It only takes a strong tie:
Board gender quotas and network-based hiring

Esther Chevrot-Bianco[*]

June 28, 2021

ABSTRACT

How do board gender quotas interact with network-based hiring practices, and which women benefit from quotas? Using matched firm-director datasets covering the population of Danish firms and blood- and marriage-based ties as relevant social connections, I show that the introduction of a board gender quota in Denmark in 2012 intensifies network-based hiring, resulting in differential benefits of the law for potential candidates depending on their family connections. First, the quota leads firms to double the share of connected directors among female appointments. Second, potential candidates with family connections to incumbent directors and CEOs become three times more likely to be appointed, whereas the probability of being appointed remains the same for highly qualified but unconnected potential candidates. Taken together, the evidence suggests that sticky norms of hiring based on networks create search frictions in the recruitment of female directors, even in the presence of board gender quotas.

Keywords: Gender Quotas, Corporate Boards, Social Networks, Family Connections

1 Introduction

Many countries have used board gender quotas to improve women's representation in the corporate business sector [1]. Board gender quotas usually mandate a numerical target for women's representation but remain silent on *how* appointments should be made. Hence, boards have complete freedom to implement the policy requirements, and not much is known about how female directors are identified and selected and who is ultimately hired for such positions.

Ample evidence suggests that social networks play a crucial role in the recruitment of directors (Nguyen (2012); Kramarz and Thesmar (2013); Schmidt (2015); Cai et al. (2020))[2]. Generally, such positions are not publicly advertised, and candidates do not submit an application. Instead, hiring committees rely greatly on CEOs' and incumbent directors' networks to identify potential candidates, who are almost always subsequently elected by shareholders. From the potential candidate perspective, such network-based hiring implies that connections to relevant social networks are a prerequisite for a board position.

It is not clear ex ante how board gender quotas interact with network-based hiring practices. On the one hand, the introduction of quotas could spur more widespread search efforts and help qualified women outside of traditional social networks to gain the attention of businesses. On the other hand, quotas may increase reliance on traditional hiring networks and provide more opportunities to already well-connected women, thereby amplifying inequalities in opportunity. In this paper, I ask the following questions: Which women benefit from board gender-balance laws? How do these laws interact with network-based hiring practices? Do quotas enable qualified women outside the traditional busi-

---

[1]Since 2008, no less than 10 European countries (Belgium, Denmark, France, Germany, Iceland, Italy, the Netherlands, Norway, Portugal, Spain, and Sweden) as well as the state of California and India have adopted mandatory board gender quotas.

[2]In Denmark and many other countries, the director recruitment process is entirely left to the discretion of companies, and there are no transparency requirements regarding how appointments are made. Despite the lack of binding regulation, the Committee on Corporate Governance has formulated recommendations for good practices. Source: Recommendations for Corporate Governance. Report, 2020.

ness networks to enter the boardroom? The answers offer insights for the design of board gender-balance laws and contribute to the debate about the impact of quotas on meritocratic selection.

To address these questions, I exploit the introduction of a board gender quota implemented in Denmark in 2012 that permanently required large Danish firms to reach a 40% target for women's representation on boards within four years. Eligibility relies on passing two of three size criteria based on the number of employees, total assets, and profits.[3]. I use marriage- and blood-based ties as relevant social connections and study the effect of the law on network-based hiring at the firm level and the consequences regarding board opportunities for potential candidates. Social ties based on blood and marriage have been found to be an important pathway to political power for women across history and countries (Folke et al. (2020); Labonne et al. (2020)). In the context of business leadership, family connections may play an important role in women's access to the boardroom for several reasons. First, boards may generally prefer to hire candidates who have strong ties[4] to incumbent or close directors because, under the assumption that good directors associate with other good directors, the quality of the director could convey a signal about the candidate's quality. Strong ties may be even more crucial for female candidates, for whom hiring committees have less experience in recruitment and therefore ex ante noisier information. Second, since women are less present in traditional business networks (Allemand et al. (2021); Von Essen and Smith (2021)[5]), family ties may provide the strong connections that they need to access the boardroom[6].

I start by documenting empirical patterns motivating the choice of blood- and marriage-based ties as relevant social connections for the analysis. I combine matched

---

[3]In contrast to many board quotas implemented in Europe (Norway, Italy, Belgium, etc.) that cover only listed or state-owned companies, the Danish law covers both publicly traded and privately held firms.

[4]Family ties possess the typical characteristics of strong social ties as defined by Granovetter (1983), such as highly frequent interactions, strong emotional links, and the use of reciprocal services.

[5]In a paper using similar data, Von Essen and Smith (2021) document differences in professional networks across genders: female directors have fewer total connections, fewer connections to larger and listed firms, and fewer connections to men.

[6]Burke (1997) surveys 280 female directors and find that personal contacts and visibility to male board members were critical for them to access the boardroom.

firm-management datasets and administrative registers to retrieve the family ties of directors at sample firms between 2007 and 2017. Family-owned firms represent only 6% of the sample firms[7], 33% of female directors – but only 10% of male directors – had a relative or spouse who was a CEO or director at a sample firm before they started their career. The gender gap remains similar conditional on a range of personal, educational and professional characteristics and when restricting the sample to non-family-controlled firms. These patterns strongly suggest that family connections represent an important recruitment pool for female directors.

To study the effect of the quota on network-based hiring from the firm perspective, I focus on firms with at least 100 employees (henceforth referred to as large firms) and follow a difference-in-differences approach comparing the evolution of appointments across firms that passed two of the criteria and were therefore subject to the law and firms passing only one or none of the criteria and therefore remaining unaffected. To address concerns about potential differential trends across firms of different sizes, I use two additional approaches. First, I control for interactions between year fixed effects and pre-reform characteristics that differ across the treated and control firms. Second, I restrict the analysis to firms in a narrower bandwidth around the eligibility thresholds, thereby making treated and control firms comparable based on observable characteristics.

I find that the board gender quota intensifies network-based hiring. An inspection of the unconditional outcomes and dynamic treatment effects shows no pre-trends before the reform. Classifying appointments as connected if the person recruited has a blood or marriage tie to an incumbent director or CEO at a treated firm, I show that the share of women among connected appointments more than triples due to the quota. As a consequence, the share of connected directors among female hires increases by 12 percentage points or doubles relative to the pre-reform mean of 7.5%. Examining firm heterogeneity shows that the appointment of female directors through family ties is a general tendency in all firms, but is more pronounced in family-controlled firms and in medium-sized private firms. The results remain similar when using alternative outcomes,

---

[7]Figure from 2014. Sample firms are firms with at least 100 full-time employee equivalents. Source: Family Businesses in Denmark. *Statistics Denmark.*

introducing firm fixed effects, and reducing the sample to comparable treated and control firms. In addition, I find no evidence of firm strategic behavior to avoid the reform.

Additional tests support the interpretation that a candidate's connection – rather than other credentials correlated with family connections – was the main determinant of the appointment. First, the results remain similar when controlling for the appointment of directors possessing educational credentials and professional experience correlated with family connections. Second, the reform did not increase the appointment of women connected to *untreated* firms.

I then examine the consequences of network-based hiring for board opportunities for potential candidates. Do potential candidates differentially benefit from the reform depending on their connections? To answer this question, I construct a sample of highly qualified women who were visible to the board at the moment of the reform and adopt a triple-differences approach comparing the probability of being appointed between connected and unconnected women, across treated and untreated firms, and over time during the 2007-2017 period. Specifically, I consider women with CEO, board, and/or top executive experience prior to the reform and classify them as connected if they have a blood- or marriage-based tie to a person who was a director or CEO in the pre-reform period. To define a group of unconnected potential candidates, I include women who were CEOs or top executives between 2007 and 2011.[8] While connected and unconnected potential candidates have different types of credentials, reflecting that they correspond to two distinct recruitment pools for board positions, they had a similar probability of appointment before the reform.

I find that connected potential candidates become three times more likely than unconnected potential candidates to be appointed following the reform. I show that the results are robust to the inclusion of a wide range of individual characteristics, which mitigates the concern that the advantage of connected over unconnected potential candidates is due to differences in credentials rather than caused by connections. Furthermore,

---

[8]Previous studies (see, for instance, Smith and Parrotta (2018)) show that top executive positions represent a major pipeline to the boardroom; therefore, top executives around the time of the reform are a relevant pool from which firms select new directors.

the probability of being appointed remains stable for unconnected potential candidates, suggesting that the reform does not smooth access to the boardroom for highly qualified women outside the traditional hiring networks.

The last part of the paper provides descriptive evidence on the qualifications of connected female directors. While network-based hiring could allow boards to reach the best candidates, it could also restrict the search process to very few candidates, especially for groups that tend to be underrepresented in traditional hiring networks. Consistent with this second possibility, I find that connected female directors tend to be less qualified than other female directors and that the quota promotes the recruitment of slightly less qualified women. Taken together, the findings presented in this paper suggest that network-based hiring practices create frictions in the search process for qualified female directors, even when board quotas are implemented.

This paper makes three main contributions to the academic literature. First, it extends the literature on gender diversity on boards (Adams and Ferreira (2009); Bertrand et al. (2010); Adams and Funk (2012); Smith and Parrotta (2018)), specifically the literature and policy debate on the consequences of board gender quotas. While the consequences of board gender quotas for firm performance and policies have been explored in a number of studies (Ahern and Dittmar (2012); Matsa and Miller (2013); Bøhren and Staubo (2014); Bøhren and Staubo (2016); de Cabo et al. (2019); Eckbo et al. (2019); Kunze and Scharfenkamp (2019)), not much is known about their impact on the intended beneficiaries[9]. This study underlines the unequal benefits of board gender quotas caused by their interaction with powerful social networks and deeply anchored hiring practices. This paper closely relates to Ferreira et al. (2020), who find that a board gender quota introduced in France created incentives for firms to change their search technology from networks to executive search firms. My paper offers a different answer in the Danish context, where the introduction of a quota increased the number of appointments based on family networks.

Second, this paper contributes to the literature on the selection of board directors. Although the relationship between board composition and firm outcomes has been inves-

---

[9]Two important exceptions are Bertrand et al. (2019) and Reberioux and Roudaut (2019).

tigated theoretically and empirically, we know little about how directors are identified and selected and what the subsequent implications are for board composition (Adams et al. (2010)).[10]. Relative to this literature, my evidence highlights the considerable impact of blood- and marriage-based connections in the labor market for female directors. This finding complements a growing body of empirical literature documenting the important role played by social networks in board composition and functioning (Fracassi and Tate (2012);Nguyen (2012); Kramarz and Thesmar (2013); Schmidt (2015); Cai et al. (2020)). By providing evidence that family connections help women access the boardroom, this paper also relates to studies on women's pathways to business leadership (Adams and Ferreira (2009); Agarwal et al. (2016); Smith and Parrotta (2018)).

Third, this paper is broadly related to the economics and political science literature documenting the persistence of economic and political elites through their influence on new leader selection (Xu (2018); Voth and Xu (2019)); (Dal Bó et al. (2009); Querubin (2016); Cruz et al. (2017)). This paper highlights a mechanism through which families can perpetuate their influence in the corporate world via appointments onto boards of directors.

The rest of this paper is organized as follows: In the following section, I describe the Danish board gender quota. Section 3 presents the data and summary statistics. In Section 4, I describe the empirical strategies implemented to evaluate the effect of the law, and the results are shown in Section 5. Section 6 explores the qualifications of different types of directors, and Section 7 concludes the paper.

---

[10]In their review of the literature on corporate boards, they provide the following directions for future research: *"How are potential outside directors identified? (...) What is the role of social networks in this process?"* (p.99).

2 The Danish board gender quota

The law on *"Target Figures"* was implemented in Denmark in 2012 and permanently required publicly traded and large privately held companies to reach 40% representation for women on boards of directors[11]. In their annual reports, all firms had to report on their achievement with respect to this target, on the measures they had taken to achieve it, and on the reasons for failure if it was not achieved. Annual reports had to be submitted to the Danish Business Authorities and made available to the general public, and a failure to set a target figure and to report the different elements was punished by a fine. In section D of the appendix, I provide additional information about the background and contents of the law.

The largest firms in Denmark, defined in terms of total assets, net revenue, and number of employees, were affected by the law. Specifically, firms exceeding two of the three following criteria – total assets of 143 million DKK ($ 19 million), net revenue of 286 million DKK ($ 38 million), and an average of 250 full-time employees – over two consecutive years were subject to the law. While the largest firms were impacted by the law, a number of large firms remained out of the treated group because they passed only one or none of the eligibility criteria. The identification strategies presented in the next subsections build on this feature of the law.

The law created a large and sudden positive demand shock for female directors in treated firms. Figure 1 plots the number of female appointments in the group of treated firms within a 5-year period before and after the reform. The yearly number of female appointments went from approximately 23 before the reform to 50 after the reform.

The passing of the law and the group of affected firms were unexpected. Following heated debates on a potential hard quota affecting only listed firms, the proposal of a quota was abandoned in April 2012. A softer law focusing on a larger group of firms was announced in May 2012, and neither the details of implementation nor the group of affected firms was known before. The shock caused by the law was therefore plausibly

---

[11]Specifically, firms had to set a target at least equal to the number closest to 40% (see Table 17 in Appendix Section D for details) and reach it within 4 years.

exogenous to women's connections and outcomes.

3   Data and summary statistics

3.1   Data sources

The empirical analysis requires the construction of two datasets. The first one tracks directors at large Danish firms from 2007 to 2017 and allows us to study the impact of the law on network-based hiring from the firm perspective. The second one tracks potential female candidates during the same period and allows us to evaluate which women benefited from the law. For all directors and potential candidates, I obtain information on their personal and professional characteristics, as well as their family networks. The different sources used in the construction of the datasets are described below. All variables are listed and described in Table 15.

