

Board Gender Quotas and Female CEOs in Private Firms

BSE Working Paper | 1532 November 2025

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bse.eu/research

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First Draft: November 10, 2025

Abstract

Since Norway's board gender reform in 2003, many European countries have introduced gender targets for the boards of listed firms. We examine how these regulations affected the gender of newly appointed chief executive officers (CEOs) in private firms. Using cross-country and industry-level variation in exposure to the reform, we document an 8 to 13 percent increase in the number of appointments of female CEOs in industries with listed firms subject to the reforms, and no change in industries without such exposure. The effect is stronger in countries with mandatory quotas and where board appointments are more salient. The results indicate that board gender regulations generated positive spillover effects beyond the targeted listed firms, increasing the representation of women in top executive positions in private firms; however, they did not lead to a broader country-level cultural shift.

Keywords: Board quotas, Female CEOs, Private firms.

JEL Codes: G14, G34

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Marcelo Ortiz thanks the Spanish Government for support through grants PID2023-147587NB-I00 and RYC2023-044281-I from the Ministry of Science and Innovation, as well as the Severo Ochoa Program for Centers of Excellence in R&D (CEX2024-001476-S).

1. Introduction

Women remain markedly underrepresented in top executive positions, with the "glass ceiling" still limiting their access to the highest levels of corporate leadership. In response, many governments have adopted gender board quota policies, beginning with Norway's landmark reform in 2003. Since then, most European countries have implemented similar legislation mandating minimum thresholds for female representation on the boards of listed companies. These policies aim not only to increase board diversity but also to dismantle barriers that prevent women from advancing to senior leadership roles more broadly. The recent EU Directive 2022/2381 on gender balance in corporate boards exemplifies this approach, emphasizing that listed companies—given their visibility and economic importance—can indirectly set standards that influence corporate practices across the wider economy.

While gender quota reforms have substantially increased the representation of women on corporate boards, their impact on executive leadership positions remains limited. According to the *European Women on Boards* (EWOB) report (2023), women now hold about 34% of board seats in large listed European firms, reflecting the success of these policies in diversifying boards. However, progress at the top executive level has been much slower: only around 8% of CEOs and 15% of executive committee members are women. A similar pattern appears in the United States, where the *2024 Spencer Stuart Board Index* reports that women account for 34% of directors in S&P 500 companies but lead only 43 of them as CEOs. Likewise, He and Whited (2023) document that women hold just 6.6% of CEO positions in the S&P 500, suggesting that the main constraint is the limited pool of women with prior executive experience, rather than productivity differences or overt discrimination.

The existing literature has predominantly used these reforms as exogenous shocks to board composition and studied their direct consequences on regulated firms (Ahern and Dittmar 2012, Eckbo et al. 2022, Ferrari et al. 2022, Bennouri et al. 2025, Matsa and Miller 2013). Only a few papers have examined whether such policies generate spillover effects beyond directly affected firms. For instance, Bertrand et al. (2019) show that the main beneficiaries of Norway's reform were the women appointed to boards, with limited evidence of wider labor market effects. More recent studies on Italy provide a mixed picture of spillovers. Guiso et al. (2025) document that Italy's 2011 quota reform for listed firms generated *horizontal spillovers* through interlocking directorates, as unlisted firms connected to listed companies also increased their share of female directors. Bongiovanni et al. (2023) study unlisted Italian banks and find that, even though they were not required to comply, their board composition shifted after the reform, with a higher probability of having at least one female director. By contrast, Del Prete et al. (2020) focus on non-listed banks that belong to listed groups and find no significant spillovers, with board changes largely confined to the regulated entities themselves. Taken together, these studies suggest that spillovers exist but are heterogeneous, varying by industry and the level of connections of the regulated firms.

We contribute to this debate by examining whether board gender quota reforms generated *market-wide spillover* effects in the appointment of female CEOs. Focusing on CEO appointments offers a more direct and stringent test of the reforms' ability to crack the "glass ceiling." Unlike board appointments, CEO appointments are less likely to reflect tokenism (Kesner, 1988). Moreover, because these reforms target boards rather than executive roles, any rise in female CEO appointments must result from indirect or cultural spillovers rather than from legal compulsion or anticipatory adjustments. To identify such spillover, we focus on private firms, which are not

covered by these reforms but represent the backbone of the European economy, accounting for over 99% of all enterprises (Eurostat, 2023). Using comprehensive data from Amadeus on private firms across eleven European countries between 2000 and 2020, we assess whether the quota reforms directed at listed firms ultimately produced broader changes in the selection of female executive leaders—an outcome explicitly envisioned by such regulations.[1]

The literature suggests that gender quota reforms may influence firms beyond their legal reach by altering cultural perceptions of female leaders. Beaman et al. (2009), for instance, show that exposure to women in elected positions improves the future prospects of female candidates in Indian villages, as repeated exposure enhances perceptions of women's effectiveness in leadership. In our context, mandating female board appointments in listed firms gives visibility to new female leaders that can reshape beliefs about the effectiveness of women in top executive roles, thereby facilitating female CEO appointments in unregulated firms.

We identify the spillover effects of gender quotas reforms on female CEO appointments in private firms using a difference-in-differences design. We compare appointment patterns across industries with and without listed firms subject to quotas, within the same country–year, thereby netting out contemporaneous shocks to the labor market and institutional environment. We also exploit the staggered implementation of quota reforms across European countries, which provides additional variation in timing and intensity of exposure. The specification includes country–year

[1] For example, the EU Directive 2022/2381 indicates that "Listed companies have a particular economic importance, visibility and impact on the market as a whole. Such companies set standards for the wider economy and their practices can be expected to be followed by other types of companies. The public nature of listed companies justifies their being regulated to a greater extent in the public interest."

and industry–year fixed effects to absorb unobserved heterogeneity at both levels, ensuring that our estimates are not confounded by aggregate trends in female labor participation, changes in childcare or parental leave policies, or other gender-related reforms. This empirical strategy allows us to isolate the causal impact of quota-induced visibility of female leaders in listed firms on the selection of female CEOs in private firms.

Our main finding is that board gender quotas reforms for listed firms generated a significant increase in female CEO appointments in private firms. Specifically, both ordinary least squares (OLS) regressions and the Callaway–Sant'Anna estimator for staggered adoption designs show that female CEO appointments rose between 8% and 13% more in industries with listed firms subject to quotas relative to those without such firms.

Although cultural change is difficult to capture directly, we exploit settings where reform-induced appointments received greater visibility, allowing us to assess whether heightened exposure reduces cultural gender bias more effectively, and thus, generates more subsequent female CEO appointments. We start by showing that the increase in female CEO appointments in private firms is particularly pronounced in salient director appointments—for instance, when appointees are experienced directors, when affected listed peers account for a significant share of industry activity, or when the appointments represent the first female director in the industry.

The second set of tests contrasts the effects of quota reforms under soft versus strict implementation. We find that the increase in female CEO appointments in private firms is concentrated in countries that have adopted mandatory quotas with clear enforcement mechanisms as those characterized by binding deadlines, credible sanctions, and limited scope for evasion. By contrast, in settings where quotas were introduced with weaker monitoring or less credible penalties, the spillover effects are statistically indistinguishable from zero. This pattern suggests

that only when listed firms comply visibly with binding requirements—thereby generating broader public debate and greater visibility of female appointments—do private firms update their beliefs and practices regarding female leadership.

Our third test exploits the 2014 French Reform. This reform is particularly relevant for our analysis because it expands the group of firms subject to the quota to include large private firms. By extending the quota beyond listed companies, the law increased the visibility of female board appointments within the private sector, thereby increasing the chances of awareness and exposure to new female leaders. In line with this interpretation, we find that spillovers to female CEO appointments are more pronounced in France after this reform.

Lastly, we also show that the spillover effects have clear boundaries. The increase in female CEO appointments is confined to private firms operating in industries with listed firms subject to the quota; we do not find compelling evidence of a comparable impact from appointments in more distant industries or from country-wide cultural shifts. This pattern reinforces the idea that the channel operates through direct exposure to the new female appointments, rather than reflecting a broad, economy-wide change in attitudes toward female leaders.

The structure of the rest of the paper is as follows. Section 2 explains the institutional background. Section 3 presents the data, the empirical strategy, and the main empirical findings. Section 4 explores the mechanism. The conclusion is in section 5.

2. Board Quotas and Data

2.1 Introduction of Board Quotas

Over the past two decades, most countries in Europe have adopted regulatory measures to improve gender balance on corporate boards. These interventions vary significantly in legal force, design, and enforcement mechanisms, reflecting differing institutional, cultural, and political contexts.

