# CEO demographics and gender diversity in senior management in large Scandinavian firms

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## Abstract

**Purpose** – This study aims to investigate whether chief executive officer (CEO) demographics are associated with gender diversity in senior management in the Scandinavia region.

**Design/methodology/approach** – The research design draws on multivariate cross-sectional analysis. The demographic characteristics examined are gender, age and education. A total of six hypotheses are developed and tested. The sample includes the largest 106 public firms from Denmark, Finland, Norway and Sweden.

**Findings** – Results show that firms with female CEOs have more women in senior management than other firms. However, neither age nor level of formal education of CEOs shows significant results, with the exception of CEOs holding MBA degrees, who are associated with fewer women in these positions. Interestingly, the association between educational background and gender diversity is principally driven by study-abroad experiences. Finally, results show that gender diversity in senior management has an important country component, whereas the industry component is negligible.

**Originality/value** – The relationship between managers' demographics and gender diversity among subordinates is a relatively unexplored research issue, as previous works have focused on general comparisons between male and female managers. Furthermore, the Scandinavian context is particularly interesting as this region leads gender equality rankings.

**Keywords** Senior management, Gender inequality, Chief executive officer

**Paper type** Research paper

## Introduction

This study investigates the importance of the chief executive officer (CEO) demographics (gender, age and educational background) as determinant factors of gender diversity in senior management. The empirical analysis examines the context of Scandinavian large



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firms in early 2020. The decision to focus on Scandinavia is because this region leads gender equality rankings. Furthermore, the analysis of Scandinavia is also revealing because in 2006 Norway passed a law establishing a 40% board gender quota in public companies, fully effective since 2008. The particularly serious consequences for the non-compliant firms (the liquidation) explain that Norway has been the business case for examining the effects of gender diversity on corporate outcomes (Ahern and Dittmar, 2012; Garcia-Blandon *et al.*, 2022). However, in spite of expectations of spillover effects of the quota in increasing gender diversity beyond board boundaries, there is consensus that such spillover effects have not occurred [1] (Wang and Kelan, 2013).

Following the above discussion, the motivation for this study lies primarily in the real-life relevance of the research topic, and also in the lack of research on the influence of managers' characteristics on gender inequality among subordinates (Carnahan and Greenwood, 2018). Additionally, because most prior studies on gender diversity in senior management focus on the board of directors (BoDs) (Terjesen *et al.*, 2009), the picture provided by these studies regarding women's effective participation in leadership is incomplete. It should be noted that the incorporation of women to boards has been mainly as independent directors (Singh *et al.*, 2001), and Barnes *et al.* (2019) point out that the actual involvement of independent directors with the companies on whose boards they serve is, in many cases, merely testimonial, as it limits to participation in a few meetings over the year. Consequently, more women on BoDs does not necessarily indicate greater management responsibilities for women.

The relationship between managers' demographics and gender diversity among subordinates is a relatively unexplored research issue, as previous works focus on general comparisons between male and female managers regarding gender inequality (Carnahan and Greenwood, 2018). More specifically, to the best of the authors' knowledge, for the first time the role of the demographic characteristics of the CEO as determinants of gender diversity in senior management is investigated. This research topic will interest scholars from different fields such as management, psychology, sociology and gender studies. Once the number of seats held by women on boards has increased significantly in recent years as a result of public pressure, the debate shifts from the narrow boundaries of the BoD to the broader category of senior management. Interestingly, Barnes *et al.* (2019) warn of very limited actual involvement with the firm of many of the women appointed as independent directors, while Vinnicombe *et al.* (2020) caution about the danger of women being appointed as BoD members for purely symbolic reasons, and to avoid scrutiny associated with low board gender diversity (Mitra *et al.*, 2021). Conversely, the appointment of women to senior management is a less scrutinized decision, and from this perspective, a more interesting research topic.

Anticipating the results, we find female CEOs to facilitate the presence of women in senior management. Regarding educational background, firms whose CEOs have study-abroad experiences have more women in these positions, and the opposite situation holds for CEOs holding MBA degrees. However, neither the age of the CEO nor the level of formal education has a significant impact on gender diversity in senior management.

The article continues as follows. The next section reviews the related literature and develops the hypotheses. The subsequent sections describe the research design and explain the sample; present and discuss the empirical results; and, finally, conclude the article.

## Conceptual background and hypotheses

Essentially, the same theoretical framework that explains the participation of women on BoDs would also explain the appointment of women to senior management. This is the view

of Blum *et al.* (1994) when they adopt the framework developed by the institutional and resource dependence theory (Pfeffer and Salancik, 1978) to explain women's participation in management. The resource dependence theory highlights the role of board linkages for the managers decision-making aiming to reduce uncertainty and to ensure the access of the firm to essential resources. More specifically, Pfeffer and Salancik (1978) classify the explicit benefits from these linkages into providing advice and counsel, legitimacy and channels for both the communication of information and the access to external important resources for the firm. Later, Hillman *et al.* (2007, p. 942) use this framework to explain the appointment of female directors.

