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THE MORE, THE MERRIER? WOMEN IN TOP-MANAGEMENT TEAMS AND ENTREPRENEURSHIP IN ESTABLISHED FIRMS

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Research summary: *We study the association between firms' entrepreneurial outcomes and their gender composition. Though highly topical, there is little solid empirical knowledge of this issue, which calls for an inductive approach. We match a paired-respondent questionnaire survey with population-wide employer-employee data, and find evidence that the presence of female top managers is positively related to entrepreneurial outcomes in established firms. Yet, this relation is conditional on the proportion between male and female top managers. Another finding is that the overall proportion of women in the firm's workforce negatively moderates the relation between female top managers and entrepreneurial outcomes. We discuss various mechanisms that can explain these findings, and argue that they are best understood in terms of the dynamics of social categorization.*

Managerial summary: *We investigate how companies benefit from having more women on the top-management team. We show that beyond a threshold level of female top managers, more women are associated with more entrepreneurial outcomes (more products and services profitably launched). However, this positive effect is weakened in firms that have many women in the workforce. These effects may be explained in terms of the ways employees mentally categorize managers and how this influences their work motivation. We find evidence for such an explanation.*

INTRODUCTION

In spite of recent increases of female representation in some dimensions of corporate leadership, women remain underrepresented in firms' upper echelons (Heilman, 2012). Yet, firms that keep female representation low in their upper echelons may be sacrificing valuable entrepreneurial initiative.

Keywords: female leadership advantage; gender composition; top-management teams; entrepreneurship; social categorization
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First, upper-echelons research (Hambrick, 2007; Hambrick and Mason, 1984) suggests that the diversity associated with tenure, education, functional backgrounds, and gender composition at the top-management team (TMT) level (e.g., Carpenter, Geletkanycz, and Sanders, 2004; Dwyer, Richard, and Chadwick, 2003) can promote the out-of-the-box thinking that drives entrepreneurial activity (Hunter, Cushenberey, and Friedrich, 2012). Increasing the diversity of the TMT by bringing in more women may thus directly increase entrepreneurship in firms. Second, top managers also influence the values, visions, and goals of subordinate organizational members (Damanpour and Schneider, 2008). As such, they may inspire

and support entrepreneurial behaviors among lower-level employees (Hornsby *et al.*, 2009; Kuratko, Ireland, and Hornsby, 2001). Research associates female managers with leadership styles that are characterized by high levels of inclusion, communication, "communal values," and knowledge sharing (e.g., Eagly and Carli, 2003; Powell, Butterfield, and Bartol, 2008; Scott and Brown, 2006). Such leadership styles can assist in building internal environments that are conducive to the recognition and exploitation of entrepreneurial opportunities by facilitating high levels of communication, knowledge sharing, and openness to external environments (Cohen and Levinthal, 1990; Foss, Laursen, and Pedersen, 2011).

However, the effect of gender composition is very complex and extant research is silent about some key aspects. Shifting the gender composition in the TMT may not be linearly associated with outcomes (e.g., because women need to obtain critical mass in the TMT before any positive consequences will manifest). Additionally, as Hambrick and Pettigrew (2001): 39–40) state, "Top managers don't just do things; they stand for things. They are a highly visible embodiment of the organization, its strategic direction, values, credibility, and staying power." As such, employees form expectations to the TMT (Sheppard and Aquino, 2013). For example, employees' stereotyping and prejudice may negatively influence positive effects of increasing female participation in TMTs.

Given that little is known theoretically and empirically about the effects of female participation in TMTs on firm-level entrepreneurial outcomes, we adopt an inductive and exploratory empirical research design in this study. However, rather than adopting a small-N research design—as is usually recommended in cases of exploratory empirical research (Eisenhardt, 1989)—we exploit privileged access to a number of large-scale datasets, a research strategy endorsed by Helfat (2007), and Bettis *et al.* (2014). This "approach is appropriate when existing theory provides a useful frame for a baseline argument but is not robust enough for precise hypotheses" (Bettis *et al.*, 2014: 950). Although inductive large-N research designs are rare in the management literature (but see Amore, Garofalo, and Minichilli, 2014; Birhanu, Gambardella, and Valentini, 2015), they have often been applied in economic and finance research (e.g., Bandiera, Prat, and Sadun, 2013; Fryer and Levitt, 2012; Jensen and Murphy, 1990).

We match a large-scale double-respondent survey with unique, population-wide, employer-employee data. After controlling for discrete firm- and TMT-level characteristics, we find evidence that female top managers have a conditional positive influence on the firm's number of successfully launched new products/services. However, this effect is negatively conditioned by the firm's proportion of lower-level female employees. Given the inductive nature of these findings, we examine their validity by employing a series of robustness tests.

We end by offering plausible explanations of our findings (c.f. Gelman and Imbens, 2013). We argue that while increasing female representation in the TMT may make the firm more entrepreneurial, this effect depends on how female top managers are perceived by lower level employees. We submit that the dynamics of categorization processes in firms is the most plausible explanatory mechanism at hand.

In sum, this study contributes to our knowledge of gender-based antecedents of entrepreneurship, and empirically identifies a female management advantage in the context of entrepreneurship. However, this advantage depends on the overall gender composition of the firm.

DATA AND METHOD

Data collection

We used survey and register data to investigate the influence of female top managers on entrepreneurial outcomes. The first data source originated from a paired questionnaire survey that targeted all private Danish firms with more than 40 employees (3,392 firms) in 2009, and was administered by Statistics Denmark. The survey consisted of two independent questionnaires that were mailed to the CEO and the executive HR manager of each firm. The CEO questionnaire featured questions related to firm-level entrepreneurship (e.g., the number of new business opportunities successfully realized by the firm). The HR manager questionnaire focused on the firm's organizational design and HR practices.

Statistics Denmark conducted pretests with CEOs and HR managers, but these did not motivate any noteworthy changes to the questionnaires. Subsequently, an e-mail containing an Internet link and a personal password was sent directly to the relevant respondents in each firm. Nonrespondents received two e-mail reminders before they were

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contacted by telephone and offered an opportunity to complete the questionnaire with an interviewer. This procedure produced 654 pairs of returned questionnaires, resulting in a paired-response rate of 19.3 percent. List-wise deletion was used in cases of missing data points, which resulted in a final sample of 392 firm-level observations. To examine the representativeness of our sample, we conducted mean comparison tests between respondents and nonrespondents. No significant differences (at conventional levels) were found in terms of firm age, number of employees, or industry. We also tested whether nonrespondents differed significantly in terms of their proportion of female top managers and female employees, firm tenure, salary, and age. The tests did not reveal significant differences.[1] Finally, we tested whether our sample was biased in terms of geographical location of the responding firms. Traditional social structures have recently been linked to stronger gender bias among men (Desai, Chugh, and Brief, 2014) so that, for example, an overrepresentation of responding firms located in major urban areas might bias our results. We did not find any significant difference between being located inside/outside Denmark's three most populous municipalities.

The second data source was compiled using the Danish Integrated Database for Labor Market Research (IDA). IDA contains information on Danish firms and employees extracted from official registers. We collected information on general firm characteristics for all firms included in the questionnaire sample. Moreover, as IDA is designed as a linked employer-employee database, we were able to collect detailed information on individual characteristics (e.g., gender, wage, and education) of all individuals employed by the sampled firms. We used averaged register data from 2007 to 2009 to mitigate simultaneity issues and obtain chronological correspondence with the survey data. To mitigate missing individual data points that may bias firm-level aggregates, a cut-off level was imposed on the percentage of missing observations at the firm level. All individuals with missing observations were dropped and firms with more than five percent missing individual-level observations were excluded from the final sample.

