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Fidan Ana Kurtulus
University of Massachusetts Amherst, fidan@econs.umass.edu

Donald Tomaskovic-Devey
University of Massachusetts Amherst, tomaskovic-devey@soc.umass.edu

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DEPARTMENT OF ECONOMICS

Working Paper

Do Women Top Managers Help Women Advance? A Panel Study Using EEO-1 Records

By

Fidan Ana Kurtulus
Donald Tomaskovic-Devey

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DO WOMEN TOP MANAGERS HELP WOMEN ADVANCE?
A PANEL STUDY USING EEO-1 RECORDS

May 12, 2011

Fidan Ana Kurtulus and Donald Tomaskovic-Devey
University of Massachusetts Amherst

ABSTRACT

The goal of this study is to examine whether women in the highest levels of management ranks of firms help reduce barriers to advancement in the workplace faced by women. Using a panel of over 20,000 private-sector firms across all industries and states during 1990-2003 from the U.S. Equal Employment Opportunity Commission, we explore the influence of women in top management on subsequent female representation in lower-level managerial positions in U.S. firms. Our key findings show that an increase in the share of female top managers is associated with subsequent increases in the share of women in mid-level management positions within firms, and this result is robust to controlling for firm size, workforce composition, federal contractor status, firm fixed effects, year fixed effects and industry-specific trends. The influence of women in top management positions is stronger among federal contractors, in firms with larger female labor forces, and for white women. We also find that the positive influence of women in top leadership positions on managerial gender diversity diminishes over time, suggesting that women at the top play a positive but transitory role in women's career advancement.

Keywords: Women Managers, Gender Diversity, Discrimination, Mentoring, Promotions, Hiring and Retention
JEL Classifications: J16, J21, J24, J44, J62, J71, J78, J82, M51

INTRODUCTION

Despite great advances in labor force participation and declines in both pay gaps and occupational segregation, women in the U.S. remain under-represented in managerial positions (Rothstein, 2001, Blau, Ferber and Winkler, 2006, pp. 181, Reskin and Bielby, 2005). While women have comprised around 45 percent of employment in large U.S. firms since the early 1990s, the proportion of women in managerial occupations was only 29 percent in 1990, although this figure has been steadily increasing with 34 percent of management positions held by women in 2003 (U.S. Equal Employment Opportunity Commission).[1] The goal of this study is to empirically examine whether women in the highest levels of management at firms help reduce barriers to advancement in the workplace faced by other women.

It is often argued that women in top leadership positions of firms serve to improve women's recruitment and promotion to managerial positions by mentoring women in lower-level jobs, acting as positive role models, and enhancing hiring and retention of women at the firm. However, theories about whether gender diversity at high levels of firms' hierarchies helps women advance have largely been based on anecdotal evidence and general observation due to the dearth of appropriate datasets conducive to an empirical analysis of this topic. The few empirical studies which have examined the influence of women in top company leadership on subsequent managerial gender diversity have primarily been based on small samples of firms or workers involved in limited tasks, and often lack a longitudinal component.

[1] Nationally representative data from the U.S. Bureau of Labor Statistics confirm these trends: Current Population Survey estimates of the share of employed women aged 16 and over is steady around 45 percent during the 1990s while the share of employed women in management occupations in private sector firms (of all sizes) rises steadily from 33 percent in 1990 to 36 percent in 2003.

This paper uses a unique panel of over 20,000 large private-sector firms across all industries and states during 1990-2003 obtained from the U.S. Equal Employment Opportunity Commission to study the influence of female top managers on the subsequent representation of women in mid-level management positions in U.S. firms, and how this relationship varies with firm characteristics such as industry and federal contractor status. The Equal Employment Opportunity Commission firm reports create a unique opportunity to conduct a large-scale examination of this topic that until now has been mainly confined to empirical studies limited in size and generalizability.

In addition to using a sample much larger in size and scope than previous studies on the topic, our study is also the first to exploit panel methods to identify the influence of female top mangers on subsequent managerial gender diversity, allowing us to derive more precise estimates of this relationship. Though detecting the influence of women top managers is difficult in the absence of exogenous variation in female representation in the highest ranks of firm hierarchies, we are able to control for numerous sources of heterogeneity in our panel regressions that threaten the identification of the women top managers effect, including time-varying observed firm heterogeneity, time-invariant unobserved firm heterogeneity, and industry-specific and economy-wide trends that may additionally affect the evolution of female managerial representation at firms.

Our key findings show that an increase in the share of female top managers is associated with subsequent further increases in the share of women in mid-level management, and this result is robust to controlling for firm size, workforce composition, federal contractor status, firm fixed effects, year fixed effects and industry-specific time trends. We also find that the positive influence of female top managers on managerial

gender diversity diminishes over time. These results suggest that women in the highest leadership positions play a positive but transitory role in women's career advancement in U.S. firms.

MECHANISMS

Why might we expect greater representation of women in top leadership positions to lead to subsequent increases in managerial gender diversity at the firm? One potential mechanism is mentoring (Athey, Avery and Zemsky, 2000). Women managers may act as mentors to female employees in lower ranks of the firm's hierarchy, actively training them in firm-specific human capital and skills necessary to succeed at the firm thereby improving the likelihood that they will get promoted to top managerial positions—an advantage male employees have long benefited from given historically male-dominated management at firms (Kanter, 1977, Ibarra, 1993, Noe, 1988).

Furthermore, if it is the case that female employees are given less favorable performance evaluations by male supervisors than by female supervisors --either because of gender discrimination in supervisor evaluations (both taste-based and statistical discrimination) or because women perform worse when working under male managers than female managers--and are thus less likely to be promoted to higher positions (Tsui and O'Reilly, 1989; Giuliano, Leonard and Levine, 2006), then women employees would be more likely to be promoted in firms with a greater share of women at the top.