A growing body of literature suggests that through hiring, promotion and compensation decisions, managers are held accountable for gender inequality in the organization (Carnahan and Greenwood, 2018). Several studies have examined the role of the BoD on the appointment of female CEOs (Wang and Kelan, 2013). Because the appointment (and dismissal) of CEOs is a primary board responsibility, studying how certain characteristics affect the decision to appoint a male or female CEO emerges as an interesting research topic. Extending the logic of previous studies on the relationship between the BoD and the gender of the CEO, we address the relationship between the CEO and gender diversity in senior management. Thus, in the same way that the BoD bears responsibility for the appointment of CEOs, CEOs have the final decision on the appointment and organization of senior executives in the firm (Katzenbach, 1997) and, consequently, they are held accountable for lack of gender diversity in these positions.

Although it does not focus on the role of the CEO, there is growing research interest in the influence of managers on gender inequality in the whole organization. Carnahan and Greenwood (2018) structure this influence as caused, first, by the use of some "type of mental discriminant function" (Bielby and Baron, 1986: 781) in the evaluation of candidates (Perry *et al.*, 1994) and, secondly, by the influence of personal attitudes and beliefs about gender roles, stereotypes and inequality on this evaluation (Ridgeway and Correll, 2004). For example, Carnahan and Greenwood (2018) find that managers' political beliefs influence gender inequality among their subordinates. The psychological literature provides sound theoretical background to predict that certain demographic characteristics of CEOs such as gender, age and education should influence personal attitudes and beliefs about gender roles, stereotypes and gender inequality and discrimination (Elm *et al.*, 2001; Lopez-Zafra and Garcia-Retamero, 2012; Terjesen *et al.*, 2009). Additionally, interest in focusing on CEO demographics is supported by prior related studies on the role of board members demographics in the decision to appoint a female CEO (Hurley and Choudhary, 2016). While these studies concentrate on the gender of directors (Matsa and Miller, 2011), the issues of age and education (Wang and Kelan, 2013) have also received some research attention. The hypotheses of this study are developed next.

*Gender*

Firms with female CEOs are expected to show more gender equality in senior management. This expectation is based on Kanter's (1977) "homosocial reproduction" idea, later developed by Powell and Butterfield (2002) when they argue that decision makers tend to reserve the most attractive positions in the organization for in-group members. This leads to better assessments for in-group members, and entry barriers for other members (Terjesen *et al.*, 2009). Extending this idea to the BoD, Elsaid and Ursel (2011) maintain that a male-predominant BoD will likely choose a male new CEO in substitution of a former CEO. From a different perspective, Arvate *et al.* (2018) argue that female leaders provide role models for other women, and encourage them to enter into male-dominated environments.

Additionally, (women) leaders who have themselves suffered discrimination may be more willing to support non-discriminating policies (Raeburn, 2004). According to Cook and Glass (2016), there is substantial empirical support for female leaders having stronger commitment to inclusive policies and practices than male leaders, and being also more likely to undertake innovative management policies (Torchia *et al.*, 2011). More specifically, Ng and Sears (2017) observe that women CEOs are associated with more women in management positions. Similarly, LaPierre and Zimmerman (2012) find that most male managers were not supportive of increasing the proportion of women in senior management. However, Wang and Kelan (2013) find that female directors increase the likelihood of appointing a female chair [2] but not a female CEO. Accordingly, the first hypothesis is as follows:

*H1*: Firms with female CEOs have more women in senior management.

*Age*

The main driver in the relationship between CEO's age and gender diversity in senior management is social gender stereotypes. These stereotypes infiltrate the workplace and put women at a disadvantage in advancing their professional careers (Gupta and Sharma, 2003). Because of gender stereotypes, "[. . ..] top management and executive level jobs are almost always considered to be "male" in sex-type" (Heilman, 2001, p. 659). Therefore, CEOs with stronger gender stereotypes would be less willing to promote women to senior management, as they tend to view women as less suitable for executive jobs. According to Lopez-Zafra and Garcia-Retamero (2012), older people tend to show stronger and more stable gender stereotypes and, thus, they would tend to perceive women as having more traditionally female-dominated occupations than men. Furthermore, because of the societal change of attitudes towards gender inequality in leadership, [3] younger CEOs may be less gender discriminatory than older CEOs. Regarding the extant evidence, Wang and Kelan (2013) do not find that the age of the board members affects the likelihood of appointing a female chair or CEO. Accordingly, the next hypothesis is as follows:

*H2*: Firms with older CEOs have fewer women in senior management.

*Level of formal education*

The association between the level of formal education of the CEO and gender equality in senior management derives mainly from the influence of education on the principles and values which define the interaction of individuals with society (Hood, 2003). According to Hambrick and Mason (1984), a person's education provides an indicator of her/his values and cognitive preferences. Furthermore, Elm *et al.* (2001) maintain that there is strong research evidence of a positive relationship between formal education and moral judgement (Rest, 1986), and Andreoletti and Lachman (2004) argue that individuals with higher levels of education are better able to resist the negative effects of stereotypes. The limited available evidence suggests a positive association between the level of formal education of the CEO and gender diversity in senior management. Hence, Wang and Kelan (2013) find that a sounder educational background of board members facilitates the appointment of female chairs and CEOs. Finally, empirical studies report a straightforward relationship between directors' educational background and the board's concern towards societal and environmental matters (Elm *et al.*, 2001). Therefore, based on the above discussion, the hypothesis is as follows:

*H3*: Firms whose CEOs hold advanced education degrees have more women in senior management.

