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## Gender Compositions in Executive Management Teams and their Impact on Firm Performance

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## **Gender Compositions in Executive Management Teams and Their Impact on Firm Performance**

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### **Abstract**

*This paper examines gender composition in executive management teams and explores how female executive managers affect the financial performance of their organizations. Using data compiled from 2,872 US companies between 1992 and 2008, we find evidence of a significant non-linear relationship between the proportion of female executives in a firm and its financial performance. We show that this relationship is present only in firms with entrepreneurial organizational characteristics (i.e., firms that are simple, small, young, and risky). By demonstrating the importance of these moderating characteristics, we extend Van Knippenberg, De Dreu and Homan's (2004) integrative theoretical model of social categorization and elaboration processes. The findings of this paper also contribute to critical mass research, and affect policy makers concerned with gender quotas in various institutional and business contexts.*

**Keywords:** CEM, female executive management

Track: Management & Leadership

Word Count: 7.497

### **1. Introduction**

*'I think that you are insane commercially if you run any corporation and you turn down the opportunity for different views, innovation and a different way of thinking'.*

Irene Dorner, Chief Executive, HSBC USA, April 2, 2013

While there are many commentators agreeing with Irene Dorner's call for greater gender equality in top management teams, female managers at an executive level remain underrepresented. In 2013, women held 14.6 percent of Executive Officer positions at Fortune 500 companies (Catalyst, 2014). In Europe, China, and the BRIC States (Brazil, Russia, India, China) women representation in executives committees of firms of the local stock exchanges has been equally low in the past, ranging from two percent in Germany and India to 17 percent in Sweden in 2010 (Desvaux, Devillard, and Sancier-Sultan, 2010).

Despite the importance of executive management teams for the execution of corporate strategic decisions and the implementation of governance policies, there is very little research on how different gender compositions at the executive management level affect a firm's performance. Most studies exploring gender diversity in work groups and firm performance have focused on boardroom compositions, and have provided differing findings. Researchers who utilize a categorization (in-group/out-group) perspective argue that greater homogeneity within work groups leads to better group performance than greater heterogeneity does (see, for example, Jehn, Northcraft, & Neale, 1999; Simons, Pelled, & Smith, 1999); while supporters of an information/decision-making (elaboration) perspective suggest that

heterogeneous teams perform better than homogeneous teams (see, for example, Arfken, Bellar, & Helms, 2004; Carter, Simkins, & Simpson, 2003).

In this paper we use comprehensive longitudinal empirical data to investigate how female representation in executive management teams impact the financial performance of their organizations, and thus address the research gap of gender diversity in executive management teams, and elucidate the relationship between gender diversity and firm performance. Using our data, we not only extend the theoretical framework of Van Knippenberg et al. (2004) but also test the predictive validity of their Categorization-Elaboration Model (CEM). Our empirical results indicate that there is a non-linear relationship between work group diversity and performance. We thus infer that there is an interactive relationship between categorization and elaboration processes as projected by the CEM framework (see Van Knippenberg et al., 2004). By demonstrating the importance of entrepreneurial organizational characteristics as moderating factors in the relationship between the proportion of female executives in a firm and its financial performance, we respond to Van Knippenberg et al.'s (2004) call for greater attention to conditional aspects and their moderating effects in the study of work group diversity and performance.

Our empirical evidence describing the linear spline relationship between gender diversity in top management teams and firm performance, also contributes to the critical mass literature and the seminal work of Kanter (1977) on the categorization of groups with different gender compositions. Kanter and subsequent studies in this area have assumed that there is a linear relationship between work group diversity and performance. Our empirical findings indicate that this assumption needs to be revisited.

In the subsequent section, we offer an overview of the research on gender diversity and performance in the literature on work group diversity and the critical mass literature, and present our hypotheses. Next, we present our methodological approach and our assessment of the relevant biographical panel data collected from 2,872 US companies (active and inactive) and their executive management teams between 1992 and 2009 that are found in Standard and Poor's ExecuComp database. We then discuss the findings of our study and our theoretical contributions. In the concluding section, we posit the practical implications of our study for policy makers in the private and public sectors who seek to make more informed decisions on quota legislation and affirmative action policies and programs.

## **2. Gender diversity**

### **2.1. Shifting the focus from boardrooms to executive management teams**

Most of the literature on gender diversity and performance has focused on boardrooms, where gender inequality has been as significant as in executive management teams (see, for example, Desvaux et al., 2010; Catalyst, 2012). The studies undertaken in this field typically arrive at different findings and conclusions. A number of researchers have observed a positive relationship between gender diversity and organizational performance. Campell and Minguez-Vera (2008) found that "the diversity of the board had has a positive impact on firm value" (p. 447) and concluded that "greater gender diversity may generate economic gains" (p. 435). Other observers have found a negative relationship or no link at all (e.g., Böhren & Ström, 2010; Rose, 2007). Adams and Ferreira (2009: 291), for example, concluded that mandating gender quotas for directors could reduce firm value for well-governed firm.