There have been a few empirical studies examining the relationship between the share of women in top management and internal promotions of women employees within firms, and the overall evidence is mixed. Chused (1988) found that women law

professors were more likely to be granted tenure in faculties with a higher proportion of tenured women than in faculties with a very low proportion of tenured women in their sample of 149 U.S. law schools. Using data on managerial workers at 333 savings and loan banks in California, Cohen, Broschak and Haveman (1998) found that women were more likely to be promoted into a managerial job level when a higher proportion of women were already there. On the other hand, Blau and DeVaro (2007) found no evidence of this in their cross-section of 1,772 urban establishments in Atlanta, Boston, Detroit and Los Angeles from the Multi-City Study of Urban Inequality, and Rothstein (1997) found no evidence of differences in subjective perceptions of future promotion probabilities based on supervisor gender among young workers in the National Longitudinal Survey of Youth.

Another channel through which women in top leadership may play an influential role in increasing subsequent managerial gender diversity at the firm is by recruiting highly qualified women from other firms to managerial positions at the firm. For example, Cohen, Broschak and Haveman (1998) found increased external recruitment of female managers when there were more preexisting female managers in their sample of 333 California savings and loan banks. Company executives often socialize with executives from other firms and these networks are commonly divided along gender lines. So it is more likely that female top managers will be more knowledgeable than male top managers about women at outside firms who may be suitable for a managerial opening at the firm. In other words, women top managers can improve female recruitment using their female networks and informing women outside the firm of managerial job opportunities.

In addition to recruiting qualified females directly to the managerial positions of the firm, women in top leadership may increase the recruitment of women to lower-level non-managerial positions in the firm, thereby increasing the likelihood of female internal promotions to managerial positions. A limited number of studies have documented greater external hiring of female non-managerial employees when management was comprised of a higher female share (Carrington and Troske, 1995 and 1998). Huffman et. al (2010) show that increased women in management jobs is associated with declines in workplace sex segregation.

Apart from increasing the probability of female promotions through increasing the proportion of female non-managers, women managers may utilize their female networks to recruit *higher quality* female non-managers, which will also lead to higher female internal promotions to managerial positions for a given proportion of female non-managers at the firm.

In addition to improved female recruitment, women in top leadership can facilitate growth in female managerial representation through improving retention, both of existing female non-managers and managers. For instance, Giuliano, Leonard and Levine (2006) found that female employees demonstrated lower quit rates working under female supervisors than under male supervisors at a large U.S. retail chain.

The above mechanisms are ways in which female top managers may *actively* increase the subsequent share of women in mid-level management positions at the firm. However, women top managers may also *indirectly* improve gender diversity in the managerial ranks of the firm.

First, women who have attained visibility in top positions of the corporate hierarchy may weaken traditional stereotypes claiming female managers are less capable than male managers, thereby weakening a formidable barrier to the advancement of women in the workplace (Blau, Ferber and Winkler, 2006, pp. 179-91). This can make it more difficult for discriminatory employers to implement taste-based discrimination in hiring and promotion of women to managerial positions (Becker, 1957). It can also lower statistical discrimination in hiring and promotion of women to managerial positions (Phelps, 1972, Arrow, 1973, Aigner and Cain, 1977). Theories of statistical and taste-based discrimination also suggest that discriminatory employers will be less likely to hire women to jobs that have long promotion ladders or occupations that lead to eventual company management, so the weakening of stereotypes regarding women's ability to effectively manage are also likely to reduce discrimination of this form. Furthermore, theories of the signaling role of promotions suggest that the improved information regarding female managerial ability due to a greater salience of women in top leadership positions in the labor market will increase the likelihood that a woman will be promoted to managerial jobs from lower levels since the promoting firm will be less concerned about revealing information about the productivity of the promoted female to competing firms (Milgrom and Oster, 1987, DeVaro and Waldman, 2009).

Second, female top managers can act as role models to female employees at lower levels of the firm hierarchy without actually mentoring them. In a series of qualitative interviews and questionnaires of attorneys at U.S. law firms, Ely (1994) found that junior women associates with few senior women partners were less likely to view senior women as role models than at firms with many senior women. Further, the presence of a large

share of female top managers can serve as a signal to lower-level female managerial employees at the firm that rising through the firm's ranks is feasible and hence motivate lower-level female employees to put forth more effort in hopes of eventually attaining promotion to top management ranks. The presence of a large share of female top managers may also serve as an external signal that the firm provides a hospitable environment for women to succeed and attain the high wages associated with those positions and this may attract highly qualified female applicants, both to managerial and non-managerial openings. The gender gap in wages among both managers and non-managers has been shown to be lower in firms with more women at the highest levels of firms (Bell, 2005, Hultin and Szulkin, 1999, Shenhav and Haberfeld, 1992), and this is also likely to attract highly qualified female applicants.

DATA AND METHODOLOGY

The firm-level data we use in our empirical analyses come from confidential annual EEO-1 reports from 1990 to 2003 that have been collected by the U.S. Equal Employment Opportunity Commission as mandated by Title VII of the U.S. Civil Rights Act of 1964, and describe the occupation, race and gender composition of employees across all U.S. private-sector firms with 100 or more employees and private-sector federal contractors with 50 or more employees. We have records on more than 20,000 firms over the 1990-2003 period. Furthermore, a great advantage of these data is their longitudinal nature, allowing us to follow firms over time and thereby enabling us to use panel regression methods to control for unobserved attributes of firms that may be correlated with female managerial representation and derive sharper econometric estimates of the effects being studied. Firms are observed for 7.1 years on average.

Finally, to our knowledge the EEO-1 records comprise the only available cross-firm database with information on employee gender and race composition by occupational category at the firm.