We took specific precautions to reduce concerns regarding common method variance in our analysis. Thus, we relied on objective register data to construct gender proportions (i.e., our independent variables), while our dependent variable came from the questionnaire addressed to the CEO. Control variables were constructed from the HR questionnaire (e.g., organizational design and R&D activities), the CEO questionnaire (e.g., opportunity recognition by top management), and secondary register data (e.g., firm age, size, industry sector, TMT size, TMT wage, and TMT tenure).

Variables and measures

Dependent variable

The dependent variable, namely, "entrepreneurial outcomes," was measured using firms' self-reported counts of new business opportunities, in terms of products and/or services, successfully realized within the last three years. To isolate major entrepreneurial outcomes from minor or ongoing improvements, respondents were instructed to exclude "minor modifications to existing products and services." The choice of a three-year time span (2007–2009) was motivated by two considerations. First, a three-year time span is similar to the Community Innovation Survey that is a widely used source for firm-level innovation/entrepreneurship (Laursen and Salter, 2006), and which we utilize in the robustness analysis. Second, while the realization of some opportunities may immediately contribute to firm performance, realizing the value creating potential of new products/services may often take a substantial amount of time. The notion of "successfully" launched products/services was defined to respondents as "contributing to improve firm performance." By focusing on new successfully realized business opportunities, we captured behavior that actually results in successful entrepreneurial outcomes.

Independent variables

Given our focus on the influence of female top managers on entrepreneurial outcomes, we relied on a proportional measure of the focal firm's TMT gender composition: *The proportion of female top managers* was calculated as the number of

[1] Note that the insignificant association between proportions of female top managers and inclusion in the sample also alleviate concerns about selection bias based on the gender of the responding top manager, as a large proportion of female top managers increases the likelihood that a female top manager responded to the questionnaire.

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female top managers divided by the total number of top managers. Similarly, the firm's *proportion of female employees* was measured as the number of, non-TMT, female employees divided by the total number of employees. Individuals with a Danish International Standard Classification Codes (DISCO) corresponding to executive management were coded as top managers. However, as a large proportion of Danish firms only list a single top manager, we relied on a broader notion of top managers to also include vice presidents (Smith, Smith, and Verner, 2006). Vice presidents are key contributors to TMT decision-making and they have significant managerial authority over their respective area. Thus, in terms of exercising, encouraging, and supporting entrepreneurial behavior vice presidents may reasonably be categorized as top managers. All employees not categorized as top managers are considered lower-level employees.[2]

Control variables

First-mover proclivity may influence different aspects of entrepreneurship. First, a strong proclivity to be the first to introduce new products/services—for example, because of a strategy of technological leadership—may positively bias resource allocation toward entrepreneurial activities. Second, high levels of first-mover proclivity may signal the firm's entrepreneurial focus to the labor market. Thus, unobserved covariance between entrepreneurial outcomes and recruitment patterns are to some extent captured by this control. Thus, we included a control based on firms' responses (on a scale from 1 to 7) to the question, "How often is your firm the first in the industry to introduce new products/services, business processes, and technologies?"

The *organizational design* of the firm structures interactions among organizational members at different hierarchical levels, thereby influencing the context under which entrepreneurial behavior is carried out (Foss, Lyngsie, and Zahra, 2013; Linder *et al.*, 2015). Our measure relies on Burns and Stalker's (1961) categorization of organizational design as a continuum ranging from fully organic to fully mechanistic. We measured the extent to which a firm's organizational design was characterized as organic using five seven-point Likert scale questions ($\alpha = 0.7$). The hierarchical level at which new business opportunities are recognized may also affect the interactions between top managers and lower-level organizational members. To account for this potential influence, all models included a control for whether the focal firm's *opportunity recognition* primarily happens at the top-management level (no = 0; yes = 1). *Delegation of entrepreneurial decision-making authority* from the top-management level to lower hierarchical levels may both directly and indirectly affect entrepreneurial behavior. Delegation may enable better use of dispersed knowledge within the firm and better utilization of external knowledge sources (Foss *et al.*, 2013). Furthermore, delegation plays an important role in structuring interactions across hierarchical levels. For example, interactions between top managers and lower-level employees may be less frequent if decision-making authority is heavily delegated. Accordingly, a control measuring the firm's overall level of delegation of entrepreneurial decision-making authority was included. The measure was based on four different entrepreneurial activities: (1) developing new products or services, (2) making major changes in marketing activities, (3) making significant changes in products and services, and (4) discontinuing a major existing product or service. Respondents were asked to indicate at what level the decision-making authority for each activity was located. To ensure accurate responses, given cross-firm differences in organizational structures, a four-point scale was used. The lowest level of delegation (1) denoted top management, (2) top management and middle management make the decision together, (3) middle management, and (4) lower-level management. A composite average measure was constructed based on the four activities ($\alpha = 0.7$).

Top managers' tenure may reflect the extent of intergroup biases by virtue of how entrenched social groups are in the minds of members (Oakley, 2000). Thus, tenure may be an indicator of how inclined the firm is to recruit female top managers. Moreover, managers with longer tenure are likely to have more experience with coordinating firm resources with regard to entrepreneurial activities. Thus, TMT tenure, measured as the average number of years top managers had been employed in the focal firm, was included.

[2] IDA categorization does not allow for identification of the exact hierarchical positions of lower-level employees.

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TMT age may relate to several aspects of entrepreneurship. First, age is generally believed to reduce entrepreneurial risk taking (e.g., Lévesque and Minniti, 2006). Second, age and experience are not synonymous. Thus, controlling for TMT tenure, older TMTs may negatively affect entrepreneurial outcomes because of more limited time and attention spans. Finally, older top managers may have a more conservative view of female top managers. For these reasons, we included a control for the average age of members of the firm's top management.

In addition to tenure and age, top managers also differ in their aptitudes as managers. As highly capable managers are likely to command a wage premium relative to less capable managers, we included *top managers' average wage* as a control. The variable was created as the log of the average of the annual wages of the managers in the focal firm's TMT.

The *educational background* of top managers may be an important factor in the context of furthering entrepreneurial behavior, and may also correlate with top manager gender. The control was based on IDA education register data. We measured educational background as the shortest possible time (based on prescribed time) from admittance to primary school until completion of the individual's highest degree. To compute the overall educational level of the TMT, top managers' educational attainments were averaged.

The extant literature suggests that in addition to individual differences (e.g., gender, educational background, and work experience), the level of *TMT diversity* may influence firms' strategic decision-making (Hambrick, 2007). To ensure that the association of female top managers with entrepreneurship was not confounded by overall TMT diversity, a control was included in all models. We based our diversity measure on TMT educational backgrounds. Men and women systematically vary in their choice of education (Barbulescu and Bidwell, 2012). Thus, using educational background as the base for the diversity controls helps diminish concerns about gendered educational choices influencing our results. Similar to the International Standard Classification of Education (ISCED) each TMT member's educational background was categorized based on the level of the obtained degree (e.g., high-school diploma, Bachelors degree, Master's degree). This categorization was then used to construct the familiar Blau index of diversity.

Three control variables were included to mitigate unobserved associations between more entrepreneurial firms and their proportions of female top managers. First, marital status has been linked to men's perception of female organization members (Desai *et al.*, 2014). Thus, the proportion of *married top managers* was included. Second, a firm's disposition to recruit female top managers is likely influenced by the social structures it is embedded in.[3] Social structures may also correlate with firms' entrepreneurial proclivities (Acemoglu, Akcigit, and Celik, 2014). Thus, we employed two proxy measures for pro-female social structures. First, using official listings of all candidates for the most recent (2009) municipality elections, the proportion of *female candidates* was recorded. The proportion of female candidates is likely to be correlated with a general aspiration of women to seek employment with high responsibility. Second, we identified municipalities where the proportion of elected female officials was greater than the proportion of female candidates (coded 1, zero otherwise). Adjusting for proportion of female candidatures, a higher proportion of elected female officials points to stronger *pro-female social structures* on the demand side. Indeed, geographical areas characterized by a conservative view of women's role in society have been found to mitigate cross-hierarchical gender effects (Amore *et al.*, 2014).

