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Gender tokenism in corporate boardrooms in Europe

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Abstract

While women constitute 25% of the board members in private European corporations, firms with no women are dominant and merely 10% of firms report more than one woman in the boardroom. We leverage new data, covering 5 million companies from 29 European countries spanning 1986-2020. Using this data, we provide novel stylized facts about the phenomenon of token women in European corporate boardrooms. We emphasize the differences between two types of situation when the corporate boardroom hosts a singular woman: the appointment of the first woman and the barriers to further rise in diversity. We thus contribute to improving our understanding of the conflict between the tokenism hypothesis and diversity spillover hypothesis.

Keywords:

gender, board, diversity

JEL Classification

C81, J16, M12, M51, J24

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1 Introduction

Tokenism signifies the presence of a tacit quota. This phenomenon pertains to cases where actual diversity is not an objective, but having no representative of a given minority group(s) would give rise to criticism of the organization. If tokenism is prevalent as a motivation, few organizations remain completely homogeneous, but the representatives of minorities are not in position to influence the decision-making. In this paper, we provide new stylized facts about the phenomenon of gender tokenism in corporate Europe. We discuss how these facts square with the existing theories and suggest several gaps for theory. Further, we study gender board diversity spillovers scrutinizing consequences of token women in supervisory roles for management diversity.

We conjecture several empirical regularities, which allow to shed new light on the existing theories of tokenism and gender board diversity, as well as suggest important avenues for further research. We identify and explore the conflict between the diversity spillover hypothesis and the tokenism hypothesis. The tokenism hypothesis applied to the top corporate positions implies that appointing a woman prevents more women from being appointed. The spillover hypothesis implies that women in nominating committees can appoint more women to executive directors. We study if firms which allow the first woman in the boards are more or less likely to report a higher number of women in the boardroom. We further ask about persistence of board appointment and about the trade-offs between women in supervisory roles and women in management positions within corporate boards.

To address these issues, we use novel and particularly suitable data provided by Drzakowski et al. (2024). This data builds on firm-level information from two million unique incorporated firms spanning four decades in Europe. Majority of firms in our sample are private firms, whereas our sample also includes approximately 13 thousand public (stock-listed) firms. Our data covers 29 European countries and thus allows us to draw inference about common trends once idiosyncrasies are accounted for.

The original literature on tokenism in corporations, commenced by the seminal book of Kanter (1977a), focused on the impact that being the *sole* representative of a gender or social, ethnic, racial group had on these individuals. Inherently qualitative, this line of research emphasized the evolving nature of handicaps faced by minority individuals. Quantitative evidence on prevalence of women in top corporate positions has been provided by various stakeholders in the course of the decade subsequent the publication of Kanter. The share of women in C-suite positions, as well as in supervisory roles (non-executive directors) has been rising steadily, encouraging empirical and theoretical research rationalizing this fact. Gender board diversity spillovers hypothesis is among the most pronounced explanations: women appointed to non-executive positions start having influence over appointment to the top corporate management, and they promote more women. This hypothesis has found relatively sound empirical support (Matsa and Miller 2011, Morikawa 2016, Kunze and Miller 2017, Guldiken et al. 2019, Kirsch and Wrohlich 2020).

However, as observed by Geletkanycz (2020), the rate of progress towards greater equality is slowing down. She provides several explanations of this empirical regularity, building on social movement theory. However, for this pattern to emerge, one would need to observe that appointing a woman to a leadership position reduces the chances for subsequent appointments to women. Indeed, in many cases that mechanism finds support in the data. Studying German plants, Bossler et al. (2020) finds that managers tend to hire the likes of them which perpetuates the scarcity of women in the boardroom. Studying Danish plants, Smith and Parrotta (2018) show that appointing a woman to chairing a board reduces the probability of subsequent promotions to director level positions for women. Drzakowski et al. (2023) show negative spillovers among private firms in Europe over the past four decades.

Our paper is structured as follows. First, we leverage the existing theoretical and empirical literature to contextualize tokenism and gender diversity. Next, we describe our data in section 3. This section presents stylized facts about the phenomenon of gender tokenism in corporate Europe. Our methods are covered in Section section 5. Our results are discussed in section 6 with a variety of sensitivity analyses and robustness checks. The paper concludes with policy implications and avenues for further research.

2 Literature

The original conceptualization of tokenism involves the sense of isolation and the lack of a social network in the workplace, the pressure of being closely monitored in terms of performance, and stereotyping (Kanter 1977a,b, 1987). While these findings appear fairly common across industries and occupations as well as periods of time, the implications of tokenism are both diverse and complex. Kanter emphasized the sense of having a special status and feeling like an outsider in a group. She also emphasized being held to different standards and a need to prove one's right to holding a given position. Consequently, the early literature focused on the phenomenon of tokenism in general.¹ The attention to the prevalence of token women in top corporate positions came partly as an afterthought. Scholars such as Yoder (1991) emphasized that women and minorities were able to break through the glass ceilings more frequently and their presence became more salient, and the backlash ensued towards minority representatives. They emphasize that as minorities rose in numbers in positions incoherent with the stereotypes, and they started to threaten the position of the dominant majority news forms of discrimination and intimidation emerged.

Qualitative research on tokenism became coupled with quantitative research as the awareness increased that women remained notoriously rare in top corporate positions. A phrase was coined that there were more men by the name John among board members of the NYSE companies than all women taken together. This statement stopped being factually accurate as late as 2023, but research repeatedly finds low share of women holding top corporate positions in the US (e.g., Adams and Ferreira 2009, Carter et al. 2010, Dezső and Ross 2012). Indeed, the majority of firms have no women in BRICS (Saeed et al. 2016), Denmark (e.g., Smith and Parrotta 2018), France (e.g., Sabatier 2015), Finland (e.g., Virtanen 2012), Germany (e.g., Bossler et al. 2020), Italy (e.g., Flabbi et al. 2019, Ferrari et al. 2022), Japan (e.g., Morikawa 2016), Norway (e.g., Matsa and Miller 2013, Kunze and Miller 2017), the UK (e.g., Brammer et al. 2007), and likely every other country of the world.² As early as in 1980s, in the US, larger firms were less likely to appoint women to top corporate positions, whereas firms with greater diversity among highly ranked managers were more likely to eventually appoint women to directorship level (Harrigan 1981). Using the data for Japan, Morikawa (2016) observe that longer histories, complex corporate structures and high unionization as well as being publicly traded are the correlates which reduce the probability of women among top corporate positions, including the CEO.

The low prevalence of women and the high share of firms with no women in top corporate positions spurred the wave of theories on the mechanisms preventing equality in promotions at the top. While numerous theories address the lack of women, fewer of them directly address the issue of tokenism.³ The critical mass theory traced back to Kanter (1977b, 1987) argues that a minority without a sufficiently strong representation is unable to influence decision processes. In addition, many empirical studies confirm the phenomenon of the replacement effect: if a woman leaves a top corporate position, the firm is more likely to fill this position with another woman (Davis and Penner 1986, Tinsley et al. 2017). This phenomenon was termed gender-matching heuristic and refers to an implicit mental quota attributed to minority or minorities within groups. However, if a woman assumes a position previously held by men's majority, this reduces the likelihood of appointing more women or replacing a position held by women with another woman.

Against the implications of the gender-matching heuristic, the diversity spillover hypothesis posits that appointing minority representatives to the positions of power raises the probability of subsequent promotions

¹See also: Kanter (1987), Webber (1987), Yoder et al. (1983).

²In this study we purposefully ignore the literature which focuses on sorting of women across industries and departments within corporations. (Smith et al. 2013) deploy detailed administrative linked employer-employee data for Denmark to show that even once one adjusts for all those factors, there remains a considerable gender gap in reaching the top corporate positions. Field et al. (2020) show similar results for a large sample of non-employee directors on US corporate boards. Finally, von Essen and Smith (2023) show that even if women's networks were the same as men's they would still be less conducive to successful appointments.

³For examples of theories of majority reasserting its dominating position, see for example a review by McPherson et al. (2001) about homophily, Hewstone et al. (2002) for inter-group bias, Kahneman et al. (1991) for status quo bias, Byrne (1971) for similarity attraction theory and Finkelstein (1992) for power theory.

for women. This theory draws on resource-dependence theory as well as a variety of other mechanisms. For example, firms with women in supervisory roles may be more likely to attract women during the scouting for C-suite positions, for example due to more fair evaluation (Ridgeway 1997, Hultin and Szulkin 1999, Cohen and Huffman 2007, Cook and Glass 2018). Women in supervisory roles may be more skilled in adequately evaluating potential of other women (Flabbi et al. 2019). They may also exert positive influence on the professional development of women occupying positions a rank or two below the C-suite (in case of internal promotions to director level Kunze and Miller 2017). Some empirical literature confirms positive spillovers (e.g. Matsa and Miller 2011, Elkinawy and Stater 2011, Morikawa 2016, Guldiken et al. 2019, Kirsch and Wrohlich 2020). For the positive spillover hypothesis to work, women appointed to supervisory roles ought not to be tokens. Alternatively, being a single woman among the non-executive directors cannot actually bring about all the implications of tokenism. Specifically, while the individual women in those positions can still feel held to higher standards, handicapped, and alienated in the board room, they also have to be sufficiently powerful to affect appointments for the executive directors, in particular for the C-suite positions.