EEO-1 reports contain employment counts at each firm by gender of five race or ethnic groups (White, Black, Hispanic, Asian or Pacific Islander, American Indian or Alaskan Native) distributed across the following nine occupational categories: Managers and Officers, Professionals, Technicians, Sales Workers, Office and Clerical Workers, Craft Workers, Operatives, Laborers, and Service Workers. Specifically, the Managers and Officers category is defined as administrative and managerial personnel who set broad policies, exercise overall responsibility for execution of these policies, and direct individual departments or special phases of the firm's operations. Examples of jobs in the Managers and Officers category include executives, plant managers, department managers, superintendents, and managing supervisors. Within the occupational category of Managers and Officers, we are able to distinguish between *top managers* working at firm headquarters with control over broad firm policy and firm-wide visibility, and *middle managers* working at the firm's non-headquarter establishments.

When filing their EEO-1 forms, firms are instructed not to include temporary or casual employees hired for a specified period of time or for the duration of a specified job in their reports but to include leased employees as well as both part-time and full-time employees. Robinson et. al. (2005) compare employment covered in the EEO-1 data to employment estimates from the U.S. Bureau of Labor Statistics and report EEO-1 coverage to be about 40 percent of all U.S. private-sector employment through the 1990s, with higher proportions in industries comprised of larger firms such as manufacturing and

transportation. The EEO-1 reports also include information on the firm's industry, geographic location, whether or not the firm is a federal contractor, and whether or not the firm is a multi-establishment organization. A complete description of these data can be found in Robinson et. al. (2005).

We estimate fixed effects regressions of the relationship between the share of women top-level managers at a given firm in the past and the share of women mid-level managers in the future of the following form:

$$Pctfemmidmanager_{i,t} = \sum_{j=0}^{n} \alpha_j Pctfemtopmanager_{i,t-j} + X'_{i,t}\beta + \theta_i + \lambda_t + Industry_i * t + \varepsilon_{i,t} \qquad (1)$$

for specifications with incrementally more lags of *Pctfemtopmanager* on the right hand side, i.e., $n = \{0,1,2,3,4,5\}$. Here, $X_{i,t}$ is a vector that includes a constant term and an array of time-varying firm *i* year *t* controls, defined below, θ_i is a firm fixed effect, λ_t is a year fixed effect, and $Industry_i*t$ represents industry-specific time trends (dummy variables indicating firm *i*'s industry interacted with a linear time trend).

Our goal in this paper is to estimate the influence of women top managers on subsequent female representation in middle management at the firm net of economy-wide and firm-specific factors that may also be influencing the evolution of female representation in mid-level management. Including firm fixed effects in Equation (1) allows us to control for time-invariant unobserved firm attributes which may influence the future share of women in middle-management, such as stable human resource policies. Furthermore, we include year fixed effects to control for any economy-wide shocks and general trends affecting the evolution of female managerial representation symmetrically across all firms. However, there may also be factors influencing the share

of women mid-level managers that vary within the firm and the firm's industry over time which would bias our estimates of the influence of women top managers on subsequent female representation in mid-level management if such factors do not change at a national level uniformly and get picked up by the year fixed effects in our model (McTague et. al. 2009). We would therefore like to additionally control for such firm-specific and industry-specific factors that may also be serving to increase the share of women middle managers at the firm over time. A very flexible way to do this would be to incorporate firm-specific trends (θ_i*t) into Equation (1), but this is not feasible given the large number of firms in our sample. Instead, we incorporate interactions of industry dummies with a linear time trend to account for industry-specific trends in the prevalence of women in mid-level management positions. For example, many firms in a particular line of business or industry may react to a high-profile gender discrimination lawsuit against a similar firm by enacting a policy of increasing the share of women managers in mid-level management over a period of time. Including industry-specific time trends allows us to control for such phenomena so that we can get more accurate estimates of the firm-level influence of women top managers on subsequent representation of women middle managers net of any industry trends toward higher levels of managerial gender diversity.

Our study is the first to exploit panel methods to investigate the role played by women in top leadership positions at firms in increasing overall managerial gender diversity. One previous study, Cohen et al. (1998) analyzed 333 California savings and loan banks and found that both external hiring and upward mobility by women into management was facilitated by preexisting women managers, however, despite having

collected yearly data on managers at these banks over the period 1975 to 1987, they pooled all observations across all years and banks and estimated logistic regressions of the probability of a managerial job being filled by a woman given the current composition of employment at the bank without accounting for any worker, firm or year fixed effects. Our regressions, on the other hand, control for numerous sources of unobserved heterogeneity in order to more precisely quantify the influence of women top managers on the subsequent representation of women in firms' mid-level management ranks. Furthermore, the Cohen et. al. study is both geographically and industrially specific and so leaves open the question of the generality of this phenomenon, while our study is based on a longitudinal sample of over 20,000 firms covering a much broader geographic and industry scope.[2]

Even after accounting for firm fixed effects, year fixed effects and industry-specific trends, there may still remain differences across firms in factors such as firm culture or diversity policy that vary over time within firms and that influence the evolution of female managerial representation at the firm, biasing our estimates of the effect of women top managers on subsequent managerial gender diversity. To alleviate this potential source of bias, we additionally control for a set of observable time-varying firm characteristics that are likely to be correlated with unobservable factors like firm culture or the intensity with which diversity policies are implemented at the firm and that are likely to influence the extent to which women in top managerial positions can help reduce barriers to advancement in the workplace faced by other women.

[2] Because Cohen et. al. did not provide marginal effects, we are not able to compare the magnitudes of our estimates to theirs.

Previous research has shown that firms with formalized human resource practices such as formal job titles, vacancy postings and standardized employee evaluations have lower occupational segregation, lower wage gaps and higher female access to jobs at the top of firm hierarchies (Elvira and Graham, 2002, Konrad and Linnehan, 1995, Reskin and McBrier, 2000), and that the formalization of human resource practices is correlated with organizational size and complexity (Marsden, Cook and Kalleberg, 1996). We therefore control for firm size.

