

WORKING P A P E R

Chipping Away at the Glass Ceiling

Gender Spillovers in Corporate Leadership

DAVID A. MATSA AND AMALIA R. MILLER

WR-842

January 2011

This paper series made possible by the NIA funded RAND Center for the Study of Aging (P30AG012815) and the NICHD funded RAND Population Research Center (R24HD050906).

This product is part of the RAND Labor and Population working paper series. RAND working papers are intended to share researchers' latest findings and to solicit informal peer review. They have been approved for circulation by RAND Labor and Population but have not been formally edited or peer reviewed. Unless otherwise indicated, working papers can be quoted and cited without permission of the author, provided the source is clearly referred to as a working paper. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

RAND® is a registered trademark.

Chipping Away at the Glass Ceiling: Gender Spillovers in Corporate Leadership*

David A. Matsa and Amalia R. Miller

January 17, 2011

Abstract

This paper examines the role of women helping women in corporate America. Using a merged panel of directors and executives for large U.S. corporations between 1997 and 2009, we find a positive association between the female share of the board of directors in the previous year and the female share among current top executives. The relationship's timing suggests that causality runs from boards to managers and not the reverse. This pattern of women helping women at the highest levels of firm leadership highlights the continued importance of a demand-side "glass ceiling" in explaining the slow progress of women in business.

JEL: G34, M51, J16, J71

* Matsa: Finance Department, Kellogg School of Management, Northwestern University, 2001 Sheridan Road, Evanston, IL 60208 (e-mail: dmatsa@northwestern.edu); Miller: Economics Department, University of Virginia and RAND Corporation, 1200 South Hayes Street, Arlington, VA 22202 (e-mail: amiller@rand.org). We thank Kai Li and Brian Melzer for helpful comments.

Wal-Mart has a “strong-willed young lady on the board now who has already told the board it should do more to ensure the advancement of women.”

– Sam Walton, Founder and CEO of Wal-Mart, about Hillary Clinton¹

Although women comprise 47 percent of the overall labor force, they account for only 6 percent of corporate CEOs and top executives. Why are there so few women at the top? Supply side explanations stemming from sex differences in preferences and productivity, in either corporate leadership or in home production, may play a role. For example, women may shy away from competition for promotions (Muriel Niederle and Lise Vesterlund 2009) or choose to avoid the stress and work-life imbalance associated with occupying the executive office suite. Career interruptions due to childbearing may also limit women’s ultimate professional advancement (Amalia Miller 2010, Marianne Bertrand, Claudia Goldin and Lawrence Katz 2010).

At the same time, there may also remain systematic demand-based or institutional barriers that present a “glass ceiling” blocking women’s progress to the highest corporate levels, despite their continued gains at lower levels and in middle management. Current top executives and corporate directors, who are primarily male, may tacitly discriminate or stereotype by sex, and the historic absence of women in top positions may lead to hysteresis, preventing women from accessing powerful, male-dominated professional networks, or same-sex mentors (Susan Athey, Christopher Avery, Peter Zemsky 2000). The existence of these demand-side barriers would suggest a potential role for women serving in positions of corporate leadership to help other women advance to top management.

¹ Wal-Mart’s 1987 annual shareholders’ meeting (*New York Times*, May 20, 2007).

This paper presents evidence of women helping women in corporate America. The central role of a company's board of directors is to appoint and oversee the company's executives. We explore how female representation on corporate boards affects the gender composition of the companies' top management. Much of the economics and finance literature on boards focuses on the role of directors' personal incentives and potential conflicts of interest (e.g., for insiders at the company) in guiding their decision making (see Benjamin Hermalin and Michael Weisbach 2003). Recent research finds that female board members differ from males in setting corporate strategy (David Matsa and Amalia Miller 2010), in the monitoring of executives (Renée Adams and Daniel Ferreira 2009), and in mergers and acquisitions (Maurice Levi, Kai Li and Feng Zhang 2010). This study uses the lens of gender to explore the role of director preferences, perceptions, and networks in the selection of corporate executives.

I. Female-female hiring in the market for executives

We analyze data on corporate board members and top executives for a large panel of publicly traded U.S. companies from 1997 to 2009. We combine data on the name, title, compensation level, and sex of the top 5 executives for each firm-year from Standard and Poor's Execucomp database with firm-year level information on female representation among corporate directors from the Investor Responsibility Research Center's and RiskMetrics's directors datasets. Combined, the sample covers S&P 1500 companies, which represent approximately 90 percent of market capitalization in the United States.

