"Girl Power": Female Participation in Top Management and Firm Performance

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Abstract

We study female participation in top management. Female participation below the CEO level has a positive association with several measures of firm performance but having a female CEO has either a neutral or negative association. The positive associations below the CEO level are entirely driven by firms pursuing an "innovation intensive" strategy, where collaboration among colleagues may be especially important. Our results are thus consistent with the notion of a "female management style" that enhances the performance of senior management by facilitating collegiality but is rendered less effective by the leadership attributes of the CEO position.

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I. Introduction

"*What the world needs today is not more competition but woman's native genius for sympathetic co-operation*" (Meyer, 1953, pg: 397).

"*Man is defined as a human being and a woman as a female - whenever she behaves as a human being she is said to imitate the male*" (de Beauvoir, 1952, pg: 51).

The role of women in society has been a major political and academic issue for over a century. As women have continued to make inroads into domains traditionally dominated by men, attention has focused on the relatively small number of women in senior management positions in large corporations. As of 2006, under a third of the top 1,500 hundred U.S. firms had even a single woman among their top executives and less than 3% had a female chief executive officer ("CEO").[‡]

Even if one leaves aside issues of fairness and equality, the large gender disparity at senior levels of management raises the issue of whether modern corporations are efficiently identifying and developing managerial talent. In addition, there is a large literature in social psychology and organizational behavior that argues that females are not merely "just as good as men" in an executive capacity. In brief, authors assert that women tend to manage in a less hierarchical and more interactive style than their male counterparts, leading to more teamwork and intrinsic motivation.[§] Women also bring a different set of life experiences. The presence of women in a firm's senior management

[‡] See Table III.

[§] Many of the best known references in this genre are practitioner-oriented books. Representative work includes Helgesen (1990), Rosener (1995), and Book (2000).

should accordingly increase the management team's range of perspectives, cognitive resources, and problem-solving ability, resulting in better outcomes for the firm.[**]

At the same time, females may be less effective in competitive environments like that likely to obtain among the top managers of many firms (Gneezy, Nierdle, and Rustichini, 2003). Also, diversity may lead to diversity of opinion and thus to disagreement and internal conflict, slowing down the decision-making process and potentially hampering performance.[††] This is especially likely if male executives resist working with women as colleagues (Oakley, 2000). Diversity might also reflect a response to political pressure to the detriment of firm operating efficiency. Finally, in a fully competitive and efficient labor market, the "right person" should always be in the "right job," suggesting that there would be no observable effect of gender diversity in senior management. The relationship between female participation in senior management and firm performance thus remains an open question.

Moreover, even if female managers add value by fostering collegiality or for some other reason, it does not necessarily follow that the "female management style" would be conducive to success at the CEO level, given that position's symbolic and real role as "top dog." Women may be – or may be considered – insufficiently aggressive and dominant to adopt the "preferred leadership style," which is typically associated with male leaders (Oakley, 2000). Moreover, CEOs are overwhelmingly male, and evidence from psychology suggests that, ceteris paribus, men tend to be more favorably evaluated in roles occupied mainly by men (Eagly, Makhijani, and Klonsky, 1992). So, a female

[**] The management literature on top management teams has studied the general issue of team diversity across a number of dimensions. See Hambrick, Cho and Chen (1996) for a discussion of the pros and cons of management team diversity.
[††] Ibid.

CEO may be less accepted as a leader by the employees who work for her than a male CEO. Thus, what may hold for female participation in top management below the CEO level may not hold for female CEOs.

The purpose of the present study is to investigate these ideas. Specifically, using data on the top 1,500 US firms from 1992 to 2006, we study the relationship between (a) firm quality and performance as measured by Tobin's Q, return on assets, return on equity, and annual sales growth and (b) both the percentage of women in top management team positions below the CEO level (the "TMT participation rate") and having a female CEO. Controlling for time, firm characteristics, and industry at the 4-digit SIC code level, we find that there is a strong positive association between Tobin's Q, return on assets, and return on equity on the one hand and the TMT participation rate on the other. We term this the "female participation effect." The female participation effect survives the inclusion of lagged values of the dependent variable, providing at least indicative evidence that greater female representation in senior management positions leads to – and is not merely a result of – better firm quality and performance.

In contrast, the association with these performance indicators and having a female CEO is negative or neutral, suggesting that there is something special about the symbolic and real role of the CEO position that interferes with the effectiveness of female managers. In addition, both the TMT participation rate and having a female CEO are weakly associated with slower sales growth, which is broadly consistent with the evidence that females have a lower appetite for risk than males.[‡‡]

[‡‡] Byrnes, Miller, and Schafer (1999) and Croson and Gneezy (2004) review this literature.

We then conduct a follow-on analysis to investigate the origins of the female participation effect. There is broad agreement in the social psychology and organizational behavior literature that participatory, collaborative management practices tend to foster – while dictatorial, controlling management practices tend to stifle – employee creativity and innovation.[§§] It follows that if the female participation effect is a result of a greater tendency of female managers to foster collaboration, the effect should be strongest in firms that are adopting an innovation intensive strategy. If, by contrast, the female participation effect simply reflects the better identification and development of managerial talent, innovation intensity should not matter. Using a firm's R&D expenditures as a proxy for innovation intensity, we find that it is *only* firms pursuing an innovation intensive strategy that benefit from the female participation effect.