It is reasonable to expect that gender diversity in the non-managerial ranks at the firm may influence the extent to which women top managers can attract more women into mid-level management positions in the future. The most obvious reason for this is that the greater the percentage of women in non-managerial positions, the greater is the probability that women will be promoted from lower levels to mid-level managerial positions. It is also possible that when women have a large share of employment at the firm, the firm may be more likely to promote women to mid-level managerial positions to motivate its lower-level female employees. Furthermore, there might be less resistance to increasing the share of women in management overall when there are many non-managerial women at the firm. Reskin and McBrier (2000), in their analysis of 516 employers from the 1991 National Organizations Study, showed that the higher women's share of jobs in an establishment, the higher the proportion of female managers. Stainback and Tomaskovic-Devey (2009) also found women's representation in management to be closely linked to their representation in non-managerial occupations in their analysis of EEOC private sector data. In a series of experimental studies on cognitive psychological processes and unconscious biases reviewed in Valian (1998, pp.

139-44), women's performance ratings were more negative than men's when women comprised smaller percentages within teams. We therefore also control for the share of non-managerial employees at the firm who are women in our regressions.

It is also reasonable to expect that firms which actively implement race diversity policies are more likely to give high priority to implementing gender diversity programs as well. We therefore also include as controls the share of black and Hispanic employees at the firm to account for idiosyncratic variation across firms in the implementation intensity of managerial gender diversity policies. Furthermore, our models control for the share of employees who are managers to account for the difficulty of attaining managerial positions at the firm.

We also control for federal contractor status in all of our regression analyses. Firms with government contracts are subject to compliance reviews by the Office of Federal Contract Compliance (OFCCP), with penalties for non-compliance ranging from revocation of current government contracts to suspension of the right to bid on future contracts. Firms that are government contractors may therefore be more likely to implement their diversity programs with greater intensity. They are also required to take affirmative action in recruiting and promoting women and minorities as mandated by Executive Order no. 11246 of 1965. In his analysis of EEO-1 records for the period 1974-1980, Leonard (1984a, 1984b, 1986) found that federal contractors increased the employment shares of women and minorities significantly faster than non-contractors and that the occupational advancement of minority groups into skilled white-collar work was more rapid within contracting than non-contracting establishments. Ashenfelter and Heckman (1976) used EEO-1 records for the period 1966-1970 to show that employment

of black males relative to white males increased more rapidly in firms with government contracts than in firms without contracts, and Heckman and Wolpin (1976) found a similar result based on their analysis of EEO-1 records of firms in the Chicago metropolitan area for the period 1970-1973. Brown (1982) also concluded, from a review of the literature, that the employment shares of protected groups increased more rapidly among contractors than non-contractors. Konrad and Linnehan (1995) found that being a government contractor was positively associated with management attitudes about the importance of the company reputation in the area of equal employment opportunity and also positively associated with the percentage of women in high-level management and the percentage of women employees, and Kalev and Dobbin (2006) found that OFCCP compliance reviews had a positive but declining effect on white female and black access to managerial jobs since the 1970s.

Below we define the variables used in our empirical analysis and Table 1 presents summary statistics for these variables. Figure 1 shows trends in the percentage of women, women managers, women top managers, women middle managers, and women non-managers over the years 1990 to 2003.

Variable Definitions

Pctfemmanager	Percentage of managers at the firm who are female
Pctfemtopmanager	Percentage of top managers at firm headquarters who are female
Pctfemmidmanager	Percentage of middle managers at non-headquarter establishments of the firm who are female
Lnsize	Ln(number of employees at the firm)
Fed	Dummy variable equaling 1 if the firm is a federal contractor, 0 otherwise
Pctblk	Percentage of employees at the firm who are black
Pcthisp	Percentage of employees at the firm who are Hispanic
Pctfemnonmanager	Percentage of non-managerial employees at the firm who are female
Pctmanager	Percentage of employees at the firm who are managers
Year dummies (1990-2003)	Dummy variable indicating year (1990-2003)
Industry-Specific Time Trends (9):	
*Agriculture*Trend*	(Dummy variable equaling 1 if the industry of the firm is agriculture)*(Linear time trend)
*Mining*Trend*	(Dummy variable equaling 1 if the industry of the firm is mining)*(Linear time trend)
*Construction*Trend*	(Dummy variable equaling 1 if the industry of the firm is construction)*(Linear time trend)

*Manufacturing*Trend*	(Dummy variable equaling 1 if the industry of the firm is manufacturing)*(Linear time trend)
*Transportation*Trend*	(Dummy variable equaling 1 if the industry of the firm is transportation)*(Linear time trend)
*Wholesale*Trend*	(Dummy variable equaling 1 if the industry of the firm is wholesale trade)*(Linear time trend)
*Retail*Trend*	(Dummy variable equaling 1 if the industry of the firm is retail trade)*(Linear time trend)
*Finance*Trend*	(Dummy variable equaling 1 if the industry of the firm is finance)*(Linear time trend)
*Service*Trend*	(Dummy variable equaling 1 if the industry of the firm is services)*(Linear time trend)

EMPIRICAL ANALYSIS

In order to determine whether top-level women managers have a positive influence on subsequent mid-level female managerial representation, we estimate fixed effects regressions of the share of female top managers at firm *i* in year *t* on the share of female managers at firm i in year *t* and in the previous five years *t-1, t-2, t-3, t-4* and *t-5*, and the full set of controls including firm size, whether the firm is a federal contractor, the share of employees at the firm who are black or Hispanic, and the share of non-managerial employees at the firm who are female, the share of management at the firm, year dummies, and industry-specific trends. The estimates from this model are reported in Table 2, and as seen in Columns 1 through 6 of Table 2, the coefficient estimates are remarkably stable as we incrementally add older lags of the shares of top women managers to the right hand side of the empirical specification. The estimates reveal a positive relationship between the share of female top managers at the firm in the past and the share of women in mid-level management in the future. Focusing on the specification in the last column with concurrent and five lags of female top manager shares and the full set of firm controls, year indicators, and industry-specific trends, we see that the coefficient on the concurrent percentage of female mid-level managers is 0.017 and statistically significant at the one percent level. The coefficient on the percentage of female middle managers in year t-1 is even larger, 0.024, and significant. The coefficients on older lags are also positive and significant, and gradually become smaller

in magnitude.[3] Note that another way to interpret the results in the last column of Table 2 is that a one percentage point increase in the share women in top-level management this year is associated with a 0.017 percentage point increase in the share of female middle managers in the same year, a 0.024 percentage point increase in the next year, a 0.020 percentage point increase two years later, a 0.009 percentage point increase three years later, a 0.011 percentage point increase four years later, and a 0.008 percentage point increase five years later. These amount to a six-year cumulative increase of 0.088 percentage points in the share of female middle managers.[4]