Matched firm-CEO and director datasets   The main source of information is a database from the Danish Business Authorities (*Erhvervsstyrelsen*, or *ES*) reporting the personal identification number (CPR) of the Danish CEOs and board directors of all limited liability corporations in Denmark. Danish firms are required by law to report any change in their management or board to *ES* within two weeks after making the change. In addition, the database contains the unique identification number (CVR) of the firm in which the position is held, information on the nature of the position (CEO or director), and the exact starting and ending dates for each position.

Personal and professional information   A director's unique CPR number allows us to retrieve a number of types of individual-level information. First, I add personal characteristics and family information obtained from the Danish Civil Registration System. These administrative records are provided by *Statistics Denmark* (the Danish National Statistical Agency) and cover the entire national population since the 1980s. They include personal information (date of birth and death, gender, educational attainment), as well as the CPR number of parents and spouses, which can be used to construct family trees and identify

whether directors and potential candidates are related by blood or marriage to other directors and CEOs. Second, in addition to board and CEO experience retrieved from the *ES* database, I add information on their professional experience outside the boardroom (number of years of professional experience, level of responsibility in their main position, experience as a top executive) using the matched employer-employee datasets provided by *Statistics Denmark*. Finally, I add information on their status inside the boardroom (employee- or shareholder-elected, chairperson status) using data collected by a private firm (*Experian*) that were available only through 2015.

Financial information on firms Similarly, I use the CVR number to retrieve firm-level information. The main datasets are the General Firm Statistics registers (FIRE and FIRM) provided by *Statistics Denmark*. These registers record financial statements (income and balance sheet statements), as well as the number of employees, firm age, location, and industry code.

3.2 Samples statistics

Sample of firms For the firm-level analysis, I track large Danish firms[12] and their directors from 2007 to 2017. I exclude from the sample firms for which some financial information is missing. Table 1 presents summary statistics for the 1006 firms in the final sample. The variables are averaged over the pre-reform period (between 2007 and 2011). Panel A presents firm-level characteristics, and Panel B presents board-level characteristics. The average sample firm has 413 employees, assets of DKK 1535 million ($ 256 million), and sales of DKK 1207 million ($ 201 million). Note that these measures are highly skewed by a few extremely large firms: in fact, the median firm in the sample has 188 employees and assets and sales of DKK 267 million ($ 45 million) and DKK 391 million ($ 65 million), respectively. The average board has 5 directors (excluding employee-elected directors), among whom 11.5% are women. Within boards, the average age of directors is 53 years,

---

[12]Section C in the appendix provides details on the sample construction. Firms with more than 100 employees represent approximately 40% of the total number of employees in Denmark. Source: *Statistics Denmark*.

and they have 21 years of professional experience on average. On the average board, 53% of directors hold a university degree, and 44%, 53%, and 65% have previous top executive, CEO and director experience, respectively.

Sample of potential candidates   There is no unique way to define the set of potential candidates for board positions. I consider women with qualifications that make them relevant candidates, that is, women with previous CEO, board, and/or top executive experience. In addition, I require these women to be "visible" to boards at the moment of the reform; that is, they must have a family connection to an incumbent CEO or director or must be top executive/CEO at a sample firm during the pre-reform period. The sample includes 13,828 women, accounting for less than 0.8% of the active female labor force in Denmark. I track potential female candidates' appointments to boards between 2007 and 2017 and observe 240 appointments at the treated firms, i.e., 60% of appointments at treated firms during the sample period.

Table 2 shows summary statistics for the sample of potential candidates. Time-varying variables are measured in 2011. The average female potential candidate is 43 years old and has 17 years of professional experience. A total of 85% of potential candidates have top executive experience, and 22% and 13% have previous director and CEO experience, respectively. As expected from the sample construction, all potential candidates have at least one of the three types of experience. They have, on average, 15 years of education, and 45% hold a university degree. For comparison, the average female director in the firm sample is 48 years old, has 19 years of professional experience, and has 14 years of education. Of these female directors, 20%, 48% and 27% have top executive, director, and CEO experience, respectively (see Panel C in Table 1).

3.3   Family connections among Danish directors

Before studying the effect of the gender quota on network-based hiring, I present empirical patterns motivating the choice of blood- and marriage-based ties as relevant social connections for the analysis.

Using the first sample (directors at large firms), I create an indicator variable

Previous family connection equal to one if the director has a close relative (parents, siblings, children) or spouse who was ever a CEO or director at a sample firm and started her career *before* her and equal to zero otherwise.

Figure 2 (Panel A) shows that among directors, 33% of women and 10% of men had a previous family connection at one of the sample firms. Panel B of Figure 2 shows that the gender gap in previous family connections remains very stable when conditioning on a range of personal and professional characteristics that differ between male and female directors (see Table 1). In addition, Figure 3 shows that the general patterns remain similar when excluding family firms, firms with fewer than 250 employees, and spousal ties. Notably, the share of directors with previous family connections is reduced when considering only ties *across* firms, suggesting that a majority of connected directors sit on the board of the same firm where they had their family connection. Finally, Appendix Table 16 shows the distribution of family members among previous family connections.

These patterns suggest that family connections play an important role in women's access to the boardroom. These findings align well with previous studies documenting the impact of family networks on women's access to leadership positions in politics (Dal Bó et al. (2009); Folke et al. (2020); Labonne et al. (2020)) and on corporate boards (Bianco et al. (2015)). In addition, the size of the gender gap strongly suggests that the large share of female directors with previous family connections does not simply reflect characteristics correlated with family networks, such as talent or ability, since there is no reason to believe that the correlation between talent and family networks would differ for men and women.

4 Empirical strategies

In this section, I present the identification strategies employed to study the effect of the quota on network-based hiring and on potential candidates.

Firm-level analysis   In the first part of the paper, I study the consequences of the 2012 board quota on network-based hiring. Specifically, I study whether the law has impacted the board's propensity to appoint a female director and which pool new female directors are recruited from. My main outcomes of interest are the share of women in appointments, the share of women in unconnected appointments, the share of women in connected appointments, and the share of connected directors in female appointments. I define a director as connected if she has a blood or marriage tie to the incumbent board at any treated firm. That is, a director is connected if she is related by blood or marriage to a person who was a director or CEO at a treated firm during the pre-reform period between 2007 and 2011.

I use a difference-in-differences approach comparing the outcomes of firms in the treated and control groups before and after the passing of the law in 2012. To avoid changes in the composition of the treatment group, I define firms as treated if they fulfilled the criteria to be affected by the law in 2012, that is, if their total assets, net revenue, and number of employees in 2011 and 2012 were above two of the three thresholds (see Section 2). Throughout the paper, I refer to this group of firms as the "treated" group or "intent-to-treat" group interchangeably. In Table 10, I show that the results are robust to defining the group of treated firms based on their post-reform treatment status.

For control firms, I use large Danish firms that remain unaffected by the reform because they met only one or none of the criteria. As a first test of the design, I check whether firms manipulate their profits, capital size, or number of employees to avoid having to comply with the law (Nygaard (2011); Bøhren and Staubo (2014)). I fail to reject the null hypothesis of continuity in the density of the reform criteria at the eligibility thresholds using McCrary (2008) tests (see Figure 8 in the appendix), suggesting that firms do not systematically manipulate their numbers. I begin with the following baseline

specification:

$$y_{j,t} = \lambda_t + \gamma Treat_j + \beta(Treat_j \times Post_t) + \epsilon_{j,t} \qquad (1)$$

where $y_{j,t}$ denote the different outcomes in the analysis. $Treat_j$ is an indicator variable equal to one if firm j is treated and 0 otherwise, and $Post_t$ indicates the post-reform period (from 2013 to 2017). To control for common time shocks, I include year fixed effects λ_t. I do not include firm fixed effects in my main specification, as many firms hire a director only once during the sample period.[13] Note that $Post_t$ is omitted in the specification of equation 1 since it is absorbed by the year fixed effects. Standard errors are robust and clustered at the firm level, and the coefficient of interest, β, captures the average impact of the quota on the different outcomes. OLS estimation is used throughout the paper.

Analysis of potential candidates   In the second part of the paper, I study the effect of the law from the potential candidates' perspective, making it possible to estimate the differential impact of the law on board opportunities for potential candidates depending on their family connections. I can also investigate to what extent unconnected potential candidates benefit from the law.

Using the sample of potential candidates described in Section 3, I classify a potential female candidate as connected to a firm if she has a close relative (parent, sibling or child) or spouse who was a director or CEO at the firm at some point during the pre-reform period (2007-2011). Measuring connections during the pre-reform period reduces endogeneity by ensuring that I do not capture connections that were strategically formed by women or their relatives in response to the law.

For unconnected potential candidates, I use recent top executives at sample firms. I classify a potential female candidate as unconnected but related to a firm if she was the CEO, vice-president, or another top executive with transverse responsibilities, was at the firm at some point during the pre-reform period (2007-2011) and had no family connections to the incumbent board or CEO. In the rest of the paper, I refer to this group

---

[13]I show that the results are robust to the inclusion of firm fixed effects in the robustness checks.

as unconnected potential candidates. Recent top executives represent a credible pool of potential candidates. First, top executives from within the firm and from firms in similar sectors constitute one of the main recruitment pools for new board directors (Smith and Parrotta (2018)). Second, their presence at the top of the firm hierarchy during the years leading up to the reform makes them visible on the labor market for top executives, particularly to incumbent directors. Thus, these candidates have realistic chances to be considered for board positions around the time of the reform. In support of this choice, Table 4 shows that the pre-reform probability to be appointed is similar for unconnected and connected potential candidates.

To capture variation in the exposure to the reform, I assign women to treated and untreated firms based on where their family connection or top executive experience is. Women with connections or experience to both treated and untreated firms represent x% of the sample and are assigned to the treated group, since they are known to and therefore in the potential pool of candidates for *at least one treated firm*.

To investigate which women benefit from the quota, I use a triple-difference approach comparing the probability of being appointed at a treated firm for connected and unconnected potential candidates, across treated and untreated firms, and over time between 2007 and 2017.

I estimate the following equation:

$$
\begin{aligned}
y_{i,t} = \alpha_i + \lambda_t + \gamma' \mathbf{X_{i,t}} + \beta_1 (Connect_i \times Post_t) \\
+ \beta_2 (Treat_i \times Post_t) + \beta_3 (Connect_i \times Treat_i \times Post_t) + \epsilon_{i,t}
\end{aligned}
\tag{2}
$$

The variable $y_{i,t}$ is an indicator variable equal to one if woman i was appointed to the board of a treated firm in year t and zero otherwise. $Connect_i$ is an indicator variable equal to one if the woman has a family connection and zero if she is unconnected. $Treated_i$ is an indicator variable equal to one if the woman is connected/related to a treated firm and zero if she is connected/related to an untreated firm, and $Post_t$ indicates the post-reform period. $\mathbf{X_{i,t}}$ is a vector of individual characteristics interacted with $Treated_i$ and $Post_t$. α_i and λ_t are individual and year fixed effects. Note that $Connect_i$, $Treated_i$,

Connect$_i$ × *Treated$_i$*, and *Post$_t$* are omitted in the specification of equation 2 since they are absorbed by individual and year fixed effects, respectively. Standard errors are robust and clustered at the individual level, and the coefficient of interest, β_3, captures the differential impact of the reform on the probability of being appointed for connected potential candidates compared with their unconnected counterparts. OLS estimation is used throughout the paper, but the results are robust to the use of a probit model.

4.1 Identifying assumptions and threats to identification

Firm-level analysis This approach relies on the usual assumption of parallel trends in the outcomes of treated and control firms. A consequence of the research design is that treated firms are by construction larger than control firms, which raises the concern that control firms may not provide an adequate counterfactual in the outcome trend.

Table 3 presents summary statistics for control and treated firms. The median treated firm has 315 employees, assets of DKK 512 million ($ 85 million), and sales of DKK 707 million ($ 118 million). For control firms, these numbers are 132, DKK 108 million (18 $ million), and DKK 186 million (31 $ million), respectively. While treated firms are 2 to 4 times larger than control firms, they have similar levels of performance. Treated firms also have slightly larger boards (5.2 and 4.6 directors on average in treated and control firms, respectively), with slightly older and more qualified directors in terms of educational credentials, previous top manager experience, and board experience.

I follow three approaches to probe the validity of the control group as a counterfactual. First, I assess the plausibility of the parallel trends assumption by inspecting pre-trends in the raw data and by formally testing the presence of pre-trends using equation 3. To increase power and to smooth fluctuations in hiring, each dummy t corresponds to a two-year period, except for $t = 3$, which corresponds to the baseline pre-reform year, 2011:

$$y_{j,t} = \gamma Treat_j + \sum_1^6 \beta_t \lambda_t + \sum_1^6 \beta_t^T \lambda_t \times Treat_j + \epsilon_{j,t} \tag{3}$$

Second, the systematic differences between treated and control firms could lead to biased estimates of the reform effect if those same firm characteristics are associated with differential trends in the outcome variables. To address this possibility, I estimate equation 1 augmented with interactions between pre-reform characteristics (measured in 2011) – namely, assets, profits, number of employees, number of directors, number of seats held by directors, share of directors with a university degree, and share of directors with previous board experience – and year fixed effects, thereby flexibly controlling for differential trends [14]. In addition, Table 3 shows that the pre-reform share of female directors is higher in control firms than in treated firms: before the law, 12% of directors were women in control firms, compared to 8% in treated firms. To disentangle the reform effect from dynamic adjustment processes, I further include interactions between the pre-reform share of female directors and year fixed effects.

Third, I perform the analysis using a restricted sample, retaining only firms in a reduced bandwidth around the eligibility thresholds. This approach, comparable in spirit to a difference-in-discontinuity design, successfully eliminates observable differences between treated and control firms and leaves the results unchanged, as shown in the next section.

