Firm Performance and Female CEO Appointments: Glass Cliff or Opportunity?

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Abstract

This paper examines whether poor firm performance affects the likelihood of appointing a female CEO. We first document two key descriptive findings: female CEOs are disproportionately concentrated in low-performing firms, and this sorting explains a substantial portion of the CEO gender pay gap. To identify the causal effect of firm performance on CEO appointments, we exploit unexpected shocks that disrupt a firm's performance trajectory. We find that sudden negative performance shocks significantly increase the likelihood of appointing a female CEO in the short term, a pattern consistent with a "gender glass cliff". We propose a new, previously overlooked, mechanism to explain this result. Because more CEO positions become vacant during crises, and the supply of qualified women is growing over time, the likelihood of female leadership increases—not because of the crisis itself—but via increased CEO turnover.

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1 Introduction

Despite significant progress in recent decades, women continue to be underrepresented in leadership roles, a phenomenon commonly known as the "glass ceiling" (Bertrand et al., 2019; Albrecht et al., 2003). For instance, in S&P 500 companies, women constitute approximately 45 percent of the workforce, yet occupy only 5.8 percent of CEO positions (Fischer et al., 2020). This persistent gender imbalance has motivated extensive research on the barriers that prevent women from reaching the highest levels of corporate leadership. However, while much attention has been paid to the factors that hinder women's advancement, relatively little is known about the conditions under which women are appointed to leadership positions.

In this paper we examine the relevance of another potential invisible hurdle for women—the gender glass cliff. The term, first coined by Ryan and Haslam (2005), refers to women's higher probability of being appointed to leadership positions which are "risky or precarious". Unlike the well-documented glass ceiling, which refers to the invisible barriers preventing women from reaching top positions, the glass cliff suggests that when women do break through, they are more likely to be appointed to leadership roles when firms are performing poorly or facing organizational decline. This phenomenon has been widely discussed in the management and psychology literature (see the meta-analyses by Ryan et al. (2016) and Morgenroth et al. (2020)) and is frequently mentioned in popular media. Yet, systematic causal evidence on its existence is lacking.

We address this gap in the literature by leveraging rich administrative data that allows us to observe both firm performance and CEO appointments. We combine matched employer-employee data, firm financial accounts, and executive board information for the universe of Swedish firms. We start our analysis by documenting three novel descriptive patterns: first, there is a strong negative correlation between firm performance and the gender of the CEO. Conditional on operating in the same industry, year and location, the lowest-performing firms are more than twice as likely to have a female CEO compared with the highest-performing ones. Second, we also find a negative relationship between changes in firm performance, measured by turnover, and the likelihood of female CEO appointments. Third, the systematic sorting of female CEOs into lower performing firms explains almost half of the CEO gender pay gap within industry, conditional on observable CEO characteristics and firm size. This clearly calls for a better understanding of the relationship between firm performance and gender of the CEO.

In order to provide causal evidence on the gender glass cliff, we exploit unexpected negative shocks to firm performance, as measured by sudden drops in turnover of at least 20%. We then use a matched differences-in-differences design to trace out the trajectories of shocked firms relative to observationally identical control firms. We first show that there is a sharp and persistent break in the firm performance trajectory after the shock. Crucially, we find that this sudden decline in firm performance significantly increases the likelihood of appointing a female CEO. The increase is of 1.1 percentage points up to two years after the shock, which represents an increase of approximately 16% relative to the mean share of female CEOs in shocked firms in the year prior to the shock (6.7%). These findings are consistent with the existence of a gender

glass cliff, whereby women are more likely to be appointed CEOs in times of crisis. This pattern is particularly strong in firms operating in female-dominated industries and when there are women on the board of directors. This result suggests that the likelihood of CEO appointments is strongly related to the supply of female CEO candidates.

Why do we see this glass cliff phenomenon? The literature puts forward three main explanations. First, while strong leadership is often associated with traditionally male traits, this perception may shift during times of crisis, when stereotypically feminine qualities (e.g. risk aversion) become more valuable. Second, organizations may appoint women or minorities during crises to signal a break from past leadership. Third, the glass cliff phenomenon may stem from discrimination, where women are placed in precarious leadership roles that are high-risk, undesirable, and potentially set up for failure.

We propose a fourth indirect, and previously overlooked channel, which we call the female *opportunity effect*. Because more CEO positions become vacant during crises, and the supply of qualified women is growing over time, we expect the likelihood of female leadership to increase—not because of the crisis itself—but via increased CEO turnover. Indeed, we document that the probability to replace the former CEO increases significantly during economic crises. To examine the relevance of the opportunity effect further, we look at changes in female leadership in firms experiencing a CEO retirement. Compared to matched control firms, the timing of CEO retirement is unrelated to firm performance. In contrast, the likelihood of appointing a female CEO increases by 8.4 percentage points. This effect, when scaled by the impact on CEO turnover, is almost identical to the impact of a firm performance shock on female CEO appointment. This suggests that increases in CEO vacancies are the main mechanism behind the increase in female CEOs after a performance shock.

Finally, we study whether being appointed CEO after a negative firm performance shock is associated with worse career outcomes. We compare the earnings trajectories and the probability of being CEO of men and women who are appointed CEO after a negative-demand shock or after a CEO retirement shock. While we do not find evidence of slower earnings growth for women appointed CEO after a performance shock, we do observe these positions are associated with a shorter tenure as CEO, consistent with them being more precarious.

With this paper, we contribute to three different strands of the literature. First, we build on a large literature in economics documenting gender disparities in the labor market and their evolution over time, as well as the causes and consequences of such gaps (Bertrand, 2011; Blau and Kahn, 2006; Cortes and Pan, 2022; Goldin, 2014). A consistent finding is that women's underrepresentation is more severe and persistent when considering the highest-ranked positions within firms and the top of the income distribution (Bertrand, 2018; Blau and Kahn, 2006; Boschini et al., 2020; Keloharju et al., 2022). We contribute to the set of papers that document the underrepresentation of females in executive positions and study some of the potential determinants, such as the gender composition of the board (Matsa and Miller, 2011; Bertrand et al., 2019), the area of specialization of top executives (Smith et al., 2013), or the corporate culture (Keller et al., 2023). We take a different perspective by examining whether women are promoted under different conditions—specifically, when firms are performing poorly.

Second, we provide novel evidence on the existence of the gender glass cliff and its potential drivers. As described in Section 2, previous studies typically conducted archival searches of new board or CEO appointments for smaller samples of listed firms, and then compared the evolution of firm performance in the years leading up to such appointments according to the gender of the newly appointed executive. These approaches make it difficult to disentangle if women's appointments are due to drops in performance or might respond to other potential unobserved differences between firms. By combining high-quality administrative data on the universe of all Swedish firms with a matched differences-in-differences analysis of large and unexpected performance shocks, we offer novel credible evidence on the existence of the glass cliff. We also advance the existing knowledge by showing that these patterns are largely explained by an opportunity effect, as crises increase the availability of CEO vacancies.

Third, we also contribute to the large and growing literature on the pass-through of economic shocks to workers by examining how these shocks differently impact women's and men's opportunities at the top of the corporate ladder. Prior research consistently finds evidence of rent-sharing, where negative performance shocks are partially absorbed by workers (see Card et al. (2018) for a review of the literature). Additionally, other studies highlight that firms also adjust along different margins in response to economic shocks, such as employment reductions (Carlsson et al., 2021; Maibom and Vejlin, 2021) or changes in the firm's hierarchical structure (Friedrich, 2022).

The rest of the paper is structured as follows. The next section outlines the glass cliff hypothesis and summarizes the available empirical evidence on its existence, as well as the hypothesized explanations. Section 3 describes the data we use and Section 4 our empirical strategy. Section 5 presents our main results. In Section 6 we discuss the mechanisms behind our findings, Section 7 descriptively explores the consequences of different types of CEO appointments, and the final section concludes.

2 The Gender Glass Cliff Phenomenon

As women's representation in company boards and C-suites increased over time, so did the interest in evaluating their leadership skills and their potential effects on firm performance (e.g. Ahern and Dittmar, 2012; Bertrand et al., 2019; Flabbi et al., 2019; Gagliarducci and Paserman, 2015; Smith et al., 2006; Wolfers, 2006). Some papers document negative correlations between the share of females represented in leadership positions and different measures of firm performance, with most studies finding that these associations disappear once firm fixed effects are accounted for (Flabbi et al., 2019; Gagliarducci and Paserman, 2015; Smith et al., 2006).

The term "glass cliff" was first used by Ryan and Haslam (2005) to suggest a new explanation for the observed negative correlation between firm performance and female leadership: women are appointed to leadership positions, as board members or CEOs, to a greater extent amid downturns in company performance. As such, their positions entail a greater risk and can be seen as more fragile or precarious. To provide evidence in favor of this hypothesis, they conduct an archival search of appointments of new board members in 2003 among FTSE 100 companies

operating in the London Stock Exchange. They compare the evolution of firms' average share price in the months leading up to the new appointment between firms which appointed a female board member compared to those appointing a male board member, and find some evidence consistent with the existence of a "glass cliff".

The "glass cliff" phenomenon was henceforth explored, mostly through archival and qualitative studies, in the management and psychology literatures (Ryan et al., 2016; Morgenroth et al., 2020). Most of these papers adopt a similar approach to that in Ryan and Haslam (2005) in that they identify new board or CEO appointments in listed firms in different settings (mostly in the UK and the US), and then compare the evolution of past firm performance by the gender of the new appointee.[1] Overall, the findings emerging from these papers are consistent with the hypothesis of a glass cliff both for women and other minorities, although not in all cases (Li et al., 2025).[2] For instance, several articles find that there are only significant differences in firm performance before the new appointment when studying market-based measures of performance (such as stock prices), but not when studying accountancy-based performance measures (Haslam et al., 2010; Ryan et al., 2016).