We infer from these results that women in top management have the greatest impact on women's advancement to the mid-level managerial ranks of firms after one year but the effect gradually weakens in later years. A possible explanation for the diminishing effect is that women may exit the firm to take up better jobs elsewhere after several years of serving in mid-level managerial positions at the firm and the positions they vacate are statistically more likely to be filled by men; as seen in Table 1 the probability that a mid-level managerial position will be filled by a man is over 70 percent. We conclude that women top managers help women advance but the positive impact of an increase in the share of women top managers slowly tapers off over the years.[5]

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[3] The coefficient on the contemporaneous share of female top managers is likely smaller than the t-1 coefficient because an expansion in the share of top managers is will be in part due to promotion of women from middle management ranks (thus shrinking women's middle management share in the contemporaneous period).

[4] We also estimated models with the lagged versions of the time-varying firm control variables; the estimates of the coefficients on the main independent variables remain nearly identical to those reported in Table 2. This is also true for all of the models in the remainder of the paper. These results are available from the authors.

[5] Our focus is on regressions of the share of female middle managers on the share of female top managers rather than the other way around since, as we have argued throughout the paper, the channels of influence are most likely to flow from higher levels to lower levels in the firm's hierarchy through mechanisms like mentoring of lower level employees, hiring and retention. However, we also explored the reverse specification by estimating analogous fixed effects regressions of the share of female top managers on the share of female middle managers. The estimated coefficients on the contemporaneous and lagged shares of

ADDITIONAL RESULTS

In this section we pursue a number of extensions to the main empirical analysis. In particular, we explore asymmetries in the impact of female top managers upon the evolution of gender diversity in mid-level management by firm federal contractor status, industry, and the percentage of female non-managers already working at the firm. We also examine whether the influence of female top managers varies by race of top managers.

Federal Contractor Status

Does the influence of female top managers on the subsequent representation of women in middle management vary depending on whether the firm is a federal contractor? As explained in the last section, firms with government contracts are required to take affirmative action in recruiting and promoting women and minorities and are potentially subject to OFCCP reviews, and previous empirical work has found that the increase in employment shares and occupational advancement of protected groups was more rapid among federal contractors than non-contractors during the initial years of the Civil Rights movement. Given these regulatory pressures, it is reasonable to suspect that women in top leadership may be better able to expand managerial gender diversity at firms with government contracts in comparison to non-contractors. We test this hypothesis by augmenting the most controlled regression specification presented in the

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female middle managers were either statistically indistinguishable from zero or considerably smaller than the estimates from our main specifications discussed above, showing that the direction of influence is from top management to middle management and not the other way around. These results are available from the authors.

last columns of Table 2 with interactions of the current and lagged shares of women top managers with current federal contractor status.[6]

The estimates from this model are presented in Table 3, with the lower panel showing the marginal effects of women in top management at firms holding federal contracts versus non-contractors. It is interesting to note that among non-contractors, the influence of woman top managers can be characterized as more of a short-term phenomenon, with most of the statistically significant female top manager effects concentrated in the current and early periods, while at federal contractors there are more sustained, longer-term effects as indicated by the fact that the coefficient on later lags (lags one, two three and four) are also strongly statistically significant. This suggests that affirmative action in contracting extends the persistence of the positive effect of women in top leadership, perhaps because women in top leadership also influence contractors' formal affirmative action plans to expand managerial gender diversity. Moreover, we also see in the lower panel of Table 3 that the six-year cumulative effect of women top managers is slightly larger among contractors, providing further support that the idea that women top managers are better able to expand female managerial representation at firms with government contracts in comparison to non-contractors.

Industry

A unique advantage of the EEO-1 data is that they include firms across all industries of the United States. Since women's representation, gender norms, and occupational segregation by gender vary a great deal across industries, the positive

[6] We also estimated models in which the interaction terms were with one period lagged federal contractor status, five year lagged federal contractor status, federal contractor status concurrent with the lag of the share of female managers, and an indicator of whether the firm was a federal contractor in each of the previous five years. The results are very similar to those reported here, and are available from the authors.

influence of women in top leadership is likely to be more intense for certain industries than for others. We explore this idea in Table 4 by restricting the regression analysis to samples consisting of firms in each of the following industries: agriculture, mining, construction, manufacturing, transportation, wholesale trade, retail trade, finance, and the service industry. There is considerable variation in the impact of women top managers on subsequent female representation in mid-level management. Focusing on the six-year cumulative effect, firms in the construction, manufacturing, finance and wholesale trade industries tend to exhibit the largest benefits to female managers. Interestingly some of these are also industries in which women have historically been underrepresented relative to men and therefore where the benefits of women managers on increasing recruitment, retention and promotion of women may be expected to be large. On the other hand, firms in the agriculture and mining industries exhibit the weakest effects.