Finally, a last source of concern might be the existence of time-varying shocks that occur in the same period and differentially affect treated and control firms. I am not aware of other Danish laws implemented during the sample period covering the same group of firms. However, in the same year, the European Commission adopted a proposal for a directive that set the objective of 40% female directors on the board of listed firms by 2020. While this directive ultimately was not adopted, I test the robustness of my results to the exclusion of listed companies.

Analysis of potential candidates   This approach relies on the assumption of parallel trends in the probability of being appointed for connected and unconnected potential female candidates at treated and control firms in the absence of the reform. To test this

---

[14]See, e.g., Jaeger et al. (2020) and Hjort et al. (2017) for a similar approach in a difference-in-differences setting with observable differences between treated and control groups.

assumption, I inspect the raw data and formally test the pre-trends by estimating equation 4 separately for connected and unconnected potential candidates.

$$y_{i,t} = \alpha_i + \sum_1^6 \beta_t \lambda_t + \sum_1^6 \beta_t^T \lambda_t \times Treat_i + \epsilon_{i,t} \tag{4}$$

In addition, I test for parallel trends in the triple difference by estimating the following equation in the pre-reform period (2007 to 2011):

$$
\begin{aligned}
y_{i,t} = \alpha_i &+ \beta_1 Trend_t + \beta_2 Trend_t \times Connect_i + \beta_3 Trend_t \times Treat_i \\
&+ \beta_4 Trend_t \times Connect_i \times Treat_i + \epsilon_{i,t}
\end{aligned} \tag{5}
$$

Since family ties may correlate with other characteristics likely to affect the director selection process, the advantage of connected potential candidates over unconnected ones could also reflect an omitted variable correlated with family connections. Several aspects of the design mitigate this concern. First, all women in the sample of potential candidates have top-level qualifications and experience, which reduces differences between connected and unconnected women in terms of, e.g., ability and drive relative to the overall population. Second, the use of recent top executives at the sample firm as unconnected potential candidates attenuates the concern that firm-specific factors correlated with family connections – such as firm-specific skills or geographic proximity to the firm – would explain the results. Third, if connected candidates have a systematic advantage over unconnected candidates that is not due to a family connection, we may see that candidates connected to *untreated* firms are also increasingly likely to be appointed after the reform, but I do not observe this in the data.

In addition, I explicitly control for all observable differences between connected and unconnected potential candidates in the regressions. Table 4 shows summary statistics for connected and unconnected potential candidates at treated and untreated firms. Connected and unconnected candidates differ in a range of characteristics. Connected women are older, more likely to be married and have children, and less likely to be of non-Danish origin. They are slightly more educated: they have slightly less than one

additional half year of education and are more likely to hold a university degree. Connected and unconnected candidates have different professional backgrounds but similar pre-reform probabilities of board appointments. This emphasizes that they correspond to two distinct pipelines leading to the boardroom. A large share of connected women have director and CEO experience (70% and 38%, respectively), but less than 25% have another type of top executive experience. These patterns are reversed among unconnected candidates, who all have top executive experience by construction; only approximately 10% and 5% have director and CEO experience, respectively.

I interact individual characteristics – namely, age, non-Danish origin, marital status, number of children, number of years of education, whether the woman has a university degree, industry background, number of years of professional experience, CEO experience, and board experience – with $Treated_i$ and $Post_t$. These interaction terms alleviate the concern that observable differences between connected and unconnected potential candidates – rather than the family connection – explain the higher probability of appointment of connected women.

5 Results

5.1 Response to the quota and network-based hiring

Figure 4 plots the unconditional share of i) women in appointments (Panel A), ii) women in unconnected appointments (Panel B), iii) women in connected appointments (Panel C), and iv) connected directors in female appointments (Panel D) in treated and control firms. All outcomes follow stable and parallel paths in treated and control firms before the reform and show an increase in treated firms following the reform. This result is confirmed in Figure 5, which displays the coefficients from the dynamic specification in equation 3. I detect no significant differential pre-reform trends in either of the outcomes, and the effect of the reform emerges gradually over time after 2012.

Table 5 shows the regression results obtained by estimating equation 1. All specifications include year fixed effects. The coefficient on $Treat \times Post$ captures the average

effect of the law on the different outcomes. Considering that family connections may partly signal qualifications, even-numbered columns display the results based on regressions augmented with controls for appointments of directors with specific characteristics. Specifically, I add the share of new hires with i) a university degree, ii) director experience, iii) CEO experience, and iv) top executive experience.

Column 1 of Table 5 shows that the law increases the share of women in appointments by 7.6 percentage points. The effect is statistically significant at the 1% level and economically meaningful with respect to the baseline of 10%. Column 2 shows that among unconnected appointments, the share of women increases by 4.6 percentage points from a 10% baseline, which is significant at the 5% level. Column 3 shows that the effect is stronger among connected appointments: in this recruitment pool, the share of women increases by 29 percentage points from a baseline of 11.5%, which is significant at the 1% level. In other words, the share of women among connected appointments more than tripled after the reform. While the appointment of connected directors represents a minority of all appointments realized during the sample period, this intensification of network-based hiring is reflected in the total composition of female hires. Column 4 shows that the share of connected directors among female appointments increases by 12.3 percentage points from a baseline of 7.9% – i.e., more than doubled – after the reform. The inclusion of controls leaves the different estimates unchanged.

Overall, the results presented in Table 5 show that firms respond to the quota by disproportionately appointing women with family connections to incumbent directors and CEOs, indicating an increase in network-based appointments following the quota.

5.1.1 Heterogeneity by type of firms

Table 6 replicates the main results in different subsamples. In columns 1 and 2, listed firms are excluded as they may be subject to greater public attention and more pressure from investors and may have reacted to the announcement of the 2012 European directive. The results remain similar, indicating that the effect does not result from specific factors affecting only listed firms. Columns 3 and 4 indicate whether the effect is mainly driven by family firms. Family firms may have natural family candidates and organizational rules

facilitating the appointment of family members, making them likely to react to the reform by appointing a connected woman. I classify firms as family firms if three or more family members were involved as directors or CEO in 2010 or 2011. In non-family firms, the share of women among connected appointments increases by 26 percentage points with significance at the 5% level, an estimate that is very similar to that obtained when using the full sample. Excluding family firms moderately reduces the magnitude of the reform effect on the share of connected directors among female appointments, perhaps reflecting that connected appointments represent a smaller share of the total number of appointments in non-family firms. The share of connected directors among female appointments increases by 8.5 percentage from a baseline of 6%, which is significant at the 10% level. This evidence indicates that reliance on family connections following the reform was a general practice rather than being specific to family firms.

5.1.2 Robustness checks

Tables 7, 8, 9 and 10 present the results of several robustness tests.

Firm fixed effects   In Table 7, I show similar results using alternative outcomes to include firm fixed effects. I define two indicator variables at the firm level. The first variable captures the probability of appointing an *unconnected* woman and is equal to one if the firm appoints an unconnected woman in a given year and zero otherwise. The second variable captures the probability of appointing a *connected* woman and is equal to one if the firm appoints a connected woman in a given year and zero otherwise. Compared to the outcomes in the main analysis that are coded as missing in the years where no appointment is made, these two variables also provide information on the decision of firms not to appoint any director, since firm-year observations in which no appointments are made are coded as zero. This feature also allows me to perform the analysis with firm fixed effects, since I have time series for each firm. Table 7 shows that the quota increases the probability of appointing an unconnected female director in a given year by 2.6 percentage points from a baseline of 4.4% (see column 1) and the probability of appointing a connected female director by 1.3 percentage points from a baseline of 0.4%

(see column 3). Economically, these numbers reveal an intensification of network-based appointments: after the reform, firms become more than four times more likely to appoint a connected woman and 1.6 times more likely to appoint an unconnected woman.

Firm size   In Table 9, I present the two main tests described in Section 4.1 addressing the fact that the average sizes of control and treated firms differ. Column 1 shows the baseline specification. Column 2 shows the results obtained when augmenting the regression with time-varying controls for firm assets, profits, and number of employees, as well as interactions between pre-reform assets, profits, number of employees, number of directors, number of seats held by directors, share of directors with a university degree, share of directors with previous board experience, share of female directors, and year fixed effects. The results show that the share of connected directors among female appointments increases by 16.6 percentage points from the baseline of 7.9%, a larger increase than in the basic specification. Thus, the results are not biased by differential trends caused by differences in observable characteristics. In column 3, I replicate the result in a sample retaining only comparable treated and control firms. Specifically, I keep small treated firms, i.e., firms that are below the median value in terms of assets, profits, and number of employees among treated firms, and large control firms, i.e., firms that are above the median value in terms of assets, profits, and number of employees among control firms. This approach yields a sample of 270 firms and successfully eliminates the differences between treated and control firms (see Table 8). In the restricted sample, the average firm has 225 employees and assets of DKK 316 million. In this sample, the reform leads to a 37.3 percentage-point increase in the share of connected directors among female appointments, from a baseline of 10.5%, with significance at the 1% level. This effect is larger than for the full sample, indicating that the recruitment of women through family ties after the reform is stronger in smaller firms.

Design choices and placebo tests   In Table 10, I show that the results are robust to different methodological choices and placebo tests. Column 1 shows the baseline specification. In column 2, I replicate the results using the full sample, i.e., including firms that

have missing financial information during the sample period. In Column 3, I replace the intent-to-treat indicator as the treatment variable with a variable equal to 1 if a firm is treated in a given year and zero otherwise. Second, I perform three placebo tests. In column 4, I show that the reform did not increase the appointment of women with ties to incumbent directors at *untreated* firms, supporting the interpretation that the connection – rather than other factors correlated with family connections – is the main determinant of the appointment. In column 5, I estimate the effect of a placebo reform placed in 2009 on the sample restricted to the years 2007-2011 and show that the point estimate is drastically reduced to 1.7 percentage points and statistically nonsignificant. In column 5, I estimate the reform effect on the share of connected directors among *male* appointments and find a small negative effect of 2.8 percentage points from a baseline of 6.2%, which is significant at the 10% level. The results suggest that a small share of connected male directors might have been substituted by the appointment of connected women.

5.2 Consequences for board opportunities for potential candidates

In this section, I study the effect of the quota on board opportunities for potential female candidates depending on their family connections. Figure 6 shows the share of women appointed in a given year in each group for connected (Panel A) and unconnected (Panel B) potential candidates. The probability of being appointed is stable and follows parallel paths among connected and unconnected potential candidates at treated and control firms before the reform. When the reform occurs, the probability of being appointed increases sharply among connected potential candidates at treated firms (see Panel A) and increases slightly for unconnected potential candidates at treated firms (see Panel B).

This result is confirmed in Figure 7, which displays the coefficients from the dynamic specification in equation 4, estimated separately for connected (Panel A) and unconnected (Panel B) potential candidates. That is, I compare potential female candidates connected to treated and untreated firms before and after 2012 (Panel A) and unconnected potential candidates related to treated and untreated firms before and after 2012 (Panel B). First, for both groups, I detect no significant differential pre-reform trends in the probability of being appointed between candidates at treated and untreated firms. This result

is confirmed by the test for pre-reform trends in the triple differences based on equation 5. I fail to reject the null hypothesis of parallel trends ($\beta_4 = -.0005$, p-value= 0.31). Second, the positive effect of the quota on the probability of being appointed of connected potential candidates emerges after 2012. The quota has no positive effect on the probability of appointment for unconnected potential candidates.

Table 11 displays the regression results. All specifications include individual and year fixed effects, and standard errors are clustered at the individual level. In columns 1 and 2, *treat* × *post* captures the effect of the law on the probability of being appointed for connected and unconnected potential candidates, respectively. Connected potential candidates are three times more likely to be appointed after the reform ($0.0019/0.0008 = 2.1$, see column 1), whereas for unconnected potential candidates, I detect no significant effect on the probability of being appointed (see column 2). Column 3 reports the results based on the triple-difference specification in equation 2. The triple-differences estimate confirms the result obtained in columns 1 and 2: the probability of being appointed increases by 0.2 percentage points for connected potential candidates relative to unconnected potential candidates after the reform from a baseline of 0.1%, a result that is significant at the 5% level. In column 4, I estimate the same regression using the number of appointments at treated firms as an alternative outcome. The estimate has a similar significance level and increases slightly in magnitude when considering the number of board appointments, suggesting that some connected women were appointed to several boards.

Overall, these results show the relative advantage of connected potential candidates and indicate that they were the main beneficiaries of the reform. Unconnected potential candidates, while highly qualified and visible, did not reap the benefits of the reform, suggesting that the reform missed its goal of smoothing access to the boardroom for all qualified women.

Differences between connected and unconnected potential candidates   I test the robustness of the results to the inclusion of controls for observable differences between connected and unconnected candidates described in Section 4.1. Table 12 shows the results of the triple-difference specification in equation 2 including interactions between

individual characteristics and *Treat* and *Post*. Column 1 replicates the baseline specification. Columns 2 and 3 include controls for differences in demographic and family characteristics. Column 4 includes controls for differences in education, and column 5 includes controls for industry background. Columns 6 to 9 control for differences in professional experience, CEO experience, and director experience. The parameter estimate remains relatively stable across specifications, with magnitudes ranging from 0.18 percentage points to 0.32 percentage points, compared to the magnitude of 0.21 percentage points in the baseline specification. All estimates are significant at the 5 or 10% level. The results thus show that the advantage of connected potential candidates over unconnected candidates results from their connections rather than from other individual characteristics.