Studies differ in describing gender composition, using gender ratios (e.g., Lückerath-Rovers, 2012; Smith, Smith, & Verner, 2006), dummies (women on board, yes/no) (e.g., Campbell & Mínguez-Vera, 2008; Erhardt, Werbel, & Shrader, 2003), or absolute numbers (e.g., Huse, 2012; Torchia, Calabrò, & Huse, 2011). Studies use also different definitions of firm performance, including return on assets (e.g., He & Huang, 2011), return on equity (Haslam, Ryan, Kulich, Trojanowski, & Atkins, 2010), return on investment (e.g., Miller & del Carmen Triana, 2009), gross profit, net sales (e.g., Smith et al., 2006), and self-reported innovation (e.g., Huse, 2012). Adding to the methodological complexity are conceptual and contextual factors, such as the different types of boardrooms (supervisory boards, executive boards, and unified boards), the differences between public and private boards, and the differences between boards that exist in different legal contexts.

Although boardrooms can play an important role in the internal governance and strategic direction of a firm (Sealy, Doldor, & Vinnicombe, 2009), the inconclusiveness between relevant studies, and their use of different types of boardrooms has led us to shift the focus from boardrooms to executive management. The execution of corporate strategic decisions and the implementation of governance policies are as important to an organization's success as the development of these corporate strategies at the board level. Thus far, however, very few studies have explored how different gender compositions at the executive management level might affect a firm's financial performance. Opstrup and Villadsen (2015) explored gender diversity in top management teams and firm performance in 91 Danish municipalities. The focus on public sector organizations required Opstrup and Villadsen (2015) to consider administrative structures in their analysis, which are very different from the private sector business models that we decided to study. Dezsó and Ross (2012) studied the informational and social benefits different gender compositions can bring to top management teams. The two authors concluded that "female representation in top management benefits firm performance only to the extent that a firm's strategy is focused on innovation" (Dezsó and Ross, 2012:3). As outlined in a separate subsequent section, our study complements Dezsó and Ross' (2012) findings by addressing their call for more research of factors that moderate the effect of female representation in top management on firm performance.

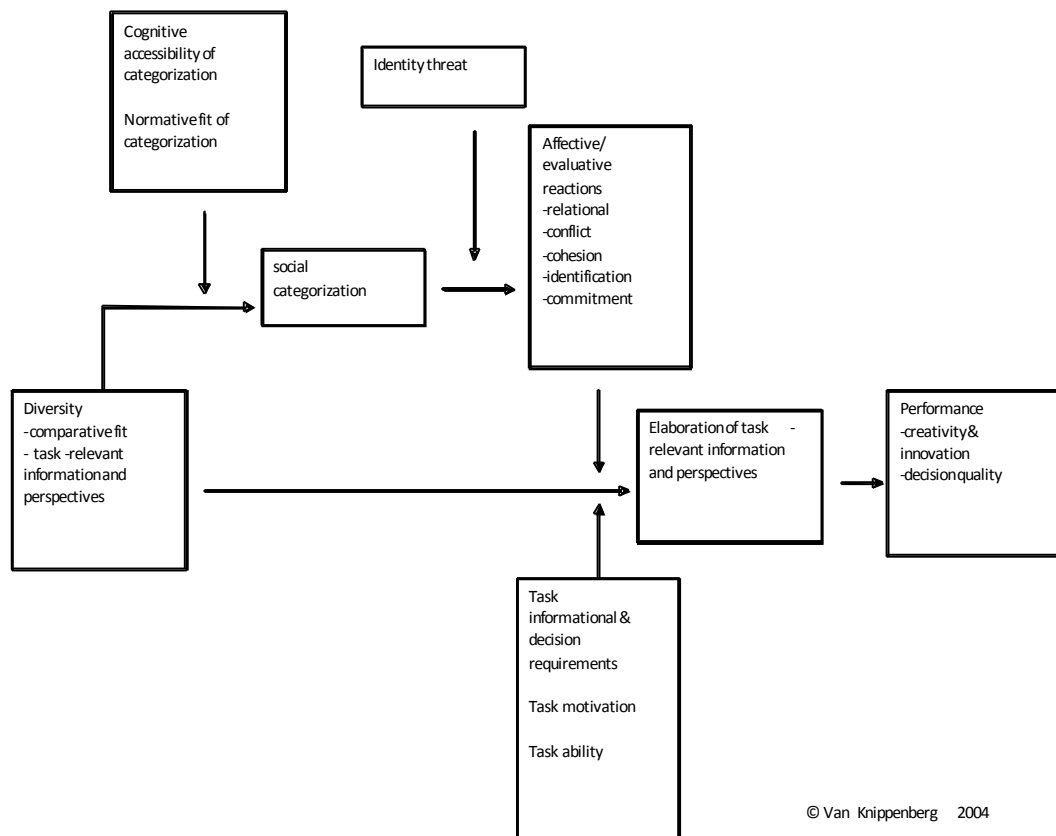
## **2.2. Work group diversity research on group composition – performance and CEM**