The nature of these analyses makes it difficult to ascertain if there is a causal relationship between firms' negative performance and women's promotions to leadership positions, as firms which decide to appoint leaders of different genders might also differ in a host of observable and unobservable characteristics. In any case, the idea of a glass cliff has become a recurring theme in media narratives, and the concept is often cited in news articles when high-profile cases emerge (e.g. Clark, 2010; Olen, 2012; Trop, 2014).

Why would women be more likely to be appointed CEOs or top executives in times of crisis? Some studies adopt an experimental vignette approach and present participants with the CVs of identical male and female candidates for a leadership position in a hypothetical company with different past trends in firm performance. Although there are no differences in the evaluation of different candidates in good times, participants tend to favor female over male candidates and evaluate them as more suitable leaders in times of declining firm performance (Bruckmüller and Branscombe, 2010; Haslam and Ryan, 2008). Three main explanations for these patterns have been proposed in the literature (Ryan et al., 2016; Morgenroth et al., 2020). First, while good leaders are generally associated with stereotypically masculine traits, this association has been found to weaken in times of crisis, when stereotypically feminine traits are regarded as more important—a phenomenon which has been labeled as "think crisis–think female" association. A second explanation is that organizations might appoint females or other minorities as leaders in times of crisis as a signaling device, to indicate a departure from former leadership choices. Finally, the glass cliff phenomenon could also respond to prejudice, whereby women are appointed to precarious leadership positions which are risky, undesirable, and might set them up for failure. While previous work has found some evidence consistent with each of

[1] One notable exception is Mulcahy and Linehan (2014), who instead identify listed firms in the UK incurring into a negative profit and compare the changes in board diversity in the following year to those observed in a sample of similar-sized firms in the same industry which are in a positive profit trajectory.

[2] Outside corporations, patterns consistent with a gender "glass cliff" have also been identified in other domains, such as politics (O'Brien, 2015) or sports (Wicker et al., 2019).

these hypotheses, there is to date no conclusive evidence on the drivers behind the gender glass cliff.

3 Data

Our study uses administrative data covering the entire Swedish workforce, firms, and their boards from 2004 to 2016. Various datasets are linked using (anonymized) person and firm-level identifiers in order to construct a panel where we observe who the CEO is, whether the CEO is female or male, and firm performance measures on an annual basis.

In Sweden, all incorporated firms are required to have defined boards, and from 2004 onward, a national register has recorded the personal identifiers of all board members, including the CEOs. These identifiers allow for the linking of board data with other administrative records. We use the Louise/Lisa database to identify the gender of the CEOs as well as their age and education level. We also link individuals to the Employer-Employee Registry to obtain information on their total annual labor earnings.

On the firm side, we incorporate annual financial data, including information on turnover from Statistics Sweden's business register on firm-level accounts. Turnover is the income from the firm's normal operations of goods and/or services. We compute turnover per worker as turnover divided by the number of workers recorded in the firm accounts. In addition, we add firms' industry affiliation, size, and location from the firm-level register Ftgast. Industry is based on one-digit SNI 2002 codes.

Throughout our analysis, we restrict the sample to incorporated private sector firms with at least two employees. To diminish the influence of extreme values, we winsorize turnover and value added at the 1^{st} and 99^{th} percentiles of their yearly distributions.[3] We also exclude financial firms from the analysis as these firms are missing from the financial accounts. Other sample restrictions are listed where applicable in the text.

4 Empirical Strategy

We are interested in analyzing how the likelihood of hiring women in leadership roles changes in times of firm crises. To operationalize firm crises, we exploit sudden drops in turnover as a proxy for a negative demand shock to the firm. Since our interest is in firms with formalized structures that make managerial decisions, we focus on firms with at least 50 employees four years prior the shock. We then match shocked firms to observationally-similar but unshocked firms, and analyze the changes in their outcomes around the time of the event. This section describes each of these steps in detail.

4.1 Shocked firms

We define a firm as "shocked" the first time it experiences a drop in turnover of at least 20%. We apply three additional restrictions. First, shocks are only defined once firms are observed for

[3] Before winsorizing, we drop observations where turnover ≤ 0.

at least five consecutive years. This ensures that we do not define as shocked new firms, which may have more variable demand in their initial years of existence. Second, to avoid capturing the higher volatility of small firms, we require firms to have at least 10 employees in the year prior to the shock. Third, to be able to follow firms both before and after the shock, we focus on those that are first shocked between 2007 and 2014.

Table 1 includes summary statistics for the sample of shocked firms in the year prior to the drop in demand. Turnover on average drops by 36% when the firms are shocked. 6.7% of the firms have a female CEO in the year prior to the shock, and 11.6% of individuals on the board are women. Most firms (86%) are medium-sized with 50–249 employees.[4] Around half of the shocked firms are in manufacturing and nearly half of the shocks occur in 2009 (see Figure A.1). This is in line with that some, but not all, likely relate to the Great Recession, which predominantly hit exporting firms in Sweden.

Table 1: Summary statistics for Shocked Firms at τ-1

Female Representation in Leadership	
Share of female-CEO firms	0.067
Average % of women in board	0.116
Firm Performance	
Turnover(SEK)	241,763,688
log(turnover)	19.030
Magnitude of Turnover Shock	-0.363
Firm Size	
Firm size 10-49	0.059
Firm size 50-249	0.864
Firm size 250+	0.077
Industry Composition	
Agriculture	0.004
Mining	0.002
Fishing	0.000
Manufacturing	0.477
Utilities	0.003
Construction	0.095
Wholesale retail	0.124
Hotel/Restaurant	0.009
Transport	0.070
Business services	0.170
Education	0.007
Health/Social Work	0.023
Other Services	0.015
Observations	1211

Notes: Outcomes are measured one year before the negative turnover shock. The unit of observation is firm × year.

[4]Note that we restrict the sample to firms with at least 50 employees four year prior to the shock. Firms are allowed to be shrinking over time, so that they could have less than 50 employees in the year prior to the shock.

4.2 Matched Differences-in-Differences

Firms that experience negative demand shocks may systematically differ from firms that do not. In order to estimate causal effects on management composition for firms in distress, we combine a matching with an event study approach, comparing shocked firms to observationally similar non-shocked firms, before and after the demand shock. This approach is similar to that adopted in Adams et al. (2024) and Adams-Prassl et al. (2023), in turn related to the stacked difference-in-differences approach in Cengiz et al. (2019). We build our control group from firms which do not experience shocks at any point during our sample period.

Formally, we match perfectly on the one-digit industry, gender of the CEO and firm size category (50–249, 250-999 or 1000+ employees) four years prior to the shock. Within these coarsened exact match groups, we find the five nearest neighbors based on the estimated propensity score from a logit model that controls for a wider set of covariates. In particular, this model includes the number of employees and turnover in -3, the change in the number of employees and in turnover between -3 to -2, and the share of females on the board in -3 and -2. We only include the firms for which we find exactly five matches in the analysis. As shown in Table A.1, which reports balance statistics for the shocked and non-shocked firms, the matching works well and the two firm types are observationally similar. This is true also for variables we do not target, such as the firm's annual result.

With the matched control and treatment observations, we estimate the following regression:

$$y_{ft} = \sum_{j=-4, j\neq -1}^{2} \lambda_j E_j + \sum_{j=-4, j\neq -1}^{2} \beta_j (Treat_f \times E_j) + \theta_f + \delta_t + \varepsilon_{ft} \tag{1}$$

where y_{ft} is our outcome of interest for firm f in calendar year t. τ is the year of the firm shock, and $j = t - \tau$ is the year relative to the shock. $Treat_f$ is equal to one for the shocked firms, and E_j are time since firm shock indicators. We include firm fixed effects θ_f to control for time-invariant differences across firms, and calendar year fixed effects δ_t to control for general changes in our outcomes of interest over time. Standard errors are clustered at matched-pair level. β_j are the coefficients of interest, which compare the evolution of the outcome in shocked versus observationally similar but non-shocked firms over time. The year prior to the shock is omitted, which means we estimate effects relative to the year before the firm shock.

The key identifying assumption for our analysis is that the probability of having a female CEO in firms who experience a negative performance shock would otherwise have evolved similarly to their matched controls following the event. Estimates from Equation 1 will provide visual support for the parallel trends assumption.

The event study analysis will show the dynamic effects of the shock on the different outcomes. To obtain aggregate estimates of the impacts of the firm shocks, we also estimate a differences-in-differences version of the same regression. We use the same time window and estimate the following equation using the sample of matched treated and control firms:

$$y_{ft} = \beta Treat_f \times Post_j + \theta_f + \delta_t + \varepsilon_{ft} \tag{2}$$

where we replace the event-time indicators with a single $Post_j$ indicator that takes the value one from the year of the firm shock onward. Similarly to the event study analysis, we also control for firm and calendar year fixed effects. The coefficient of interest is β, which measures the average change in outcomes for shocked firms relative to unshocked firms after the sudden decline in performance.

5 Results

5.1 Descriptive Evidence: Where Do Female CEOs Work?

Before focusing on the shocked firms, we provide a description of where female CEOs work in the universe of firms and how this relates to firm performance. We classify firms into ten firm performance deciles based on persistent differences in firm turnover per worker, following the firm ranking procedure developed by Åslund et al. (2021). We then compute the share of female CEOs by performance decile and consider how the shares have evolved over time.

