A Gender Quota for Top Executives: Diversity without Disruption

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Abstract

We study Germany's landmark quota requiring major public companies to include at least one woman on their top executive teams. The quota increased female representation among top executives by about two-thirds. Firms largely recruited women from outside their networks and without prior public-company top-executive experience, choosing them over male candidates with similar profiles. Most were appointed to HR or niche roles, and there was no increase in female CEOs. We find no significant effects on the female share of managers in lower ranks, policies promoting gender equality, firm value, or performance. Overall, the quota boosted diversity without causing much disruption.

Keywords: corporate leadership, top executive selection, gender quotas, gender diversity, discrimination

JEL Codes: G34, G38, J44, J71, J78, K22, K31, M51

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I. Introduction

Female representation among top business executives has slowly trended upward in recent decades, yet men still account for over 90% of CEOs at Fortune 500 companies (Catalyst, 2023) and top listed companies in Europe (EIGE, 2025). In August 2021, Germany became the first country in the world to adopt a gender quota for corporate executives, requiring large German companies each to include at least one woman on their top executive team. The quota followed a series of earlier policy interventions—including supervisory board gender quotas and policies requiring companies to establish their own diversity targets—that did not meaningfully increase women's representation in top executive roles.[1] The German quota for top executives is exceptionally interventionist. Compared to broader public policies aimed at improving gender diversity in the workplace, such as antidiscrimination laws and affirmative action requirements,[2] the quota is remarkable in its mandate to appoint high-ranking female executives and in the severity of its consequences for noncompliance, barring companies with no female top executives from appointing additional male top executives.

In this paper, we evaluate the impact of this novel gender intervention along four key dimensions. First, we assess whether the German quota succeeded in raising women's share among top corporate executives. Second, we examine which hiring strategies firms employed to satisfy the unprecedented mandate. Third, we measure the quota's effects on female representation in lower levels of management and on policies intended to promote gender equality (e.g., maintaining a formal plan for increasing female leadership, backup-care benefits, or flexible scheduling).

[1] Companies were given considerable flexibility in determining their diversity targets and timelines for achieving them. According to a government review, 78.2% of companies set a target of zero or none at all (BMFSFJ 2020b; p. 76).

[2] In the US, from September 1965 to January 2025, federal government contractors were required, under Executive Order 11246, to take affirmative action such as "training programs, outreach efforts, and other positive steps" to "recruit and advance qualified…women" (DOL 2024).

Finally, we analyze how the quota affected companies' stock prices and performance. We evaluate these outcomes using difference-in-differences comparisons between German firms targeted by the quota and two sets of control companies: other firms in Germany and comparable companies elsewhere in Europe. We use the control firms to account for business-cycle fluctuations and secular trends in female leadership. Taken together, the tests assess whether an executive mandate raises women's representation, how firms comply, whether it shifts other gender-equality policies, and whether any gains come at the expense of performance.

Our first finding is that the quota significantly increased gender diversity in top corporate positions. Despite having similar trends in the three years preceding the quota's announcement, the female share of top executives at quota-targeted German companies increased by 6 percentage points, relative to both sets of control companies, over the following three-year period. This change represents a two-thirds increase relative to the 9% female top executive share at quota-targeted companies in 2019. Similarly, the share of targeted companies with any female top executives increased by over 20 percentage points to an average of 87% in 2023.[3] The female share of new top executive appointments increased by over 20 percentage points at targeted firms, a more than doubling of the average female share of new appointments at targeted companies in the pre-quota period. The share increased by twice as much, about 40 percentage points, when the appointing company had no female top executives already in place to satisfy the quota's minimum

[3] Despite full compliance with the quota's rule for new appointments, this rate is less than 100% of targeted companies for two reasons. First, we use an intent-to-treat measure to define targeted companies, and some companies stopped being bound by the quota because they reduced the size of their top executive team, as the quota only applied to companies with at least four people in their top executive team. Hugo Boss, for example, reduced its count of top executives to three, just below the quota's threshold, after the quota was enacted, and had yet to appoint a female top executive by the end of the sample period. Second, the quota only applies at the time of new appointments. Thus, even among continually targeted firms, variation in the timing of new appointments and the departures of female top executives allows companies to have spells with all male top executive teams.

participation requirement. These magnitudes underscore a sizable, policy-induced shift in executive-team composition.

Our results show that the mandatory gender quota we study is exceptional among gender policies in that it substantially increased gender diversity at the top-executive level. This contrasts with previous gender policies that have shown limited effects on women's advancement to top leadership jobs. Supply-side policies, such as paid maternity leave and subsidized childcare provision, have not consistently improved career advancement for working women (Lalive et al. 2014; Ginja et al. 2023; Thomas 2021; Kleven et al. 2024). Nor have broad-based anti-discrimination policies. The wage gains that accrued to women from the Civil Rights and Equal Pay Acts of the 1960s were concentrated in the lower half of the pay distribution (Bailey et al. 2024). Studies of affirmative action have similarly not detected effects on women's promotion rates or representation in management (Leonard 1984; Holzer and Neumark 2000a; Carrington et al. 2000; Kurtulus 2016; Miller 2018; Miller and Segal 2012). Even gender quotas for supervisory boards, which often select top executives, have not led to more women in top executive roles (Bertrand et al. 2019; Maida and Weber 2022; Matsa and Miller 2025).[4] This makes the executive-team quota all the more notable because it increased female representation among top executives.

Our examination of new appointments reveals that targeted firms primarily recruited new female executives from outside the company and its leaders' professional networks. The reduction in male appointments was also concentrated among unconnected outsiders, so complying with the quota did not result in an overall shift in the shares of unconnected outsiders appointed to executive boards. Although the quota increased female presence on the top executive team, it did not

[4] These scholarly findings are consistent with the German experience, where the limited gains for female top executives after the 2016 supervisory board quota were the primary impetus for Germany adopting the quota we study, which targets top executives directly. An exception is Ladant and Paul-Delvaux's (2023) examination of France's supervisory board quota.

detectably increase the likelihood of women serving in CEO, CFO, or COO positions. Rather, targeted firms recruited female executives into a limited set of functional roles. The new female top executives were concentrated in human resources and labor relations roles, which also had greater female representation before the quota, and in less common top executive roles, such as divisional COO or head of sustainability.

After establishing that firms appointed more women to top jobs in response to the quota, we next explore the impact of those appointments on executive quality. A binding quota that increases hiring of female top executives would be expected to reduce match quality and potentially profits if firms were optimizing before it came into effect and they complied by bypassing more qualified men. However, this effect can be offset or reversed if the pre-quota hiring process was tainted by explicit or implicit gender bias. The economic theory literature on affirmative action in employment identifies a variety of scenarios under which quotas can improve efficiency, but many of those mechanisms are unlikely to apply in our setting because they depend on changes in human capital investment and mentoring that emerge only over time (e.g., Lundberg and Startz 1983; Coate and Loury 1993; Athey et al. 2000; Moro and Norman 2003; Chaudhuri and Sethi 2008; De Sousa and Niederle 2022; Müller-Itten and Aniko Öry 2022). The main factor the literature identifies that could quickly mitigate, and potentially even reverse, reductions in new hire quality is the quota's potential to expand the pool of high-quality female candidates (Niederle, Segal, and Vesterlund 2013).

When we proxy for the quality of newly hired top executives with measures of prior experience in corporate leadership, we find no significant effects of the quota. The point estimates suggest small reductions in average experience levels, but these are not statistically distinguishable from zero. That firms were able to increase diversity without lowering experience levels is

consistent with hiring mainly unconnected outsiders and drawing on a wider pool of qualified female candidates rather than digging deeper into the limited pool of connected candidates.

Even if the newly appointed female top executives are as skilled and capable as the male candidates they replaced, they may differ in their preferences and strategic priorities. To test whether these appointments—primarily to HR positions—shifted corporate decisions, we examine workforce outcomes previously linked to executive gender: female representation among managers and the adoption of a range of gender-related corporate policies (e.g., Tate and Yang 2015; Flabbi et al. 2019; Matsa and Miller 2011; Kunze and Miller 2017). We find no significant effects on representation across different levels of management or on workforce policies.

Consistent with the finding that the quota does not affect top executives' quality or workforce policies, we also find no significant effects on companies' stock-market valuations or profitability. The estimated effects vary in sign and are statistically insignificant across samples and specifications. Taken together, these results suggest that the quota, as implemented, substantially expanded gender diversity in leadership without disrupting firm operations or causing economic harm. This stands in contrast to concerns raised by its critics that the unprecedented gender quota for corporate executives would "encroach on entrepreneurial freedom" and reduce corporate profits (BMFSFJ 2020b; p.18). If our findings hold more broadly, they suggest that firms could increase women's representation among top executives in other companies and countries without lowering profits.

At the same time, the lack of any immediate benefit in valuation or profitability suggests that the quota did not appreciably improve match quality by removing barriers to women's appointments to top executive positions. The lack of a clear financial benefit from hiring women to top executive positions could help explain why firms avoided doing so, even under Germany's

quota for supervisory directors and its voluntary target system for executives. Firms had little motivation from market forces to overcome the inertia in their hiring practices and incorporate more women. Only under direct external pressure, in the form of the executive quota, did firms change their practices.

These findings contribute to the labor economics literature on gender gaps in top corporate jobs (Bertrand and Hallock 2001; Goldin 2014; Wolfers 2006; Smith et al. 2013) and at the high end of the earnings distribution (Blau and Kahn 2017). Prior work has focused primarily on reasons for women's limited progress, including household obligations, especially following motherhood (Bertrand et al. 2010; Miller 2011; Gicheva 2013; Cortes and Pan 2019), preferences against risk and competition (Niederle and Vesterlund 2011), institutional factors, such as limited access to mentors (Athey, Avery, and Zemsky 2000), and lingering gender bias or discrimination (Becker 1957; Charles et al. 2022; Husain et al. 2023).[5]

We extend this literature by examining the impact of a government policy that forced firms to appoint women to top leadership positions. Our results illustrate what is possible: firms boosted female representation without altering the profile of their top executive appointments—that is, diversity without disruption. However, the lack of an immediate increase in female CEO appointments or spillovers to other management positions underscores quotas' limits in catalyzing broader changes within firms.

Our analysis also builds on studies of other gender quotas. In the US, researchers have analyzed broad-based affirmative action requirements for federal contractors (e.g., Leonard 1984, Holzer and Neumark 2000a, 2000b), targeted quotas imposed in response to discrimination in law enforcement (Miller and Segal 2019), and California's short-lived quota on boards of directors

[5] Experimental studies of discrimination typically focus on entry-level jobs for new graduates (Kessler et al. 2019) or hiring for lower-level jobs with large and anonymous candidate pools (Kline et al. 2022).

(e.g., Hwang et al. 2018; Greene et al. 2020; Gopal 2025). European gender quotas on corporate boards are also well studied (e.g., Ahern and Dittmar 2012; Matsa and Miller 2013; Eckbo et al. 2022; Comi et al. 2020), as are quotas for women in politics (e.g., Krook 2010; Pande and Ford 2011; Besley et al. 2017; Casas-Arce and Saiz 2015; Beaman et al. 2009; Chattopadhyay and Duflo 2004). We contribute by studying the first-in-the-world gender quota on top executives.

The remainder of the paper is organized as follows. Section 2 describes the quota law, our data, and our estimation samples. Section 3 examines the law's impact on top executive teams' gender diversity, and Section 4 analyzes how targeted companies complied with the quota, including how they sourced top executives, their prior experience, what roles they filled, and the quota's impact on the size of top executive teams. We study the quota's effects on corporate policies and gender equality in Section 5, and on firm value and performance in Section 6. We conclude in Section 7.

II. Background and Data

II.A The German Quota for Top Executives

On November 20, 2020, Germany's coalition government announced its constituent parties had reached a deal to introduce a mandatory quota for the number of women working as senior managers in the country's listed companies. Press coverage hailed the announcement as "a 'historic' step towards sexual equality" (Goodley 2020). The Second Leadership Positions Act (henceforth, the quota law) was enacted on August 11, 2021, with its requirement for new top executive appointments taking effect on August 1, 2022.[6]

[6] The first Leadership Positions Act (FüPoG), passed in 2015, established a mandatory gender quota for supervisory boards and created a system for firms to set voluntary gender targets for top management positions (including both the top executives who were later subjected to the quota and one layer below). The full name of the first law is (in

The quota law leverages German companies' existing two-tier board governance structure to designate the top executives subject to the quota. Each company has two distinct formal boards: an executive board and a supervisory board. The executive board, which is chaired by the CEO, is staffed by full-time employees of the company. These executives, who are subject to the quota we study, oversee the management of the business as a collective body, including major strategic, financial, compliance, and risk-management decisions, and are akin to the senior executive team of a US company. The supervisory board, which is most comparable to the board of directors of a US company, is composed of non-executive directors, who appoint and supervise the executive board and oversee its performance and compliance with its legal duties.

While it is overseen by the supervisory board, the executive board is the company's central decision-making body. The German Stock Corporation Act (AktG) assigns it responsibility not only for directing the company's affairs, but also for corporate planning, regular reporting to the supervisory board, and the creation of monitoring systems to identify threats to the firm (Sections 76(1), 90(1), and 91(2)).[7] Company governance statements show that executive-board responsibilities extend to budgeting and resource allocation, senior staffing decisions, financial reporting, and the oversight of internal controls (e.g., Adidas 2024, BASF 2025, Bayer 2026).

Under German law, this authority belongs to the executive board as a collective body, not to the CEO alone. Members of the executive board typically hold distinct portfolios, but they share joint responsibility for managing the company's affairs, as German law bars one or several members of the executive board from taking a decision overriding the view held by the majority

translation) "Act for the Equal Participation of Women and Men in Leadership Positions in the Private and Public Sector" and the second is "Act to Supplement and Amend the Regulations for the Equal Participation of Women in Management Positions in the Private Sector and the Public Sector."

[7] These responsibilities are also enumerated in Principles 1, 2, 4, 5, and 16 of the German Corporate Governance Code (DCGK), which outlines the legal duties and obligations of the executive board and also recommends best practices.

of its members (AktG Section 77(1) and DCGK Principle 1). The CEO chairs and coordinates the board, but does not legally usurp the other members. Board members also can be held jointly and severally liable for breaches of duty. Each seat on the executive board therefore carries substantial authority and responsibility.

The quota law institutes a "minimum participation requirement" that at least one member of a targeted company's executive board be female. Companies targeted for this requirement are those that are incorporated in Germany, publicly traded, employ more than 2,000 workers, and have executive boards with at least four members.[8] The law bars targeted companies with all-male top executive teams from appointing any new top executives until they satisfy the minimum participation requirement by appointing a female top executive. Appointments made in violation of this rule are legally void. In practice, this penalty and enforcement mechanism make the requirement binding on firms only at the time that they make top executive appointments. Because firms are not required to immediately replace departing top executives, regardless of their gender, a small share of targeted firms can have no female top executives at any point in time, even if the law is strictly enforced and all new appointments adhere to its requirements.

II.B Data and Estimation Samples

In our empirical analysis, we compare quota-targeted companies to two samples of comparison companies for the period between January 2016 and May 2024. Companies subject to the gender quota for top executives are identified using the research and advocacy organization

[8] Similar to the previously adopted supervisory board quota, the executive quota targeted the largest companies in Germany by imposing the requirement on firms with parity codetermination. Parity codetermination is required for German companies with more than 2,000 employees in any industry or more than 1,000 employees in mining and steel industries (though the latter distinction was not empirically relevant at the time of the quota's adoption). Jäger et al. (2021) and Jäger et al. (2022) examine the effects of German codetermination on wages and firm outcomes.

FidAR's "Women on Board Index" reports from 2021 through 2023.[9] We take an intention-to-treat approach and consider firms to be targeted if they were subject to the law at any point, which includes companies that reduced their board size following the passage of the quota law.[10]

Our first comparison sample includes all public companies in Germany with multimember top executive teams, while the second contains all large public companies in Europe with dual-board structures and multimember top executive teams.[11] The comparison within Germany allows us to hold constant economic, political, and social factors that vary across countries and may affect our outcomes of interest. However, because the quota was intentionally imposed on the largest and most prominent firms in Germany, other German companies are necessarily smaller and less prominent.[12] The second comparison is to large and prominent companies throughout Europe, specifically firms with a market capitalization of at least 200 million euros. These companies are mostly based in Austria, Denmark, France, Germany, Italy, Poland, and the Netherlands.[13] By excluding smaller Germany companies, this comparison group also has the advantage of being less subject to concerns about the possibility that smaller German firms might mimic leading

[9] The name FidAR is a contraction of Frauen in die Aufsichtsräte, or women in supervisory boards. Reports are available online at https://www.fidar.de/.