In a sense, the conflict between the tokenism hypothesis and the diversity spillover hypothesis is a reincarnation of the critical mass theory in the context of board composition (Torchia et al. 2011, Joecks et al. 2013, Jia and Zhang 2013, Chang et al. 2019). Critical mass can be considered in terms of numbers. For example, Konrad et al. (2008) builds a case for at least three women among the non-executive directors. Indeed, studying Danish corporations, Smith and Parrotta (2018) show that electing a non-employee woman to chair the boardroom reduces the chances of appointing women to the C-suite at all. That could be related to the saturation effect or the replacement effect.⁴ Studying listed companies in Europe during the 2000s, Schoonjans et al. (2024) confirm the prevalence of the replacement effect and show that the probability of the next woman to be appointed declines in the number of women previously appointed.

However, the critical mass can also be viewed through the lens of structural power theory. Bozhinov et al. (2021) studies German stock-listed firms and finds that single women in supervisory roles are more frequently empowered in raising gender diversity in the C-suite if they are (co-)owners of the firm or if they chair the nominating committee. This is an interesting case where the tokenism hypothesis holds in general, but even singular women can be effective in driving change, and can be endowed with additional power due to positioning within the organization.

Summarizing, the existing literature has paid ample attention to the ability of women on boards to influence decision processes. The conflict between the diversity spillover hypothesis and the tokenism hypothesis lies at the core of our research questions. Specifically, on the one hand some empirical literature finds that appointing women (especially the first woman) to some positions reduces the chances for other women to reach the top corporate positions, at least for some time. This is the essential implication of the tokenism hypothesis when applied to the top corporate positions. However, on the other hand, some literature demonstrates positive spillovers from non-executive directors (supervisory roles) to C-suite. We address this potential conflict by disentangling the effect of diversity per se from the number of women. We further focus on the (potential of) spillovers from supervisory roles to executive directors. We explore the role of the number of women in supervisory roles in the likelihood of appointing a woman to a top managerial role.

3 The data

We obtain information about the composition of boards from novel data, Gender Board Diversity Database (GBDD). Using firm-level registry information, GBDD provides several important innovations relative to the existing data sources. We describe the data origins and its features below. Next, we move to our

⁴Knippen et al. (2019) shows that firms include more women among directors when the size of the board increases. Indeed, there is strong empirical evidence of reluctance to appoint a woman to a position previously occupied by a man.

empirical strategy.

GBDD starts from rich firm-level registry information provided by Moody's Analytics.⁵ Drazkowski et al. (2024) harmonize information on positions within boards, as well as develop an algorithm to recognize the gender of each individual based on linguistic rules. We use GBDD spanning the years between 1986 and 2020 and covering 29 European countries.⁶ These countries represent one-tier, two-tier as well as mixed systems.⁷

The registry data collected for GBDD encompasses the universe of firms in countries covered.⁸ For the firms, the data provides information about each individual within each company: name, surname and position. As of 2014, the data comprises information on gender of all individuals. For the period 1986-2013, using the name and the surname and relying on linguistic rules, Drazkowski et al. (2024) provide heuristics to recognize the gender. They validate their approach using post 2014 data and report accuracy of their algorithm in excess of 99%.

Using information about the position, GBDD assigns board members into management (executive) roles and supervisory (non-executive) roles. We consider all board positions jointly.⁹ In this sample, 5,910,340 firms report at least two board members for at least two years, see Table 1. These companies are present in the sample for 7 years on average. Overall, this gives us 41.2 million firm-years observations and 115 million person-year observations.

[TABLE 1 about here]

This data set yields large sample sizes for various specifications of the dependent and independent variables, including the potential to lag the independent variables. We can also provide a wide battery of sensitivity analyses, by restricting purposefully the sample to comprise the firms for which the results should be of particular interest.

4 Stylized facts about token women in European corporate boards

While qualitative research in the past has revealed many important features of tokenism, our study contributes to the quantification of some phenomena. To this end, our stylized facts section consists of two substantive parts. First, we portray the prevalence of firms yet without women, with one woman and with more than one woman in the boardroom. We complement these 'states' measures with 'flows' measures which quantify the changes in tokenism across boardrooms. Second, we study the time trends, country specificity and industry features of tokenism.

⁵In the past, this data was collected and disseminated by Bureau van Dijk and it is known as Orbis. This is proprietary data which is obtained across countries by local information providers. The providers obtain public records of firms, which include the names of individuals in boards and their functions.

⁶Drazkowski et al. (2024) use 2000, 2002, 2003, 2004, 2006, 2008, 2010, 2012, 2014, 2016 waves and the 2020 edition of the so-called Orbis Historical Data to obtain coherent track record for each firm.

⁷GBDD originally covers 42 European countries. However, the case of some countries only initials are given for names (e.g. the Netherlands) which makes it impossible to recognize the gender of individuals. In some countries, a high fraction of businesses operating as legal persons, which ought to report board members, have missing information. We restrict the sample of countries to those where at least 50% of companies mandated to report board members actually do so. The countries included in our sample are: Albania, Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, UK

⁸In some countries, some smaller companies are exempt from the obligation to report financial records, but all types of companies provide ownership and representation data. Drazkowski et al. (2024) identify the eligible business as legal persons obliged to constitute a board. The sample excludes businesses operating as physical persons, and other, non-business legal persons.

⁹This choice brings an additional advantage of maximizing sample size. Drazkowski et al. (2024) report that for some positions, the description is insufficient to confirm supervisory (non-executive) role, but it is sufficient to exclude management (executive) role. Such cases include for example positions with the description: "member of the board". In such cases, they propose a broad and strict definition of the supervisory (non-executive) roles.

4.1 Basic statistics about tokenism

We visualize the boardroom composition and changes thereof in as state-flow diagram. We identify three states: a firm has no woman, a firm has only one woman and a firm has more than one woman in the boardroom. In line with these three states, there are complementing flows: a firm could have no woman in time t and appoint one or more women in time $t + 1$. For each state, there are two potential outcomes: no change in the state or a change to a different state. We identify those flows (four for each state). Understanding these dynamics is crucial to recognize patterns of tokenism and progress toward genuine diversity and inclusion.

[FIGURE 1 about here]

Our sample consists of firms over time: the unit of observation is a boardroom in a given point in time, thus a firm-year. We re-scale the numbers to reflect the average in each year of our sample. Specifically, for each 'state' we obtain the number of years that the a given firm is observed in a given 'state' in our sample. We then average thus number of years and use it to re-scale that 'state' and the flows originating from that 'state'. We present the results in Figure A1. Each 'state' is represented by a node. An arrow originating and ending in that node reflects the persistence of a given 'state'. The 'flows' over time are portrayed by arrows between the nodes. Each arrow illustrates the change for a given firm in its board composition. Some firms move towards a larger number of women, whereas others move towards fewer women.

Figure 1 suggests several novel facts. First, the majority of firms do not change their state in an average year. This suggests inertia and status quo bias in board composition. Second, across European corporate boardrooms majority of firms in an average year have no women, then only one woman. This is reflected by the numbers at each node. In fact, having more than one woman is extremely rare: it is roughly 10% of the total sample, and 13% of the sample adjusted for the number of years. Third, firms tend to move step wise: it is very rare that a firm moves from no women to more than one woman. In relative terms it is five times more frequent that a firm appoints one woman than that it appoints more than one woman. While both numbers are very low when compared to the number of firms that have no women and do not change, adding one woman at a time to the boardroom reinforces the inertia and status quo bias interpretation. Fourth, out of the three net 'flows' from each 'state', two point towards a rising number of women whereas one points towards fewer women in the boardroom. Specifically, more firms change from no woman to one woman, and from no woman to more than one woman than vice versa. However, among firms which have women in the boardroom, fewer firms add women than remove them. This could be interpreted as a reflection of a imbalance between the external pressures to appoint women and internal resistance or barriers to doing so. Once the initial barrier of appointing the first woman is overcome, companies appear to be less determined to improve diversity.

These diagrams represent raw data. We consider together all countries, industries and time periods. In the next section, we move to identifying the role of these factors in the phenomenon of tokenism throughout European corporate boardrooms.

4.2 Time trends, country specificity and industry features

Next, we provide time trends as well as country and industry specificity of tokenism in Europe over the past four decades. GBDD sample grows over time both in terms of firms and in terms of individuals reported in supervisory and management roles. Coverage increases differentially between countries. To adequately capture these evolutions, we deploy modeling to obtain time trends, industry, and country characteristics after adjusting for changes in Orbis sample.

Specifically, we define the following two firm-level measures. First, we define $token^F$ which takes on the value of 1 if the firm has exactly one woman and zero if there are no women. This variable is not

defined for the cases when there are more women. Therefore, when we study $token^F$, we focus on stylized facts for firms as they appoint the first woman to boards. Second, we also define a complementary measure $token^B$, which takes on the value of 1 if the firm has exactly one woman in boards and zero if the firm has more than one woman in boards. This variable is not defined if the firm has no women in boards. When we study $token^B$ we thus present stylized facts for firms not allowing more than one woman in boards.

