Why so few women on boards of directors?
Empirical evidence from Danish companies 1998-2010

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Conflict of interest

The authors hereby declare that they have no conflict of interest.

Abbreviations

BOD	boards of directors
CEO	chief executive officer
CFO	chief financial officer
COO	chief operating officer
ED	executive directors
EEBMs	employee-elected board members
FE	fixed effect panel regression
FTSE	Financial Times and the London Stock Exchange (UK stock index)
NED	non-executive director
NC	nomination committees
POP	pool of potential executives
RE	random effects panel regression
VP	vice-president of the board of directors
WOCB	women on corporate boards

ABSTRACT

This paper analyzes the determinants of women's representation on boards of directors based on a panel of all privately owned or listed Danish firms with at least 50 employees observed during the period 1998-2010. We focus on the directors who are not elected by the employees and test three hypotheses on female board representation that we denote the female-led hypothesis, the tokenism hypothesis, and the pipeline hypothesis, respectively. We find evidence rejecting the female-led hypothesis. Firms with a female chairperson on the board of directors tend to have significantly fewer other non-employee-elected female board members. We also find clear evidence of a tokenism behavior in Danish companies. The likelihood of enlarging the share of non-employee-elected female board members is significantly smaller if one, two or more women have sat on the board of directors. Finally, the pipeline hypothesis is partly confirmed. The relation between the female pipeline of potentially qualified directors and female directors is weaker than the similar relation for males. Our findings offer insights to policy makers interested in promoting gender diversity within boardrooms. Our empirical evidence suggests that an important way to increase the female proportion of non-employee-elected board members is that more women reach top executive positions.

Keywords: Corporate Governance, Gender Gap, Female-led Companies, Tokenism Hypothesis, Pipeline Hypothesis.

INTRODUCTION

In many countries, more than half of all university graduates are women; in addition, women have been full-time members of the labor force for decades. However, women appear to have large difficulties in attaining to the top of the hierarchy in companies despite their increasing educational levels and despite an increasing proportion of women who succeed in climbing at least a few steps on the career ladder in these firms. In 2013, the largest US companies (Fortune 500) had a female proportion of approximately 17 percent, see Catalyst (2013). For EU countries, the picture is nearly the same. In 2013, 18 percent of the members of the boards of directors in EU countries were women, see EU Commission (2014a, b). From an economic point of view, this evidence may reflect a loss of talent and human capital investments and may cause a loss of efficiency for the firms. There may also be other non-economic and more ethical arguments, such as fairness and equal opportunities arguments, for a larger proportion of women reaching top positions and sitting on boards of directors, see Oakley (2000). More women in powerful positions within the firm may have consequences for the firm culture and attitudes towards female employees at lower levels in the organization, Bell (2005), and it may affect the image and legitimacy of the company, see Terjesen, Sealy, and Singh (2009). Thus, in most countries there is a heated debate on the following question: Why have so few women succeeded in obtaining a position on the boards of directors even in countries where equal opportunity policies and affirmative action have been in force for decades?

However, times are changing. Recently, starting with the gender quota of 40 percent put in force in Norway in 2008, a number of European countries have either implemented or announced regulations governing board compositions for the largest companies. In many countries, soft law regulations have been introduced during recent years where a more gender balanced composition of boards of directors are included in the guidelines for good corporate guidelines, see survey on regulations in different countries in Smith (2014). The EU Commission has discussed a gender quota of 40 percent for all large EU companies in accordance with the Norwegian quota. Although the EU initiative has

not yet been approved, the national regulations in a number of EU countries and the mere discussion on potential quota legislation at the EU level may have had an impact on the female representation on the boards (Grosvold and Brammer, 2011). Therefore, although the female percentage on the boards of directors of the largest EU companies remains fairly low, this percentage has increased by as much as 50 percent within recent years, from 9 percent in 2003 to 18 percent in 2013, see Smith (2014). For Denmark the same figures were 11 percent in 2003 and 17 percent in 2013. In Denmark, gender diversity on board of directors was introduced in the guidelines on good corporate governance in 2008. There is no binding gender quota for boards of directors in private sector companies, and the Danish government has decided – in contrast to some other Nordic countries - not to introduce a binding quota. Instead, a much more flexible regulation of the largest 1100 private sector companies was introduced in 2013, see Smith and Smith (2015). The companies have to set individual targets for the proportion of women on the board of directors and for the highest levels of top executives.

In this work, we test three potentially alternative hypotheses on why so few women sit on the boards of directors, using a large representative panel data set of 3,625 Danish companies, observed during a 13-year period for all Danish companies in the private sector, publicly listed companies as well as family owned companies. We test whether (i) female-led companies have more women on their boards of directors (i.e., female-led hypothesis), (ii) the presence of one or few women in a boardroom reduces the likelihood of hiring more women onto the board of directors (i.e., token hypothesis), and (iii) the relation between the female pipeline of potentially qualified directors and female directors is weaker than the similar relation for males. Whereas the first two hypotheses mentioned have previously been tested for other countries, the pipeline hypothesis has, to our knowledge, not been empirically tested. Furthermore, the richness of the data set available for this study allows us to provide evidence of joint testing for all three hypotheses. Thus, both the separate

testing of the pipeline hypothesis and the joint testing of all three hypotheses represent the novelties and main contributions of our empirical analysis.

We provide evidence rejecting the female-led hypothesis and supporting the token hypothesis. Specifically, we find that companies with a female chairperson tend to have an approximately 4 percent lower share of women on the board among the non-employee-elected members. This result is instead consistent with a tokenism story. Indeed, we find clear evidence of a tokenism behavior: having a female non-employees-elected board member is related to a reduction in the chance of hiring at least one more woman on the board by approximately 17 percentage points; the relation almost doubles (is 1.5 times larger) if we consider cases of only two (more than two) women on board. Concerning the pipeline hypothesis, our results suggest that solely women who already succeeded in attaining a company's top position are likely to be hired onto the board of directors, and that female potential board members have fewer chances in obtaining a seat in boardrooms than their male peers. Interestingly, a joint testing of all three hypotheses suggests that (a) a significant part of the evidence concerning the female-led hypothesis may be attributed to the tokenism effect rather than to the female chair, (b) the share of women among potential board members is weakly linked to the share of women on the board of directors.

According to our findings, the moderate increase in the female representation on the boards of directors may reflect an outside pressure for diversity, which often solely implies that one (or few) non-employee-elected woman will access the boardroom, as expected by the token theory. Furthermore, our findings suggest that an important way to increase the female proportion of non-employee-elected board members is that more women reach top executive positions.

EARLIER EMPIRICAL STUDIES

A number of empirical studies analyze the gender composition of boards with a focus on different perspectives. Some studies analyze whether the relative representation of women is greater in larger

companies and boards of directors (BOD) with more directors. This appears to be the case according to most empirical studies. This is the case for studies based on US data (Hyland and Marcellino, 2002; Hillman et al., 2002), Norwegian companies (Groswold et al., 2007), the top 500 Australian companies (Wang and Clift, 2009), and a cross-country study of European banks (de Cabo et al., 2012). However, Kang et al. (2007) do not find that there are more women on corporate boards (WOCB) in larger BODs in the top 100 Australian companies or UK companies (Groswold et al., 2007). In the studies, which test for industry differences, there is no clear pattern with respect to female representation on BODs across industries. However, there seems to be more WOCBs in industries or companies with higher female employment at lower levels in the industries or companies (Bilimoria, 2006; Hillman et al., 2007).

The competences of female board members are analyzed in a number of studies. An extensive survey is given in Terjesen et al. (2009). According to a study by Burke (1997a) based on a survey of Canadian female directors, the most important qualifications are 'strong track record, business contacts, an understanding of business and advanced education' (Burke, 1997a, p. 123) and being known personally to the CEO of the company or other board members (Burke, 1997b). The same type of competence is stressed in the studies by Singh and Vinnicombe (2004), who analyze UK FTSE-100 companies, and Sheridan and Milgate (2005), who use a survey of male and female Australian directors in publicly listed companies. The Australian female directors also highlight the importance of 'visibility in the public' and 'family relations to the owner of the company' as important determinants of their board membership. Dunn (2012) estimates a model of the probability of hiring a woman onto an only-male board based on Canadian data. Women who are hired onto boards that earlier had no women tend to have specialist competences (professional bankers, lawyers, government bureaucrats, and public relation experts). When extending the estimation to all new hires in the sample, including boards that had women on boards, Dunn concludes that experience as a business manager is the most important background for women in addition to network relations to

other directors (Sheridan, 2002). These results are parallel to the results for US Fortune 500 firms reported in the study by Peterson and Philpot (2007) and the results reported by Nekhili and Gatfaoui (2013) for French large and mid-capitalized companies.