Firm performance deciles are computed by dividing the empirical distribution of firm fixed effects from the following regression into deciles:

$$\ln(turnover/N)_{ft} = \beta_f + \delta_t + \varepsilon_{ft} \tag{3}$$

where $\ln(turnover/N)_{ft}$ is log turnover per worker for firm f in calendar year t, β_f are firm fixed effects, δ_t are year fixed effects, and ε_{ft} is an error term.

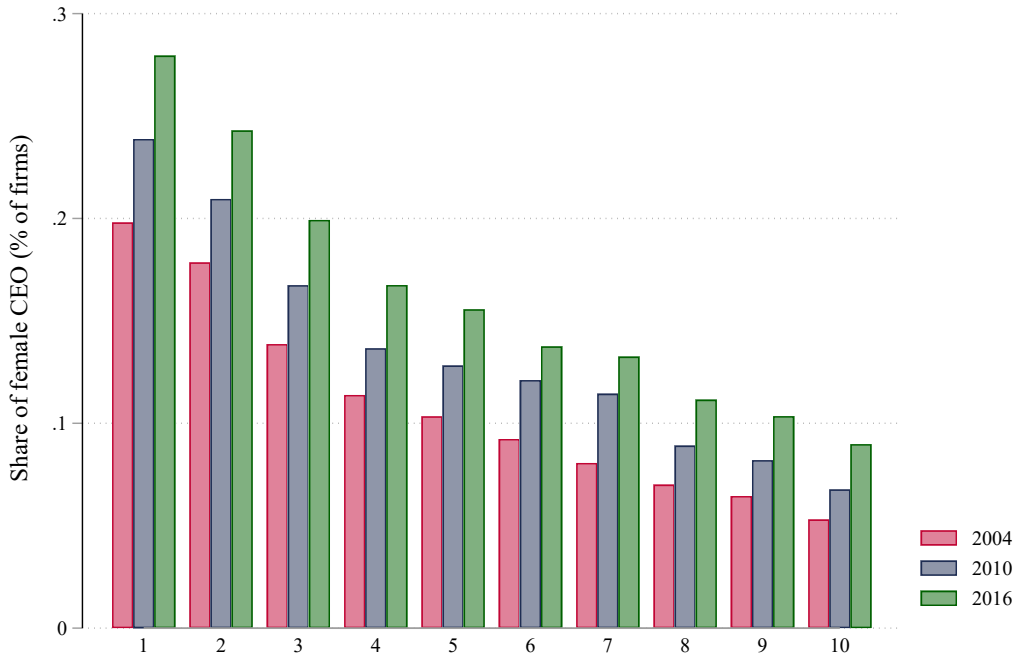
Figure 1 shows the results of this exercise. Two key patterns stand out: (i) women are over-represented in lower performing firms, and (ii) the share of female CEOs has increased across firms of all levels of performance over time.[5] The over-representation of women in less productive firms is also evident when we compute the distribution of male and female CEOs across the performance distribution (see Appendix Figure A.3).

That women on average work in lower performing firms could be related to the fact that they are overrepresented in certain industries. The distribution of female and male CEOs across industries (see Figure A.4 in the Appendix) indeed shows that, while wholesale and retail and real estate/business services are the most common industries for both men and women, women are also overrepresented as CEOs compared to men in health and social work and hotels and restaurants, and underrepresented in manufacturing and construction.

Figure 2 therefore predicts the share of firms with a female CEO by productivity decile using a linear probability model, after controlling for industry by location by year fixed effects. There is still a clear negative pattern: female CEOs are twice as common in the lowest-performing

[5] In Figure A.2 in the appendix we instead plot the share of firms with a female CEO over time, as well the mean share of women on the board. These reveal a similar pattern: there has been a gradual increase in the share of women reaching top leadership positions over our study period.

Figure 1: Share female CEOs by firm performance and over time

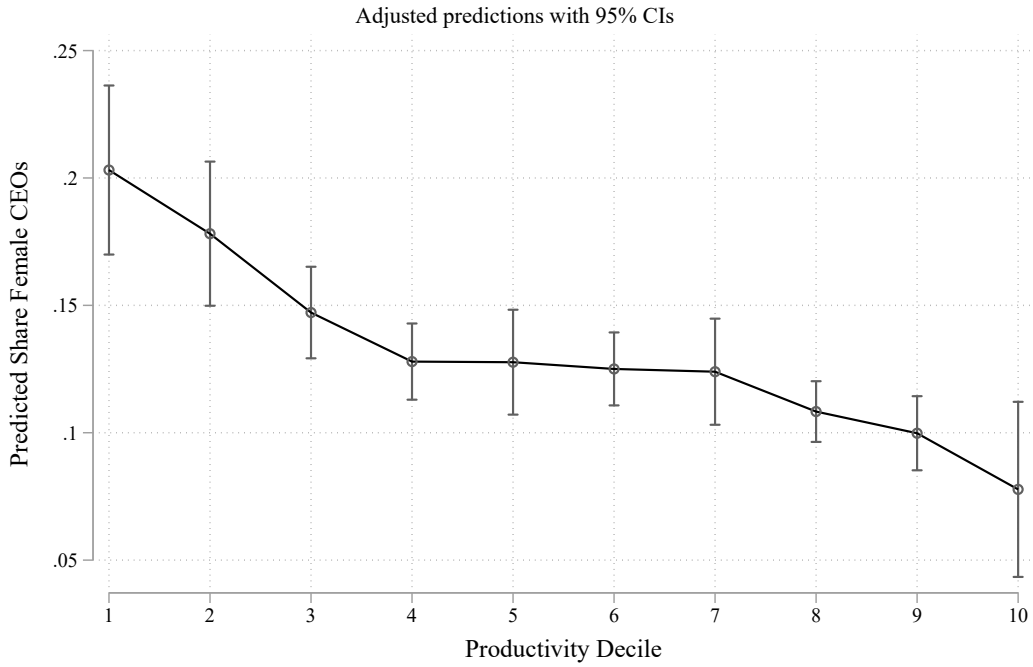


Notes: This plots the share of female CEOs by performance decile and year (2004, 2010, 2016), using the data described in Section 3. Decile 1 refers to the lowest performance decile.

firms compared to the highest-performing ones. This shows that selection across industries does not explain the negative relationship between firm performance and the share of female CEOs. Separate analyses by broad industries suggest that the negative relationship between firm performance and presence of female CEOs is a general phenomenon observed across all industries, with the exception of hotels and restaurants (itself a low-productivity industry).

How much does this sorting of female CEOs into firms with lower performance contribute to gender inequality at the top? Table 2 estimates the gender pay gap among CEOs in our sample. The first column presents the coefficient estimate on an indicator for having a female CEO in an unadjusted regression of log annual earnings on the gender of the CEO which only controls for year fixed effects. We see that, on average, female CEOs earn 20% less than their male counterparts. In the next columns, we cumulatively control for different sets of observables. The gender gap in CEO pay increases to about 26% when controlling for individuals' age and education, given that female CEOs are on average more educated than males (column 2). Controlling for tenure at the firm in column 3 reduces the gap only marginally. A substantial share of the gender gap can be explained by sorting across industries and, especially, across firms of different sizes: column 4 shows that the gap shrinks to 21% when industry fixed effects are included; in column 5, incorporating firm size fixed effects further reduces it to 15%. The fact that a substantial part of the CEO gender pay gap can be explained by female CEOs working in smaller companies mimics the findings by Bertrand and Hallock (2001). Finally, in column 6 we explore the role of sorting across firms with different performance levels by adding fixed effects for the performance decile of the firm. The gender pay gap is reduced to 8.4%, suggesting that

Figure 2: Predicted share female CEOs by firm performance



Notes: This shows the predicted share of female CEOs by performance decile, from the following linear probability model: $CEO_{female,ft} = \alpha + \sum_d Decile_d + \gamma_{itr} + \varepsilon_{ft}$ where γ_{itr} are $industry \times year \times location$ fixed effects. Standard errors are clustered by industry.

sorting by productivity explains around 44% of the gender gap in CEO pay within industry, conditional on firm size and individual characteristics.

Given the relevance of firm performance in explaining the gender gap in CEO's pay, a key open question is whether this pattern is entirely driven by women self-selecting into industries or firms with different productivity levels, or whether supply-side factors also play a role in explaining this sorting. In particular, is firm performance itself explaining part of this relationship through the gender glass cliff phenomenon?

Before moving to our matched event study, we first explore descriptively the relationship between past firm performance and female CEO appointments. We relate the lagged change in turnover in firm f between $t-1$ and $t-x$ to the likelihood of having a female CEO in t. We include the universe of firms described in Section 3, imposing the restriction that the firm must be present for at least five consecutive years. We also include industry by calendar year fixed effects to control for differences in the gender composition of CEOs across industries and time. Table 3 shows that there is a negative correlation between firm performance and women in leadership roles: as turnover drops, there is an increase in the future likelihood of having a female CEO. For example, a 20% drop in turnover is associated with an increase of 0.16 percentage points in the probability of appointing a female CEO. These patterns are consistent with the glass cliff hypothesis. Given the potential existence of omitted variables that drive both the changes in firm performance and the managerial choices, in the next section we turn to the analysis of unexpected firm shocks in a matched differences-in-differences design.