This paper forms part of a broader literature on how managerial characteristics matter for firm performance. This topic is attracting increasing attention in economics and finance. For example, in a seminal piece, Bertrand and Schoar (2003) find that there is a managerial fixed effect in firm behavior and that CEO age and education are systematically related to some firm policies; Malmendier and Tate (2005) link CEO overconfidence to corporate investment decisions; Pérez-González (2006) demonstrates that firms run by incoming CEOs who are related to the firm's founder underperform relative to other firms; and Bebchuk, Cremers, and Peyer (2007) show that CEO centrality (in terms of ability, contribution, or power) is negatively related to firm performance. The management literature on top management teams, for its part, is vast and dates at least since the monograph by Barnard (1938) on the role of the chief

[§§] See, for example, Kanter (1983), Oldham and Cummings (1996), and Deci and Ryan (1987) for discussions of these issues directed toward, respectively, practitioners, organizational behavior researchers, and social psychologists.

executive. More recent related work investigates the effects of top management team heterogeneity (Hambrick, et al., 1996) and gender differences in the stock market reaction to the announcement of CEO hires (Lee and James, 2007).

There has been relatively little academic work on the relationship between female participation in senior management and firm performance.[***] Using a sample of firms that went public in 1993, Welbourne (1999) shows that firms with a higher percentage of females in top management have better 3-year post-IPO stock price performance, although she does not control for industry effects. We are aware of a few academic studies that study the link between female participation in management and firm performance outcomes. Using survey data from 535 banks and a broader definition of top management than we use, Dwyer, Richard and Chadwick (2003) fail to discover a link between female participation in management and either productivity or return on equity, although some interaction terms are significant. Krishnan and Park (2005) study one year of data and obtain the result that female participation in management is positively associated with return on assets in some specifications without industry controls. Shrader, Blackburn, and Iles (1997) also use one year of data without industry controls, finding that female participation in management, but not in top management or on the board, is positively related to performance. Perhaps, the work closest to ours in spirit is Smith, Smith, and Verner (2006), who study female participation in various levels of the senior management of Danish firms. These authors find in a pooled OLS regression that higher

[***] An emerging literature focuses on the association between gender diversity in the boardroom and the quality of corporate governance and firm performance. See, for example, Carter, Simpkins, and Simpson (2003) and Adams and Ferreira (2007). See also the report by Catalyst (2007), a non-profit organization that seeks to promote opportunities for women in business.

female participation in some levels of top management is positively related to gross margin.[†††]

To our knowledge, this paper is the first large-sample academic study to provide a systematic analysis of the association between female participation in top management and performance in the largest U.S. companies, to differentiate this impact according to the rank of female participation, to provide indicative evidence of causality, and, most importantly, to make a link between the benefits of the TMT participation rate and the "female management style" in the form of firm innovation intensity.

The remainder of the paper is organized as follows. Section II provides a more detailed discussion of how female participation in senior management might be related to firm performance. Section III describes the data and variables as well as our empirical specification. Section IV presents formal empirical analysis. Section V concludes.

II. Female Participation in Top Management: Theoretical Background

In this section, we develop our hypotheses about how female participation in top management may be associated with firm quality and performance. It is understood that without directly observing female and male managers "in action," we cannot make conclusive causal inferences. Nonetheless, there is a large literature in social psychology, organizational behavior, and related areas of women's studies, that suggests that the proportion of a firm's senior managers below the CEO level (the "TMT participation

[†††] In the practitioner-oriented literature, see Adler (2001), who uses survey data and a scoring system to rank Fortune 500 firms based on their "record for promoting women to the executive suite." The author finds that the firms who score highest tend to be more profitable. See also the Catalyst (2004) report, which uses a sample of 353 Fortune 500 companies over 1996-2000, and finds that the companies ranked in the top quartile based on the gender diversity of their top management teams outperform companies in the bottom quartile in terms of equity returns to shareholders.

rate") and the gender of the firm's CEO may be associated with – and even contribute to the determination of – firm quality and performance.

To fix ideas, we first focus our discussion on how various theories on gender differences and diversity pertain specifically to the TMT participation rate. Then, we turn to the special attributes of the CEO position. The final subsection relates our discussion to innovation intensity.

Female Managerial Style and "Ability"

The issue of gender specific leadership styles is part of a long-standing debate. A traditional view in social psychology maintains that gender-stereotypic differences found in surveys and laboratory experiments are attenuated in organizational settings, since leadership roles come with clearly defined norms that regulate activities and behavior, which take precedence over gender roles (Eagly and Johnson, 1990). Moreover, senior managers presumably pass through a selection mechanism as part of the competitive market for managerial talent and the promotion process of their employers. Whatever differences may exist between men and women in the general U.S. population, then, such differences may not exist in the subpopulation of senior managers of large U.S. companies. These arguments imply that gender should not have any explanatory power with regard to firm quality and performance.