*MBAs*

Finkelstein *et al.* (2009) argue that managers holding MBA degrees tend to make different decisions than other managers. According to Kelan and Jones (2010), in spite of continuing efforts by business schools to improve gender diversity, MBA programs remain largely male-dominated. Schein (2001) points out the masculine culture of business schools and the extended paradigm of "Think Manager–Think Male" as the main impediment for women to enter MBAs, and Sinclair (1995) maintains that many MBA programs are based on in-teams work, with women confronting a sustained exposure to systematic discrimination. Therefore, MBAs provide the ideal context for the survival of gender stereotypes. Furthermore, there is sound evidence that the study cases used in these programs are seriously affected by gender stereotypes. Symons and Ibarra's (2014) analysis of 53 award-wining and best-selling business cases from 2009 to 2013 reveals that women were simply absent in 45% of them, featured as protagonists in only seven cases, were described in less depth than their male peers in the same case study and in none of the 53 cases did the teaching note make any reference to gender as a relevant topic for discussion. More recently, Soule *et al.* (2019) examine the 249 study cases taught in the Stanford MBA core curriculum between 2015 and 2017, finding a pattern similar to that described by Symons and Ibarra (2014). Hoever, to the best of the authors' knowledge, no previous study has empirically investigated whether CEOs with MBAs are more or less willing to appoint women to senior management, based on the above discussion the next hypothesis states:

*H4*: Firms whose CEOs hold MBA degrees have fewer women in senior management.

*Engineering degrees*

According to Leslie *et al.* (2015), gender stereotypes cause female students to be considered less talented than their male peers in all areas of science. They note that "women are underrepresented in fields whose practitioners believe that raw, innate talent is the main requirement for success, because women are stereotyped as not possessing such talent" (Leslie *et al.*, 2015, p. 262). Unlike the situation in other academic fields, women are still clearly underrepresented in science, technology, engineering and mathematics (STEM) (Wang and Degol, 2017). When the STEM field is further disaggregated, the gender gap becomes particularly severe in the subfields of computer science and engineering (Sassler *et al.*, 2017). Powel *et al.* (2009) maintain that the image of engineering as a masculine field reinforces the perception that this profession is not suitable for women, and Fernando *et al.* (2018) highlight the importance of increasing the visibility of female role models to improve the image of women engineers. Consequently, we would expect CEOs with engineering backgrounds to have more gendered personal and professional identities and experiences than other CEOs and, therefore, to be less prone to promote female candidates to senior management. Based on the above discussion, the next hypothesis is as follows:

*H5*: Firms whose CEOs hold engineering degrees have fewer women in senior management.

*Study-abroad experiences*

The association between CEOs study-abroad experiences and their willingness to appointing women to senior management should be driven by the effects of these experiences on the development across cognitive, intrapersonal and interpersonal domains (Engberg, 2013). Jessup-Anger (2008) maintains that studying abroad not only enhances the student's understanding of other cultures but may also be influential to the formation of self. Particularly, cross-cultural experience provides potentially valuable information for understanding the development of students' identities and their understanding of difference. In that regard, Grewal and Kaplan (1994) specifically refer to the importance of gender differences. Jessup-Anger (2008) concludes that study-abroad experiences offer a unique opportunity for students to reconsider the assumptions that have framed their understanding of the world. Prior studies agree that study-abroad participation may improve intercultural attitudes and skills. For example, Gingerich (1998) observes students with study-abroad experiences to show greater levels of cultural sensitivity and white racial consciousness than other students. This suggests that participation in study-abroad programs contributes to cognitive and experiential culture learning. Accordingly, CEOs with study-abroad experiences are expected to have developed stronger intercultural attitudes and skills, to be more open-minded and also more appreciative of diversity than other CEOs. Hence, they should be less affected by gender stereotypes and more willing to improve gender diversity among their subordinates. Therefore, in spite of lack of previous empirical evidence, based on the above discussion, the last hypothesis of the study states the following:

*H6*: Firms whose CEOs have study-abroad experience have more women in senior management.

## Research design

The research design draws on the regression model represented by equation (1). The dependent variable is the percentage of women in senior management (*WiSM*). The independent variables include six variables of interests (*FEMCEO, AGE, ADVEDUC, MBA, ENGIN* and *STUDAB*) and several control variables:

$$WiSM_i = \beta_0 + \beta_1 FEMCEO_i + \beta_2 AGE_i + \beta_3 ADVEDUC_i + \beta_4 MBA_i + \beta_5 ENGIN_i + \beta_6 STUDAB_i + \Sigma\beta_k CONTROLS_i + \varepsilon_t \quad (1)$$

Table 1 provides the definition of the variables. According to the hypotheses, firms with female CEOs (*FEMCEO*) should have more women in senior management than other firms (*H1*), and the same holds for CEOs with advanced education degrees (*ADVEDUC*) (*H3*) and with study-abroad experience (*STUDAB*) (*H6*). Conversely, firms with older CEOs (*AGE*) (*H2*) or with CEOs holding MBA (*MBA*) (*H4*) or engineering (*ENGIN*) (*H5*) degrees should be associated with fewer women in senior management. Equation (1) includes the following control variables: firm size (*FIRMSIZE*), firm age (*FIRMAGE)*, firm performance (*ROA*), financial leverage (*LEVERAGE*) and three variables accounting for the firm's ownership structure (*INSTOWN, FAMOWN* and *STATOWN*).

