.

Table 11 - Placebo test of first-stage IV using Female and FemaleExec Placebo

Table 11 illustrates the results of the first-stage IV regressions using the state-level gender equality index proposed by Sugarman and Straus (1988) as the instrument for Female Placebo and FemaleExec Placebo. Female Placebo is the dependent variable in Columns (1)-(3), which present the strategic decisions and return metrics analysis. FemaleExec Placebo is the dependent variable in Columns (4) and (5), displaying the executive turnover analysis using the entire sample and the sample consisting of CEOs and CFOs, respectively. Female Placebo represents randomly assigned values for the fraction of female executives ranging from 0 to 1, while the variable FemaleExec Placebo received randomly binary values of either 0 or 1. The definitions for the control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	Strategic decisions	**Return on Assets**	**Tobin's Q**	**Exec. Turnover - no role distinction**	**Exec. Turnover - CEOs and CFOs**
Dependent variable	**Female Placebo**	**Female Placebo**	**Female Placebo**	**FemaleExec Placebo**	**FemaleExec Placebo**
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Index Value	-0.007	-0.015	-0.010	0.030	0.070
	(0.29)	(0.62)	(0.43)	(0.55)	(0.81)
ROA	0.046**		0.041**	0.007	0.029
	(1.98)		(2.06)	(0.14)	(0.36)
Size	-0.007*	-0.007*		0.005	0.009
	(1.73)	(1.67)		(1.39)	(1.62)
Capex to PPE	-0.011	-0.004	-0.012		
	(1.06)	(0.50)	(1.28)		
PPE to Total Assets	-0.034*	-0.024	-0.012		
	(1.67)	(1.20)	(0.83)		
Market to Book	0.003	0.005*		0.001	-0.004
	(1.23)	(1.94)		(0.30)	(0.51)
PPE	0.005	0.005	-0.001		
	(1.32)	(1.20)	(0.39)		
Executive Age				0.001	0.001
				(1.12)	(0.94)

Executive Tenure				-0.001	-0.002
				(0.96)	(1.52)
No. of observations	28,501	29,433	30,901	111,171	43,403
F-statistic	1.31	0.89	1.12		
[P-value]	0.24	0.50	0.35		
Adj. R-squared	0.001	0.000	0.000		

8. Limitations and avenues for future research

Despite the study's insightful findings, the analysis has several limitations that should be acknowledged, most of which are due to data unavailability and constraints. First, while non-crisis years were defined as periods without a recession, firms might still encounter other types of crises, such as firm-specific crises during these years, or alternatively, there might be other major events that influence the market but did not lead to a recession. Such unaccounted crises could affect the robustness and interpretation of the findings. Future research could define crisis in different ways to explore the effect of crisis definition on the analyzed dependent variables.

Second, the Crisis variable in this thesis is measured on an annual basis. However, this does not accurately capture the timing and duration of the crises considered, as the crises do not necessarily conform to calendar or fiscal years. For instance, the duration of the Covid-19 recession was only two months, from February 2020 until April 2020. Nevertheless, the entire year of 2020 was considered a crisis year, and the effect on society lasted even longer than a year. This discrepancy between the variable measurement and the actual crisis occurrence could lead to an under- or overestimation of the true impact of crises on firm decisions and performance. The reason for considering crises this way is that the executive data collected from ExecuComp is only available on an annual basis. With hand-collected data, future research could attempt to gather monthly or quarterly executive-related data, which would enable more precise matching of the executive data to the actual duration of the crises and, therefore, more accurate results.

Third, the generalizability of the results to other markets with different cultural and market characteristics is limited. The glass cliff phenomenon and crisis management styles might manifest differently across countries due to cultural differences. For example, while the study has found that firms with a higher share of female executives are more conservative during a crisis, it may not hold true in other markets like Western Europe or the Middle East, where societal attitudes towards gender roles are different. Consequently, further research of different countries would help determine whether the results of this thesis are applicable to other markets outside the US.

Fourth, one main limitation of this study is the potential weakness of the IV used, as evidenced by the inflated IV estimates observed. Although the first-stage IV regressions indicated that the gender equality index is a strong instrument, expressed by the high F-statistic and significant coefficients of Index Value at 1%, the excessively large coefficients in the second stages suggest that the instrument may not be strong enough to provide reliable estimates. As a result, while the direction of the relationships identified in the study provides useful insights, the magnitude of the estimated effects should be interpreted with caution. Therefore, future researchers are encouraged to search for a more reliable and accurate instrument to validate the findings and provide more insights into the magnitude of the examined effects.