And yet, gender roles may spill over to leadership roles and organizations, partly in the form of gender-based expectations to which senior managers may be expected to conform (Ridgeway, 1997; Oakley, 2000). In fact, psychological research suggests the notion of a "female managerial style," according to which women are generally less hierarchical and more democratic, cooperative, and collaborative than men (Eagly and

Johnson, 1990) and are more apt to engage in so-called transformational behaviors, which include examining new perspectives and attending to followers' needs (Eagly, Johannesen-Schmidt, and van Engen, 2003). Related trade literature also argues that, compared with men, women devote more effort to mentoring and empowering others (Book, 2000), manage more interactively (Rosener, 1995), and are more caring towards colleagues and willing to share information with them (Helgesen, 1990). In fact, some authors have even taken these arguments to the point of asserting that women are simply better managers than men. For example, according to one management consultant, women rank higher than men on 28 of 31 measures used in performance evaluations (Sharpe, 2000). A meta-analysis in social psychology also concludes that the leadership attributes where women exceed men relate positively to leaders' effectiveness whereas those attributes where men exceed women have no or a negative relationship with effectiveness (Eagly et al., 2003). If these arguments are correct, a higher TMT participation rate should be associated with more favorable firm outcomes, particularly where the female managerial style is more suitable, an issue we return to below.

Talent Development, Diversity, and Tokenism

The mere fact that as of 2006, fewer than a third of U.S. firms had even a single female in top management (see Table III) while females account for over a third of managers overall[‡‡‡] raises the issue of whether U.S. corporations are adequately developing their employees. Both researchers and public advocacy groups have made the case that firms that increase opportunities for women have a human resources advantage

[‡‡‡] Bureau of Labor and Statistics, Women in the Labor Force: A Databook, 2007

because they have access to a wider pool of managerial talent (Robinson and Dechant, 1997; Catalyst, 2004).

More generally, it seems reasonable to suppose that men and women have different life experiences and thus different perspectives.[§§§] Scholars in management have argued that diversity – broadly defined – on a top management team enlarges the horizon of perspectives, and enhances the cognitive resources and problem-solving abilities of corporate leadership (Hambrick et al., 1996; Robinson and Dechant, 1997). Diversity also may lead to productive disagreement, which can "harness the energy, experience, and creativity" of top management teams more effectively (Eisenhardt, Kahwajy and Burgeois, 1997). Since the overwhelming majority of top management teams among large U.S. corporations are predominately male, these arguments in favor of diversity suggest that increasing the TMT participation rate should increase diversity and thus be associated with better firm quality and performance.

All the same, these same scholars acknowledge that disagreement is not always productive and can slow down the decision making process and potentially hamper performance (Hambrick et al., 1996). Furthermore, with groups like Catalyst advocating for U.S. firms to hire more women at senior levels and with increasing pressure on companies to behave in a socially responsible manner,[****] some hiring of females to senior management positions may be "tokenism" motivated by political or public

[§§§] This intuitive idea has support in the academic literature. For example, Ruderman, Ohlott, Panzer, and King (2002) present evidence that the roles women play in their personal lives enhance women's interpersonal and task-related managerial skills.

[****] Reportedly, corporate social responsibility has become so important that most large multinational corporations now have a senior executive specifically charged with responsibility for the corporation's activity in that domain (The Economist, 2005).

relations considerations. If so, a higher TMT participation rate would be negatively associated with firm quality and performance.

Gender and Risk-Taking

A large literature in psychology and sociology documents the widely-held belief that women are more risk-averse than men. (See Byrnes et al., 1999 and Croson and Gneezy, 2004, for detailed reviews.) More specific to our study, the literature that focuses on attitudes towards financial risk also finds that women are more risk-averse than men. For instance, by studying investment behavior, Jianakoplos and Bernashek (1998) found that women tend to hold a smaller percentage of their wealth in risky assets.

Although our focus in this study is on firm quality and performance rather than risk-taking per se, we do study sales growth as one of our performance indicators. If risk-seeking manifests itself as a drive for, and achievement of, faster growth, we would expect, based on the foregoing discussion, for the TMT participation rate be negatively associated with sales growth, other things being equal.

The CEO Position

The effect of differences in risk-taking propensity between males and females should a priori be just as significant, if not more so, at the CEO position as at other areas of senior management, given the CEO's role in setting the overall strategy of the firm.

In contrast, the other aspects of female participation discussed above do not extend as obviously from top management team below the CEO level to the CEO position. First, since virtually every company has only one CEO at any point in time, the benefits of diversity are impossible to obtain by definition.

Second, if female managers are not in fact better than men but add value by facilitating cooperation or sharing power and information, they may be most effective at doing so when working with other senior managers at a similar level rather than as a CEO, in which capacity collegiality may be less important than leadership in the classic sense (Barnard, 1938); in fact, given the CEO's status as "top dog," CEOs may operate in a more competitive environment than other senior managers, something that seems to increase the relative performance of males (Gneezy et al., 2003). Moreover, from the point of view of collaboration, the CEO may just be "another executive," so that the marginal effect of having a female CEO may be no more or less than having a female chief financial officer, chief operations officer, head counsel, and so forth.