Within the field of work group diversity, there are two key strands of research that explore the relationship between work group diversity and performance. Studies employing a categorization perspective (in-group/out-group) argue that greater homogeneity within work groups leads to stronger group cohesion, greater member commitment, fewer interpersonal conflicts, and lower member turnover rates. These studies conclude that homogeneity leads to better group performance than does heterogeneity (see, for example, Jehn et al., 1999; Simons et al., 1999). Theorists who assume the elaboration perspective suggest that heterogeneous teams possess a wider range of task-relevant knowledge, competencies, and experiences, all of which may help group members make more informed decisions; from this perspective, heterogeneity on teams leads to greater creativity with regard to problem-solving and decision-making processes and to better group performance than does homogeneity (see, for example, Arfken et al., 2004; Carter et al., 2003).

In response to the differing conclusions posited by these two perspectives, Van Knippenberg et al. (2004: 1008) developed the CEM, a theoretical framework "from which to understand the effects of diversity on group performance [and] that we believe has greater predictive

power and opens up new directions in research on diversity and group performance.” The model developed by Van Knippenberg et al. integrates the two different research traditions and identifies mediators and other factors that moderate the relationship between social categorization processes and informational/decision-making (elaboration) processes, as outlined in Figure 1.

**Figure 1: Knippenberg’s Categorization-Elaboration Model**



Van Knippenberg and his colleagues consider cognitive accessibility, the normative fit of a categorization, and the comparative fit of the categorization as stimuli for social categorization—and, together with intergroup bias and threats to identity, “as potentially disruptive to diverse groups” (2004: 1016). In contrast, moderators such as task motivation and ability, in addition to task informational and decision requirements, “concern elaboration as the core process underlying the positive effects of diversity” (Van Knippenberg et al., 2004: 1016). In this paper, we empirically test the central proposition of Van Knippenberg et al. (2004: 1010) “that information/decision making and social categorization processes interact.” Because this interaction implies a nonlinear relationship, we expect our empirical data to show nonlinear effects, inferring the proposition of interacting agents from Van Knippenberg et al.

*Hypothesis 1: The relationship between different gender compositions in executive management teams and firm performance is nonlinear.*

As mentioned earlier, and as outlined in greater detail in the following section, this hypothesis has implications for critical mass theory.

### **2.3. Critical mass research on group composition and performance**

Studies within the critical mass literature often refer to the seminal work of Kanter (1977). In a qualitative field study of a large industrial US corporation that included both interviews and observations, Kanter categorized the interactions of sales training groups with different gender compositions. In skewed groups, men are dominant, and the few women (less than 20%) are considered tokens which only represent their category and exert no influence on the decisions made by the group. In tilted groups (those including between 20 and 40% women) and balanced groups (those including between 40 and 60% women), the number of female members increases to the extent that the “majority and minority turn into potential subgroups which may or may not generate actual type-based identifications [and] outcomes for individuals in such a balanced peer group, regardless of type, will depend on other structural and personal factors, including formation of subgroups or differentiated roles and abilities” (Kanter, 1977: 966).

Although Kanter may implicitly indicate certain interactions between the processes of social categorization and elaboration, there has been no study in the critical mass research literature that has empirically tested for nonlinear effects within the relationship between gender diversity and performance. Studies that explore gender composition on teams and the range effects of gender composition on team performance frequently assume that the relationship is linear, narrow their focus to isolated range effects, and/or use absolute numbers to describe critical mass points, which yields inconclusive and contradictory results (Van Knippenberg & Schippers, 2007). In our comprehensive empirical study, we advance critical mass research by testing a nonlinear relationship between different gender compositions and performance (see Hypothesis 1), by considering range effects before and after the critical mass point, and by using relative numbers to identify different range effects.

### **2.4. Organizational configuration as a moderator for gender diversity and firm performance**

Considering the differencing findings of studies that explore the relationship between work group diversity and performance, recent studies have argued that changing the focus to conditional aspects would “better reflect the contingent nature” of this relationship (see Ely et al., 2012: 342). The CEM framework developed by Van Knippenberg et al. (2004: 1010) highlighted that “diversity in a group is most likely to lead to elaboration of task-relevant information and perspectives when the group task has strong information-processing and decision-making components, when the group is highly motivated to process task-relevant information and perspectives, and when group members are high in task ability.” Torchia et al. (2011) highlighted the positive effects of board strategic tasks as moderators, whereas Dezsó and Ross (2012: 3) concluded that “innovation intensity does not merely positively moderate the effect of female representation in top management on firm performance, but that female representation in top management benefits firm performance only to the extent that a firm’s strategy is focused on innovation.”