We show the time trends, country specificity and sector characteristics through the lens of a model. We choose this method to account for a massive increase in sample size in Orbis during the years under analysis here. Our model serves the purpose of providing stylized facts which adjust for the changes in sample size, and even the sample composition, which would not be related to the changes in the corporate boards. Technically, we estimate the following models on our sample:

$$token_{i,t}^F = \alpha_0 + \alpha_i \times industry + \alpha_c \times country + \alpha_t \times time + \epsilon_{i,t}. \quad (1)$$

$$token_{i,t}^B = \alpha_0 + \alpha_i \times industry + \alpha_c \times country + \alpha_t \times time + \epsilon_{i,t}, \quad (2)$$

where α_s denotes a vector capturing industry specificity, α_c denotes a vector capturing country specificity and α_t is a vector of time effects. We will infer time evolution from α_t and we will use the estimated values of α_i and α_c to portray the characterizations across sectors and countries. We present the results graphically.¹⁰ This model yields the time trends as α_t . These trends adjust for changes in the sample size and composition both in terms of countries and sectors.

Figure 2 reports the time trends for the total sample and for a sample restricted to those firms, that report at least 4 board members. The estimates are anchored to 2006 as the base year. We find that there was a rapid decline in the prevalence of tokenism as a barrier (no more than one woman) and a rising share of firms with the first woman in their boards in the 1990s. The 2000s were associated with a relative stagnation. In the 2010s, there was some further rise in the share of firms reporting the first woman, and no substantial changes in the share of firms preventing the higher number of women than one. In other words, while having no women on boards is becoming less prevalent over time (though the pace was slow during the 2000s), tokenism is not easing. In fact, conditional on having any women, the odds that an average firm will continue with only one woman have been surprisingly stable since the 2000s.

[FIGURE 2 about here]

We obtain a reference-free measure of the role of country and sectoral effects, through a multiple regression approach. We reestimate the model for each country of interest and each sector of interest. In the multiple estimations for country effects, we set a given country dummy equal 1 for this country and 0 for all other countries. We then repeat the estimation for each country. These regressions include time and sector fixed effects. We proceed analogously for the sector effects. Specifically, we set a given sector dummy equal 1 for this sector and 0 for all other sectors. These regressions include country fixed effects and time effects. Note that all regressions include weights for country size (as measured by population). We include those weights to account for the fact that some national sample sizes in Orbis may be disproportionately large relative to the size of this country. We construct the confidence intervals based on the standard errors of the estimated own factor effects.¹¹ Given that the time trends are similar for the full sample and for the sample restricted to firms with at least four board members, we report the estimates for the full sample.

The results for the countries are reported in Figure 3 revealing several novel observations. These results come from the estimates of the regressions (1) and (2), and adjust for the country effects and time trends. Note that a negative size effect on the right panel signifies lower barriers to gender board diversity, as does a positive size effect in the left panel. First, there appears to be a positive correlation between the high probability of having the first woman and the rapid decline in barriers for women to become more broadly represented on boards. The rank correlation does not hold for all the countries, but it holds for the

¹⁰The detailed estimation log is available upon request.

¹¹We do not do multiple testing, hence there is no need to adjust the estimated standard errors.

countries at both ends of the spectrum, because the countries in the top of the ranking in the left panel (the first woman in boards relative to no women) tend to be the last countries in the right panel (no more than one woman relative to more women). In other words, those countries which exhibit higher probability of welcoming any women in boards are less likely to offer only token position to women.

[FIGURE 3 about here]

Second, we show that corporate tokenism on boards does not fall under easy categories of e.g., stereotypically gender-equal countries or countries known for low levels of gender equality. For example, while on average Scandinavia is believed to be egalitarian and open to diversity, only Finland and Sweden are conducive to having at least one woman in boards, whereas Denmark, Iceland and Norway stand out with negative fixed effects. Similarly, while Central and Eastern European countries have a higher prevalence of firms with no women, Lithuania leads the whole ranking. In terms of blocking greater gender diversity, the top ranking countries include CEE, but also Sweden and Finland. These two Scandinavian countries take better care that boards have a woman, but do not provide environment to further diversifying the composition of the boards. By contrast, some other Scandinavian countries – Denmark, Iceland – once they do allow the first woman on board, they actually observe a lower than average probability that this woman will remain the sole token of gender diversity.

[FIGURE 4 about here]

Finally, the stylized facts concerning sectors are equally complex, as portrayed in Figure 4. Recall that majority of firms in our sample have no women in boards. We first look at the probability of having the first woman, in panel 4a. We find that retail, IT and non-market services are more likely to have one woman than no women in general. By contrast, the sectors such as finance, HoReCa, construction and the whole of manufacturing are less likely to have one woman than no women on boards. The differences between these sectors reach as much as 25 percentage points in terms of size effects. In other words, there are specific sectors, in which women are virtually absent from the boards. These sectors are highly heterogeneous and include both the types of businesses close to the final consumer (e.g., HoReCa) and those which may be a part of long value chains and thus far away from the final consumer (many industries within manufacturing). By contrast tokenism – that is not letting more than one single woman on boards – is somewhat less diverse among sectors and the overlap with excluding women from boards altogether is only partial. For example, mining, HoReCa and construction rank both low on having any women and high on not allowing any more women than one. The same is true of some sectors in manufacturing, construction and, to some extent, IT. However, relatively many sectors rank average on tokenism, whereas they differ in terms opening any board positions to women. For example, the sector of professional services is both encouraging the first woman (high positive coefficient) and average in terms of tokenism. Energy and utilities is discouraging the first woman, but once they are there, prevalence of tokenism is close to average.

This complex picture in terms of sectors and countries suggests that only some differences in the extent of tokenism can be explained by social norms exhibiting in education, labor market and corporate norms. While our analysis does not study directly these factors, the heterogeneous and diverse patterns displayed in our data cannot be reconciled with off-the-shelf beliefs. Specifically, career paths and organizational cultures within firms have to be able to produce heterogeneity displayed in our data in terms of both opportunities for women to enter board rooms and to be kept in isolation in those board rooms.

5 Methods

We proceed in two steps. First, we measure the **persistence of tokenism** in firms. We use the same definitions of tokenism as in the above, descriptive section: the first woman in a board (relative to firms

with no women at all, $token_{i,t}^F$) and the only woman in the board (relative to firms with more than one woman, $token_{i,t}^B$). We define these variables at a firm level in each point in time and study how persistent these phenomena are across time. Second, we study the role of the number of women in supervisory roles in **gender board diversity spillovers**. To this end, we deploy a specification analogous to Matsa and Miller (2011).

5.1 Persistence of tokenism

We estimate:

$$token_{i,t}^X = \alpha_0 + \alpha_i + \gamma woman_{i,t-1} + \xi controls_{i,t} + \epsilon_{i,t}, \quad (3)$$

where $X \in F, B$ and $woman_{t-1}$ is a dummy variable taking on the value of 1 if the firm reported at least one woman on its boards and 0 otherwise. The estimated coefficient γ measures the probability that the firm is classified as a $token^F$ or a $token^B$ in time t conditional on having reporting at last one woman on boards in period $t-1$ (relative to the probability of the same outcome if no woman was reported in period $t-1$). For example, a negative estimate of γ implies that the prevalence of non-zero outcome variable in time t for the case $woman_{i,t-1} = 0$ is higher than for the case $woman_{i,t-1} = 1$. A positive estimate of γ has the opposite interpretation: the prevalence for the case $woman_{i,t-1} = 0$ is lower than for the case $woman_{i,t-1} = 1$.

Like in the case of descriptive statistics reported in the previous section, the interpretation depends crucially on the definitions of $token^F$ and $token^B$. Recall, that $token^F$ excludes all cases when there are more than one woman in time t , whereas $token^B$ excludes all cases when the firm reports no women in boards at time t . Thus, we study quite specific research questions.

The case of $token^F$. In the case of regression (3) for $token^F$, we consider cases when in time t the firm reports strictly no or one woman, and estimate the prevalence of this event conditional on what the firm reported for $woman_{i,t-1}$. Two cases are possible: (i) a firm reported no women in time $t-1$: $woman_{i,t-1} = 0$ and (ii) a firm reported at least one woman in time $t-1$: $woman_{i,t-1} = 1$. A negative [positive] estimate of γ implies that case (ii) is characterized by a lower [higher] probability of having one woman rather than no woman as compared to case (i). Firms which report more than one woman in time t are excluded from this estimation. We interpret the estimates of γ from this regression to signify the phenomenon of persistence of allowing the first woman to the European corporate boards.

The case of $token^B$. In the case of regression (3) for $token^B$, we consider cases when in time t the firm reports one or more women, and estimate the prevalence of this event conditional on what the firm reported for $woman_{i,t-1}$. Again, two cases are possible: (i) a firm reported no women in time $t-1$: $woman_{i,t-1} = 0$ and (ii) a firm reported at least one woman in time $t-1$: $woman_{i,t-1} = 1$. A negative [positive] estimate of γ implies that case (ii) is characterized by a lower [higher] probability of not allowing more than one woman in boards as compared to case (i). Firms which report more no woman in time t are excluded from this estimation. We interpret the γ estimates to signify the phenomenon of allowing no more than one woman in the European corporate board rooms

We estimate the models portrayed in equation (3) with firm fixed effects, sector fixed effects, time fixed effects and a variety of controls. First, we include the overall board size. We also adjust for the degree of competitiveness in the sector (as measured by Hirschmann-Herfindahl index, HHI). We also include the country weights to reflect the size of each economy rather than the size of the sample from a given country. Finally, we study samples that exclude firms whose status on gender board diversity is constant over time: never-takers (firms that do not report a woman among board members in our sample) and always-takers (firms that report a woman among board members in every period in our sample). These two subsamples help to isolate what happens in the firms where there was an actual change in gender board diversity.