Singh and Vinnicombe (2004, p. 485) note that despite this, it appears to be very important for potential female board members to hold a top executive position or to have served earlier as a director; 'there are many male directors in the FTSE 100 index who do not appear to have had CEO status before their appointments as NEDs' (i.e., become a non-executive director, NED, in a board other than the board of the company where he is presently an executive officer). This evidence may be taken as an indication of higher barriers (or recruitment standards) for women than for men and may reflect direct or indirect and unconscious types of discrimination against women, see Oakley (2000). This means that, although potential female board members may have the same formal or informal competences as their male peers, they may not succeed to obtain a seat on the BOD to the same extent as their male peers because of higher hiring standards for females, see Terjesen et al. (2009) for a recent survey on female competences and board positions.

The empirical evidence of the importance of personal networks with other (most likely male) CEOs and board members and a track record in general indicates that this is a way of reducing uncertainty regarding a woman's actual competences, i.e., this may reflect classical statistical discrimination mechanisms as discussed below (Burke, 1997b). As a consequence of this mechanism and combined with the increasing efforts in many companies to increase board diversity, the relatively few women who succeed in attaining top executive positions or becoming directors in large companies become a highly demanded group of women who are often acting on a number of boards. These women tend to obtain more board offers than their male peers, and they may be in a position where they are able to self-select into the most attractive and/or best performing companies, see Farrell and Hersch (2005). Hillman et al. (2002) find that females on the boards of US Fortune 1000 companies tend to join multiple boards at a faster rate than white male directors, i.e., given that the competences of female

directors have been discovered they seem to be more successful in obtaining board membership than their male peers. Sealy et al., (2007) document similar results for UK FTSE 100 companies.

The increasing pressure for diversity, which is present in many countries, may be one of the factors explaining that the decreasing proportion of 'male-only' boards in these countries, see Farrell and Hersch (2005) and Dunn (2012). However, very often this means that, once the target is met with one woman on the board, there are no further hires of women to the board, i.e., the one woman is supposed to fulfill the diversity requirement with respect to the representation of women; this is often called tokenism behavior. Farrell and Hersch (2005) estimate a model of the gender of new hires in US Fortune 500 and Service 500 companies in the 1990s. They find that the likelihood of hiring a woman for a board is significantly smaller if one or more women currently sit on the board. Furthermore, if a woman leaves the board, this increases the chance that she is substituted with another woman, and not a male board member. These empirical findings seem to support the token theory that women on boards of directors with exactly one female board member act as 'tokens' for all women instead of being considered board members on a par with all other (male) board members. Singh and Vinnicombe (2004, p.486) conclude in their study of FTSE 100 companies in the UK that, despite the frequent existence of only one woman on a BOD, "The successful women directors have strong backgrounds and significant corporate experience, and do not appear to have been recruited as 'token' women."

A few studies focus on the role of powerful women in chairperson positions on the BOD, as female CEOs or female members of nomination committees (NC). Kaczmarek et al. (2012) find that for UK FTSE350 companies the representation of females in the NC has a positive impact on WOCB as well as more non-national directors. The same results are found for publicly listed Swiss companies (Ruigrok et al., 2006). A related result is found in Phillips (2005). The latter study finds that companies (US law firms) that were founded by women or had women in top management positions

from inception, tended to replicate this pattern in the next 'generation' of the organization, i.e., the gender composition of boards may be 'path dependent' and stable over time.

Hypotheses on gender composition of boards of directors

There is considerable variation across countries with respect to the traditions or formal regulation of board composition and nomination processes.[i] Formerly, in most countries the norm was that the CEO and other members of the executive board (Executive directors, EDs) were full members of the BOD. In this case, theories and empirical evidence concerning WOCB are, by definition, closely related to theory and evidence relating to female promotion rates into top executive positions. In Denmark, as in many continental European countries, this is no longer considered good corporate governance, and the EDs are seldom members of the BOD (two-tier system). Another institutional aspect relates to the size of the company. Publicly listed companies, which are typically larger companies, must comply with a number of regulations, including regulations regarding BOD independence. However, smaller companies, which are often family-owned companies, are less regulated, and board members are often related, as family, to the owners. Furthermore, there are regulations regarding the number of board members elected by the employees of the firm (in this study, denoted 'employee-elected board members', EEBMs). The determinants of being elected as a female EEBM are expected to be a different process compared to being appointed as a board member elected by the general assembly by the stakeholders of the company, or appointed by the nomination committee, see Data section below. We focus mainly on the determinants of the gender composition of the latter group in this study, i.e., the focus is on non-EEBMs who are appointed by the owner or the nomination committee.[ii]

The gender composition of WOCB (excluding the EEBMs) may be explained by a number of alternative theories ranging from theories of pure discrimination, for instance, due to powerful male business leaders who may have a disutility for having women on the board, to theories that explain

the low female representation by lack of female competence or lack of female interest in demanding top management positions. Singh and Vinnicombe (2004) and Terjesen et al. (2009) offer extensive surveys of the theories on women directors on corporate boards.

The classical economic discrimination theory, for instance, as discussed by Becker (1957), states that individuals from minority groups may face discriminatory behavior simply because firms, customers or colleagues dislike engaging with the minority group. This classical discrimination behavior is seldom used to explain the low representation of women in the boardroom; however, the notion of the 'old boys' network' may basically reflect the same mechanisms. Alternatively, as stated by Singh and Vinnicombe (2004, p. 479): "..senior women do not easily gain access to the boardroom where an elite group of male directors maintain their power." In the same paper (p.480), Singh and Vinnicombe also stress that these discriminatory mechanisms "may be unintentional, subtle forms of discrimination."

The sociological and management literature often explains the lack of women on boards by 'gender stereotyping' and 'homosocial reproduction' theories, see Schein (1973) and Kanter (1977). The 'Think Manager-Think Male' hypothesis says that there is a tight relation between sex role stereotypes and the characteristics that are requested in order to become a successful manager, i.e., there are different hiring standards for men and women, see Schein (1973). The recruiting agents and the potential top managers or board members tend to have gender stereotype views on what it takes to occupy top management positions. This may give rise to the (statistical) discrimination effects described above. This may also affect women's perception of their own chances of getting board positions and their self-confidence with respect to filling the positions as board members. In accordance with these considerations, and with the results found in Ruigrok et al. (2006) and Kaczmarek et al. (2012) we expect that female-led companies, i.e., companies with a female chairperson, will tend to be less subject to gender stereotype views compared with firms with no females on the nomination committee. We denote this hypothesis, the 'female-led' hypothesis:

Hypothesis 1: Female-led companies (companies with a female chairperson) are more likely to have other female directors.

In the recent decades, the number of companies with no women on the board has decreased significantly in many countries, see for instance Catalyst (2004) for the US Fortune 500 companies and Singh and Vinnicombe (2004) for UK FTSE companies. However, very often one sole woman is observed for years (among the non-EEBM); in addition it appears to be much rarer to obtain a seat for the second woman on the board than the first one. This is often explained by the token theory, see Kanter (1977). The 'token' board member is seen as representing the 'minority' in general, i.e., in this case women, and they are not considered a board member with broad board competence, to the same extent as other board members. Therefore, only one woman is hired and the chance of hiring the second woman for the board is lower than for the first female hired. In the cases where more women eventually join the board, this may change the perception of women, as documented in Kanter (1977). However, causality may, of course, also operate in the opposite way: Only companies with fairly neutral gender views among the recruiting agents or the nomination committee may have more women on their boards. Thus, according to this hypothesis, we may expect companies that currently have exactly one woman on the board to have a lower probability of having a second (or more) woman on the board (among the non-EEBMs). This hypothesis is denoted, the 'tokenism hypothesis':

Hypothesis 2: Female board members act as tokens and the chance of hiring one more female board member is much lower than the chance of hiring the first female board member(s).