Third, men may be reluctant to accept women as symbolic and actual leaders. Since CEOs are overwhelmingly male, females face an incongruity between the qualities and behaviors typically associated with women (gender role) and the qualities and behaviors believed to be required for successful leadership (leader role). Women may accordingly be reluctant to adopt the "preferred leadership style" (Oakley, 2000). Even if they do, women females may be less favorably evaluated, because such behavior is perceived as less desirable in women (Eagly et al., 1992) and subordinates are conditioned to prefer men in traditionally male roles (Eagly, Karau, and Makhijani, 1995). Consequently, a female CEO may be less accepted as a leader by her subordinates. If so, any benefits that a female CEO may bring from a female management style may be dissipated by internal and external factors.

Finally, from an empirical point of view, we note that the stock market does not react favorably to announcements that a female CEO has been retained (Lee and James, 2007). For these reasons, we study gender at the CEO and sub-CEO level separately.

Innovation Intensity

If female participation in senior management leads to positive firm outcomes and does so because a female management style encourages collaboration, the positive firm outcomes should be particularly significant when collaboration is particularly important.

Generally speaking, innovation success is said to be a product of "bargaining and negotiation" to "accumulate information," not "domination of others" and to rely, inter alia, on "coalition building" (Kanter, 1983, 1988). "Supportive" management behavior bolsters feelings of self-determination and personal initiative and thereby increases intrinsic motivation. In contrast, controlling supervisory behavior undermines intrinsic motivation. Intrinsic motivation is in turn a key determinant of employee creativity (Oldham and Cummings, 1996).

There is a wealth of empirical evidence supporting these claims. In an R&D context, for instance, both Andrews and Farris (1967) and Amabile (1988) find that "freedom" for employees is positively associated with innovation. Oldham and Cummings (1996) obtain similar results among technical teams in manufacturing facilities (1996). Scott and Bruce (1994) show that the degree to which interactions between a supervisor and subordinate are characterized by "trust, mutual liking, and respect" is positively related to the subordinate's innovative behavior.

With regard to the underlying social and psychological mechanisms, Deci and Ryan (1987) review the literature on employee autonomy, concluding that autonomy support leads to, inter alia, more intrinsic motivation, more creativity, and better conceptual learning. It has been demonstrated experimentally that "informational verbal rewards" increase intrinsic motivation while "controlling verbal rewards" do not (Pittman, Davey, Alafat, Wetherhill and Kramer, 1980; Ryan, Mims and Koestner, 1983). Participatory leadership styles have also been linked to more sharing of information in group discussions (Larson, Foster-Fishman and Franz, 1998).

Based on the foregoing, we adopt a firm's innovation intensity – specifically, its R&D activity – as a proxy for determining whether a participatory female management style, if it exists, is likely to be particularly valuable. We also note that the moderating impact of innovation intensity on the effects of a female management style may also be contingent on whether the woman is CEO or another member of senior management. Such a difference in effect could arise, for example, if the female management style fosters innovation in general, but gender stereotyping with regard to the CEO's symbolic leadership role forces a female CEO to conform to masculine norms or renders a female management style ineffective. The CEO may also have too little contact with the employees doing the innovating for the female management style to foster innovation.

III. Data, Variables, & Empirical Specification

We use S&P's ExecuComp database for 1992-2006 to study the effect of female participation in top management on firm performance. ExecuComp reports information

on the top management of firms in the S&P 1,500, including age, title, and compensation.[††††]

We construct two measures of female participation. The first, FEMRATIO, is the ratio of female executives in ExecuComp for a given firm in a given year to the total number of executives for that firm and year. Given the unique leadership attributes of the chief executive position, we exclude executives identified with the tag "CEO" in ExecuComp's ceoann field from the calculation of FEMRATIO and instead define the dummy variable FEMCEO, which takes the value 1 (0) if, for a given firm in a given year, the executive with the tag "CEO" is female (male). Thus, FEMRATIO measures what we have called the TMT participation rate.

In Table I, we use the 48 Fama-French industries (Fama and French, 1997) to tabulate the percentage of firms with at least one female executive below the CEO level and the percentage with a female CEO. The level of female participation in top management varies considerably by industry. Generally speaking, consumer-oriented industries (e.g., Apparel and Printing & Publishing), the financial services sector (Banking and Insurance), and the "new economy" (Pharmaceutical Products and Telecommunications) have the highest rates of female participation. "Traditional" industries like Agriculture, Petroleum & Natural Gas, and Shipping Containers have the lowest.

The TMT participation rate is associated with a higher probability of having a female CEO. As shown in Table II, in over ¾^{ths} of the sample observations, the firm does

[††††] According to S&P, ExecuComp gathers information on up to the 9 highest-paid executives reported by each S&P 1,500 firm in public SEC filings. However, most firms only report information on the 5 highest-paid executives. In 1992 and 1993, ExecuComp covers a smaller set of firms, which more or less corresponds to the S&P 500 at that time.

not have even 1 female senior executive below CEO level. Of those firms, only 0.75% have a female CEO. In contrast, among the firms with at least one female senior executive below CEO level, 3.15% have a female CEO. This is intuitive. Firms where women are more likely to rise to senior management are also those where a woman is more likely to become CEO.