Fifth, this study does not differentiate between the impacts of different executive roles on corporate decisions and performance. Executive roles such as CEOs and CFOs likely have more significant influence on key strategic decisions like firm leverage or equity issuance compared to roles like CHROs or CMOs. Therefore, the observed effects in the analysis might be biased if the female executives in the sample held more influential positions. For instance, due to the importance of these roles, a firm with a female CEO with a low share of female executives may reach even higher Tobin's Q valuations and engage in fewer acquisitions than a firm with a male CEO with a higher share of female executives. Future research could explore the impact of gender differences in various roles, which may potentially help obtain a more accurate picture of gender differences on executive boards. However, conducting such an analysis would require a significant amount of hand-collected data to accurately classify the roles of the executives, which was beyond the scope of this study.

Lastly, another main limitation of the study is that the underlying economic, political, or legal environment of some US states might have evolved or changed since 1988, which would limit the relevance of the index as an instrument as the index might not be able to predict observations in more recent years correctly. This might also explain the reason for the inflated estimates of the IV analysis. In future research, using a lagged index available for multiple years will enable a more accurate estimation of the states and, as a result, the fraction of females.

9. Conclusion

This thesis explored the rationale behind the glass cliff phenomenon, which posits that firms are more likely to promote women to top leadership positions during times of crisis. By analyzing a large sample of public US firms from 1993 to 2021, this study investigated the impact of maintaining a higher share of female executives on key strategic decisions, firm performance, executive turnover, and announcement CARs of acquisitions and equity issuances during economic crisis times.

The findings of the study substantiate the rationale behind the glass cliff, indicating that a higher share of females on executive boards is strategically advantageous during economic crises. Specifically, firms with a higher fraction of female executives pursue a more conservative strategy during times of economic crisis, resulting in higher liquidity levels, fewer acquisitions, and higher Tobin's Q valuations. Moreover, female CEOs and CFOs are less likely than their male counterparts to experience turnover during economic crises, reaffirming the "think crisis – think female" phenomenon, as the market reacts positively to a higher presence of females on the executive boards during crisis times, leading to lower turnover rates of such executives. Furthermore, this effect could not be observed when considering the entire sample, which highlights the varying impact of different roles. On top of that, the fraction of female executives does not seem to influence the abnormal returns of acquisition and equity issuance announced during an economic crisis. In addition, despite the counterintuitive results from the initial baseline regressions, the econometric approaches used in this thesis, namely the IV analysis, the placebo tests, bivariate probit model, and the Heckman selection model, attempted to correct for endogeneity issues present in the initial regressions and ensure more robust and reliable findings.

The results of this thesis have relevant implications for corporations. This study provides insights into how gender composition in top management can influence corporate strategies and performance during periods of economic crisis and highlights the benefit of having more women in executive positions as a clear strategic advantage in crisis management. Firms that seize this

opportunity are more likely to manage an economic crisis in a way that is perceived more positively by the market.

Finally, one of the main limitations of this study is the potential weakness of the instrument used, leading to less reliable coefficient estimates. Finding an alternative stronger instrument in future research will help validate the findings and give more evidence to the magnitude of the effects found in this study. Additionally, future research should analyze alternative definitions for the Crisis variable and collect more detailed hand-collected role- and executive-specific data to further validate and expand upon the thesis's findings.