Two main approaches have emerged: some countries adopted a stricter approach, imposing legally binding minimum quotas for board gender composition and sanctions for non-compliance; and, others, a softer one, which relies on non-binding recommendations often embedded in national corporate governance codes or public policy reports, encouraging voluntary progress without direct legal enforcement.

Countries such as France, Italy, Norway, and Germany have implemented mandatory quota systems with clearly defined timelines and sanctions, including monetary fines, nullification of appointments, or restrictions on directors' fees. These laws have been particularly effective in rapidly increasing female representation in boardrooms, especially in large publicly listed companies. By contrast, countries like the United Kingdom, the Netherlands, and Denmark have adopted non-mandatory frameworks, encouraging companies to improve board diversity through guidance, public monitoring, and comply-or-explain disclosure mechanisms. These approaches aim to preserve flexibility and promote cultural change organically, although progress has generally been more gradual in the absence of legal compulsion.

In terms of target thresholds, most regulatory frameworks across Europe have converged around a 33% (one-third) minimum female representation. However, several countries have opted for more ambitious targets. France introduced a 40% quota as early as 2011, and Italy recently

followed suit, raising its board gender quota from one-third to 40% for listed companies. These higher thresholds reflect an evolving policy consensus that meaningful gender parity requires stronger institutional commitments.

This national momentum has now been reinforced at the EU level with the adoption of the Women on Boards Directive in November 2022. The Directive establishes a minimum target of 40% representation of the underrepresented gender among non-executive directors, or 33% for all board members combined, to be achieved by June 2026. It also introduces transparent selection procedures and requires companies to prioritize candidates of the underrepresented gender in cases of equal qualification. This development marks a significant step toward the harmonization of board diversity standards across member states, and underscores the EU's broader commitment to advancing gender equality in corporate leadership.

2.2 Data sources

In assembling a database of female CEOs, we benefit from the EU's directives that mandate private firms to report those taking part in the administration, supervision, or control of the firm. Moreover, the EU also mandates private firms to disclose their financial statements, an obligation that varies with firm size: large and medium-sized firms (measured in terms of assets, sales, and employees) disclose detailed balance sheets, income statements, and management reports. The smallest disclose abbreviated statements, and in some countries (e.g., Austria, Germany, and the United Kingdom), not even income statements (Bernard et al., 2018).[2] It helps our data collection

[2] The First Council Directive (68/151/EEC) in 1968 established compulsory reporting in business registries about appointments and terminations of the people who take part in the administration, supervision, or control of the firm.

that countries keep up-to-date business registries, with later directives requiring their digitalization (see EU directives 2003/58/EC, 2013/34/EU).

We collect data on CEO appointments from Amadeus, a database by Bureau van Dijk. Since the mid-2000s, Amadeus has reported information on managerial teams, including names, roles, and appointment dates. Over time, its coverage has expanded to include more firms and executives, along with additional details such as age and gender. The data provides a cross-sectional snapshot of each firm's management team in any given year. Crucially, because appointment dates are recorded, we can track executive changes that took place before a firm first appeared in the database, helping us avoid mechanical biases caused by Amadeus' coverage.

Because countries differ in how private firms name their CEOs – sometimes managing director, others general manager, and so on - we rely on Amadeus to understand who the CEO is (the "highest executive" in Amadeus) (Ortiz, Urzua, and Volpin, 2025). We then collect managerial data over multiple years, allowing us to track CEO appointments over time. All in all, we have CEO appointment data for the 2000 – 2020 period, for Austria, Belgium, Germany, Denmark, Spain, Finland, France, Italy, the Netherlands, Sweden, and the United Kingdom. We complement these appointments on private firms with data on listed firms' CEO, chairs, and board appointments from BoardEx, a widely used database on executive appointments.

Figure 1 shows the number of appointments by gender for each country in our database. Unsurprisingly, the number of female appointments is dwarfed by that of males, particularly after

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The Fourth Company Law Directive (78/660/EEC) in 1978 and the Seventh Company Law Directive (83/349/EEC) in 1983 established common reporting requirements for annual financial statements.

the mid-2000s when the coverage of our data significantly improved. Table 1, Panel A reports 0.7 million female CEO appointments, accounting for 18.5% of all CEO appointments in private firms. The share of female appointments is highest in France (26.6%) and Ireland (23.6%), whereas it is lowest in Sweden (4.8%) and the Netherlands (10.7%). In absolute terms, Germany and Ireland record the largest number of female CEO appointments, with 252,718 and 238,619, respectively. By contrast, the Netherlands and Sweden register the fewest, with only 3,034 and 2,571 appointments, respectively. These cross-country differences largely reflect variation in the size of national economies and in the coverage of Amadeus data, which depends on local providers and reporting mandates. Accordingly, our empirical strategy avoids relying solely on cross-country variation for identification. Panel B shows the number of appointments over time. Importantly, the number of female appointments rose by more than seven times between 2000 and 2020 (59,397/7,779 = 7.6), whereas that of males increased by only five times, indicating a growing trend towards appointing women CEOs in private firms. This upward trend is also evident in the share of female appointments, which rises from approximately 13% in 2000 to about 20% by 2020.

3. Identification Strategy and Main Results

3.1 Identification Strategy

A natural starting point for evaluating the impact of mandatory board quotas on female career progression is to regress the number of female CEO appointments on the introduction of board quotas at the country–year level. However, this approach is unlikely to yield credible estimates, as it cannot adequately account for contemporaneous country-level developments—such as broader institutional reforms or evolving social norms—that may also drive the increase in female appointments documented in Figure 1.

To address this concern, we adopt a more disaggregated perspective by analyzing CEO appointments at the country–industry–year level. This design offers two key advantages. First, it allows us to absorb all country–year shocks through country-year fixed effects, thereby isolating variation that is not confounded by contemporaneous country-level developments. Second, it enables us to examine heterogeneous effects of the reform across industries with different exposure to listed firms subject to the reform. Accordingly, our empirical analysis aggregates the data at the three-digit SIC industry within country–year level.

A key assumption in our design is that industries differ in their exposure to the reform because some of them have listed firms (which are required to adopt the quotas), whereas others do not. To evaluate this, Figure 2 plots the number of female CEO appointments among private firms in the years around the reform using the same industry classification. As can be clearly seen, industries with and without listed firms behaved similarly in the years before the reform. However, starting in the year of the reform, we see tens of thousands more appointments in those with listed peers.

Overall, Figure 2 is consistent with the idea that private firms operating in industries with listed peers are more exposed to female leaders recruited due to the gender quota reform. This allows us to exploit within-country cross-industry variations in the effect of the reform by estimating the following specification:

$$Female\ Appointments\ (log)_{cjt} = \beta\ Female\ Reform\ X\ Listed\ Industry_{cjt} + Controls_{cjt} + FE(cj, ct, jt) + \varepsilon \quad (1)$$

where c, j, and t index country, industry, and year, respectively. The dependent variable is the number of female CEOs at the country-industry-year level (in log). Our coefficient of interest is $Female\ Reform\ X\ Listed\ Industry$, the interaction between a dummy for the adoption of female

board quotas and a dummy for industries with listed firms. Therefore, to the extent that the adoption of the female quota reform influences more strongly the female CEO appointments in private firms when these firms have listed peers, we expect β to be positive and significant. We do not include the direct effect of *Female Reform*, as its impact, together with other contemporaneous country-level factors that may influence female CEO appointments, is absorbed by the country-year fixed effects. By contrast, we retain the direct effect of *Listed Industry*, since listing and delisting decisions generate meaningful time variation in this variable that is not eliminated by the country-industry fixed effects. Furthermore, the country-industry fixed effects also capture persistent differences in the CEO labor market at this level, such as variation in managerial skill requirements or entrenched gender biases (Bertrand, 2009). Additionally, we include industry-year fixed effects to absorb common industry-wide shocks and trends unrelated to the reform. Lastly, we control for country-industry characteristics such as *Nr of Firms*, which is the number of firms (in log), as well as their median size and profitability (*Median assets (in log)* and *Median ROA*). Standard errors are clustered at the country-industry and country-year level.

An important feature of our empirical design is that one of the countries in our sample, Finland, did not adopt a board quota reform. The presence of these non-treated observations helps mitigate several concerns commonly associated with difference-in-differences designs (Baker et al., 2022).