To pin down the exact persistence of first woman and no more than one woman, we also estimate specific cases that exclude other than token presence of women at time t . Thus, in addition to the specification of equation (3) we also study the pure persistence of tokenism *per se*. In this case the equation takes on the form:

$$token_{i,t}^X = \alpha_0 + \alpha_i + \gamma token_{i,t-1}^X + \xi controls_{i,t} + \epsilon_{i,t}. \quad (4)$$

Lagging the dependent variable tells us how persistent both forms of tokenism are, thus changing the interpretation of the γ estimate. For $token^B$, this estimate implies that conditional on having no more than one woman in time $t - 1$, the firm continues to have no more than one woman in period t . Again the estimated γ coefficient informs about the differences between $token_{i,t-1}^X = 0$ and $token_{i,t-1}^X = 1$.

5.2 Spillovers and tokenism

We deploy a specification analogous to Matsa and Miller (2011). For a firm i at time t , we estimate the following equation:

$$woman_{i,t}^M = \alpha_0 + \alpha_i + \beta woman_{i,t-1}^S + \xi controls_{i,t} + \epsilon_{i,t}. \quad (5)$$

In this notation, $woman^M$ is a dummy variable taking on the value of one if company i reports at least one woman in an executive role at time t . In this estimation, we follow the classification of Drazkowski et al. (2024) to management and supervisory roles boards.¹² For the variable $woman^S$ we construct a sequence of dummy variables:

- $one_{i,t-1}^S$ which takes on the value of 1 if the company i reports exactly one woman in supervisory roles at time $t - 1$, and zero otherwise;
- $two_{i,t-1}^S$ which takes on the value of 1 if the company i reports exactly two women in supervisory roles at time $t - 1$, and zero otherwise;
- $three+_{i,t-1}^S$ which takes on the value of 1 if the company i reports three or more women in supervisory roles at time $t - 1$, and zero otherwise.

Note that $\hat{\beta}$ as the the estimate of β is a vector of coefficients. The base level for each of these dummies is having no women in supervisory roles in firm i at time $t - 1$. The estimates of β coefficient signify an *additional* change in the probability of having a woman in managerial role in the next period. Our specification reminisces of Schwartz-Ziv (2017) who start from the share of women on supervisory boards. We deploy both definitions of supervisory roles provided by Drazkowski et al. (2024): broad and strict.

Our specifications adjust for firm-level fixed effects and a variety of controls variables. In addition to time effects, we have time-invariant sector fixed effects. We use three-digit NACE codes to obtain sector indicators.¹³ We also include a time-varying sector-level indicator. Using the records reported by firms, we compute Hirschman-Herhfinahl index of competitive pressure (based on employment shares). This indicator is computed at the level of two-digit NACE sector. We include the number of individuals reported in C-suite of the firm i at time t of the board.

Our objective is to study diversity spillovers, we thus want to eliminate the cases of career changes. These could blur our results if, for example, a specific individual in our sample was to move from a supervisory role in one year to a management role in the next year. This is because our specification would inadequately estimate such career changes as a positive gender board diversity spillover. We thus construct a dummy variable which identifies the firms reporting the same individual in both management and supervisory roles.

We estimate the equation (5) using a linear probability model. We consider it important to provide a variety of fixed effects, including firm-fixed effects in a panel setting. Deploying fixed effects reduces panel

¹²Table A1 reports descriptive statistics delineated for management and supervisory roles.

¹³Kalemli-Ozcan et al. (2022), Drazkowski et al. (2024) explain the ways to harmonize NACE codes for the entire sample period, despite changes in NACE classifications.

data bias, whereas our vast samples make us reasonably confident that efficiency is not an issue. Given these objectives, non-linear estimators (such as probit or logit) are not applicable. We cluster standard errors at firm-level. In selected specifications, we weight the regressions by population size of a given country.

6 Results

We discuss the results in two substantive parts. First, we analyze the results of estimating equations (3) and (4). Having built some basic intuitions about the prevalence of tokenism among boards of European firms, we next move to the spillovers between boards, following equation (5). Our findings reveal a very high persistence of barriers to greater gender board diversity and a relatively high disappearance of women from the boardrooms.

6.1 Persistence of tokenism

Table 2 reports the findings in four panels. Panel A discusses specification (3) with $token^B$ as an explanatory variable. Panel B continues with the same specification for $token^F$. We move to the specification (4) in panels C and D, with persistence of $token^B$ and $token^F$, respectively.

Among firms with at least one woman on the boards in time t , 76% firms on average have no more than exactly one woman in time t . This is reported as baseline probability in Panel A. The estimated coefficient of interest ranges between -0.05 and -0.13 in columns (1) to (3). The interpretation of this coefficient states that firms with at least one woman in the boardroom at time $t - 1$ were 5 to 13% less likely to have a single woman at time t than to have more than one woman. Negative coefficient implies that with the intensity of 5-13 percentage points (or 6-18%) the one woman already in the boardroom was less likely to remain singular. This indicates a positive momentum where the presence of women on boards begets presence of non-token women. The coefficient increases to -15% when we restrict the sample to exclude firms with always at least one woman in the boardroom.¹⁴ These results say nothing about how the first woman arrives in the boardroom.

In Panel B, we estimate the analogous estimates for $token^F$. The baseline probability of a firm appointing woman to the boardroom in time t is about 46%. This probability increases by roughly 60% (or 1.5 times) for firms with at least one woman in the boardroom at time $t - 1$ as compared to firms which report no women.

We study the pure persistence in panels C and D. The baseline prevalence of outcomes in the explained variable are essentially the same as in panels A and B. This is because the definition of the variables is the same and the samples are almost identical. There is a small number of firms which would drop out due to the fact that $women_{t-1}$ from specification (3) is replaced by $token_{t-1}^X$ in specification (4). In these two panels, the estimated coefficients reflect the persistence within firms and over time of $token^B$ in panel C and $token^F$ in panel D. The persistence of the former is higher, but at a lower baseline probability. If the firm had more than one woman in period $t - 1$, that firm is 39-51% (or roughly 2/3rds) more likely to have no more than one woman when compared to firms with greater gender board diversity. This is a very high persistence of barriers to greater gender board diversity, as this coefficient implies that the prevalence of firms with no more than one woman in the boardroom can be halved every two years from the baseline of more than 70%. The estimated coefficient is higher, ranging between 61% and 66% across specification. Firms with one woman at time $t - 1$ are roughly 60% more likely to appoint a woman also in time t when compared to firms which did not. This estimate also implies that among firms with one woman at time $t - 1$, roughly 40% no longer report even one woman in boardroom in time t . If we take the lens of replacement theory and gender-matching heuristic, this number is relatively high.

¹⁴Note that in Panel A there is no difference in samples used for estimations (2) and (3), because essentially firms cannot be never-takers for the $token^B$ to take values.

[TABLE 2 about here]

6.2 Gender board diversity spillovers and tokenism

We now move to study the spillovers in the context of tokenism. The results are reported in Table 3: in Panel A we show the results for the broad definition of the supervisory board, whereas Panel B does so for a strict definition of supervisory roles (thus, with a smaller sample size). Column (1) is a brief look at the pure correlations. It shows negative coefficients in panel A: the more women there are in supervisory roles, the higher the probability that any woman in management role is token. This relationship is the opposite for the strict supervisory roles, but this specification does not account for any relevant factors, such as sector specificity, time trends, board size, etc. These controls are included in column (2), where both broad and strict definition of the supervisory roles are negative. In fact, we show that each additional woman in the supervisory roles is associated with a *lower* prevalence of women in management roles.

[TABLE 3 about here]

Our estimates from column (2) prove to be very robust. In fact, we replicate them even among highly restricted samples which exclude firms which never had women and firms which always had women among their board members. Despite reduction in sample size, the estimates remain statistically significant for all subsequent estimates of β_{one} , β_{two} and β_{three} . The results are consistent for broad and strict definition of management roles.

The magnitudes of estimated coefficients are consistent for columns (2)-(4). On average, having one woman in supervisory roles reduces the probability of a firm reporting a woman in management roles by roughly 5 percentage points on a baseline probability of approximately 21%, which is a 25% size effect. The second woman in supervisory roles adds additional 10 percentage points (or 50%). Having three or more women in supervisory roles essentially wipes out to zero the baseline probability of a woman in management roles. The same applies in columns (5): a higher baseline probability is reduced to null. For column (6), we exclude always-takers, that is firms which had at least one woman in managerial roles throughout the entire period during which this firm is observed in our sample. The interpretation of the coefficients is thus strongly counterfactual.

The effect sizes are somewhat smaller in Panel B, where three or more women in supervisory roles jointly reduce the baseline probability by roughly 10 percentage points, or 40% in our preferred specification (4), and as much as 5 percentage points (or 25%) in specification (2). Panel B confirms the findings of Panel A: more women in supervisory roles is associated with fewer women in management roles.