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Appendix

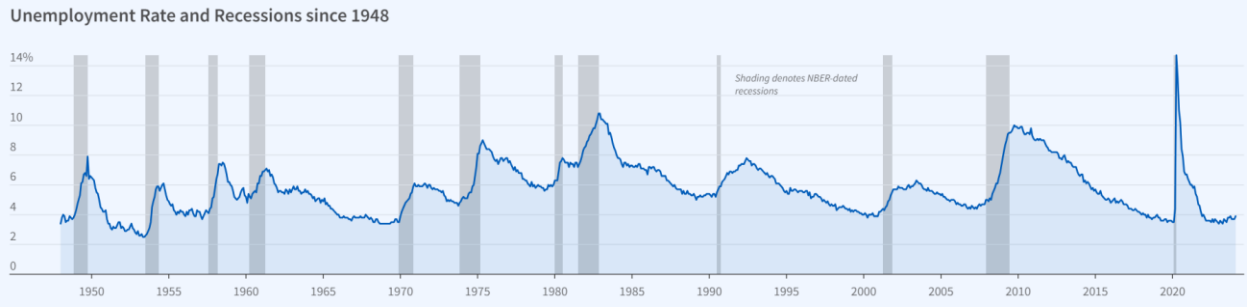
Appendix A – Variable definitions

This table lists all the variables used in the analysis, including their definitions and the methods used for their computation. The approach for computing the financial ratios and metrics is based on Huang and Kisgen (2013).

Variable	Definition	Item numbers	code
Acquisitions	Total annual acquisitions divided by net plant, property, and equipment	item 129 / item 8	aqc / ppent
Capex to PPE	Capital expenditures divided by lagged net plant, property, and equipment	item 128 / lagged item 8	capx / ppent [t-1]
Debt Issuance	The logarithm of annual long-term debt issuance	Log (item 111)	Log (dltis)
Equity Issuance	The logarithm of the annual sale of common and preferred stock	Log (item 108)	Log (sstk)
Female	The division of the number of female executives by the total executive board size	n.a.	n.a.
Leverage	Total debt (long-term debt + short-term debt) divided by the sum of total debt, the book value of common equity, and preferred stock liquidating value minus deferred taxes and investment tax credits.	(item 9 + item 34) / (item 9 + item 34 + item 60 + item 10 - 35)	(dltt + dlc) / (dltt + dlc + ceq + pstkl - txditc)
Market to Book	The ratio of market value of assets (sum of market capitalization, total debt, and value of preferred stock liquidating value minus deferred taxes and investment tax credits) to book value of total assets.	(item 9 + item 34 + item 199*item 25 + item 10 – item 35) / item 6	(Dltt + dlc + prcc * csho + pstkl – txditc) / at
PPE to Total Assets	Net plant, property, and equipment divided by book value of total assets.	item 8 / izem 6	ppent / at

Quick Ratio	Current assets minus inventories as a fraction of current liabilities	(item 4 - item 3) / item 5	(act - invt) / lct
Return on Assets	Operating income before depreciation divided by lagged total assets.	item 13 / lagged item 6	oibdp / at [t-1]
Sales Growth	Percentage change in annual net sales	item 12 / item 12 [t-1]	sale / sale [t-1]
Size	The logarithm of the sum of market capitalization (annual price close * common shares outstanding) and book value of total debt (long + short term debt).	Log (item 199 * item 25 + item 9 + item 34)	Log (prcc * csho + dltt + dlc)
Tobin´s Q	The division of the sum of market capitalization and book value of total debt (long + short term debt) by total assets	(item 199 * item 25 + item 9 + item 34) / item 6	(prcc * csho + dltt + dlc) / at

Appendix B – Recession waves



Adopted from National Bureau of Economic Research, n.d.

Appendix B presents the unemployment rates and recession waves in the US from 1948 to Feb 2024. The shaded areas indicate the dates of NBER-dated recessions.

Appendix C - The state-level gender equality index

Appendix C presents the US state-level gender equality index proposed by Sugarman and Straus (1988), including the rank of each state. The index encompasses economic, political, and legal factors.

State full name	State abbreviation	Index Value
Alabama	AL	0.201
Alaska	AK	0.555

Arizona	AZ	0.458
Arkansas	AR	0.276
California	CA	0.518
Colorado	CO	0.461
Connecticut	CT	0.516
Delaware	DE	0.398
Florida	FL	0.423
Georgia	GA	0.381
Hawaii	HI	0.513
Idaho	ID	0.478
Illinois	IL	0.394
Indiana	IN	0.390
Iowa	IA	0.446
Kansas	KS	0.433
Kentucky	KY	0.459
Louisiana	LA	0.312
Maine	ME	0.547
Maryland	MD	0.539
Massachusetts	MA	0.506
Michigan	MI	0.561
Minnesota	MN	0.525
Mississippi	MS	0.192
Missouri	MO	0.428
Montana	MT	0.491
Nebraska	NE	0.443
Nevada	NV	0.406
New Hampshire	NH	0.494
New Jersey	NJ	0.421
New Mexico	NM	0.344
New York	NY	0.497
North Carolina	NC	0.351
North Dakota	ND	0.341
Ohio	OH	0.489
Oklahoma	OK	0.327
Oregon	OR	0.599
Pennsylvania	PA	0.404
Rhode Island	RI	0.426
South Carolina	SC	0.240
South Dakota	SD	0.370
Tennessee	TN	0.345
Texas	TX	0.305
Utah	UT	0.356
Vermont	VT	0.297
Virginia	VA	0.347
Washington	WA	0.484
West Virginia	WV	0.374
Wisconsin	WI	0.384
Wyoming	WY	0.335