6 Do network-based hiring practices create search frictions in the recruitment of female directors?

Whether network-based hiring practices allow boards to appoint the most qualified directors remains an empirical question. On the one hand, boards could use the network of incumbent directors and CEOs when searching for potential directors because it helps them to reach the most qualified candidates. On the other hand, such a network-based search could lead boards to hire from a restricted pool of candidates, therefore excluding part of the talent pool from the search process and ultimately leading to the recruitment of less qualified directors. For women in particular, network-based hiring could lead boards to recruit from a very restricted pool of candidates, since they tend to be underrepresented in incumbent director and CEO networks (Von Essen and Smith (2021)).

In this section, I provide suggestive evidence on this question by exploring the qualifications of connected and unconnected female directors and of female directors appointed before and after the reform.

Qualifications of connected and unconnected female directors Table 13 displays the characteristics of female directors with and without previous family connections (fol-

lowing the same definition as in Section 3.3) at sample firms between 2007 and 2017. Connected female directors have fewer board seats and almost two fewer years of professional experience. The share of directors with previous top executive and director experience are similar across connected and unconnected female directors. However, unconnected female directors are more likely to have CEO experience. Finally, unconnected female directors are also more educated, as they possess one additional year of education and are 17 percentage points more likely to hold a university degree.

Overall, connected female directors appear to be less qualified than unconnected female directors. These patterns are in line with descriptive evidence provided in Bianco et al. (2015) and González et al. (2020). This evidence is consistent with network-based hiring practices leading to the recruitment of less qualified directors, indicating a potential loss of talented candidates excluded from the search process. Alternatively, family connections could substitute for other educational and professional credentials used in the recruitment process.

Qualifications of female directors appointed before and after the reform If sticky hiring norms based on networks constitute search friction in the recruitment of female board directors and the quota suddenly forced firms to hire more women without changing their hiring practices, this may have led to the recruitment of less qualified female directors. As a final exercise, I compare the qualifications of newly appointed female directors at treated firms before and after the reform. Table 14 shows the results. After the reform, there is a clear decrease in experience and a small decrease in the educational credentials of newly appointed female directors. Women appointed before the law are older and have more than 5 additional years of professional experience. Among women appointed before the law, 34 and 61% have top manager and previous director experience, respectively. After the law, these numbers decrease to 8 and 45%, respectively. While the differences in educational background are less pronounced, women appointed after the reform are also less likely to hold a university degree.

This last piece of evidence is consistent with the idea that boards consider the same restricted choice set of women before and after the reform. They start by choos-

ing the best qualified candidates and have to appoint the less qualified candidates as the required number of women on boards increases. This interpretation also helps to rationalize contradictory findings from previous studies. In the context of the Norwegian quota, Bertrand et al. (2019) show that the number of business women whose qualifications mirror those of the median male director is as large as 5,000, which is well above the total number of women on boards, yet Ahern and Dittmar (2012) find a clear decrease in the qualifications of female directors appointed following the law. This apparent contradiction could arise because, as in the Danish case, Norwegian firms mainly relied on traditional hiring networks to comply with the law, therefore overlooking a large pool of qualified female candidates. Finally, studying a board gender quota implemented in France, Ferreira et al. (2020) suggest that firms changed their search technology from network-based to executive search firms, therefore leading to an increase in the qualifications of newly appointed directors after the quota.

7 Conclusion

Mandatory board gender quotas are being implemented in an increasing number of countries but remain highly contested and controversial. One particular concern is which women benefit from these laws and the associated consequences for meritocratic selection. Since networks play a determinant role in board appointments, understanding the interaction between board gender quotas and network-based hiring practices is essential to inform this concern.

Board gender quotas does not have a clear predictive effect on network-based hiring practices. On the one hand, such laws could lead boards to adjust their hiring practices to find qualified women and rely less on the "old boys" networks. On the other hand, firms may find it costly to adjust and simply increase reliance on their traditional hiring networks.

This paper addresses this question by studying how a board gender quota implemented in Denmark in 2012 impacted a widespread practice in the recruitment of female directors: appointments through family connections. After establishing that blood- and

marriage-based ties play an important role in women's access to the boardroom, I find that the introduction of the quota intensified the recruitment of female directors through family ties, as shown by the composition of new female appointments changing to favor connected women. As a consequence, board opportunities increased for potential candidates with relevant family connections but not for other highly qualified but unconnected potential candidates. From the individual perspective, this finding suggests that the policy missed its goal of smoothing access to the boardroom for all qualified women. In addition, I find that the qualifications of connected female directors tend to be lower than those of other female directors, suggesting that such network-based hiring practices do not necessarily lead to the selection of the most qualified female candidates.

The evidence presented in this paper suggests that board gender quotas may lead to unintended consequences because they interact with deeply anchored hiring practices based on networks. Inspired by Ferreira et al. (2020), I propose a story that may account for the different findings in this paper. Before the quota, boards mainly relied on their direct networks to identify potential directors. Since women tend to be underrepresented in these networks, such hiring practices automatically led to women being underrepresented in the boardroom. After the introduction of the gender-balance law, firms did not renew their hiring practices to identify qualified women but in fact relied more on their usual hiring networks. This in turn led boards to choose new female directors from the same restricted pool of potential female candidates as before the law, therefore leading to a decrease in the qualifications of the newly appointed directors.

From a policy perspective, one implication of this paper is that numerical targets alone may not be sufficient to reform sticky hiring practices that exclude women from certain positions. However, this work does point toward potential solutions. First, an increased level of transparency in board appointment processes could help to break the path of dependence on "old boys" networks and bring more women into the pool of candidates. Second, reducing the costs associated with switching search technology may help firms adjust more rapidly to quotas.

While this article represents a first step in informing how women are selected for directorships, one open question is whether the conclusions can be generalized to

other types of networks. Although blood- and marriage-based ties arguably represent a major pathway to female business leadership, some women access the boardroom differently – for example, through the intermediary of executive search firms or through internal promotion in the company – and the effect of gender-balance laws on such practices may differ. In addition, firms with high search costs may have reacted more quickly by appointing a woman from within their network, anticipating that a change in hiring practices was not an option. In the long run, as firms with lower search costs start to appoint women and the cost of searching for qualified women decreases, women with no previous access to traditional hiring networks could secure board positions.

References

Adams, R. B. and Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of financial economics*, 94(2):291–309.

Adams, R. B. and Funk, P. (2012). Beyond the glass ceiling: Does gender matter? *Management science*, 58(2):219–235.

Adams, R. B., Hermalin, B. E., and Weisbach, M. S. (2010). The role of boards of directors in corporate governance: A conceptual framework and survey. *Journal of Economic Literature*, 48(1):58–107.

Agarwal, S., Qian, W., Reeb, D. M., and Sing, T. F. (2016). Playing the boys game: Golf buddies and board diversity. *American Economic Review*, 106(5):272–76.

Ahern, K. and Dittmar, A. K. (2012). The changing of the boards: The impact on firm valuation of mandated female board representation. *The Quarterly Journal of Economics*, 127(1):137–197.

Allemand, I., Bédard, J., Brullebaut, B., and Deschênes, J. (2021). Role of old boys' networks and regulatory approaches in selection processes for female directors. *British Journal of Management*.

Bertrand, M., Black, S., Jensen, S., and Lleras-Muney, A. (2019). Breaking the glass ceiling? the effect of board quotas on female labour market outcomes in norway. *The Review of Economic Studies*, 86(1):191–239.

Bertrand, M., Goldin, C., and Katz, L. F. (2010). Dynamics of the gender gap for young professionals in the financial and corporate sectors. *American Economic Journal: Applied Economics*, 2(3):228–55.

Bianco, M., Ciavarella, A., and Signoretti, R. (2015). Women on corporate boards in i taly: The role of family connections. *Corporate Governance: An International Review*, 23(2):129–144.

Bøhren, Ø. and Staubo, S. (2014). Does mandatory gender balance work? changing organizational form to avoid board upheaval. *Journal of Corporate Finance*, 28:152–168.

Bøhren, Ø. and Staubo, S. (2016). Mandatory gender balance and board independence. *European Financial Management*, 22(1):3–30.

Burke, R. J. (1997). Women directors: selection, acceptance and benefits of board membership. *Corporate Governance: An International Review*, 5(3):118–125.

Cai, J., Nguyen, T., and Walkling, R. A. (2020). Director appointments–it is who you know. Working paper, 28th Annual Conference on Financial Economics and Accounting.

Cruz, C., Labonne, J., and Querubín, P. (2017). Politician family networks and electoral outcomes: Evidence from the philippines. *American Economic Review*, 107(10):3006–37.

Dal Bó, E., Dal Bó, P., and Snyder, J. (2009). Political dynasties. *Review of Economic Studies*, 76(1):115–142.

de Cabo, R. M., Terjesen, S., Escot, L., and Gimeno, R. (2019). Do 'soft law'board gender quotas work? evidence from a natural experiment. *European Management Journal*, 37(5):611–624.

Eckbo, E., Nygaard, K., and Thorburn, K. (2019). Board gender-balancing and firm value. *ECGI Working Paper*.

Ferreira, D., Ginglinger, E., Laguna, M.-A., and Skalli, Y. (2020). Board quotas and director-firm matching.

Folke, O., Rickne, J., and Smith, D. M. (2020). Gender and dynastic political selection. *Comparative Political Studies*.

Fracassi, C. and Tate, G. (2012). External networking and internal firm governance. *The Journal of finance*, 67(1):153–194.

González, M., Guzmán, A., Pablo, E., and Trujillo, M. A. (2020). Does gender really matter in the boardroom? evidence from closely held family firms. *Review of Managerial Science*, 14(1):221–267.

Granovetter, M. (1983). The strength of weak ties: A network theory revisited. *Sociological theory*, pages 201–233.

Hjort, J. et al. (2017). Universal investment in infants and long-run health: evidence from denmark's 1937 home visiting program. *American Economic Journal: Applied Economics*, 9(4):78–104.

Jaeger, D. A., Joyce, T. J., and Kaestner, R. (2020). A cautionary tale of evaluating identifying assumptions: did reality tv really cause a decline in teenage childbearing? *Journal of Business & Economic Statistics*, 38(2):317–326.

Kramarz, F. and Thesmar, D. (2013). Social networks in the boardroom. *Journal of the European Economic Association*, 11(4):780–807.

Kunze, A. and Scharfenkamp, K. (2019). Unintended consequence of gender quotas on boards. *Working paper*.

Labonne, J., Parsa, S., and Querubin, P. (2020). Political dynasties, term limits and female political empowerment: Evidence from the philippines. *Working Paper*.

Matsa, D. A. and Miller, A. R. (2013). A female style in corporate leadership? evidence from quotas. *American Economic Journal: Applied Economics*, 5(3):136–69.

McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of econometrics*, 142(2):698–714.

Nguyen, B. D. (2012). Does the rolodex matter? corporate elite's small world and the effectiveness of boards of directors. *Management Science*, 58(2):236–252.

Nygaard, K. (2011). Forced board changes: Evidence from norway.

Querubin, P. (2016). Family and politics: Dynastic persistence in the philippines. *Quaterly Journal of Political Science*, 11(2):151–181.

Reberioux, A. and Roudaut, G. (2019). The role of rookie female directors in a post-quota period: Gender inequalities within french boards. *Industrial Relations: A Journal of Economy and Society*, 58(3):423–483.

Schmidt, B. (2015). Costs and benefits of friendly boards during mergers and acquisitions. *Journal of Financial Economics*, 117(2):424–447.

Smith, N. and Parrotta, P. (2018). Why so few women on boards of directors? empirical evidence from danish companies in 1998–2010. *Journal of Business Ethics*, 147(2):445–467.

Von Essen, E. and Smith, N. (2021). Gender and networks on corporate boards.

Voth, H.-J. and Xu, G. (2019). Patronage for productivity: Selection and performance in the age of sail.

Xu, G. (2018). The costs of patronage: Evidence from the british empire. *American Economic Review*, 108(11):3170–98.

8 Figures and Tables

Figure 1: Reform impact
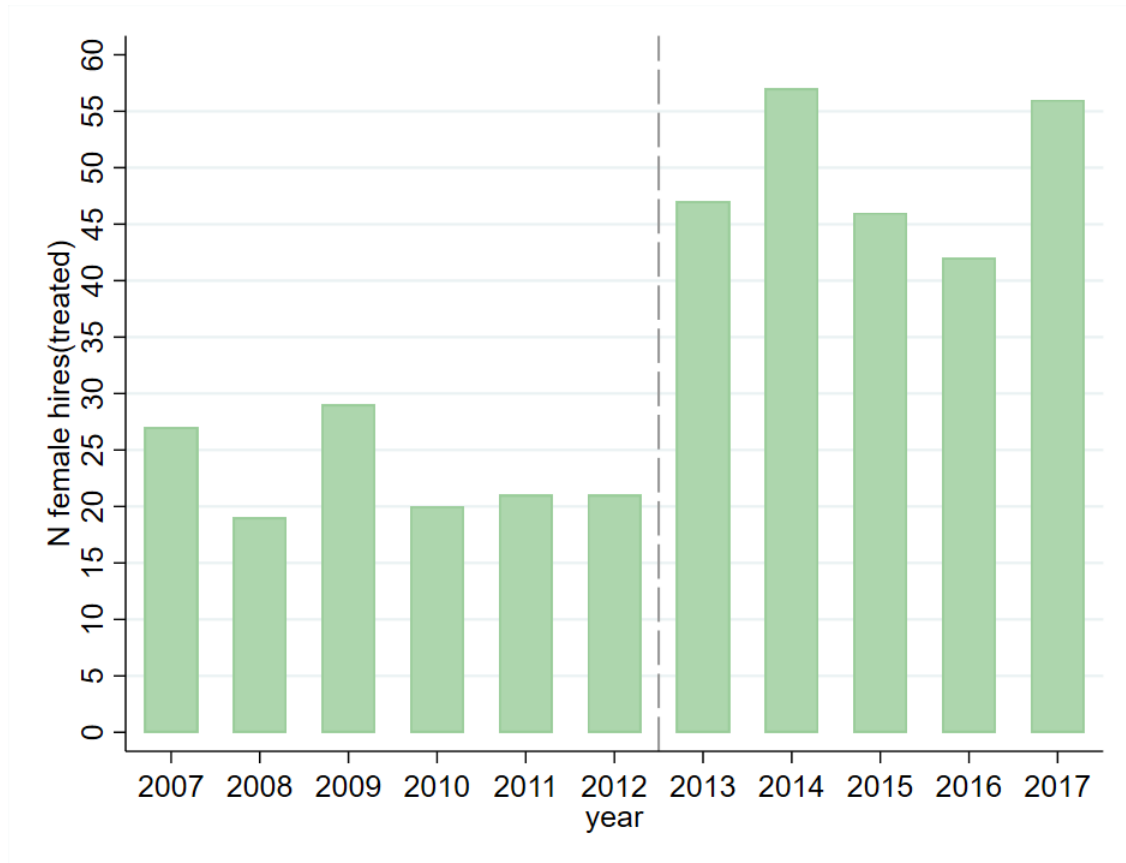
Figure 1 illustrates the positive shock on demand for female directors. Each bar corresponds to the total number of female hires in a given year, for the group of firms impacted by the law. Number of unique firms = 614, total number of female hires = 413.