The concept of discrimination basically refers to a situation where equally productive workers are treated differently. Therefore, an important question is: Are women as competent as men regarding competences relevant to the tasks that a board of directors is responsible for? The role of the board is usually described by two main tasks: advising the management board, and monitoring, hiring, and firing the management board, as specified, for instance, by Adams and Ferreira (2007). A reformulation of the question above is: Which competences are important for being a competent board member who is able to act as an advising and monitoring agent in the boardroom for the CEO, COO, CFO, and remainder of the management board? The 'classical human capital' competence, i.e., having a university degree or having lengthy experience and tenure as managers at lower levels may not be sufficient competence for serving on a board of a large company. It may be equally important that the board members are "powerful" individuals who are able to match the competences of the CEO and management board. Adams and Ferreira (2009, p. 297) state that 'For gender diversity to have an impact on board governance, it is not sufficient that female directors behave differently than male directors. Their behavior should also affect the working of the board.' Huse et al. (2009) reach the same conclusion based on a study of Norwegian companies. If the individual shall be able to act as a valuable board member and be able to impact the board decisions, the professional image and esteem of the board member is important, pursuant to Huse et al. (2009). Therefore, to be in the pipeline of qualified board members, the individual should have relevant experience as a top executive or otherwise be a powerful individual who is able to impact the decisions of the management board. Assuming that the main relevant competence as a board member is to be in a CEO position or to possess this type of job experience, it is plausible to assume that the proportion of females in the boardroom is positively affected by the size of the `pipeline' of females in top management positions.

If the typical female pipeline to the boardroom flows through the executive suite, a next relevant question to pose is: Do potential male and female board members face the same hiring standards?

Alternatively, are the hiring standards higher for women? Theories on statistical discrimination may state that, because female members in the boardroom and in top management positions are a minority, they are also subject to a larger uncertainty regarding their qualifications and competences. In addition, this uncertainty may explain higher hiring standards for women, despite being as productive (i.e., competent) as their male peers, see for instance Bjerk (2008). If women tend to socialize less than men with the recruiting agents (e.g., the members of the nomination committee), for instance, because they are not participating in the same social networks as their male peers, this increases the 'risk' and uncertainty related to hiring a woman for the board. Therefore, it may be rational for the nomination committee to set higher hiring standards for female board members. One method of setting a higher hiring standard or reducing the 'risk' related to appointing a woman for the board, is to hire a woman who has already succeeded in attaining a company's top position, either as a CEO or a management board member or a member of other boards of directors. If these mechanisms are occurring to a larger extent for women than for men, we should expect that the impact of the potential male and female 'pipelines' is different, i.e., that the size of the coefficient of the male 'pipeline' variable (share of males among the potential board members) is larger than for females.

Hypothesis 3: The relation between the pipeline of potential female board members and women on corporate boards is weaker than the similar relation for men.

DATA

Sample

The study is based on an unbalanced panel of all privately owned or listed Danish firms with at least 50 employees observed during the period 1998-2010. Only companies that have a formal BOD registered by the Danish authorities (Erhvervsstyrelsen) are included in the sample. The study is

based on information retrieved from Danish administrative registers supplied by Statistics Denmark. Register data from Statistics Denmark includes an extensive amount of information both at the individual level (for all employees in the company) and the firm level, which can be merged by using an employer-employee link variable.[iii] These data are supplemented with variables from a private Danish data account register (Experian). Experian collects information on economic performance, names of board members, and other relevant data based on annual company reports to the authorities. The Experian register contains information on the names of the chairperson and the other board members, which may be split into employee-elected members (EEBM) and non-EEMBs who are appointed by the nomination committee or the owners. The information on names is used to construct gender variables on board composition by using a program that defines all Danish female and male names. In a few cases names can be given to both girls and boys. These observations (including the firms where they are board members) are excluded from the sample. Furthermore, because the data stemming from Statistics Denmark are collected for administrative purposes, there are a number of firm units which are not 'real' companies having a real production and staff; instead, they may exist in the registers for other purposes (e.g., taxation). We exclude companies with extreme values, defined as either a negative value of net capital or an extreme relationship between firm's revenue and employment in order to eliminate holding companies. This means that the effective sample is reduced to 15,624 observations covering 3,625 different firms during the 13-year period from 1998 to 2010 (a large number of firms are close to the cut-off criterion of having at least 50 employees and therefore drop out of the sample in certain years). The sample consists of listed as well as non-listed firms. The selection criterion implies that most of the listed firms are selected into the sample; however, most of the firms included in the data are not listed firms.

Variables

We consider the share of (non-EEBMs) women and whether this share enlarges as dependent variables to test the three hypotheses. The key regressors relate to the three alternative hypotheses to be tested, i.e., the 'female-led', the 'tokenism', and the 'pipeline' hypotheses. The variable representing a 'female-led' company is a dummy, which assumes the value of 1 if the chair is a woman. We do not have information on the gender composition of the nomination committee and in many firms there is no nomination committee. However, whether there is a nomination committee, the chair of the board of directors typically will be the most powerful person with respect to appointing new board members (Ruigrok et al., 2006; and Kaczmarek et al., 2012). To test the token-theory, we define two indicator variables for having exactly 1 female non-EEBM, 2 female non-EEBMs, and more than 2 female non-EEBMs, respectively. Finally, the pipeline variable is proxied by either the (1-year lagged) share of women among all CEOs and VPs within the industry, or the (1-year lagged) female share in the 'pool of potentials' (potential top managers) in the industry, or the ratio between such shares. The latter variable may inform on the relative size of female CEOs and VPs over the female pool of potential executives, compared to the overall ratio within the industry. In fact, the data set contains information on the gender of the CEOs and the VPs (i.e. CFO, COO and other members of the management board). This allows us to identify a group of potential top executive managers ('pool of potentials'), individuals holding occupational positions just below the management board at the industry level, i.e., who may be potential VPs or CEOs.[iv] We are aware that there is no simple way to define the relevant pipeline for board members, see the discussion above regarding relevant board competences. Nonetheless, we apply the three alternative specifications to test the hypothesis that women face stricter hiring standards than men, i.e., women have significant fewer chances to become members of the boards of directors.

We control for a large set of covariates in our specifications. We include the share of women and share of employees with a university degree to account for the educational composition of the female

and firm workforce, respectively. We distinguish between board of directors with no more than 4 members and board with 5 or 6 members, leaving as residual category all cases of boards with more than 6 directors (the latter comprises approximately 18 percent of the full sample, see Table A1). Firms are grouped in small (between 50 and 99 employees), medium (between 100 and 499 employees) and large (more than 499 employees) categories. The inclusion of dummies for both board and firm size may capture specific unobserved effects related to each of these dimensions. Similar argument applies for industry affiliation dummy variables: agriculture, manufacturing, construction, energy, wholesale trade, transports, and business sector. Further, we also include dichotomous variables indicating whether a firm is involved in export and import activities, or has been recently established (in the last 5 years). The latter variables control for the effect that such specific firm characteristics may have on the dependent variables, e.g., new born firms or companies that trade internationally might be more prone to have a more gender balanced board of directors.

DESCRIPTIVE STATISTICS

Table 1 shows the overall size and board compositions of firms in the sample for the year 2010, which is the last year analyzed. In total, there are 1,541 firms included in the sample in 2010, on average the female share of non-EEBMs is 8 percent. This figure is not very different from the female share among CEOs and VPs in Danish companies in 2007 where the female share of the CEOs was 7 percent (13 percent if VPs are also included), see Smith et al. (2013).[v] Indeed, the numbers here reported are not far from the current female representation on BODs, see Smith and Smith (2015). About 40 percent of the firms have small boards of directors with 4 members or less. The share of non-employee-elected female directors decreases with board size up to a size of approximately 9-10 members, however for 11-12 members this share reaches 12 percent, i.e., 1-2 female non-EEBMs is the norm if there are 11-12 board members. About 70 percent of the firms

(1,082 of the 1,541 firms) do not have female non-EEBMs, 23 percent have exactly 1 female non-EEBM, 5 percent have 2 or more female non-EEBMs (numbers not reported in the table).