Appendix D - Variable correlation table

Appendix D depicts the firm-level variable correlation table of all the independent, dependent and control variables used in the thesis. The definitions for the control variables included in the regression can be found in Appendix A.

Variable	Interaction Female * Crisis	Female	Crisis	ROA	Size	Market to Book	Capex to PPE	PPE to Total Assets	PPE
Interaction Female * Crisis	1.00								
Female	0.18	1.00							
Crisis	0.92	0.03	1.00						
ROA	-0.09	-0.03	-0.09	1.00					
Size	-0.01	-0.01	-0.01	0.17	1.00				
Market to Book	-0.02	0.05	-0.03	0.50	0.31	1.00			
Capex to PPE	-0.06	0.00	-0.06	0.25	-0.04	0.29	1.00		
PPE to Total Assets	-0.02	-0.07	-0.01	-0.01	0.03	-0.25	-0.28	1.00	
PPE	0.00	-0.07	0.00	-0.02	0.69	-0.18	-0.34	0.62	1.00

Appendix E – First stage IV regression of executive turnover

Appendix E displays the first-stage OLS IV regression of the executive turnover analysis using the state-level gender equality index proposed by Sugarman and Straus (1988) as an instrument for FemaleExec, a dummy variable equals to 1 if the executive is a female. The results using the entire sample are presented in Column (1), and the sample consisting only of CEOs and CFOs is presented in Column (2). The dependent variable in both columns is FemaleExec. The definitions for the control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	No role distinction	CEOs and CFOs
Dependent variable	**FemaleExec**	**FemaleExec**
Variable	**(1)**	**(2)**
Index Value	0.075***	0.075***
	(6.55)	(4.75)
ROA	-0.079***	-0.014
	(7.61)	(1.03)
Size	0.009***	0.011***
	(11.81)	(10.73)
Market to Book	0.002*	-0.002
	(1.91)	(1.16)
Executive Age	-0.002***	-0.002***
	(19.65)	(14.64)
Executive Tenure	-0.003***	-0.001***
	(16.20)	(6.44)
No. of observations	111,171	43,403
F-statistic	193.96	70.83
[P-value]	0.00	0.00
Adj. R-squared	0.033	0.050

Appendix F – First-stage OLS IV regression of executive turnover using FemaleExec Placebo

Appendix F displays the first-stage OLS IV regression of the executive turnover analysis using the state-level gender equality index proposed by Sugarman and Straus (1988) as an instrument for FemaleExec Placebo, a randomly assigned binary variable with the values 0 or 1. The results using the entire sample are presented in Column (1), and the sample consisting only of CEOs and CFOs is presented in Column (2). The dependent variable in both columns is FemaleExec Placebo. The definitions for the control variables included in the regression can be found in Appendix A. The regressions control for industry fixed effects, expressed by the first 3-digit SIC code. The numbers in parentheses indicate the t-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	No role distinction	**CEOs and CFOs**
Dependent variable	**FemaleExec Placebo**	**FemaleExec Placebo**
Variable	**(1)**	**(2)**
Index Value	-0.007	-0.031
	(0.30)	(0.89)
ROA	0.003	-0.010
	(0.16)	(0.31)
Size	-0.001	0.002
	(0.79)	(0.71)
Market to Book	-0.001	0.001
	(0.35)	(0.38)
Executive Age	0.000	0.000
	(0.19)	(0.92)
Executive Tenure	0.000	0.001
	(0.59)	(1.13)
No. of observations	111,171	43,403
F-statistic	0.26	0.59
[P-value]	0.96	0.74
Adj. R-squared	0.000	0.000