Last, all models included controls for: *firm size* (measured as the logarithm of the number of employees), formal internal *R&D activities* (yes/no), *firm age*, and *industry affiliation* (level-one ISIC), as these are generally warranted in firm-level analysis.

Endogeneity issues

Endogeneity is a key concern in the analysis. Although the IDA database consists of a longitudinal panel, our survey instrument is restricted to cross-sectional observations. Thus, we cannot address endogeneity by means of longitudinal modeling techniques. However, in the following, we offer a number of strategies that reduce endogeneity concerns.

Based on the 2010 proportion of female top managers, we tested whether highly entrepreneurial

[3] Recruitment decisions based on applicant gender are prohibited by law in Denmark as in most other industrialized countries.

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firms exhibit different recruitment strategies than less entrepreneurial firms. First, simple mean comparison based on above/below median and mean values of entrepreneurial outcomes did not reveal a significant relationship between entrepreneurial outcomes and firms' recruitment of female top managers. Second, we regressed the proportion of female top managers on the entire set of control variables, including the 2009 proportion of female top managers and female employees in general. The analysis did not indicate that firms' level of entrepreneurship was meaningfully associated with recruitment. However, we did find an indication that firms with more organic organizational designs seemingly recruit more female top managers. Given that organizational design has also been linked to entrepreneurial behaviors (e.g., Foss *et al.*, 2013; Foss, Lyngsie, and Zahra, 2014), the finding suggests that this control helps mitigate omitted variable bias.

Our final test centered on firms' decisions to employ their first female top managers. Relying on a subsample of firms with no female top managers in 2009, and using entrepreneurial outcome as the primary predictor, we were unable to identify a higher likelihood of firms recruiting their first female top manager.

To further reduce endogeneity concerns, we examined the possibility that highly entrepreneurial firms may differ in terms of promotion criteria so that, for example, female top managers are more likely to be assigned high-level positions in entrepreneurial firms. We used wages to test whether entrepreneurship outcomes relate essentially to the average remuneration of female top managers. Based on our sample, and controlling for average male top manager remuneration, no meaningful difference was detected. Thus, it does not appear that female top managers hold more authority because of firms' increased entrepreneurial behavior.

In sum, the above analyses suggest that our econometrical analysis may not be substantially confounded by endogeneity problems. Although we failed to detect a significant relationship between recruitment of female top managers and the firm's entrepreneurial outcome, we do emphasize that given the inability to identify suitable instrumental variables, the results reported in the following section should not be invested with a causal interpretation.

RESULTS

Findings

Table 1 displays descriptive statistics and pair-wise correlations. The table does not suggest that collinearity is an issue. The highest pair-wise correlation was found between proportion of female top managers and female employees (0.38). Average VIF score for the final model were 1.5, and no individual item scored higher than 4.

We tested the impact of female top managers on firms' entrepreneurial outcomes using hierarchical moderated regression analyses. All nonbinary variables were mean-centered in order to reduce nonessential collinearity (Dalal and Zickar, 2012) and ease interpretation of the results (Cohen *et al.*, 2003). Given that the dependent variable was measured as a count and as it clearly indicated over-dispersion (mean = 5.9; S.D. = 15), we used negative binomial regression analysis. Table 2 presents the coefficient estimates (*p*-values in parentheses) for the regression analyses.

The coefficient for the proportion of female top managers in Model 2 suggests the existence of a direct positive association of female top managers and entrepreneurial outcomes. Specifically, increasing the proportion of female top managers by one standard deviation is associated with an estimated 20.2 percent increase in entrepreneurial outcomes. The average marginal effect (dy/dx = 5.30) in combination with the strictly positive confidence interval (95% CI = [0.20 1.62]) of female top managers further corroborates the association. The high average marginal effect also lends credence to the economic significance of firms' proportion of female top managers. Increasing the proportion of female top managers by 20 percent is on average associated with the firm successfully realizing approximately one more business opportunity. To investigate the influence of female top managers on lower hierarchical levels, Model 3 included an interaction term. The negative coefficient for the interaction indicates the existence of a negative moderation effect.

However, the interaction may also partly reflect nonlinearity in terms of female top managers' association with entrepreneurial outcomes. Thus, Model 4 included the squared term of TMT gender composition as well as the interaction. The predictive power of the coefficient estimates strongly

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Table 1. Descriptive statistics and pair-wise correlations

Variables	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Entrepreneurial outcomes	5.93	15.00	1.00						
(2) Proportion of female top managers	0.17	0.20	0.05	1.00					
			(0.31)						
(3) Proportion of female employees	0.36	0.21	0.02	0.38	1.00				
			(0.65)	(0.0000)					
(4) R&D activities	0.48	0.50	0.12	0.06	0.08	1.00			
			(0.02)	(0.22)	(0.13)				
(5) Firm age	25.06	21.66	0.09	−0.08	0.02	−0.05	1.00		
			(0.08)	(0.13)	(0.66)	(0.34)			
(6) Firm size	4.87	0.92	0.15	−0.01	0.09	0.21	0.16	1.00	
			(0.002)	(0.88)	(0.07)	(0.0000)	(0.001)		
(7) Top managers' average wage	13.41	0.37	0.01	−0.15	0.05	0.01	0.03	0.17	1.00
			(0.90)	(0.004)	(0.33)	(0.85)	(0.55)	(0.001)	
(8) Delegation of entrepreneurial decision-making authority	1.83	0.51	0.09	0.02	0.04	0.07	−0.07	−0.01	0.03
			(0.07)	(0.74)	(0.42)	(0.17)	(0.16)	(0.91)	(0.58)
(9) Organizational design	5.05	0.90	−0.03	0.04	0.01	0.04	−0.14	−0.11	0.11
			(0.55)	(0.40)	(0.86)	(0.47)	(0.005)	(0.03)	(0.02)
(10) Top managers' average age	46.61	5.74	−0.07	−0.25	−0.09	−0.01	0.12	−0.09	0.02
			(0.17)	(0.0000)	(0.09)	(0.88)	(0.02)	(0.09)	(0.70)
(11) Top managers' average tenure	6.88	4.78	−0.05	−0.10	−0.05	0.001	0.14	−0.10	0.03
			(0.32)	(0.05)	(0.37)	(0.99)	(0.01)	(0.05)	(0.62)
(12) Top managers' average education	13.99	1.40	−0.04	−0.03	0.09	0.22	−0.01	0.06	0.30
			(0.39)	(0.49)	(0.09)	(0.0000)	(0.80)	(0.23)	(0.0000)
(13) Married top managers	0.79	0.19	−0.01	−0.20	−0.09	0.07	0.06	−0.09	0.19
			(0.88)	(0.0001)	(0.07)	(0.17)	(0.26)	(0.08)	(0.0002)
(14) Female candidates	30.25	4.69	0.11	0.13	0.15	−0.04	0.06	0.07	0.14
			(0.04)	(0.01)	(0.003)	(0.49)	(0.24)	(0.18)	(0.01)
(15) Pro-female social structures	0.46	0.50	0.04	0.05	0.11	−0.01	−0.03	0.05	0.09
			(0.44)	(0.37)	(0.03)	(0.80)	(0.49)	(0.28)	(0.07)
(16) First-mover proclivity	3.83	1.69	0.09	−0.005	−0.01	0.07	−0.02	0.13	0.13
			(0.07)	(0.92)	(0.81)	(0.18)	(0.70)	(0.01)	(0.01)
(17) Opportunities recognized by top management	0.72	0.45	−0.07	−0.04	−0.01	−0.02	−0.02	−0.06	−0.03
			(0.17)	(0.47)	(0.77)	(0.66)	(0.73)	(0.20)	(0.51)
(18) TMT diversity	0.49	0.24	0.13	0.01	0.05	0.07	0.12	0.33	0.17
			(0.01)	(0.79)	(0.33)	(0.17)	(0.02)	(0.0000)	(0.001)