[10] This measure understates the treatment effect of operating under the gender quota if firms intentionally avoided the quota by changing their status. Out of 72 firms ever subject to the quota, we observe 6 with consistently all-male executive boards through the end of our sample period. Four of those six firms were no longer targeted by the quota in 2023, because two delisted (Bauer AG and ElringKlinger AG) and two dropped down to three top executives (Hugo Boss and Rhön-klinikum AG). The remaining two firms (Wüstenrot & Württembergische AG and Koenig & Bauer AG) remained subject to the quota but had not yet appointed a new top executive since the quota's effective date. Overall, 10 firms in the targeted group were no longer bound by the quota in 2023 and 6 firms affected in 2023 were not initially targeted.

[11] We identify companies' board structures from the European Federation of Employee Share Ownership (EFES) survey, which includes all listed companies with a stock market capitalization of at least 200 million Euros. Companies in many European countries have a choice of adopting unitary (single-tiered) versus dual (two-tiered) board structures. See Belot et al. (2014) for an analysis of the tradeoffs and implications of these choices in France.

[12] Comparison German companies were also affected by a less restrictive feature of the quota law, which newly required firms setting a target of zero women on their executive boards to justify why they did so. Companies that fail to report a target or to provide a justification for a zero target face fines of up to 5% of annual sales, twice the economic benefit gained, or 10 million euros, whichever is greatest.

[13] We obtain similar results if we use a German or pan-European control sample that is restricted to more prominent companies included in a stock market index, such as the DAX, CDAX, MDAX, TecDAX, or Euro Stoxx 50 (see Appendix Figure A1).

companies in addressing gender diversity after the quota.[14]

For each targeted and control firm, we collected information from BoardEx and Bloomberg. BoardEx compiles publicly available information, including from firms' disclosures, on individuals who currently hold or historically held positions as an executive board member, a supervisory board member, or a senior manager not on the executive board. For these individuals, we obtained data on their gender and the full history of their corporate leadership roles, including the organization, job title, and start and end dates for each distinct role. These career histories allow us to track changes in board composition over time as well as flows into the board through new appointments. For top executives appointed during our sample period, we also collected information on their network connections with the organization's supervisory directors and top executives before the appointment. We measure connections between individuals using overlaps in their work history and education. Following Gormley et al. (2023), we define a connection as existing between two individuals if they ever worked simultaneously at the same employer or graduated from the same school within one year of each other.[15]

From Bloomberg, we obtain information on firms' daily stock returns, Tobin's Q, and operating profits scaled by assets.[16] We also draw on microdata underlying the Bloomberg Gender-Equality Index (BGEI). These variables, which are available on an annual basis and sourced from companies' public filings, include the female share of managers in all levels of the company as well as indicators for whether the company has various HR policies in place, such as flexible work

[14] As an additional robustness check that further addresses potential concerns about within-country spillovers, we also confirmed that we obtain similar findings when using a comparison sample limited to companies with multimember executive boards and incorporated in Austria or Poland, where all listed companies use a dual board structure (see Appendix Figure A2).
[15] Our findings are robust to using alternative measures of connections (see Section IV.A for details).
[16] Tobin's Q is computed by Bloomberg as (Market Cap + Total Liabilities + Preferred Equity + Minority Interest) / Total Assets. Both Tobin's Q and operating profits are Winsorized at the 1% tails. We obtain similar results when we use the full range of values without Winsorizing. We use the 3-month U.S. Treasury bill yield from Federal Reserve Economic Data (series DGS3MO) as the risk-free rate.

hours, back-up childcare, and mandatory sexual harassment training. We examine these data starting in 2020, when Bloomberg implemented a new data collection methodology and vastly increased its sample size. The sample goes through fiscal year 2023. Because the BGEI sample focuses on the largest companies worldwide, it includes only 33 of the smaller firms that compose our German comparison sample. Although we report estimates from both comparison samples for completeness, we are cautious about drawing conclusions from the within-Germany sample for these outcomes.

Summary statistics on the targeted and control firms are reported in Table 1, separately for 2019, the year before the quota was announced and passed, and 2023, the first full year after the quota went into effect and the last full year of our sample. As expected, targeted companies have larger boards and are also larger in terms of assets and market capitalization, particularly when compared to companies in Germany that were not subject to the quota. The Europe-wide comparison sample includes firms that are closer in size and profitability to the ones targeted by the quota. In keeping with their larger size, the targeted companies may have fewer growth opportunities, which are reflected in their lower Tobin's Q ratios.

In the year before the quota, 46% of targeted companies had a female top executive in place, more than did the comparison groups. However, accounting for their somewhat larger top executive team size, targeted companies' average female share of top executives (9%) was not higher than that of the pan-European comparison sample. Targeted firms were also no more likely to have a female CEO. In 2023, after the quota's implementation, targeted firms had a much higher rate of having any female top executive (87%) and also a much higher average female share among top executives (21%).

III. Did the Quota Increase Gender Diversity at the Top?

III.A Female Representation Among Top Executives

We start by examining the law's impact on top executive teams' gender diversity, using two main outcomes: the share of the top executive team that is female and indicator for the presence of any female top executive. We estimate a difference-in-differences comparison of changes in these outcomes between the periods before and after the quota law is announced among targeted firms relative to others:

$$(1) \qquad Diversity_{jt} = \beta * Targeted_j * Post_t + \alpha_j + \tau_t + \zeta_{jt},$$

where the outcome variable, $Diversity_{jt}$, measures female presence on the executive board of firm j in month t. We include firm fixed effects, α_j, to account for unobserved heterogeneity across companies and year-month fixed effects, τ_t, to account for sample-wide variation over time. The standard errors are adjusted for clustering at the firm level to account for within-firm correlations over time.

We find large and statistically significant increases in female representation at targeted companies after the quota's announcement relative to each control group. The columns of Table 2 report estimates for the treatment effect, β, for the different outcomes and control groups. Compared to other German firms, the quota is associated with a 5.8 percentage point increase in the female share of top executives (column 1) and a 22 percentage-point increase in the likelihood of having at least one woman in such a role (column 2). This implies that the quota accounts for about half of the total increases between 2019 and 2023 in the female share of top executives (12 percentage points; Table 1) and in any female presence (41 percentage points; see Table 1) at targeted companies. The estimates are similar in magnitude when we examine the pan-European control group (columns 3 and 4).

The timing of the increase in female top executives is consistent with the quota causing the increase. Figure 1 plots time-varying difference-in-differences estimates for the changes in the female share of top executives relative to 2019 for targeted versus other German firms in Panel A and for targeted versus other large European firms in Panel B. The corresponding estimates for having any female top executive are reported in Panels C and D. The estimates come from expanding Equation (1) to split out the $\beta^{*}Targeted_j^{*}Post_t$ term into ones that capture the differential effect on targeted firms in three periods: between the quota's announcement in November 2020 and its passage in August 2021 ($\beta_A^{*}Targeted_j^{*}Annoucement_t$); between its passage and effective date in August 2022 ($\beta_P^{*}Targeted_j^{*}Passage_t$); and after the effective date ($\beta_E^{*}Targeted_j^{*}Effective_t$). To check for differential trends, the pre-quota period is also divided into calendar years by estimating the terms $\beta_y^{*}Targeted_j^{*}Post_t^{*}1(Year=y)_t$, where y = {2016, 2017, 2018}. There is no estimate for 2019, the last full year before the quota, as it is omitted from the specification and provides the baseline for the other estimates. The estimate for 2020 captures the portion of the year preceding the quota's announcement.

Figure 1 shows that the female share of top executives at targeted firms was relatively flat pre-quota and grew markedly after the quota's announcement, relative to comparison firms. While there is some indication of growth in the early part of 2020 for the within-Germany comparison, this pattern is muted in the pan-European comparison is not statistically significant in either sample. After the quota's announcement, the female share grew over time and reached its highest level after the mandatory quota took effect. We find similar results across the different control groups.[17] This pattern is also shown in the regression estimates in Appendix Table A1. The initial

[17] We obtain similar results if we exclude firms in France from the pan-European controls (see Appendix Figure A3). France followed Germany and, in December 2021, adopted a gender quota for senior executives that was legislated to take effect on March 1, 2026, followed by a two-year compliance period.

increase in female shares (of about 3 percentage points) in the post-announcement period indicates that some firms took action in anticipation of the quota's passage and implementation. The continued increases to 5 percentage points in the period after passage, and then to 8 percentage points after the law took effect, show that other firms only hired a female executive after being legally required to do so.

We reach similar conclusions from analysis using different reweighting approaches. Figure 2 reports estimates using synthetic controls (Abadie et al. 2010) in Panels A and B and synthetic difference-in-differences (Arkhangelsky et al. 2021) in Panels C and D. These two estimation approaches differ primarily in that the synthetic control approach matches on both levels and trends in the pre-treatment period between the targeted and control firms, while the synthetic difference-in-differences approach matches only on trends. This distinction is more relevant for the within-Germany comparison (Panels A and C), where the control firms tend to be smaller in size and have lower diversity levels in the pre-period. Because targeted firms' pre-quota diversity levels were more similar to the pan-European controls (see Table 1), the two reweighting approaches yield relatively similar estimates (Panels B and D). In any case, all of the estimation approaches and control samples reveal a large and growing gap in female shares between targeted and other firms after the quota's adoption.

These reweighting approaches confirm the quota's sizeable impact on female representation among top executives. Table 3 reports the estimated effects (and standard errors) over the entire post-announcement period. Because the reweighting procedure is estimated only on firms that are present in all months of the sample, Table 3 reports OLS estimates on the balanced panels of German (column 1) and European (column 4) firms for comparison. These various balanced-panel estimates are slightly smaller than for the full sample, ranging across the samples

and models from 4 to 6 percentage points for the increase in female top executive shares and from 15 to 28 percentage points for the increase in the share of companies with any female top executives. These results support the interpretation that the quota achieved its intended effect of increasing gender diversity among top executives, over and above any secular trends in female leadership that affected other German or European firms.

III.B Female Representation Among Newly Appointed Top Executives

Next, we study new top executive appointments. Because the quota's mandate is on appointments, this approach allows us to identify the firm-specific timing of when the quota's minimum participation mandate is binding and to examine potential indirect effects on top executive appointments at firms already satisfying the mandate.

The quota law does not mandate any specific timing for new appointments, and appointments occur with varying frequency at different sample firms. For this analysis, an observation is a new top executive appointment that occurs at a target or control firm during our sample period. For each appointment, we test whether the quota increased the likelihood of a woman being selected. Our estimation equation has a similar structure to equation (1) applied to a different unit of observation:

$$(2) \qquad Female_{ijt} = \beta * Targeted_j * Post_t + \gamma * NoFemale_{jt} + \delta * Targeted_j * NoFemale_{jt} + \chi * Post_t * NoFemale_{jt} + \alpha_j + \tau_t + \zeta_{ijt},$$

where the outcome, $Female_{ijt}$, is an indicator for a newly appointed top executive i at firm j in month t being female. As in equation (1), the model includes controls for firm and month fixed effects and the impact of the quota is measured by β, the coefficient on the interaction term for targeted companies after the quota's announcement. To be consistent with our subsequent analysis, this model also controls for $NoFemale_{jt}$, which is an indicator for a firm not having a female top

executive before the appointment, and the pairwise interactions of $NoFemale_{jt}$ with $Targeted_j$ and $Post_t$. The standard errors are again adjusted for clustering at the firm level.

Results from this analysis are reported in columns 1 and 4 of Table 4. Across both estimation samples, we find that targeted companies' newly appointed top executives are more likely to be female after the quota is announced. The increase is 22.1 percentage points in the German sample (column 1) and 26.9 percentage points in the pan-European sample (column 4). Both estimates are highly statistically significant and represent a substantial increase relative to the sample means of 16 and 18 percent, respectively.

We also estimate an expanded version of the model to separately examine the effects of the quota on targeted firms' appointments when it is immediately binding versus when it is not. The quota explicitly bars only firms without a female top executive from appointing a male top executive, but the quota's shadow might also nudge firms to appoint additional female top executives to avoid being constrained later. To distinguish between the effects of the quota on targeted companies based on whether it is binding or not, we estimate the following equation:

$$
\begin{aligned}
(3) \qquad Female_{ijt} = {} & \beta^{NF} * Targeted_j * Post_t * NoFemale_{jt} + \\
& \beta^{HF} * Targeted_j * Post_t * HasFemale_{jt} + \gamma * NoFemale_{jt} + \\
& \delta * Targeted_j * NoFemale_{jt} + \chi * Post_t * NoFemale_{jt} + \alpha_j + \tau_t + \zeta_{ijt},
\end{aligned}
$$

where $HasFemale_{jt}$ is an indicator for a firm having a female top executive before the appointment. In this model, the β^{NF} coefficient captures the effect of the quota when the firm does not have a female top executive, and the β^{HF} coefficient captures the effect when the company already has one or more female top executives in place before the new appointment. We also include a direct control for $NoFemale_{jt}$ as well as the pairwise interactions between that variable and the $Targeted_j$ and $Post_t$ indicators.

We find that the quota's impact on targeted companies is largest when the firm has no female top executives in place.[18] In such scenarios, the quota increases the likelihood of a female appointment by 40 to 43 percentage points ($p < 0.001$; columns 2 and 5). This increase amounts to a more than tripling of the average female appointment rate of 19% at targeted firms with no women in place before the quota. The estimated impact of the quota is much smaller, and sometimes not statistically significant, when the company already has a female top executive. In all the specifications, the difference between the treatments effects in these scenarios is statistically significant ($p < 0.01$).

Further analysis suggests the increase women's appointments after the quota cannot be explained by spillover effects from women on supervisory boards or pipeline effects from women in senior leadership positions below the top executive level. In a modified version of equation (3), reported in columns 3 and 6 of Table 4, we include additional controls for the female shares of the company's supervisory board and senior leadership. We find positive point estimates for both the spillover and the pipeline variables, although the only statistically significant estimate is for pipeline effects in the European sample. Conditioning on these controls has limited impact on the estimates, and we continue to find that a binding quota increases female appointments by about 40 percentage points ($p < 0.001$).

These results are from our sample of top executive appointments of people not currently serving on the firms' executive board. However, companies also have the option of filling openings with existing members of the top executive team, through a change in job responsibilities (adding a new role and possibly dropping an old one). Because our data from BoardEx include these role

[18] The quota does not require that all of top executive appointments by these firms are women, because when such firms appoint more than one top executive at the same time, only one of them must be female.

changes, we can also estimate our models using an extended sample that includes both new hires to the executive team and current members' appointments to new roles.[19]

Estimates from this expanded sample also show that the quota causes sizable and significant increases in the likelihood of a woman being appointed, as shown in Appendix Table A2. The effect sizes are somewhat smaller on this sample, and the increased rate of female appointments is now concentrated entirely among targeted firms without female top executives already in place. Among firms without female top executives, the quota increases the female share of new and continuing appointments by about 28 percentage points ($p < 0.001$), a more than tripling of the 12 percent rate of female appointments at targeted firms with no female top executives in the pre-quota period.

IV. How Did Firms Comply with the Quota?

In this section, we examine how targeted companies complied with the quota, including how they sourced top executives, what roles they filled, and the impact on the size of top executive teams. We first analyze the prior work experience and professional connections of newly appointed male and female top executives. Specifically, we study to what extent the new top executives came from internal promotions or from external searches, whether top executives sourced externally had prior connections to the firm's top leaders, and whether new top executives had previous experience in a top leadership position before their appointment. We then examine job titles to see which roles female executives were hired to fill. Finally, we examine the size of the top executive team and changes in the numbers of males and females to test whether the additional women were accommodated by replacing male members or by increasing the size of the leadership team.

[19] We do not observe extensions in the duration of an appointment or reappointments to the same position.

IV.A. Recruiting Sources

We start by examining how the quota affects firms' sourcing of new top executives. We first extend our analysis of new top executive appointments to distinguish between internal promotions and external hires. We define a new top executive appointment as an internal promotion when the candidate transitions into the top executive position from a lower-ranking senior leadership position at the same company. Other appointments are designated external hires.[20] In analysis reported Table 5, we subdivide female and male appointments into these different categories and re-estimate equation (3) after substituting indicator variables of these different outcomes for the dependent variable.