Figure 2: Gender gap in family connections among board directors
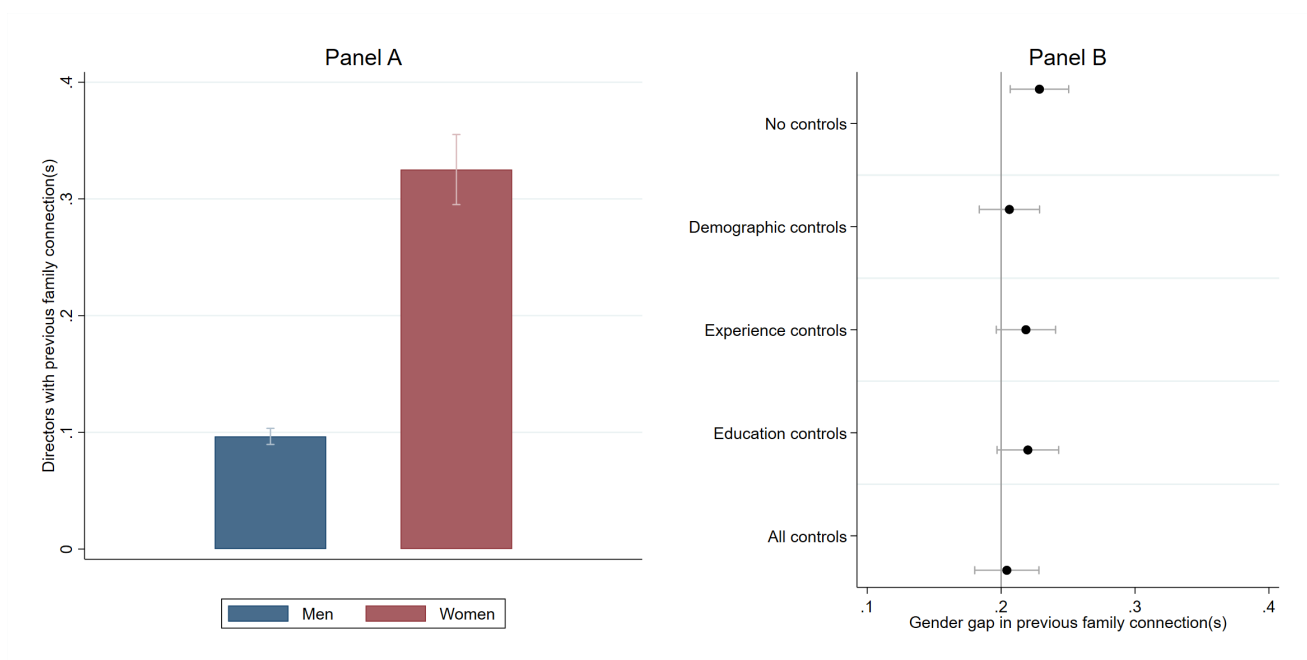
Panel A of Figure 2 shows the share of male and female directors with previous family connections. Panel B of Figure 2 shows the gender gap in previous family connections conditional on a range of observable characteristics. The unit of observation is the person-position level. Demographic controls include age, married, children, and non-Danish origin. Experience controls include tenure, number of years of professional experience, top manager experience, director experience, and CEO experience. Education controls include number of years of education, university degree, and PhD degree. Definitions of variables are explained in Table 15.

Figure 3: Share of members with previous family connections, 2007-2017

Figure 3 shows the share of male and female directors with previous family connections. The unit of observation is the person-position level. In the first row, family firms are dropped (graph on the left), and firms with less than 250 employees are dropped (graph on the right). In the second row, directors with spousal ties are dropped (graph on the left), and directors with family connections within the same firm are recoded as zero (graph on the right). Definitions of variables are explained in Table 15.

Figure 4: Time series - Composition of hires over time
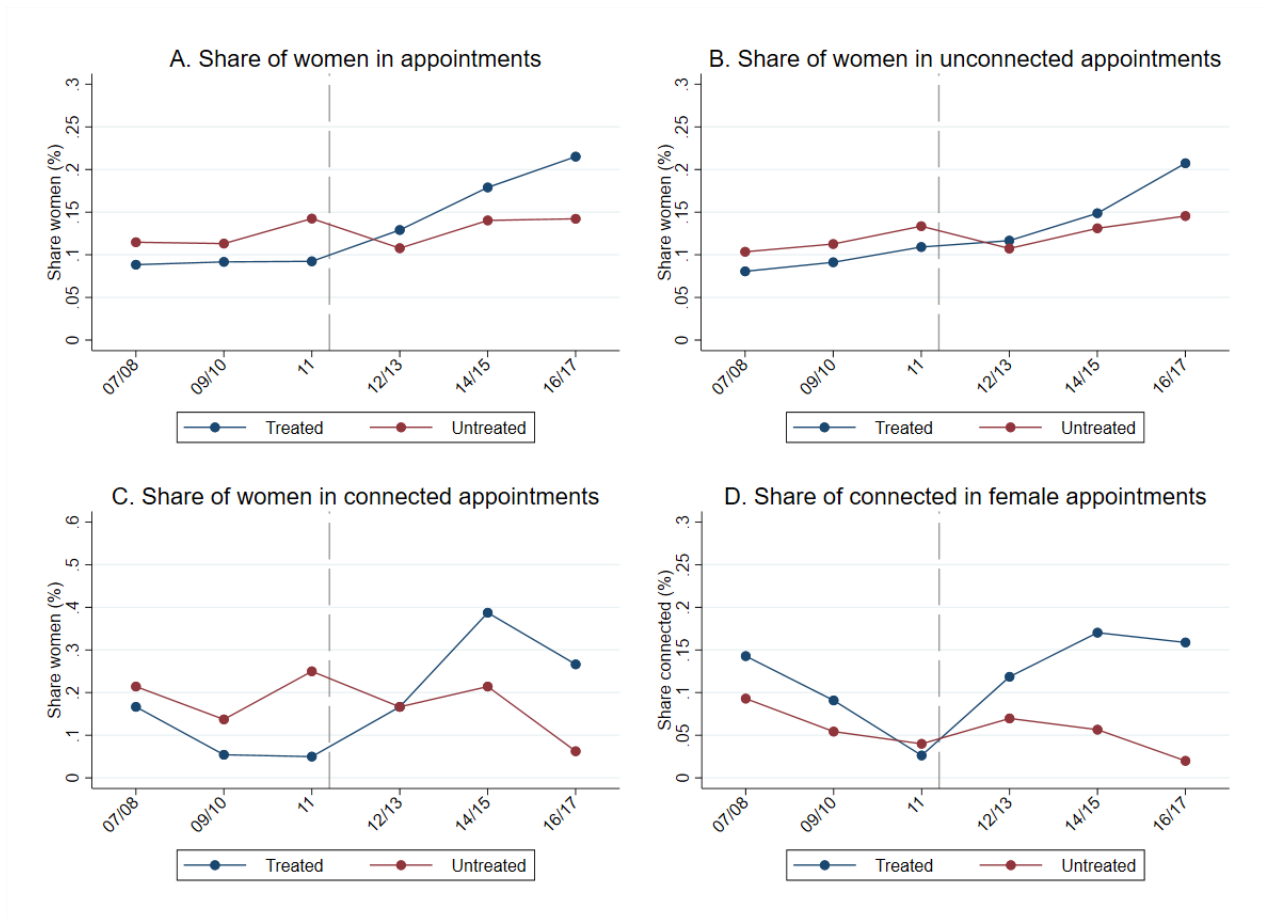
Figure 4 shows the unconditional share of i) women in appointments ii) women in unconnected appointments iii) women in connected appointments iv) connected directors in female appointments in treated and control firms. Variables definitions are available in Table 15.

Figure 5: Event study analysis - Effect of the board gender quota on network-based hiring
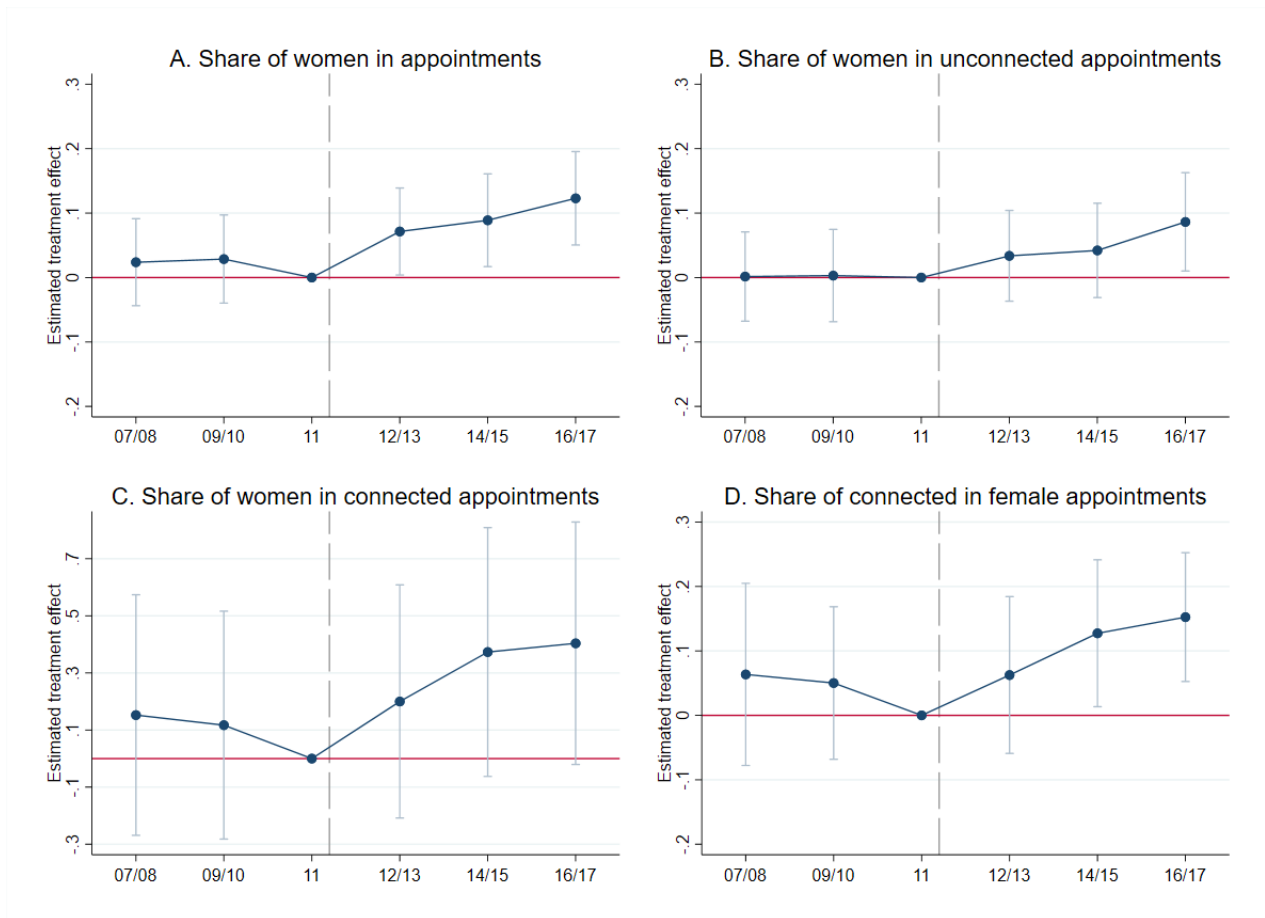
Figure 5 shows point estimates and 90 percent confidence intervals of the parameters β_t^T in equation 3. The variable $y_{i,t}$ is the share of i) women in appointments ii) women in unconnected appointments iii) women in connected appointments iv) connected directors in female appointments at firm i in year t. Standard errors are clustered at the firm level. The coefficients β_t^T measure the change in the outcomes following the reform. The coefficient β_{2011}^T is normalized to 0.