Because this study focuses on large corporations, the sample includes public companies from Denmark, Finland, Norway and Sweden, with market capitalization over €2.5bn by late 2019. The dependent variable *WiSM* and the variables accounting for CEO demographics are hand-collected and refer to March 31, 2020. As for the control variables, to better capture the causal relationship between the independent and dependent variables, they are computed for the year 2019. For all the variables, the data are obtained from Capital

| Name | Abbreviation | Definition |
|---|---|---|
| *Dependent variable* | | |
| Women in senior management | *WiSM* | The percentage of women among the firm's key executive professionals, excluding the CEO |
| *Variables of interest* | | |
| Female CEO | *FEMCEO* | 1 if the CEO of the firm is a woman, and 0 otherwise |
| Age | *AGE* | Age of the CEO in logarithms |
| Advanced education | *ADVEDUC* | 1 if the CEO holds a Master or PhD degree, and 0 otherwise. MBA degrees are not considered |
| MBA degree | *MBA* | 1 if the CEO holds an MBA degree, and 0 otherwise |
| Engineering degree | *ENGIN* | 1 if the CEO holds a degree in engineering, and 0 otherwise |
| Study abroad | *STUDAB* | 1 if the CEO has study abroad experience, and 0 otherwise. Only full programs (Bachelor, Master or PhD) coursed abroad are considered |
| *Controls* | | |
| Firm's size | *FIRMSIZE* | The logarithm of the firm's total assets |
| Firm's age | *FIRMAGE* | Number of years since the company was founded, in logarithms |
| Financial leverage | *LEVERAGE* | Total liabilities divided by total assets |
| Return on assets | *ROA* | Earnings before interest and taxes divided by total assets |
| Institutional ownership | *INSTOWN* | The percentage of shares owned by institutional investors |
| Family ownership | *FAMOWN* | The percentage of shares owned by members of the same family |
| State ownership | *STATOWN* | The percentage of shares owned by the state |
| Country-fixed effects | *COUNTRY FE* | Country indicator variables |
| Industry-fixed effects | *INDUSTRY FE* | Industry indicator variables |
| *Additional analyses* | | |
| Women in senior management (dummy) | *WiSMDM* | 1 if the percentage of women in senior management is above the average of *WiSM*, and 0 otherwise |
| Small firms | *SMALL* | 1 if the firm is included in the smallest quartile of *SIZE*, and 0 otherwise |
| Large firms | *LARGE* | 1 if the firm is included in the largest quartile of SIZE, and 0 otherwise |
| Family firms | *FAMILY* | 1 if the firm is included in the largest quartile of *FAMOWN*, and 0 otherwise |
| Non-family firms | *NOFAMILY* | 1 for firms with *FAMOWN* equal to 0, and 0 otherwise |

**Table 1.** Definition of variables

IQ. In the case of *WiSM*, Capital IQ provides the identity of firms' professionals labelled as key executives. The number of firms in the sample by country is as follows: Denmark (24 firms), Finland (17 firms), Norway (14 firms) and Sweden (51 firms). All the continuous variables are winsorized at the top and bottom 1% levels.

Table 2 displays some descriptive statistics for the sample. The average women representation in senior management is 23%, with a maximum of 44% and a minimum of zero. As for the variables of interest, female CEOs represent around 10% of the sample, the average age of CEOs is 53 years, almost 60% of them hold advanced education degrees (excluding MBAs), 20% have MBA degrees, 27% engineering degrees and nearly 20% have study-abroad experience.

Table 3 displays pairwise correlation coefficients. The dependent variable shows significant correlations with *FEMCEO* and *STUDAB*, indicating that female CEOs and CEOs with study-abroad experience are associated with more women in senior management. This supports *H1* and *H6*. Finally, given the low correlations for the independent variables, no serious multicollinearity problems are anticipated.

**Table 2.**
Descriptive statistics

| Variable | Obs. | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| *WiSM* | 106 | 0.227 | 0.119 | 0 | 0.441 |
| *FEMCEO* | 106 | 0.113 | 0.318 | 0 | 1 |
| *AGE* (in years) | 106 | 53.215 | 5.857 | 36 | 68 |
| *ADVEDUC* | 106 | 0.575 | 0.497 | 0 | 1 |
| *MBA* | 106 | 0.198 | 0.4 | 0 | 1 |
| *ENGIN* | 106 | 0.274 | 0.448 | 0 | 1 |
| *STUDAB* | 106 | 0.179 | 0.385 | 0 | 1 |
| *FIRMSIZE* | 106 | 8.898 | 0.718 | 7.965 | 10.265 |
| *FIRMAGE* | 106 | 4.234 | 0.899 | 1.946 | 6.019 |
| *LEVERAGE* | 106 | 50.012 | 21.192 | 0 | 79.537 |
| *ROA* | 106 | 6.633 | 4.828 | 0.411 | 17.895 |
| *INSTOWN* | 106 | 41.35 | 16.706 | 13.078 | 70.718 |
| *FAMOWN* | 106 | 0.019 | 0.035 | 0 | 0.125 |
| *STATOWN* | 106 | 3.571 | 11.087 | 0 | 39.2 |