Non-Managerial Gender Diversity

It is reasonable to expect that gender diversity in the non-managerial ranks at the firm may influence the extent to which women top managers can attract more women into mid-level managerial positions in the future, perhaps because the greater the percentage of women in non-managerial positions the greater is the probability that women will be promoted from lower levels to middle management positions, or because when women have a large share of employment at the firm the firm may be more likely to promote women to management ranks to motivate its lower-level female employees, or because there may be less resistance to increasing managerial gender diversity when there are many non-managerial women at the firm. We test this hypothesis by including interactions of the share of non-managerial employees who are female with the current

and lagged shares of female top managers in the baseline regression of the share of female middle managers on the current and lagged shares of female top managers. Estimates from this regression are presented in Table 5, with the lower panel showing the implied marginal effects of the share of female top managers on subsequent female mid-level managerial representation computed at different shares of female non-managerial workers at the firm. Reading across rows in the lower panel, we see that the short-term benefits of female top managers (current and first lag) are increasing with the share of female non-managers at the firm, suggesting that indeed women top managers can more effectively diversify management ranks when women's overall firm presence is larger. Similarly, the six-year cumulative effect of women in top leadership is increasing with the share of non-managerial women. On the other hand, the longer-term benefits of women top managers (lags two, three, four and five) are either decreasing with the share of female non-managers or not statistically significant.

Race of Women Managers

A potential objection to the results presented so far is that the revealed positive effect of women managers may represent only a white women manager effect. This, however, turns out not to be the case. Despite the fact that the incidence of non-white female top managers is much lower than the incidence of white female top managers in any given year during 1990-2003 (Table 6), we find that black, Hispanic and Asian female top managers in fact have a positive and statistically significant influence on expanding the subsequent representation of black, Hispanic and Asian women in middle management as do white female top managers have on expanding the subsequent representation of white women in middle management. As seen in Table 7 Panel B, a

one percentage point increase in the share of black female top managers at the firm is associated with a statistically significant 0.022 percentage point further increase in the share of black female middle managers in the following year, and a 0.034 percentage point further increase in the share of black female middle managers after five years. As seen in Panels C and D of Table 7, a one percentage point increase in the share of Hispanic female top managers is associated with a 0.027 percentage point further increase in the share of Hispanic women middle managers after two years, and a one percentage point increase in the share of Asian female top managers is associated with a 0.016 percentage point further increase in the share of Asian women middle managers after five years. Note that the estimated relationships between the contemporaneous shares of minority female top managers and middle managers are generally negative, probably because an expansion in minority female top managers is likely to be due to promotion of minority women from middle management ranks (thus shrinking their middle management share in the contemporaneous period). Although the relationship between black, Hispanic and Asian women in top management and subsequent increases in black, Hispanic and Asian women in middle management is quite a bit smaller than the relationship between white female top managers and subsequent increases in white female middle management revealed in Panel A, there *are* clear effects for black, Hispanic and Asian women, indicating that the average effects revealed earlier in the paper were not merely a white women managers phenomenon.[7,8]

DISCUSSION AND CONCLUSION

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[7] We also estimated cross-race regressions of the influence of white women in top management on minority women in middle management. For black and Hispanic women the influence was weakly positive, and for Asian and Native American women the impact was essentially zero.

[8] Additionally including a control variable for the percentage of non-managerial workers belonging to the relevant race does not change the regression estimates very much.

Using a unique panel of over 20,000 large private-sector firms across all industries and states during 1990-2003 from the U.S. Equal Employment Opportunity Commission, we show that female top managers have a positive influence on expanding the subsequent representation of women in the lower-level managerial ranks of U.S. firms, and this result is robust to controlling for firm size, workforce composition, industry, geographic location, federal contractor status, firm fixed effects, year fixed effects and industry-specific time trends. Further, the influence of women top managers on gender diversity in lower-levels of management diminishes over time. Our findings collectively suggest that women in top management play a positive but transitory role in the advancement of women within U.S. firms.

We additionally uncover interesting differences in the effect of women top managers on the evolution of managerial gender diversity by federal contractor status, industry, managerial race, and the proportion of female non-managers already working at the firm. For example, the positive effect of women in top leadership positions is found to be more persistent at firms holding federal contracts and thereby bound by affirmative action obligation, than at non-contractors.

Our analysis reveals that an increase in the share of women in top leadership leads to subsequent further growth in managerial gender diversity at firms -- but how does the initial increase in the share of women top managers come about? What are the exogenous influences that begin this process? Our analysis does not address how women can make initial inroads into top management that will lead to further increases in managerial gender diversity, but highlights the potential importance of external intervention (e.g., positive and negative press coverage, lawsuits) and government

regulation in bringing about such initial inroads for women in top levels of company hierarchies. As Athey et. al (2000, pp. 765) point out, a firm may have multiple steady states for female managerial representation whereby temporary affirmative-action policies may have a long-run impact on the evolution of diversity at the firm by moving the firm to a steady state characterized by greater female managerial representation.

Future work might involve a formal analysis of the mechanisms through which women in top leadership positions expand managerial gender diversity. A limitation of the EEO-1 database is that it does not contain information on promotions, hiring, turnover, or mentoring of female employees relative to men, preventing us from determining which of these different channels of influence are the predominant mechanisms underlying our main results. It would be useful to investigate the relative strengths of these various mechanisms using more detailed datasets in future research.