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(8)	1.00										
(9)	0.08	1.00									
	(0.13)										
(10)	−0.02	−0.05	1.00								
	(0.66)	(0.32)									
(11)	−0.01	0.07	0.38	1.00							
	(0.89)	(0.16)	(0.0000)								
(12)	−0.04	0.02	−0.10	−0.18	1.00						
	(0.41)	(0.71)	(0.05)	(0.0003)							
(13)	0.02	0.02	0.34	0.13	0.09	1.00					
	(0.74)	(0.69)	(0.0000)	(0.01)	(0.07)						
(14)	−0.03	−0.03	−0.12	−0.16	0.15	−0.16	1.00				
	(0.50)	(0.54)	(0.02)	(0.002)	(0.004)	(0.01)					
(15)	−0.12	−0.03	−0.07	−0.15	0.07	−0.07	0.18	1.00			
	(0.02)	(0.61)	(0.16)	(0.003)	(0.19)	(0.14)	(0.0004)				
(16)	−0.07	0.04	−0.09	−0.11	0.11	−0.02	0.06	0.02	1.00		
	(0.14)	(0.46)	(0.07)	(0.03)	(0.03)	(0.70)	(0.26)	(0.68)			
(17)	−0.13	−0.14	0.05	0.02	−0.002	−0.02	−0.004	0.01	−0.04	1.00	
	(0.01)	(0.004)	(0.34)	(0.69)	(0.97)	(0.68)	(0.94)	(0.86)	(0.43)		
(18)	−0.07	0.10	−0.12	0.05	−0.01	−0.07	0.08	0.002	0.11	−0.05	1.00
	(0.18)	(0.06)	(0.02)	(0.34)	(0.91)	(0.17)	(0.12)	(0.96)	(0.03)	(0.33)	

n = 392; *p*-values in parentheses.

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Table 2. Hierarchical negative binomial regression analysis for entrepreneurial outcomes

DV: entrepreneurial outcomes	Model 1	Model 2	Model 3	Model 4	Model 5 AME (+1SD)	Model 6 AME (-1SD)
Proportion of female top managers		0.91	1.32	−0.42	−10.93	31.24
		(0.01)	(0.003)	(0.49)	(0.08)	(0.27)
Proportion of female employees	0.45	0.23	0.34	0.48	2.54	−10.86
	(0.29)	(0.60)	(0.44)	(0.26)	(0.50)	(0.47)
Proportion of female top managers × proportion of female employees			−2.97	−6.39		
			(0.08)	(0.001)		
Proportion of female top managers^2				5.13		
				(0.000)		
R&D activities	0.59	0.60	0.59	0.66	4.66	5.41
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.02)
Firm age	0.01	0.01	0.01	0.005	0.03	0.04
	(0.16)	(0.17)	(0.17)	(0.21)	(0.22)	(0.24)
Firm size	0.15	0.16	0.17	0.21	1.47	1.70
	(0.04)	(0.04)	(0.03)	(0.01)	(0.02)	(0.05)
Top managers' average wage	−0.01	0.20	0.22	0.21	1.49	1.73
	(0.96)	(0.39)	(0.34)	(0.36)	(0.37)	(0.39)
Delegation of entrepreneurial decision-making authority	0.37	0.38	0.32	0.47	3.35	3.88
	(0.01)	(0.004)	(0.02)	(0.000)	(0.002)	(0.02)
Organizational design	−0.14	−0.14	−0.12	−0.08	−0.58	−0.67
	(0.09)	(0.09)	(0.16)	(0.33)	(0.33)	(0.32)
Top managers' average age	−0.02	−0.01	−0.02	−0.02	−0.11	−0.13
	(0.15)	(0.32)	(0.26)	(0.25)	(0.25)	(0.29)
Top managers' average tenure	−0.03	−0.02	−0.02	−0.02	−0.12	−0.14
	(0.09)	(0.16)	(0.20)	(0.30)	(0.31)	(0.31)
Top managers' average education	−0.11	−0.10	−0.08	−0.05	−0.38	−0.44
	(0.10)	(0.12)	(0.19)	(0.40)	(0.40)	(0.41)
Married top managers	0.18	0.09	0.09	−0.10	−0.70	−0.81
	(0.67)	(0.84)	(0.83)	(0.83)	(0.83)	(0.83)
Female candidates	0.04	0.03	0.03	0.02	0.15	0.17
	(0.01)	(0.02)	(0.03)	(0.15)	(0.15)	(0.18)
Pro-female social structures	0.26	0.20	0.18	0.22	1.56	1.81
	(0.07)	(0.16)	(0.20)	(0.12)	(0.13)	(0.14)
First-mover proclivity	0.09	0.09	0.08	0.08	0.59	0.69
	(0.04)	(0.04)	(0.06)	(0.05)	(0.06)	(0.11)
Opportunities recognized by top management	−0.19	−0.19	−0.20	−0.18	−1.30	−1.51
	(0.22)	(0.21)	(0.20)	(0.23)	(0.23)	(0.27)
TMT diversity	0.58	0.67	0.60	1.23	8.69	10.08
	(0.07)	(0.04)	(0.07)	(0.000)	(0.001)	(0.02)
Constant	1.25	1.30	1.38	1.11		
	(0.000)	(0.000)	(0.000)	(0.000)		
Log likelihood	−1029.08	−1025.83	−1024.36	−1015.12		
	(0.000)	(0.000)	(0.000)	(0.000)		

n = 392; *p*-values in parentheses.
All models include industry controls.

indicates that the moderating effect exists independently of nonlinearity (Ganzach, 1997). Although the estimates indicate an association of female top managers, direct interpretation of coefficients is hampered by the multiplicative nature of the model. To aid interpretation, Figure 1 plots average marginal effect of female top managers with 90 percent confidence intervals based on Model 4 estimates.

Figure 1 illustrates that female top managers are positively/negatively associated with entrepreneurial outcomes at high/low proportions.