**Table 3.**
Pairwise correlations coefficients

| Variables | *WiSM* | *FEMCEO* | *AGE* | *ADVEDUC* | *MBA* | *ENGIN* | *STUDAB* |
|---|---|---|---|---|---|---|---|
| *WiSM* | 1.000 | | | | | | |
| *FEMCEO* | 0.214** | 1.000 | | | | | |
| *AGE* | −0.047 | −0.092 | 1.000 | | | | |
| *ADVEDUC* | 0.027 | −0.055 | 0.108 | 1.000 | | | |
| *MBA* | −0.054 | 0.121 | 0.026 | 0.140 | 1.000 | | |
| *ENGIN* | −0.105 | −0.152 | 0.142 | 0.270*** | 0.067 | 1.000 | |
| *STUDAB* | 0.247** | −0.012 | 0.037 | 0.252*** | 0.200** | −0.011 | 1.000 |
| *FIRMSIZE* | −0.007 | 0.009 | −0.086 | 0.094 | 0.058 | −0.000 | 0.015 |
| *FIRMAGE* | −0.016 | 0.109 | 0.062 | −0.079 | 0.098 | −0.004 | 0.120 |
| *LEVERAGE* | −0.115 | −0.227** | 0.080 | −0.029 | −0.003 | 0.014 | −0.070 |
| *ROA* | −0.155 | 0.046 | −0.050 | 0.159* | −0.035 | 0.022 | 0.075 |
| *INSTOWN* | 0.107 | −0.010 | −0.057 | 0.004 | 0.055 | 0.076 | 0.043 |
| *FAMOWN* | 0.054 | −0.028 | −0.025 | −0.042 | −0.011 | −0.114 | −0.035 |
| *STATOWN* | 0.060 | 0.070 | 0.089 | 0.078 | −0.086 | −0.053 | 0.013 |
| Variables | *FIRMSIZE* | *FIRMAGE* | *LEVERAGE* | *ROA* | *INSTOWN* | *FAMOWN* | *STATOWN* |
| *FIRMSIZE* | 1.000 | | | | | | |
| *FIRMAGE* | 0.185* | 1.000 | | | | | |
| *LEVERAGE* | −0.140 | −0.043 | 1.000 | | | | |
| *ROA* | 0.099 | −0.052 | 0.000 | 1.000 | | | |
| *INSTOWN* | −0.117 | 0.075 | −0.044 | −0.038 | 1.000 | | |
| *FAMOWN* | 0.308*** | −0.019 | −0.028 | 0.082 | 0.114 | 1.000 | |
| *STATOWN* | 0.273*** | 0.037 | 0.042 | −0.101 | −0.222** | −0.008 | 1.000 |

**Notes:** ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

## Results of the empirical analysis

### *Preliminary univariate analysis*

Table 4 shows the mean and median values for *WiSM* by groups of firms according to the categories defined by each dichotomous variable of interest (*FEMCEO*, *ADVEDUC*, *MBA*, *ENGIN* and *STUDAB*). Results indicate that firms with female CEOs have significantly large mean and median values of *WiSM* ($p$-value $< 0.05$ in both cases). Therefore, female CEOs are associated with more gender diversity in senior management. Similar results are

| Variable | Obs. | Mean | Median |
|---|---|---|---|
| *FEMCEO* = 0 | 94 | 0.2176 | 0.2243 |
| *FEMCE0* = 1 | 12 | 0.2979 | 0.2928 |
| Sig. level | | ** | ** |
| *ADVEDUC* = 0 | 45 | 0.2229 | 0.2264 |
| *ADVEDUC* = 1 | 61 | 0.2295 | 0.2308 |
| Sig. level | | | |
| *MBA* = 0 | 85 | 0.2299 | 0.2381 |
| *MBA* = 1 | 21 | 0.2140 | 0.2000 |
| Sig. level | | | |
| *ENGIN* = 0 | 77 | 0.2344 | 0.2381 |
| *ENGIN* = 1 | 29 | 0.2065 | 0.2308 |
| Sig. level | | | |
| *STUDAB* = 0 | 87 | 0.2130 | 0.2105 |
| *STUDAB* = 1 | 19 | 0.2896 | 0.2750 |
| Sig. level | | ** | ** |

**Notes:** The *t*-test is used for the significance of mean values, and the Mann–Whitney test for median values; $^{**}p < 0.05$

**Table 4.** Mean and median differences of WiSM by categories of the variables of interest

reported for *STUDAB*. Conversely, none of the remaining variables of interest presents significant results. Overall, these results are consistent with the correlations in Table 3 in providing preliminary support to *H1* and *H6*.

*Multivariate analysis*

Table 5 (Column 1) presents the results of the cross-sectional estimation of equation (1) with ordinary least squares. Significance tests are conducted with robust standard errors. The estimation is globally statistically significant ($p$-value $< 0.01$) with 44% $R$-squared. Although Table 3 did not anticipate multicollinearity problems, variance inflation factors (VIFs) are computed to further assess this issue. The relatively low VIFs observed (results untabulated), with average value of 2.44 and a maximum of 6.03, confirm the expectations that multicollinearity should not affect the estimates.

As for the variables of interest, only *FEMCEO* and *STUDAB* show significant coefficients ($p$-value $< 0.05$ for *FEMCEO* and $p$-value $< 0.01$ for *STUDAB*), with positive sign in both cases. Accordingly, firms with female CEOs and with CEOs with study-abroad experiences present more gender diversity in senior management. Both results are consistent with the correlations in Table 3 and the univariate analysis in Table 4. Conversely, neither CEO's age nor the level or field of formal education is associated with different levels of gender diversity in senior management. These results were also anticipated by the correlations and the univariate analysis. Finally, the results for the control variables show that *FAMOWN* is the only variable with significant effects ($p$-value $< 0.05$).