Table 2: Gender gap in CEO pay

	(1)	(2)	(3)	(4)	(5)	(6)
Female CEO	-0.201***	-0.259***	-0.255***	-0.210***	-0.149***	-0.084***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Age & Education	No	Yes	Yes	Yes	Yes	Yes
Tenure in Firm	No	No	Yes	Yes	Yes	Yes
Industry	No	No	No	Yes	Yes	Yes
Firm Size	No	No	No	No	Yes	Yes
Productivity Controls	No	No	No	No	No	Yes
N	383546	383546	383546	383546	383546	383546
Male CEO Avg. Earnings	603061.32	603061.32	603061.32	603061.32	603061.32	603061.32
R^2	0.017	0.116	0.137	0.159	0.306	0.366

Notes: This table shows how the gender gap in CEO pay changes when sequentially accounting for different observables. Using a sample of CEOs, the table presents the results from regressions of log annual earnings on a dummy equal to one if the CEO is a woman and different sets of fixed effects, as indicated in the different columns. Standard errors are clustered at the firm level. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table 3: Changes in firm performance and future appointments of female CEOs

	(1) (t-1)–(t-2)	(2) (t-1)–(t-3)	(3) (t-1)–(t-4)
Δ log(turnover)	-0.0071801***	-0.0075434***	-0.0087428***
	(0.0018677)	(0.0022310)	(0.0026147)
N	297475	256581	215687
R^2	0.063	0.063	0.062
Mean share female CEOs	0.115	0.115	0.115

Notes: This table shows estimates from the regression $CEO_{female,ft} = \Delta_x \ln(turnover)_{f,t-1} + \lambda_{it} + \varepsilon_{ft}$. The regressions separately consider the correlation between the change in turnover between $t-1$ and $t-2$ (col. 1), $t-1$ and $t-3$ (col. 2) and $t-1$ and $t-4$ (col. 3) and the probability of having a female CEO in year t. λ_{it} are industry by year FEs. Standard errors are clustered by industry.

5.2 Matched Differences-in-Differences Results

We now present the effects of sudden negative drops in firm performance, based on the matching approach described in Section 4, on turnover and number of employees, and on the gender of the CEO. We show the results from our dynamic event study, which allows us to inspect pre-trends in outcomes as well as dynamics in treatment effects.

5.2.1 Firm Performance

We start by analyzing how firm shocks impact firm performance in Figure 3. Prior to the negative shock, shocked firms and non-shocked were following a very similar trajectory. Turnover levels are somewhat lower in shocked firms compared to their matched control firms prior to the shock, relative to their difference the year before the shock, but the level differences are constant over time (panel (a)).

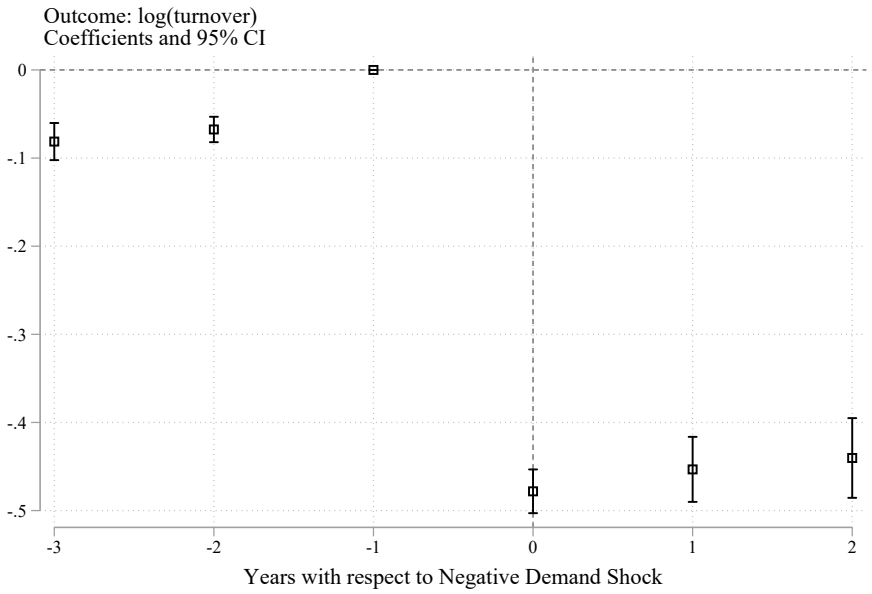
In the year of the shock, there is a sudden drop in turnover of nearly 50 percent. Turnover continues to be lower (around 40 percent) during the following two years. Additionally, panel (b) shows that there is a 25 percent drop in firm size, suggesting that the drop in turnover also implies significant downsizing. There is a persistent decrease in the number of employees for the following two years that corresponds to around 22 fewer employees at the shocked firms (see Appendix Table A.2). Note that, for this outcome, the trajectory before the shock is also very similar between shocked and non-shocked firms.

5.2.2 Female CEOs

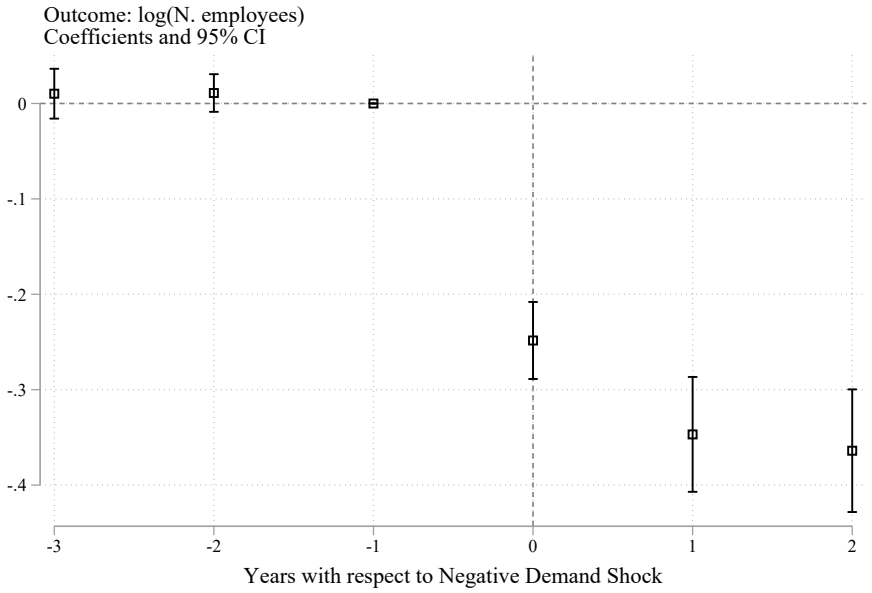
Figure 4 plots estimates for the impact of the firm's negative performance shock on the likelihood of having a female CEO by event time, following our matched difference-in-differences estimation. There is no indication that treated firms were more likely to appoint female CEOs than matched control firms before the sudden drop in performance. The absence of differential pre-trends in the outcome variable provides support for our empirical strategy. This is also supported by an inspection of the raw shares of firms with a female CEO by event time (see Appendix Figure A.5).

Figure 3: Impact of shocks on firm performance

(a) Log Turnover

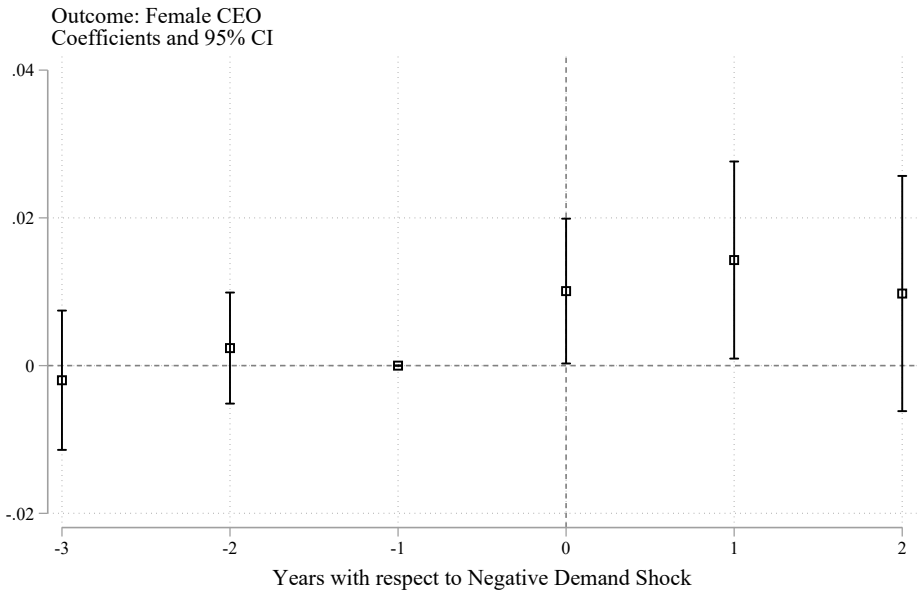


(b) Log Number of employees



Notes: This figure shows the event study results for firm turnover (in logarithms) in panel (a) and for the number of employees (in logarithms) in panel (b) as outcomes, estimated on the sample of matched shocked and non-shocked firms, using the specification in equation (1).

Figure 4: Impact of shocks on likelihood of having a female CEO



Notes: This figure shows the event study results for female CEO as an outcome, estimated on the sample of matched shocked and non-shocked firms, using the specification in equation (1).

After the shock, we observe a statistically significant increase in the likelihood of appointing a female CEO. In terms of the size of the effect, the likelihood of having a female CEO increases by 1.1 percentage points (see Table 4, col. 1). Matched control firms on average have 1.8% female CEOs in the year prior to the demand shock. The estimate therefore implies that the share of firms with a female CEO increases by 61% in times of crises. That the relative size of the effect is large owes to the fact that the starting level of matched firms with a female CEO is low. Four years prior to the shock, no treated or control firms have a female CEO. A more natural comparison may be the overall sample of shocked firms themselves. In the year prior to the shock 6.7% have a female CEO, implying the shock increases the fraction of female-led firms by 16%. As we would expect, we also observe an increase in the CEO turnover of around 9 pp (column 2). We neither detect a statistically significant effect of the firm shock on the share of females on the board nor on the size of the board, which remains around 4 individuals on average (see Table A.2).