Thus far, the discourse concerning the conditional aspects that moderate the relationship between gender diversity and performance has focused on task- or process-related moderators. Although there are indications that greater gender diversity might positively influence performance in firms with entrepreneurial characteristics (Hoogendoorn, Oosterbeek, & Van Praag, 2011), to our knowledge, there is no comprehensive empirical study that explores organizational configurations as a key condition under which diverse teams perform better or worse. Organizational configurations have been described as groups of companies that share the same set of distinct organizational characteristics (Miller & Mintzberg, 1984), and this concept has long been the center of debate in the strategic management literature regarding its relationship to performance outcomes over time (Ketchen et al., 1997). For the purposes of our study, we categorize organizational configuration as a conditional characteristic and argue that group diversity has a positive influence on performance in firms with entrepreneurial organizational characteristics (those that are simple, small, young, and risky). In so doing, we infer from Van Knippenberg et al. (2004) that task requirements such as information processing, creative and innovative idea generation and problem solving, and high quality decision making also positively condition the diversity-performance relationship in considering that these task requirements are particularly prevalent in entrepreneurial firms (see, for example, D'Amboise & Muldowney, 1988; Stevenson & Jarillo, 1990).

*Hypothesis 2. Organizations with entrepreneurial characteristics positively moderate the effect of female representation within executive management teams on firm performance.*

The following section describes how we generated our sample and variables.

### 3. Method and analysis

#### 3.1. Method

The data for our analysis come from the Standard and Poors' ExecuComp database. The ExecuComp database provides executive compensation data that are collected directly from each company's annual proxy. Our sample contains data from 1992 to 2008 and includes compensation and other information for the top five most highly paid executives (including the CEO) in a given year for each company. The universe of firms covers the S&P 1500, companies that were once part of the S&P 1500 index, and companies removed from the index that are still trading. After some initial cleaning, we retained information on 1,836 companies giving us information on 5.75 executives per company for each fiscal year thus we have data for a total of 31,260 executives. We interpret the managers included in ExecuComp to be the firm's top management team (Dezsó & Ross, 2012). We gather other financial information from the S&P Compustat database. We use the Center for Research in Security Prices (CRSP) database for information on the initial public offering date of each company and for the company's daily stock returns. Table 1 provides the summary statistics for our data.

**Table 1: Summary statistics**

Panel A: Summary statistics, firm-year observations						
Variable	N	Mean	Std. Dev.	Q1	Median	Q3
Total executives	31,280	6	1	5	6	6
Female executives	31,280	0	1	0	0	0

Panel A: Summary statistics, firm-year observations						
Variable	N	Mean	Std. Dev.	Q1	Median	Q3
Female proportion	31,280	0	0	0	0	0
Sales (\$ millions)	31,238	4236	13250	357	1004	3076
Total assets (\$ millions)	31,249	10773	59402	404	1285	4718
Return on assets	30,503	0.066	0.588	0.034	0.069	0.112
Tobin's Q	27,012	2.083	2.426	1.136	1.506	2.256
Business segments	27,545	4.866	4.637	1.000	3.000	7.000
Age (years)	29,435	20.843	17.995	7.641	15.203	29.066
Innovation intensity	31,280	0.028	0.063	0	0	0.029
Marketing intensity	31,280	0.011	0.034	0	0	0.004
Capex intensity	29,613	0.056	0.054	0.021	0.042	0.073
Age of capital stock	29,803	-1.717	0.787	-2.196	-1.775	-1.274
Leverage	31,160	0.189	0.187	0.026	0.155	0.297

Panel B: Proportion of female executives		
	N	Average Female Exec.
Female proportion		
0%	23,653	0
0% to 10%	25	1.00
10% to 20%	3,431	1.00
20% to 30%	2,995	1.16
Over 30%	1,176	2.19

Panel A of Table 1 presents certain characteristics of the firms in our sample. We have a total of 31,280 firm-year observations, and each company every year reports details for 5.75 top executives on average. The average number of female executives is 0.30, which indicates that on average, female executives account for 5.26% of their top management team. With respect to financial characteristics, we note that the firms in our sample have average sales of \$4.2 billion and assets of \$10.7 billion. These firms are profitable, with an average return on assets of 6.57%, and they are not very highly leveraged (19%). The firms in our sample, on average, are complex and operate in almost five different business segments; and as expected they are also mature, with an average age of 21 years.