3.2 Summary Statistics

Table 2 shows summary statistics for our sample. The average country-industry has 4.71 female CEO appointments in private firms per thousand firms, with the median being 0.3. As discussed above, our key variable of interest is the interaction between a binary indicator for the post-reform period and a binary indicator for industries with listed firms. Table 2 shows that approximately 9

percent of the observations fall into this category. We benchmark the few CEO female appointments in private firms against the appointments of females to CEO, chair, and board positions in listed firms. For this, we use a binary variable detecting country-industries-years that have observed such appointments. Again, the comparison with male appointments is stark: 0.3 percent of industries have female CEO appointments in listed firms, whereas this figure is ten times higher (3%) for male CEO appointments, simply reflecting the fact that we have 234 female CEO appointments in listed firms in our sample period compared to 3,485 for men. Similar (but significantly smaller in magnitude) differences exist at chair and board appointments: male appointments are twice as likely as female appointments.

In terms of industry characteristics, only 21 percent of country-industries in our sample have listed firms. Having access to private firm data from Amadeus means that we know the median firm size of the private firms in the sample, which is approximately €0.5 million in assets. The median profitability is nine percent, and the average number of firms per country-industry is close to 3,000. The importance of listed firms varies per country-industry, with the average proportion of employees working for listed firms close to two percent, their assets four percent, and their sales three percent.

3.3 Main Results

Table 3, Panel A reports the estimation results for Equation (1). Column one includes country-year fixed effects and controls for industry characteristics, such as the number of firms and the presence of listed firms. The coefficient on *Female Reform* × *Listed Industry* is positive and statistically significant. Column two adds accounting-based controls, specifically the median firm size and profitability. Column three further incorporates industry-year fixed effects, and Column four, our preferred specification, additionally introduces country-industry fixed effects. Across all

specifications, the interaction term remains positive and significant, consistent with the interpretation that the adoption of board gender quotas has a stronger effect on female CEO appointments in private firms operating in industries with listed peers than in those without.

Our results are also economically significant: the coefficient of 0.130 in column four suggests that in countries with board quotas and industries with listed firms there are 13% more female CEO appointments among private firms. Since the mean (standard deviation) of female appointments is 1.03 (1.33), the increase is close to thirteen (ten) percent, a sizable effect.

In Table 3, Panel B, we examine the robustness of this result to an alternative measure of female appointments. Instead of using the number of female CEO appointments as the dependent variable, we look at the ratio of female appointments over a thousand firms in the industry. Replicating Panel A with this ratio shows that our results remain basically unchanged, both in terms of significance and relevance. In countries with board quotas and industries with listed firms, we see 0.61 more female CEO appointments in private firms, which is equivalent to a 13% increase with respect to the mean, a similar effect to that in Panel A.

To better understand the timing of the effects of the reform, in Figure 3 we show the effects of the reform in an event-study fashion, plotting the coefficients of our interaction term for each year around its implementation. We see no increase in female appointments before the reform. In year t+1, we see a large – although not significant increase, which only strengthens in subsequent years.

3.4 Robustness

Recent literature shows that difference-in-difference regressions, like the one we use, might suffer from econometric problems, biasing the estimates. This is particularly acute when there are few

non-treated observations and the effects of the reform are heterogeneous and time-varying (see Baker et al., 2022, for an excellent review). As a result, we check the robustness of our findings using the methodology in Callaway and Sant'Anna (2021), which is an improvement on OLS in the presence of heterogeneous treatment effects. Table 4 shows our results, noting that we see an eight-percent increase in female appointments in private firms of listed industries in countries that passed the reform.

In Table 3, we used the Listed Industry Dummy as a simple proxy for whether an industry is exposed to the shock. This allows us to estimate the extensive margin of the effect. To shed light on the intensive margin, in Table 5, we modify Equation (1) by replacing the Listed Industry dummy with different proxies for the relevance of listed peers. Arguably, larger and prominent peers attract more business press and interact with more firms, increasing the exposure of their forced female appointments. To evaluate this, column one uses the fraction of assets held by listed peers, whereas columns two and three use the fraction of sales and employees, respectively. Confirming that the results extend to the intensive margin, the effect of the gender quota reform on female CEO appointments is stronger in industries where the affected listed peers are prominent actors.

4 Understanding the Mechanism

The evidence so far indicates that firms with listed peers are more strongly affected by the adoption of gender quota reforms, as reflected in their significant increase in female CEO appointments, relative to those without such peers. The literature highlights that gender quota policy could affect firms beyond their legal boundaries through indirect cultural changes toward female leaders. For instance, Beaman et al. (2009) show that exposure to women in elected positions in Indian villages

improves the prospects of future female candidates. Repeated exposure to female leadership leads to improved perceptions regarding female leadership effectiveness. In our setting, forcing listed firms to appoint female board members can help improve perceptions of female leadership, which might help women get into executive roles even beyond the affected firms.

In this section, first we exploit cross-sectional differences in the exposure to the shock. Second, we examine cross-country differences in the intensity of the shock. Next, we borrow the concept of saliency form the behavioral literature to develop specific tests of whether female appointments as directors of listed firms can be viewed as salient events. Finally, we examine how far the spillover effects extend.

4.1 Cross-sectional differences in the exposure to the shock

To gauge the size of the shock, Figure 4 shows the number of female appointments to boards of listed firms and the proportion they represent at the time of the reform. The number of female appointments is stable in the years leading up to the reform, with around 150 appointments per year. This number increases significantly following the reform, almost doubling two years afterwards. A similar pattern can be seen when looking at the proportion of female board appointments. It is clear, therefore, that following the reform, there is an increase in the number of female directors being appointed, although whether it is enough to reduce the cultural gender bias is unclear.

For private firms the exposure to this shock is likely to vary depending on whether their industry experiences a new female director appointment (in listed firms) or not. In Table 6, we regress female CEO appointments on a lagged dummy that takes the value of one when listed firms in an industry appoint female board members. Column one shows that, when listed firms appoint female board members, we see a positive and significant increase in the number of women CEOs

the following year. Controlling for contemporaneous male appointments, either board members in column two, chair in column three, CEO in column four, or altogether in column five, does not change the coefficient of female CEO board appointments noticeably. The coefficient shows that, following female board appointments in listed firms, there is about a 4-percent increase in female CEOs in private firms. This result suggests that, as it happened in Indian villages, exposure to female board members in listed firms leads to an improvement in perceptions of female leadership, eventually leading to more female CEOs.

4.2 Cross-country differences in the intensity of the shock

The reforms were associated with differential enforcement across countries: some countries (like Germany) impose hefty fines for companies that do not fulfill the board quotas, whereas others have a softer approach. In Figure 5, we explore cross-country differences in the enforcement of the reform. We test whether these differences matter for how private firms react by splitting the sample into countries with soft and strict implementation, while keeping Finland in both as the never-treated group, as it has no gender quota. For simplicity, we report an event-study figure for both samples using the coefficients and their confidence intervals rather than a regression table. While there is no increase in female appointments in countries with softer quotas, we find a clear upward trend in those with stricter ones.

In a similar manner, we can focus on the French reform in 2014, which increased the group of firms subject to the gender quota by also mandating female board representation in private companies with more than 500 employees or revenues above €50 million. Table 7 explores whether the expansion of the group of peers subject to the quota led to a subsequent increase in the number of female CEO appointments among firms that remain unaffected. Given the particularities of the French reform, we first check whether our previous results in Table 3 also

take place when excluding France from the sample, which we see in column one. Although the coefficient is smaller than before, 0.084 compared to 0.130, the effect is still positive and significant. We complement this result by looking only at France and Finland in column two, again finding that the reform has a positive and significant effect on female appointments. In columns three to five, we focus on private industries, first French, then French and Finnish, and finally all private industries in our sample. Our coefficient of interest is the dummy that takes the value of one for French private industries with firms forced to add female board members (French Private Board Quota). As expected, the exposure of large private firms' female board appointments increases even more the number of female CEO appointments among small peers.

These results support our hypothesis that there is a link between the introduction of quotas on the board of listed companies and the increases appointments of female CEOs in private firms: the more extensive that reform the greater the effect on CEO appointment.

4.3 Cross-sectional differences in the saliency of the appointments

Our interpretation of the results is that female appointments as directors of listed firms are salient. According to the behavioral literature, an event is salient if it attracts decision makers' attention automatically and involuntarily (Bordalo et al., 2022). Under this interpretation, female board appointments in listed firms catch the attention of decision makers, reducing discrimination against women and eventually leading private firms' boards to appoint more women. Salient events must be contrasting, surprising, and/or prominent; otherwise, their impact is limited by not attracting enough attention. In this section, we explore each of these dimensions.