[Insert Table 1 about here]

The share of female non-EEBM has been increasing slowly during the sample period, as shown in Table 2. In 1998, women represented only 5.3 percent of non-EEBMs. The share of companies with a female chairperson has also increased, from 2 percent to 3.4 percent between 1998 and 2010. The same holds for the pipeline of potential female board members stemming from executive top positions, which increases from 32 to 34 percent. In 1998, there were only 2.4 percent of all the companies in the sample which had a female CEO, a figure that has tripled, to 6.4 percent in 2010. Similar pattern is observed for the share of women in CEO positions or immediately below the CEO-level, and for the proportion of women with a university degree.

[Insert Table 2 about here]

Table A1 summarizes the main variables for the full pooled sample and for three subgroups of companies we use in the estimations: companies with a female chairperson, companies with only one woman among non-EEBMs and firms with a relatively high proportion of women in their 'pipeline' denoted 'above-median VP_CEO' firms and defined as firms above the median with respect to the relative share of women in the VP-CEO 'pipeline'. Only 3 percent of the companies have a female chairperson. These companies tend to have larger share of female employees, they also tend to be smaller companies not listed on the stock exchange compared to the full sample. In the average company, the share of women among non-EEBMs is approximately 8 percent. Firms with a share of women in the `pipeline' above the median are not very different from the average company (full

sample) with respect to any of the listed parameters in Table A1. The same tendency holds for firms with only one female non-EEBM, which do not appear to deviate much from other firms in the sample (i.e., with respect to the listed firm characteristics). The bivariate correlations of all variables are reported in Table A2.[vi] Although correlations between dependent variables and key regressors appear to support the female-led and tokenism hypotheses of our study, they are not particularly meaningful because in these computations we do not control for both firm observables as well as time-invariant unobservables.

ESTIMATION STRATEGY

To test the female-led, tokenism, and pipeline hypotheses, we implement both a random effects (RE) and a fixed effects (FE) panel estimation approach: we are able to exploit the fact that we observe the same firms over a number of years. Therefore, we can control for time-constant unobserved firm characteristics, u_i. Specifically, we separately estimate the following linear models:

$$ShareWomenBoard_{it} = \alpha + \beta\, FemaleChair_{it} + z'_{it}\,\gamma + x'_{it}\,\delta + u_i + v_{it} \quad (1)$$

$$\Pr(\Delta ShareWomenBoard_{it} > 0) = \alpha + Token'_{it-1}\,\beta + z'_{it}\,\gamma + x'_{it}\,\delta + u_i + v_{it} \quad (2)$$

$$ShareWomenBoard_{it} = \alpha + \beta\, Pipeline_{it-1} + z'_{it}\,\gamma + x'_{it}\,\delta + u_i + v_{it} \quad (3)$$

In the first specification (1) the left-hand side variable, share of female non-EEBMs, does not include the chairperson. In the text that follows, we do not consider EEBMs; hence we use 'share of women on board' and 'share of female non-EEBM' interchangeably. In model (2), the left-side variable is a dummy variable indicating whether the share of women in the boardroom increases. For simplicity we estimate the model as a linear probability model. In specification (3), the left-side variables are defined as the female share of board members including the chairperson. This difference in the

computation of the proportion of women on the board is due to the simultaneity of the dependent variable and the key indicator in (1). Each specification presents a different hypothesis of interest represented by the variables (i) whether the chairperson is a woman, , $FemaleChair_{it}$, (ii) whether there was at least one, two, or more than two women on the board of directors last year, $Token'_{it-1}$, and (iii) the share of women in last year `pipeline' on the board, $Pipeline_{it-1}$, respectively.

Each dependent variable is regressed on our variable of interest, a set of standard controls z'_{it} (dummies for year and industry) and firm characteristics x'_{it} (share of women among all employees in the firm, share of women with tertiary education, share of total workers with tertiary education, firm size, export dummy, import dummy, listed dummy, dummies for boards with ≤ 4 or 5-6 board members, and an indicator for being a newly established firm). We include the share of women in the firm and the share of highly educated female employees to control for other potential time-varying 'female-friendly' aspects of the company, which are not captured by the inclusion of the firm FE. Furthermore, these variables may capture a 'firm legitimacy effect' regarding firms with a large share of female employees, and/or a large share of women with higher educational levels may want to signal a willingness to have females on the board of directors, see Bilimoria (2006). The error term is composed of a time-invariant firm effect u_i, and a time-varying term v_{it}, which we assume to be purely idiosyncratic. We apply a FE specification that addresses with the potential correlation between our variables of interest and time-invariant component. However, endogeneity may still be an issue for our FE estimates in case of reverse causality or correlation between our variables of interest and unobserved time-varying firm effects. Thus, we cannot claim that our results represent causal effects because we do not have valid instruments readily available or other ways of identifying causal effects. However, we partly cope with such issues in the regression (1) by performing endogeneity checks: for instance we check whether the inclusion of either 1-year lag or 1-year lead in $FemaleChair$ affects our main results substantially.

RESULTS

The following paragraphs present findings from the implemented estimation strategy. Tables 3 to 6 report our main results while endogeneity tests and robustness checks are presented in the Appendix (Tables A1-A7).

Main Results

Table 3 reports our main results on the female-led hypothesis. The first three models refer to the RE estimates, whereas the rest are FE (firm-specific) estimates. The dependent variable is the share of women among non-employee-elected board members.

[Insert Table 3 about here]

The coefficient on $FemaleChair$ is significantly negative in all models, indicating that firms with a female chairperson also appear to have fewer women on the board of directors beside the female chair. The coefficient on the key variable is larger in absolute terms when assuming the systematic influence of time-invariant unobserved heterogeneity, i.e., in the FE estimation models. Given that the Hausman's tests rejected at the 1 percent level the hypothesis that RE estimates are unbiased, this implies that there exists a certain positive correlation between $FemaleChair$ and the residuals in the RE regressions. Furthermore, the inclusion of all controls does not substantially affect the size and significance of our key parameter in the FE regressions. Using model 6 as our favorite (and more reliable) specification, we find that a change to a female chair is related to a reduction in the chance of another female board member by 4 percent. Although one should be careful not to take this as causal evidence, our findings allow us to reject the female-led hypothesis because they indicate the opposite relationship between female chairperson and share of women in the boardrooms. Instead, this result may fit with a tokenism story, which is discussed below. Interestingly, the size of the

board seems to matter. Smaller boards with less than 7 board members have significantly fewer female non-EEBMs than larger boards with 7 or more members. Because we also control for the size of the company, this correlation cannot solely reflect firm size, i.e., larger firms tend to have larger boards and a larger proportion of women on the board for instance because they are more prone to follow the soft law guidelines of good corporate governance and the public pressure for gender diversity, see Farrell and Hersch (2005) and Dunn (2012). One hypothesis may be that larger boards have been extended in order to increase diversity without having to reduce the number of male board members. The proportion of employees with tertiary education in the firm carries a positive and significant coefficient, meaning that more educated workforces may favor the female representation in the boardrooms. There are no significant associations between the dependent variable and both the within-firm share of women and the share of female employees holding a university degree. In addition, no significant relationships emerge between the share of women on the board and the fact that the firm is involved in trading internationally, is newly established, or is listed on the national stock market.

Table 4 has the same structure as Table 3 but now the key variables are the indicators for having one, two, or more than two women as non-EEBMs. If the token theory shall not be rejected, we must find significantly negative coefficients on these indicators, and possibly find an increase in the numerical size of the estimate with the increase in board seats for women. This is clearly the case in both the RE and FE regressions. Indeed, the hypothesis testing the equality between different token coefficients is always rejected at high significance levels. As for the female-led hypothesis, FE and RE results are systematically different, hence RE parameters carried by the key variables appear to be upward biased: there may be a substantial positive correlation between the firm time-invariant error component and the token variables. FE results are very robust, models (4) - (6), i.e., having a female non-EEBMs last year is related to a reduction in the chance of having at least one more woman on the board in the current period by approximately 17 percentage points, the relation almost

doubles (is 1.5 times larger) if we consider cases of only two (more than two) women on board. Furthermore, whereas negative effects appear to be more pronounced for small boards and new born firms, it appears attenuated in firms with larger shares of women and highly educated employees. Other firm characteristics appear not to matter regarding a larger share of women on board.

[Insert Table 4 about here]

The pipeline hypothesis is tested in Tables 5 – 7. In Table 5, we evaluate how the 1-year lagged share of women in the 'pipeline' of potential top executives in the industry is related to the female share of women on the board of directors. We find that the pool of potentials is not related to the share of female board members according to all RE and FE models.