Figure 6: Time series: Unconditional probability of being appointed for connected and unconnected candidates, in treated and untreated firms
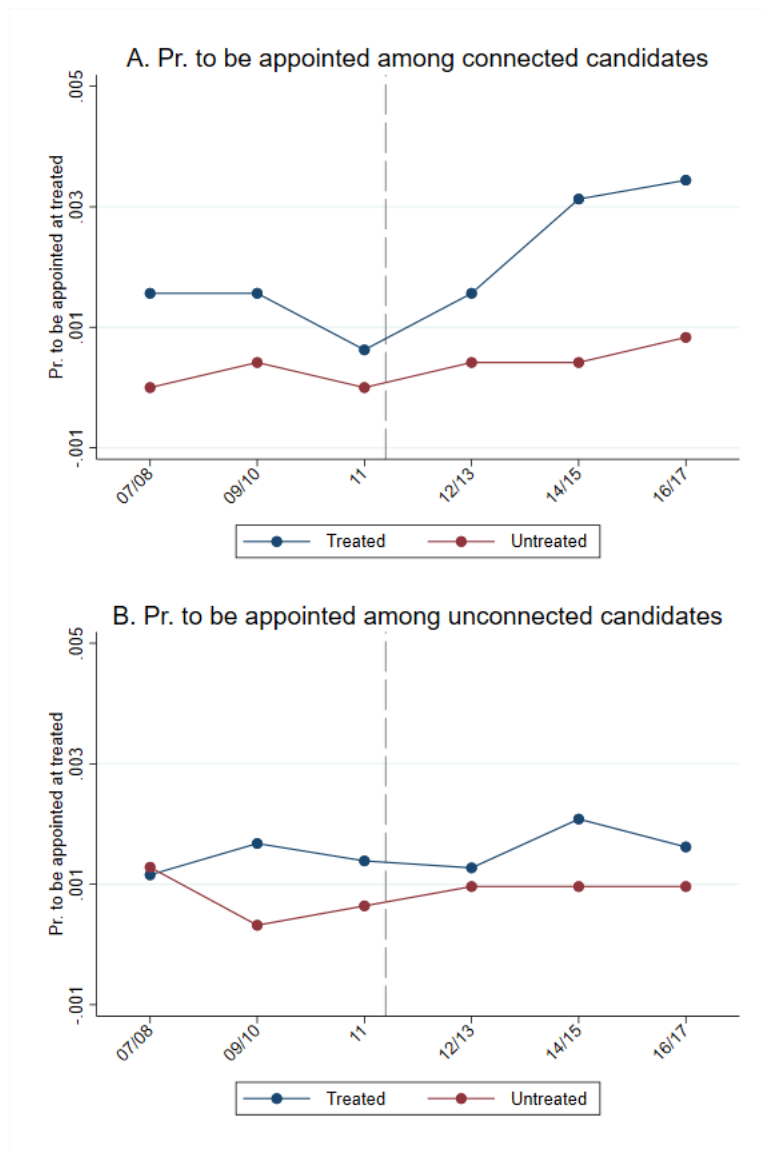
Figure 6 shows the probability of being appointed to the board of a treated firm among connected and unconnected potential candidates

Figure 7: Event study analysis: Effect of the board gender quota on the probability of being appointed of connected and unconnected candidates
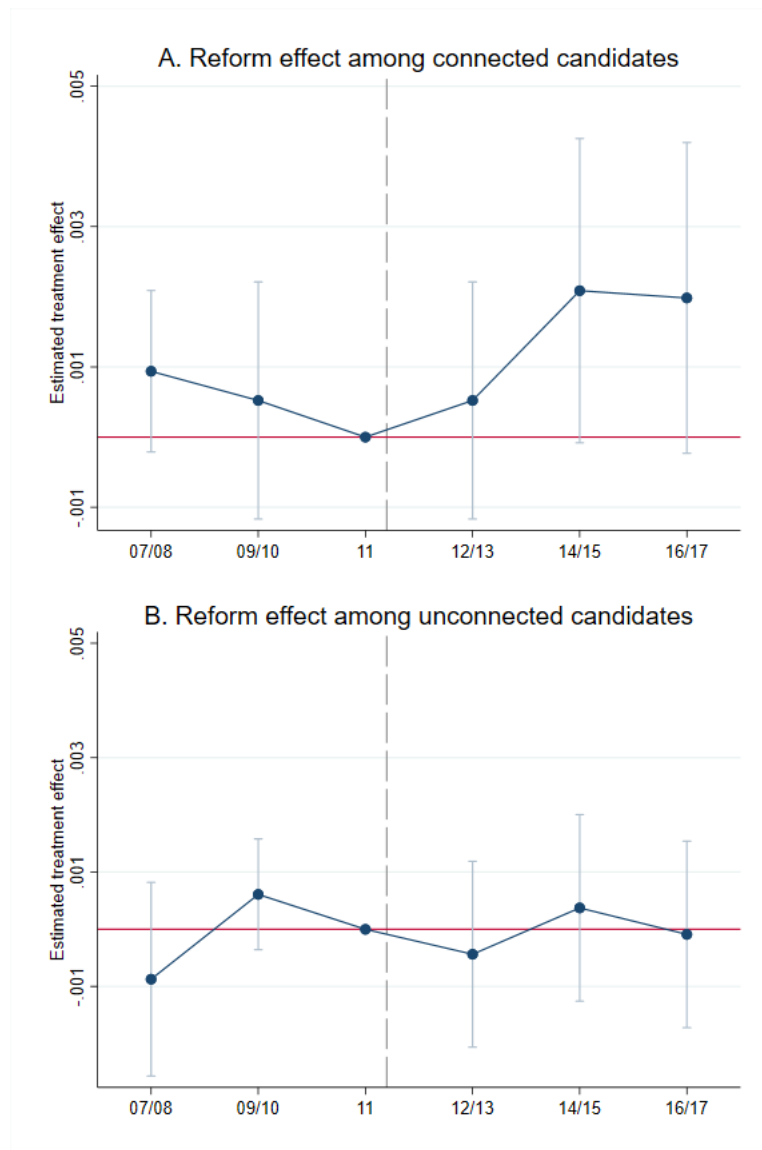
Figure 7 shows point estimates and 90 percent confidence intervals of the parameters β_t^T in equation 4. The variable $y_{i,t}$ is a dummy equal to one if women i is appointed to the board of a treated firm in year t. Standard errors are clustered at the individual level. The coefficients β_t^T measure the change in the probability of being appointed following the reform, for both groups of women separately. The coefficient β_{2011}^T is normalized to 0.

Table 1: Sample of firms: firm, board, and director characteristics

Table 1 Panel A and B display the number of observations, sample means, medians, and standard deviations of firm- and board-level characteristics for all firms. Time-varying variables are averaged over the sample period (2007-2017). The unit of observation is the firm. Panel C displays the summary statistics for male and female directors at sample firms. The unit of observation is the person-position level. The variables are defined in Table 15.

Panel A: Firm-level characteristics

Variable	Obs	Mean	Med	S.d
Profits/assets	1006	.058	.047	.259
Assets (M DKK)	1006	1535.041	261.648	9799.939
Profits (M DKK)	1006	1206.59	390.978	4326.949
N. Employees	1006	412.849	188.26	1020.187
Family firms	1006	.174	0	.379
Listed firms	1006	.041	0	.198

Panel B: Board-level characteristics

Variable	Obs	Mean	Med	S.d
Women share (%)	1006	.115	.035	.169
All-men board	1006	.679	.818	.374
Pr. appoint woman	1006	.063	0	.103
Pr. appoint connected woman	1006	.007	0	.039
N directors	1006	4.884	4.727	2.295
Age (mean)	1000	52.465	52.416	6.182
Professional experience (years, mean)	1006	20.898	21.61	7.031
Tenure (mean)	1006	7.369	4.828	7.348
Number of seats (mean)	1006	1.415	1.2	.526
University degree (%)	1001	.533	.542	.309
Top executive experience (%)	1006	.438	.442	.281
CEO experience (%)	1006	.531	.562	.292
Director experience (%)	1006	.651	.703	.282

Panel C: Directors characteristics

	All		Men		Women	
Variable	Obs	Mean	Obs	Mean	Obs	Mean
Age	7677	52.187	6756	52.735	921	48.174
Married	7677	.845	6756	.861	921	.725
Children (dummy)	8216	.874	7240	.885	976	.798
Previous family connection	7982	.123	7044	.097	938	.325
Non-Danish origin	7677	.025	6756	.023	921	.042
Chair or vice-chair	6361	.169	5676	.181	685	.069
Tenure (years)	8213	5.683	7237	5.583	976	6.428
Number of seats	8216	1.441	7240	1.475	976	1.184
Professional experience (years)	8216	20.392	7240	20.644	976	18.525
Top executive experience (dummy)	8216	.319	7240	.335	976	.195
Director experience (dummy)	8216	.667	7240	.692	976	.483
CEO experience (dummy)	8216	.543	7240	.58	976	.267
Education(years)	7037	14.557	6246	14.596	791	14.244
University degree (dummy)	7037	.519	6246	.528	791	.454
PhD degree (dummy)	7037	.01	6246	.01	791	.013
N unique individuals				5440		869
N unique individuals	6309		5440		869	

Table 2: Sample of potential female candidates

Table 2 displays the number of observations, sample means, medians, and standard deviations of individual characteristics for all potential female candidates. The unit of observation is the potential candidate. Time-varying variables are measured in 2011. The variables are defined in Table 15.

Variable	Obs (1)	All firms Mean (2)	Med (3)	S.d (4)
Age	13522	42.9517	43	11.899
Married	13522	.5947	1	.491
Children (dummy)	13827	.7101	1	.454
N Children	13827	1.4023	2	1.092
Non-Danish origin	13522	.0564	0	.231
Professional experience (years)	13827	16.5065	15.862	10.667
Top executive experience (dummy)	13828	.8426	1	.364
Director experience (dummy)	13827	.2233	0	.416
CEO experience (dummy)	13827	.1313	0	.338
Top ex/Director/CEO exp. (dummy)	13828	1	1	0
Education (years)	13420	14.7379	14	2.349
University degree (dummy)	13420	.449	0	.497
Pre-reform pr. appointment at treated firm	13827	.0054	0	.073

Table 3: Firm characteristics, by treated and control groups

Table 3 displays the number of observations, sample means, medians, and standard deviations of firm- and board-level characteristics for treated and control firms. The unit of observation is the firm. The last column reports the difference in mean of the pre-reform characteristics between treated and control firms. Time-varying variables are averaged over the pre-reform period (2007-2011). The variables are defined in Table 15. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Variable	Treated firms				Control firms				Difference
	Obs	Mean	Med	S.d	Obs	Mean	Med	S.d	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Firm-level characteristics									
Profits/assets	530	.083	.044	.739	455	.045	.054	.168	0.037
Assets (M DKK)	530	2286.803	511.855	10955.1	455	290.625	108.293	2163.165	1996.178***
Profits (M DKK)	530	1908.462	706.448	6176.14	455	245.782	185.723	864.494	1662.680***
N. Employees	530	646.668	314.807	1432.062	455	164.461	132.432	307.984	482.207***
Family firms	530	.128	0	.335	455	.235	0	.425	-0.107***
Listed firms	530	.064	0	.245	455	.015	0	.123	0.049***
Panel B: Board-level characteristics									
Women share (%)	530	.083	0	.152	455	.121	0	.19	-0.037***
All-men board	530	.747	1	.386	455	.666	1	.43	0.081***
Pr. appoint woman	530	.042	0	.096	455	.056	0	.124	-0.014**
Pr. appoint connected woman	530	.004	0	.029	455	.004	0	.029	0.001
N directors	530	5.167	5	2.59	455	4.574	4.2	2.301	0.593***
Age (mean)	524	55.353	54.939	6.499	449	53.988	53.597	7.229	1.365***
Professional experience (years, mean)	530	21.589	22.39	8.364	455	22.173	23.045	7.736	-0.584
Tenure (mean)	530	7.898	4.568	8.899	455	7.681	5	8.004	0.218
Number of seats (mean)	530	1.51	1.267	.621	455	1.281	1	.482	0.229***
University degree (%)	525	.573	.6	.33	451	.504	.5	.334	0.068***
Top manager experience (%)	530	.489	.49	.306	455	.444	.44	.3	0.044**
CEO experience (%)	530	.519	.54	.318	455	.507	.5	.314	0.012
Previous director experience (%)	530	.671	.733	.299	455	.62	.667	.321	0.050**

Table 4: Potential female candidate characteristics, by connected and unconnected groups, across treated and untreated firms

Table 4 displays the number of observations, sample means and standard deviations of individual characteristics for connected and unconnected potential candidates, by treated and untreated firms. Columns 10 and 16 report differences in mean between connected and top executives in each group. The unit of observation is the potential candidate. Time-varying variables are measured in 2011. Variables are defined in Table 15. *, **, and *** denote significance at 10%, 5%, and 1%, respectively

	Treated						Difference	Untreated						Difference
	Connected			Unconnected				Connected			Unconnected		
Variable	Obs	Mean	S.d	Obs	Mean	S.d	(2)-(5)	Obs	Mean	S.d	Obs	Mean	S.d	(9)-(11)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Age	1598	51.2509	13.38	8396	40.1062	10.581	11.145***	1201	51.438	12.922	1518	42.4071	10.034	9.031***
Married	1598	.7778	.416	8396	.5361	.499	0.242***	1201	.7802	.414	1518	.5586	.497	0.222***
Children (dummy)	1598	.8874	.316	8642	.6497	.477	0.238***	1201	.8893	.314	1558	.6919	.462	0.197***
N Children	1598	1.9537	1.045	8642	1.2268	1.063	0.727***	1201	1.9775	.998	1558	1.3228	1.049	0.655***
Non-Danish origin	1598	.0144	.119	8396	.0717	.258	-0.057***	1201	.0258	.159	1518	.0547	.227	-0.029***
Professional experience (years)	1598	16.8654	10.336	8642	15.6868	10.714	1.179***	1201	18.0821	10.018	1558	17.7042	10.669	0.378
Top executive experience (dummy)	1598	.2428	.429	8642	1	0	-0.757***	1201	.1965	.398	1558	1	0	-0.803***
Director experience (dummy)	1598	.7034	.457	8642	.0892	.285	0.614***	1201	.7269	.446	1558	.1335	.34	0.593***
Recent Director experience (dummy)	1598	.5682	.495	8642	.0724	.259	0.496***	1201	.5887	.492	1558	.1142	.318	0.474***
CEO experience (dummy)	1598	.383	.486	8642	.055	.228	0.328***	1201	.4147	.493	1558	.0956	.294	0.319***
Recent CEO experience (dummy)	1598	.3191	.466	8642	.0429	.203	0.276***	1201	.3281	.47	1558	.0757	.265	0.252***
Top ex/Director/CEO exp. (dummy)	1598	1	0	8642	1	0		1201	1	0	1558	1	0	
Education (years)	1591	15.1113	2.612	8293	14.6366	2.299	0.475***	1196	14.8909	2.564	1520	14.6478	2.133	0.243***
University degree (dummy)	1591	.5619	.496	8293	.4206	.494	0.141***	1196	.4858	.5	1520	.4342	.496	0.052***
Pre-reform pr. appointment at treated firm	1598	.0063	.079	8642	.0067	.082	-0.000	1201	.0008	.029	1558	.0032	.057	-0.002