Female proportion: Previous studies, notably Dezső and Ross (2012), have used a dummy variable for the presence of women on top management teams and for the proportion of female executives on these teams as proxies for female representation. However, because we posit a nonmonotonic relationship between the proportion of women and firm performance, we adopt a different strategy. We first calculate the proportion of women in the top management team for each firm for each fiscal year and then use the following spline variables in our analysis.

$$\begin{aligned}
 FEMPROPOTO10 &= \text{female proportion if female proportion} < 0.10, \\
 &= 0.10 \text{ if female proportion} \geq 0.10;
 \end{aligned}$$



$$\begin{aligned} FEMPROP10TO20 &= 0 \text{ if female proportion} < 0.10, \\ &= \text{female proportion} - 0.10 \text{ if } 0.10 \leq \text{female proportion} < 0.20, \\ &= 0.10 \text{ if female ownership} \geq 0.20; \end{aligned}$$

$$\begin{aligned} FEMPROP20TO30 &= 0 \text{ if female proportion} < 0.20, \\ &= \text{female proportion} - 0.20 \text{ if } 0.20 \leq \text{female proportion} < 0.30, \\ &= 0.10 \text{ if female ownership} \geq 0.30; \end{aligned}$$

$$\begin{aligned} FEMPROPOVER30 &= 0 \text{ if female proportion} < 0.30, \\ &= \text{female proportion} - 0.30 \text{ if female proportion} \geq 0.30; \end{aligned}$$

For example, when the proportion of female executives is equal to 0.37, we have FEMPROP0TO10 equals 0.10, FEMPROP10TO20 equals 0.10, FEMPROP20TO30 equals 0.10 and, FEMPROPOVER30 equals 0.07. Utilizing linear splines (as defined above) enables us to estimate the relationship between firm performance and the percentage of women on the team as a piecewise linear function, which is a function composed of linear segments. One linear segment represents the function for percentage values below 10%, another linear segment represents values between 10 and 20%, and so on. As noted above, our empirical design will shed light on the proportion of women on top management teams as a key factor in firm performance. In using the above specification, we are implicitly assuming that the relation between the proportion of female executives and firm performance is non-monotonic.

Panel B in Table 1 presents several statistics for the variables listed above. There are 7,627 observations for top management teams with at least one female executive. This figure equals 24% of the sample. Of these, 6,083 (80%) firm-years have exactly one top female executive, 1,270 have two female executives, and the remaining 274 have three or more. The bulk of our sample, 76%, is composed of companies with no female representation, which essentially forms our first spline variable FEMPROP0TO10. The second variable, FEMPROP10TO20, comprises nearly 11% of our sample and has, on average, one female executive. At 9.5% of companies, the proportion of female executives is between 20 and 30%; on average, these companies have more than one female executive, i.e., 1.16 female executives. Finally, in 1,176 observations, the proportion of female executives on the management team is greater than 30%, and these teams have 2.19 female executives on average.

Firm performance: We use Tobin's Q as a proxy for firm performance. Tobin's Q is defined as the ratio of the market value of assets to their replacement cost. Because of data limitations, it is almost impossible to arrive at estimates for replacement cost. We therefore follow Kaplan and Zingales (1997) in computing Tobin's Q. For each firm  $i$  and year  $t$  we compute,

$$Q_{it} = \frac{[BV_{\{it\}Assets} + MV_{\{it\}ofCommonStock} - BV_{\{it\}ofCommonStock} - DeferredTaxes_{\{it\}}]}{BV_{\{it\}Assets}} \quad (1)$$

where  $BV$  is "book value,"  $MV$  is "market value," and both are measured at the end of the fiscal year. We use the log of  $Q$  in our analysis. The advantage of using Tobin's Q rather than accounting measures of performance is that it is a forward-looking measure and implicitly includes the expected value of a firm's future cash flows; it is used widely in the literature. The firms in our sample have an average Tobin's Q of 2.08.

### 3.2. Analysis

To test our hypothesis of female representation in top management teams and firm performance, we run the following panel data regression, which is also our base specification.

$$\ln Q_{\{i,t+1\}} = \alpha + \beta_1 FEMPROP0TO10_{\{i,t\}} + \beta_2 FEMPROP10TO20_{\{i,t\}} + \beta_3 FEMPROP20TO30_{\{i,t\}} + \beta_4 FEMPROPOVER30_{\{i,t\}} + \delta Controls_{\{i,t\}} + \varepsilon_{\{i,t\}} \quad (2)$$

As controls, we use the following variables that are commonly used in research on top management teams: (i) we use size, measured as the log of the book value of assets (Size); (ii) the numerator of Q will also reflect the capitalized value of growth options, and to control for these options, we include the log of the ratio of research and development expenses to assets (Innovation intensity); (iii) we use the log of the ratio of advertising expenditures to assets (Marketing intensity); (iv) we use the log of the ratio of capital expenditures to assets (Capex intensity); (v) we use the ratio of long term debt to assets (Leverage) (because our measure of Q may be sensitive to capital structure); and (vi) we use the age of capital stock, which is measured as the log of the ratio of depreciation expenses to net property, plants, and equipment (Age of Capital stock). If research and development expenses or advertising expenses are not disclosed by the firm, we use the value of zero for this variable.