The CEO themselves are typically appointed by the board of directors. We see that there is a positive correlation between the share of female CEOs and the share of women on the board in the aggregate data (Appendix Figure A.6).[6] We assess heterogeneity by the presence of females on the board by dividing firms into "no female on board" and "female on board". Firms fall into the former category if they have not had a female on their board at any point in the years leading up to the shock, and the latter otherwise. The heterogeneity analysis indicates that, for both types of firms, the negative demand shock increases CEO turnover (columns 4 and 6, respectively); however, the effect on female CEO appointments is only visible in firms where there is at least one female on the board in the pre-shock period (column 5).

[6]The same figure also shows that the majority of firms have no females on their board.

Table 4: Effect of negative demand shocks on CEO changes and heterogeneity by female representation on the board

	All		No Female in Board		> 0 Female in Board	
	Female CEO	Change CEO	Female CEO	Change CEO	Female CEO	Change CEO
Treat X Post	0.011**	0.090***	0.004	0.087***	0.024**	0.041**
	(0.005)	(0.013)	(0.006)	(0.016)	(0.009)	(0.020)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	35197	35202	22517	23256	12680	13140
Control Group Mean (t-1)	0.018	0.214	0.015	0.209	0.022	0.224
R^2	0.432	0.543	0.408	0.502	0.476	0.517

Notes: This table shows the effect of a negative demand shock on the probability of appointing a female CEO (column 1) and on the probability of having a CEO change (column 2), using the sample of matched treated and control firms and the specification in equation (2). Columns 3-6 explore heterogeneity by the gender composition of the board: columns 3-4 show results for the same two outcomes for firms with no female member of the board in the pre-period, while columns 5-6 include firms with at least one female on the board in the pre-period. Standard errors are clustered at the matching group level. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

The estimated effect may also vary by industry type. For instance, some industries may lack a pool of potential female CEOs due to the occupational and industry segregation prevalent in the labor market. We divide our data into "female-dominated industries" and "male-dominated industries" using the median share of female employees by industry in the universe of firms. The median cut-off is 34.9%.[7] The results are included in Appendix Table A.3. We observe that the effect is entirely driven by industries with a higher share of female employees: here, we observe an increased probability of appointing a female CEO of 3.6 pp. We observe no changes in female representation in leadership in traditionally male-dominated industries (such as manufacturing, utilities, construction, and transport).

6 Mechanisms: the Opportunity Channel

Previous work on the gender glass cliff points to several mechanisms behind the appointment of women to top leadership roles during times of crisis: the perception that stereotypically feminine traits are better suited for managing downturns, the symbolic value of signaling a break from prior leadership, and persistent gender bias whereby women are appointed to precarious leadership positions which are risky and undesirable (see Section 2 for more details).

But what if there is an alternative explanation? Perhaps these patterns are not driven by firm performance *per se*, but by the fact that negative performance shocks increase CEO turnover and firms may be more likely to then appoint a female CEO, as the candidate pool is now more diverse than when the previous (typically male) CEO was hired. If this is the case, the increase in female CEO appointments following downturns may reflect an opportunity channel,

[7] In our sample, less female-intensive industries are Manufacturing, Construction, Transport; more female-intensive industries are: Wholesale Retail and Real Estate. Firms operating in Health/Social Work, Hotel/Restaurant, Finance, Education, Other Services or part of the Primary sector are absent.

rather than a glass cliff dynamic. This would also be consistent with the heterogeneity results we document: the increase in female CEOs after a negative shock is concentrated in female-dominated industries, and when there are women on the board, pointing to the availability of women for the position being an important determinant when the CEO vacancy needs to be filled.

To examine this mechanism more carefully, we analyze a different type of shock—CEO retirements—which should be unrelated to firm performance but will lead to leadership turnover. In particular, we first define the treatment group as those firms where the incumbent CEO is last observed in this role at age 60 or later. We then use the same matched differences-in-differences approach described in Section 4 to find observationally similar firms to the treated firms and compare their evolution before and after the shock. Table A.4 in the Appendix shows that the matching procedure works. In addition, Figure A.7 shows that the retirement of the CEO is not associated with differential trends in firm performance.

Figure 5 plots the event study coefficients for the impact of the firm's retirement shock on the likelihood of having a female CEO. We again observe a very similar pattern to that for negative demand shocks: after a retirement shock, firms are more likely to appoint a female CEO. Column (1) in Table 5 shows that the effect is of 6.4 pp, which represents an increase of around 95% (given a very low presence of female CEOs before retirement in both treated and matched control firms).

Retirement shocks increase CEO turnover mechanically. Thus, to compare the effect size across the two types of shocks, panel (b) in Figure 5 scales the estimates for female CEO appointments after demand and retirement shocks by dividing them by the respective coefficients for CEO turnover.[8] The patterns from this analysis are striking: we find that the increase in female representation in leadership positions is very similar across the two types of shocks. This result suggests that the opportunity effect, that is, the vacancy opening after the negative demand shock, is the main mechanism behind the increase in female representation.

In Table 5 we next split the impact of retirement shocks by whether there was a female on the board prior to the retirement (columns 5 and 6) or there was none (columns 3 and 4). Again, consistent with the effect being driven by the availability of candidates to female CEO, we find the same patterns as with negative demand shocks: the increase in CEO turnover is very similar across these types of firms, but the increase in female CEO appointments is larger in firms with prior women on the board. Similarly, we find that the increase in female CEO appointments is higher in female- compared to male-dominated industries (Table A.5).

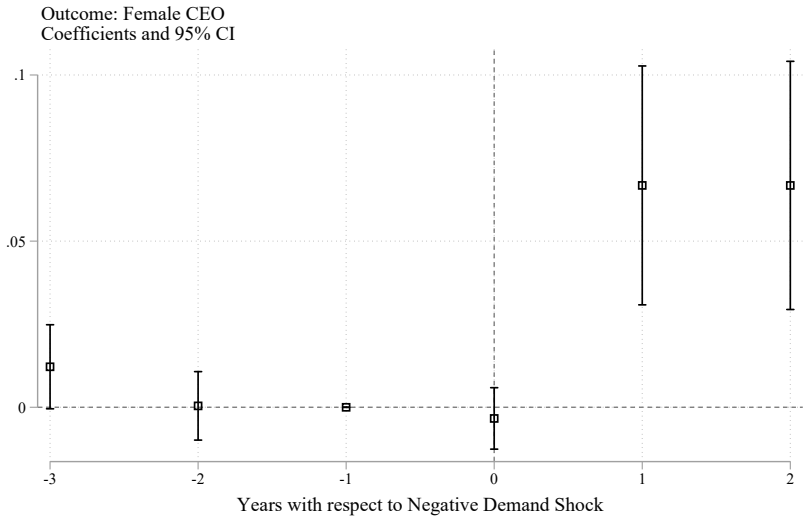
7 Firm Performance and CEOs' Career Trajectories

The evidence presented in the last section suggests that negative firm performance increases female CEO appointments mainly by increasing the availability of vacant CEO positions. In particular, we see very similar changes in female leadership following CEO retirements, which mechanically increase CEO vacancies but are unrelated to firm performance. These findings

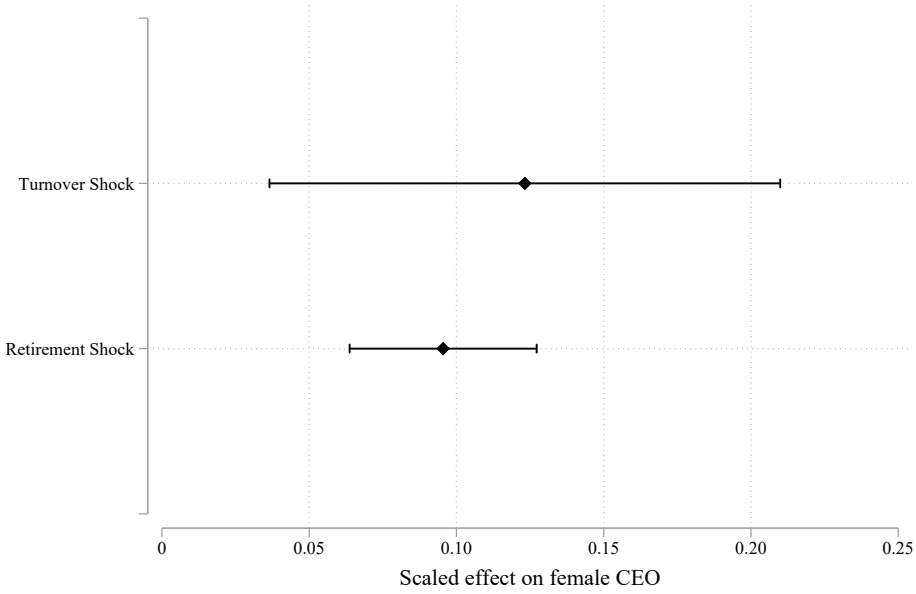
[8] We use bootstrapping to compute standard errors.

Figure 5: Impact of CEO retirements on likelihood of having female CEO and scaled effects of retirement and negative demand shocks

(a) Impact of retirement shocks on having a female CEO



(b) Scaled effects of retirement and negative demand shocks on female CEO



Notes: Panel (a) shows the event study results for the effect of a CEO retirement on the likelihood of appointing a female CEO, estimated on the sample of firms affected by a retirement and their matched controls and the specification in equation (1). Panel (b) shows the scaled effects of retirements and negative demand shocks on the likelihood of having a female CEO. These are computed by dividing the respective DID coefficients from equation (2) for having a female CEO by the estimates for changing CEO. Standard errors are computed through bootstrapping.