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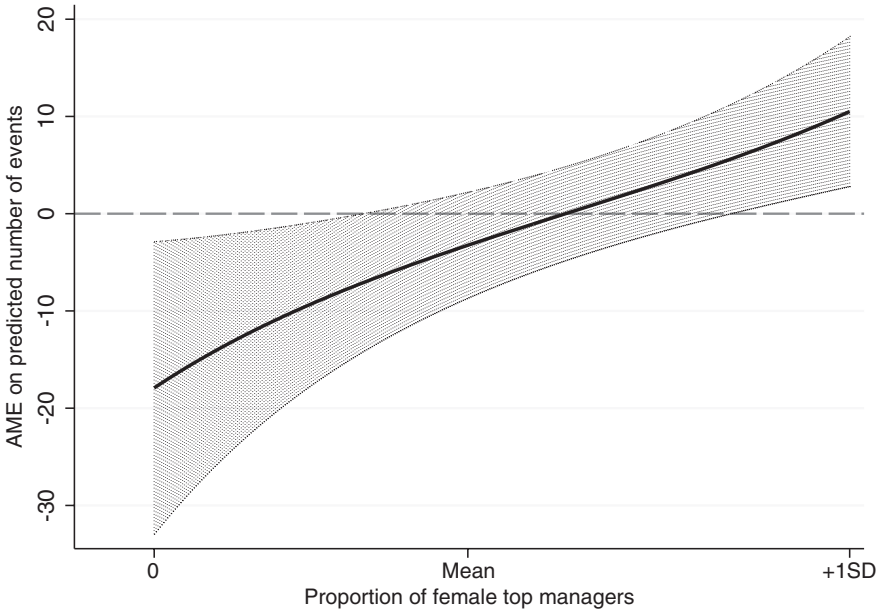

Figure 1. Average marginal effect of prop. Female top managers

Moreover, at mean proportions female top managers appear inconsequential to firms' entrepreneurial outcomes.[4]

Given the substantial interaction effect (95% CI = [−10.20, −2.57]), and the nonlinear model technique, average marginal effects at high (+1SD) and low (-1SD) levels of overall gender composition are presented in Models 4 and 5. The models indicate similar trends as the linear model, specifically the negative association between female top managers and entrepreneurial outcomes at high proportion of female employees (i.e., Model 5). To further aid interpretation, Figure 2 presents the association of female top managers at high proportion of lower-level female employees. Supporting the existence of a negative moderating relationship, the figure shows that, at high proportions of female employees, increased proportions of female top managers are predominately negatively associated with entrepreneurial outcomes. Moreover, in contrast to the direct influence (i.e., Figure 1), given high proportions of female employees, female top managers are not positively associated with entrepreneurial outcomes at higher proportions.

Figure 3 shows average marginal effects at low (-1SD) proportions of female employees.

Opposite to Figure 2, at low (-1SD) proportions of female employees, lower proportions of female top managers are not associated with entrepreneurial outcomes. And higher proportions of female top managers positively relate to outcomes. Figure 3 also indicates the reason for the low precision of the estimated association in Model 6. Rather than increasing the positive association of female top managers at higher proportions, a low proportion of female employees appears to mitigate the initial negative influence of female representation in the TMT.

In addition to the clear graphical support for a negative relationship between female top managers and female employees, average marginal effects support that the influence of female top managers depends on the overall proportion of lower level female employees (c.f. Buis, 2010; Ai and Norton, 2003). Specifically, firms with a high proportion (+1SD) of female top managers and female employees on average successfully realize 5.04 opportunities compared to 7.04 when the proportion of female employees is low (-1SD).

In sum, the analysis provides evidence for a positive association between higher proportions of female top managers and entrepreneurial outcome, and second, a negative association at initial addition of female top managers to the TMT. The analysis also reveals that the influence of

[4] Given the variance of our independent variable, we used zero proportion of female top managers rather than -1 SD.

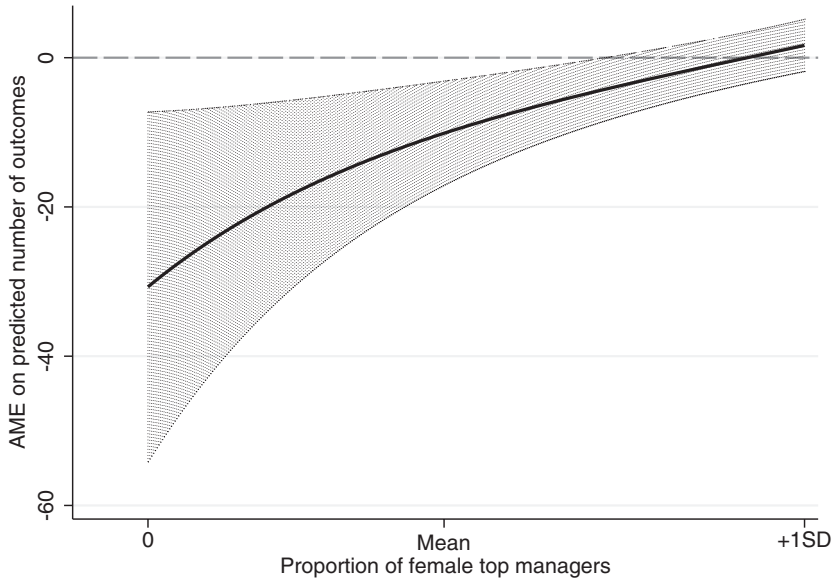

Figure 2. Average marginal effect of prop. Female top managers at high prop. of female employees

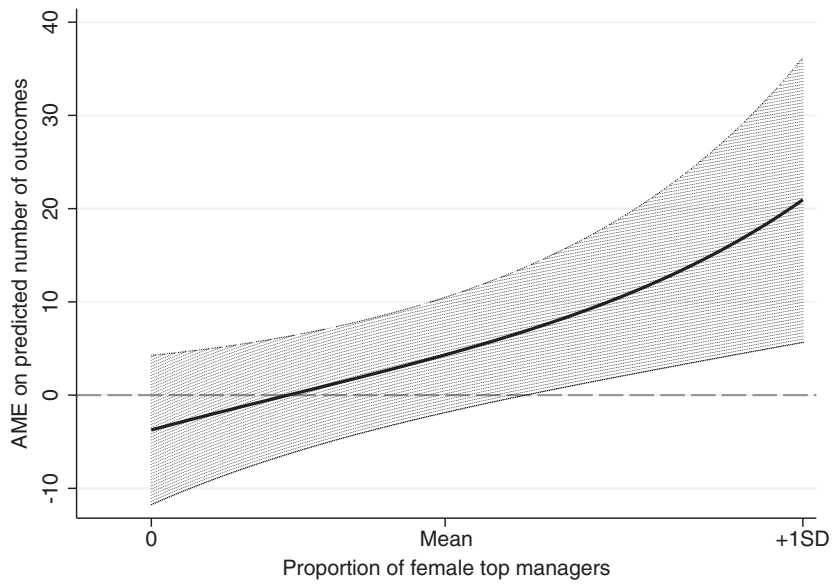

Figure 3. Average marginal effect of prop. Female top managers at low prop. of female employees

female top managers is conditional on the overall gender composition of the firm. Specifically, a high/low proportion of female employees relates to a negative/positive association between female top managers and firms' entrepreneurial outcomes.

Robustness analyses

To assess the reliability of the findings, we ran several respecified models, using the original sample and a secondary sample collected from the Danish Community Innovation Survey.

The first robustness analysis directly attempted to replicate the results of Table 2. We matched the 2009 Danish version of the Community Innovation Survey (CIS) with the surveyed firms. Chance overlap resulted in 249 firms that had responded to both surveys. The original regressors were used to predict whether (coded 1) or not (coded zero) firms responded in the affirmative to the CIS question:

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Table 3. Hierarchical probit regression analysis for CIS entrepreneurial outcome