Because of the panel nature of our data, we run most of our regressions with firm fixed effects to control for unobserved heterogeneity in firm quality. Cross-section regressions may omit significant explanatory variables, potentially causing statistical bias in the estimated relationships. For example, if an unobserved firm variable is correlated with firm performance and the gender composition of the management team, its omission from the regression may result in an erroneous estimation. Firm features such as corporate culture or the quality of the firm are likely to be important in the determination of the proportion of female executives and are difficult to measure. The use of firm fixed effects alleviates these concerns. Following Petersen (2009), we adjust the standard errors of the panel data regressions for clustering at the firm level and include year dummies to account for residuals correlation across years for a given firm (time series dependence) and residual correlation across firms in a given year (cross-sectional dependence).

Table 2 reports the results of the regression described above. Column (1) reports the results of the regression with industry fixed effects, calculated based on the 48 Fama-French groups. Column (2) reports the results with firm fixed effects. In both cases, the coefficients of FEMPROP0TO10 are negative and significant, the coefficients of FEMPROP10TO20 are positive and significant, the coefficients of FEMPROP20TO30 are negative and significant, and finally, the coefficients of FEMPROPOVER30 are positive but not significant. This finding suggests that lower (< 10%) and higher (> 20%) proportions of female representation in the top management team reduce firm performance, whereas moderate levels of female representation (between 10 and 20%) have a positive impact on firm performance. Although only three (out of four) female representation variables enter significantly in the regression, the F-test for the joint hypothesis that all four of the female proportion variables are zero is 3.71, which is significant at the 1% level. For increases in female representation between 0 and 10%, Q declines so that Q for firms with a 10% proportion of women (at 0.98) is lower than it is for firms with no women (at 2.04). Similarly, firms with 10 to 20% female representation see an increase in their Q, and those with 20% female representation have a

Tobin's Q value that is slightly higher (2.07) than that of firms with no women on their top management teams. Finally, Q declines for values between 20 and 30%, and firms with 30% female executives have a Q value of 1.02.

**Table 2: Female Proportion in Top Management Teams and Firm Performance**

This table shows the results of a piecewise linear regression with the one-year-ahead natural logarithm of Tobin's Q as the dependent variable. Tobin's Q is the ratio of the firm's market value to the book value of its assets. FEMPROP0TO10, FEMPROP10TO20, FEMPROP20TO30, and FEMPROPOVER30 are linear spline variables based on the proportion of female executives on the top management team of a firm. Size is the log of total assets, Innovation intensity is the log of the ratio of research and development expenses to assets, Marketing intensity is the log of the ratio of advertising expenditure to assets, Capex intensity is the log of the ratio of capital expenditure to assets, Age of capital stock is the log of the ratio of depreciation expenses to net property, plants, and equipment, and Leverage is the ratio of long term debt to assets. T-statistics (with standard errors clustered by firm) are presented in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable: Tobin's Q				
	(1)		(2)	
FEMPROP0TO10	-0.9523 (-3.928)	***	-0.562 (-3.180)	***
FEMPROP10TO20	1.4634 (4.519)	***	0.8673 (3.64)	***
FEMPROP20TO30	-0.6019 (-1.768)	*	-0.5091 (-2.125)	**
FEMPROPOVER30	0.3788 (1.55)		0.1223 (0.63)	
Size	-0.038 (-6.672)	***	-0.2208 (-19.577)	***
Innovation intensity	1.8451 (8.91)	***	0.6861 (4.81)	***
Marketing intensity	1.2025 (4.58)	***	-0.299 (-1.229)	
Capex intensity	1.1498 (7.13)	***	0.2382 (1.95)	*
Age of capital stock	-0.0108 (-0.924)		-0.0598 (-4.427)	***
Leverage	-0.285 (-3.970)	***	-0.0412 (-0.708)	
Intercept	0.5964 (8.32)	***	1.8989 (25.11)	***
Fixed effects	Industry		Firm	
Year dummies	Yes		Yes	
N	23,251		23,251	
Adj. R-squared	0.30		0.69	

Having established the nonmonotonic effect of the proportion of women on firm performance, we turn to our second hypothesis, and the organizational contexts in which this effect is more important. Ideally, to conduct such an analysis, we would interact the proportion of women with the organizational characteristic in which we are interested. However, because our main specification is a piecewise linear regression, interacting each of the spline variables with the relevant organizational characteristic will make our results difficult to interpret. Therefore, we adopt the following empirical strategy. We split the firms in our sample based on various characteristics and then separately run the spline specification for each category of firms. The results of this analysis will enable us to distinguish between the types of firms for which this effect is present. In the following section, we classify firms based on size, complexity, riskiness, age, and governance.