Table 1 reports means for our primary measures of female leadership, defined at the firm-year level. Female representation is higher among directors than among top executives. While 64 percent of the companies in our sample had at least one woman on their corporate board, only 24 percent had a woman among their top 5 executives. By all accounts, female representation

increased substantially over the sample period. Women's share of board seats increased by 7.2 percentage points, a 94 percent increase, and their share of top executive positions increased by 2.8 percentage points, an 86 percent increase over the initial level. Most dramatically, the share of companies with female CEOs increased more than sixfold to 5.7 percent of companies. These remarkable gains for women at the top of the corporate ladder stand in contrast to the lack of female progress in US labor markets: the rapid narrowing in the gender wage gap stalled in the mid-1990s (Francine Blau and Lawrence Kahn 2000), as did overall female labor force participation. In order to determine if the increase in female representation among top executives over the last decade can be attributed in part to an increase in the *demand* for female executives, we assess whether women directors were more likely than men to hire female executives.

We begin by analyzing raw firm-level associations. Figure 1 shows the average female share of executives depending on the previous year's female share of the company's board of directors. Firms with more women on the board also tend to have more female top executives.

We examine this pattern more closely in a multivariate regression framework. We regress the female share of executives on the female share of the board and year fixed effects. The year effects ensure that the association we measure does not merely reflect the economy-wide trend of greater female participation in all facets of corporate leadership. To isolate spillovers between board members and managers who are different people, we use an initial board measure that excludes individuals who are ever top executives at the same company. The results are reported in Table 2. The previous year's female share among directors is a significant positive predictor of the female share among top executives – a 10 percentage point greater share of women on the board of directors is associated with a 1.4 percentage point greater share of female executives.

We next explore timing to determine if female boards are hiring female executives or vice versa (Hermalin and Weisbach 1998) and find that lagged female board membership predicts female executives but not the reverse. Specifically, in Column 2 of Table 2, we present estimates from a model with year fixed effects that includes current, one-year lagged, and one- and two-year leading values for the female share of the board. The coefficient estimates are large and statistically significant for the previous year's board share, smaller for the current board share, and insignificant for the leading terms. These results imply that changes in the board composition precede changes in executive membership.

These relationships may be partly explained by companies with more female boards also having a greater supply of female managers. For example, women may have specific skills that are more valuable in some environments, such as the marketing of packaged consumer goods. The nature of the work, travel demands, and promotion tournaments may also lead women to be less interested in other workplace environments. Such supply-side factors are likely to operate primarily at the industry level. If these factors affect both directors and executives, they could induce a spurious positive correlation. We thus re-estimate the relation and include a full set of industry fixed effects, defined using four-digit SIC codes. Industry differences can explain about one half of the relation between male and female directors (Column 3).

Still, particular firms *within* an industry may attract a greater supply of female talent, perhaps because of their corporate culture or specific clientele. Similarly, there may be gradual trends during the period that make certain companies more suited to female leadership. We address these potential confounding effects in analyses reported in the next two columns of Table 2. First, we include a full set of firm fixed effects to account for any differences between firms that are invariant throughout the sample period. The relation is again significant: a 10

percentage-point increase in female board membership is associated with a 0.4 percentage-point increase in female management (Column 4).

As a second approach to unobserved firm heterogeneity, we employ a dynamic model in Column 5 and control for lagged values of the dependent variable to account for factors that affect the outcome, as of the previous year. In this model, a 10 percentage-point increase in female board membership is associated with a 0.2 percentage-point increase in female management, an increase of about 3 percent. These results can be interpreted as the reduced-form of a partial adjustment model. The female share of the board may increase the *desire* to hire female executives, but it may take time for the actual number to adjust, for example, if adjustments are costly and the positions are currently filled with qualified candidates. If so, the long-run effect of a 10-percentage point increase in female board membership is a 1.2 percentage point increase (i.e., $0.22 / (1 - 0.81)$), or 21 percent of the average female executive share.

Our analysis thus far excludes top executives who also sit on their company's board from the board share measure. This approach ensures that the results represent gender spillovers, but may underestimate the effect if employee directors also influence hiring decisions. Including employee directors approximately doubles the estimated relationship between the gender of last year's board members and this year's executives (Column 6).² The estimates imply the long-run effect of a 10-percentage point increase in female board membership is a 2.1 percentage point increase (i.e., $0.39 / (1 - 0.81)$), or 36 percent of the average female executive share.

² To prevent possible timing differences between director and executive records from incorrectly making some individuals appear to serve as directors *before* they become executives, we exclude employee observations from the director sample in the years before they are reported as top employees. This affects less than 2 percent of employee director observations.