4.3.1 Contrast

It is well known from experimental evidence that contrasting events attract more attention (Treisman and Gelade, 1980). We test whether female appointments in listed firms have a stronger

effect when they occur in industries where there have historically been fewer women. For this purpose, in Table 8, we split the sample of industries with listed firms into two groups according to whether they had female appointments before the reform. Columns one and two show the effect of lagged female board appointments on industries with (column one) and without (column two) previous female appointments. Whereas both coefficients are positive, the one in industries without previous appointments is almost twice as large and significant at 5% levels. We repeat the exercise in columns three and four when looking at any previous female appointment, with column three looking at industries with and column four at those without. As before, the effect is much larger and significant in industries without previous female appointments. The results show that the effect of female director appointments in listed firms is more strongly associated with female CEO appointments in industries where these represent the first such appointments in their history, consistent with the hypothesis that more contrasting events have a greater impact.

4.3.2 Surprise

While the reform forced firms to appoint female board members, it did not force listed firms to appoint women in other senior positions such as CEOs or Chair. This means that these appointments (if they happen) are rare and thus more surprising, strengthening their salience. In Figure 6 we show the number of female CEO/Chair appointments around the reform. The figure on the left shows that there is a notable increase in women appointed as chair of the board, even though this was not mandated. The figure on the right shows that female CEOs are very rare in listed firms (as already known in the literature), and (crucially for us) there is no increase in the number of female CEOs associated with the reform.

In Table 9 we show the effect of chair/CEO appointments in listed firms: in column one, following a female CEO appointment, we see an 8.5% increase in private firms' female CEOs,

which is sizable when compared to the median (0.69). The effect is smaller for female chairs, as the coefficient is 4%. Controlling for both in column three confirms our findings and suggests that surprising appointments seem to have a strong effect.

4.3.3 Prominence

The last dimension is prominence, as prominent features of an event increase the attention of the decision maker (Bordalo et al., 2022). In Table 10, we evaluate whether the effect of the exposure is stronger when listed peers are appointing prominent female directors. To proxy for prominence, we use Boardex and collect data on appointees' biographies, often related to their previous executive experience and details of their CVs. We then create a dummy variable for whether appointees have biographies or not. Consistent with the role of more prominent appointments triggering more attention and exposure, we find that the effect is only coming from those appointments that have biographies, suggesting that more prominent stimuli drive our results.

4.4 Boundaries to the spillover effect

Our results are consistent with the quota policy having an impact beyond its legal boundaries by increasing the exposure to female corporate leaders. Here we explore the boundaries of this effect from two perspectives: first, by looking at the effect of female director appointments in different industries, and second, by evaluating whether the gender quota reform affected female CEO appointments in industries without regulated (listed) firms.

Naturally, exposure is more pronounced for people working in related businesses, as this increases the chances of social interaction and repeated exposure to the new appointees. Therefore, we expect that the intensity of the exposure will decrease for more unconnected businesses, which we proxy by looking at appointments in different industry codes.

We test this idea in Table 11. For ease of comparison, the first column replicates the previous result from Table 5 on how appointments of female board members in listed firms within an industry (SIC3) increase female CEO appointments in private firms. In column two, we add a dummy that takes the value of one for those appointments in the same SIC2 industry but in a different SIC3. We find no effect of such appointments, consistent with these appointments in less related industries generating lower exposure to their new female leaders. In column three, we examine even more distant appointments, those within the same SIC1 but in a different SIC2, finding again no effect on female CEO appointments.

Next, we explore whether the effects of the country-wide reform were confined to listed industries. If female CEO appointments are primarily driven by reform-induced cultural change, we should observe a broad, country-wide rise in female CEO appointments, including in private industries that do not include firms subject to the quota. To evaluate this channel, we modify our main specification to include two interaction terms for the Female Reform dummy, one with the listed industry dummy as before, and another with a private industry dummy. Naturally, we are forced to drop the country-year fixed effects, meaning that this is our weakest identification. Table 12 tabulates the results. Column one, which uses the log number of female appointments as the dependent variable, indicates an increase in female appointments in both types of industries. However, this result is not robust: when we use female appointments per thousand firms as the dependent variable in column two, the effect is no longer statistically significant. An alternative approach, in columns three and four, is to focus on the sample composed of Finland (which did not pass a reform) and private industries in the other countries. Again, the coefficient for the interaction term for private industry is positive and significant when looking at the number of appointments in logarithms, yet it fails to be significant when using the ratio in column four.

In sum, the evidence in this section suggests that the effects of the gender quota policy on unaffected private firms are concentrated within industries that have direct exposure to listed companies, rather than reflecting a broad, market-wide shift in the appointment of female CEOs.

5. Conclusion

This paper provides new evidence that the introduction of gender quota reforms on the boards of listed firms has generated measurable market-wide spillover effects beyond the firms directly subject to these reforms. Using data on European private firms, we show that board gender quotas increased the appointments of female CEOs in private companies operating in the same country–industry as treated listed firms.

Our results suggest that these spillovers operate through heightened visibility and salience of female leadership. When women occupy prominent board positions in listed firms, they become more visible role models, reshaping beliefs about the effectiveness of women in top executive roles. The effects are however, localized—stronger in industries with greater exposure to listed peers and weaker where such proximity is limited—indicating that salience and context are critical for change to occur.

Overall, our findings contrast with the prevailing view that board gender regulations have had little impact on breaking the glass ceiling that prevents women from reaching top corporate positions (see Bertrand et al., 2019). Instead, we offer a more optimistic perspective: such reforms, while not transformative at the aggregate level, have produced tangible cracks in the glass ceiling by influencing female executive appointments in the wider corporate environment.