We find that companies targeted by the quota increase their appointments of both internal and external female candidates, replacing male candidates who would have been sourced through these channels in a similar proportion. As reported above in column 2 of Table 4, when a targeted firm without any female top executives appoints a new executive after the quota, the executive is 39.7 percentage points more likely to be female—and equivalently 39.7 percentage points less likely to be male—than when a nontargeted German firm without any female top executives appoints a new top executive. The analysis reported in columns 1–4 of Table 5 decomposes these 39.7 appointments and 39.7 forgone appointments into internal promotions and external hires.

We find that more of the incremental female appointments are external hires (25.7 percentage points; column 2) than are internal promotions (13.9 percentage points; column 1). The larger increase in external hires is consistent with those appointments comprising the great majority of new top executives overall (75.6 percent in the German sample) and of female top

[20] Because we only observe top executive and senior leadership roles, our external category can theoretically include promotions of even lower ranked managers or rank-and-file workers at the firm. However, we expect that promotions of these kinds, that effectively skip over hierarchical levels, are unlikely for top executive jobs at the major companies that constitute our sample.

executives in particular (74.6 percent in the German sample). We find similar patterns in the pan-European sample (see columns 6 and 7).

The male appointments displaced by the quota had a similar split into internal promotions and external hires. Most of the men not appointed to top executive jobs because of the quota would have been external hires. Male external appointments dropped by 24 to 27 percentage points (columns 4 and 9), while male internal promotions dropped by 16 to 17 percentage points (columns 3 and 8). On net, with firms sourcing the incremental women similarly to the men they replaced, the quota did not induce a significant overall change in the balance between inside and outside appointments (columns 5 and 10).

Because firms have less information about external candidates, hiring them often carries more risk than promoting from within. However, that risk may be lower when external candidates are connected to current top leadership.[21] We therefore conduct an additional analysis that subdivides external female and male hires based on whether the new executive had any professional network connections (through education or employment) to members of the top executive team prior to their appointment. Table 6 reports estimates of equation (3) after substituting indicator variables of these different outcomes for the dependent variable.[22] We find that the quota led firms to hire female executives from outside their professional networks: targeted firms without any female top executives are 18.7 to 22.4 percentage points more likely to hire an unconnected female candidate than are similar untargeted firms (columns 2 and 7; $p < 0.05$ and $p < 0.01$, respectively). The point estimates for connected female candidates are also positive but

[21] Applicants referred by current employees are more likely to be hired for rank-and-file positions (Pallais and Sands, 2016) and individuals with professional network connections to existing board members are more likely to be appointed to supervisory boards (von Essen and Smith 2023).

[22] This analysis is estimated on the subsample of appointments for which we can match all executives to our network data. The results are similar if we include the full sample and code unmatched executives as having no ties (see Appendix Table A3).

they are smaller and not statistically significant (columns 1 and 5).

These results have both demand and supply interpretations. The quota likely induced firms to engage in additional search and recruiting efforts to identify and attract capable women they might have otherwise overlooked. It is also possible that the quota, by raising women's chances of ultimately being hired, increased women's willingness to engage in the competitive application process required to obtain a top executive position.

The estimates also indicate that the quota-induced decline in male appointments came from passing over male candidates with whom they lacked connections. Targeted firms without any female top executives are 23.3 to 27.5 percentage points less likely to hire an unconnected male candidate than are similar untargeted firms (columns 4 and 9; $p < 0.05$ and $p < 0.01$, respectively), but they remain just as likely to hire a male candidate with whom they are connected (columns 3 and 8). Putting the various evidence together, it appears that firms were unwilling to pass over known (internal or connected) male candidates to comply with the quota, but they passed over men with whom they were less familiar. With firms passing over unconnected men to hire unconnected women, the quota's net effect on the overall rate at which companies hire from outside their professional networks is relatively small and not statistically significant (columns 5 and 10).

These results are robust to a variety of alternative definitions of insiders and outsiders and network connections, including expanding the set to include cases where two individuals served at some point as an officer or director at the same club, organization, or nonprofits, even when this service did not overlap in time (Appendix Table A4), limiting connections to those based on prior employment (Appendix Table A5), focusing on connections (through employment or education) between the new top executive and the current CEO (Appendix Table A6), or including connections to any member of the supervisory board (Appendix Table A7).

IV.B. Prior Leadership Experience

We next examine the effect of the quota on the quality of new top executives. We proxy for quality using measures of human capital based on the executive's prior experience in a top corporate job (Becker 1962). We then re-estimate equation (3) on the sample of new top executive appointments, analyzing indicator variables for the new hire possessing or lacking prior top executive experience, interacted with gender indicators, as the dependent variables.

The results are reported in Table 7 for our primary measure of experience, which focuses on whether the individual has previously held a comparable position as a top executive at a public company. We find that the quota primarily increased appointments of women who lacked this experience, with estimated increases of 0.36 and 0.39 in the German and pan-European samples (columns 2 and 7). The estimated increases in experienced women (in columns 1 and 6) are an order or magnitude smaller. This shift toward less experienced women was matched by a similar-sized shift away from less experienced men (columns 4 and 9), leading to much smaller estimates for the combined impact of the quota on the overall share of appointments with prior top executive experience. The point estimates imply that the overall share with this experience decreases by less than 1 percentage point in the German sample and by 4 percentage points in the pan-European sample, and neither estimate is statistically different from zero.

These results show that most of the change induced by the quota was among appointments of individuals to serve for their first time as a top executive of a public company. This pattern is consistent with these appointments representing over 80% of new appointments in our sample, as companies regularly recruit less experienced candidates for top executive appointments. The lack of a significant increase in female appointees with prior top executive experience implies that

targeted firms largely did not poach female top executives from other public companies, including those in our control samples, to comply with the quota.

Because prior top executive experience is relatively uncommon in our sample of new appointments, we also repeat our analysis using broader measures of previous leadership experience and again find no significant impact of the quota on the average experience level of new top executives. The point estimates continue to find modest, statistically insignificant, declines in experience levels when we expand our experience measure to include top executive roles at private companies (Appendix Table A8) and also positions on supervisory boards (Appendix Table A9).

Our analysis of these broader measures of prior experience shows that targeted firms recruited women with significant prior corporate leadership experience as executives at private companies or as supervisory board members. Women hired because of the quota appear to be drawn at similar rates between those with and without any public or private top executive experience, with somewhat larger declines in the hiring of experienced rather than inexperienced men (Appendix Table A8). When we further broaden the experience measure to also include supervisory board positions, the effects of the quota are concentrated primarily among more experienced male and female hires (Appendix Table A9).

Taken together, the evidence suggests that firms complied with the quota by appointing women with leadership experience—private company C-suite roles or supervisory board service—but without prior public-company top-executive posts. Hiring these women, however, did not affect the average experience level of new top executives, because the males not hired had a similar experience profile.

IV.C. Top Executive Roles Filled and Team Size

We continue our examination of how firms complied with the quota by exploring what functional roles the new female top executives filled. We do this in two ways. First, we estimate board-level effects using Equation (1) with different dependent variables that indicate whether or not the firm has a female top executive whose job title includes a given functional area. These variables measure whether a firm has any female executive serving in that role, irrespective of whether the executive also covers other areas or whether other executives cover the same functional area.[23] Second, we focus on flows into roles and estimate Equation (3) on the sample of new appointments, with dependent variables that indicate whether or not that particular appointment is of a women to a given job function.

We analyze the job functions that appear most frequently in targeted companies in our sample, specifically all roles used by at least one-fifth of targeted firms in 2019, the year before the quota. As shown in Appendix Table A10, these are: Chief Executive Officer (CEO, in 100% of firms); Chief Financial Officer (CFO, 94%), Head of Human Resources, Labor, People, or Talent (HR, 55%), Chief Operating Officer (COO, 36%), Sales (22%), Division CEO (21%), and Technology (21%). These categories are not exhaustive and 49% of targeted companies had at least one executive with a less common role, which we label as "Other".[24] We classify uninformative titles (e.g., "Executive Director") together as having an "Unknown" role. Unclassifiable positions are observed at 54% of targeted companies in 2019. Appendix Table A10

[23] When a job title includes multiple functional roles (such as, "CEO, CFO, and Head of HR"), we set the indicators to one for all relevant roles. Thus, apart from the "unknown" role category, roles are not mutually exclusive. Under this definition, the measure of any female top executive presence within a role category does not decrease when a single woman goes from holding one role exclusively to splitting her time between multiple roles. It is rare for multiple top executives to cover a single functional area, and indeed we reach the same conclusions if we examine the female share of executives in each role instead of an indicator for any female presence (see Appendix Figure A4).

[24] The most frequent other role types are deputy CEO (13%), divisional leadership other than CEO (10%), marketing (9%), IT (9%), legal (9%), and risk (6%).

also reports the unconditional share of firms with a female top executive in the role as well as this same share after limiting the sample to firms with any top executive in the role. The most common role for female top executives in 2019 is HR (24% of firms). The role with the highest female presence (67%) is the relatively rare position of legal chief (present at fewer than 10% of firms), while HR is the second most female (43%).

To estimate the quota's overall effect on female representation in each executive role, we run separate regressions on indicators for whether women hold each role using our panel of firm-month observations. Figure 3 plots the coefficient estimates from Equation (1)—diamonds for the German sample, circles for the pan-European sample—with bars depicting the 95% confidence intervals around each point estimate. The estimates are also reported in Appendix Table A11.

We find that the quota did not increase the female share of CEOs. The point estimate is small, negative and statistically insignificant. The lack of any impact on what is typically the most consequential position within the firm[25] is perhaps unsurprising, given that the quota did not place requirements on specific positions within the top executive team. Furthermore, we do not detect significant increases in women's presence in the other major C-suite roles of CFO or COO, or in the number of firms with women in Division CEO, Sales, or Technology roles. The insignificant impact of the quota on the ranks of female CFOs, COOs, and Division CEOs suggests that the quota's potential long-term effects on female CEOs may take significant time to be realized without further intervention, as these are the key stepping-stone roles for that position (Heidrick & Struggles 2023).

We find that, rather than filling those stepping-stone roles, the new female top executives tend to fill HR or one of the less common roles. The largest increase is the 20-percentage-point

[25] Longstanding research confirms the importance of individual CEOs for firm performance (e.g., Bertrand and Schoar 2003; Bandiera et al. 2020).

boost in the share of firms with a female top executive in HR. This increase is substantial and reflects an almost doubling of the 24 percent share of targeted firms with women in HR roles in the year before the quota. HR had the most female top executives before the quota, and even more afterwards. Hiring women into the functional area that had the largest female talent pool likely reduced the incremental search costs of complying with the quota.

Targeted firms also comply with the quota by appointing more women to less-common top-executive roles. Although these less-common roles had a lower female representation than HR before the quota was announced, the share of firms with women serving in these roles rises by about 10 percentage points afterward.[26] For example, while none of the top executives in lower-divisional roles (e.g., Division COO) were women in 2019, 50 percent of these lower-divisional roles included on the top executive team were held by women in 2023.

We find a similar pattern when we examine the sample of new appointments. The β^{NF} estimates from Equation (3), plotted in Appendix Figure A4 and reported in Appendix Table A12, show no relative increases in appointments of female top executives to CEO, CFO, or COO roles. Instead, the increase in new female top executive appointments is concentrated among HR and other, less common roles.

Firms' reliance on arguably less powerful top executive positions to satisfy the quota could suggest a form of token compliance. Yet even when firms appointed women to less common roles, a seat on the senior executive team still carried substantial formal authority under German law. As described in Section II.A, the team is the company's central managerial organ, and its members share responsibility for managing the firm. The CEO chairs and coordinates the board but does not

[26] When we decompose this increase into specific roles, the point estimates are largest for non-chief division executives (e.g., Division COO) and executives responsible for sustainability; however, these estimates (2 to 3 percentage points each in the firm-level analysis and 5 to 6 percentage points each in the new appointment analysis) are noisy and mostly not statistically significant.

control it unilaterally: members decide jointly, and the firm's internal rules cannot allow one or more members to override the majority view. A newly appointed woman therefore need not occupy the most powerful portfolio to hold a consequential office.

We can also assess tokenism in firms' compliance by examining how they complied. Because the quota prevents targeted firms without any female top executives from filling vacancies with men, firms can comply either by expanding the size of their top executive team to add a woman or by appointing a woman to a position that otherwise would have gone to a man. Both methods of adjustment would increase the female share of appointments and decrease the male share, but only the latter would reallocate a top executive position away from a man.[27] Expanding the team would not make the new appointee meaningless, but replacing a man rather than merely adding a woman is a stronger evidence that the quota changed the actual composition of the firm's top decision-making body rather than being satisfied only at the margin. We investigate this possibility by examining how firms adjust the structure of their top executive teams after the quota.

To distinguish between these two means of adjustment, we re-estimate Equation (1) using as dependent variables the numbers of top executives—male, female, and total. The results, reported in Table 8, indicate that targeted firms primarily reallocated positions: relative to control firms, they increased their number of female top executives (columns 3–4; $p < 0.001$) and reduced their number of male top executives (columns 5–6; $p < 0.05$). This decline in male executives is a cost borne by some members of the majority group of a quota requiring representation of both genders. The relative magnitudes of these two estimates imply that 63 to 75 percent of the women added after the quota replaced men. Consistent with reallocation rather than expansion, we

[27] Firms could also avoid triggering the quota by reducing the size of an all-male top-executive team to less than four members. Doing so also reduces the number of top executive jobs held by men. This adjustment was rare in practice (see footnote 10).

estimate only a minimal, statistically insignificant effect on board size relative to the sample mean (columns 1–2).

In summary, we find that targeted companies most often replaced a male top executive with a female candidate whose experience and connections closely matched those of the male candidate they would have hired if not for the quota. This finding weighs against the most perfunctory form of compliance, in which firms would simply have enlarged the board while preserving existing male-held positions. Moreover, even when newly appointed women entered HR and other comparatively less central portfolios, they still joined a top executive team that is empowered by law to exercise collective authority over the firm. The evidence therefore suggests that the quota changed the composition of firms' top decision-making bodies in a meaningful way, even if the initial portfolios assigned to the new female executives were not always the most powerful.

V. Did the Quota Affect Broader Gender Equality?

Having shown that the quota increased female representation among top executives, we next examine whether the newly appointed female executives, who serve primarily in HR positions, affect how their firms are managed. Their professional backgrounds resemble those of the men they displace, making gender their most salient difference. We therefore focus on workforce gender composition and employment policies, as prior literature identifies these areas as the most likely to be affected.

We first test for spillover effects within targeted firms on women's representation in lower-tier leadership roles. German law requires the top executive team to set gender diversity targets for two management levels below them (AktG Section 76(4) and DCGK Principle 3). Motivated by homophily theory and prior evidence that gender gaps in hiring and promotions shrink when the

share of women at the next-higher rank is larger (Matsa and Miller 2011, Kunze and Miller 2017) we examine gender diversity outside of the top executive team using the difference-in-differences model in Equation (1).

Two data sources both find small, insignificant effects. First, we use BoardEx to study the female share of senior managers and corporate leaders who are not part of the executive board. Figure 4 (first row) and Appendix Table A13 (column 1) report the quota's estimated treatment effects separately for the German and pan-European control groups. The estimates are positive but small—less than 1 percentage point (less than 4 percent relative to the mean)—and not statistically different than zero at conventional confidence levels. We find similar effects when we examine the female share of managers across all levels of the firm using annual data from Bloomberg in a model with firm and year fixed effects. As shown in Figure 4 (second row) and Appendix Table A13 (column 2), the estimated effects of the quota are even smaller on this broader measure of female representation in management, corresponding to a reduction of 0.36 percentage points in the German sample and an increase in 0.09 percentage points in the European sample.

The lack of any measurable impact of the quota on diversity outside of the top executive team could result from the new female executives making similar decisions to the male executives they replace, but there are also reasons to believe these outcomes might not be immediately affected. If female leaders help promote other women into and up the management ranks by mentoring and advising and providing opportunities for career growth, then increases in the broader female share of managers will take time. The effects may also be hard to detect within firms if some of the junior women who benefit from the improved growth opportunities end up leaving the firm and working at an unaffected firm.

To distinguish between these possibilities, we examine firms' adoption of seven policies that are thought to foster women's career advancement. Since these policies are relatively flexible in the short run, we would expect to see them adjusted well before women's realized share of management positions changes. We study the following policies: (1) publicly communicating an action plan for increasing female representation in the company's leadership; (2) publicly communicating an action plan to close the company's gender pay gap; (3) having a flexible workplace policy that offers employees some option to control their work timing (e.g., "flextime") or location (e.g., work from home), excluding COVID-19 related policies; (4) having an employee resource group for women; (5) offering back-up family care to help workers fill gaps in their usual care arrangements; (6) requiring all workers to complete annual training against sexual harassment; and (7) offering all workers training on unconscious and implicit bias and strategies to address discrimination. We observe the policies annually and again use Equation (1) to estimate difference-in-differences models that include firm and year fixed effects. The results are reported in Figure 4 and Appendix Table A13.