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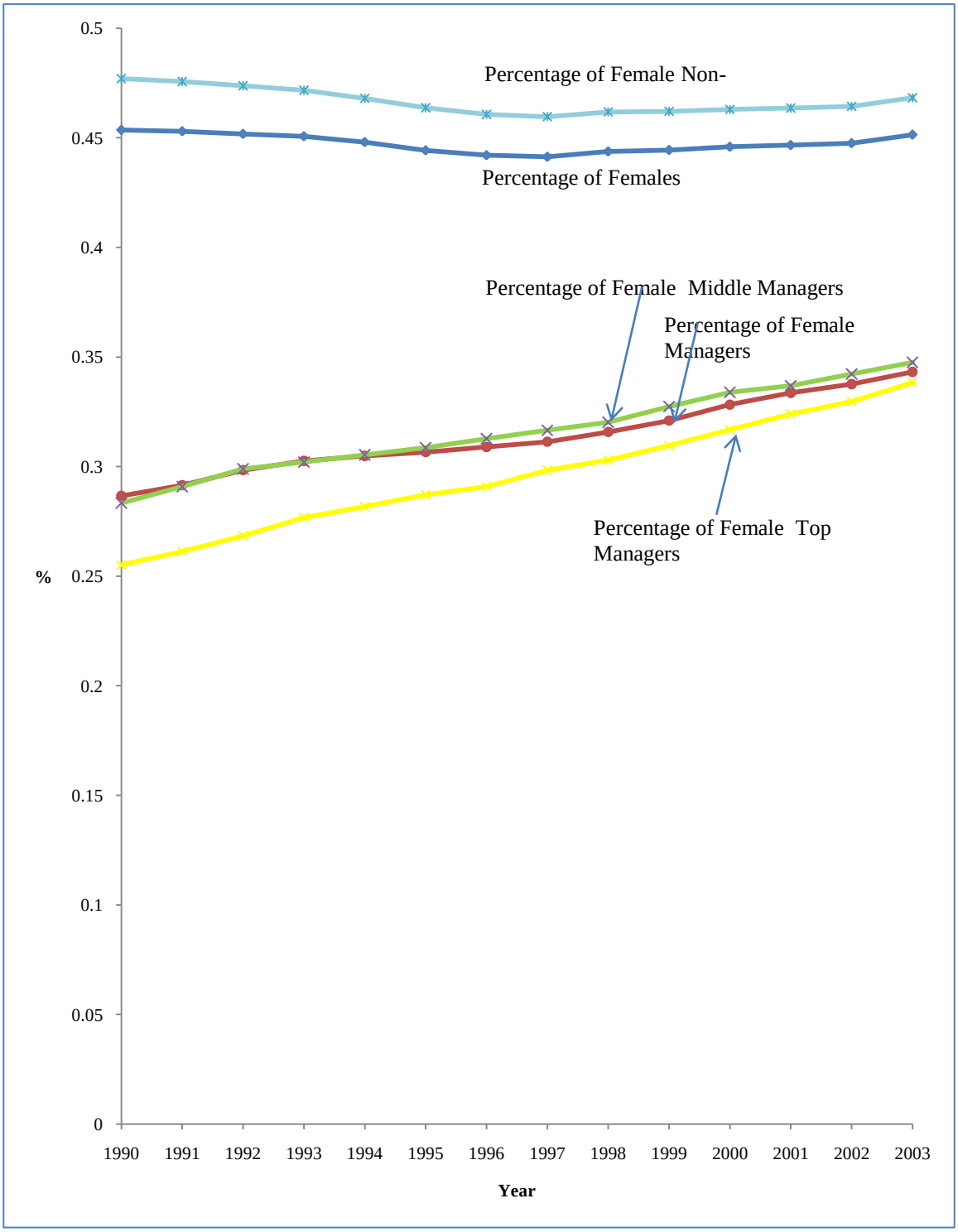
Figure 1: Percentage of Females, Percentage of Female Managers, Percentage of Female Top Managers, Percentage of Female Middle Managers, Percentage of Female Non-managers, All Industries, 1990-2003



Source: U.S. Equal Employment Opportunity Commission EEO-1 Reports.

TABLE 1: Descriptive Statistics

Variables:	Mean	Std. Dev.	Min	Max	N
Pctfemmanager	0.318	0.225	0	1	121,467
Pctfemtopmanager	0.303	0.212	0	1	121,467
Pctfemmidmanager	0.322	0.283	0	1	121,467
Lnsize	6.403	1.361	3.912	13.990	121,467
Fed	0.492	0.499	0	1	121,467
Multi	0.609	0.488	0	1	121,467
Pctblk	0.108	0.127	0	1	121,467
Pcthisp	0.089	0.133	0	1	121,467
Pctfemnonmanager	0.470	0.253	0	1	121,467
Pctmanager	0.132	0.077	0	1	121,467
Year dummies (1990-2003)	•	•	0	1	121,467
Industry-Specific Trends (9)	•	•	0	14	121,467

Note: Based on the sample of N = 121,467 firm-years used in the baseline regression model presented in the last column of Table 2.

TALBE 2: Relationship Between Percentage of Female Middle Managers and Lagged Percentage of Female Top Managers (Fixed Effects Estimates)

	Dependent Variable: Pctfemmidmanager					
	(1)	(2)	(3)	(4)	(5)	(6)
Pctfemtopmanager	0.025***	0.016***	0.016***	0.016***	0.017***	0.017***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Pctfemtopmanager_lag1		0.031***	0.023***	0.023***	0.024***	0.024***
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Pctfemtopmanager_lag2			0.023***	0.019***	0.019***	0.020***
			(0.005)	(0.005)	(0.005)	(0.005)
Pctfemtopmanager_lag3				0.013***	0.009**	0.009**
				(0.005)	(0.005)	(0.005)
Pctfemtopmanager_lag4					0.013***	0.011**
					(0.004)	(0.004)
Pctfemtopmanager_lag5						0.008*
						(0.004)
Lnsize	0.016***	0.016***	0.016***	0.016***	0.016***	0.016***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Fed	-0.003**	-0.003**	-0.003**	-0.003**	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Pctblk	0.061***	0.061***	0.061***	0.061***	0.061***	0.061***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Pcthisp	0.029	0.029	0.029	0.030	0.030	0.030
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Pctfemnonmanager	0.159***	0.159***	0.158***	0.158***	0.158***	0.158***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Pctmanager	0.250***	0.248***	0.247***	0.247***	0.247***	0.247***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Year Dummies	YES	YES	YES	YES	YES	YES
Industry-Specific Trends	YES	YES	YES	YES	YES	YES
Constant	0.066***	0.060***	0.057***	0.054***	0.052***	0.050***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Observations	121467	121467	121467	121467	121467	121467
Number of Firms	22885	22885	22885	22885	22885	22885
Adjusted R-squared	0.019	0.020	0.020	0.021	0.021	0.021

*Six-year cumulative effect of a one percentage point increase: 0.088*** (0.013)*

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

TABLE 3: How the Relationship Between Percentage of Female Middle Managers and Lagged Percentage of Female Top Managers Varies with Federal Contractor Status (Fixed Effects Estimates)