[Insert Table 5 about here]

Alternatively, we define the female 'pipeline' as the 1-year lagged share of women among CEOs and VPs in the industry. Table 6 shows that the pipeline variable now carries a positive coefficient. Because the Hausman's tests suggest that FE estimates are more reliable than the RE ones, we again focus on (the fully specified FE) model 6, exclusively. The estimate on the key variable is approximately 0.04, meaning that a within-firm standard deviation (0.20) in the share of women among VPs and CEOs (in the industry) may imply an increase of 0.8 percent in the share of woman on board. Indeed, the size of the key parameter is relatively small - there is a much lower than a 1 to 1 relation between the pipeline variable and the female share of non-EEBMs.[vii] As found for the case of *female-led* hypothesis, small boards are negatively associated with the share of non-employee-elected female directors, whereas the opposite relationship emerges for the share of employees with university degree.

[Insert Table 6 about here]

However, although we find evidence that a key requirement for being hired onto the board of directors is to have reached a top managerial position in other companies, we still need to test whether the male pipeline matters more than the female pipeline in this regard. This cannot be simply tested by replacing the dependent (i.e., share of female non-EEBMs) and key independent variables (i.e., share of women among VPs and CEOs or POPs) with their male counterparts, because these regressions would exactly replicate the results just described in Table 5 and 6. Thus, to test differences in the 'pipeline' between men and women, we use a variable defined as the 1-year lagged ratio between the share of women (men) among VPs and CEOs and the share of women (men) among POPs, both computed at the industry level. This 'pipeline' variable measures the relative magnitude of female CEOs and VPs over the female pool of potential executives, compared to the overall ratio within the industry. As reported in Table 7, we find that (for the FE fully specified model) the parameter for women is 0.02 and significant at 10 percent level, whereas the parameter for men (regressed on the share of male non-EEBMs) is 0.11 and significant at 10 percent level. Although these estimates are not highly significant, tests for no difference in coefficients between female and male 'pipeline' variables are significantly rejected, confirming that the coefficient for males is much larger than the one for female. This result seems consistent with our *pipeline* hypothesis, i.e., the relation between potential female board members and women on corporate boards is weaker than the similar relation for men.

[Insert Table 7 about here]

Sensitivity Analysis

In our sensitivity analysis, we perform a number of robustness checks jointly and separately for *female-led*, *tokenism*, and *pipeline* hypotheses. Given the results of the Hausman's tests in the main findings, we will not employ RE regressions in the sensitivity analysis.

First, we run checks to jointly test (i) the female-led and pipeline, and (ii) all three hypotheses. The dependent variable used to test (i) is the share of female non-EEBMs, whereas the left-side variable for (ii) is the dummy indicating whether the share of female non-EEBMs increases. Table A3 reports on $FemaleChair$ and 1-year lagged $Share\ of\ women\ VP\_CEO$ in the first three models while the last three models inform on estimates concerning the token and pipeline variables controlling for effects related to past within-firm changes in the chairperson gender. Indeed, the inclusion of a 1-year lagged rather than a simultaneous variable referring to the presence of a female chair seems more opportune given the definition of the dependent variable in (ii) as likelihood of positive within-board variation in the share of female non-EEBMs, $Prob(\Delta ShareWomenBoard > 0)$. Tests for (i) show no significant parameters on the pipeline variable but show estimates on $FemaleChair$ that are in line with our main findings. However, when testing all three hypotheses jointly, we find robust and significant evidence (which are qualitatively similar to the main results) solely for the tokenism hypothesis. This implies that a significant part of the evidence concerning the female-led hypothesis may be attributed to the tokenism effect rather than to the female chair.

Secondly, we perform relevant tests to exclude most of the endogeneity that may eventually affect the estimates concerning the *female-led* hypothesis. Table A4 reports such checks: in the first three models we include the first (1-year) lag of the chairman gender variable, and the last three models report estimates from specifications including the first (1-year) lead of this variable. We find that the estimates on the female chair dummy are highly significant and robust to the inclusion of either the lag or lead variables. The parameter of interest is qualitatively similar to the estimate in our main results. In addition, both the lead and the lag variables never turn to be significantly different from

zero. We take this evidence as an indication that our estimates are not affected by any type of anticipation or time-lag effect.

Third, Tables A5-A7 report our checks on a number of different sub-samples of firms: service and non-service industries; exporting and non-exporting firms; differently sized (small, medium and large) firms; companies listed and non-listed on the national stock market; below- and above-median firm age, industry share of the pool of potentials, and industry share of employees holding VP or CEO positions. The set of checks concerning the female-led hypothesis seems to corroborate our main findings: the parameter of interest is negative and significantly different from zero. The coefficient is insignificant only in the sub-sample of firms with at least 500.

All robustness checks for the *tokenism* hypothesis (Table A6) are consistent with the main findings. No substantial differences emerge from the comparison between different and mutually exclusive sub-samples.

Robustness checks reported in Tables A7 show weaker findings than the ones shown in the main results. However, such robustness checks support the hypothesis that the female *pipeline* has almost no link with the presence of women on boards of directors. Examining these results, slightly significant (and in line with the main findings) estimates are found for the subgroups of firms (a) with 50-99 and 100-499 employees, (b) not listed on the Danish stock market, and (c) belonging to industries with below-median 'pool of potentials' share. These findings seem to be all consistent with the fact that companies with less than 500 employees are typically not listed on the Copenhagen Stock Exchange market and may more likely hire their board members from the national pipeline of qualified women.

CONCLUSIONS AND DISCUSSION

In this study we analyze the determinants of non-employee-elected women among board directors based on a representative panel sample that covers all Danish private sector companies with at least 50 employees which have a registered board of directors, i.e., 3,625 companies that are observed during the 13-year period from 1998 to 2010. The share of female non-EEBMs has been increasing during the period 1998 to 2010, from 5 to 8 percent.

We test three hypotheses on the determinants of the female share of board members. First, we test the hypothesis that having females in powerful positions in the company may have an impact on the recruitment of women to the board of directors, i.e., a hypothesis on the 'role' of female-led companies. Specifically, we test whether having a female chair in the boardroom presents a positive association with the share of female directors. Our results reject this hypothesis: we find that companies with a female chairperson tend to have an approximately 4 percent lower share of other women on the board among the non-employee-elected members when controlling for a number of observed firms characteristics and unobserved time-constant heterogeneity between firms.

Secondly we test the tokenism hypothesis, saying that if there is currently one woman on the board of directors, the probability of hiring another woman for the board in the subsequent period is lower. The tokenism hypothesis cannot be rejected. We find a robust and significantly negative coefficient for companies having exactly one woman on the board when controlling for observed and unobserved time-constant heterogeneity. We also find that the chance of increasing the proportion of female non-EEBMs decreases even more significantly if 2 or more women have sat on the board.

Finally, we test whether the share of women in the boardroom is related to the 'pipeline' of possible female board members and, if so, which of the female 'pipelines' appears to be the most relevant for board positions. We find that the share of women among potential top executives (i.e., executives who have not yet reached positions on the management board level as VPs or CEOs) is not significant, whereas significant and positive coefficients are carried by the 1-year lagged share of

women among top executives (CEOs or VPs) in the industry. This result supports the hypothesis that women may need to reach top executive positions before being truly 'at risk' of obtaining a seat in the boardroom, unless they have other networks or family relations to the owners of the company. Furthermore, we find that the relation between the female pipeline and the share of women in the boardrooms is much weaker than the similar relation for men.

Overall, our findings indicate that the route to more women on boards appears to bypass executives lounges, i.e., an important way to increase the female proportion among non-EEBMs is for more women to reach top executive positions. The moderate increase in this female share may reflect an outside pressure for diversity, as specified in the soft law rules on good corporate governance. According to our results, there is a risk that this pressure will often solely imply that one non-employee-elected woman will access the boardroom, but thereafter the process of more gender diversity ceases, as expected by the token theory. Furthermore, having a female chair on the board does not appear to start a process of more gender diversity on the board of directors. On the contrary, we find a negative correlation between having a female chair and the share of other women on the board, which may reflect that the female chair, although likely powerful in many cases, may also act as a token.