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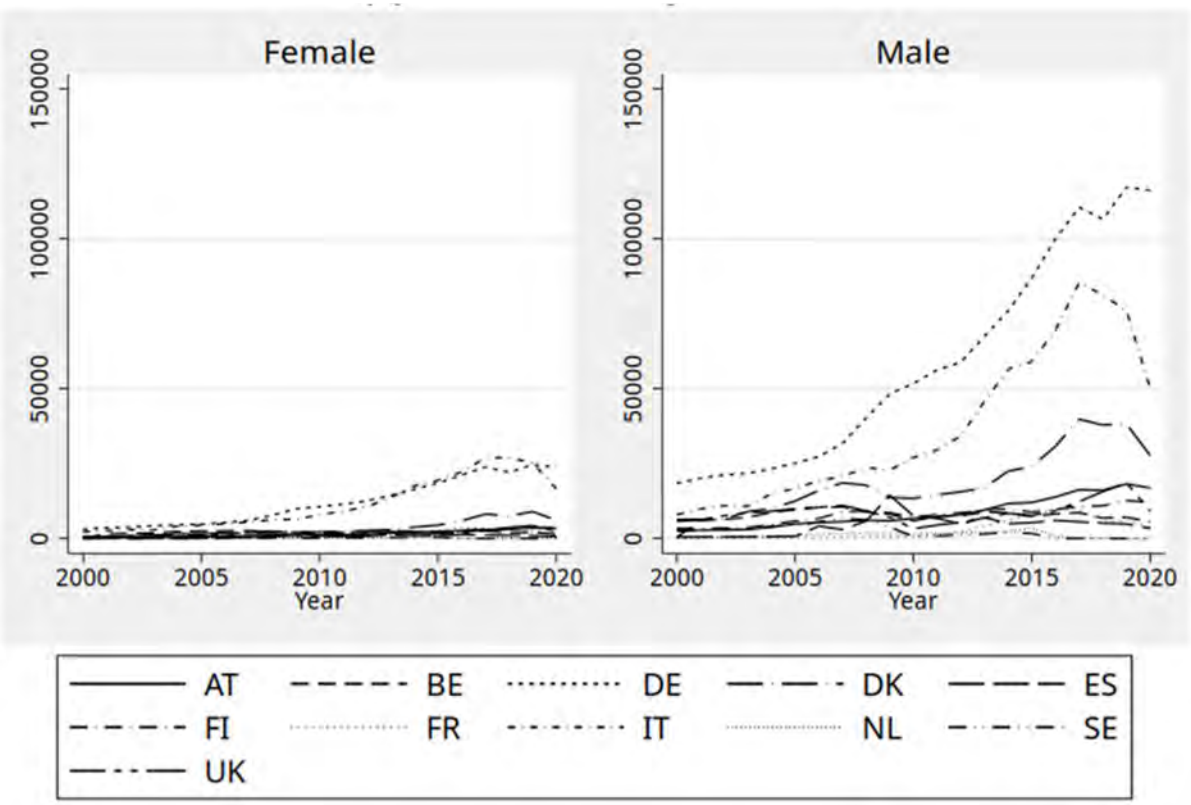
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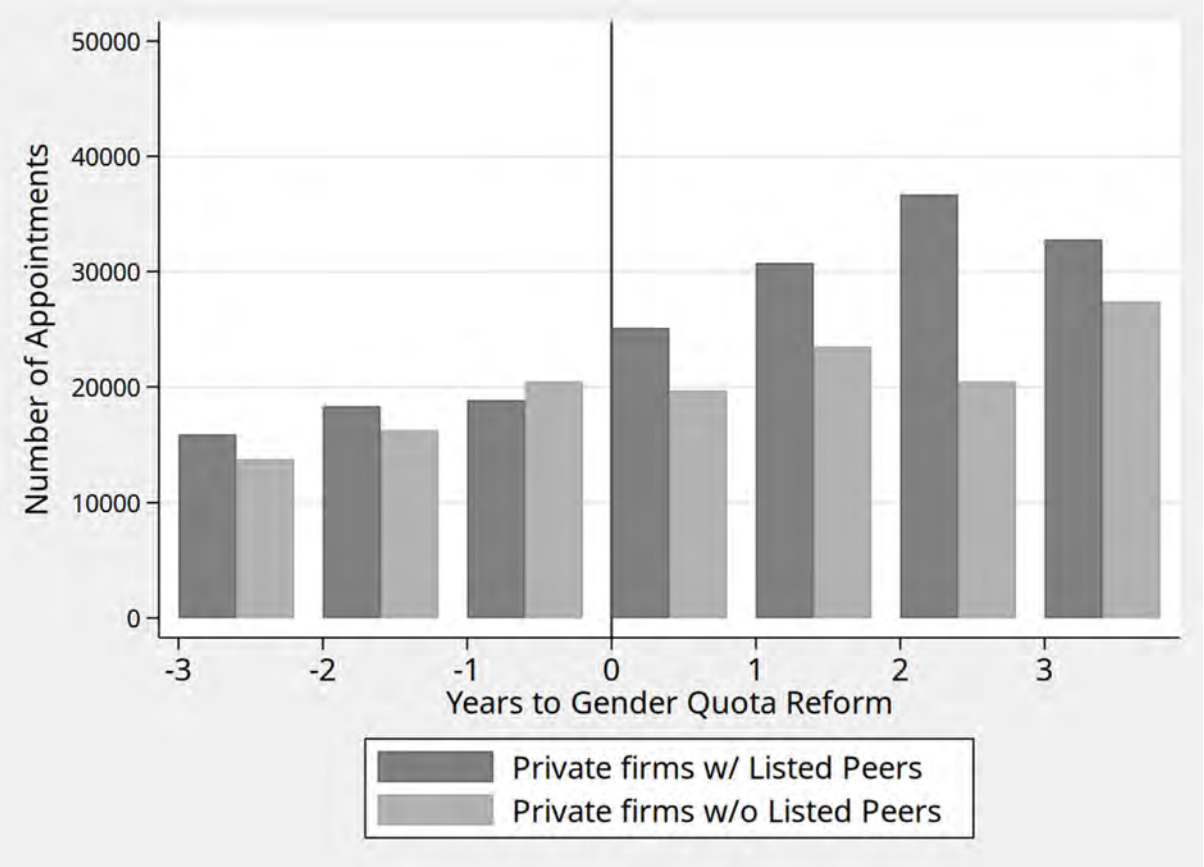
Figures and Tables

Figure 1: CEO Appointments in private firms by gender and country



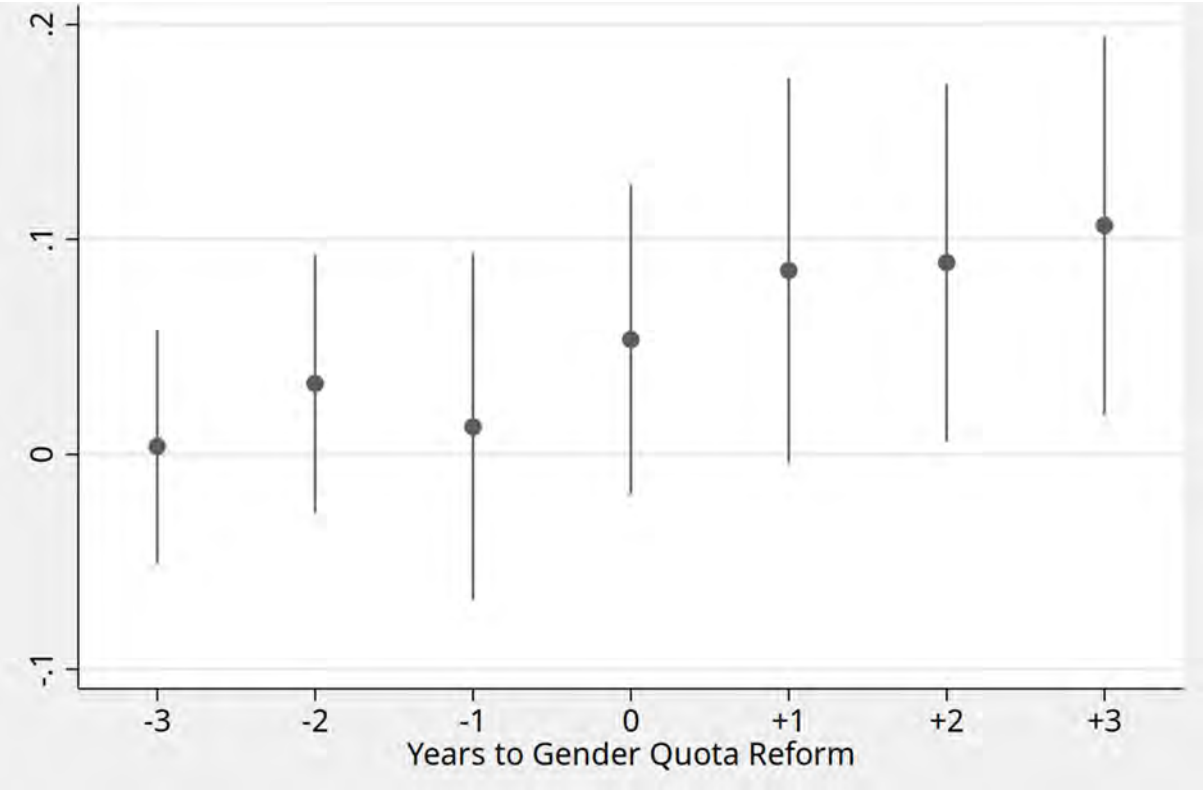
This figure shows the number of appointments in private firms by gender for each country during our sample period. Source: BVD's Amadeus.

Figure 2: Female CEO appointments in private firms around the gender quota reforms.



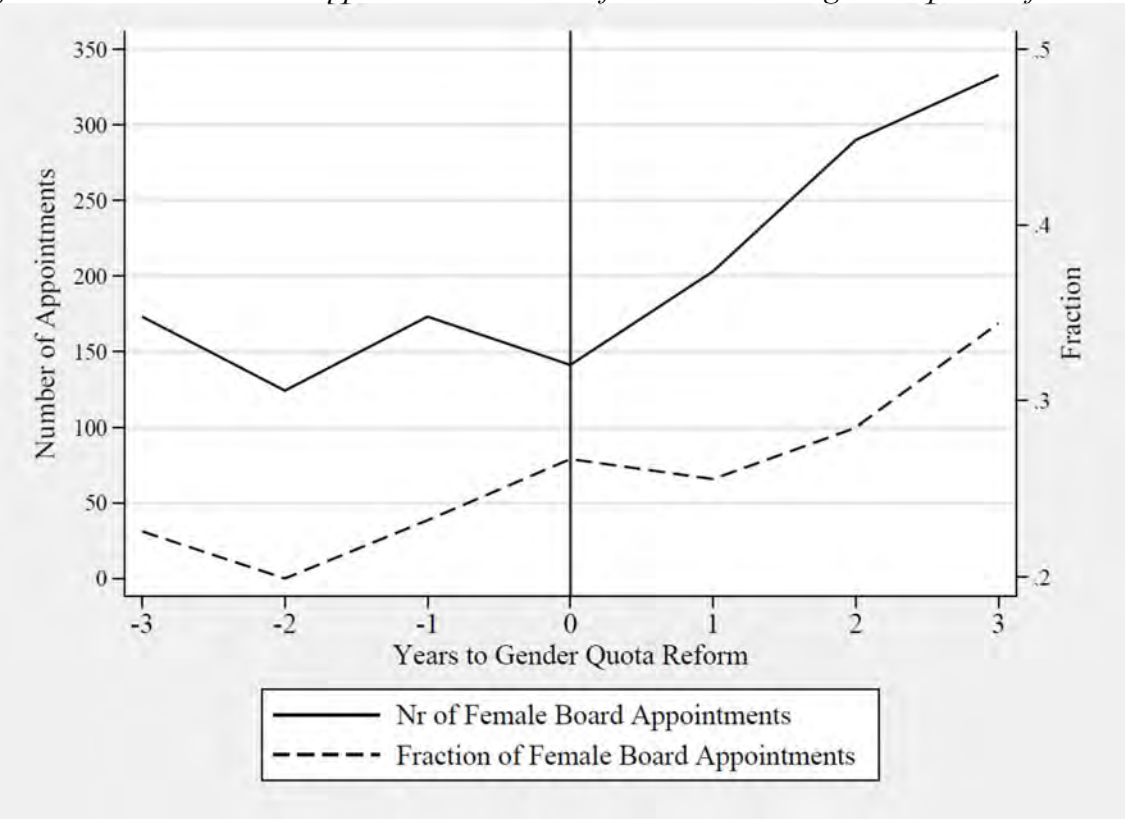
This figure shows the evolution of the number of female CEO appointments in private firms around the gender quota reforms. Private firms are classified into two groups: those that operate in industries with listed peers (Listed industries) and those without (Private industries). Source: BVD's Amadeus.