We also considered several alternative measures of female representation in top management. The results are reported in Table 3, where all specifications include year fixed effects and lagged values of the dependent variable, as in Columns 5 and 6 of Table 2. Panel A reports results that exclude all top executives from the board member sample, whereas Panel B reports results that exclude only observations for individuals recorded as serving on the board before assuming a top employee post. We first consider outcomes for all of the top 5 executives at each firm. Each 10 percentage-point increase in women on the board increases the likelihood of having any women among the top 5 executives in the next year by 0.9 to 1.5 percentage-points (Column 1). When women's share of board seats increases, women's share of top executive total compensation increases by more than their share of positions (0.025 versus 0.022 and 0.059 versus 0.039; Column 2), suggesting that some of the convergence in the gender pay gap for top executives may be attributable to female board members (Bertrand and Kevin Hallock 2001).

We also estimate separate effects of female board members on the likelihood of having a female CEO or a female among the other 4 top executives. In both cases, there is evidence of gender spillovers from board members to executives. Although female CEOs are still very rare for large companies, their ranks increased during the period. The estimates associate a 10 percentage-point increase in female board membership with a 0.2 to 0.4 percentage-point increase the probability of having a female CEO, which represents a 9 to 23 percent increase over the sample average (Column 3). There is also an increase in non-CEO female executives (Column 4). This increase is proportionally smaller (4 to 6 percent of the sample mean of 0.23), consistent with boards' greater involvement in the selection of CEOs than other top executives.

II. Broader implications of these results

If these estimates capture the causal effects of changing board composition, what do they imply about the nature of the glass ceiling and its potential remedies? Our finding that board membership affects female achievement highlights the continued importance of demand-side and institutional barriers. This sex difference in the behavior of board members may reflect differences in preferences (where one or both sexes discriminates in favor of members of their own sex) or differences in information (where individuals are better able to interpret noisy signals about ability for members of their own sex). There may also be indirect effects of increased female board membership that operate through changes in corporate culture that make the experiences of obtaining and performing in top jobs relatively more appealing for women. At the same time, the evidence should not be interpreted as showing that supply-side factors have no role. Rather, both demand- and supply-related factors are likely operating in concert and may be mutually reinforcing. One implication of the results is that public policies aimed at increasing female representation on boards of directors, such as the quota recently adopted in Norway, may lead to general spillovers in management.

The long-term impact of our results may be much larger than the immediate effects or even the “long-term” effects we estimate from the partial-adjustment model. We show that increasing the share of women on corporate boards can lead to subsequent increases in the share of women in top management. There may also be a feedback cycle in which the presence of more female managers increases the qualified pool of potential female board members (for the companies they manage, as well as other companies), leading to greater female board membership and then further increases in female executives. The impact of promoting more

women to top positions in companies will be further amplified if those women in turn serve as role models or mentors for other women at lower ranks in their firms and in their industries.

References

- Adams, Renée, and Daniel Ferreira. 2009. "Women in the Boardroom and Their Impact on Governance and Performance." *Journal of Financial Economics*, 94(2): 291–309.
- Athey, Susan, Christopher Avery, and Peter Zemsky. 2000. "Mentoring and Diversity." *American Economic Review*, 90 (4): 765-786.
- Bertrand, Marianne and Kevin F. Hallock. 2001. "The Gender Gap in Top Corporate Jobs." *Industrial and Labor Relations Review*, 55(1): 3-21.
- Bertrand, Marianne, Claudia Goldin, and Lawrence F. Katz. 2010. "Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sectors." *American Economic Journal: Applied Economics*, 2(3): 228–55.
- Blau, Francine and Lawrence M. Kahn. 2000. "Gender Differences in Pay." *Journal of Economic Perspectives*, 14(4): 75–99.
- Hermalin, Benjamin E., and Michael S. Weisbach. 1998. "Endogenously Chosen Boards of Directors and Their Monitoring of the CEO." *American Economic Review*, 88: 96-118.
- Hermalin, Benjamin E, and Michael S. Weisbach. 2003. "Boards of Directors as an Endogenously Determined Institution: A Survey of the Economic Literature." *Economic Policy Review*, 9 (1): 7–26.
- Levi, Maurice, Kai Li, and Feng Zhang. 2010. "Men are from Mars, Women are from Venus: Gender and Mergers and Acquisitions." Working Paper.
- Matsa, David A. and Amalia R. Miller. 2010. "A Female Style in Corporate Leadership? Evidence from Quotas." Working Paper.

Miller, Amalia R. 2010. “The Effects of Motherhood Timing on Career Path.” *Journal of Population Economics*.