Thus, the conclusion from this study is that Danish private sector companies are far from having gender diverse board of directors and though the female proportion of board members has been increasing, the increase is slow and in many companies may stop when one female board member has entered the board. Since Danish women, like women in the other Nordic countries, were among the first to enter the labor market decades ago and today they dominate the universities, and since female friendly policies aiming at supporting the balance between family responsibilities and female careers have been high on the political agenda also for decades, the results found in this study may seem surprising and disappointing from a diversity perspective. The same low proportion of women in leading position has also been found in the other Nordic countries, see Gupta, Smith and Verner

(2008). In Norway, the politicians have reacted on this evidence and as the first country in the world Norway introduced binding quotas for all publicly listed companies were introduced in 2008. Iceland followed Norway in 2013. The result has been that since 2008, the proportion of women in Norwegian listed companies exceeds 40 percent, and Norway and Iceland are now in front with respect to gender diversity on BOD.

The results found in this study may indicate that binding quotas are the route to follow if politicians want more gender diversity on BOD in private sector companies. However, one important question is whether the ultimate goal for the politicians is gender diversity on BOD in itself or it is a broader goal of equal opportunities in the labor market in general. If the latter is the case, it is important that quotation at top level has a spreading effect to lower levels in the organization and that more females on BOD over time imply more females in the pipeline for director positions. Here the Norwegian evidence is more mixed and the family friendly policies may counteract the ambitions of the quota policy because the family friendly schemes, especially the long maternal leave periods may have negative unintended effects on female careers, see the survey in Smith and Smith (2015).

From a company perspective, the political signals from the EU indicating a political willingness to put into force a binding quota of 30 or 40 percent may imply that Danish companies – as well as other EU companies – will be forced to change their hiring practices for BOD. This may induce an excess demand for skilled women who can fill the boardrooms. From this perspective, it may be a valuable company strategy to be voluntary first movers in order to attract the best female board members. This may change the behavior and results found in this study.

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NOTES

[i] In this study we do not discuss gender quota regulations or family friendly policies that also influence more or less indirectly the gender composition on corporate boards, see Terjesen et al. (2014) and the survey in Smith (2014).

[ii] In Denmark, firms with more than 35 employees are obliged to have EEBM. The EEBMs are elected among the employees and may stem from all parts of the organization, including the lowest hierarchic levels, i.e. EEBM may be manual workers. Thus, EEMBs are very different from 'insider board members' in a US company who are either present or former executive officers in the company, see for instance Farrell and Hersch (2005).

[iii] In this study we do not have access to newer data where register information on firm and employee level from Statistics Denmark is merged with the information on gender composition and size of corporate boards from the private database Experian.

[iv] The exact definition using Statistics Denmark's 'DISCO-codes' is: CEO=Executive director (RAS-DISCO code 121, 1210). VP=Vice-President (DISCO 122, 123, 1221-1239). Pool of potentials=Potential top executive. (First digit of DISCO code is 1 but not included in the groups of top or vice directors). In order to remove outliers or errors in the DISCO codes, we restrict the CEO group to individuals who are observed with annual earnings in top 10 of the firm. The VP-group is restricted to individuals who are observed among the top 25. The definition of the occupational groups and the sample selection in this study is different from the sample in Smith et al. (2013), mainly because we do not include companies with less than 50 employees in the present study when defining the group of potential top executives.

[v] The data set used in Smith et al. (2013) includes more and smaller companies than the data set used in this study, and therefore the proportion of females among the CEOs is larger.

[vi] In this table, all industry dummies are grouped in service and non-service sector for the sake of simplicity.

[vii] The 'pipeline' coefficient is largest for small and medium sized companies (50-99 and 100-499 employees which amounts to 89 percent of all companies in the sample), see Appendix Table A7, while the coefficient is small and insignificant for firms with more than 499 employees. Part of the explanation for the low coefficient for large firms may be that the relatively few large Danish (most often publicly listed companies) often hire their board members from other countries, i.e. the national pipeline of qualified women may be less important for large Danish firms, see Erhvervsstyrelsen (2015).

Table 1
Descriptive Statistics – by Size of Board in year 2010

Board Size	% of firms by number of non-EEBMs	Share of female non-EEBMs
≤ 4	42	0.09
5-6	40	0.06
7-8	10	0.07
9-10	5	0.04
11+	3	0.12
All firms	1,541	
Overall average		0.08

Table 2
Descriptive Statistics – Female Share by Hierarchical Level

Year	1998	2010
Chair of board of directors	0.0204	0.0344
Board of directors	0.0534	0.0766
CEO	0.0242	0.0636
CEO plus VP-level	0.0830	0.1595
Pool of Potentials (high level positions)	0.3230	0.3408
Employees with a university degree	0.2405	0.3459

Table 3
Main Results – Female-led hypothesis

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Female chair	-.02	-1.78	†	-.02	-1.81	†	-.02	-1.83	†	-.04	-2.47	**	-.04	-2.51	**	-.04	-2.49	**
≤ 4 board members							-.002	-.28								-.002	-.24	
5-6 board members							-.01	-3.13	**							-.01	-2.08	*
Share of women							.07	5.53	***							.02	.96	
Share of women III education							.03	1.03								.002	.07	
Share of employees III education							-.01	-.17								.12	1.88	†
Export							-.04	-2.75	**							-.03	-1.59	
Import							.03	1.78	†							.02	1.61	
Newly established							-.01	-1.97	*							-.01	-1.57	
Listed on CPH Stock Exchange							-.03	-3.49	***							-.01	-1.02	
Standard controls	no			yes			yes			no			yes			yes		
Other firm characteristics	no			no			yes			no			no			yes		
R-squared	.002			.02			.04			.003			.01			.01		
Number of observations	15,624			15,624			15,624			15,624			15,624			15,624		
Number of clusters	3,625			3,625			3,625			3,625			3,625			3,625		

Legend: In models (1) - (6) the dependent variable is the share of female non-EEBMs. Panel RE estimates are reported in (1) - (3), whereas (4) - (6) report panel FE estimates. The share of women on the board does not include the chairperson. Hausman's tests for the hypothesis of no systematic difference in coefficients between FE and RE models are always rejected at 0.1 percent level (Prob>chi2 =0.0000). Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.

Table 4
Main Results – Tokenism hypothesis

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
1 woman non-EEBM (t-1)	-.02	-5.01	***	-.02	-4.74	***	-.02	-5.40	***	-.17	-15.94	***	-.17	-16.00	***	-.17	-16.22	***
2 women non-EEBMs (t-1)	-.03	-4.79	***	-.03	-4.62	***	-.03	-5.52	***	-.31	-13.75	***	-.31	-13.83	***	-.32	-14.05	***
> 2 women non-EEBMs (t-1)	-.03	-4.14	***	-.03	-4.23	***	-.06	-6.65	***	-.39	-10.16	***	-.40	-10.23	***	-.42	-10.26	***
≤ 4 board members							-.03	-6.06	***							-.07	-4.98	***
5-6 board members							-.02	-4.15	***							-.04	-3.62	***
Share of women							.04	4.84	***							.11	2.19	*
Share of women III education							.02	.42								.10	1.47	
Share of employees III education							.06	1.44								.22	1.67	†
Export							-.02	-.42								-.06	-1.21	
Import							.01	.15								.07	1.55	
Newly established							-.01	2.08	*							-.03	-2.52	**
Listed on CPH Stock Exchange							-.03	-3.78	***							.01	.21	
Standard controls	no			yes			yes			no			yes			yes		
Other firm characteristics	no			no			yes			no			no			yes		
R-squared	.01			.01			.02			.07			.08			.08		
Number of observations	15,624			15,624			15,624			15,624			15,624			15,624		
Number of clusters	3,625			3,625			3,625			3,625			3,625			3,625		

Legend: In models (1) - (6) the dependent variable is a dummy variable indicating whether the share of female non-EEBMs enlarges. Panel RE estimates are reported in (1) - (3), whereas (4) - (6) report panel FE estimates. Tests for no difference in coefficients between token variables are always rejected at 0.5 percent level. Hausman's tests for the hypothesis of no systematic difference in coefficients between FE and RE models are always rejected at 0.1 percent level (Prob>chi2 =0.0000). Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.