Table 5: Effect of CEO retirements on CEO changes and heterogeneity by female representation on the board

	All		No Female in Board		> 0 Female in Board	
	Female CEO	Change CEO	Female CEO	Change CEO	Female CEO	Change CEO
Treat X Post	0.064***	0.675***	0.052***	0.707***	0.077**	0.692***
	(0.018)	(0.014)	(0.018)	(0.020)	(0.031)	(0.023)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	16622	16632	8557	8820	8065	8316
Control Group Mean (t-1)	0.067	0.230	0.045	0.278	0.098	0.356
R^2	0.714	0.607	0.710	0.580	0.721	0.570

Notes: This table shows the effect of a CEO retirement shock on the probability of appointing a female CEO (column 1) and on the probability of having a CEO change (column 2), using the sample of firms affected by a retirement and their matched controls and the specification in equation (2). Columns 3-6 explore heterogeneity by the gender composition of the board: columns 3-4 show results for the same two outcomes for firms with no female on the board in the pre-period, while columns 5-6 include firms with at least one female on the board in the pre-period. Standard errors are clustered at the matching group level. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

are inconsistent with a large disproportionate tendency to appoint female leaders in times of crisis compared to other cases of CEO turnover. However, they do not change the fact that a substantial fraction of new female CEOs are appointed to the position at times of weak firm performance. Therefore, these CEO positions might still be riskier or more precarious, and could have a negative impact on female CEOs' subsequent careers.

In this section, we explore if this is the case by studying the association between different types of CEO appointments with CEOs' earnings trajectories and their tenure as CEOs. To do so, we identify male and female CEO appointments which can be linked to either negative demand shocks or retirement shocks, as defined in our previous analyses.[9] We then study how the earnings of these executives and their probability of being a CEO change before and after their appointment, depending on their gender and the type of appointment (demand- or retirement-shock induced).

Results from this exercise are shown in Figure 6, which displays linear predictions for each year relative to the time of the appointment. These predictions are based on regressions which also account for observable differences between firms suffering different types of shocks, by controlling for industry times year fixed effects and firm size fixed effects (defined in the year prior to the shock), and for the age and level of education of the CEO.

Panel (a) presents the results for earnings. We see that demand-shock appointments are associated with a more visible increase in earnings relative to the year before the appointment compared to retirement-related appointments. This increase is particularly large for women. Both men and women appointed after a demand shock have higher earnings than those appointed after a retirement shock. Compared to retirement-related appointments, we also do not observe

[9]We consider that a CEO has been appointed due to a demand or retirement shock if they become CEO up to two years after the shock.

that performance-driven CEO appointments are related to slower earnings growth for women.

In panel (b) we examine their career trajectories in terms of their probability of having a CEO position, either at the shocked firm or at another one. We see that, for most of the sample, this appointment is their first appointment as a CEO, as a very low fraction of them had a CEO position in the pre-period. Consistent with the riskiness of demand-shock-driven appointments, we also observe lower rates of survival as CEO for both males and females in these types of firms compared to firms experiencing a CEO retirement. Notably, survival rates are lower for females compared to males appointed after a negative demand shock: four years after the shock, only 38% of females appointed after a crisis still have a CEO position, compared to 49% of males, and compared to 63% of females appointed after a CEO retirement. These patterns are very similar if we consider the probability of being a CEO at the shocked firm as an outcome, suggesting that these low survival rates are driven by short CEO tenure at the shocked firm.

All in all, we do not find evidence that crisis-driven appointments are related to lower earnings growth for either women or men. However, women who are appointed CEO after a negative firm performance shock present shorter terms as CEOs, both compared to males appointed in similar conditions and to females appointed after a CEO retirement.

8 Conclusions

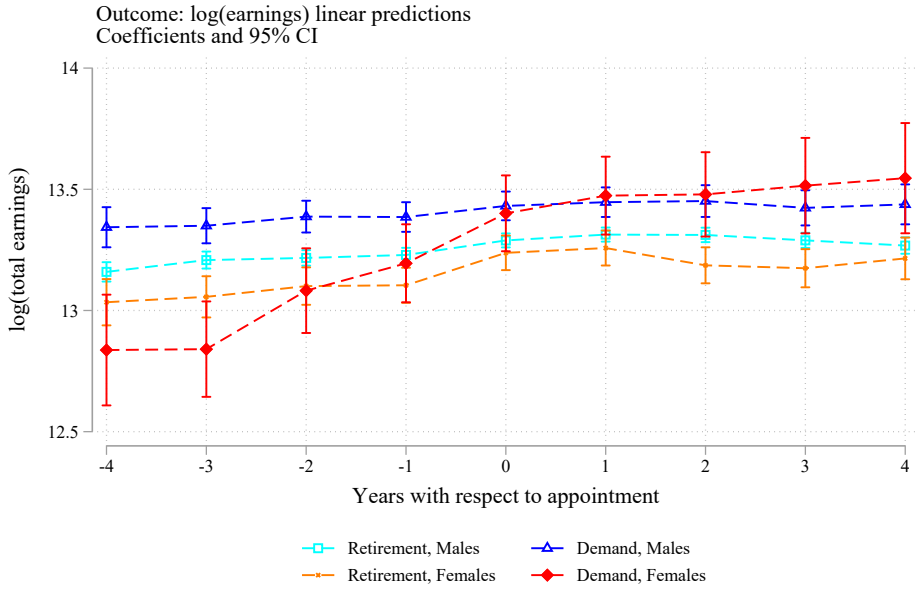
This paper presents novel systematic evidence supporting the gender glass cliff hypothesis, which suggests that women are more likely to be appointed to leadership positions when firms are underperforming.

Using detailed administrative data from Sweden, we first show that female CEOs are disproportionately concentrated in low-performing firms and that declines in firm performance are associated with a higher probability of appointing a female CEO. This sorting of female top executives into low-productivity firms explains a substantial share of the gender gap in CEO pay within industry. We then exploit unexpected firm shocks which disrupt the firm's performance trajectory, combined with a matched difference-in-differences design. We show that women are significantly more likely to be appointed CEOs when firms experience these sudden declines in turnover. The effect size is large and meaningful: this represents an increase of 16% relative to the average prevalence of female CEOs prior to the shock. Finally, we propose a new key mechanism behind this result: the "opportunity channel". During times of crises, firms are more likely to change CEO. Companies will be more likely to appoint a female CEO whenever they open a vacancy as the supply of qualified women grows. Relying on a predictable CEO change that is unrelated to firm performance—namely CEO retirements—corroborates these findings.

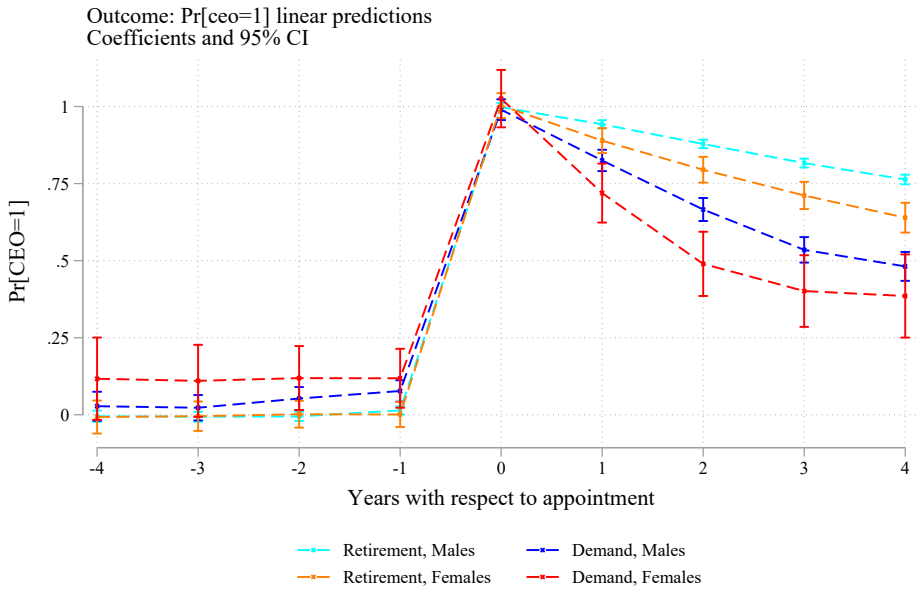
Our results show that firm-level crises represent an important pathway through which women may reach the top, suggesting that their opportunities for advancement are shaped not only by structural barriers but also by the conditions under which promotions occur. These results have important implications for understanding gender dynamics in leadership selection. While these episodes of firm distress may open doors, they might also expose women to more difficult environments in which to prove themselves. Our descriptive analysis shows that women

Figure 6: Earnings and probability of being CEO by gender and type of appointment

(a) Log total earnings



(b) Probability of being a CEO



Notes: This figure shows linear predictions of log total earnings in panel (a) and of the probability of being a CEO in panel (b) for each year relative to the time of CEO appointment for four different groups: men and women appointed after a demand or a retirement shock, respectively. The linear predictions are based on regressions of each outcome on indicators for number of years relative to the appointment, industry times year fixed effects, firm size fixed effects, and fixed effects for the age and level of education of the CEO. Firm characteristics are measured in the year prior to the shock.

appointed after negative demand shocks do not experience lower earnings growth, but they do have shorter tenures as CEOs. These findings underscore the need to further explore the implications of crisis-driven promotions for women's long-term career advancement and leadership stability.