As prior studies (Nekhili and Gatfaoui, 2013), our results may have been affected by endogeneity, as the appointment of a female CEO may depend on the same sort of factors (e.g. type of firm, firm strategy) that explain the appointment of women to other senior positions. As in Nekhili and Gatfaoui (2013), a first step has been to use lagged values of the control variables. Secondly, the Ramsey test for omitted variables is conducted, as the omission of relevant variables is one of the principal causes of endogeneity. The results of

| Variables | Predicted sign | 1<br>OLS estimation<br>Dependent variable: *WiSM* | 2<br>Logistic estimation<br>Dependent variable: *WiSMDM* |
|---|---|---|---|
| *FEMCEO* | + | 0.0591** (0.0253) | 1.608* (0.933) |
| *AGE* | − | −0.0113 (0.113) | 1.599 (2.714) |
| *ADVEDUC* | + | −0.0109 (0.0227) | −0.424 (0.601) |
| *MBA* | − | −0.0379 (0.0310) | −1.597** (0.749) |
| *ENGIN* | − | −0.0336 (0.0252) | 0.0461 (0.626) |
| *STUDAB* | + | 0.102*** (0.0311) | 4.474*** (1.263) |
| *FIRMSIZE* | + | 0.00219 (0.0187) | 0.0713 (0.556) |
| *FIRMAGE* | − | −0.00208 (0.0122) | −0.211 (0.344) |
| *LEVERAGE* | − | 0.000261 (0.000528) | −0.000724 (0.0168) |
| *ROA* | + | −0.00155 (0.00251) | −0.0482 (0.0680) |
| *INSTOWN* | + | −0.000125 (0.000833) | −0.00148 (0.0173) |
| *FAMOWN* | + | 0.549** (0.266) | 0.00788 (0.0488) |
| *STATOWN* | + | −0.000473 (0.000955) | 10.70 (7.355) |
| *Constant* | | 0.282 (0.528) | −5.399 (13.65) |
| Country FE | | YES | YES |
| Industry FE | | YES | YES |
| Observations | | 106 | 106 |
| *R*-squared | | 0.442 | 0.385 |
| *F*-value | | 6.40*** | |
| Wald $Chi^2$ | | | 63.11*** |

**Table 5.**
Results of the estimations

**Notes:** FE: fixed effect; Column 1: ordinary least squares (OLS) estimations; Column 2: logistic estimation; robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

the test (untabulated) do not suggest omitted variables in the model ($p$-value = 0.5520). To further assess this issue, the Durbin–Wu–Hausman test (augmented regression test) for endogeneity is implemented. The potentially problematic variable is *FEMCEO*, which could be endogenously determined by the same factors which explain gender diversity in senior management. Hence, a logistic model with *FEMCEO* as the dependent variable, and including the exogeneous independent variables which are expected to affect the appointment of a female CEO (firm's Beta, financial slack and financial needs) among the regressors, is estimated. Afterwards, equation (1) is re-estimated after including the residuals of the logistic estimation as an additional independent variable. The estimates (untabulated) do not suggest endogeneity problems, as the residuals variable is insignificant ($p$-value = 0.516).

Several analyses are conducted to assess the robustness of the results. The first one addresses the sensitivity of the results to an alternative definition of the dependent variable. Hence, the new variable *WiSMDM* (1 if the percentage of women in senior management is above the average of *WiSM*, and 0 otherwise), a dummy version of *WiSM*, is defined and, afterwards, we perform logistic estimation of equation (1) with *WiSMDM* as the dependent variable in substitution of *WiSM*. The new results, in Table 5 (Column 2), provide support for the positive association of female CEOs and of CEOs with study-abroad experiences with gender diversity already observed in Column 1. Interestingly, the negative and significant coefficient for *MBA* ($p$-value < 0.05) indicates that CEOs holding MBA degrees are associated with fewer women in senior management.

The next analysis addresses the sensitivity of the results to boundary conditions in the research design that could limit the generalizability of the study. We included the size of the

firm (*SIZE*) in equation (1) as a control variable because large firms are expected to have more gender diversity in senior management. However, firm size could also moderate the relationship between the variables of interest and the dependent variable. In this situation, the importance of CEO demographics as determinants of gender diversity would be weaker in large firms than in small ones. Moreover, the results in Table 5 indicate that family firms present more gender diversity in senior management than other firms. However, family ownership could also moderate the relationship between CEO demographics and gender diversity in senior management, because in these firms, the CEOs ability to appoint whomever they want may be less than in other firms, with some positions reserved for family members. To conduct this analysis, we define the new indicator variables: *SMALL* (1 if the firm is included in the smallest quartile of *SIZE*, and 0 otherwise), *LARGE* (1 if the firm is included in the largest quartile of *SIZE*, and 0 otherwise), *FAMILY* (1 if the firm is included in the largest quartile of *FAMOWN*, and 0 otherwise) and *NOFAMILY* (1 for firms with *FAMOWN* equal to 0, and 0 otherwise). Next, *FEMCEO* and *STUDAB*, which are the variables of interest with significant effects in Table 5 (Column 1), are interacted with the new indicator variables to create eight interaction variables. The estimates of equation (1) after including the interaction variables among the regressors are shown in Table 6. Because all the interaction variables present insignificant coefficients, we conclude that the evidence reported in Table 5 (Column 1) is not affected by boundary conditions.