DV: CIS outcome	Model 1	Model 2	Model 3	Model 4	Model 5 AME (+1SD)	Model 6 AME (-1SD)
Proportion of female top managers		0.78	1.25	2.30	0.44	0.83
		(0.27)	(0.12)	(0.02)	(0.16)	(0.01)
Proportion of female employees	−0.01	−0.23	−0.13	−0.21	−0.04	−0.06
	(0.99)	(0.71)	(0.83)	(0.73)	(0.83)	(0.71)
Proportion of Female top managers × proportion of female employees			−6.73	−4.45		
			(0.03)	(0.20)		
Proportion of female top managers^2				−7.19		
				(0.07)		
R&D activities	0.46	0.47	0.47	0.50	0.13	0.13
	(0.05)	(0.05)	(0.04)	(0.03)	(0.03)	(0.03)
Firm age	0.01	0.01	0.01	0.01	0.002	0.002
	(0.05)	(0.04)	(0.05)	(0.03)	(0.03)	(0.03)
Firm size	−0.04	−0.03	−0.03	−0.08	−0.02	−0.02
	(0.73)	(0.78)	(0.77)	(0.51)	(0.50)	(0.51)
Top managers' average wage	0.71	0.78	0.83	0.91	0.24	0.24
	(0.09)	(0.07)	(0.05)	(0.04)	(0.04)	(0.04)
Delegation of entrepreneurial decision-making authority	0.30	0.30	0.27	0.25	0.06	0.07
	(0.11)	(0.11)	(0.15)	(0.19)	(0.18)	(0.19)
Organizational design	0.03	0.04	0.04	0.07	0.02	0.02
	(0.79)	(0.75)	(0.71)	(0.55)	(0.55)	(0.55)
Top managers' average age	−0.04	−0.03	−0.03	−0.02	−0.01	−0.01
	(0.24)	(0.31)	(0.38)	(0.43)	(0.42)	(0.42)
Top managers' average tenure	−0.01	−0.01	−0.01	−0.01	−0.003	−0.003
	(0.65)	(0.63)	(0.65)	(0.73)	(0.73)	(0.73)
Top managers' average education	0.09	0.09	0.08	0.07	0.02	0.02
	(0.39)	(0.44)	(0.46)	(0.54)	(0.54)	(0.54)
Married top managers	1.05	1.13	1.12	0.89	0.23	0.24
	(0.12)	(0.10)	(0.10)	(0.22)	(0.21)	(0.21)
Female candidates	0.02	0.02	0.02	0.02	0.004	0.004
	(0.31)	(0.37)	(0.43)	(0.46)	(0.46)	(0.46)
Pro-female social structures	−0.20	−0.22	−0.21	−0.22	−0.06	−0.06
	(0.32)	(0.29)	(0.31)	(0.29)	(0.29)	(0.28)
First-mover proclivity	−0.03	−0.04	−0.04	−0.05	−0.01	−0.01
	(0.61)	(0.58)	(0.53)	(0.47)	(0.47)	(0.47)
Opportunities recognized by top management	0.07	0.09	0.06	−0.01	−0.002	−0.002
	(0.75)	(0.67)	(0.78)	(0.97)	(0.97)	(0.97)
TMT diversity	2.21	2.21	2.16	1.96	0.51	0.53
	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)	(0.001)
Constant	−0.44	−0.44	−0.33	−0.16		
	(0.11)	(0.11)	(0.26)	(0.59)		
Log pseudolikelihood	−118.10	−117.61	−115.90	−114.57		
	(0.000)	(0.000)	(0.000)	(0.000)		

n = 249; *p*-values in parentheses.
All models include industry controls and robust standard error specification.

"During the three years from 2007 to 2009, did your enterprise introduce: new or significantly improved goods (exclude the simple resale of new goods and changes of a solely aesthetic nature)?" Table 3 presents the findings.

Although the dichotomous coding substantially limits variance, probit regression analysis (Model 3) supports a uniformly negative moderating relationship between female top managers and female employees. To address nonlinearity issues, Model 4 includes the squared term for the proportion of female top managers. Although the interaction and squared term remain jointly predictive, accounting for nonlinearity, the interaction effect was

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imprecisely estimated (i.e., high standard error). To further examine conditionality, Models 5 and 6 presents the average marginal effect of female top managers at different proportions of female employees (+/-1SD). In support of the original findings, the models revealed that the association between the proportion of female top managers and entrepreneurial outcomes is conditional on firms' proportion of female employees. At a low proportion of female employees (-1SD), female managers have a strong and positive (dy/dx = 0.83) influence on the probability of the firm introducing new or significantly improved goods. The absence of an association at high (+1SD) proportion of female employees provides further support for a conditional negative association between female employees and the influence of female top managers in the model. In sum, based on the CIS dataset, we find general support for the original positive association between female top managers and entrepreneurial outcomes, and the negative influence of higher proportions of female employees.

Although our investigation primarily seeks to link female top managers to successful entrepreneurial outcomes, these may be subsumed by failures. Thus, the second respecified model examined whether firms' proportion of female top managers significantly predicted their general implementation of new business opportunities. Respondents were presented with six categories of entrepreneurial implementation intensity: 1: 0 percent, 2: 1–20 percent, 3: 21–40 percent, 4: 41–60 percent, 5: 61–80 percent and 6: 81–100 percent. In support of the original findings, ordered logistic regression produced similar results to the original model. Specifically, Model 4 supports a conditional association between female top managers and the firm's implementation intensity, and a negative moderating effect of a firm's overall gender composition (Table 4).

Average marginal effects, at high/low levels of female employees, further elucidate the conditional association of female top managers. At low (-1SD) proportions of female employees, increased shares of female managers negatively influences the log odds of being in category 1 (dy/dx = -0.04; $p = 0.10$), 2 (dy/dx = -0.36; $p = 0.03$) and 3 (dy/dx = -0.08; $p = 0.02$). However, female top managers increases the likelihood that the firm implements 41–60 percent (dy/dx = 0.17; $p = 0.06$), 60–80 percent (dy/dx = 0.25; $p = 0.01$) and 81–100 percent (dy/dx = 0.06; $p < 0.09$) of new business opportunities. No association existed at high (+1SD) proportions of female employees. Given a sample mean of 3.23 (SD = 1.13), the robustness analysis indicates a clear conditional and positive link between firms' proportion of female top managers and general entrepreneurial behavior. Although we focus on successful entrepreneurial behavior, the results help validate the independence of our findings from our specific measure of entrepreneurial outcomes.

INTERPRETING THE FINDINGS

Female representation in the TMT and entrepreneurship: plausible mechanisms

Different theoretical ideas can explain our findings. First, upper-echelons research (Carpenter *et al.*, 2004; Hambrick, 2007; Hambrick and Mason, 1984) suggests that increasing diversity can make the top-management team consider new, alternative solutions. This may increase overall entrepreneurial activity by leading to the recognition of more opportunities and/or new ways of realizing existing opportunity. This line of reasoning suggests that the TMT itself becomes more entrepreneurial.

Increased female representation in the TMT can also have a positive effect on entrepreneurial initiatives lower down in the organization. This may be the case to the extent that female leadership styles—which arguably are higher in inclusion, communication, cooperative attitudes, and knowledge sharing than male leadership styles (e.g., Book, 2000; Dufwenberg and Muren, 2006; Eagly and Carli, 2003; Eagly and Johnson, 1990; Helgesen, 1990; Powell *et al.*, 2008; Rosener, 1995; Rosette and Tost, 2010; Scott and Brown, 2006)—support the recognition and realization of entrepreneurial opportunities.