### **3.3. Organizational Configuration**

**Size.** We classify a firm as large if the book value of its assets in any given fiscal year is greater than the median book value of the assets for all firm-year observations in our sample; otherwise, we classify the firm as small. We then separately run the above specification for large and small firms. The results, which are striking, are shown in Table 3, Columns (1) and (2). The female proportion variables are significant only for small firms, and they have the same sign as in the base case. In other words, the observed effect of the proportion of women on firm performance exists only for small firms.

**Complexity.** We next turn our attention to the number of business segments in which a firm operates. We gather data on business segments from the segments file within the Compustat database and merge these data with our data. We define a firm as complex if it operates in more than three business segments in any fiscal year; otherwise, we define it as simple. We chose three as the cut-off because it is the median number of business segments in which the firms across our entire database operate. The results of our regressions for complex and simple firms are shown in Table 3, Columns (3) and (4), respectively. These results show that the proportion of female executives matters for firm performance only with simple firms.

**Riskiness.** We measure the riskiness of firms by downloading the daily stock returns for all the firms in our sample from the CRSP database. We use the daily stock returns to calculate the annual standard deviation for each year, which is the commonly used measure of risk in the literature. We use the median of the standard deviation of the daily stock returns to classify firms as risky or safe. A firm is risky if its measure of risk in a given year is greater than the median for the entire sample; otherwise, the firm is safe. Table 3, Columns (5) and (6) shows the results of this split. We observe the effect of the proportion of women on firm performance only for risky firms.

**Age.** Next, we study the impact of firm age. A firm is classified as old if its age in any year is greater than the median age of all the observations in our sample. We calculate firm age by determining date of firm birth as the firm's first year in Compustat or CRSP databases, whichever is earlier. Table 3, Columns (7) and (8) show the results; the pattern that we observe in our main analysis can only be observed with young firms. In other words, the nonmonotonic effect of the proportion of female executives on firm performance does not hold for old firms.

**Governance.** Finally, we turn our attention to firm governance. Our proxy for governance is the Gompers et al. (2003) G-index of antitakeover provisions. This G-index is based on 24 individual provisions and six state laws. The index is generated by counting the number of

antitakeover provisions in a firm's charter and using the relevant data from the Investor Responsibility Research Center (IRRC) handbook. The IRRC data are not available annually; they are available only biennially or triennially (for 1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006). For our analysis, we obtain the G-index from Andrew Metrick's website and merge it with our data. Because the data are not collected every year, we assume that the previous data hold until the next measurement year. For example, we match the 1995 G-index data for a particular company with the years 1995, 1996, and 1997.

We define a company as well governed if it has fewer antitakeover provisions. More antitakeover provisions make changing existing management difficult and may exacerbate agency problems. Accordingly, only firms that have fewer than the median number of antitakeover provisions are classified as well governed. The effect of the proportion of top female executives is shown only for well-governed firms; we do not observe any effect for firms that are not well governed.

Thus, the organizational characteristics that influence the nonlinear effect of female representation on firm performance are size, simplicity, risk, age, and governance. These results are unsurprising because small firms are likely to be younger and riskier, to operate in fewer business segments, and to incorporate fewer antitakeover provisions into their charters.

Having established the non-monotonic effect of the proportion of women on firm performance, and having identified the organizational contexts in which this effect is more important, we discuss the implications and limitations in the following subsections.

#### **4. Discussion**

In this study, we contributed to the discourse on gender diversity and performance by extending the literature on critical mass and work group diversity by using comprehensive empirical evidence.

##### **4.1. Diverse gender ranges, diverse performance outcomes**

We explored executive management teams and analyzed the manner in which increases in the number female executive managers affect the financial performance of their organizations. The findings obtained from our panel data based on 23,251 firm-year observations and our piecewise linear regressions clearly show a relationship between the gender composition of our sample teams and firm performance, with various turning points. We find that when fewer than 10% of executive managers are female, the impact on firm performance is negative. As stated earlier, most of the observations in this category (more than 90%) were firms with no female managers on their executive teams. Our data suggest that having no women on executive management teams is detrimental to firm performance. This finding can be seen as differing those of work group diversity studies that assume a categorization perspective and argue that homogenous teams outperform heterogeneous teams.