Our estimates in Tables 2 and 3 cover the full sample. We re-estimate the full specifications for firms which reported at least four board members. These results are reported in Tables A3 and A4 in the Appendices. The inference is essentially unaffected by this sample restriction.

7 Discussion and conclusions

Two key hypotheses in research on board gender diversity are in stark opposition. In short, on the one hand, tokenism implies that no more than certain number of (powerless) women will be allowed in the boardrooms. On the other hand, gender board diversity spillover hypothesis postulates that women in the boardrooms will be able to promote further increases in the share of positions to which women are appointed. While these two hypotheses cannot be true at the same time in the same boardroom – they may coexist across firms. Our study sheds light on the stylized facts related to the tokenism and gender spillover hypotheses, offering also implications for further theoretical and empirical research.

We leverage new data to explore the prevalence and persistence of tokenism in corporate Europe. Historically, the literature on tokenism focused on what it means for the individuals to be the only ones representing a given minority. Gradually, the literature expanded to study also the prevalence of tokenism,

including corporate board positions. The literature has focused on stock-listed companies, partly due to the availability of data and partly due to intensifying initiatives to legally mandate gender board diversity quotas across many countries (Terjesen et al. 2015, Kirsch 2018). Our contribution consists of providing several stylized facts concerning women tokenism in corporate Europe. One of our objectives for this article was to study the continuance of women in top corporate positions, as well as the prevalence of barriers to greater gender board diversity through the lens of tokenism and spillover hypotheses.

Indeed, data is an important innovation of this paper. While Orbis data was previously used to study gender board diversity (Christiansen et al. 2016), we work with samples larger by several orders of magnitude.¹⁵ The data used here, developed by Drzakowski et al. (2024) relies on full registration records of private and stock-listed firms. This novel data offers insights into previously understudied European corporations: firms which have boards, but which are not listed as public. Note that listed firms contribute roughly 0.4% of our sample. In fact, Matsa and Miller (2011) work with 1,500 companies, while our study covers more than 5 million European firms. Thus, we provide novel evidence on how prevalent tokenism is in majority of European corporations. This is a major innovation, as we know that public companies are increasingly subjected to legislative gender board diversity quotas, including the forthcoming EU directive that requires 40% representation of each gender. We show that the 40% threshold, while potentially relevant for public companies with large boards, is elusive at best for private firms. Specifically, majority of these firms have no women or, at most, one woman in our sample. While Orbis is not designed as a representative sample, for many sectors, countries, and years, it may well be comprehensive. We compare our sample sizes with those used in the earlier literature that studies gender board diversity. We report it in Table A2 in the Appendices. Only a handful of studies comprised private, non-listed firms, covering Nordic countries and Germany. Our study is the first to offer insights for private firms, for 29 European countries spanning four decades.

While it was not the focus of our study, clearly the sample includes stock-listed firms. In many countries, especially in the more recent years, these firms are subject to gender board diversity quotas. Our results are not likely to be affected by these changing regulations. Public (stock-listed) constitute roughly 0.4% of our sample.

In terms of time trends, we show that there was a rapid decline in prevalence of tokenism as a barrier to gender board diversity in the 1990s. Since then, progress has been slow. During the same period, there was a rise in the entry of women to boards: a larger share of firms started having at least one woman in their boards. Again, the 2000s and 2010s offered much less progress. In terms of geography, corporate tokenism does not seem to reflect well the stereotypes: countries ranking high in gender equality may rank both high and low in tokenism of both forms. We also show that countries which are more likely to allow the first woman into boardrooms tend to be the ones in which progress in diversity is not likely. In terms of industries, the patterns prove to be complex: there are some sectors, which tend to have many firms with no women and a high prevalence of token women, but the match is not exact.

Further, we study the persistence of tokenism and spillovers of tokenism. Firms with one woman at time $t - 1$ are roughly 60% more likely to appoint one woman also in time t when compared to firms which did not. We find very high persistence of barriers to greater gender board diversity. If the firm had more than one woman in period $t - 1$, that firm is 40-50% (or roughly 2/3rds) more likely to have no more than one woman when compared to firms with greater gender board diversity.

Finally, we study the role of the number of women in nominating committees and the probability of having women in management roles, the so-called gender board diversity spillovers. We find that a positive number of women in supervisory roles reduces the probability of appointing women to top management positions. This result is very robust and proves to intensify with the number of women in supervisory roles. Actually, with three or more women in supervisory roles, the probability of women in management roles may decline to zero for the majority of firms.

¹⁵See also Kalemli-Ozcan et al. (2015, 2022).

While our main contribution is leveraging a new, comprehensive and relevant data source to provide novel stylized facts about gender tokenism in corporate Europe – our study yields also several important insights for further theoretical work. First, it appears that more research is needed into the differentiation of mechanisms between non-executive and executive roles. So far, the literature has focused on the potential role of women in nominating committees in promoting women to the C-suite. Mandated gender board quotas emerged as one of the policy recommendations. However, it appears that there are trade-offs between the number of women in supervisory (non-executive) positions and the likelihood that more women will be appointed to the highest management echelons.

Furthermore, our research suggests that in addition to the act of *appointment* of women, the literature needs to pay closer attention to the *continuance* in these positions. Our analysis of persistence reveals not only that barriers to greater gender diversity in the boardroom are high, but also that women have a relatively high probability of disappearing from the boardrooms.

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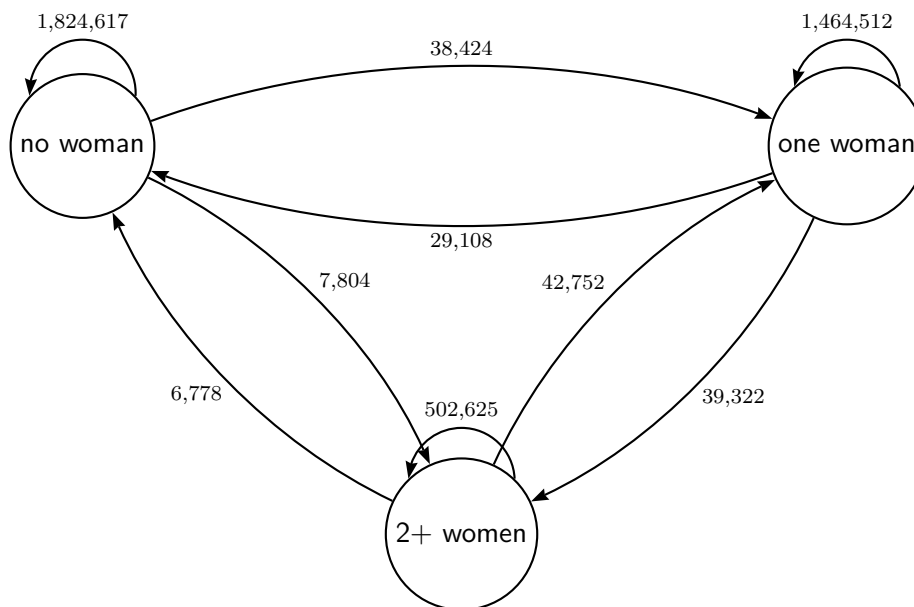
Figures and Tables

Table 1: Sample

	# of unique obs.	# of obs.
Firms	5,910,340	41,157,181
People	21,651,818	114,975,042
Men	16,132,400	85,540,353
Women	5,288,414	28,658,054
Women % in total	24.69	25.10

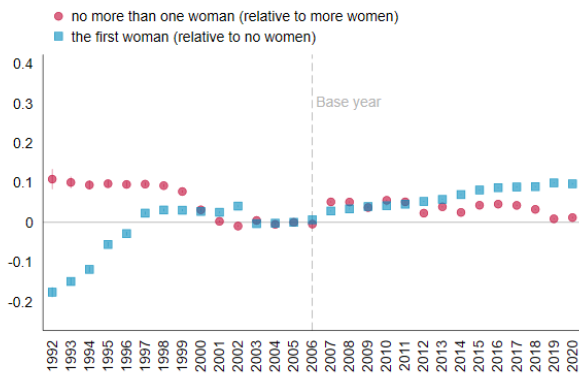
Notes: the data comes from GBDD (Drazkowski et al. 2024). It covers 29 countries and the period 1986-2020. See Table A1 for further descriptive statistics. Figure A3 reports the distribution of the number of board members in our sample

Figure 1: European corporate boardrooms with and without women

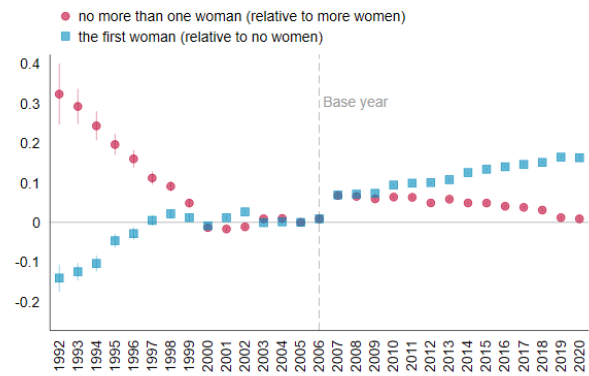


Notes: We adjust all firm-year observations by the relevant average number of years to provide yearly averages. The raw numbers, unadjusted for the number of years, are reported in Figure A1 in the Appendix. In addition, Figure A2 in the Appendix reports probabilities for each 'state' and each 'flow'.