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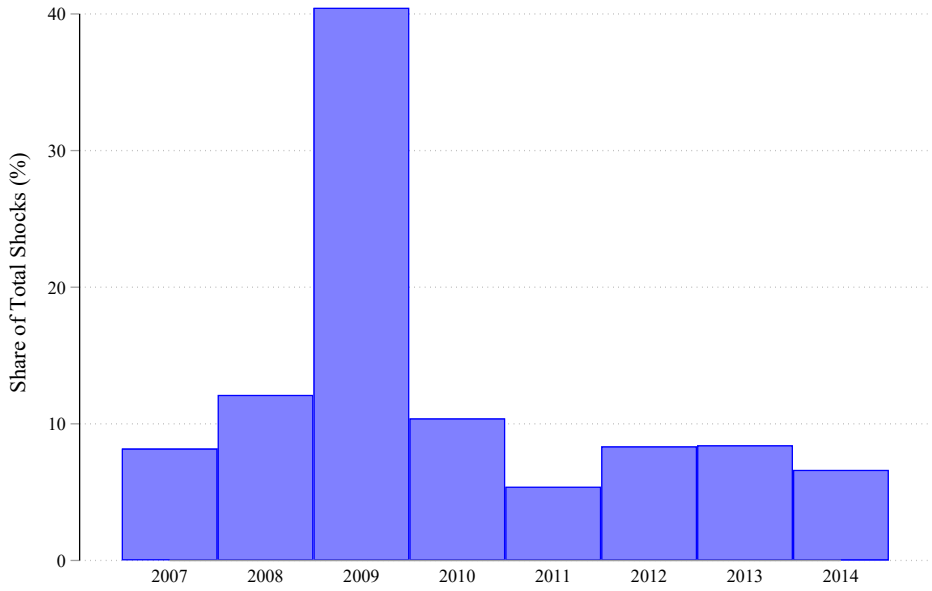
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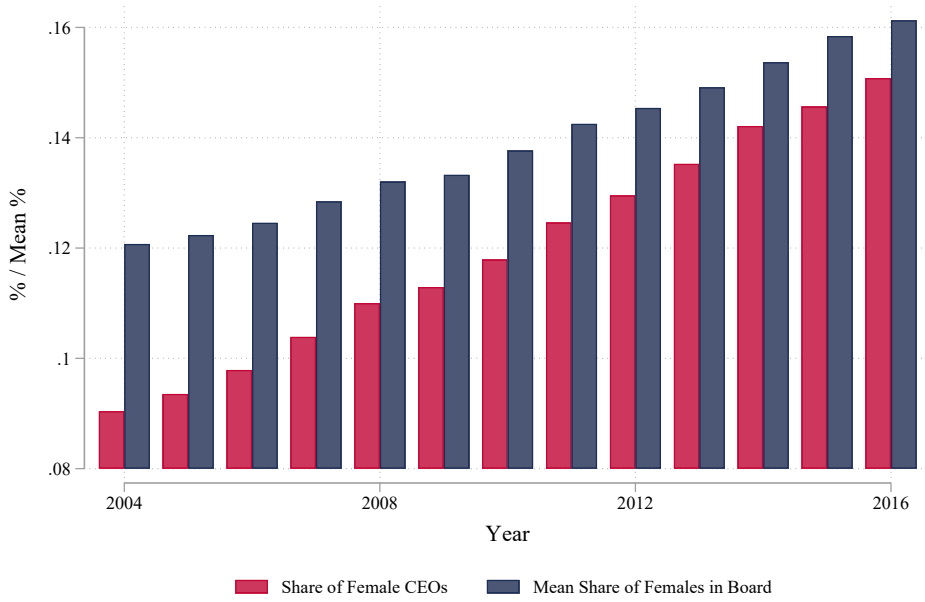
A Appendix Figures and Tables

Figure A.1: Distribution of negative shocks over years



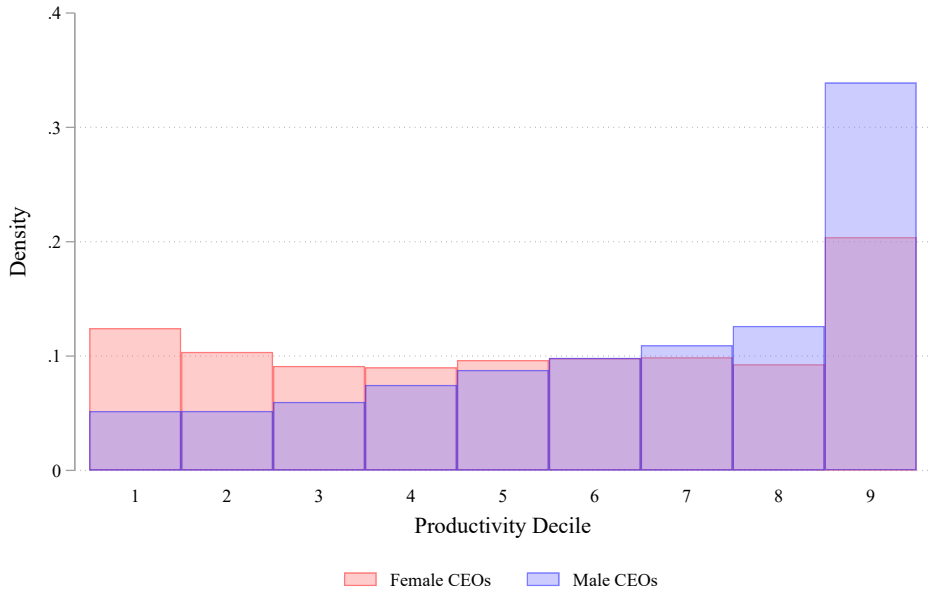
Notes: This plots the distribution of negative shocks over the observation period.

Figure A.2: Share of firms with female leaders



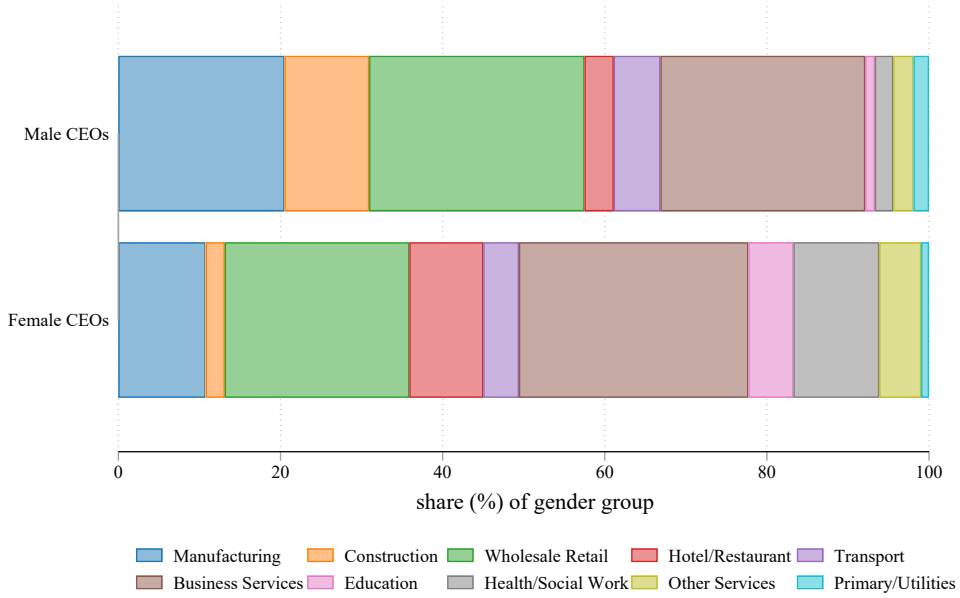
Notes: This plots the share of firms with a female CEO, and the mean share of women on the board, by year using the data described in Section 3.

Figure A.3: Distribution of CEOs across performance deciles



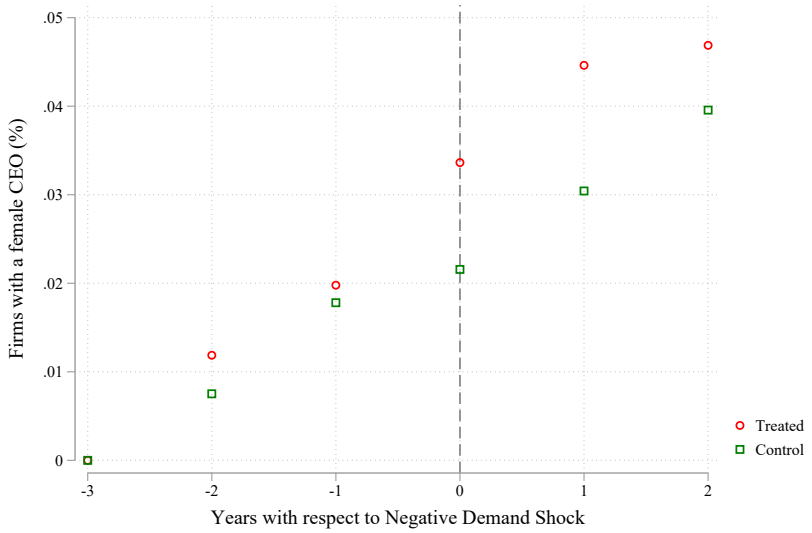
Notes: This plots the distribution of female and male CEOs across firm productivity deciles, using the data described in Section 3.

Figure A.4: Distribution of CEOs by industry



Notes: This plots the distribution of female and male CEOs by industry, using the data described in Section 3.