Table 5: Effect of the reform on network-based hiring

Table 5 shows the effect of the board gender quota on the share of i) women in appointments (columns (1) and (2)) ii) women in unconnected appointments (columns (3) and (4)) iii) women in connected appointments (columns (5) and (6)) and iv) connected directors in female appointments (columns (8) and (9)). Controls include the share of new hires with a university degree, the share of new hires with director experience, the share of new hires with CEO experience, and the share of new hires with top executive experience. Mean of DV reported using pre-reform years. Standard errors are clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Dep. Var.:	Share women in appointments		Share women in unconnected app.		Share women in connected app.		Share connected in female app.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat	-0.0254*	-0.0233*	-0.0185	-0.0170	-0.1040*	-0.0830	0.0116	0.0129
	(0.0141)	(0.0137)	(0.0146)	(0.0142)	(0.0594)	(0.0558)	(0.0338)	(0.0336)
Treat × Post	0.0757***	0.0719***	0.0463**	0.0440**	0.2938***	0.2650***	0.1258***	0.1233***
	(0.0210)	(0.0206)	(0.0213)	(0.0209)	(0.0931)	(0.0935)	(0.0466)	(0.0460)
Year F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Pre-shock mean of D.V.	.1036	.1036	.1011	.1011	.115	.115	.0786	.0786
Adj. R2	.017	.067	.012	.065	.097	.166	.039	.062
Observations	3347	3347	3125	3125	326	326	636	636
N. Firms	950	950	927	927	241	241	424	424

Table 6: Effect of the reform on network-based hiring, excluding listed and family firms

Table 6 shows the effect of the board gender quota on the share of i) women in connected appointments and ii) connected directors in female appointments in non-listed firms (columns (1) and (2)) and in non-family firms (columns (3) and (4)). Controls include the share of new hires with a university degree, the share of new hires with director experience, the share of new hires with CEO experience, and the share of new hires with top executive experience. Mean of DV reported using pre-reform years. Standard errors are clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Dep. Var.:	Listed firms excluded		Family firms excluded	
	Share women in connected app.	Share connected in female app.	Share women in connected app.	Share connected in female app.
	(1)	(2)	(3)	(4)
Treat	-0.1159*	0.0037	-0.0716	-0.0002
	(0.0603)	(0.0348)	(0.0668)	(0.0330)
Treat × Post	0.2771***	0.1117**	0.2601**	0.0847*
	(0.0944)	(0.0477)	(0.1063)	(0.0463)
Year F.E	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Pre-shock mean of D.V.	.1111	.0757	.1168	.0599
Adj. R2	.091	.032	.108	.025
Observations	292	590	234	541
N. Firms	221	399	180	355

Table 7: Robustness checks: alternative outcomes and fixed effects

Table 7 shows the effect of the board gender quota on the probability of appointing an unconnected woman and on the probability of appointing a connected woman. Controls include a dummy equal to one if the firm hires a director with a university degree this year, a dummy equal to one if the firm hires a director with director experience this year, a dummy equal to one if the firm hires a director with CEO experience this year, and a dummy equal to one if the firm hires a director with top executive experience this year. All the specifications include firm and year fixed effects. Mean of DV reported using pre-reform years. Standard errors are clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Dep. Var.:	Pr. appoint Unconnected woman		Pr. appoint Connected woman	
	(1)	(2)	(3)	(4)
Treat × Post	0.0261***	0.0095	0.0131***	0.0104***
	(0.0092)	(0.0067)	(0.0032)	(0.0031)
Firm F.E	Yes	Yes	Yes	Yes
Year F.E	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Pre-shock mean of D.V.	.0436	.0436	.004	.004
Adj. R2	.004	.515	.003	.114
Observations	10374	10044	10374	10044
Firms	1006	1001	1006	1001

Table 8: Summary statistics, restricted sample

Table 8 displays the number of observations, sample means, medians, and standard deviations of firm- and board-level characteristics for the restricted sample, and for control and treated firms. The restricted sample is constructed as follows: I keep small treated firms, i.e, firms that are below the median value in terms of assets, profits, and number of employees among treated firms, and large control firms, i.e, firms that are above the median value in terms of assets, profits, and number of employees among control firms. Time-varying variables are averaged over the pre-reform period (2007-2011). The last column reports the difference in mean of the pre-reform characteristics between treated and control firms. Variables are defined in Table 15. *, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Variable	All				Treated firms				Control firms				Difference
	Obs	Mean	Med	S.d	Obs	Mean	Med	S.d	Obs	Mean	Med	S.d	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(6)-(10)
Panel A: Firm-level characteristics													
Profits/assets	270	.049	.043	.094	167	.048	.041	.08	103	.05	.055	.115	-0.002
Assets (M DKK)	270	315.6	246.108	590.24	167	293.92	270.533	124.129	103	350.75	173.928	944.29	-56.831
Profits (M DKK)	270	446.845	356.576	1107.19	167	438.473	434.628	131.833	103	460.419	258.327	1790.069	-21.945
N. Employees	270	224.456	189.712	391.251	167	206.09	190.966	75.416	103	254.236	188.418	626.896	-48.146
Family firms	270	.215	0	.411	167	.216	0	.412	103	.214	0	.412	0.002
Panel B: Board-level characteristics													
Pr. appoint woman	270	.038	0	.093	167	.035	0	.088	103	.043	0	.1	-0.008
Pr. appoint connected woman	270	.005	0	.036	167	.004	0	.027	103	.008	0	.048	-0.004
N. appointed connected women	270	.005	0	.036	167	.004	0	.027	103	.008	0	.048	-0.004
N directors	270	4.972	5	2.215	167	4.898	5	2.128	103	5.092	4.8	2.354	-0.194
Women share (%)	270	.091	0	.156	167	.1	0	.167	103	.075	0	.134	0.025
All-men board	270	.727	1	.402	167	.713	1	.405	103	.75	1	.397	-0.037
Age (mean)	268	55	54.867	6.559	166	55.182	54.41	6.765	102	54.705	55.258	6.23	0.477
Professional experience (years, mean)	270	22.213	23.249	7.995	167	21.994	22.579	8.399	103	22.568	23.922	7.32	-0.574
Tenure (mean)	270	8.054	5	8.108	167	8.851	5.577	8.722	103	6.762	4.05	6.845	2.089**
Number of seats (mean)	270	1.454	1.2	.615	167	1.444	1.183	.602	103	1.471	1.2	.64	-0.027
University degree (%)	269	.539	.5	.327	166	.546	.533	.323	103	.527	.5	.336	0.019
Top manager experience (%)	270	.478	.5	.307	167	.47	.47	.309	103	.49	.5	.304	-0.020
CEO experience (%)	270	.498	.517	.31	167	.462	.5	.314	103	.558	.574	.297	-0.097**
Previous director experience (%)	270	.636	.673	.291	167	.607	.653	.294	103	.682	.733	.28	-0.075**

Table 9: Robustness checks: controlling for differential trends and restricted sample

Table 9 shows the effect of the board gender quota on the share of connected directors in female appointments. Column (1) replicates the baseline result. In Column (2), time-varying controls for firm assets, profits, and number of employees are included, as well as interactions between pre-reform assets, profits, number of employees, number of directors, number of seats held by directors, share of directors with a university degree, share of directors with previous board experience, and share of female directors (all variables measured in 2011) and year fixed effects. In columns (3), the analysis is performed using the restricted sample of comparable treated and control firms (see Table 8). Mean of DV reported using pre-reform years. Standard errors are clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Dep. Var.:	Basic specification	Controls for size & differential trends	Restricted sample
	Share connected in female app.	Share connected in female app.	Share connected in female app.
	(1)	(2)	(3)
Treat	0.0116	-0.0092	-0.1896*
	(0.0338)	(0.0431)	(0.1022)
Treat × Post	0.1258***	0.1666**	0.3726***
	(0.0466)	(0.0664)	(0.1351)
Year F.E	Yes	Yes	Yes
Pre-shock mean of D.V.	.0786	.0786	.1047
Adj. R2	.039	.179	.097
Observations	636	594	139
Firms	424	393	105

Table 10: Robustness checks: full sample, alternative treatment definition, and placebo tests

Table 10 shows the effect of the board gender quota on the share of connected directors in female appointments. Column (1) replicates the baseline result. In column (2), firms with missing financial information during the sample period are included. In column (3), the treatment variable is based on the post-reform treatment status rather than on the intent-to-treat status. In column (4), the outcome is the share of directors with family connections to *untreated* firms in female appointments. In column (5), the reform year is placed in 2009 and the sample of analysis is restricted to years 2007 to 2011. Columns (5) reports the results for men. Mean of DV reported using pre-reform years. Standard errors are clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Dep. Var.:	Basic specification Share connected in female app.	Full sample Share connected in female app.	Alternative treatment definitions Share connected in female app.	Connected to untreated Share connected in female app.	Placebo reform Share connected in female app.	Effect on men Share connected in male app.
	(1)	(2)	(3)	(4)	(5)	(6)
Treat	0.0116	0.0064	0.0303	-0.2200***	0.0290	0.0541***
	(0.0338)	(0.0297)	(0.0348)	(0.0423)	(0.0499)	(0.0110)
Treat × Post	0.1258***	0.1212***	0.1072**	0.0160	0.0177	-0.0284*
	(0.0466)	(0.0422)	(0.0462)	(0.0547)	(0.0711)	(0.0155)
Year F.E	Yes	Yes	Yes	Yes	Yes	Yes
Pre-shock mean of D.V.	.0786	.0719	.0786	.1441	.1124	.0626
Adj. R2	.039	.036	.046	.127	.022	.015
Observations	636	740	547	636	229	3033
Firms	424	494	389	424	191	934

Table 11: Effect of the reform on the probability of being appointed for potential female candidates

Table 11 shows the differential effect of the reform on connected and unconnected potential candidates. Column (1) and (2) report the reform effect for connected and unconnected potential candidates, separately. Column (3) and (4) report the triple-difference estimate of the reform effect on returns to connections, using the probability and number of appointments as outcomes, respectively. All regressions include individual and year fixed effects, and standard errors are clustered at the individual level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Dep. Var.:	Pr. to be appointed at treated firm			N appointments at treated firm
Sample:	Connected candidates	Unconnected candidates	All candidates	All candidates
	(1)	(2)	(3)	(4)
Treat × Post	0.0019**	-0.0002	-0.0002	-0.0004
	(0.0009)	(0.0005)	(0.0005)	(0.0007)
Connect × Post			-0.0003	-0.0004
			(0.0006)	(0.0007)
Connect × Treat × Post			0.0021**	0.0025**
			(0.0010)	(0.0012)
Individual F.E	Yes	Yes	Yes	Yes
Year F.E	Yes	Yes	Yes	Yes
Pre-shock mean of D.V.	.0009	.0012	.0012	.0012
Observations	30789	112200	142989	142989
N. Women	2799	10200	12999	12999

Table 12: Effect of the reform on the probability of being appointed for potential female candidates, controlling for observable differences

Table 12 shows the differential effect of the reform on connected and unconnected potential candidates. Demographic characteristics include age and non-Danish origin. Family characteristics include marital status and the number of children. Education includes the number of years of education and whether the woman has a university degree. Industry background is a dummy indicating the industry in which the woman has her most recent professional experience. Professional experience is the number of years of professional experience. All regressions include individual and year fixed effects. Standard errors are clustered at the individual level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Dep. Var.:	Pr. to be appointed at treated firm								
Sample:	All candidates								
Controls for:	No controls	Demographic characteristics	Family characteristics	Education	Industry background	Professional experience	CEO experience	Director experience	All experience
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treat × Post	-0.0002	0.0007	-0.0014*	-0.0031	-0.0002	-0.0005	-0.0002	-0.0001	-0.0004
	(0.0005)	(0.0011)	(0.0008)	(0.0034)	(0.0006)	(0.0007)	(0.0005)	(0.0004)	(0.0007)
Connect × Post	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0001	-0.0001
	(0.0006)	(0.0007)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0007)	(0.0010)	(0.0011)
Connect × Treat × Post	0.0021**	0.0023**	0.0020*	0.0018*	0.0026**	0.0021**	0.0023*	0.0031**	0.0032*
	(0.0010)	(0.0012)	(0.0011)	(0.0011)	(0.0012)	(0.0010)	(0.0012)	(0.0016)	(0.0018)
Individual F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic characteristics × Treat × Post	No	Yes	No	No	No	No	No	No	No
Family characteristics × Treat × Post	No	No	Yes	No	No	No	No	No	No
Education × Treat × Post	No	No	No	Yes	No	No	No	No	No
Industry background × Treat × Post	No	No	No	No	Yes	No	No	No	No
Professional experience × Treat × Post	No	No	No	No	No	Yes	No	No	Yes
CEO experience × Treat × Post	No	No	No	No	No	No	Yes	No	Yes
Board experience × Treat × Post	No	No	No	No	No	No	No	Yes	Yes
Pre-shock mean of D.V.	.0012	.0011	.0011	.0011	.0012	.0012	.0012	.0012	.0012
Observations	142989	139843	139843	138600	132462	142989	142989	142989	142989
N. Women	12999	12713	12713	12600	12042	12999	12999	12999	12999