The estimates are positive for some outcomes, negative for others, and some are inconsistent across the two samples. None are precisely estimated. Across the 14 treatment-effect estimates for the seven different policies (with two samples each), only one, for flexible workplace policies using the German control firms, is significant at the 10 percent level. This is not more than would be expected by chance. Bloomberg observes this outcome for only 33 of the German comparison firms, and we obtain a much smaller estimate in the pan-European sample of similarly sized firms. We therefore conclude that the quota did not immediately increase female career progression in management and had little effect on firms' adoption of policies and programs that are thought to benefit female workers.

This finding and the findings in the prior section—that the quota did not significantly alter executive team sourcing or experience, and that women in top roles often hold less influential positions—together imply that the quota likely had minimal effect on firm performance. We test this hypothesis empirically in the next section.

VI. Did the Quota Affect Firm Performance?

We finally examine whether the quota affected firm value and performance. We begin by estimating the impact of the quota's announcement on targeted companies' stock market valuation, which reflects the market's assessment of the present discounted value of the company's future cash flows. In standard asset-pricing theory, capital markets incorporate all available information into security prices. Following this premise, we study how the quota affects firm value by quantifying the impact of the quota's announcement on the firms' stock returns. Finance scholars have developed the event-study methodology to perform this type of analysis using returns data. Although this approach is commonly applied to estimate the value effects of gender quotas for supervisory boards (e.g., Allen and Wahid 2024, Eckbo et al. 2022, Ahern and Dittmar 2012), its reliance on investors' expectations means measured announcement returns can be downward biased if investors harbor systemic biases against female top executives (Wolfers 2006).

We compare the excess stock returns of companies targeted by the quota to those of the comparison companies in Germany and elsewhere in Europe on the days surrounding the quota's announcement on November 20, 2020. On that day, the governing coalition of Germany announced an agreement between the Christian Democratic Union and the Social Democratic Party (SPD) to introduce the mandatory gender quota for top executives in parity-codetermined

companies with four or more members on their executive board.[28] After the agreement was announced, there was little remaining uncertainty about the likelihood of the quota's passage.

To mitigate issues related to the cross-correlation of stock returns (see Eckbo et al. 2022), we conduct the analysis on portfolios of targeted and comparison firms, rather than on data for the individual firms themselves. For each portfolio, we calculate the average daily excess stock return over the yield on 3-month U.S. Treasury securities, weighted using firms' previous day market capitalization, for each day from a calendar year before the announcement through the event window.

We regress the excess total return including dividends r_{pd} of portfolio p on date d on an indicator for the portfolio containing firms targeted by the quota interacted with indicators for the three days around the announcement, D_s, where s indexes the trading day relative to the announcement. We examine daily returns over a three-day event window, starting on $s = -1$, the trading day before the agreement was announced:

$$(4) \qquad r_{pd} = \sum_{s=-1}^{1} \alpha_s \, Targeted_p \times (D_s)_d + \sum_{s=-1}^{1} \gamma_s (D_s)_d + \delta_1 \, Targeted_p + \delta_0 + \psi_{pd}$$

We then compute the cumulative abnormal excess return as the sum of α_s. Table 9 reports these sums and their standard errors, computed using the delta method.

[28] Before the agreement, SPD's calls for a quota were resisted by other coalition members. SPD Federal Ministers Giffey (Minster for Family, Senior Citizens, Women, and Youth) and Lambrecht (Minster of Justice and Family Affairs) originally called for a quota in a Press Release on June 10, 2020, that announced the Federal Cabinet's adoption of two government reports on gender representation in top management in the public and private sectors and that characterized the reports' findings as showing that "only fixed quotas work" (BMFSFJ 2020a). On that same day, amid concerns about a potential second wave of coronavirus infections and renewed lockdowns, the Federal Reserve released a bleak forecast projecting a 6.5% contraction in real GDP for 2020 and an unemployment rate of 9.3% by year-end, leading stock markets to suffer their worst single-day drop in nearly three months. Because the press release coincided with this aggregate shock, it does not provide a clean event to isolate investor reactions to news about a potential quota. The same concern applies to October 28, 2020, when escalating pandemic concerns and the potential for new restrictions to curb the virus's spread led to fears of a double-dip recession and to stock markets suffering their worst day since the drop in June. That same day happens to be when the German government published an evaluation report showing that the requirement for firms to set nonbinding targets for female executive representation had limited impact (BMFSFJ 2020b), making further regulation more likely.

The estimates differ in sign and are statistically indistinguishable from zero. Compared with other German companies, quota-targeted firms show an estimated cumulative excess return of −44 basis points (standard error = 57 bps; column 1). In the comparison with large firms across Europe, the estimate is +29 basis points (standard error = 55 bps; column 3). Neither estimate is statistically significant. Overall, we find no statistically significant evidence of a market reaction to the quota announcement.

The lack of a measurable effect in the full sample could mask heterogeneity, as the quota is likely to have a greater immediate impact on firms that do not have any top female executives in place and would need to hire one to comply. Indeed, we find above that these firms add the most women post-quota (see Table 4). We therefore estimate an expanded version of Equation (4) that allows stock-market responses to differ by whether a firm had a female top executive when the quota was announcement. For each estimation sample, we form four portfolios by splitting the targeted-firm and comparison-firm portfolios according to whether the firm had at least one female top executive on November 20, 2020. We then estimate a model with separate announcement effects for firms with and without female presence by triple-interacting indicators for female presence and absence with the targeted-firm portfolio indicator and with indicators for each trading day in the [-1, +1] window. The expanded model also includes the female presence main effect and its pairwise interactions with the targeted-firm-portfolio indicator and each event-day indicator. The estimates are reported in columns 2 (for the German sample) and 4 (for the pan-European sample) of Table 9.

In both samples, we find positive point estimates of the effect of the quota's announcement on targeted firms without female top executives. The estimate in column 2 for the German sample indicates an increase of 20 basis points that is not statistically distinguishable from zero, while the

estimate in column 4 for the pan-European sample shows an increase of 101 basis points that is statistically significant at the 10-percent level. We find statistically insignificant point estimates for the effect on targeted firms that already have a female top executive in place, which vary in sign between the German (–49 basis points) and pan-European (+14 basis points) samples. In neither sample is the difference between the pairs of estimates (for targeted firms with and without female top executives) statistically significant ($p = 0.39$ in the German sample, and $p = 0.26$ in the pan-European sample). These findings suggest that investors did not view the quota's announcement as particularly harmful to the firms most affected by it, relative to either untargeted firms or other targeted firms that were less exposed because they already had women among their top executives.[29]

Stock market event study analysis relies on the researcher identifying dates when news reaches the market. The absence of a detectable reaction to the quota's announcement suggests that investors expected firms to recruit qualified women without materially affecting performance. However, it is also possible that the market had already priced the quota into valuations on an earlier date that we have not identified. To analyze stock price effects without relying on specific dates of information diffusion, we examine quarterly market value scaled by assets (Tobin's Q) using the difference-in-differences approach described in Section 3. Specifically, we estimate a version of Equation (1) that examines quarterly Tobin's Q instead of monthly executive outcomes. The variable *Post* again measures differential effects on quota-targeted firms after the announcement date. The estimates are reported in the first two columns of Table 10.

The results do not reveal significant effects of the quota on firm value. The estimated

[29] We reach similar conclusions when we control for other potential shocks using movements in other asset prices: the FTSE Europe Excess Return and its two lags (Appendix Table A14) or the factors from the Fama-French five-factor model (Appendix Table A15). In both analyses, we allow for these returns and factors to have a different relation with each portfolio.

effects on Tobin's Q are positive relative to both German (0.042; column 1) and European (0.015; column 2) controls, but neither is statistically significant. Relative to the sample mean of about 1.8, these magnitudes are economically negligible, amounting to changes of less than 2.5 percent. Taken together with the insignificant and inconsistently signed announcement-effect estimates in Table 9, the evidence suggests that the quota did not harm firm value.

A direct analysis of firm performance aligns with this interpretation. Unlike stock value, which reflects the market's *expectations* of future profitability, operating profits capture *realized* current performance. The latter two columns of Table 10 report estimated effects of the quota on firms' quarterly operating profits scaled by book assets. The $Targeted_j \times Post_t$ coefficients again differ in sign across the two samples and are statistically indistinguishable from zero at conventional levels.

To ensure comparability across firms and time periods, the estimation samples for the analysis reported in Table 10 are restricted to quarterly report filings. As shown in Appendix Table A16, the results remain unchanged when we expand the sample to also include annual and semi-annual reports (that are not filed in the same period as a quarterly report, to avoid duplication). In all models, we account for the different periodicities by controlling for the reporting frequency and its interaction with indicators for reporting quarter. We also adjust operating profits from annual or semi-annual reports to quarterly equivalents by dividing by four or two, respectively. The absence of any detectable effects on the value or profitability of targeted firms is also robust to adding controls for sector-specific trends and firm size (using log assets), as shown in Appendix Table A17.

The absence of any operating profit impact from the German quota for top executives contrasts with the significant negative effects of supervisory board quotas documented in Norway,

France, and Spain (Matsa and Miller 2013, Comi et al. 2020, Eckbo et al. 2022). This difference may reflect the distinct nature of the quotas or the contexts in which they were adopted. It is also possible that changes introduced by new female top executives will influence profits only over time—beyond the horizon covered by our data—whereas the effects of supervisory board quotas are more immediate.

VII. Conclusion

Women have long been underrepresented in corporate leadership, and increases have been slow. Policymakers unsatisfied with the slow pace of change have recently employed a novel tool to push corporations to add women to their executive ranks: gender quotas for managers. We study the first of these, announced in November 2020, which targets top executives in Germany. Since then, France has imposed gender quotas on top managerial positions in corporations with 1,000 or more employees, requiring 30% female representation by 2026 and 40% by 2029.

We estimate that, within three years of its announcement, the German quota increased the female share of corporate executives at targeted firms by two-thirds, with the largest increases at firms where the quota was immediately binding. The targeted firms primarily recruited new female executives from outside the company and its leaders' professional networks, selecting these women in place of external male candidates with whom they also lacked connections. Before the quota, firms overwhelmingly opted for men when hiring executives from outside of their leaders' professional networks. But when facing the quota, targeted firms passed over some of these unconnected male candidates in favor of similarly unconnected women.

Despite these changes in firms' executive teams, we find no evidence that the quota materially affected targeted firms' performance. To date, financial statements show no discernible impact on profitability. Market valuations were likewise unaffected.

The lack of any valuation or profitability effects could be related to how firms complied: the quota forced firms to meaningfully diversify their top executive teams, but it did not lead them to change the gender of the CEO. The female shares of CEOs, CFOs, COOs, and divisional leaders did not detectably increase. Rather, targeted firms largely recruited new female executives into more specialized roles, many of which already had greater female representation before the quota, most prominently in human resources and labor relations.

The mandatory gender quota was not the German government's first attempt to get top companies to hire female executives. In 2015, Germany required top companies to set a target figure for female executives. These companies were required to report annually whether they had met their target or explain why not (so called "comply or explain"). To create systems conducive to advancing women into executive roles, these companies were even required to have at least 30% women on their supervisory boards. But these policies did not achieve policymakers' stated objectives: only 7.7% of top executives were women, the vast majority of companies (80.7%) had no female top executives at all, and 78.2% of companies set a target figure of zero or no target figure at all (BMFSFJ 2020b; page 76). We find that the mandatory quota for top executives, in contrast, was effective. This pattern of findings is consistent with the limited effects of diversity goals in the federal contractor program (Leonard 1989) and policies aimed at diversifying candidate pools (akin to the "Rooney Rule" used in the NFL; Fershtman and Pavan 2021). Our findings show that hard quotas, focused on hiring outcomes, are more effective than "softer" affirmative action policies.

While our results show that gender quotas can expand diversity in corporate leadership, apparently without hurting firm performance, they also show that firms mainly complied by meeting minimal standards and by appointing women to potentially less powerful roles among top

executive positions. This raises the question of whether the quota was itself consequential or if it had only symbolic effects. While being promoted to the top executive team under the formal dual-board structure is itself a meaningful change in access and responsibilities, an important question for future research is whether these promotions also helped female top executives develop their skills and networks to obtain further promotions, including to CEO positions, at their current firms or elsewhere. Another important consideration is that symbolic gains for female leaders can themselves be significant, particularly if those leaders invest in supporting and mentoring other women in business or if their accomplishments inspire greater ambition among women in later cohorts.

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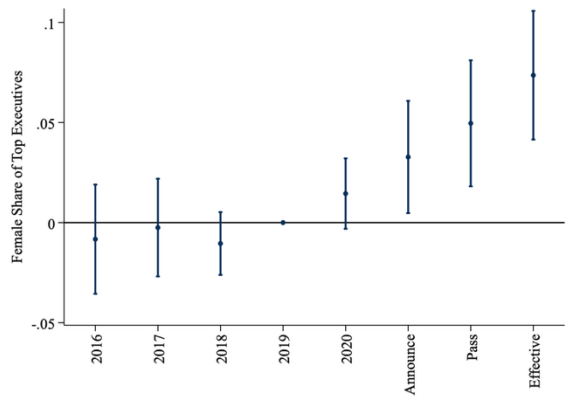
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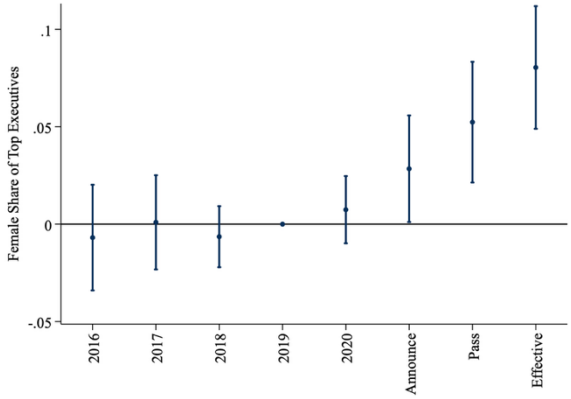
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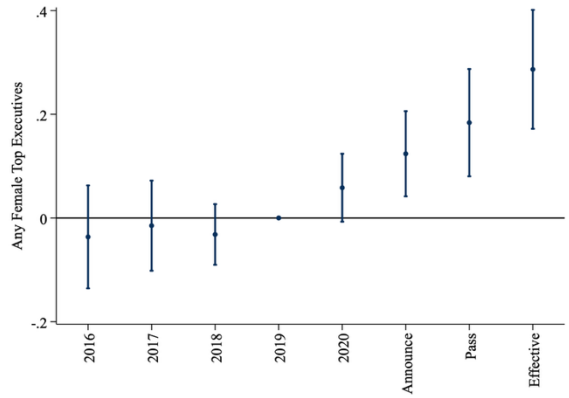
Figure 1: Timing of Changes in Female Representation Among Top Executives Before and After the Quota's Adoption



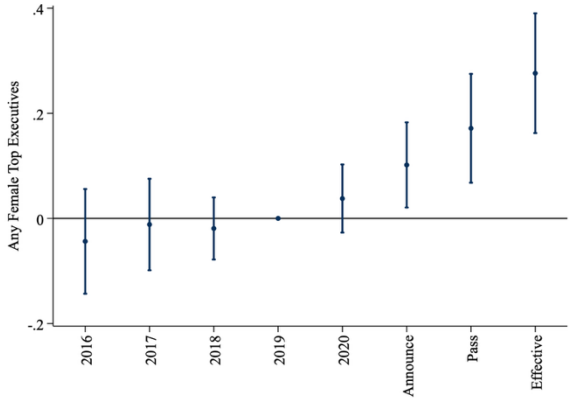
Panel A: German Firms



Panel B: European Firms



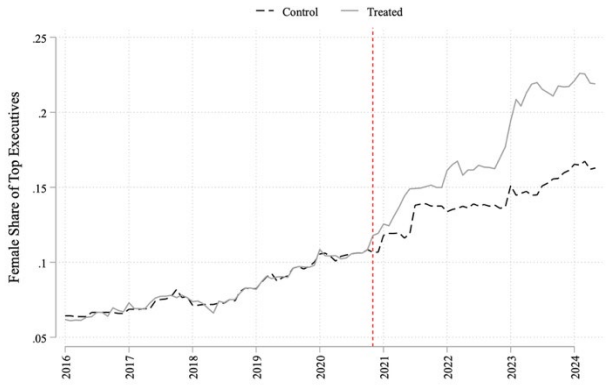
Panel C: German Firms



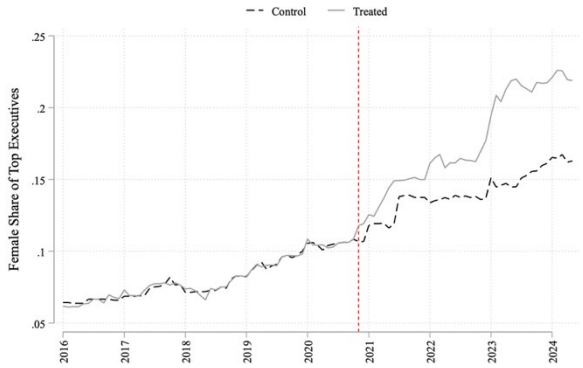
Panel D: European Firms

Notes: The figures plot difference-in-differences estimates and 95% confidence intervals for relative changes in the average share of female top executives in the years before and time periods after the three key quota events (being announced, passed, and taking effect), in Panels A and B, and in the share of companies with any female top executive, in Panels C and D. The models include firm and year fixed effects and use robust standard errors clustered at the firm level. Panels A and C use other German firms as controls, while Panels B and D use large public companies with dual boards across Europe. An observation is a company-month between January 2016 and May 2024.