Our finding that female representation of 10 to 20% (one woman per team on average) has a positive impact on firm performance contrasts empirically and explanatorily with those of previous studies in the critical mass literature, which concluded that the threshold at which a clear positive relationship between gender diversity and performance is observable is reached between 20 and 40%. The latter studies have argued that a few female group members are typically considered token members who only represent their category and exert no influence

on the decisions made by the group. Although we have no empirical evidence that negates the existence of categorizing practices, the positive relationship that we found between teams with very few female executives and firm performance show that such practices do not necessarily lead to tokenism or to indifference toward the contributions made by female executive managers. Instead, a “qualitative change will take place in the nature of group interactions” (see Torchia et al., 2011:302), and gender-related differences will be replaced by different subgroup competencies and skills, thus fostering alternative perspectives and approaches to the group’s decision making processes (Konrad, Kramer, & Erkut, 2008).

As Table 2 illustrates, at 20%, we observe a tipping point at which the relationship between female managers and performance becomes negative. This may be because the group members are not able to fully understand others’ diverse input because of the lack of a common frame of reference, as suggested by Van Knippenberg and Schippers (2007):

“the potentially positive effects of diversity on group performance may only obtain up to a certain level of diversity, beyond which the lack of a common frame of reference may get in the way of fully appreciating all group members’ contributions.” (p. 532)

The plot in Chart 1 that shows the different tipping points differ from the results of critical mass and work group diversity studies that have proposed a linear relationship between gender diversity and performance. Our empirical analysis suggests a) that we should not argue a priori that there is a consistent increase in performance as gender diversity increases and b) that we should more deeply explore the different range effects in this area, as “some of the inconsistent findings in diversity research might be due to the restriction of range effects” (Van Knippenberg & Schippers, 2007: 532).

#### **4.2. Entrepreneurial organizational configurations matter**

The second purpose of this study was to explore whether organizational configurations matter to the relationship between gender composition on executive management teams and firm performance. We have provided empirical evidence that entrepreneurial firm profiles have a positive moderating effect on the relationship between gender diversity and performance, supporting the experimental findings of Hoogendoorn et al. (2011). Although there is no empirical evidence that explains the moderating effects of entrepreneurial configuration, we assume that in nascent companies or start-up firms, hierarchical structures and glass ceilings that have historically hindered women from moving into top-management positions have not yet been established. Furthermore, because of the relative youth of such companies, strong, influential networking dynamics and in-groups/out-groups may not yet have been developed. However, these suggestive explanations must be explored further and confirmed with more empirical evidence. Like Ely et al. (2012), we call for more research on other conditional aspects that can provide new insights into the complex relationship between gender diversity and firm performance.

#### **5. Limitations and further research**

We must note that our study is not without limitations. Our analysis is based on an average top management team size of 5.8. Arguably, this might be a limitation because the teams from which we draw our inferences are small. Thus, the proportions of female executives that we calculate to generate our variables of interest might not constitute the full spectrum of values.

Moreover, we use 10, 20 and 30% as the turning points for our piecewise linear regressions. Admittedly, the choice of turning points is arbitrary. However, we find empirically that these cut-offs best fit the data and allow for a reasonable interpretation of the results. Our findings suggest the need to move away from a linear framework and explore different specifications in greater depths to analyze diverse teams.

Another methodological concern may be endogeneity. Our panel data enable us to use firm fixed effects in all of our regressions, which largely address the issue of omitted variables. However, the issue of reverse causality remains. In other words, it is plausible that firm performance drives the observed proportions of women on top management team rather than vice versa. Although it is easy to argue that more profitable firms will have a greater proportion of female executives, it is difficult to explain why the proportion of women should lie exactly between 10 and 20%. However, as a result of our empirical specification, which includes piecewise linear regression, the problem of reverse causality is minimized. The normal way to address endogeneity arising from reverse causality is to use instrumental variable regressions. An ideal instrument should be exogenous, i.e., correlated with the endogenous variable (the female proportion variables) but not with the dependent variable (Tobin's Q). Because of our spline specification, it is difficult to find a truly exogenous instrument. We use the industry average female proportions (based on Fama-French industry groups) as instruments to run our fixed effects regressions and confirm that our main results remain intact (not shown but available upon request). This gives us confidence in our results.

Our quantitative investigation sheds light on the role played by women on executive teams. It would be interesting to supplement our findings with qualitative studies of organizations and anecdotal evidence. We believe that we have provided a rich starting point for further research on this multilayered issue.

Finally, the more practical implications of our study will affect policy makers and business leaders who are concerned with gender quotas in different institutional and business contexts. Our findings call for more nuanced policy recommendations in place of the fixed target points and quotas that we have observed in various countries at the boardroom level.

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