| Variables | 1<br>Firm size | 2<br>Family ownership |
|---|---|---|
| *FEMCEO* | 0.0683* (0.0354) | 0.0823** (0.0313) |
| *FEMCEO* × *FAMILY* | | −0.0811* (0.0479) |
| *FEMCEO* × *NOFAMILY* | | −0.0502 (0.0434) |
| *FEMCEO* × *SMALL* | −0.0469 (0.0515) | |
| *FEMCEO* × *LARGE* | 0.000339 (0.0692) | |
| *AGE* | −0.00574 (0.115) | −0.00116 (0.118) |
| *ADVEDUC* | −0.00929 (0.0250) | −0.0156 (0.0237) |
| *MBA* | −0.0464 (0.0326) | −0.0382 (0.0314) |
| *ENGIN* | −0.0323 (0.0256) | −0.0325 (0.0261) |
| *STUDAB* | 0.131*** (0.0320) | 0.106*** (0.0363) |
| *STUDAB* × *FAMILY* | | −0.0442 (0.0635) |
| *STUDAB* × *NOFAMILY* | | 0.0233 (0.0605) |
| *STUDAB* × *SMALL* | −0.0649 (0.0492) | |
| *STUDAB* × *LARGE* | −0.0374 (0.0818) | |
| *FIRMSIZE* | 0.000823 (0.0201) | 0.00357 (0.0193) |
| *FIRMAGE* | −0.00147 (0.0128) | −0.00175 (0.0130) |
| *ROA* | −0.00197 (0.00271) | −0.00134 (0.00251) |
| *LEVERAGE* | 0.000230 (0.000553) | 0.000290 (0.000555) |
| *INSTOWN* | −0.000132 (0.000839) | −0.000235 (0.000854) |
| *STATOWN* | −0.000378 (0.00106) | −0.000586 (0.00100) |
| *FAMWOWN* | 0.530* (0.269) | 0.687** (0.295) |
| *Constant* | 0.279 (0.546) | 0.235 (0.556) |
| Country FE | YES | YES |
| Industry FE | YES | YES |
| Observations | 106 | 106 |
| *R*-squared | 0.451 | 0.454 |
| *F*-value | 7.39*** | 6.52*** |

**Notes:** FE: fixed effect; robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

**Table 6.**
Analysis of boundary conditions

Subsequently, we examine the importance of industry and country issues to explain differences in gender diversity in senior management across firms. This analysis is summarized in Table 7. Column 1 shows the estimates of equation (1) after removing industry-fixed effects from the model. Comparing the results of the new estimation with those in Table 5 (Column 1), industry-specific variables just slightly increase the explanatory ability of the model (from 39% to 44%). To further assess the importance of the industry, the null hypothesis that all the coefficients for the industry dummy variables are equal to zero is tested. The *F* test (untabulated) indicates that the null hypotheses cannot be rejected. Another interesting finding is that *MBA* becomes marginally significant ($p$-value $< 0.10$) with the anticipated negative sign, consistent with the results in Table 5 (Column 2). Finally, Table 7 (Column 2) summarizes the estimates of equation (1) after removing country-fixed effects from the model. Now, the explanatory power of the model drops by almost 50% (from 44% to 24%), indicating that gender diversity in senior management has an important country component. Supporting this conclusion, the *F* test of joint significance for the country-specific dummy variables (untabulated) rejects the null hypothesis that these coefficients are jointly equal to zero.

Because most of the variables in Table 5 (Column 1) present insignificant coefficients, a stepwise estimation of equation (1) is performed to obtain a final model with only the variables with significant explanatory ability ($p$-value $< 0.10$). The results of the new estimation are summarized in Table 8. As in Table 5 (Column 1), *FEMCEO* and *STUDAB* present significant coefficients. Interestingly, *MBA* shows a negative and marginally significant coefficient ($p$-value $< 0.10$), suggesting that CEOs with MBAs are associated with fewer women in senior management. This adds to the similar evidence in Tables 5 (Column 2) and 7 (Column 1). As for the control variables, *FAMOWN* remains as the only variable with significant results. Finally, the only significant country variable is the variable

| Variables | Predicted sign | 1<br>Model without industry FE | 2<br>Model without country FE |
|---|---|---|---|
| *FEMCEO* | + | 0.0720*** (0.0271) | 0.0820*** (0.0276) |
| *AGE* | − | −0.0237 (0.105) | 0.000634 (0.122) |
| *ADVEDUC* | + | −0.00170 (0.0206) | 0.000450 (0.0276) |
| *MBA* | − | −0.0499* (0.0263) | −0.0374 (0.0309) |
| *ENGIN* | − | −0.0308 (0.0248) | −0.00560 (0.0276) |
| *STUDAB* | + | 0.108*** (0.0266) | 0.0960*** (0.0279) |
| *FIRMSIZE* | + | −0.00328 (0.0173) | 0.00616 (0.0217) |
| *FIRMAGE* | − | −0.00338 (0.0106) | −0.00725 (0.0144) |
| *LEVERAGE* | − | −0.000135 (0.000465) | −5.22e−05 (0.000626) |
| *ROA* | + | −0.00260 (0.00221) | −0.00402 (0.00258) |
| *INSTOWN* | + | −9.41e−05 (0.000770) | 0.000951 (0.000831) |
| *FAMOWN* | + | 0.591** (0.236) | 0.233 (0.322) |
| *STATOWN* | + | −0.000330 (0.000756) | 0.000134 (0.000811) |
| *Constant* | | 0.441 (0.488) | 0.119 (0.581) |
| Country FE | | YES | NO |
| Industry FE | | NO | YES |
| Observations | | 106 | 106 |
| *R*-squared | | 0.393 | 0.235 |
| *F*-value | | 7.44*** | 2.04** |
| Wald $Chi^2$ | | | |

**Notes:** FE: fixed effect; robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

**Table 7.**
Importance of country and industry characteristics

for Denmark, showing that, after controlling for the factors that may explain differences in gender diversity in senior management across firms, Danish firms still have relatively fewer women in these positions.