Figure 2: Time trends in tokenism



(a) all firms

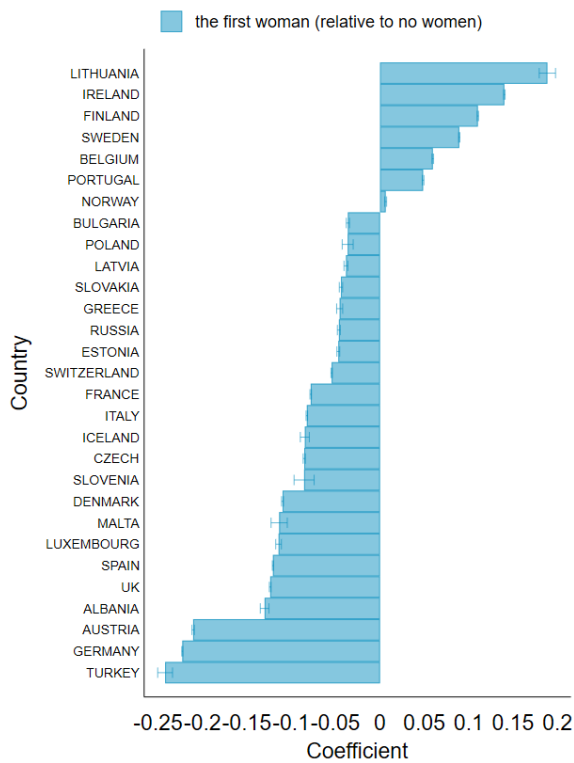


(b) firms which report at least four board members

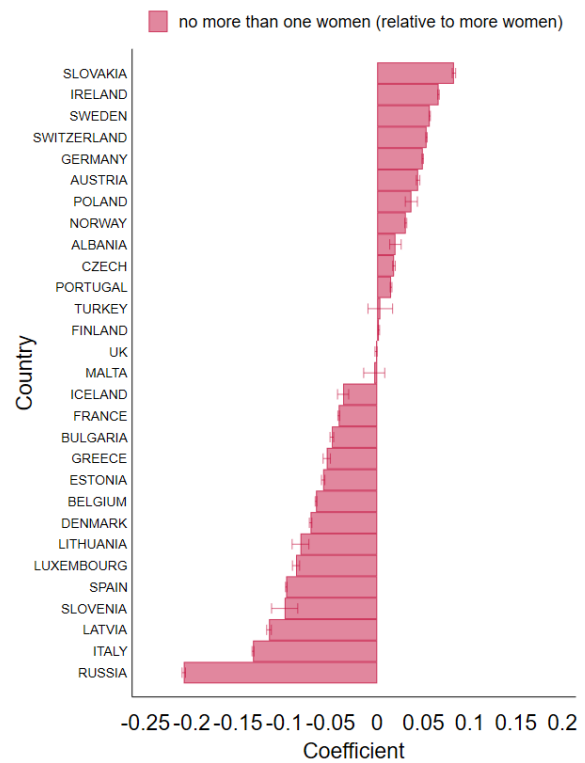
Data: out of the full sample, 0.66% of observations represent the years 1986-1992, for clarity we do not report them in this figure.

Notes: The estimates come from a regression that includes country dummies. For panel (a) we use the sample of 30 mln observations in the regressions of equation (1) and 18 mln observations in the estimation of equation (2). For panel (b) the samples are restricted to 4 mln and 3.5 mln observations, respectively.) The log of detailed point estimates available upon request.

Figure 3: Country specificity in tokenism



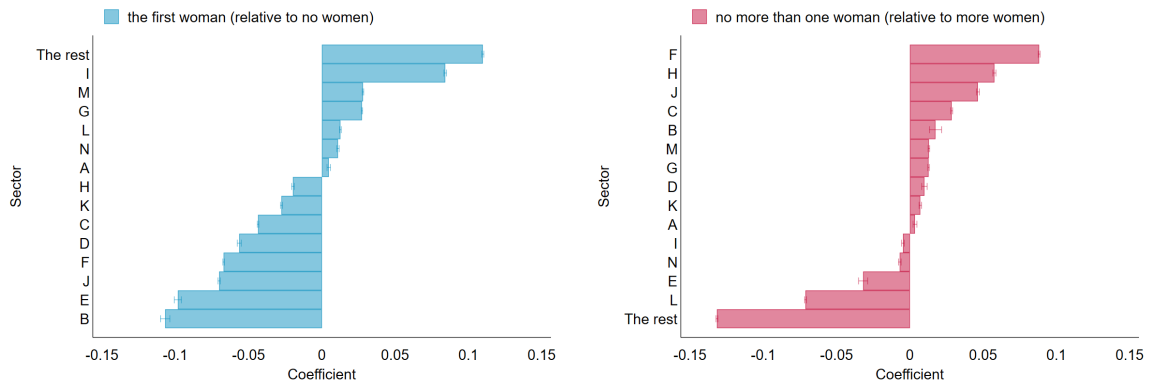
(a) the first woman in boards



(b) no more than one woman in boards

Notes: We reestimate equations (2) and (1) for each country of interest, setting the given country dummy equal 1 for this country and 0 for all other countries. These regressions include time and sector fixed effects. All regressions include weights for country size (as measured by population). We use the sample of 30 mln observations in the regressions of equation (1) and 18 mln observations in the estimation of equation (2). The log of detailed point estimates available upon request.

Figure 4: Sector specificity in tokenism



(a) the first woman in boards

(b) no more than one woman in boards

Notes: We reestimate equations (2) and (1) for each sector of interest, setting the given sector dummy equal 1 for this sector and 0 for all other sectors. These regressions include time and country fixed effects. All regressions include weights for country size (as measured by population). We use the sample of 30 mln observations in the regressions of equation (1) and 18 mln observations in the estimation of equation (2). The log of detailed point estimates available upon request.

Table 2: Tokenism and gender board diversity spillovers

Probability of $token^X = 1$ in time t	(1)	(2)	(3)	(4)	(5)
Panel A: no more than one woman in t (relative to more women), specification (3)					
Women in boards in $t - 1$	-0.050*** (-76.32)	-0.12*** (-176.96)	-0.13*** (-100.61)	-0.13*** (-100.61)	-0.15*** (-71.64)
% of firms with $token_t^B = 1$	0.76	0.76	0.76	0.76	0.73
# of observations	21,576,163	17,866,597	17,866,597	17,866,597	2,112,415
# of firms	3,306,271	2,988,771	2,988,771	2,988,771	336,414
Panel B: one woman (relative to no women), specification (3)					
Women in board in t-1	0.64*** (1245.94)	0.61*** (1108.68)	0.60*** (561.09)	0.62*** (452.20)	0.64*** (452.20)
% of firms with $token_t^F = 1$	0.46	0.46	0.46	0.7	0.53
# of observations	36,017,902	29,748,286	29,748,286	15,528,035	2,907,858
# of firms	5,368,752	4,863,848	4,863,848	2,566,093	338,583
Panel C: no more than one woman (relative to more women), specification (4)					
$token^B$ in t-1	0.51*** (786.66)	0.40*** (599.70)	0.39*** (311.40)	0.39*** (311.40)	0.45*** (182.63)
% of firms with $token_t^B = 1$	0.76	0.76	0.76	0.76	0.72
# of observations	21,089,177	17,449,241	17,449,241	17,449,241	1,918,100
# of firms	3,155,973	2,859,083	2,859,083	2,859,083	272,323
Panel D: one woman (relative to no women), specification (4)					
$token^F$ in t-1	0.66*** (1305.92)	0.63*** (1147.57)	0.61*** (567.08)	0.63*** (454.76)	0.65*** (448.12)
% of firms with $token_t^F = 1$	0.45	0.45	0.53	0.69	0.52
# of observations	35,561,600	29,383,412	29,383,412	15,242,353	2,831,960
# of firms	5,328,305	4,835,640	4,835,640	2,543,792	335,514
Firm fixed effects	YES	YES	YES	YES	YES
Sector fixed effects	-	YES	YES	YES	YES
Time fixed effects	-	YES	YES	YES	YES
Log of number of people in C-suite	-	YES	YES	YES	YES
HHI	-	YES	YES	YES	YES
Country weights	-	-	YES	YES	YES
Without never-takers	-	-	-	YES	YES
Without always-takers	-	-	-	-	YES

Data: Panel A includes those firm-year observations which report at least one woman in the boardroom in period t . Panel B includes those firm-year observations which report no woman or strictly one woman in period t . Panel C includes those firm-years which which report at least one woman in the boardroom in both periods. In Panel D includes those firm-year observations which report no woman or strictly one woman in both periods. Thus, the sample is larger in Panel A than in Panel C and, analogously in Panel B than in Panel D.

Notes: The model is estimated with a panel version of OLS with standard errors clustered at firm level. t-statistics reported in the parentheses. *** denotes significance at 0.01% level. HHI signifies Herfindahl-Hirschman index and was computed using employment data in a given sector, country and year. Country weights reflect population size. Always-takers are defined as firms which have at least one woman in supervisory roles in each year in our sample. Never-takers are defined as firms which report no single woman in any of the years in our sample.