Female participation levels also increase over the sample period. Table III reports the percentage of firms with at least one female senior executive below CEO level and the percentage with a female CEO. Only 0.2% of firms had a female CEO in 1992, but 2.5% did in 2006. Only 6.0% of firms had at least one female senior executive below CEO level in 1992. This figure rises steadily to a peak of 31.1% in 2001 but subsequently levels off.[‡‡‡‡]

We use CompuStat as a source of financial information about the firms in our sample, and CRSP as a source of stock price information. We relate female participation in senior management to four common indicators of firm quality and performance: (i) Tobin's Q, or the ratio of market value to book value, (ii) Return on Assets, or operating income divided by book assets from the prior year, (iii) Return on Equity, or net income before extraordinary items divided by book equity from the prior year, and (iv) year-on-year sales growth in percent.[§§§§]

We also use four control variables, which are commonly used in the literature on CEO effects (e.g., Bertrand and Schoar, 2003; Bebchuk et al., 2007; and Pérez-González,

[‡‡‡‡] The figures for 1992 and 1993 may be misleadingly small, since ExecuComp did not cover the entire S&P 1,500 in those years, instead focusing on the larger firms.
[§§§§] The firm performance variables are calculated as follows from CompuStat data. Tobin's Q: (data6+data28*data199-data60-data74)/data6; Return on Assets: data13/data6(prior period); Return on Equity: data18/data60(prior period); and Sales Growth: data12/data12(prior period)-1.

2006): (i) LNASSETS, a proxy for firm size defined as the natural log of book assets from the prior year, (ii) FIRMAGE, or the firm age in years with firm "birth" determined by the earlier of the firm's first year in CompuStat or CRSP, (iii) BOOKLEV, or the ratio of debt to assets, and (iv) RDINT, or the intensity of R&D activities defined as the ratio of R&D expense to assets.[*****] Many firms do not report R&D expense as a separate item. For those firms, RDINT is set to zero. Following Bebchuk, Cremers and Peyer (2007) and Pérez-González (2006), we also classify firms that report R&D expense as "innovation intensive." We return to this issue in below.

Table IV provides descriptive statistics for the variables used in the study. The low means of FEMRATIO and FEMCEO reflect the large number of firms with a TMT participation rate of 0. The majority of firms are less than 30 years old, although a small number are significantly older. The four firm performance variables are all ratios. The result is that each has outlying observations with values many standard deviations from the mean. In the regression analysis, we accordingly follow other authors and exclude observations where the value of the dependent variable is more than 3 standard deviations greater or less than the mean (e.g., Huson, Malatesta and Parrino, 2004).

Our basic regression specification is the following:

$Y_j = FEMRATIO_j + \sum_i X_j^i + industry^k + \varepsilon_j$, where

j is a an index of firm-year observations,

Y_j is a firm performance variable,

[*****] The control variables from CompuStat data are calculated as follows. LNASSETS: ln(data6(prior period)), BOOKLEV: (data9+data34)/data6, and RDINT: data46/data6(prior period).

The X_j^i are a set of i control variables,

$industry_j$ is an industry fixed effect for the firm's 4-digit SIC code, and

$!_j$ is an error term.

To account for correlation in the $!_j$ among observations from the same year and of the same firm, we calculate robust covariance matrices in respect of each regression using the Huber-White-Sandwich estimator.

IV. Results

Base Case Analysis

Table V reports a regression of four firm performance variables on FEMRATIO and the control variables. The TMT participation rate is strongly associated with higher Tobin's Q, Return on Assets, and Return on Equity. This is consistent with arguments in the social-psychology and organizational behavior literature that female participation in senior management is beneficial for firm performance. Intriguingly, there is weak evidence – p-value of 10% – that higher rates of female participation are associated with slower sales growth. This is accords with arguments found to hold in the general population that women exhibit a more conservative attitude towards risk. For the most part, the control variables are highly significant across the regressions, although much of their explanatory power is absorbed by the four-digit SIC code industry fixed effects, as one would expect.

Endogeneity & Casuality

It is not possible in a large-scale empirical study of this kind to definitively establish the direction of causation between female participation in senior management and firm performance. Although we present evidence that female participation in senior management is strongly associated with higher firm quality and performance, it is unclear from these associations alone whether female participation is a cause, outcome, or both.

Nonetheless, if our results were being driven entirely by the propensity of "better" firms to hire female senior managers and not by any positive effect that these managers had on firm performance, we would expect that the statistically significant and positive coefficient on FEMRATIO in the first three columns of Table V to become insignificant once we control for the past values of the dependent performance variable.

We test this by re-running the regressions in Table V in Table VI, this time including the lag of each performance variable in each regression. The sign and significance of FEMRATIO is unchanged from Table V. Indeed, the magnitude of the coefficient on FEMRATIO only drops materially from Table V to Table VI in the Tobin's Q regressions. This is unsurprising, since Tobin's Q, as a "level" measure, is likely to be more persistent than Return on Assets, and Return on Equity. Overall, the results not only suggest that at least some of the positive association between the TMT participation rate and firm performance is driven by a positive effect such participation has on firm performance but also that this effect is persistent, leading to more than a one-off improvement. In other words, the results are evidence of a beneficial female participation effect.

Female CEOs

To test whether the female participation effect carries over to the position of CEO, we rerun the regressions from Table V in Table VII, now including the dummy variable FEMCEO. The coefficients on FEMRATIO and the controls are essentially unchanged from Table V. The coefficient on FEMCEO is insignificant in the Tobin's Q and Return on Assets regressions, and negative and significant at the 10% and 5% levels, respectively, in the Return on Equity and Sales Growth regressions.