While the research literature can explain a positive association between female representation in the TMT and firm-level entrepreneurship, there are also *a priori* arguments that may suggest a negative relation. In particular, social categorization arguments offer a reason why increased female representation in the TMT need not be associated with positive firm-level outcomes. Categorization, a pervasive psychological force (e.g., Brewer, 1979; Brown and Turner, 1981; Rabbie, 1982; Tajfel and Turner, 1979), assigns universal properties to all

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Table 4. Hierarchical ordered logistic regression for entrepreneurial implementation intensity

DV: entrepreneurial implementation	Model 1	Model 2	Model 3	Model 4
Proportion of female top managers		0.68	1.39	0.88
		(0.20)	(0.02)	(0.27)
Proportion of female employees	−0.49	−0.74	−0.45	−0.38
	(0.35)	(0.18)	(0.43)	(0.51)
Proportion of female top managers × proportion of female employees			−6.02	−6.69
			(0.01)	(0.003)
Proportion of female top managers^2				1.57
				(0.34)
R&D activities	0.13	0.12	0.11	0.11
	(0.54)	(0.58)	(0.61)	(0.61)
Firm age	−0.0005	−0.0002	−0.0002	−0.001
	(0.91)	(0.96)	(0.96)	(0.88)
Firm size	0.19	0.20	0.22	0.23
	(0.10)	(0.09)	(0.06)	(0.05)
Top managers' average wage	0.11	0.17	0.20	0.21
	(0.71)	(0.56)	(0.49)	(0.47)
Delegation of entrepreneurial decision-making authority	0.13	0.14	0.08	0.09
	(0.50)	(0.47)	(0.69)	(0.65)
Organizational design	−0.18	−0.19	−0.18	−0.18
	(0.09)	(0.08)	(0.10)	(0.10)
Top managers' average age	−0.005	−0.0004	0.002	0.002
	(0.81)	(0.98)	(0.93)	(0.90)
Top managers' average tenure	0.004	0.004	0.01	0.01
	(0.84)	(0.86)	(0.69)	(0.73)
Top managers' average education	−0.01	−0.002	0.01	0.02
	(0.93)	(0.98)	(0.86)	(0.78)
Married top managers	−0.34	−0.35	−0.31	−0.30
	(0.54)	(0.52)	(0.58)	(0.59)
Female candidates	0.05	0.05	0.04	0.04
	(0.02)	(0.03)	(0.06)	(0.06)
Pro-female social structures	−0.26	−0.27	−0.26	−0.25
	(0.18)	(0.17)	(0.19)	(0.20)
First-mover proclivity	0.23	0.23	0.23	0.23
	(0.000)	(0.000)	(0.00)	(0.000)
Opportunities recognized by top management	−0.20	−0.18	−0.24	−0.23
	(0.36)	(0.39)	(0.27)	(0.28)
TMT diversity	−0.45	−0.46	−0.63	−0.48
	(0.30)	(0.29)	(0.16)	(0.31)
Log likelihood	−559.39	−558.56	−554.56	−554.11
	(0.002)	(0.002)	(0.0002)	(0.0003)

n = 392; *p*-values in parentheses.
All models include industry controls.

members of a given group. Gender has consistently been emphasized as one of the strongest individual characteristics used for categorization (Fiske, Haslam, and Fiske, 1991; Stangor *et al.*, 1992; Van Knippenberg, van Twuyver, and Pepels, 1994). Much research has focused on how stereotyping and intergroup biases among male organizational members negatively influence female members (e.g., Eagly and Karau, 2002; Heilman, 2012; Rosette and Tost, 2010; Sheppard and Aquino, 2013). Male-dominated settings are associated with female team members being perceived as less competent and having less decision-making influence, regardless of their actual level of expertise (Joshi, 2014). As a result of stereotyping and/or tokenism (e.g., Carli, 2010; Ridgeway and Smith-Lovin, 1999), contributions from female top managers may be sidelined or simply dismissed as inferior to those of the majority male top managers. In a setting with strong, gender-based categorizations, out-group members (i.e., women) are able to contribute less to the combined decision-making of

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the TMT (Nielsen and Huse, 2010; Westphal and Milton, 2000). This suggests that a TMT with gender-based fault lines can be dysfunctional, even conflictual, and that neither male nor female members of the team will be able to supply high levels of entrepreneurial efforts.

Interestingly, we do find that female top managers appear to be negatively associated with entrepreneurial outcomes at low proportions of female/male team composition (c.f. Figure 1). However, successive increases at higher proportions are positively associated with entrepreneurial outcomes at the firm level, which may point to a critical mass effect with respect to female representation in TMT. While the relevant mechanism is unobserved in our study, initially negative categorization of female members of the TMT may change as a result of recategorization, which in this context means raising the saliency of common superordinate group membership, namely being a top-manager. At low levels of representation, gender differences are likely to be highly salient as they represent a fundamental change in terms of the established in-group of male managers (e.g., Lee and James, 2007). However, as female managers become more common in the firm's top management, recategorization is likely to be more frequent. Although female top managers still represent a minority, they no longer represent a new and unique challenge to the dominant group. Thus, as the number of women in the top management team increases, individual female managers are increasingly able to demonstrate commitment to the team rather than their gender.[5] This diminishes negative out-group bias based on gender, and facilitates women pursuing entrepreneurial opportunities in the TMT and exercising those leadership styles that are conducive to entrepreneurship at lower levels in the organization.

Negative moderation effect of a higher proportion of female employees: plausible mechanisms

Our empirical analysis revealed that the association between the focal firm's proportion of female top managers and its level of entrepreneurial outcomes is conditional on the extent to which it employs female employees. This surprising finding was robust to alternative specifications. We argue that social categorization arguments may also be usefully deployed to explain the moderation effect.

The TMT does not exist in an organizational vacuum, and its composition has important consequences for the motivation and commitment of lower-level organizational members (Gonzales and Denisi, 2007: 22). Although recategorization of women into the top-manager category may alleviate stereotypes and out-group biases within the TMT and strengthen female top managers' influence, it may have negative repercussions *beyond* the TMT, specifically with respect to lower-level female employees. For example, Amore *et al.* (2014) argue that increased female representation at higher hierarchical levels may mitigate negative gender biases at lower levels.

However, much of the literature on female top managers' vertical dyadic relationships is based on an untested assumption that a gender-specific relation of solidarity exists between female managers and lower-level female employees (Dezsö and Ross, 2012; Mavin, 2008). While the presence of female top managers may indicate greater opportunity for the hierarchical advancement of female employees, this does not imply solidarity among women at different hierarchical levels per se. In fact, the notion that female managers are responsible for and willing to carry the "woman in management mantle" likely depends on whether the focus is on top- or lower-level female organizational members (Mavin, 2008). Contrary to the expected solidary behavior, a female top manager is less likely to favor lower-level female employees because of their gender, as her categorization as a member of the TMT restricts gender-based favoritism.

Recategorization of female top managers may frustrate lower-level female employees, who may expect more solidary behavior from female top managers than the latter are willing to provide. In extreme cases, female top managers may be categorized as "queen bees" (Mavin, 2006), who are seen as particularly hostile and unfriendly (Derks *et al.*, 2011; Mavin, 2006). When lower-level female employees perceive female top managers negatively, or experience a clash between the expected and actual behavior of female top managers, motivation and commitment is likely to

[5] As a majority, female top managers may not benefit from being categorized as "top manager" compared to the in-group favoritism of the female categorization. However, top-management teams with a majority of women are still extremely rare. Moreover, if the majority is reached incrementally, gender-based favoritism may be harder to establish as existing female managers will have to revert to gender-based categorization.

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decline. Stereotyping impedes communication and collaboration, and may result in biased evaluations of actual performance (Ellemers *et al.*, 2004). In other words, a divergence between expected and actual gender solidarity may lead lower-level female employees to perceive female top managers as relatively unsympathetic and unsupportive. Out-group perception of female top managers entails that female employees benefit less from the positive association between entrepreneurial behavior and female management. Perceived unsupportiveness reduces availability of resources to female organizational members (e.g., championing of entrepreneurial activities) and increases the perceived risk that a project will be unfairly rejected. These mechanisms can drive the unexpected negative moderation effect we observe in the data.

On the other hand, the negative moderation may reflect adverse behavior by *male*, rather than female, employees. To investigate this alternative explanation, we examine the association between female top managers and remuneration of female employees. We focus on (average) employee wage because it strongly correlates with authority and hierarchical position within the firm. The average wage of female employees is likely to be higher the more women are employed in higher responsibility jobs and/or hold lower/middle level management positions. First, we regressed the log of average female wage on the proportion of female top managers, controlling for key characteristics of the firm and female employees. Next, we carried out the same regression focusing on male employees' average wage. Table 5 presents results from a seemingly unrelated regression with robust standard error clustered by firm.