Figure A.5: Raw shares of firms with a female CEO

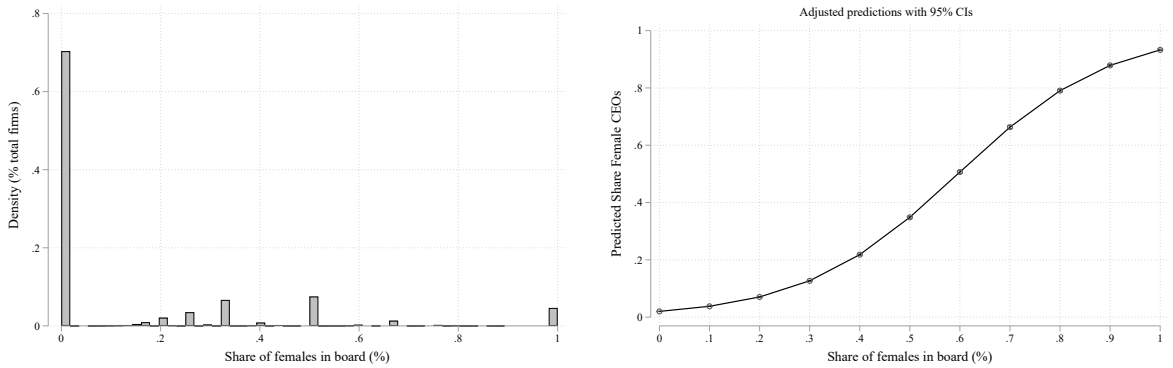


Notes: This shows the raw shares of firms led by female CEOs separately for matched treated and control firms around the time of a negative demand shock.

Figure A.6: Women on boards

(a) Distribution

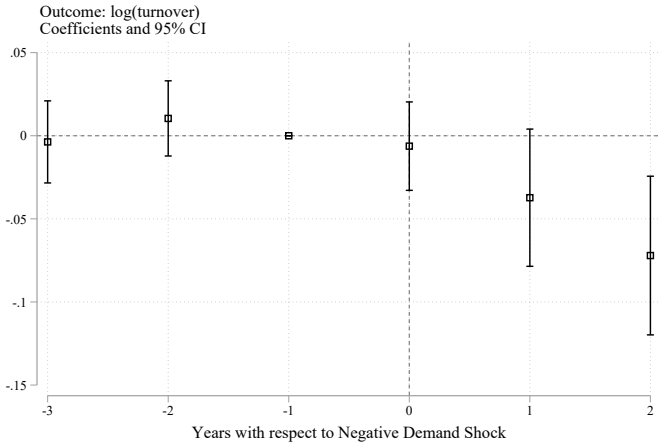
(b) Predicted share female CEOs



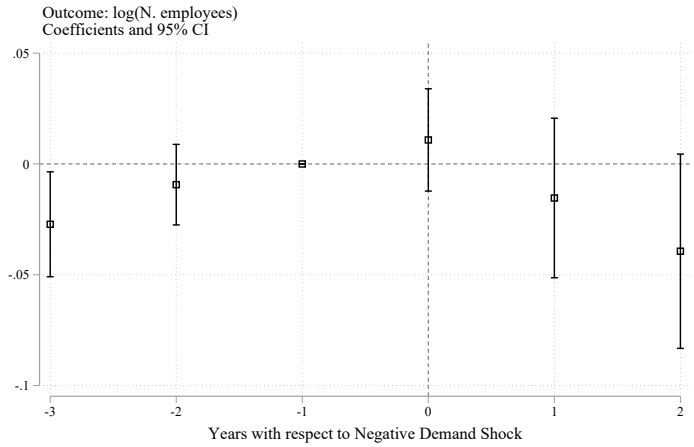
Notes: Panel (a) shows the distribution of women on boards, while panel (b) shows the predicted share of female CEOs from the following logit model: $CEO_{female,ft} = \alpha + \beta ShareFemale_{ft} + \gamma_i + \gamma_t + \varepsilon_{ft}$ where $ShareFemale_{ft}$ are the share of women on the firm's board of directors, and γ_i (γ_t) are industry (year) fixed effects. The analysis uses the data described in Section 3.

Figure A.7: Impact of CEO retirements on firm performance

(a) Log Turnover



(b) Number of emloyees



Notes: This figure shows the event study results for firm turnover (in logarithms) in panel (a) and for the number of employees (in logarithms) in panel (b) as outcomes, estimated on the sample of firms affected by a retirement and their matched controls and the specification in equation (1).

Table A.1: Balance between matched shocked and non-shocked firms – Demand shocks

	(1) Control		(2) Treatment		(1)-(2) Pairwise t-test	
Variable	N/Clusters	Mean/(SE)	N/Clusters	Mean/(SE)	N/Clusters	Mean difference
N. employees (t-3)	5055	102.975	1011	103.581	6066	-0.605
	1011	(1.624)	1011	(2.212)	1011	
% change N (t-2)	4443	0.198	888	0.147	5331	0.051*
	935	(0.023)	888	(0.020)	935	
Turnover (t-3)	5055	1.42e+08	1011	1.98e+08	6066	-5.65e+07***
	1011	(2.89e+06)	1011	(4.77e+06)	1011	
% change in turnover (t-2)	5055	0.155	1011	0.182	6066	-0.027
	1011	(0.006)	1011	(0.021)	1011	
Share females BoD (t-3)	4969	0.077	996	0.077	5965	-0.000
	1011	(0.003)	996	(0.005)	1011	
Share females BoD (t-2)	4978	0.086	996	0.087	5974	-0.001
	1011	(0.003)	996	(0.005)	1011	
Turnover/n	5055	1.45e+06	1011	2.04e+06	6066	-5.91e+05***
	1011	(24022.580)	1011	(47204.913)	1011	
Productivity Decile	5055	6.614	1011	7.539	6066	-0.925***
	1011	(0.063)	1011	(0.071)	1011	
Annual Result	5055	6.53e+06	1011	5.38e+07	6066	-4.73e+07
	1011	(6.38e+05)	1011	(3.59e+07)	1011	
N. BoD	5007	3.979	1008	3.738	6015	0.241***
	1011	(0.035)	1008	(0.060)	1011	

Notes: This table shows averages of different firm characteristics in the pre-period, separately for matched shocked and non-shocked firms, and tests for equality of the means across groups. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A.2: Effect of negative demand shock on various firm outcomes

	(1) Female CEO	(2) Share Female in Board (%)	(3) log(turnover)	(4) N. Employees	(5) N. BoD
Treat X Post	0.011**	-0.004	-0.410***	-22.279***	0.001
	(0.005)	(0.004)	(0.015)	(1.939)	(0.035)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	35197	34581	35197	35197	34893
R^2	0.432	0.757	0.927	0.864	0.868

Notes: This table shows the effect of a negative demand shock on the probability of appointing a female CEO (column 1), on the share of females on the board (column 2), on log turnover (column 3), on the number of employees (column 4), and on the number of members of the board (column 5), estimated using the sample of matched treated and control firms and using the specification in equation (2). Standard errors are clustered at the matching group level. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A.3: Effect of negative demand shocks on CEO changes by type of industry

	Male Industries		Female Industries	
	Female CEO	Change CEO	Female CEO	Change CEO
Treat X Post	0.000	0.070***	0.036**	0.136***
	(0.005)	(0.015)	(0.014)	(0.024)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	24572	24575	10625	10627
Control Group Mean (t-1)	0.016	0.219	0.021	0.205
R^2	0.441	0.549	0.428	0.537

Notes: This table shows the effect of a negative demand shock on the probability of appointing a female CEO and on the probability of having a CEO change separately for male-dominated and female-dominated industries, using the sample of matched shocked and non-shocked firms. Industries are classified as female-dominated if the share of female employees in the industry is above the median. Standard errors are clustered at the matching group level. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A.4: Balance between shocked and non-shocked firms – CEO retirement shocks

	(1) Control		(2) Treatment		(1)-(2) Pairwise t-test	
Variable	N/Clusters	Mean/(SE)	N/Clusters	Mean/(SE)	N/Clusters	Mean difference
N. employees (t-3)	2380	136.176	476	137.994	2856	-1.817
	476	(5.812)	476	(6.465)	476	
% change in N (t-3_t-2)	1957	0.112	394	0.074	2351	0.038**
	404	(0.014)	394	(0.015)	404	
Turnover (t-3)	2380	2.59e+08	476	2.66e+08	2856	-7.31e+06
	476	(7.03e+06)	476	(8.84e+06)	476	
% change in turnover (t-2)	2380	0.044	476	0.056	2856	-0.013
	476	(0.006)	476	(0.010)	476	
Share females BoD (t-3)	2368	0.123	472	0.126	2840	-0.003
	476	(0.006)	472	(0.009)	476	
Share females BoD (t-2)	2367	0.129	471	0.130	2838	-0.001
	476	(0.006)	471	(0.009)	476	
Turnover/n	2380	2.26e+06	476	2.29e+06	2856	-2.93e+04
	476	(56350.974)	476	(74817.361)	476	
Productivity Decile	2380	7.844	476	7.859	2856	-0.016
	476	(0.071)	476	(0.092)	476	
Annual Result	2380	2.07e+07	476	3.64e+07	2856	-1.57e+07
	476	(4.53e+06)	476	(1.04e+07)	476	
N. board members	2376	3.809	475	4.257	2851	-0.448***
	476	(0.047)	475	(0.095)	476	

Notes: This table shows averages of different firm characteristics in the pre-period, separately for firms affected by a retirement shock and their matched controls, and tests for equality of the means across groups. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A.5: Effect of CEO retirements on CEO changes by type of industry

	Male Industries		Female Industries	
	Female CEO	Change CEO	Female CEO	Change CEO
Treat X Post	0.053***	0.679***	0.091**	0.666***
	(0.019)	(0.017)	(0.037)	(0.026)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	11519	11528	5103	5104
Control Group Mean (t-1)	0.065	0.318	0.084	0.312
R^2	0.705	0.593	0.728	0.646

Notes: This table shows the effect of a CEO retirement shock on the probability of appointing a female CEO and on the probability of having a CEO change separately for male-dominated and female-dominated industries, using the sample of firms affected by a retirement and their matched controls. Industries are classified as female-dominated if the share of female employees in the industry is above the median. Standard errors are clustered at the matching group level. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$