Essentially, we find that female participation generally improves firm performance, but the effect of having a female CEO is either neutral or negative, particularly for firm growth. These results are consistent with the proposition that the managerial style of females is more effective below then CEO level, rather than in the powerful and symbolic CEO position. Moreover, these results also suggest that female managers may indeed adopt a more conservative attitude towards risk, as represented by firm growth rate; given the power CEOs have to set firm policy, it is unsurprising that this more conservative attitude is more significant at the CEO level.

Female Participation & Innovation Intensity

The positive female participation effect documented above could arise from several factors. If the effect arises because of women's role in fostering collaboration, then the social psychology and organizational behavior literature suggests that the effect would be particularly strong where a firm pursues an innovation intensive strategy and collaboration is accordingly particularly important.

To test this idea, we follow Pérez-González (2006) and Bebchcuk, Cremers and Peyer (2007) in classifying firms into two groups, depending on whether the firm separately reports R&D expense on its income statement. We consider firms that report R&D expense to be pursuing an innovation intensive strategy, as firms where R&D expense is not sufficiently material do not disclose it as a separate line item. 48.2% of the firms in our sample report R&D expense. We accordingly partition FEMRATIO into two variables, FEMRATIO/RD, which assume the value of FEMRATIO if the firm reports R&D expense and zero otherwise, and FEMRATIO/No RD, which is the corresponding variable for firms that do not report R&D expense.

As seen in Table VIII, FEMRATIO/RD is positive and significant in the Tobin's Q, Return on Assets, and Return on Equity regressions, and FEMRATIO/NoRD never is. We conclude from this that the female participation effect is associated with a firm's pursuit of innovation and is thus likely to be a result of a tendency by women to engage in and foster the collaborative behaviors that encourage innovation.

V. Conclusion

This paper documents that female participation in senior management below the CEO level is strongly associated with a number of commonly used measures of firm quality and performance but that having a female CEO has a negative or neutral effect, even after controlling for firm and industry effects. These effects are robust to the inclusion of lagged values of the performance measures, providing at least indicative evidence of causality.

In addition, the paper demonstrates that the positive effects of female participation are entirely driven by firms whose R&D expenditures are sufficiently material to merit

their separate disclosure. Given the strong link between collaborative management practices and firm innovation, our results are consistent with the proposition that female managers add value by fostering collaboration but that females are unable or unwilling to achieve similar results as CEOs, perhaps because of gender typecasting or male resistance to women in symbolic positions of leadership. We also document that female participation in senior management is associated with lower growth, which we interpret as a gender difference in attitude toward risk.

These results have implications for the "case for gender diversity" and the empirical question of whether the U.S. labor market for managerial talent is fully efficient. We also believe that the results give rise to interesting questions. Why, for example, are more firms not able to take advantage of female participation in senior management? Does the tendency for female managers to promote collaboration provide tangible benefits in areas besides R&D? Can men acquire managerial skills associated with women? These questions must await future research.

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Table I
Distribution of Female Executives by Industry

The second column reports, for each Fama-French industry, the percentage of firms with at least one female executive listed in EXECUCOMP, excluding CEOs. The third column repeats the exercise for CEOs alone. Each year a firm appears in the database is treated as a separate observation.

Fama French Industry	% with One or More Female Executives	% with Female CEO
Apparel	38.9%	5.9%
Printing & Publishing	36.8%	2.6%
Personal Services	36.0%	5.1%
Consumer Goods	35.9%	6.7%
Banking	34.1%	1.3%
Restaurants, Hotel, Motel	34.1%	0.4%
Wholesale	33.7%	2.6%
Pharmaceutical Products	32.1%	2.7%
Fabricated Products	31.8%	3.0%
Business Services	31.4%	3.2%
Telecommunications	29.1%	1.0%
Recreational Products	28.7%	3.1%
Trading	28.5%	0.9%
Utilities	27.4%	0.8%
Miscellaneous	27.2%	4.9%
Healthcare	27.0%	1.1%
Tobacco Products	26.8%	4.9%
Insurance	26.5%	0.1%
Medical Equipment	26.4%	1.0%
Computers	23.6%	1.6%
Candy & Soda	22.2%	0.0%
Food Products	21.1%	0.4%
Measuring & Control Equipment	19.3%	0.0%
Alcoholic Beverages	19.1%	0.0%
Defense	18.8%	0.0%
Chemicals	17.7%	0.0%
Business Supplies	17.7%	0.0%
Nonmetallic Mining	17.5%	0.0%
Entertainment	17.5%	0.0%
Construction	16.6%	0.0%
Transportation	16.1%	0.0%
Construction Materials	15.4%	0.0%
Electrical Equipment	14.3%	0.0%
Aircraft	14.2%	0.0%
Textiles	14.0%	1.7%
Electronic Equipment	13.7%	0.3%
Petroleum & Natural Gas	12.6%	0.0%
Machinery	12.6%	0.6%
Shipping Containers	12.1%	0.0%
Precious Metals	11.8%	0.0%
Steel Works, etc.	11.6%	0.0%
Rubber & Plastic Products	10.3%	0.0%
Automobiles & Trucks	7.4%	2.2%
Coal	4.5%	0.0%
Agriculture	0.0%	0.0%
Real Estate	0.0%	0.0%
Shipbuilding, Railroad Equipment	0.0%	0.0%

Table II
Relationship between Female Participation in Top Management and Having a Female CEO

The percentage figures in parentheses to the right (below) each cell in the table are calculated with reference to the total in each row (column).