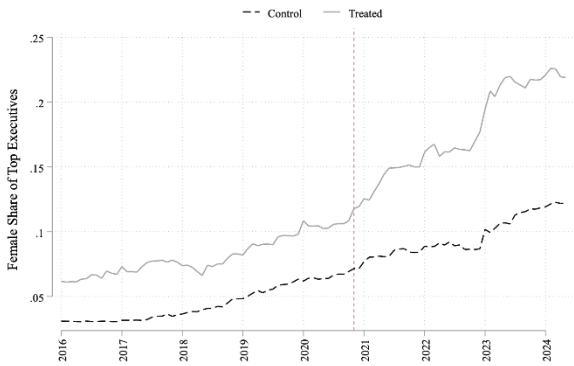
Figure 2: Reweighted Difference-in-Difference Estimates



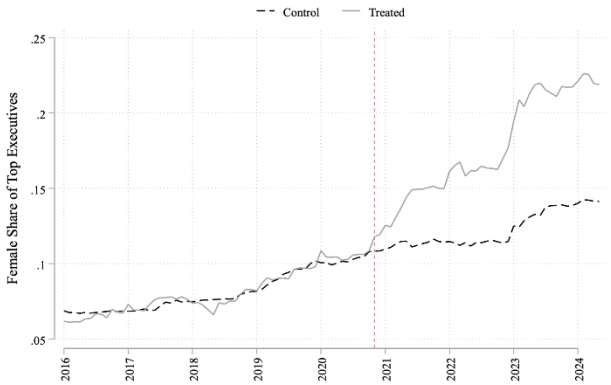
Panel A: Synthetic Controls, German firms



Panel B: Synthetic Controls, European firms



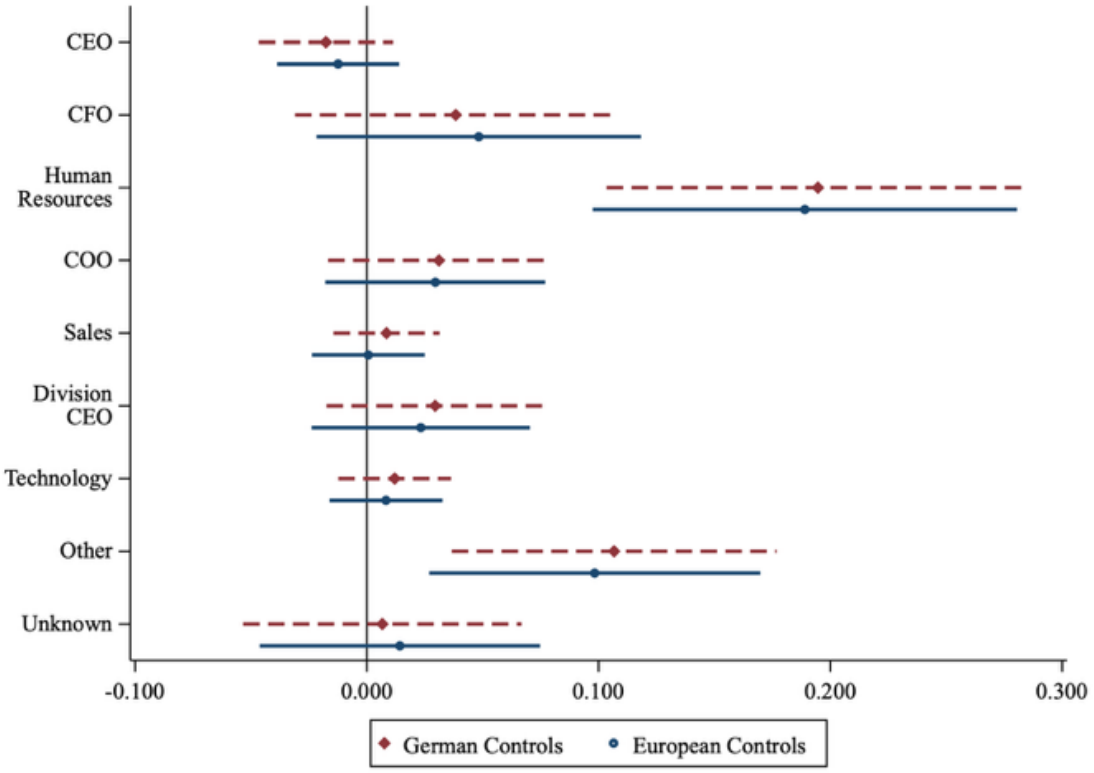
Panel C: Synthetic DID, German firms



Panel D: Synthetic DID, European firms

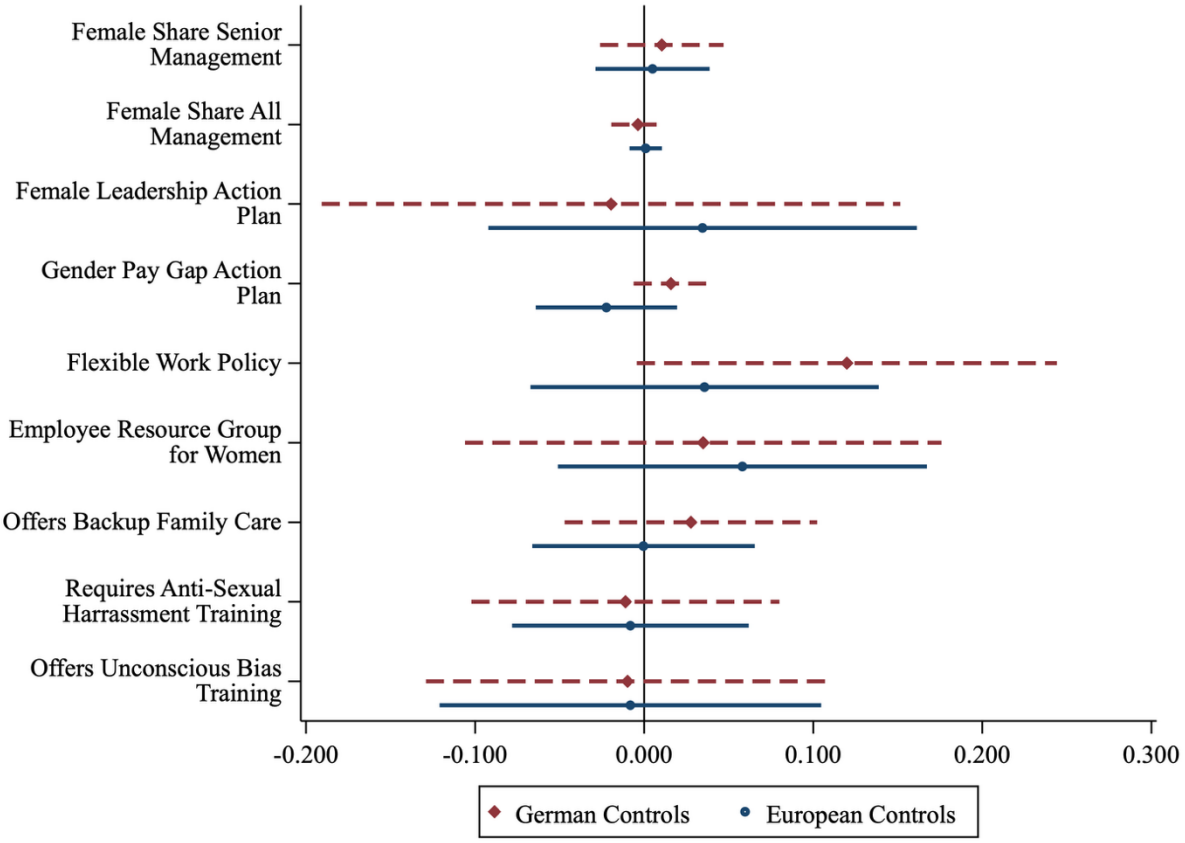
Notes: The figures depict trends in the average female share of top executives on the balanced panel of firms that are present in every month of the sample period from January 2016 and May 2024. The solid grey lines show raw data for targeted firms and the dashed black lines show the weighted averages among control firms, where the weights are computed using pre-quota data. The post period starts after the quota's announcement in November 2020, as depicted by the vertical red line. Panels A and C use weights from synthetic controls (Abadie et al. 2010) that match the levels and trends in the pre-period, while Panels B and D use synthetic differences-in-differences (Arkhangelsky et al. 2021), which only matches on trends. The panels on the left use other German firms as controls, while those on the right use large public companies with dual boards across Europe.

Figure 3: Effects of the Quota on Female Top Executive Presence by Role



Notes: This figure shows the effects of the quota on female top executive presence in different functional roles. Each observation is a company-month between January 2016 and May 2024. Separate regression models are estimated for each outcome variable and for the German (red diamonds) and pan-European (blue circles) samples. The outcomes are indicators for the company having any female top executives with a job title relating to the function listed on the left. The figure plots the coefficient estimates, and 95 percent confidence intervals, for the estimated treatment effect, which is the coefficient on the interaction term between the targeted firm indicator and the indicator for the observation coming after the quota's announcement in November 2020. All models include firm and year fixed effects. Robust standard errors are adjusted for clustering at the firm level.

Figure 4: Effects of the Quota on Female Managers and Corporate Policies



Notes: This figure shows the effects of the quota on the female share in management and on corporate policies. Separate regression models are estimated for each outcome variable and for the German (red diamonds) and pan-European (blue circles) samples. The first outcome, Female Share Senior Management, is computed from BoardEx data. For this outcome, each observation is a company-month between January 2016 and May 2024, the model controls for firm and month fixed effects, and the post-quota period starts in December 2020. The remaining outcome variables are from Bloomberg. The first is a measure of the female share among managers across all hierarchical levels, while the rest are indicators for the company having in place various policies and programs to support female employees. For these outcomes, each observation is a firm-year between 2020 and 2023, the model controls for firm and year fixed effects, and the post-quota period starts in 2021. The figure plots the coefficient estimates, and 95 percent confidence intervals, for the estimated treatment effect, which is the coefficient on the interaction term between the targeted firm indicator and the indicator for the observation coming in the post-quota period. Robust standard errors are adjusted for clustering at the firm level.

Table 1. Summary statistics

	2019			2023		
Sample:	Targeted	Control Germany	Control Europe	Targeted	Control Germany	Control Europe
Mean:						
Female Share of Top Executives	0.09	0.05	0.09	0.21	0.10	0.14
Any Female Top Executives	0.46	0.16	0.28	0.87	0.26	0.41
Female CEO	0.04	0.04	0.06	0.03	0.06	0.07
Number of Top Executives	5.50	2.91	3.60	5.56	2.88	3.70
Quarterly Operating Profits/Assets (%)	1.05	0.38	1.15	1.25	0.25	1.21
Tobin's Q	1.41	2.00	1.85	1.28	1.67	1.72
Ln(Assets)	9.79	5.96	7.53	9.90	6.22	7.70
Ln(Market Value)	10.04	6.46	7.95	10.09	6.58	8.07
Total:						
Firms	67	430	546	71	415	484

Notes: Summary statistics are presented for 2019 (the year before the quota's announcement) and 2023 (the last full year of data) on three samples of companies: targeted companies in Germany (large companies with at least 4 top executives on their management board) and two sets of comparison firms (other companies in Germany and large companies across Europe). All firms in the sample are publicly traded and have a dual-board governance structure with a multimember management board. Reported summary statistics are computed after variables are first averaged to the firm-year level (diversity measures are from monthly snapshots and financial measures are from public reports). Number of Top Executives is a count; Any Female Top Executive and Female CEO are indicators; and the remaining variables are continuous. The return on assets (Quarterly Operating Profits/Assets) is presented in percent form to ease readability.

Table 2. Effects of the Quota on Female Representation Among Top Executives

	Female Share of Top Executives	Any Female Top Executives	Female Share of Top Executives	Any Female Top Executives
	(1)	(2)	(3)	(4)
Targeted * Post	0.058***	0.223***	0.061***	0.212***
	(0.014)	(0.045)	(0.013)	(0.045)
Observations	46,841	46,841	58,312	58,312
Firms	624	624	747	747
R^2	0.098	0.108	0.079	0.089
Dep. Var. Mean	0.073	0.240	0.103	0.343
Fixed Effects				
Month	X	X	X	X
Firm	X	X	X	X
Control group	Germany	Germany	Europe	Europe

Notes: Unit of observation is a firm-month. Values are computed on the first day of the month, and the sample period is January 2016 through May 2024. Estimates are from the model in Equation (1): *Post* indicates observations after the quota's November 2020 announcement and *Targeted* indicates large public companies in Germany with at least four top executives. The within-Germany control group includes other public German companies, while the pan-European control group includes large public companies across Europe. All firms in the sample are publicly traded and operate under a dual-board structure with a multimember management board. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3. Estimated Effects of the Quota on Female Representation with Alternative Specifications

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Female Share of Top Executives						
Targeted * Post	0.0494***	0.0361**	0.0421***	0.0601***	0.0505***	0.0535***
	(0.0147)	(0.0143)	(0.0106)	(0.0138)	(0.0181)	(0.0125)
Model	Fixed Effects	SC	SDID	Fixed Effects	SC	SDID
Control group	Germany	Germany	Germany	Europe	Europe	Europe
Observations	29,391	29,391	29,391	40,198	40,198	40,198
Panel B: Any Female Top Executive						
Targeted * Post	0.189***	0.283***	0.152***	0.188***	0.169***	0.159***
	(0.0478)	(0.0601)	(0.0393)	(0.0464)	(0.0547)	(0.0444)
Model	Fixed Effects	SC	SDID	Fixed Effects	SC	SDID
Control group	Germany	Germany	Germany	Europe	Europe	Europe
Observations	29,391	29,391	29,391	40,198	40,198	40,198

Notes: Columns 1 and 4 report treatment effects from OLS models with firm and month fixed effects (as in Table 2), estimated on a balanced panel of observations from firms with data available in every month from January 2016 through May 2024. Columns 2 and 5 report synthetic controls (SC) estimates (Abadie et al. 2010), and Columns 3 and 6 report synthetic difference-in-differences (SDID) estimates (Arkhangelsky et al. 2021). Standard errors, reported in parentheses, are adjusted for clustering at the firm level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Effects of the Quota on the Gender of New Top Executive Appointments

	Woman Appointed					
	(1)	(2)	(3)	(4)	(5)	(6)
Targeted * Post	0.221***			0.269***		
	(0.061)			(0.052)		
No Female * Targeted * Post		0.397***	0.395***		0.435***	0.429***
		(0.079)	(0.078)		(0.075)	(0.075)
Has Female * Targeted * Post		0.0277	0.0409		0.165***	0.167***
		(0.077)	(0.078)		(0.062)	(0.061)
No Female	0.206***	0.291***	0.279***	0.161***	0.181***	0.185***
	(0.053)	(0.057)	(0.057)	(0.031)	(0.032)	(0.033)
No Female * Targeted	0.189***	-0.00900	0.00625	0.207***	0.0861	0.0817
	(0.072)	(0.085)	(0.087)	(0.063)	(0.074)	(0.074)
No Female * Post	0.171***	0.0337	0.0462	0.180***	0.133***	0.131***
	(0.052)	(0.063)	(0.065)	(0.037)	(0.041)	(0.042)
Female Share Senior Leadership			0.131			0.145**
			(0.083)			(0.068)
Female Share Supervisory			0.227			0.165
			(0.147)			(0.119)
Pr(Equal Effects)		< 0.001	0.001		0.003	0.004
Observations	1,628	1,628	1,492	2,603	2,603	2,550
Firms	446	446	396	587	587	579
R^2	0.227	0.235	0.243	0.130	0.133	0.138
Dep. Var. Mean	0.162	0.162	0.168	0.178	0.178	0.177
Fixed Effects						
Month	X	X	X	X	X	X
Firm	X	X	X	X	X	X
Control Group	Germany	Germany	Germany	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. The outcome variable is an indicator for the new top executive being female. Estimates in columns 1 and 4 are from the model in Equation (2) while those in other columns are from the model in Equation (3). *Post* indicates observations after the quota's November 2020 announcement, *Targeted* indicates large public companies in Germany with at least four top executives, and *No Female* and *Has Female* indicate whether the company has at least one female top executive at the start of the month prior to the focal appointment's start date. The variables for female share of senior leaders below the top-executive level and for the female share of non-executive supervisory board members are calculated as of the start of the prior month. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 5. Effects of the Quota on New Top Executive Appointments by Source Inside or Outside the Firm