Niederle, Muriel, and Lise Vesterlund. 2007. “Do Women Shy away from Competition? Do Men Compete too Much?” *Quarterly Journal of Economics*, 122(3): 1067-1101.

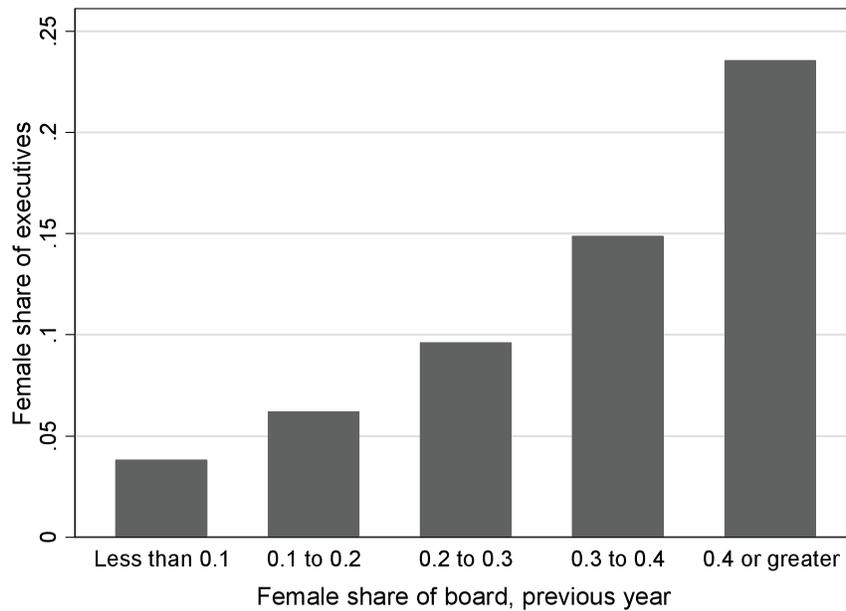


Figure 1 – Average Executive Share Female by Corporate Board Share Female

Table 1 -- Female Representation in Top Corporate Leadership, United States, 1997-2009

Year	Board of directors			Top five executives		
	Any female?	Share female (including executives)	Share female (excluding executives)	Any female?	Share female	Female CEO?
1997	59.1	7.6	8.9	14.2	3.2	0.9
2009	77.4	14.8	17.0	22.6	6.0	5.7
Average	63.7	9.5	10.9	23.5	5.7	1.8

Notes: This table reports the percent of company-year observations with any female representation among its corporate leadership, and women’s average aggregate percent of these positions.

Table 2 -- Gender Spillovers from Boards to Executives

	Dependent Variable: Female share of top five executives					
	(1)	(2)	(3)	(4)	(5)	(6)
Female share of board:						
Previous year	0.141*** (0.022)	0.096*** (0.024)	0.067*** (0.020)	0.038** (0.018)	0.022*** (0.007)	0.039*** (0.008)
Current year		0.037** (0.018)				
Forward 1 year		0.001 (0.018)				
Forward 2 years		0.016 (0.023)				
Female share of executives, previous year					0.813*** (0.010)	0.810*** (0.010)
Observations	13,491	9,287	13,491	13,491	13,491	13,491
R-squared	0.03	0.03	0.20	0.71	0.70	0.70
Fixed effects:						
Across time	Year	Year	Year	Year	Year	Year
Across firms	None	None	Industry	Firm	Industry	Industry
Board member sample includes executives?	No	No	No	No	No	Yes

Notes: Standard errors, reported in parentheses, are adjusted for within-firm correlation.

*** p<0.01, ** p<0.05, * p<0.1

Table 3 -- Alternative Measures of Female Executive Representation

	All top five executives			Any other female executives? (4)
	Any female? (1)	Female share of pay (2)	Female CEO? (3)	
Panel A: Non-executive board members				
Female share of board, previous year	0.086*** (0.026)	0.025*** (0.008)	0.016* (0.009)	0.081*** (0.026)
Observations	13,491	13,408	13,491	13,491
R-squared	0.65	0.62	0.76	0.63
Panel B: All board members				
Female share of board, previous year	0.151*** (0.031)	0.059*** (0.011)	0.040*** (0.012)	0.128*** (0.031)
Observations	13,491	13,408	13,491	13,491
R-squared	0.65	0.62	0.76	0.63

Notes: Each column represents a separate regression for a different dependent variable, indicated in the column headings. All specifications include a full set of year fixed effects and controls for the lagged value of the dependent variable. Standard errors, reported in parentheses, are adjusted for within-firm correlation.

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