Figure 3: Regression coefficients around the board gender quota reforms.



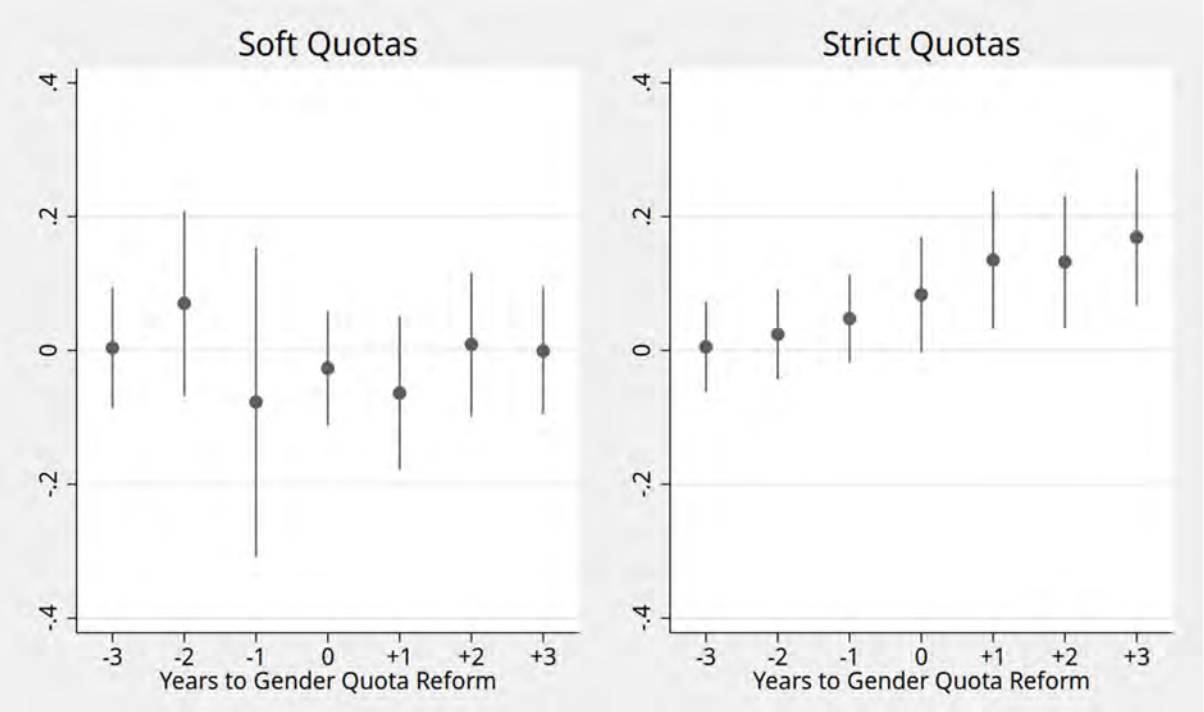
This figure illustrates the effect of the adoption of board gender quota reform among private firms with listed peers using those without listed peers as a benchmark. Each dot represents the estimated treatment effect from a staggered difference-in-differences specification. The vertical lines depict 95% confidence intervals based on standard errors clustered at the country-year level. Source: BVD's Amadeus.

Figure 4: Female Director appointments in listed firms around the gender quota reforms.



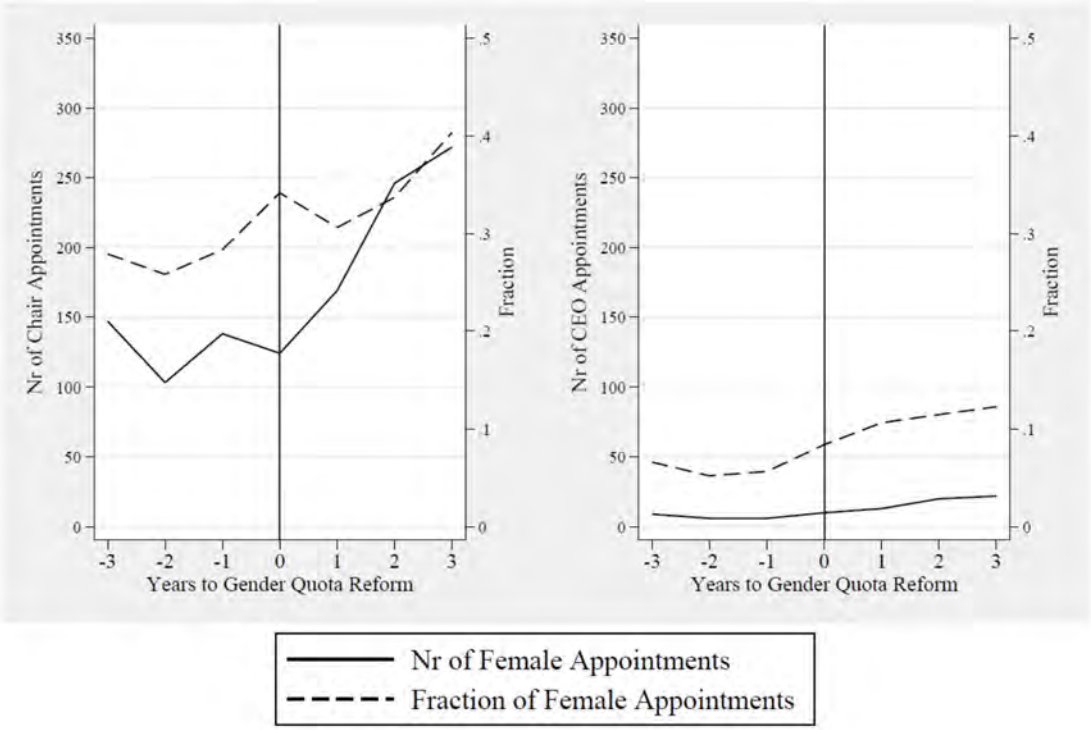
This figure shows the evolution of the number of female director appointments and the fraction of female director appointments relative to the total number of appointments in listed firms around the gender quota reforms. Source: BVD's Amadeus.

Figure 5: Exposure intensity in soft and strict implementation



This figure illustrates the effect of the adoption of board gender quota reform comparing private firms in countries with soft vs strict quotas. Each dot represents the estimated treatment effect from a staggered difference-in-differences specification. The vertical lines depict 95% confidence intervals based on standard errors clustered at the country-year level. Source: BVD's Amadeus.

Figure 6 Female Chair and CEO appointments on listed firms around the reform



This figure shows the evolution of female chair (left) and CEO (right) appointments in terms of their total and fraction relative to the number of such appointments in listed firms around the gender quota reforms. Source: BVD's Amadeus and BoardEx.

Table 1: Appointments Distribution
The table presents the distribution of female and male CEO appointments across countries (Panel A) and across years (Panel B) in the sample period from 2000 to 2020. Source: BVD's Amadeus.