	Female		Male		Any	Female		Male		Any
	Inside	Outside	Inside	Outside	Inside	Inside	Outside	Inside	Outside	Inside
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.139**	0.257***	-0.160**	-0.237**	-0.020	0.148**	0.287***	-0.169**	-0.266***	-0.021
	(0.064)	(0.077)	(0.076)	(0.095)	(0.088)	(0.065)	(0.074)	(0.071)	(0.090)	(0.086)
Has Female * Targeted * Post	0.061	-0.034	-0.013	-0.015	0.049	0.020	0.145***	-0.003	-0.162*	0.017
	(0.046)	(0.069)	(0.088)	(0.096)	(0.088)	(0.037)	(0.055)	(0.066)	(0.084)	(0.073)
Observations	1,628	1,628	1,628	1,628	1,628	2,603	2,603	2,603	2,603	2,603
Firms	446	446	446	446	446	587	587	587	587	587
R^2	0.128	0.200	0.109	0.157	0.115	0.081	0.104	0.053	0.085	0.054
Dep. Var. Mean	0.041	0.121	0.203	0.635	0.244	0.047	0.131	0.231	0.592	0.277
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. Estimates are from the model in Equation (3). The outcome variables are indicators for the new top executive being a female insider (someone who was promoted internally from a senior leadership position within the firm) in columns 1 and 6; a female outsider (someone without such a prior position) in columns 2 and 7; a male insider in columns 3 and 8; a male outsider in columns 4 and 9; or any insider of either gender in columns 5 and 10. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table 6. Effects of the Quota on New Top Executive Appointments of Connected and Unconnected Outsiders

	Female		Male		Any	Female		Male		Any
	Connected	Unconnected	Connected	Unconnected	Connected	Connected	Unconnected	Connected	Unconnected	Connected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.077	0.187**	-0.019	-0.233**	0.058	0.071	0.224***	0.001	-0.275***	0.072
	(0.050)	(0.077)	(0.084)	(0.098)	(0.099)	(0.049)	(0.074)	(0.076)	(0.093)	(0.091)
Has Female * Targeted * Post	-0.038	0.018	0.095	-0.092	0.057	0.058	0.078	-0.082	-0.051	-0.024
	(0.047)	(0.066)	(0.099)	(0.098)	(0.101)	(0.038)	(0.052)	(0.069)	(0.076)	(0.075)
Observations	1,571	1,571	1,571	1,571	1,571	2,430	2,430	2,430	2,430	2,430
Firms	437	437	437	437	437	568	568	568	568	568
R^2	0.110	0.182	0.122	0.146	0.118	0.070	0.104	0.065	0.079	0.060
Dep. Var. Mean	0.041	0.08	0.225	0.412	0.266	0.055	0.076	0.252	0.336	0.307
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. Estimates are from the model in Equation (3). The outcome variables are indicators for the new top executive being a female connected outsider (an outsider who had a prior network connection with a prior top executive at the firm) in columns 1 and 6; a female unconnected outsider (an outsider who lacked such a connection) in columns 2 and 7; a male connected outsider in columns 3 and 8; a male unconnected outsider in columns 4 and 9; or a connected outsider of either gender in columns 5 and 10. The sample is limited to appointments for which data are available on network connections with prior firm leaders. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table 7. Effects of the Quota on New Top Executive Appointments by Prior Top Executive Experience at a Public Company

	Female		Male		Any	Female		Male		Any
Prior Top Executive	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.038	0.357***	-0.045	-0.350***	-0.007	0.035	0.393***	-0.075	-0.353***	-0.040
	(0.034)	(0.084)	(0.076)	(0.092)	(0.080)	(0.034)	(0.081)	(0.069)	(0.080)	(0.073)
Has Female * Targeted * Post	0.007	0.034	-0.057	0.017	-0.051	-0.003	0.187***	-0.065	-0.119	-0.068
	(0.029)	(0.082)	(0.068)	(0.105)	(0.075)	(0.027)	(0.059)	(0.051)	(0.076)	(0.059)
Observations	1,606	1,606	1,606	1,606	1,606	2,527	2,527	2,527	2,527	2,527
Firms	445	445	445	445	445	584	584	584	584	584
R^2	0.136	0.203	0.090	0.147	0.075	0.081	0.127	0.054	0.090	0.050
Dep. Var. Mean	0.017	0.144	0.155	0.684	0.172	0.022	0.155	0.157	0.665	0.18
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. Estimates are from the model in Equation (3). The outcome variables are indicators for the new top executive being a woman with prior top executive experience at a public company in columns 1 and 6; a woman without such experience in columns 2 and 7; a man with such experience in columns 3 and 8; a man without such experience in columns 4 and 9; or a person of either gender with such experience in columns 5 and 10. The sample is limited to appointments for which data are available on prior work histories. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8. Effects of the Quota on Counts of Top Executives by Gender

	Number of Top Executives		Number of Female Top Executives		Number of Male Top Executives	
	(1)	(2)	(3)	(4)	(5)	(6)
Targeted * Post	0.137	0.083	0.380***	0.348***	-0.243**	-0.265**
	(0.109)	(0.111)	(0.064)	(0.065)	(0.111)	(0.112)
Observations	46,841	58,312	46,841	58,323	46,841	58,312
Firms	624	747	624	747	624	747
R^2	0.005	0.006	0.145	0.097	0.022	0.012
Dep. Var. Mean	3.280	3.865	0.280	0.445	3.000	3.421
Fixed Effects						
Month	X	X	X	X	X	X
Firm	X	X	X	X	X	X
Control group	Germany	Europe	Germany	Europe	Germany	Europe

Notes: Unit of observation is a firm-month. Estimates are from the model in Equation (1). The outcome in the first two columns is the total count of top executives on the first day of the month. The later columns examine counts of female (columns 3 and 4) and male (columns 5 and 6) top executives. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9. Stock Market Event Study of Excess Returns Associated with Quota's Announement

	(1)	(2)	(3)	(4)
Targeted * Announcement	-0.0044		0.0029	
	(0.0057)		(0.0055)	
No Female * Targeted * Announcement		0.0020		0.0101*
		(0.0054)		(0.0054)
Has Female * Targeted * Announcement		-0.0049		0.0014
		(0.0060)		(0.0056)
p -value for difference in coefficients		0.387		0.260
Observations	518	1,036	518	1,036
Firms	447	447	576	576
R^2	0.001	0.002	0.001	0.001
Fixed Effects				
Announcement	X	X	X	X
Targeted	X	X	X	X
No Female		X		X
No Female * Announcement		X		X
No Female * Targeted		X		X
Control Group	Germany	Germany	Europe	Europe

Notes : Results from stock market event study analysis of the announcement, on November 20, 2020, of the German coalition government's agreement to introduce a gender quota for top executives. Estimates are from the model in Equation (4). The outcome variable is the average cumulative stock return in excess of the three-month Treasury bill rate over the three trading days around the announcement (i.e., from the day before to the day afterwards). Each observation is a daily return on a stock portfolio, whose component firms are weighted by their market capitalization on the previous day. Models in columns 1 and 3 include portfolios for targeted and comparison firms, while those in columns 2 and 4 have separate portfolios, within targeted and comparison firms, based on whether the firm had any female top executives at the time of the announcement. The estimation sample starts one year before the announcement. Robust standard errors are reported in parentheses.

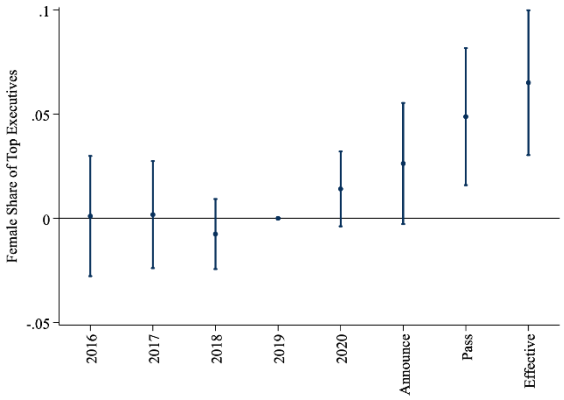
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 10. Effects of the Quota on Firm Value and Profits

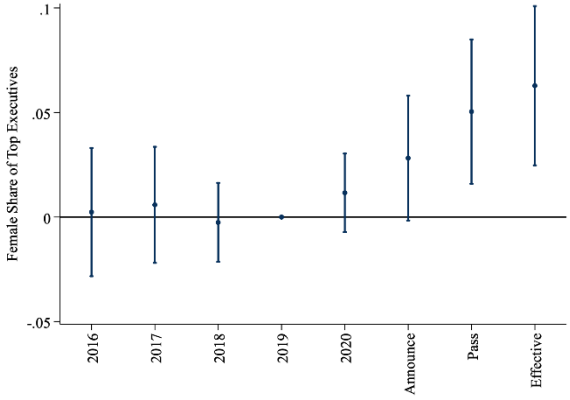
	Tobin's Q		Quarterly Profits / Assets	
	(1)	(2)	(3)	(4)
Targeted * Post	0.042	0.015	0.0005	-0.00003
	(0.084)	(0.068)	(0.0019)	(0.0017)
Observations	7,682	12,540	7,682	12,540
Firms	287	458	287	458
R^2	0.093	0.070	0.032	0.028
Dep. Var. Mean	1.817	1.756	0.0099	0.0141
Fixed Effects				
Quarter	X	X	X	X
Firm	X	X	X	X
Control group	Germany	Europe	Germany	Europe

Notes: Unit of observation is a firm-quarter. Estimates are from the model in Equation (1). The outcome variable in columns 1 and 2 is the ratio of the firm's market value to the book value of its assets (Tobin's Q) at the time of its quarterly financial report. In columns 3 and 4, it is the ratio of the firm's quarterly operating profit to the book value of its assets. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

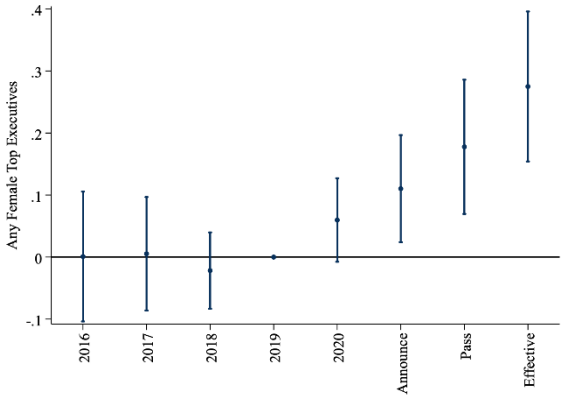
Appendix Figure A1: Changes in Female Representation Among Top Executives Before and After the Quota's Adoption, Comparison to More Prominent Companies



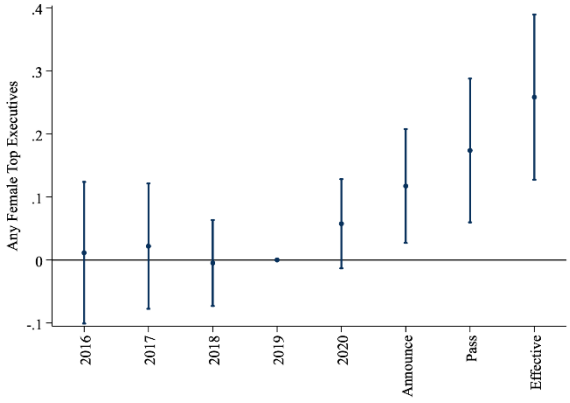
Panel A: Prominent German Firms



Panel B: Prominent European Firms



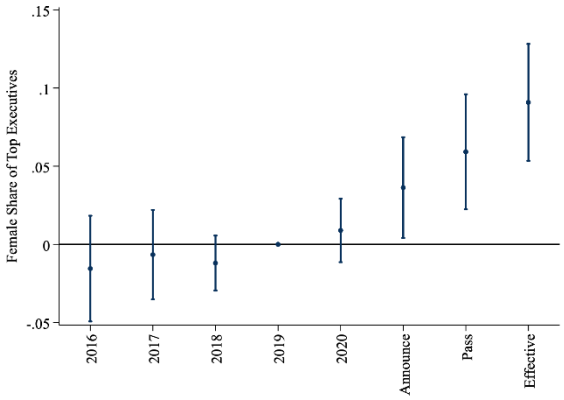
Panel C: Prominent German Firms



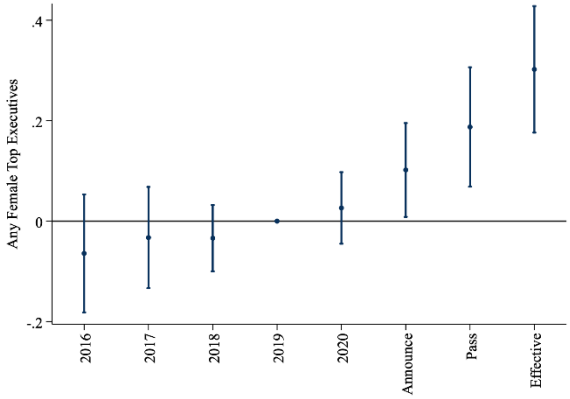
Panel D: Prominent European Firms

Notes: The figures plot estimates from analysis similar to that reported in Figure 1 of the paper, except that the samples of comparison firms are limited to companies listed in a stock market index.

Appendix Figure A2: Changes in Female Representation Among Top Executives Before and After the Quota's Adoption, Comparison to Large Public Companies in Austria and Poland



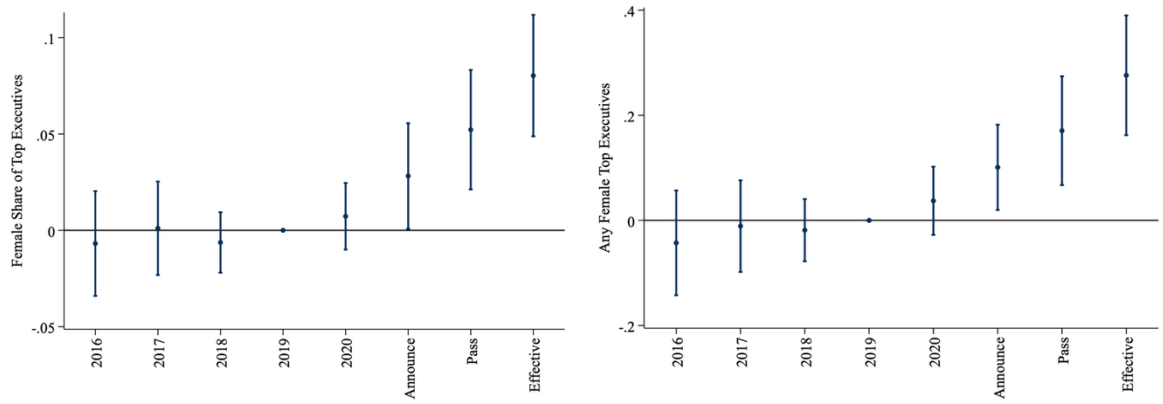
Panel A: Female Share



Panel B: Any Female

Notes: The figures plot estimates from analysis similar to that reported in Panels B and D of Figure 1 of the paper, except that the comparison firms are large public companies in Austria and Poland, where it is standard for listed companies to have dual boards.