Table 3: Tokenism and gender board diversity spillovers

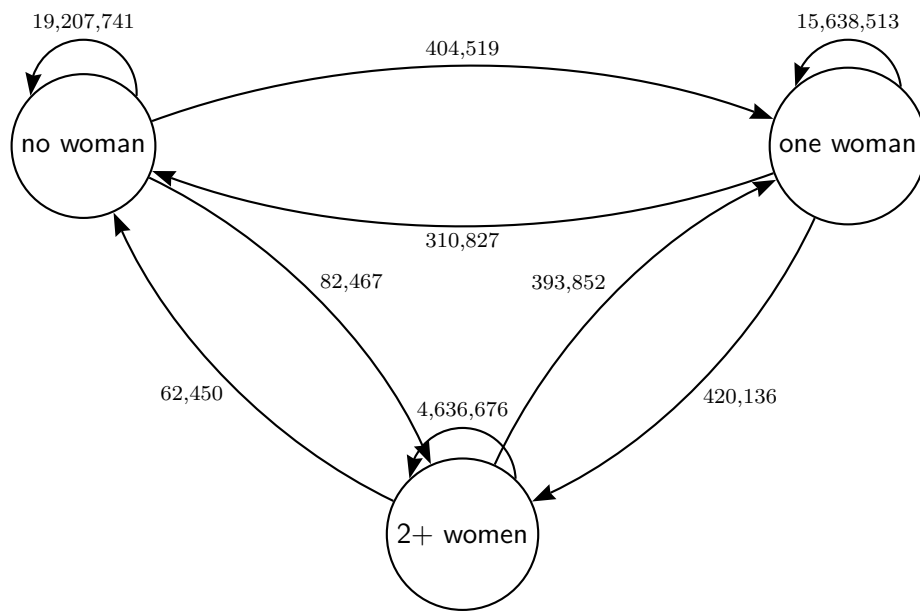
1+ woman in top management role in t	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: supervisory roles include all c-suite positions not assigned to management roles (broad)						
$one_{t-1} (\beta_{one})$	-0.027*** (-31.98)	-0.052*** (-62.00)	-0.053*** (-62.69)	-0.048*** (-42.19)	-0.14*** (-47.51)	-0.21*** (-48.51)
$two_{t-1} (\beta_{two})$	-0.040*** (-32.58)	-0.093*** (-75.87)	-0.094*** (-76.82)	-0.082*** (-47.42)	-0.24*** (-54.79)	-0.35*** (-57.83)
$three_{t-1} (\beta_{three})$	-0.023*** (-11.43)	-0.10*** (-52.85)	-0.11*** (-53.63)	-0.092*** (-33.66)	-0.27*** (-43.81)	-0.41*** (-47.07)
% of firms w/ 1+ woman	0.21	0.21	0.21	0.21	0.68	0.37
# of observations	10,958,286	9,687,341	9,687,341	9,687,341	2,953,749	1,434,846
# of firms	1,822,687	1,710,905	1,710,905	1,710,905	497,006	186,596
Panel B: supervisory roles include <i>only</i> of supervisory positions (strict)						
$one_{t-1} (\beta_{one})$	0.018*** (6.18)	-0.016*** (-5.48)	-0.016*** (-5.50)	-0.020*** (-2.72)	-0.041*** (-2.58)	-0.055*** (-2.69)
$two_{t-1} (\beta_{two})$	0.033*** (8.10)	-0.022*** (-5.45)	-0.022*** (-5.48)	-0.040*** (-4.07)	-0.089*** (-4.20)	-0.12*** (-4.37)
$three_{t-1} (\beta_{three})$	0.073*** (12.28)	-0.011* (-1.95)	-0.011** (-1.97)	-0.038*** (-2.97)	-0.091*** (-3.34)	-0.12*** (-3.25)
% of firms w/ 1+ woman	0.24	0.24	0.24	0.24	0.64	0.41
# of observations	640,334	577,489	577,489	577,489	214,280	127,045
# of firms	133,425	126,103	126,103	126,103	43,442	22,321
Firm fixed effects	YES	YES	YES	YES	YES	YES
Sector fixed effects	-	YES	YES	YES	YES	YES
Time fixed effects	-	YES	YES	YES	YES	YES
Log of number of people in C-suite	-	YES	YES	YES	YES	YES
HHI	-	YES	YES	YES	YES	YES
Eliminating self-promotion	-	-	YES	YES	YES	YES
Country weights	-	-	-	YES	YES	YES
Without never-takers	-	-	-	-	YES	YES
Without always-takers	-	-	-	-	-	YES

Data: Panel A includes all the firms for which individuals in supervisory roles were identified. The definition of BoD includes all board members who are not assigned to management (executive) positions in GBDD. In Panel B the supervisory roles positions are restricted to those unequivocally assigned to supervisory (non-executive) board. Thus, the sample is larger in Panel A, because a less restrictive definition of supervisory roles is applied. If a company does not report individuals on such board in a given year, it is not included in the sample.

Notes: The model is estimated with a panel version of OLS with standard errors clustered at firm level. t-statistics are reported in the parentheses. *** denotes significance at 0.01% level. HHI signifies Herfindahl-Hirschman index and was computed using employment data in a given sector, country and year. We classify as self-promotions the cases when the same individual moves from a supervisory to a management role with two years. Country weights reflect population size. Always-takers are defined as firms which have at least one woman in supervisory roles in each year in our sample. Never-takers are defined as firms which report no single woman in any of the years in our sample.

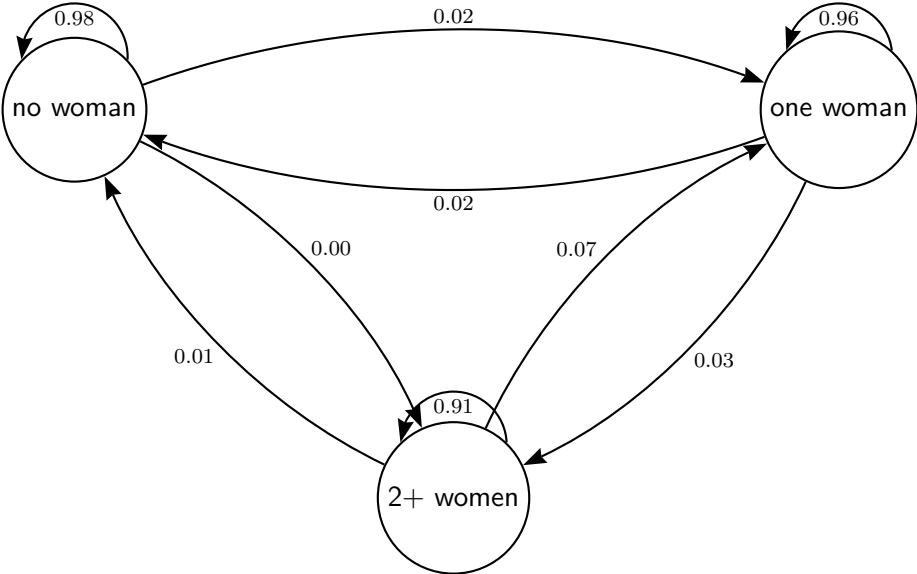
A Additional data descriptives and results

Figure A1: European corporate boardrooms with and without women – unadjusted sample



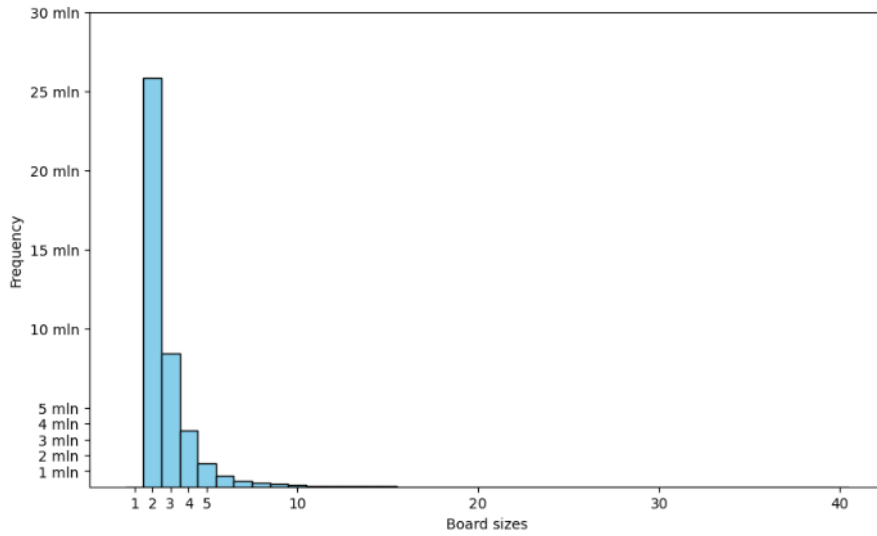
Notes: The data comes from GBDD (Drazkowski et al. 2024).