Table 5
Main Results – Pipeline hypothesis (share of women POP)

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Share of women POP (t-1)	.01	.40		.01	.39		.003	.10		.01	.42		.02	.57		.02	.54	
≤ 4 board members							-.01	-.21								-.004	-.45	
5-6 board members							-.02	-2.57	**							-.01	-2.05	*
Share of women							.06	4.64	***							.02	.71	
Share of women III education							.01	.18								.04	.93	
Share of employees III education							.01	.32								.14	2.03	*
Export							-.02	-2.09	*							-.02	-.87	
Import							.01	1.24								-.01	-.73	
Newly established							-.01	-1.96	*							-.01	-1.65	†
Listed on CPH Stock Exchange							-.03	-3.79	***							-.02	-.95	
Standard controls	no			yes			yes			no			yes			yes		
Other firm characteristics	no			no			yes			no			no			yes		
R-squared	.0001			.03			.05			.0004			.004			.01		
Number of observations	15,624			15,624			15,624			15,624			15,624			15,624		
Number of clusters	3,625			3,625			3,625			3,625			3,625			3,625		

Legend: In models (1) - (6) the dependent variable is the share of female non-EEBMs. Panel RE estimates are reported in (1) - (3), whereas (4) - (6) report panel FE estimates. Hausman's tests for the hypothesis of no systematic difference in coefficients between FE and RE models are always rejected at 0.1 percent level (Prob>chi2 =0.0000). Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.

Table 6
Main Results – Pipeline hypothesis (share of women VP_CEO)

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Share of women VP_CEO (t-1)	.06	2.24	*	.09	2.10	*	.08	1.72	†	.03	1.30		.05	1.70	†	.04	1.98	*
≤ 4 board members							-.001	-.02								-.04	-.47	
5-6 board members							-.01	-2.58	**							-.01	-2.06	*
Share of women							.06	4.59	***							.02	.71	
Share of women III education							.01	.18								-.04	-.95	
Share of employees III education							.01	.24								.14	1.97	*
Export							-.02	-2.02	*							-.02	-.87	
Import							.01	1.32								.01	.78	
Newly established							-.01	-1.94	†							-.01	-1.65	†
Listed on CPH Stock Exchange							-.03	-3.80	***							-.02	-.96	
Standard controls	no			yes			yes			no			yes			yes		
Other firm characteristics	no			no			yes			no			no			yes		
R-squared	.002			.03			.05			.0004			.005			.01		
Number of observations	15,624			15,624			15,624			15,624			15,624			15,624		
Number of clusters	3,625			3,625			3,625			3,625			3,625			3,625		

Legend: In models (1) - (6) the dependent variable is the share of female non-EEBMs. Panel RE estimates are reported in (1) - (3), whereas (4) - (6) report panel FE estimates. Hausman's tests for the hypothesis of no systematic difference in coefficients between FE and RE models are always rejected at 0.1 percent level (Prob>chi2 =0.0000). Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.

Table 7
Main Results – Pipeline hypothesis (VP_CEO/POP)

	Women									*Men*								
	Model 1			Model 2			Model 3			Model 1			Model 2			Model 3		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
VP_CEO/POP (t-1)	.01	1.67	†	.01	1.69	†	.02	1.76	†	.08	1.51		.10	1.73	†	.11	1.82	†
Standard controls		no			yes			yes			no			yes			yes	
Other firm characteristics		no			no			yes			no			no			yes	
R-squared		0.001			0.01			0.01			0.001			0.01			0.01	
Number of observations		15,624			15,624			15,624			15,624			15,624			15,624	
Number of clusters		3,625			3,625			3,625			3,625			3,625			3,625	

Legend: All models are FE panel regressions, in which the dependent variable is the share of female or male non-EEBMs. Test for no difference in coefficients between female and male 'pipeline' variables are always rejected at 1 percent level. Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.

Appendix

Table A1
Mean values – Pooled sample

Sample	Full	Female-led	1 woman non-EEBM (t-1)	above-median VP_CEO share
Outcome variables				
Share of female non-EEBMs	.08	.10	.20	.09
Share of female non-EEBMs enlarges (dummy)	.04	.12	.03	.04
Main variables				
Female chair (dummy)	.03	1.00	.09	.03
1 woman non-EEBM (t-1) (dummy)	.22	.60	1.00	.23
2 women non-EEBMs (t-1) (dummy)	.05	.21	.00	.06
> 2 women non-EEBMs (t-1) (dummy)	.02	.10	.00	.02
Share of women POP (t-1) (within-industry)	.37	.37	.37	.46
Share of women VP_CEO (t-1) (within-industry)	.15	.16	.16	.21
Firm characteristics				
≤ 4 board members (dummy)	.39	.44	.42	.42
5-6 board members (dummy)	.43	.35	.38	.36
Share of women	.33	.37	.35	.39
Share of women with III education	.05	.05	.06	.09
Share of employees with III education	.06	.05	.06	.10
Export (dummy)	.85	.84	.84	.87
Import (dummy)	.72	.75	.74	.77
Newly established (dummy)	.05	.05	.04	.04
Listed on CPH Stock Exchange (dummy)	.04	.002	.03	.05
Service sector (dummy)	.19	.20	.19	.50
49<employees<100 (dummy)	.38	.45	.43	.39
99<employees<500 (dummy)	.51	.50	.47	.50
Number of observations	15,624	480	3,411	7,585

Table A2
Bivariate correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Share of female non-EEBMs	1.00														
2. Share of female non-EEBMs enlarges	.24	1.00													
3. Female chair	.04	.08	1.00												
4. 1 woman non-EEBM (t-1)	.47	-.02	.16	1.00											
5. 2 women non-EEBMs (t-1)	.50	-.02	.13	-.13	1.00										
6. > 2 women non-EEBMs (t-1)	.33	-.01	.10	-.07	-.03	1.00									
7. Share women POP (t-1)	-.003	.04	-.001	.01	.003	.04	1.00								
8. Share of women VP_CEO (t-1)	.04	.04	.02	.04	.02	-.05	.09	1.00							
9. ≤ 4 board members	.13	-.04	.02	.03	-.01	-.09	-.01	.05	1.00						
10. 5-6 board members	-.11	-.003	-.02	-.05	-.02	-.06	-.07	-.12	-.68	1.00					
11. Share of women	.10	.05	.04	.05	.07	.10	.38	.33	-.001	-.08	1.00				
12. Share of women with III education	.01	.06	-.02	.01	-.02	.09	.33	.35	-.04	-.05	.14	1.00			
13. Share of employees with III education	-.02	.06	-.01	.003	.01	.02	.38	.39	-.05	-.04	.20	.88	1.00		
14. Export	-.02	-.04	-.03	-.02	-.02	.02	-.36	-.36	.11	.07	-.21	-.11	-.14	1.00	
15. Import	.05	.01	-.01	.03	-.01	-.10	-.18	-.004	.14	-.01	-.09	.03	-.01	.47	1.00
16. Newly established	-.02	-.01	.02	-.01	.01	-.04	- .01	-.02	.01	-.03	.01	-.002	-.003	-.01	.01
17. Listed on CPH Stock Exchange	-.07	-.01	-.0001	-.04	-.03	.0003	.10	.08	-.16	-.02	.07	.06	.09	-.18	-.15
18. Service sector	-.01	.05	.01	.003	.01	.04	.66	.69	-.03	-.09	.25	.45	.51	.45	-.17
19. 49<employees<100	.11	- .03	.03	.05	.03	.02	-.01	.01	.23	-.09	-.08	-.02	-.03	.05	.09
20. 99<employees<500	.06	.01	-.003	-.04	-.02	-.02	-.01	-.03	-.13	-.10	.04	-.02	-.01	-.01	-.06

	16	17	18	19	20
16. Newly established	1.00				
17. Listed on CPH Stock Exchange	-.01	1.00			
18. Service sector	.02	.11	1.00		
19. 99<employees<500	-.02	-.11	-.04	1.00	
20. 499<employees	.01	-.001	.01	-.80	1.00

Table A3
Test hypotheses jointly

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Female chair	-.05	-2.47	**	-.05	-2.51	**	-.05	-2.48	**									
Share of women VP_CEO (t-1)	.04	1.30		.07	1.55		.07	1.50		.13	1.75	†	.04	.28		.06	.36	
Female chair (t-1)										-.001	-.03		-.001	-.04		-.004	-.12	
1 non-EEBM (t-1)										-.21	-14.31	***	-.21	-14.53	***	-.21	-14.75	***
2 non-EEBMs (t-1)										-.35	-11.64	***	-.36	-11.85	***	-.36	-12.73	***
> 2 non-EEBMs (t-1)										-.52	-8.52	***	-.52	-8.63	***	-.54	-8.73	***
Standard controls	no			yes			yes			no			yes			yes		
Other firm characteristics	no			no			yes			no			no			yes		
R-squared	.01			.01			.02			.09			.10			.11		
Number of observations	15,624			15,624			15,624			15,624			15,624			15,624		
Number of clusters	3,625			3,625			3,625			3,625			3,625			3,625		

Legend: In panel FE models (1) - (3) the dependent variable is the share of female non-EEBMs, in (4) - (6) the dependent variable is a dummy indicating whether the share of female non-EEBMs enlargers. Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.