Has at least One Female Executive below CEO Level?	Has Female CEO?				
	No		Yes		Totals
No	17,358	*99.25%*	132	*0.75%*	17,490
	76.33%		*43.00%*		*75.89%*
Yes	5,382	*96.85%*	175	*3.15%*	5,557
	23.67%		*57.00%*		*24.11%*
Totals	22,740	*98.67%*	307	*1.33%*	23,047

Table III
Distribution of Female Executives by Year

The second column reports, for each year in the sample, the percentage of firms with at least one female executive listed in EXECUCOMP, excluding CEOs. The third column repeats the exercise for CEOs alone.

Year	% with One or More Female Executives	% with Female CEO
1992	6.0%	0.2%
1993	9.1%	0.3%
1994	13.6%	0.5%
1995	15.8%	0.6%
1996	17.8%	0.7%
1997	21.3%	0.7%
1998	23.3%	1.0%
1999	25.8%	1.2%
2000	28.7%	1.5%
2001	31.1%	1.7%
2002	31.0%	1.9%
2003	31.0%	2.0%
2004	30.9%	1.8%
2005	28.5%	2.3%
2006	29.2%	2.5%

Table IV
Descriptive Statistics

For a given firm in a given year, FEMRATIO is the percentage of female officers among those listed in EXECUCOMP, excluding the CEO. FEMCEO is a dummy variable taking the value 1 if a given firm in a given year has a female CEO. LNASSETS is the natural log of a firm's book assets. FIRMAGE is the age of the firm, with firm "birth" determined by the firm's first appearance in COMPUSTAT or CRSP. BOOKLEV is book leverage. RDINT is the ratio of the firm's R&D expense to assets, with a value of zero imputed if R&D expense is not reported. Tobin's Q is the ratio of market value to book value. Return on Assets is the ratio of operating income before depreciation to prior year assets. Return on Equity is the ratio of income before extraordinary items to prior year book equity. Sales Growth is the year-on-year percentage change in sales.

	Observations	Mean	Standard Deviation
FEMRATIO	23,047	0.041	0.081
FEMCEO	23,047	0.013	0.115
LNASSETS	23,015	7.321	1.800
FIRMAGE	23,047	26.114	19.394
BOOKLEV	22,928	0.236	0.242
RDINT	23,047	0.034	0.086
Tobin's Q	19,814	2.085	2.465
Return on Assets	22,627	0.147	0.221
Return on Equity	22,627	0.177	6.499
Sales Growth	22,957	0.170	0.737

Table V
Firm Performance and Female Participation

Regression of indicated firm performance variables on TMT participation rate. Tobin's Q is the ratio of market value to book value. Return on Assets is the ratio of operating income before depreciation to prior year assets. Return on Equity is the ratio of income before extraordinary items to prior year book equity. Sales Growth is the year-on-year percentage change in sales. For a given firm in a given year, FEMRATIO is the percentage of female officers among those listed in EXECUCOMP, excluding the CEO. LNASSETS is the natural log of a firm's book assets. FIRMAGE is the age of the firm, with firm "birth" determined by the firm's first appearance in COMPUSTAT or CRSP. BOOKLEV is book leverage. RDINT is the ratio of the firm's R&D expense to assets, with a value of zero imputed if R&D expense is not reported. Regressions include fixed effects for the year and industry at the 4-digit SIC code level. Observations where the value of the dependent variable is more than 3 standard deviations away from the mean are excluded. All standard errors are robust to heteroskedasticity and arbitrary within-firm serial correlation. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	Tobin's Q		Return on Assets		Return on Equity		Sales Growth	
FEMRATIO	0.3904	***	0.0264	**	0.1721	**	-.04963	*
LNASSETS	-0.0308	***	0.0016	*	0.0096	**	-0.0111	***
FIRMAGE	-0.0024	***	-0.0003	***	0.0006	*	-0.0020	***
BOOKLEV	-0.8847	***	-0.1121	***	-0.0956		-0.0351	***
RDINT	3.2885	***	-0.1277	***	-1.3284	***	0.5237	***
Observations	19,509		21,321		21,809		21,669	
R^2	0.3610		0.2170		0.0536		0.1231	

Table VI
Firm Performance and Female Participation with Lagged Dependent Variables