Figure A2: European corporate boardrooms with and without women – unconditional probabilities



Notes: The data comes from GBDD (Drazkowski et al. 2024). The sum of probabilities of outgoing flows equal to 1. The probabilities are rounded to two significant digits

Figure A3: Count of how many boards have certain size



Notes: the data comes from GBDD (Drazkowski et al. 2024). The total number of board members is a sum of observations for management roles and supervisory roles. We study only the boards of size 2 and more and for which we observe at least 2 years.

Table A1: Sample descriptives

	# of unique obs.	# of obs.	# of observations in		
			management	supervisory (strict)	supervisory (broad)
Firms	5,910,340	41,157,181	29,729,215	1,140,893	21,735,998
People	21,651,818	114,975,042	60,721,564	3,516,241	50,812,912
Men	16,132,400	85,540,353	46,167,422	2,722,353	36,712,412
Women	5,288,414	28,658,054	14,256,179	749,464	13,666,175
Women % in total	24.69	25.10	23.59	21.59	27.13

Notes: the data comes from GBDD (Drazkowski et al. 2024). It covers 29 countries and the period 1985-2020. The total number of observations is lower than the sum of observations for management roles and supervisory roles because for some firms there are two or more board assignments.

Table A2: Samples used in gender board diversity spillover literature

Study	# Firms / # obs.	Public / Private	Countries	Sample
Harrigan (1981)	112 / 221	Public	USA	Fortune 500
Farrell and Hersch (2005)	300 / 2972	Public	USA	Fortune 500 & Service 500
Elkinawy and Stater (2011)	n.a. / 31,594	Public	USA	ExecuComp
Matsa and Miller (2011)	1,500 / 13,491	Public	USA	ExecuComp
Matsa and Miller (2013)	1,207 / 1,664	Both	Nordic	Orbis & Norwegian Register
Smith et al. (2013)	3,053 / 57,632	Both	Denmark	Statistics Denmark
Kunze and Miller (2017)	4,000 / 744,531	Private	Norway	Statistics Norway & NHO survey
Gould et al. (2018)	1,387 / 10,330	Public	Australia	Sirca
Smith and Parrotta (2018)	3,625 / 47,125	Both	Denmark	Statistics Denmark & Experian
Bertrand et al. (2019)	1,295 / n.a.	Both	Norway	Norwegian Register
Guldiken et al. (2019)	184 / 747	Public	USA	BoardEx
Knippen et al. (2019)	1,699 / 14,325	Public	USA	BoardEx, COMPUSTAT
Bossler et al. (2020)	33,237 / 148,131	Both	Germany	IEB of IAB
Kirsch and Wrohlich (2020)	200 / 1,400	Public	Germany	DIW Berlin
Bozhinov et al. (2021)	149 / 673	Public	Germany	German annual reports
Maida and Weber (2022)	6,426 / n.a.	Both	Italy	Italian Social Security Institute
Fleischer (2022)	304 / 2,432	Public	Germany	CDAX
Garcia-Blandon et al. (2023)	475 / 1,229	Public	Nordic	Refinitiv Workspace
Schoonjans et al. (2024)	3,353 / 27,486	Public	17 European	Orbis

Notes: The data comes from GBDD (Drazkowski et al. 2024). The number of observations refers to firm-years, except for Elkinawy and Stater (2011), Smith et al. (2013) and Kunze and Miller (2017), where the observations refer to person-years.

Table A3: Tokenism and gender board diversity spillovers: boards with at least four members

Probability of $token^X = 1$ in time t	(1)	(2)	(3)	(4)	(5)
Panel A: no more than one woman in t (relative to more women), specification (3)					
Women in boards in $t - 1$	-0.090*** (-84.47)	-0.089*** (-81.80)	-0.095*** (-45.37)	-0.095*** (-45.37)	-0.088*** (-37.39)
% of firms with $token_t^B = 1$	0.43	0.43	0.43	0.43	0.73
# of observations	4,183,478	3,587,951	3,587,951	3,587,951	1,166,415
# of firms	989,953	904,774	904,774	904,774	337,531
Panel B: one woman (relative to no women), specification (3)					
Women in board in $t-1$	0.47*** (368.28)	0.45*** (333.85)	0.46*** (191.03)	0.47*** (191.72)	0.48*** (195.31)
% of firms with $token_t^F = 1$	0.41	0.41	0.41	0.73	0.56
# of observations	4,455,063	3,818,055	3,818,055	2,129,750	1,320,168
# of firms	1,067,649	976,261	976,261	525,056	303,170
Panel C: no more than one woman (relative to more women), specification (4)					
$token^B$ in $t-1$	0.33*** (247.77)	0.29*** (222.97)	0.33*** (131.12)	0.33*** (131.12)	0.37*** (92.34)
% of firms with $token_t^B = 1$	0.41	0.41	0.41	0.41	0.61
# of observations	3,885,533	3,320,892	3,320,892	3,320,892	920,649
# of firms	989,953	802,142	802,142	802,142	242,912
Panel D: one woman (relative to no women), specification (4)					
$token^F$ in $t-1$	0.48*** (369.66)	0.45*** (333.86)	0.47*** (188.20)	0.47*** (187.74)	0.49*** (191.18)
% of firms with $token_t^F = 1$	0.4	0.4	0.4	0.72	0.55
# of observations	4,377,044	3,753,823	3,753,823	2,066,960	1,288,530
# of firms	1,055,694	966,874	966,874	516,024	299,836
Firm fixed effects	YES	YES	YES	YES	YES
Sector fixed effects	-	YES	YES	YES	YES
Time fixed effects	-	YES	YES	YES	YES
Log of number of people in C-suite	-	YES	YES	YES	YES
HHI	-	YES	YES	YES	YES
Country weights	-	-	YES	YES	YES
Without never-takers	-	-	-	YES	YES
Without always-takers	-	27	-	-	YES

Data: Panel A includes those firm-year observations which report at least one woman in the boardroom in period t . Panel B includes those firm-year observations which report no woman or strictly one woman in period t . Panel C includes those

Table A4: Tokenism and gender board diversity spillovers: boards with at least four members

1+ woman in top management role in t	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: supervisory roles include all c-suite positions not assigned to management roles (broad)						
$one_{t-1} (\beta_{one})$	0.014*** (7.12)	-0.0077*** (-3.95)	-0.0070*** (-3.60)	-0.0068** (-2.35)	-0.023*** (-2.99)	-0.035*** (-3.93)
$two_{t-1} (\beta_{two})$	0.017*** (6.69)	-0.020*** (-7.93)	-0.019*** (-7.48)	-0.017*** (-4.39)	-0.054*** (-5.97)	-0.081*** (-7.23)
$three+_{t-1} (\beta_{three})$	0.031*** (8.88)	-0.029*** (-8.88)	-0.028*** (-8.53)	-0.024*** (-5.23)	-0.088*** (-8.59)	-0.13*** (-10.31)
% of firms w/ 1+ woman	0.21	0.21	0.21	0.21	0.68	0.37
# of observations	1,551,874	1,419,656	1,419,656	1,419,656	503,816	302,985
Panel B: supervisory roles include <i>only</i> of supervisory positions (strict)						
$one_{t-1} (\beta_{one})$	0.014*** (3.41)	-0.0036 (-0.88)	-0.0036 (-0.88)	-0.0059 (-0.46)	-0.011 (-0.46)	-0.024 (-0.77)
$two_{t-1} (\beta_{two})$	0.030*** (5.47)	0.00053 (0.10)	0.00045 (0.08)	0.0031 (0.19)	-0.0016 (-0.05)	-0.018 (-0.45)
$three+_{t-1} (\beta_{three})$	0.065*** (8.51)	0.0044 (0.59)	0.0046 (0.62)	0.0049 (0.25)	-0.0053 (-0.15)	-0.022 (-0.47)
% of firms w/ 1+ woman	0.24	0.24	0.24	0.24	0.64	0.41
# of observations	229,430	207,368	207,368	207,368	83,107	49,123
Firm fixed effects	YES	YES	YES	YES	YES	YES
Sector fixed effects	-	YES	YES	YES	YES	YES
Time fixed effects	-	YES	YES	YES	YES	YES
Log of number of people in C-suite	-	YES	YES	YES	YES	YES
HHI	-	YES	YES	YES	YES	YES
Eliminating self-promotion	-	-	YES	YES	YES	YES
Country weights	-	-	-	YES	YES	YES
Without never-takers	-	-	-	-	YES	YES
Without always-takers	-	-	-	-	-	YES

Data: Panel A includes all the firms for which individuals in supervisory roles were identified. The definition of BoD includes all board members who are not assigned to management (executive) positions in GBDD. In Panel B the supervisory roles positions are restricted to those unequivocally assigned to supervisory (non-executive) board. Thus, the sample is larger in Panel A, because a less restrictive definition of supervisory roles is applied. If a company does not report individuals on such board in a given year, it is not included in the sample.

Notes: The model is estimated with a panel version of OLS with standard errors clustered at firm level. t-statistics are reported in the parentheses. *** denotes significance at 0.01% level. HHI signifies Herfindahl-Hirschman index and was computed using employment data in a given sector, country and year. We classify as self-promotions the cases when the same individual moves from a supervisory to a management role with two years. Country weights reflect population size. Always-takers are defined as firms which have at least one woman in supervisory roles in each year in our sample. Never-takers are defined as firms which report no single woman in any of the years in our sample.