Appendix Figure A3: Timing of Changes in Female Representation Among Top Executives Before and After the Quota's Adoption, Excluding French Firms

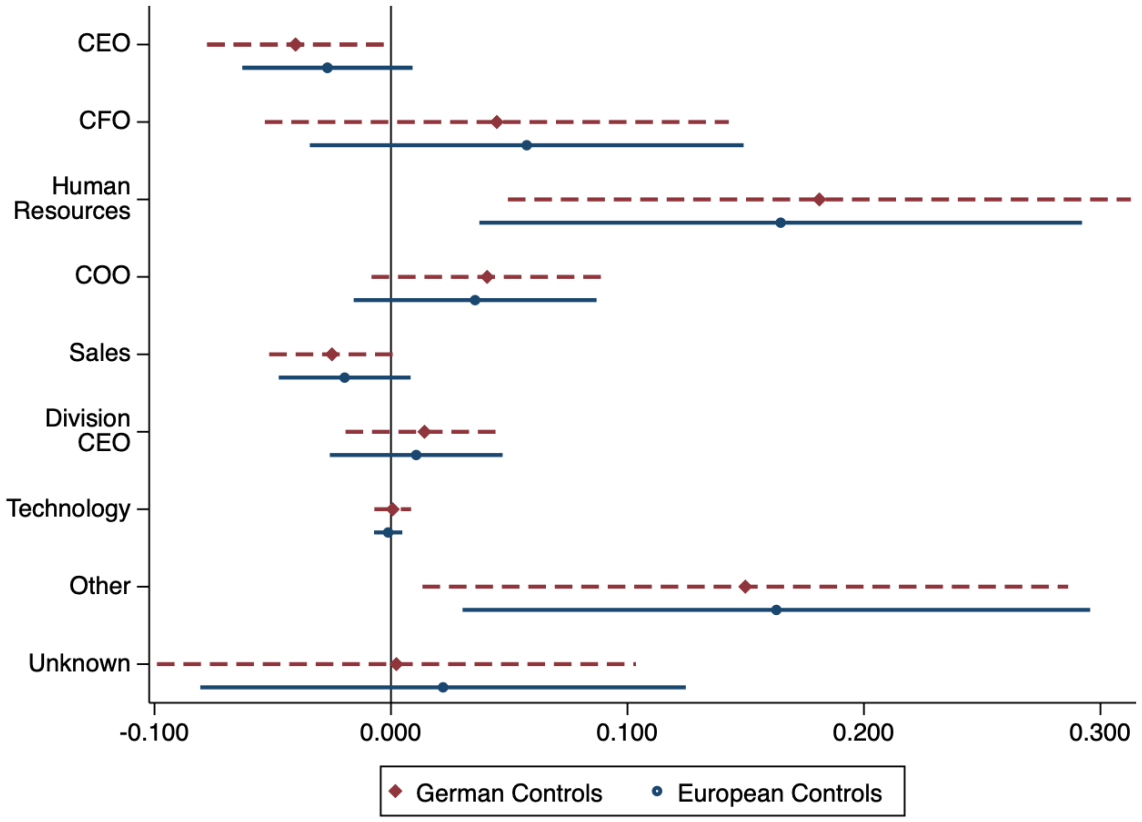


Panel A: Female Share

Panel B: Any Female

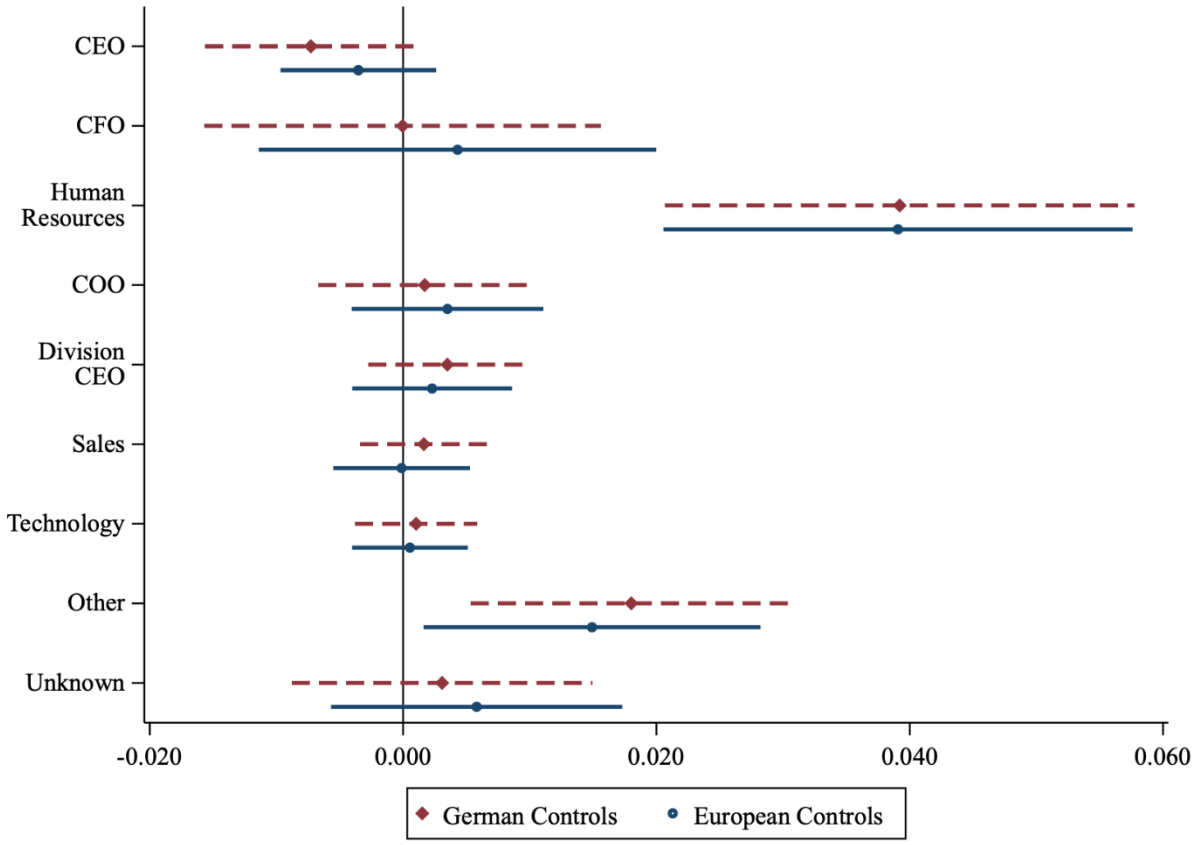
Notes: The figures plot estimates from analysis similar to that reported in Panels B and D of Figure 1 of the paper, except that the comparison firms exclude those in France, which adopted a quota for top executives soon after the German quota.

Appendix Figure A4: Effects of the Quota on New Female Top Executive Appointments by Role



Notes: This figure shows the effects of the quota on the likelihood that newly appointed top executives are female and serving in different functional roles. Each observation is a new top executive appointment between January 2016 and May 2024. Separate regression models are estimated for each outcome variable, corresponding to the functional role listed on the left, and for the German (red diamonds) and pan-European (blue circles) samples. The figure plots the coefficient estimates, and 95 percent confidence intervals, for the estimated treatment effect, which is the coefficient on the triple interaction term between the affected firm indictor, the indicator for the observation coming after the quota's announcement in November 2020, and the indicator for the firm having no other female top executives in place. All models include firm and year fixed effects. Robust standard errors are adjusted for clustering at the firm level.

Appendix Figure A5: Effects of the Quota on Female Share of Top Executives by Role



Notes: This figure shows the effects of the quota on the female share, among top executives who serve in different functional roles. The analysis is similar to Figure 3 of the paper, except that the outcome variable is the female share of top executives in the role instead of an indicator for any female representation.

Table A1. Timing of the Effects of the Quota on Female Representation Among Top Executives

	Female Share of Top Executives		Any Female Top Executives	
	(1)	(2)	(3)	(4)
Targeted * Period Post Announcement	0.0330**	0.0277**	0.123***	0.103**
	(0.0140)	(0.0136)	(0.0417)	(0.0413)
Targeted * Period Post Passage	0.0512***	0.0536***	0.190***	0.179***
	(0.0156)	(0.0153)	(0.0513)	(0.0513)
Targeted * Post Effective Date	0.0750***	0.0815***	0.292***	0.284***
	(0.0152)	(0.0148)	(0.0535)	(0.0532)
Observations	46841	58312	46841	58312
Firms	624	747	624	747
R^2	0.100	0.081	0.112	0.092
Dep. Var. Mean	0.0734	0.103	0.240	0.343
Fixed Effects				
Month	X	X	X	X
Firm	X	X	X	X
Control group	Germany	Europe	Germany	Europe

Notes: Estimates in this table are from the same model as those in Table 2, except here the post period is split into three parts: following the announcement, following the passage, and following the effective date of the quota. Robust standard errors clustered at the firm level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A2. Effects of the Quota on the Gender of Top Executive Appointments

	Woman Appointed					
	(1)	(2)	(3)	(4)	(5)	(6)
Targeted * Post	0.122**			0.141***		
	(0.050)			(0.044)		
No Female * Targeted * Post		0.280***	0.285***		0.283***	0.281***
		(0.073)	(0.072)		(0.074)	(0.074)
Has Female * Targeted * Post		-0.032	-0.062		0.064	0.062
		(0.058)	(0.060)		(0.050)	(0.050)
No Female	0.0719*	0.144***	0.158***	0.082***	0.099***	0.103***
	(0.044)	(0.044)	(0.045)	(0.027)	(0.028)	(0.028)
No Female * Targeted	0.106*	-0.055	-0.069	0.076	-0.015	-0.018
	(0.061)	(0.069)	(0.072)	(0.052)	(0.060)	(0.059)
No Female * Post	0.109**	-0.002	-0.033	0.110***	0.072**	0.065*
	(0.044)	(0.049)	(0.051)	(0.031)	(0.034)	(0.034)
Female Share Senior Leadership			0.135**			0.150**
			(0.067)			(0.059)
Female Share Supervisory			0.225**			0.069
			(0.108)			(0.089)
Pr(Equal Effects)		< 0.001	< 0.001		0.008	0.009
Observations	2,542	2,542	2,334	3,886	3,886	3,810
Firms	476	476	417	631	631	623
R^2	0.105	0.111	0.118	0.059	0.062	0.065
Dep. Var. Mean	0.142	0.142	0.147	0.158	0.158	0.158
Fixed Effects						
Month	X	X	X	X	X	X
Firm	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Europe	Europe	Europe

Notes: Unit of observation is a top executive appointment. The sample of appointments includes both new top executives (examined in Table 4) and new roles for continuing top executives. The outcome variable is an indicator for the new top executive being female. The variables No Female, Has Female, Female Share Senior Leadership, and Female Share Supervisory are calculated at the start of the month prior to the focal appointment's start date. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A3. Including Top Executive Appointments with Missing Network Information

	Female		Male		Any	Female		Male		Any
	Connected	Unconnected	Connected	Unconnected	Connected	Connected	Unconnected	Connected	Unconnected	Connected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.070	0.187**	-0.022	-0.215**	0.049	0.074	0.213***	0.009	-0.275***	0.082
	(0.048)	(0.074)	(0.079)	(0.095)	(0.092)	(0.047)	(0.072)	(0.072)	(0.091)	(0.085)
Has Female * Targeted * Post	-0.034	0.000	0.098	-0.113	0.064	0.073**	0.072	-0.058	-0.104	0.016
	(0.045)	(0.063)	(0.095)	(0.095)	(0.098)	(0.035)	(0.048)	(0.059)	(0.071)	(0.063)
Observations	1,628	1,628	1,628	1,628	1,628	2,603	2,603	2,603	2,603	2,603
Firms	446	446	446	446	446	587	587	587	587	587
R^2	0.109	0.182	0.122	0.142	0.118	0.071	0.103	0.061	0.074	0.056
Dep. Var. Mean	0.041	0.08	0.223	0.412	0.264	0.054	0.077	0.248	0.343	0.302
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. The variables are defined similarly to the analysis reported in Table 6, but here the analysis uses the full sample of appointments and treats people with missing connection data as being unconnected. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A4. Including Employment, Educational, and Service Connections

	Female		Male		Any	Female		Male		Any
	Connected	Unconnected	Connected	Unconnected	Connected	Connected	Unconnected	Connected	Unconnected	Connected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.077	0.187**	-0.019	-0.233**	0.058	0.071	0.224***	0.002	-0.275***	0.072
	(0.050)	(0.077)	(0.084)	(0.098)	(0.099)	(0.049)	(0.074)	(0.076)	(0.093)	(0.091)
Has Female * Targeted * Post	-0.038	0.018	0.095	-0.092	0.057	0.058	0.078	-0.077	-0.056	-0.019
	(0.047)	(0.066)	(0.099)	(0.098)	(0.101)	(0.038)	(0.052)	(0.069)	(0.075)	(0.075)
Observations	1,571	1,571	1,571	1,571	1,571	2,430	2,430	2,430	2,430	2,430
Firms	437	437	437	437	437	568	568	568	568	568
R^2	0.110	0.182	0.122	0.146	0.118	0.070	0.104	0.065	0.078	0.060
Dep. Var. Mean	0.0414	0.0796	0.225	0.412	0.266	0.0547	0.0757	0.253	0.335	0.307
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. The outcome variables differ from those in the analysis reported in Table 6 by defining connections using employment, education, or service as an officer or director of a club, organization, or nonprofit. The sample is limited to appointments for which complete data are available on potential network connections. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A5. Limiting Network Connections to Employment Connections

	Female		Male		Any	Female		Male		Any
	Connected	Unconnected	Connected	Unconnected	Connected	Connected	Unconnected	Connected	Unconnected	Connected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.077	0.187**	-0.006	-0.246***	0.071	0.068	0.226***	0.010	-0.283***	0.078
	(0.050)	(0.077)	(0.079)	(0.095)	(0.095)	(0.049)	(0.075)	(0.072)	(0.091)	(0.088)
Has Female * Targeted * Post	-0.038	0.018	0.093	-0.090	0.055	0.056	0.080	-0.083	-0.050	-0.027
	(0.047)	(0.066)	(0.096)	(0.096)	(0.099)	(0.039)	(0.052)	(0.067)	(0.076)	(0.074)
Observations	1,571	1,571	1,571	1,571	1,571	2,430	2,430	2,430	2,430	2,430
Firms	437	437	437	437	437	568	568	568	568	568
R^2	0.110	0.182	0.118	0.150	0.115	0.068	0.103	0.061	0.078	0.057
Dep. Var. Mean	0.041	0.080	0.220	0.418	0.261	0.053	0.077	0.243	0.344	0.296
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. The outcome variables differ from those in the analysis reported in Table 6 by defining connections using only employment. The sample is limited to appointments for which complete data are available on potential network connections. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A6. Limiting Network Connections to the CEO

	Female		Male		Any	Female		Male		Any
	Connected	Unconnected	Connected	Unconnected	Connected	Connected	Unconnected	Connected	Unconnected	Connected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.072	0.192**	-0.046	-0.205**	0.026	0.090*	0.204***	-0.082	-0.191**	0.008
	(0.047)	(0.078)	(0.068)	(0.098)	(0.085)	(0.047)	(0.077)	(0.062)	(0.095)	(0.077)
Has Female * Targeted * Post	0.014	-0.034	0.104	-0.101	0.118	0.042	0.094*	-0.034	-0.098	0.008
	(0.036)	(0.068)	(0.083)	(0.100)	(0.083)	(0.036)	(0.054)	(0.065)	(0.094)	(0.075)
Observations	1,571	1,571	1,571	1,571	1,571	2,430	2,430	2,430	2,430	2,430
Firms	437	437	437	437	437	568	568	568	568	568
R^2	0.101	0.180	0.105	0.140	0.102	0.071	0.097	0.066	0.087	0.065
Dep. Var. Mean	0.030	0.091	0.141	0.496	0.171	0.036	0.094	0.163	0.423	0.200
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. The outcome variables differ from those in the analysis reported in Table 6 by defining connections with respect to only the CEO. The sample is limited to appointments for which data are available on potential network connections with prior firm leaders. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A7. Expanding Network Connections to Include Top Executives and Supervisory Board Members

	Female		Male		Any	Female		Male		Any
	Connected	Unconnected	Connected	Unconnected	Connected	Connected	Unconnected	Connected	Unconnected	Connected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.102*	0.161**	-0.053	-0.199**	0.050	0.104*	0.190***	-0.012	-0.261***	0.092
	(0.058)	(0.073)	(0.095)	(0.087)	(0.108)	(0.055)	(0.073)	(0.090)	(0.082)	(0.102)
Has Female * Targeted * Post	-0.023	0.004	0.082	-0.079	0.058	0.068*	0.068	-0.076	-0.056	-0.009
	(0.049)	(0.061)	(0.106)	(0.094)	(0.104)	(0.037)	(0.050)	(0.077)	(0.069)	(0.080)
Observations	1,571	1,571	1,571	1,571	1,571	2,430	2,430	2,430	2,430	2,430
Firms	437	437	437	437	437	568	568	568	568	568
R^2	0.122	0.179	0.107	0.138	0.106	0.071	0.093	0.066	0.074	0.063
Dep. Var. Mean	0.053	0.068	0.285	0.352	0.338	0.066	0.064	0.323	0.265	0.389
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: : The unit of observation is an appointment of a new top executive. The outcome variables differ from those in the analysis reported in Table 6 by defining connections with respect to either a top executive or a supervisory board member at the firm. The sample is limited to appointments for which data are available on potential network connections with prior firm leaders. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A8. Effects of the Quota on New Top Executive Appointments by Prior Top Executive Experience