Regression of indicated firm performance variables on TMT participation rate and lagged values of performance variables. Tobin's Q is the ratio of market value to book value. Return on Assets is the ratio of operating income before depreciation to prior year assets. Return on Equity is the ratio of income before extraordinary items to prior year book equity. Sales Growth is the year-on-year percentage change in sales. …[N-1] denotes the dependent variable from the prior year. For a given firm in a given year, FEMRATIO is the percentage of female officers among those listed in EXECUCOMP, excluding the CEO. LNASSETS is the natural log of a firm's book assets. FIRMAGE is the age of the firm, with firm "birth" determined by the firm's first appearance in COMPUSTAT or CRSP. BOOKLEV is book leverage. RDINT is the ratio of the firm's R&D expense to assets, with a value of zero imputed if R&D expense is not reported. Regressions include fixed effects for the year and industry at the 4-digit SIC code level. Observations where the value of the dependent variable is more than 3 standard deviations away from the mean are excluded. All standard errors are robust to heteroskedasticity and arbitrary within-firm serial correlation. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	Tobin's Q		Return on Assets		Return on Equity		Sales Growth	
Tobin's Q [N-1]	0.1979	***						
ROA [N-1]			0.0008					
ROE [N-1]					-0.0033			
Sales Growth [N-1]							0.0005	
FEMRATIO	0.2869	***	0.0278	**	0.1548	**	-0.0483	*
LNASSETS	-0.0264	***	0.0019	**	0.0091	*	-0.0097	***
FIRMAGE	-0.0012	**	-0.0003	***	0.0007	*	-0.0020	***
BOOKLEV	-0.6880	***	-0.1142	***	-0.0923		-0.0367	***
RDINT	1.3331	***	-0.1245	*	-1.272	***	0.5091	***
Observations	19,368		21,167		21,698		21,566	
R^2	0.4566		0.2183		0.0522		0.1212	

Table VII
Firm Performance and Female Participation with CEO Effects

Regression of indicated firm performance variable on TMT participation rate and indicator variable denoting whether CEO is female. Tobin's Q is the ratio of market value to book value. Return on Assets is the ratio of operating income before depreciation to prior year assets. Return on Equity is the ratio of income before extraordinary items to prior year book equity. Sales Growth is the year-on-year percentage change in sales. For a given firm in a given year, FEMRATIO is the percentage of female officers among those listed in EXECUCOMP, excluding the CEO. FEMCEO is a dummy variable taking the value 1 if a given firm in a given year has a female CEO. LNASSETS is the natural log of a firm's book assets. FIRMAGE is the age of the firm, with firm "birth" determined by the firm's first appearance in COMPUSTAT or CRSP. BOOKLEV is book leverage. RDINT is the ratio of the firm's R&D expense to assets, with a value of zero imputed if R&D expense is not reported. Regressions include fixed effects for the year and industry at the 4-digit SIC code level. Observations where the value of the dependent variable is more than 3 standard deviations away from the mean are excluded. All standard errors are robust to heteroskedasticity and arbitrary within-firm serial correlation. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	Tobin's Q		Return on Assets		Return on Equity		Sales Growth	
FEMRATIO	0.3912	***	0.0271	**	0.1836	**	-0.0463	*
FEMCEO	-0.0090		-0.0084		-0.1365	*	-0.0379	**
LNASSETS	-0.0308	***	0.0016	*	0.0095	**	-0.0111	***
FIRMAGE	-0.0024	***	-0.0003	***	0.0006	*	-0.0020	***
BOOKLEV	-0.8848	***	-0.1121	***	-0.9556		-0.0352	***
RDINT	3.288	***	-0.1281	***	-1.3329	***	0.5219	***
Observations	19,509		21,321		21,809		21,669	
R^2	0.3610		0.2170		0.0540		0.1233	

Table VIII
Firm Performance and Female Participation as a Function of Innovation Intensity

Regression of indicated firm performance variables on TMT participation rate, partitioned into separate variables depending on whether a firm is pursuing an innovation intensive strategy. Tobin's Q is the ratio of market value to book value. Return on Assets is the ratio of operating income before depreciation to prior year assets. Return on Equity is the ratio of income before extraordinary items to prior year book equity. Sales Growth is the year-on-year percentage change in sales. For a given firm in a given year, FEMRATIO is the percentage of female officers among those listed in EXECUCOMP, excluding the CEO. /RD (/NoRD) is FEMRATIO where a firm reports (does not report) R&D expense. LNASSETS is the natural log of a firm's book assets. FIRMAGE is the age of the firm, with firm "birth" determined by the firm's first appearance in COMPUSTAT or CRSP. BOOKLEV is book leverage. RDINT is the ratio of the firm's R&D expense to assets, with a value of zero imputed if R&D expense is not reported. Regressions include fixed effects for the year and industry at the 4-digit SIC code level. Observations where the value of the dependent variable is more than 3 standard deviations away from the mean are excluded. All standard errors are robust to heteroskedasticity and arbitrary within-firm serial correlation. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	Tobin's Q		Return on Assets		Return on Equity		Sales Growth	
FEMRATIO/RD	0.8133	***	0.0490	***	0.2699	**	-0.0509	
FEMRATIO/NoRD	-0.0923		0.0016		0.0629		-0.0482	
LNASSETS	-0.0307	***	0.0016	*	0.0097	**	-0.0111	***
FIRMAGE	-0.0023	***	-0.0002	***	0.0006	*	-0.0020	***
BOOKLEV	-0.8866	***	-0.1123	***	-0.9604		-0.0351	***
RDINT	3.2620	***	-0.1291	***	-1.334	***	0.5238	***
Observations	19,509		21,321		21,809		21,669	
R^2	0.3618		0.2172		0.0537		0.1231	