Panel A: Appointments across countries

Country	Female	Male	% Female
AT	32,248	179,125	15.3%
BE	42,120	158,519	21.0%
DE	252,718	1,225,571	17.1%
DK	70,195	398,343	15.0%
ES	14,854	92,421	13.8%
FI	42,143	165,594	20.3%
FR	21,969	60,590	26.6%
IE	238,619	772,420	23.6%
NL	3,034	25,242	10.7%
SE	2,571	50,939	4.8%
UK	33,575	186,106	15.3%
Total	754,646	3,314,870	18.5%

Panel B: Appointments by Year

Year	Female	Male	% Female
2000	7,779	48,892	13.7%
2001	10,401	58,742	15.0%
2002	11,519	63,528	15.3%
2003	12,776	68,493	15.7%
2004	15,853	80,566	16.4%
2005	17,122	91,349	15.8%
2006	19,328	107,178	15.3%
2007	21,709	119,098	15.4%
2008	24,097	129,548	15.7%
2009	26,761	134,928	16.6%
2010	27,651	125,629	18.0%
2011	31,222	137,885	18.5%
2012	34,796	148,405	19.0%
2013	42,655	179,811	19.2%
2014	50,103	209,059	19.3%
2015	55,638	224,011	19.9%
2016	64,065	258,194	19.9%
2017	74,628	299,381	20.0%
2018	71,574	285,918	20.0%
2019	75,572	299,087	20.2%
2020	59,397	245,168	19.5%
Total	754,646	3,314,870	18.5%

Table 2: Summary Statistics

The table reports the descriptive statistics for the industries and firms in our sample between 2000 and 2020. The unit of analysis is the country-industry-year level, where industries are defined using SIC3 codes. Source: BVD's Amadeus, BoardEx, and World Bank.

		Mean	SD	P10	P25	P50	P75	P90	N. obs
Appointments	Female Appointments (log)	1.03	1.33	0.00	0.00	0.69	1.79	3.00	62,197
	Female Appointments / Thousand Firms	4.71	9.03	0.00	0.00	0.35	5.46	14.49	62,197
Reform	Female Reform X Listed Industry	0.09	0.28	0.00	0.00	0.00	0.00	0.00	62,197
	Female Reform X % Listed Assets	0.01	0.08	0.00	0.00	0.00	0.00	0.00	62,197
	Female Reform X % Listed Sales	0.01	0.07	0.00	0.00	0.00	0.00	0.00	62,197
	Female Reform X % Listed Employment	0.01	0.07	0.00	0.00	0.00	0.00	0.00	62,197
Appointments in	Female CEO Dummy	0.003	0.06	0.00	0.00	0.00	0.00	0.00	62,197
Listed Peers	Female Board Dummy	0.03	0.17	0.00	0.00	0.00	0.00	0.00	62,197
	Female Chair Dummy	0.03	0.17	0.00	0.00	0.00	0.00	0.00	62,197
	Male CEO Dummy	0.03	0.17	0.00	0.00	0.00	0.00	0.00	62,197
	Male Board Dummy	0.07	0.25	0.00	0.00	0.00	0.00	0.00	62,197
	Male Chair Dummy	0.06	0.23	0.00	0.00	0.00	0.00	0.00	62,197
Industry	Listed Industry	0.21	0.41	0.00	0.00	0.00	0.00	1.00	62,197
Characteristics	Median Assets (log)	12.99	1.49	11.36	12.08	12.90	13.77	14.69	62,197
	Median ROA	0.09	0.07	0.01	0.05	0.08	0.11	0.16	62,197
	Nr. of Firms (log)	6.30	1.88	3.76	4.93	6.30	7.61	8.76	62,197
	% Listed Employment	0.02	0.11	0.00	0.00	0.00	0.00	0.01	62,197
	% Listed Assets	0.04	0.15	0.00	0.00	0.00	0.00	0.06	62,197
	% Listed Sales	0.03	0.12	0.00	0.00	0.00	0.00	0.02	62,197

Table 3: CEO Appointments in Private Firm

This table reports regression estimates of two metrics of female CEO appointments in private firms on Female Reform (a dummy equal to one following the adoption of board gender-quota regulations for listed firms, and zero otherwise), Listed Industry (binary variable equal to one for industries with at least one listed firm, and zero otherwise), Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. In Panel A, the dependent variable is the log of the total number of female CEO appointments in private firms. In Panel B, the dependent variable is the number of female CEO appointments, scaled by one thousand. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Panel A

VARIABLES	(1) Female Appointments (log)	(2) Female Appointments (log)	(3) Female Appointments (log)	(4) Female Appointments (log)
Female Reform x Listed Industry	0.128***	0.162***	0.160***	0.130***
	(0.048)	(0.059)	(0.056)	(0.030)
Listed Industry	0.011	0.055*	0.001	-0.008
	(0.028)	(0.033)	(0.032)	(0.017)
Median Assets (log)		-0.052***	-0.042***	0.007
		(0.010)	(0.010)	(0.005)
Median ROA		-0.421***	-0.268**	0.033
		(0.141)	(0.123)	(0.045)
Nr. of Firms (log)	0.448***	0.449***	0.417***	0.341***
	(0.019)	(0.019)	(0.019)	(0.035)
Observations	67,491	62,272	62,261	62,197
R-squared	0.658	0.673	0.715	0.904
Country-Industry FE	No	No	No	Yes
Country-Year FE	Yes	Yes	Yes	Yes
Industry-Year FE	No	No	Yes	Yes

Panel B

VARIABLES	(1) Female Appointments / Thousand Firms	(2) Female Appointments / Thousand Firms	(3) Female Appointments / Thousand Firms	(4) Female Appointments / Thousand Firms
Female Reform x Listed Industry	0.593**	0.770***	0.959***	0.610***
	(0.264)	(0.280)	(0.269)	(0.224)
Listed Industry	-1.050***	-0.503***	-0.410**	-0.183
	(0.181)	(0.193)	(0.177)	(0.131)
Median Assets (log)		-0.575***	-0.313***	0.002
		(0.094)	(0.075)	(0.066)
Median ROA		-1.756**	-1.825**	0.603
		(0.866)	(0.807)	(0.606)
Nr. of Firms (log)	0.300***	0.156***	-0.034	-0.328
	(0.052)	(0.049)	(0.065)	(0.505)
Observations	67,491	62,272	62,261	62,197
R-squared	0.363	0.388	0.450	0.612
Country-Industry FE	No	No	No	Yes
Country-Year FE	Yes	Yes	Yes	Yes
Industry-Year FE	No	No	Yes	Yes

Table 4: Callaway Sant'Anna Robustness Test

The table reports Callaway and Sant'Anna regression of the number of female CEO appointments in private firms (log). The treatment variable is the interaction term between Female Reform (a dummy equal to one following the adoption of board gender-quota regulations for listed firms, and zero otherwise) and Listed Industry (binary variable equal to one for industries with at least one listed firm, and zero otherwise). Controls include Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	Female Appointments (log)
ATT	0.081**
	(0.034)
Controls	Yes
Observations	62,036
Country-Ind FE	Yes
Country-Year FE	Yes
Industry-Year FE	Yes

Table 5: Intensive margins

This table reports regression estimates of the number of female CEO appointments in private firms (in log) on Female Reform (a dummy equal to one following the adoption of board gender-quota reform for listed firms, and zero otherwise) and its interaction with the relevance of listed peers, measured by their share in assets, sales, and employment. Controls include Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

VARIABLES	(1) Female Appointments (log)	(2) Female Appointments (log)	(3) Female Appointments (log)
Female Reform X % Listed Assets	0.147***		
	(0.051)		
Female Reform X % Listed Sales		0.124**	
		(0.055)	
Female Reform X % Listed Employment			0.110*
			(0.062)
% Listed Assets	-0.030		
	(0.025)		
% Listed Sales		-0.039	
		(0.033)	
% Listed Employment			-0.033
			(0.034)
Controls	Yes	Yes	Yes
Observations	62,197	62,197	62,197
R-squared	0.903	0.903	0.903
Country-Industry FE	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes

Table 6: Exposure through female appointments in listed peers

This table reports regression estimates of the number of female CEO appointments in private firms (log) on lagged dummy variables that capture appointments on listed peers in director, chair, and CEO positions. Controls include Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

VARIABLES	(1) Female Appointments (log)	(2) Female Appointments (log)	(3) Female Appointments (log)	(4) Female Appointments (log)	(5) Female Appointments (log)
Female Director Dummy	0.040**	0.038*	0.039**	0.038**	0.038*
	(0.019)	(0.020)	(0.020)	(0.019)	(0.020)
Male Director Dummy		0.008			
		(0.012)			
Male Chair Dummy			0.003		
			(0.012)		
Male CEO Dummy				0.019	
				(0.013)	
Any Male Appointment Dummy					0.008
					(0.013)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	59,504	59,504	59,504	59,504	59,504
R-squared	0.906	0.906	0.906	0.906	0.906
Country-Industry FE	Yes	Yes	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes

Table 7: French reform

This table reports regression estimates of the number of female CEO appointments in private firms (log) on Female Reform (a dummy equal to one following the adoption of board gender-quota regulations for listed firms, and zero otherwise), Listed Industry (binary variable equal to one for industries with at least one listed firm, and zero otherwise). French Private Board Quota is a dummy equal to one for French private industries with firms mandated to add female board members. Controls include Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)
Female Reform x Listed Industry	0.084***	0.432***			
	(0.028)	(0.086)			
French Private Board Quota			0.315***	0.296***	0.285***
			(0.096)	(0.102)	(0.085)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	56,387	11,009	3,649	7,891	48,949
R-squared	0.911	0.876	0.645	0.873	0.889
Sample	All non-France	France and Finland	French Private Industries	French and Finish Private Industries	All Private Industries
Country-Industry FE	Yes	Yes	Yes	Yes	Yes
Country-Year FE	Yes	Yes	No	Yes	Yes
Industry-Year FE	Yes	Yes	No	Yes	Yes

Table 8: Contrast

This table reports the regression estimates on the number of female CEO appointments in private firms (in log) on Female Director Dummy, which take value one if in the previous period, at least one listed firm in the industry appointed a female director, and zero otherwise. Controls include Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Sample:	Industries w/ female directors before the reform		Industries w/ any female before the reform	
	Yes	No	Yes	No
	(1)	(2)	(3)	(4)
VARIABLES	Female Appointments (log)	Female Appointments (log)	Female Appointments (log)	Female Appointments (log)
Female Director Dummy	0.041*	0.077**	0.040*	0.078**
	(0.021)	(0.031)	(0.021)	(0.031)
Controls	Yes	Yes	Yes	Yes
Observations	30,734	54,164	30,833	54,065
R-squared	0.895	0.908	0.894	0.908
Country-Industry FE	Yes	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes

Table 9: Surprise

This table reports regressions of the (log) number of female CEO appointments in private firms on lagged indicators of female leadership appointments in listed peer firms within the same industry. The key explanatory variables are Female CEO Dummy and Female Chair Dummy which take value one if in the previous period, at least one listed firm in the industry appointed a female CEO or a female chair respectively. Controls include Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

VARIABLES	(1) Female Appointments (log)	(2) Female Appointments (log)	(3) Female Appointments (log)
Female CEO Dummy	0.085**		0.080**
	(0.040)		(0.039)
Female Chair Dummy		0.040**	0.038**
		(0.019)	(0.019)
Controls	Yes	Yes	Yes
Observations	59,504	59,504	59,504
R-squared	0.906	0.906	0.906
Country-Industry FE	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes

Table 10: Prominence

This table reports the estimates for the number of female CEO appointments in private firms (log) on lagged indicators of the prominence of female director appointments in listed peers. Prominent (Non-Prominent) directors are those with (without) a career biography in BoardEx. Controls include Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

VARIABLES	(1) Female Appointments (log)	(2) Female Appointments (log)	(3) Female Appointments (log)
Female Director Dummy	0.040**		
	(0.019)		
Prominent Female Director Dummy		0.052*	
		(0.028)	
Non-Prominent Female Director Dummy		-0.027	
		(0.040)	
Prominent Female Dummy			0.059**
			(0.029)
Non-Prominent Female Dummy			-0.032
			(0.040)
Controls	Yes	Yes	Yes
Observations	59,504	59,504	59,504
R-squared	0.906	0.906	0.906
Country-Industry FE	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes

Table 11: Do female appointments in other industries matter? Listed firms appointments in distant industries

This table reports regression estimates of the number of female CEO appointments in private firms (log) on Female Director Dummy (a dummy equal to one for industries (defined at the SIC3 level) with female director appointments in listed firms, and zero otherwise. *SIC2–No SIC3 Female Director Dummy* is equal to one for SIC3 industries without female director appointments in listed firms but belonging to an SIC2 industry with at least one appointment in listed firms. Similarly, *SIC1–No SIC2 Female Director Dummy* is equal to one for SIC2 industries without female director appointments but belonging to an SIC1 economic sector with at least one appointment. All Female Board Dummies are lagged one year. Controls include Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

VARIABLES	(1) Female Appointments (log)	(2) Female Appointments (log)	(3) Female Appointments (log)
Female Director Dummy	0.040**	0.035*	0.040*
	(0.019)	(0.020)	(0.020)
SIC2-No SIC3 Female Board Dummy		-0.012	
		(0.011)	
SIC1-No SIC2 Female Board Dummy			-0.000
			(0.010)
Controls	Yes	Yes	Yes
Observations	59,504	59,504	59,504
R-squared	0.906	0.906	0.906
Country-Industry FE	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes

Table 12: Do female appointments in other industries matter? The impact on private industries

This table reports regression estimates of two metrics of female CEO appointments in private firms on Female Reform (a dummy equal to one following the adoption of board gender-quota regulations for listed firms, and zero otherwise), Listed Industry (binary variable equal to one for industries with at least one listed firm, and zero otherwise). Controls include Median firm assets (in log) and Return Over Assets (ROA), and the number of firms (in log) in the industry. In columns one and three, the dependent variable is the log of the total number of female CEO appointments in private firms. In columns three and four, the dependent variable is the number of female CEO appointments, scaled by one thousand. The sample covers the period 2000–2020. Standard errors are two-way clustered at the country-industry and country-year levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

VARIABLES	(1) Female Appointments (log)	(2) Female Appointments / Thousand Firms	(3) Female Appointments (log)	(4) Female Appointments / Thousand Firms
Female Reform X Non-Listed Industry	0.136***	0.363	0.110**	-0.092
	(0.052)	(0.470)	(0.050)	(0.477)
Female Reform x Listed Industry	0.355***	1.132		
	(0.073)	(0.692)		
Controls	Yes	Yes	Yes	Yes
Observations	62,197	62,197	26,673	26,673
R-squared	0.873	0.515	0.867	0.540
Country-Industry FE	Yes	Yes	Yes	Yes
Country-Year FE	No	No	No	No
Industry-Year FE	Yes	Yes	Yes	Yes
Sample	All	All	Finland and Non-Listed Industries	Finland and Non-Listed Industries

Appendix

Table A1: Variable definition

Variable Name	Definition / Description
A) Private firms:	
Female Appointments (log)	Natural logarithm of the number of female CEO appointments in private firms at the country–industry–year level.
Female Appointments / Thousand Firms	Number of female CEO appointments in private firms per thousand firms in the same country–industry–year.
Female Reform	Dummy variable equal to one following the adoption of board gender-quota regulations for listed firms in a country, and zero otherwise.
Listed Industry	Binary variable equal to one for industries (defined at the 3-digit SIC level) that have at least one listed firm, and zero otherwise.
Nr. of Firms (log)	Natural logarithm of the number of private firms within a country–industry–year cell.
Median Assets (log)	Median total assets (in logarithms) of private firms within a country–industry–year cell. Used as a proxy for firm size.
Median ROA	Median Return on Assets (ROA) of private firms within the same country–industry–year, measuring average profitability.
B) Listed peers:	
% Listed Employment	Share of total employment in the industry accounted for by listed firms.
% Listed Assets	Share of total industry assets held by listed firms.
% Listed Sales	Share of total industry sales generated by listed firms.
Female Director Dummy	Dummy variable equal to one if, in the previous year, at least one listed firm in the same industry appointed a female board director; zero otherwise.
Male Director Dummy	Dummy variable equal to one if, in the previous year, at least one listed firm in the same industry appointed a male board director; zero otherwise.
Female Chair Dummy	Dummy variable equal to one if, in the previous year, at least one listed firm in the same industry appointed a female chair of the board; zero otherwise.
Male Chair Dummy	Dummy variable equal to one if, in the previous year, at least one listed firm in the same industry appointed a male chair of the board; zero otherwise.

Female CEO Dummy	Dummy variable equal to one if, in the previous year, at least one listed firm in the same industry appointed a female CEO; zero otherwise.
Male CEO Dummy	Dummy variable equal to one if, in the previous year, at least one listed firm in the same industry appointed a male CEO; zero otherwise.
Prominent Female Director Dummy	Dummy equal to one if the newly appointed female board member in a listed firm has a professional biography in BoardEx, indicating prominence or visibility.
Non-Prominent Female Director Dummy	Dummy equal to one if the newly appointed female board member lacks a biography in BoardEx.
SIC2–No SIC3 Female Board Dummy	Dummy equal to one for industries (SIC3) without female director appointments but belonging to a broader SIC2 industry where at least one appointment occurred.
SIC1–No SIC2 Female Board Dummy	Dummy equal to one for SIC2 industries without female director appointments but belonging to a broader SIC1 sector where at least one appointment occurred.