	Female		Male		Any	Female		Male		Any
Prior Top Executive	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.185**	0.210**	-0.244***	-0.151*	-0.059	0.197***	0.230***	-0.263***	-0.165*	-0.065
	(0.073)	(0.083)	(0.090)	(0.091)	(0.096)	(0.072)	(0.080)	(0.084)	(0.085)	(0.086)
Has Female * Targeted * Post	0.079	-0.039	0.069	-0.110	0.148	0.099***	0.085	-0.039	-0.144*	0.060
	(0.048)	(0.078)	(0.094)	(0.102)	(0.100)	(0.038)	(0.052)	(0.074)	(0.078)	(0.079)
Observations	1,606	1,606	1,606	1,606	1,606	2,527	2,527	2,527	2,527	2,527
Firms	445	445	445	445	445	584	584	584	584	584
R^2	0.150	0.180	0.114	0.117	0.092	0.073	0.106	0.070	0.069	0.053
Dep. Var. Mean	0.053	0.108	0.364	0.474	0.417	0.062	0.116	0.376	0.447	0.437
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. The outcome variables differ from the analysis reported in Table 7 by defining top executive experience to include positions at public or private companies. The sample is limited to appointments for which data are available on prior work histories. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A9. Effects of the Quota on New Top Executive Appointments by Top Executive or Supervisory Board Experience

	Female		Male		Any	Female		Male		Any
Prior Top Leadership Role	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No Female * Targeted * Post	0.297***	0.098	-0.365***	-0.030	-0.068	0.284***	0.144**	-0.338***	-0.090	-0.054
	(0.076)	(0.071)	(0.086)	(0.073)	(0.084)	(0.073)	(0.068)	(0.083)	(0.070)	(0.079)
Has Female * Targeted * Post	0.028	0.012	0.014	-0.055	0.043	0.074	0.110***	-0.186**	0.002	-0.112
	(0.064)	(0.058)	(0.099)	(0.103)	(0.100)	(0.056)	(0.040)	(0.080)	(0.079)	(0.075)
Observations	1,606	1,606	1,606	1,606	1,606	2,527	2,527	2,527	2,527	2,527
Firms	445	445	445	445	445	584	584	584	584	584
R^2	0.161	0.155	0.140	0.107	0.102	0.097	0.080	0.093	0.061	0.060
Dep. Var. Mean	0.083	0.078	0.462	0.377	0.545	0.106	0.071	0.509	0.314	0.615
Fixed Effects										
Month	X	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X
Control group	Germany	Germany	Germany	Germany	Germany	Europe	Europe	Europe	Europe	Europe

Notes: The unit of observation is an appointment of a new top executive. The outcome variables differ from the analysis reported in Table A8 by defining top leadership experience to include positions as a top executive or a board member. The sample is limited to appointments for which data are available on prior work histories. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A10. Top Executive Roles at Targeted Firms, 2019

	Any Top Executive in Role	Any Female Top Executive in Role	Share Female in Role
Role:			
CEO	1.00	0.06	0.06
CFO	0.94	0.09	0.10
Human Resources	0.55	0.24	0.43
COO	0.36	0.01	0.04
Sales	0.22	0.04	0.20
Division CEO	0.21	0.03	0.14
Technology	0.21	0.01	0.07
Other Less Common Roles	0.49	0.07	0.15
Deputy CEO	0.13	0.00	0.00
Other Divisional Roles	0.10	0.00	0.00
Marketing	0.09	0.01	0.17
IT	0.09	0.01	0.17
Legal	0.09	0.06	0.67
Risk	0.06	0.00	0.00
Unknown Role	0.54	0.15	0.28

Notes: The table reports the means of 45 variables for companies targeted by the quota for 2019, the year before the quota's announcement. Variables reported in the first two columns are indicators and the variables reported in the third column are continuous. Individual executives whose job title includes multiple functional roles are counted in each of those roles. Other roles include less common job functions not listed in the table, and unknown roles are ones whose job title does not identify a specific job function (e.g., "Executive Director").

Table A11. Effects of the Quota on Female Top Executive Presence by Job Title

	Any Female Top Executive in Role								
	CEO	CFO	HR	COO	Division	Sales	Technology	Other	Unknown
Targeted * Post	-0.0177	0.0383	0.195***	0.0311	0.00849	0.0295	0.0120	0.107***	0.00667
	(0.0147)	(0.0353)	(0.0464)	(0.0244)	(0.0117)	(0.0239)	(0.0124)	(0.0357)	(0.0306)
Observations	46,841	46,841	46,841	46,841	46,841	46,841	46,841	46,841	46,841
Firms	624	624	624	624	624	624	624	624	624
R^2	0.011	0.035	0.077	0.009	0.005	0.006	0.005	0.038	0.005
Dep. Var. Mean	0.042	0.059	0.051	0.019	0.008	0.009	0.005	0.039	0.049
Control group	Germany	Germany	Germany	Germany	Germany	Germany	Germany	Germany	Germany
Targeted * Post	-0.0124	0.0482	0.189***	0.0295	0.000606	0.0232	0.00826	0.0983***	0.0142
	(0.0134)	(0.0357)	(0.0466)	(0.0242)	(0.0124)	(0.0240)	(0.0124)	(0.0364)	(0.0308)
Observations	58,312	58,312	58,312	58,312	58,312	58,312	58,312	58,312	58,312
Firms	747	747	747	747	747	747	747	747	747
R^2	0.010	0.025	0.063	0.012	0.005	0.006	0.006	0.021	0.002
Dep. Var. Mean	0.058	0.081	0.051	0.011	0.012	0.012	0.006	0.101	0.085
Control group	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe
Fixed Effects									
Month	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X

Notes: Notes: Estimates in this table correspond to those reported in Figure 3 of the paper. They are obtained from estimating Equation (1) using the panel of firm-month observations between January 2016 and May 2024. The upper panel of the table uses German control firms while the lower panel uses the pan-European controls. The outcomes are indicators for the company having any female top executive with a job title relating to the function stated in the column heading. Robust standard errors are clustered at the firm level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A12. Effects of the Quota on New Female Top Executive Appointments by Job Title

	Woman Appointed to Role								
	CEO	CFO	HR	COO	Division	Sales	Technology	Other	Unknown
No Female * Targeted * Post	-0.040**	0.045	0.181***	0.041	0.014	-0.025*	0.001	0.150**	0.00231
	(0.019)	(0.050)	(0.067)	(0.025)	(0.017)	(0.014)	(0.004)	(0.070)	(0.0515)
Observations	1,628	1,628	1,628	1,628	1,628	1,628	1,628	1,628	1,628
Firms	446	446	446	446	446	446	446	446	446
R^2	0.100	0.113	0.136	0.077	0.086	0.114	0.101	0.120	0.118
Dep. Var. Mean	0.010	0.035	0.033	0.007	0.007	0.006	0.003	0.031	0.033
Control group	Germany	Germany	Germany	Germany	Germany	Germany	Germany	Germany	Germany
No Female * Targeted * Post	-0.027	0.057	0.165**	0.036	-0.020	0.011	-0.001	0.163**	0.022
	(0.018)	(0.047)	(0.065)	(0.026)	(0.014)	(0.019)	(0.003)	(0.068)	(0.052)
Observations	2,603	2,603	2,603	2,603	2,603	2,603	2,603	2,603	2,603
Firms	587	587	587	587	587	587	587	587	587
R^2	0.051	0.065	0.086	0.070	0.054	0.058	0.059	0.075	0.064
Dep. Var. Mean	0.012	0.036	0.027	0.005	0.007	0.007	0.003	0.046	0.038
Control group	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe
Fixed Effects									
Month	X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X

Notes: Notes: Estimates in this table correspond to those reported in Appendix Figure A4. They are obtained from estimating Equation (3) using the sample of new top executive appointments between January 2016 and May 2024. The upper panel of the table uses German control firms while the lower panel uses the pan-European controls. The outcomes are indicators for the appointment being a woman to a top executive role with a job title relating to the function stated in the column heading. Robust standard errors are clustered at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A13. Effects of the Quota on Female Managers and Corporate Policies

	Share Female Senior Management	Share Female All Management	Female Leadership Action Plan	Gender Pay Gap Action Plan	Target Female Leadership Plan	Flexible Work Policy	Employee Resource Group for Women	Offers Backup Family Care	Requires Anti-Sexual Harrassment Training	Offers Unconscious Bias Training
Targeted * Post	0.010	-0.004	-0.020	0.016	0.009	0.120*	0.035	0.028	-0.011	-0.010
	(0.019)	(0.008)	(0.086)	(0.011)	(0.043)	(0.062)	(0.071)	(0.038)	(0.046)	(0.060)
Observations	37,922	199	303	303	303	303	303	303	303	303
Firms	518	59	77	77	77	77	77	77	77	77
R^2	0.024	0.291	0.173	0.011	0.020	0.030	0.185	0.112	0.043	0.026
Dep. Var. Mean	0.263	0.286	0.703	0.007	0.079	0.888	0.294	0.244	0.046	0.195
Control group	Germany	Germany	Germany	Germany	Germany	Germany	Germany	Germany	Germany	Germany
Targeted * Post	0.005	0.001	0.035	-0.022	-0.008	0.036	0.058	0.000	-0.008	-0.008
	(0.017)	(0.005)	(0.064)	(0.021)	(0.035)	(0.052)	(0.055)	(0.033)	(0.036)	(0.057)
Observations	56,046	453	686	686	686	686	686	686	686	686
Firms	735	137	178	178	178	178	178	178	178	178
R^2	0.035	0.182	0.132	0.022	0.038	0.015	0.159	0.069	0.036	0.036
Dep. Var. Mean	0.272	0.311	0.536	0.041	0.098	0.757	0.224	0.278	0.064	0.213
Control group	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe
Fixed Effects										
Month	X									
Year		X	X	X	X	X	X	X	X	X
Firm	X	X	X	X	X	X	X	X	X	X

Notes : Estimates in this table correspond to those reported in Figure 4 of the paper. They are obtained from estimating versions of Equation (1) separately for each outcome variable in each of the German (upper panel) and pan-European (lower panel) samples. The first outcome, Female Share Senior Management, is computed from BoardEx data. For this outcome, each observation is a firm-month between January 2016 and May 2024, and the model controls for firm and month fixed effects. The remaining outcome variables are from Bloomberg. The first is a measure of the female share among managers across all hierarchical levels, while the rest are indicators for the company having in place one of various policies or programs to support female employees. For these outcomes, each observation is a firm-year between 2020 and 2023, and the model controls for firm and year fixed effects. Robust standard errors are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A14. Controlling for Current and Lagged Market Returns

	(1)	(2)	(3)	(4)
Targeted * Announcement	-0.0043		0.0036	
	(0.0027)		(0.0022)	
No Female * Targeted * Announcement		0.0019		0.0106***
		(0.0025)		(0.0020)
Has Female * Targeted * Announcement		-0.0047		0.0023
		(0.0029)		(0.0025)
p -value for difference in coefficients		0.092		0.010
Observations	518	1,036	518	1,036
R^2	0.792	0.773	0.847	0.834
Fixed Effects				
Announcement	X	X	X	X
Targeted	X	X	X	X
No Female		X		X
No Female * Announcement		X		X
No Female * Targeted		X		X
Controls				
FTSE Europe Excess Return$_t$	X	X	X	X
FTSE Europe Excess Return$_t$ * Targeted	X	X	X	X
FTSE Europe Excess Return$_t$ * No Female * Targeted		X		X
FTSE Europe Excess Return$_{t-1}$	X	X	X	X
FTSE Europe Excess Return$_{t-1}$ * Targeted	X	X	X	X
FTSE Europe Excess Return$_{t-1}$ * No Female * Targeted		X		X
FTSE Europe Excess Return$_{t-2}$	X	X	X	X
FTSE Europe Excess Return$_{t-2}$ * Targeted	X	X	X	X
FTSE Europe Excess Return$_{t-2}$ * No Female * Targeted		X		X
Control Group	Germany	Germany	Europe	Europe

Notes : Unit of observation is a portfolio-day. The analysis is similar to Table 9 of the paper, except these regression models include controls for the market excess return and its two lags. The model allows the market excess return, measured as the FTSE Europe index return minus the three-month Treasury bill rate, to have a different relation with each portfolio. Data on the FTSE Europe index return is from Bloomberg.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A15. Controlling for Fama-French Five-Factor Model

	(1)	(2)	(3)	(4)
Targeted * Announcement	-0.0072		0.0003	
	(0.0059)		(0.0058)	
No Female * Targeted * Announcement		0.0005		0.0099*
		(0.0051)		(0.0054)
Has Female * Targeted * Announcement		-0.0082		-0.0026
		(0.0066)		(0.0062)
p -value for difference in coefficients		0.296		0.128
Observations	490	980	490	980
R^2	0.742	0.718	0.690	0.667
Fixed Effects				
Announcement	X	X	X	X
Targeted	X	X	X	X
No Female		X		X
No Female * Announcement		X		X
No Female * Targeted		X		X
Controls (for Each Factor)				
Factor	X	X	X	X
Factor * Targeted	X	X	X	X
Factor * No Female * Targeted		X		X
Control Group	Germany	Germany	Europe	Europe

Notes : Unit of observation is a portfolio-day. The analysis is similar to Table 9 of the paper, except these regression models include controls for the factors ($R_m - R_f$, SMB, HML, RMW, and CMA) from the Fama-French five-factor model. The model allows each factor to have a different relation with each portfolio. To match the Fama-French model, the outcome variable is the daily stock return in excess of the one-month Treasury bill rate. Data on the factors and the one-month Treasury bill rate are from Ken French's website [link].
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A16. Effects of the Quota on Firm Value and Profits, Including All Frequencies

	Tobin's Q		Quarterly Profits / Assets	
	(1)	(2)	(3)	(4)
Targeted * Post	0.032	0.005	0.0004	-0.0002
	(0.079)	(0.064)	(0.0018)	(0.0016)
Observations	9,854	14,978	9,854	14,978
Firms	503	660	503	660
R^2	0.085	0.068	0.031	0.029
Dep. Var. Mean	1.862	1.791	0.0090	0.0139
Fixed Effects				
Quarter-by-Frequency	X	X	X	X
Firm	X	X	X	X
Control group	Germany	Europe	Germany	Europe

Notes: Unit of observation is a firm-quarter. The analysis is similar to Table 10 of the paper, except that data are included from financial reports of any reporting frequency: quarterly, semi-annual, or annual. The outcome variable in columns 3 and 4 is adjusted to a quarterly level by taking one half of the values from semi-annual reports and one quarter of the values from annual reports. The regression models include additional fixed effects for reporting frequency interacted with indicators for each quarter. Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A17. Effects of the Quota on Firm Value and Profits, Adjusting for Size and Sectoral Trends

	Tobin's Q		Quarterly Profits / Assets	
	(1)	(2)	(3)	(4)
Targeted * Post	0.048	0.016	0.0002	0.0005
	(0.086)	(0.064)	(0.0021)	(0.0017)
Ln(Assets)	-0.652***	-0.498***	0.007	-0.0039
	(0.172)	(0.103)	(0.0048)	(0.0027)
Observations	7,682	12,522	7,682	12,522
Firms	287	457	287	457
R^2	0.208	0.175	0.114	0.092
Dep. Var. Mean	1.817	1.757	0.0099	0.014
Fixed Effects				
Quarter-by-Sector	X	X	X	X
Firm	X	X	X	X
Control group	Germany	Europe	Germany	Europe

Notes: Unit of observation is a firm-quarter. The analysis is similar to Table 10 of the paper, except these regression models include a control for the natural logarithm of total assets and separate quarter fixed effects for each industrial sector. Observations for comparison firms with missing sector data are excluded from the sample (one firm in the Germany sample and three firms in the pan-European sample). Standard errors, reported in parentheses, are adjusted for clustering at the firm level.

* p < 0.10, ** p < 0.05, *** p < 0.01