Table 13: Female directors' characteristics, by Previous family connections

Table 13 displays the number of observations and sample means for connected and unconnected female directors at sample firms between 2007 and 2017. Columns (7) reports differences in mean between unconnected and connected female directors. The unit of observation is the person-position level. Variables are defined in Table 15. *, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Variable	No prev. family connection		Prev. family connection		Difference
	Obs	Mean	Obs	Mean	(4)-(2)
	(1)	(2)	(3)	(4)	(7)
Age	610	48.205	300	47.927	-0.278
Married	610	.731	300	.733	0.002
Children (dummy)	633	.823	305	.843	0.020
Tie at *any* Danish firm	633	.463	305	1	0.537***
Non-Danish origin	610	.048	300	.02	-0.028**
Chair or vice-chair	442	.057	219	.096	0.039*
Tenure (years)	633	4.535	305	10.564	6.029***
Number of seats	633	1.217	305	1.128	-0.089**
Professional experience (years)	633	19.704	305	17.786	-1.918***
Top manager experience (dummy)	633	.183	305	.233	0.050*
Director experience (dummy)	633	.487	305	.498	0.012
CEO experience (dummy)	633	.3	305	.213	-0.087***
Education(years)	531	14.588	242	13.509	-1.079***
University degree (dummy)	531	.505	242	.339	-0.166***
PhD degree (dummy)	531	.015	242	.008	-0.007
N unique women	552		282		

Table 14: Female hires' characteristics, before and after the reform

Table 14 displays the number of observations and sample means for female directors appointed at treated firms before and after the reform. Columns (7) reports differences in mean between female directors appointed before and after the reform. The unit of observation is the person-position. The sample period corresponds to the years 2007-2017. Variables are defined in Table 15. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Variable	Before or in 2012 Obs (1)	Before or in 2012 Mean (2)	After 2012 Obs (3)	After 2012 Mean (4)	Difference (4)-(2) (7)
Connected	134	.082	236	.182	0.100***
Tie at *any* Danish firm	134	.537	236	.623	0.086
Age	133	47.353	225	43.551	-3.802***
Married	133	.707	225	.733	0.027
Children (dummy)	137	.839	248	.746	-0.093**
Non-Danish origin	133	.038	225	.049	0.011
Chair or vice-chair	137	.117	150	.02	-0.097***
Tenure (years)	137	0	248	0	
Number of seats	137	1.19	248	1.315	0.125*
Professional experience (years)	137	20.656	248	15.512	-5.144***
Top manager experience (dummy)	137	.336	248	.077	-0.259***
Director experience (dummy)	137	.613	248	.452	-0.162***
CEO experience (dummy)	137	.38	248	.286	-0.093*
Education(years)	111	14.799	182	14.659	-0.139
University degree (dummy)	111	.595	182	.495	-0.100*
PhD degree (dummy)	111	.027	182	.016	-0.011
N unique women	121		214		

Appendix

A   Variable description

Table 15: Definition of Variables

Table 15 describes the variables used throughout the paper.

Variable	Description	Source
Individual characteristics		
Previous family connection	Variable is equal to 1 if the person has a close relative or spouse who ever was a CEO or director at a sample firm and started her career before her, and 0 otherwise	Administrative+Management registers
Women	Variable is equal to 1 if the individual is a woman, and 0 if it is a man	Administrative registers
Age	Person's age	Administrative registers
Married	Variable is equal to 1 if the individual is married, and 0 otherwise	Administrative registers
Children	Variable is equal to 1 if the individual has children, and 0 otherwise	Administrative registers
Non-Danish origin	Variable is equal to 1 if the individual is from a non-Danish background, and 0 otherwise	Administrative registers
Years of education	Total duration of education in years	Administrative registers
University degree	Variable is equal to 1 if the individual has a university degree, and 0 otherwise	Administrative registers
PhD degree	Variable is equal to 1 if the individual has a PhD degree, and 0 otherwise	Administrative registers
Director experience	Variable is equal to 1 if the individual has experience as a board director, and 0 otherwise[†]	Management registers
CEO experience	Variable is equal to 1 if the individual has experience as a CEO, and 0 otherwise[†]	Management registers
Professional experience	Number of years of professional experience (measured in 2011)	Labor force registers
Top executive	Variable is equal to 1 if the individual has experience as a top executive, and 0 otherwise (measured in 2011)	Labor force registers
Connected	Variable is equal to 1 if the individual has a tie based on blood or marriage with a person who was CEO or director at a treated firm between 2007 and 2011	Administrative+Management registers
Board characteristics		
Pr. appoint woman	Probability to appoint a female director	Management register
Pr. appoint connected woman	Probability to appoint a connected female director	Management register + Administrative registers
N directors	Number of board directors, excluding employees-elected directors	Management registers
Women share	Share of women on the board of directors	Management registers
All-men board	Variable is equal to 1 if there are only men sitting on the board of directors, and zero otherwise	Management registers
Age (mean)	Average age of members of the board	Management registers
Tenure (mean)	Average tenure of members of the board	Management registers
Number of seats (mean)	Average total number of seats of members of the board	Management registers
University degree	Share of board members who have a university degree	Management registers
Top manager experience	Share of board members who have top manager experience	Management registers + Labor force registers
CEO experience	Share of board members who had CEO experience prior to starting their position	Management registers
Director experience	Share of board members who had director experience prior to starting their position	Management registers
Firm characteristics		
Profits/ assets	Ratio of pre-tax earnings on the book value of total assets	Accounting registers
Assets (M DKK)	Book value of total assets	Accounting registers
Profits (M DKK)	Pre-tax earnings	Accounting registers
Employees	Number of employees	Accounting registers
Family firm	Variable equal to 1 if 3 or more family members are involved in the firm, either as board director or CEO, and 0 otherwise	Management registers

[†]: For directors, the variable is equal to one if the individual had experience before the start of her current position. For potential candidates, the variable is equal to one if the individual had experience before 2012 (year of implementation of the board gender quota).

B   Family connections among Danish directors

Table 16: Types of family ties

Table 16 displays the distribution of family members among previous family connections. The sample is all unique relationships between directors and their previous family connection(s).

Family members	N	(%)
Father	420	30.9%
Mother	157	11.5%
Spouse	274	20.1%
Son	117	8.6%
Daughter	23	1.7%
Brother	299	22%
Sister	72	5.3%
N. of unique relationships	1,362	

C   Construction of samples

C.1   Sample of firms

I start by extracting all Danish firms who have more than 100 full time equivalent employees on average during the sample period (2000-2017) from the *General Firm Statistics* registers provided by *Statistics Denmark* and keep only firms who have financial information every years (90% of firm-year observations). I further merge this dataset using the unique firm identifier with yearly management data provided by the *ES*. I restrict my sample to Danish directors elected at the general meeting (the law does not cover employees-elected directors).

D   Law Details

Obligations   On December 23, 2012, Denmark adopted Act no. 1383, which permanently required large Danish firms to decide on and to reach within four years a target figure for the representation of each gender on the board of directors. Four years is the maximum time it takes to replace the board of directors. The goal of the law was to "create a real increase in the share of women in management". The target figure had to be set at least equal to 40%, or the closest percentage to 40% depending on the total size of the board (see Table 17 for the mandated distributions based on board size). In addition, firms with more than 50 employees under the requirement to set a target figure had to establish a policy for increasing women's representation at other management levels (typically executive managers) to constitute a pool of qualified female candidates for the board of directors. However, there was no obligation to reach a target number for these other management levels.

Table 17: Minimum legal thresholds for target figures

Table 17 displays the minimum legal thresholds for setting the target figure depending on the total number of directors.

N. directors (total)	N. directors from minority	N. directors from majority	Minority (%)	Majority (%)
3	1	2	33.3%	66.7%
4	1	3	25%	75%
5	2	3	40%	60%
6	2	4	33.3%	66.7%
7	2	5	28.6%	71.4%
8	3	5	37.5%	62.5%
9	3	6	33.3%	66.7%
10	4	6	40%	60%
11	4	7	36.4%	63.6%
12	4	8	33.3%	66.7%
13	5	8	38.5%	61.5%
14	5	9	35.7%	64.3%
15	6	9	40%	60%

Incentives   All companies had to include the following elements in a specific section of their annual report: the target figure and time required for achievement, the current board gender composition and the percentage of the target achieved, the measures taken to achieve the target, and the reasons for failure if the target was not achieved. Guidelines complementing the law include comprehensive indications on how the reporting must be done. For instance, reporting must occur in the form of one overall statement rather than in several places in the report in order to "provide clarity about whether there is a real increase in the share of women in management". In addition, firms that do not achieve their target have to provide detailed reasons for their failure: "The company must address the measures it has taken to achieve the target figure and on this basis conclude as to why to the target figure has not been reached". The annual report had to be audited and submitted to the Danish Business Authorities, as well as made available to the general public [15]. Failure to set a target figure and to report the different elements was punished by a fine. The law attracted great attention in the Danish media: between March and December 2012, no fewer than 16 articles about the law were published in *Politikken*, one

---

[15] The report must remain available for 5 years.

of most prominent Danish newspapers.

Background The debate around the implementation of a board gender quota was introduced to the Danish public in the fall of 2011 after national elections brought a social democrat government into power. They announced their willingness to "initiate a dialogue with the business sector in order to ensure more female members on boards of listed companies"[16] in their statement of intention. Initially focusing on listed companies, the proposal of a quota with financial penalties for noncompliance met with sharp resistance [17], and it was dropped in April 2012. This proposal was replaced by the "Danish model" of target figures, a law focusing on larger firms for which only the failure to comply with the reporting requirements would be punished by a fine, but not the failure to *reach* the target. The law was announced in May 2012 and adopted by the Danish parliament in December 2012, and it came into force in April 2013. Neither the details of implementation nor the group of affected firms was known before the law was announced in May 2012.

Eligibility Eligibility relied on a combination of several accounting criteria, which left other large Danish firms untreated. Firms exceeding two of three following criteria – total assets of 143 million DKK ($ 19 million), net revenue of 286 million DKK ($ 38 million), and an average of 250 full-time employees – for two consecutive years were subject to the law in the following year.

---

[16]*Regeringsgrundlag Oktober 2011 (Government Basis October 2011)*
[17]Source: Report on gender equality in Denmark - Directorate for internal policies, European Parliament

E   Design checks

Figure 8: Manipulation test for sorting around the reform criteria
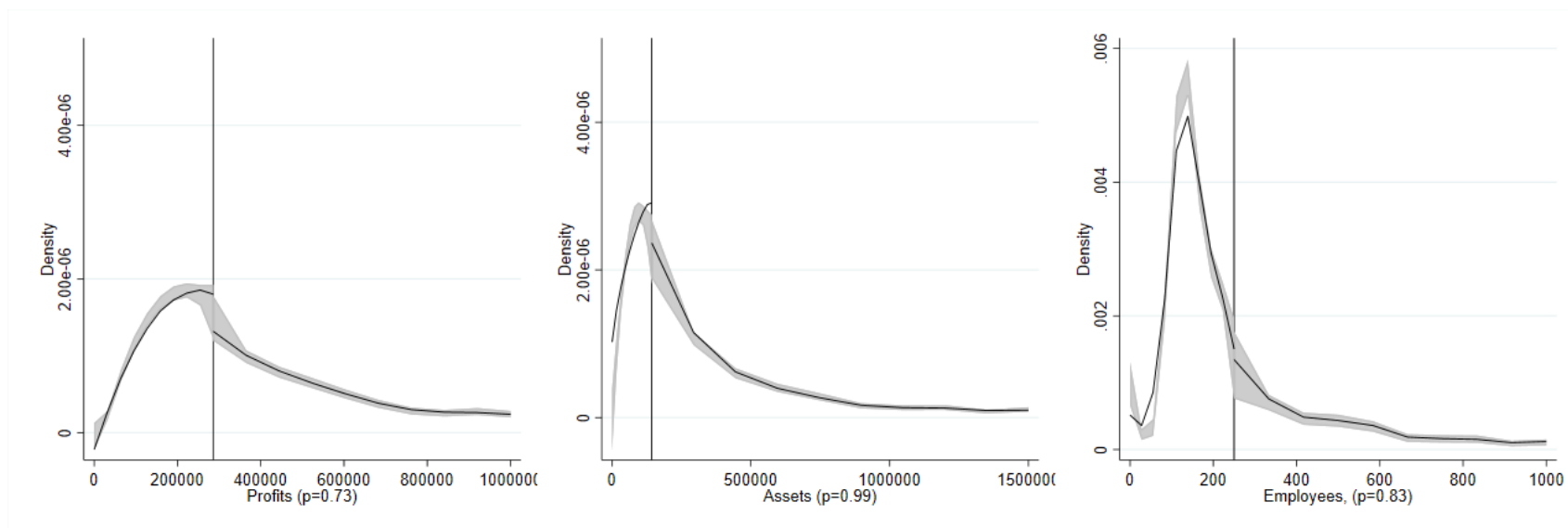

Figure 8 reports the fit of a McCrary test of continuity in the density of the profits (net revenues), the value of assets, and the number of full-time employees around the reform eligibility thresholds, using post-reform data. The p-value from the test for discontinuity at the threshold (313000, 156000, and 250 for profits, value of assets, and full-time employees, respectively) is reported below each graph.