## Discussion

The first result of this study shows that firms with female CEOs have more gender diversity in senior management. We consider this a sound result which holds in all the analyses and checks. This is consistent with the theoretical discussion of *H1*, and supports most prior empirical studies (Matsa and Miller, 2011; Ng and Sears, 2017; Wang and Kelan, 2013). The second result is that CEOs age is not associated with gender diversity in senior management. This also seems a sound result which holds across several analyses and checks. Though unexpected, this finding is consistent with the evidence reported by Wang and Kelan (2013), that the age of board members does not explain the appointment of female CEOs. Consequently, no support is provided for *H2*. The third result indicates that the level of formal education is not associated with gender diversity. This is also a sound finding which holds across different analyses and checks. Therefore, no support is provided for *H3*. Regarding education field, while no association is found between CEOs with engineering backgrounds and gender diversity in senior management and, therefore, no support is provided for *H5*, CEOs holding MBA degrees seem to be associated with less gender diversity in senior management. However, the latter result is not robust because it is observed in some analyses but not in others. Therefore, mixed support is provided for *H4*. Our results suggest that gender stereotypes in MBAs would be more important than in the engineering field. Interestingly, the main role of education on attitudes towards gender diversity is through study-abroad experiences, which show a strong relationship with the presence of women in senior management. This result provides sound support for *H6*, and is consistent with Shaftel *et al.* (2007) who highlight the importance of these experiences for the development of intercultural attitudes, open-mindedness and the appreciation of diversity.

Aside from CEO demographics, two additional results of the study are that the presence of women in senior management is significantly different across the examined countries but not across industries. Regarding the first result, Denmark presents significantly lower gender diversity than neighbouring countries. This suggests that, at least in terms of gender diversity, Scandinavia may not form such a homogeneous region as it seems. The second result is interesting because it contradicts the widespread idea that the presence of women in senior management is not homogeneously distributed across industries (Garcia-Blandon *et al.*, 2019).

| Variables | Predicted sign | Stepwise regression |
|---|---|---|
| *FEMCEO* | +/− | 0.0820*** (0.0252) |
| *STUDAB* | + | 0.104*** (0.0236) |
| *MBA* | − | −0.0493* (0.0277) |
| *FAMOWN* | + | 0.612*** (0.214) |
| *DENMARK* | ? | −0.135*** (0.0217) |
| *Constant* | | 0.228*** (0.0142) |
| Observations | | 106 |
| *R*-squared | | 0.342 |
| *F*-value | | 15.96*** |

**Notes:** Selection criterion: $p$-value $< 0.1$; robust standard errors in parentheses; ***$p < 0.01$, *$p < 0.1$

**Table 8.** Results of the estimation with stepwise regression

## Conclusions, implications and limitations

This study shows that firms with female CEOs have more gender diversity in senior management than firms with male CEOs. Conversely, neither age nor formal educational background is associated with gender diversity, with the exception of firms whose CEOs hold MBA degrees, which have fewer women in these positions. However, the main driver of the relationship between CEOs educational background and gender diversity in senior management is not the level or field of formal education, but study-abroad experiences.

The above results may have some interesting implications. From a human resources perspective, the appointment of female CEOs and CEOs with international education backgrounds may improve gender diversity in senior management. Second, given the concern of national governments and supranational institutions regarding gender inequality in leadership, facilitating international student exchange programs (for example, with more generous studentships and/or less arduous bureaucratic procedures) could help attain this objective. Third, the negative association between MBAs and gender diversity provides a valuable insight for universities regarding the design of these academic programs.

The research design is subject to several limitations. First, the sample is small, as it is limited to the largest Scandinavian corporations. Issues such as the importance of the organizational culture on gender discrimination at work or the different public scrutiny between large and medium or small firms made us decide to restrict the analysis to large firms, even though this decision reduced the size of the sample. Additionally, because of limited data availability, the research design relies on cross-sectional analysis. Finally, we acknowledge that cross-sectional regression is potentially vulnerable to endogeneity.

The said limitations provide interesting research opportunities that further studies may explore. For example, analyses based on larger and more diverse samples of firms from the same countries examined here and using more comprehensive research designs might confirm, refute or modify the evidence reported in this article. Additionally, it would also be interesting to extend the study beyond the Scandinavian region, in particular, to less gender egalitarian contexts.

### Notes

1. See Axelsdóttir and Halrynjo (2018) for a detailed discussion on the causes and solutions to improve gender diversity in senior management in the Nordic context.
2. Which may simply indicate that when there are more female directors on the board, it is more likely that one of them will ultimately be appointed chair.
3. See, for example, the United Nation Sustainable Agenda.

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