Table A4
Endogeneity checks– Female-led hypothesis

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Female chair	-.05	-2.75	**	-.05	-2.77	**	-.05	-2.71	**	-.06	-2.95	**	-.06	-2.96	**	-.06	-2.99	**
Female chair (t-1)	.01	.91		.01	.88		.01	.74										
Female chair (t+1)										.01	.41		.01	.37		.01	.38	
Standard controls	no			yes			yes			no			yes			yes		
Other firm characteristics	no			no			yes			no			no			yes		
R-squared	.01			.01			.02			.01			.01			.02		
Number of observations	15,624			15,624			15,624			15,624			15,624			15,624		
Number of clusters	3,625			3,625			3,625			3,625			3,625			3,625		

Legend: In panel FE models (1) - (6) the dependent variable is the share of female non-EEBMs. Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.

Table A5
Robustness checks– Female-led hypothesis

	Service industries			Non-service industries			Exporting firms			Non-exporting firms			Listed firms			Non-listed firms		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Female chair	-.01	-1.71	†	-.04	-2.49	**	-.04	-2.52	**	-.04	-2.44	**	-.01	-1.85	†	-.04	-2.49	**
Standard controls		yes			yes			yes			yes			yes			yes	
Other firm characteristics		yes			yes			yes			yes			yes			yes	
R-squared		.03			.02			.01			.08			.08			.01	
Number of observations		2,898			12,726			13,276			2,348			689			14,935	
Number of clusters		692			2,933			3,079			546			149			3,476	

	49<employees<100			99<employees<500			499<employees			Newly established			Non-newly established		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Female chair	-.07	-2.41	**	-.02	-1.98	*	-.04	-1.58		-.30	-1.79	†	-.03	-2.18	*
Standard controls		yes			yes			yes			yes			yes	
Other firm characteristics		yes			yes			yes			yes			yes	
R-squared		.03			.02			.04			.25			.01	
Number of observations		5,970			7,955			1,699			715			14,909	
Number of clusters		1,379			1,863			383			176			3,449	

	Below-median POP share			Above-median POP share			Below-median VP_CEO share			Above-median VP_CEO share		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Female chair	-.02	-2.18	*	-.03	-2.68	**	-.03	-2.01	*	-.04	-2.61	**
Standard controls		yes			yes			yes			yes	
Other firm characteristics		yes			yes			yes			yes	
R-squared		.03			.02			.01			.03	
Number of observations		8,523			7,101			7,370			8,254	
Number of clusters		1,978			1,647			1,685			1,940	

Legend: All robustness checks are panel FE models, in which the dependent variable is the share of female non-EEBMs. Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.

Table A6
Robustness checks– Tokenism hypothesis

	Service industries			Non-service industries			Exporting firms			Non-exporting firms			Listed firms			Non-listed firms		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
1 non-EEBM (t-1)	-.25	-9.86	***	-.16	-14.40	***	-.17	-15.77	***	-.32	-4.92	***	-.25	-4.73	***	-.17	-15.71	***
2 non-EEBMs (t-1)	-.43	-7.04	***	-.30	-11.98	***	-.31	-13.60	***	-.52	-5.21	***	-.48	-4.98	***	-.32	-13.79	***
> 2 non-EEBMs (t-1)	-.52	-6.05	***	-.40	-7.63	***	-.39	-8.87	***	-.67	-6.23	***	-.19	-2.97	**	-.43	-10.66	***
Standard controls		yes			yes			yes			yes			yes			yes	
Other firm characteristics		yes			yes			yes			yes			yes			yes	
R-squared		.13			.08			.08			.18			.16			.09	
Number of observations		2,898			12,726			13,276			2,348			689			14,935	
Number of clusters		692			2,933			3,079			546			149			3,476	

	49<employees<100			99<employees<500			499<employees			Newly established			Non-newly established		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
1 non-EEBM (t-1)	-.20	-8.75	***	-.18	-11.63	***	-.19	-6.03	***	-.49	-3.67	***	-.18	-15.96	***
2 non-EEBMs (t-1)	-.29	-8.60	***	-.38	-9.32	***	-.40	-6.48	***	-.79	-4.44	***	-.32	-13.94	***
> 2 non-EEBMs (t-1)	-.45	-4.95	***	-.44	-9.08	***	-.52	-1.87	†	-	-		-.40	-10.49	***
Standard controls		yes			yes			yes			yes			yes	
Other firm characteristics		yes			yes			yes			yes			yes	
R-squared		.10			.09			.12			.30			.09	
Number of observations		5,970			7,955			1,699			715			14,909	
Number of clusters		1,379			1,863			383			176			3,449	

	Below-median POP share			Above-median POP share			Below-median VP_CEO share			Above-median VP_CEO share		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
1 non-EEBM (t-1)	-.17	-13.40	***	-.23	-9.09	***	-.17	-11.89	***	-.27	-11.17	***
2 non-EEBMs (t-1)	-.31	-11.86	***	-.40	-7.16	***	-.32	-10.66	***	-.47	-9.30	***
> 2 non-EEBMs (t-1)	-.43	-8.10	***	-.45	-5.19	***	-.45	-6.28	***	-.57	-6.97	***
Standard controls		yes			yes			yes			yes	
Other firm characteristics		yes			yes			yes			yes	
R-squared		.08			.13			.08			.14	
Number of observations		8,523			7,101			7,370			8,254	
Number of clusters		1,978			1,647			1,685			1,940	

Legend: All robustness checks are panel FE models, in which the dependent variable is a dummy indicating whether the share of female non-EEBMs enlargers. Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.

Table A7
Robustness checks– Pipeline hypothesis

	Service industries			Non-service industries			Exporting firms			Non-exporting firms			Listed firms			Non-listed firms		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Share women VP_CEO (t-1)	.04	1.61		.10	1.41		.06	1.16		.07	.71		.002	.05		.04	1.85	†
Standard controls	yes			yes			yes			yes			yes			yes		
Other firm characteristics	yes			yes			yes			yes			yes			yes		
R-squared	.03			.01			.01			.03			.08			.01		
Number of observations	2,898			12,726			13,276			2,348			689			14,935		
Number of clusters	692			2,933			3,079			546			149			3,476		

	49<employees<100			99<employees<500			499<employees			Newly established			Non-newly established		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Share women VP_CEO (t-1)	.10	1.82	†	.06	1.74	†	.03	.53		.32	.62		.09	.79	
Standard controls	yes			yes			yes			yes			yes		
Other firm characteristics	yes			yes			yes			yes			yes		
R-squared	.02			.01			.04			.22			.02		
Number of observations	5,970			7,955			1,699			715			14,909		
Number of clusters	1,379			1,863			383			176			3,449		

	Below-median POP share			Above-median POP share			Below-median VP_CEO share			Above-median VP_CEO share		
	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|	Beta	t	p > |t|
Share women VP_CEO (t-1)	.06	1.79	†	.03	1.39		.05	1.51		.04	1.55	
Standard controls	yes			yes			yes			yes		
Other firm characteristics	yes			yes			yes			yes		
R-squared	.01			.03			.01			.02		
Number of observations	8,523			7,101			7,370			8,254		
Number of clusters	1,978			1,647			1,685			1,940		

Legend: All robustness checks are panel FE models, in which the dependent variable is the share of female non-EEBMs. Standard errors are heteroskedasticity robust and clustered at the firm level. Significance levels: ***p < .001, **p < .01, *p < .05, †p < .10.