Model 1 reveals a large negative association between increased proportions of female top managers and average female employee wage (-0.13; CI = [-0.20 -0.06]). In combination with the positive coefficient (0.09; $p = 0.05$) for male employees in Model 2, this may be interpreted to mean that female top managers are negatively associated with female employees' career outlook. Although we are unable to establish causality, the findings presented in Table 5 corroborate the suggested mechanisms of declined female employee commitment as the proportion of female top managers increases.

To mitigate concerns about split sample bias, we reran the estimations based on the combined average employee wage. Table 6 presents the results and identifies controls including municipality fixed effects.[6] As expected, the proportion of female employees is associated with a substantial decrease in average employee wage (-0.35). Model 2 includes an interaction between proportions of female top managers and female employees. The large negative coefficient (-0.47; $p = 0.02$) supports

Table 5. Regression for female/male employee wage

DV: female/male employee average wage	Model 1 Female wage	Model 2 Male wage
Proportion of female top managers	−0.13	0.09
	(0.000)	(0.05)
Firm size	0.01	−0.004
	(0.07)	(0.63)
Firm age	0.0001	−0.0004
	(0.66)	(0.19)
Female/male employee average education	0.05	0.07
	(0.000)	(0.000)
Female/male employee average age	0.01	−0.01
	(0.000)	(0.08)
Female/male employee average tenure	−0.003	−0.003
	(0.11)	(0.39)
Male/female employee average wage	0.43	0.60
	(0.000)	(0.000)
Female top manager earns highest salary	0.05	−0.06
	(0.003)	(0.01)
Married female/male employee	0.01	0.58
	(0.80)	(0.000)
Married top managers	0.01	−0.08
	(0.81)	(0.06)
Proportion of TMT with children	0.03	−0.05
	(0.29)	(0.15)
Proportion of employees with children	−0.02	−0.05
	(0.78)	(0.61)
Organizational design	0.02	−0.02
	(0.001)	(0.003)
Constant	5.81	4.58
	(0.000)	(0.000)

n = 379; *p*-values in parentheses.
All models include industry controls and firm clustered standard error.

[6] Industries, and therefore wages, may cluster between the 98 Danish municipalities based on their location and rural/urban characteristic.

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Table 6. Regression for average employee wage

DV: employee average wage	Model 1	Model 2
Proportion of female top managers	0.03	0.08
	(0.65)	(0.19)
Proportion of female employees	−0.35	−0.33
	(0.000)	(0.000)
Proportion of female top managers × proportion of female employees		−0.47
		(0.02)
Firm size	0.001	0.004
	(0.91)	(0.72)
Firm age	−0.0003	−0.0003
	(0.40)	(0.38)
Employee average education	0.11	0.11
	(0.000)	(0.000)
Employee average age	0.01	0.01
	(0.05)	(0.02)
Employee average tenure	−0.01	−0.01
	(0.16)	(0.17)
Female top manager earns highest salary	−0.02	−0.03
	(0.51)	(0.26)
Married employee	0.44	0.33
	(0.02)	(0.07)
Married top managers	−0.06	−0.04
	(0.22)	(0.35)
Proportion of TMT with children	−0.001	−0.001
	(0.99)	(0.99)
Proportion of employees with children	0.13	0.17
	(0.35)	(0.21)
Organizational design	0.001	0.001
	(0.88)	(0.94)
Constant	10.77	12.77
	(0.000)	(0.000)
R-sq	0.65	0.660
	(0.000)	(0.000)

n = 379; *p*-values in parentheses.
All models include industry controls and municipality fixed effects.

the associations found in terms of gender-specific wages, that is, as the proportion of female top managers increase the career outlook of female employees on average decreases.

The supported association between female top managers and female employees' wages helps reduce concerns about male employees generating the original findings. Table 6 is particularly suggestive regarding the idea that female top managers are associated with adverse work commitment of female employees. While alternative explanations cannot be fully rejected, we are unable to produce intuitive explanations for why men/women on average receive a higher/lower wage as the proportion of female top managers increases. Longitudinal regression (2007–2009) with firm fixed effect further rebuffs the existence of omitted covariates.[7] Although actual behavior remains unobserved, controlling for time-invariant firm characteristics, female top managers remain negatively correlated with the average wage of female employees. However, we caution against direct interpretation of the result as the substantive nature of the association is unobserved.

CONCLUDING DISCUSSION

Contribution

Scholarly interest in how top managers' gender influence organizational outcomes has only developed rather recently (Carpenter *et al.*, 2004), presumably because female participation in TMTs is a relatively recent phenomenon. Not surprisingly, little work exists on how TMT gender composition is related to entrepreneurial outcomes. Our contribution in this study is mainly empirical in that we find that a higher proportion of women in the TMT is associated with a higher number of successful entrepreneurial outcomes, but also, surprisingly, that it is negatively influenced by the overall proportion of women in the firm's workforce.

While we cannot observe the mechanisms that drive these findings, we proffer a number of candidate mechanisms. We suggest that negative biases and stereotypes of female top managers are alleviated when women are (re)categorized as "just" members of the firm's TMT rather than as *female* top managers. This allows women to be effective members of the top-management team. However, this recategorization depends on the threshold level of women in the TMT. Although we are unable to directly observe the behavior of female top managers in relation to the TMT and other organization members, the nonlinear association between female representation and entrepreneurial outcome lends support to the purported mechanism (c.f. Figure 1).

Extending the common in-group identity model (Gaertner *et al.*, 1993) to a hierarchical setting, we suggest that TMT level recategorization influences the motivation and commitment of lower-level organizational members: When female top-managers'

[7] We report regressions based on three-year averages as they afford inclusion of organizational controls.

are recategorized as first and foremost top managers, this is negatively perceived by lower-level female employees, and there is a clash between the expectations of solidary behavior and actual managerial practice. Our data offers support that this mechanism may be the one that drives our findings (c.f. Figures 2 and 3).

Limitations and future research

Our findings should be viewed in light of the study's limitations, as alternative explanations may be proffered. For example, women who are more entrepreneurially inclined may seek out top management positions in more entrepreneurial firms. To address this concern, we included controls for supply/demand side variations in female recruitment as well as the wage, tenure, and educational level of top managers. Still, municipality elections only produce rough proxies for social gender structures and the individual level controls may not necessarily capture differences in female top managers' entrepreneurial inclinations. Thus, our findings may partly reflect a weaker tendency of women to engage in entrepreneurship that takes the form of starting up a company (Parker, 2004). Unfortunately, we were unable to identify suitable instrumental measures for top managers' entrepreneurial tendency.

Conclusion

Top managers influence behavior at lower levels of the organization. TMT members may provide support for and encouragement of entrepreneurial activities carried out by lower-level organizational members. To our knowledge, this study is the first to examine the relationship between TMT gender composition and the gender composition of the entire firm. Our findings indicate that while female top managers are positively associated with entrepreneurial outcomes, the magnitude of this association is conditional on the proportion of women in the firm's workforce, a finding that is robust to alternative specifications and data. As we cannot observe the underlying mechanisms, we offer speculation along the lines that while a female leadership is conducive to entrepreneurship, there is also a partly off-setting effect when women enters TMTs and (in our interpretation) are recategorized as "just" top managers, which may have negative attitudinal and motivational consequences for women at lower levels in the firm. We are confident that our findings will prompt additional investigation of the mechanisms connecting TMT gender composition to entrepreneurial outcomes.

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