Panel A: Regression Estimates

	Dependent Variable: Pctfemmidmanager
Pctfemtopmanager	0.025***
	(0.008)
Pctfemtopmanager_lag1	0.018***
	(0.006)
Pctfemtopmanager_lag2	0.019***
	(0.006)
Pctfemtopmanager_lag3	0.005
	(0.006)
Pctfemtopmanager_lag4	0.006
	(0.006)
Pctfemtopmanager_lag5	0.012*
	(0.006)
PctfemtopmanagerXfed	-0.019*
	(0.010)
Pctfemtopmanager_lag1Xfed	0.014
	(0.009)
Pctfemtopmanager_lag2Xfed	0.000
	(0.009)
Pctfemtopmanager_lag3Xfed	0.010
	(0.008)
Pctfemtopmanager_lag4Xfed	0.012
	(0.008)
Pctfemtopmanager_lag5Xfed	-0.010
	(0.008)
Constant	0.051***
	(0.017)
Observations	121467
Number of Firms	22885
Adjusted R-squared	0.021

Note: The model includes the full set of firm controls, year dummies and industry-specific trends as listed in the last column of Table 2. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel B: Implied Marginal Effects

	Implied Effect on Pctfemmidmanager	
	For Fed=0 Firms	For Fed=1 Firms
Pctfemtopmanager	0.025***	0.007
	(0.008)	(0.007)
Pctfemtopmanager_lag1	0.018***	0.032***
	(0.006)	(0.007)
Pctfemtopmanager_lag2	0.019***	0.019***
	(0.006)	(0.006)
Pctfemtopmanager_lag3	0.005	0.015**
	(0.006)	(0.006)
Pctfemtopmanager_lag4	0.006	0.017***
	(0.006)	(0.006)
Pctfemtopmanager_lag5	0.012*	0.002
	(0.006)	(0.006)
Six-year Cumulative Effect	0.085***	0.091***
	(0.014)	(0.013)
(Six-year Effect for Fed=1 Firms) – (Six-year Effect for Fed=0 firms)	0.007	
	(0.007)	

TABLE 4: How the Relationship Between Percentage of Female Middle Managers and Lagged Percentage of Female Top Managers Varies by Industry (Fixed Effects Regressions by Industry)

	Dependent Variable: Pctfemmidmanager								
	agriculture	mining	construction	manufacturing	transportation	wholesale	retail	finance	service
Pctfemtopmanager	-0.087	0.032	0.067**	0.000	0.006	-0.024	0.010	-0.007	0.044***
	(0.077)	(0.036)	(0.028)	(0.012)	(0.020)	(0.016)	(0.013)	(0.014)	(0.012)
Pctfemtopmanager_lag1	-0.067	0.002	0.066**	0.007	0.012	0.054***	0.014	0.050***	0.023**
	(0.064)	(0.024)	(0.026)	(0.009)	(0.018)	(0.013)	(0.011)	(0.011)	(0.009)
Pctfemtopmanager_lag2	-0.064	-0.002	0.001	0.022**	0.031*	0.020	0.021**	0.006	0.022**
	(0.048)	(0.020)	(0.026)	(0.009)	(0.019)	(0.012)	(0.011)	(0.010)	(0.009)
Pctfemtopmanager_lag3	0.014	-0.031	0.031	0.028**	-0.001	-0.000	-0.003	0.017*	0.003
	(0.043)	(0.026)	(0.020)	(0.011)	(0.019)	(0.013)	(0.010)	(0.009)	(0.009)
Pctfemtopmanager_lag4	0.144	0.010	-0.003	0.010	-0.013	0.035***	-0.003	0.024**	0.007
	(0.110)	(0.023)	(0.020)	(0.009)	(0.019)	(0.013)	(0.010)	(0.010)	(0.008)
Pctfemtopmanager_lag5	0.181	0.022	-0.009	0.020**	0.000	0.007	-0.003	0.007	0.004
	(0.118)	(0.025)	(0.029)	(0.009)	(0.016)	(0.014)	(0.010)	(0.010)	(0.008)
Constant	-0.489***	-0.140**	0.061	-0.106***	-0.066	-0.106**	0.052	0.208***	0.214***
	(0.183)	(0.054)	(0.060)	(0.028)	(0.048)	(0.042)	(0.062)	(0.060)	(0.039)
Six-year Cumulative	0.122	0.033	0.153**	0.087***	0.036	0.092***	0.036	0.097***	0.103***
Effect	(0.206)	(0.055)	(0.068)	(0.028)	(0.047)	(0.036)	(0.030)	(0.030)	(0.026)
Observations	735	1114	2921	34293	6912	11061	12374	18496	33561
Adjusted R-squared	0.093	0.069	0.047	0.024	0.028	0.034	0.060	0.028	0.010
Number of Firms	129	198	562	6235	1324	1999	2339	3491	6608

Note: Each model includes the full set of firm controls, year dummies and industry-specific trends as listed in the last column of Table 2. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 5: How the Relationship Between Percentage of Female Middle Managers and Lagged Percentage of Female Top Managers Varies by Percentage of Female Nonmanagers (Fixed Effects Estimates)

Panel A: Regression Estimates

	Dependent Variable: Pctfemmidmanager
Pctfemtopmanager	0.014
	(0.010)
Pctfemtopmanager_lag1	0.014
	(0.009)
Pctfemtopmanager_lag2	0.030***
	(0.008)
Pctfemtopmanager_lag3	0.011
	(0.008)
Pctfemtopmanager_lag4	0.007
	(0.008)
Pctfemtopmanager_lag5	0.003
	(0.009)
PctfemtopmXpctfemnonm	0.006
	(0.021)
Pctfemtopm_lag1Xpctfemnonm	0.018
	(0.018)
Pctfemtopm_lag2Xpctfemnonm	-0.019
	(0.017)
Pctfemtopm_lag3Xpctfemnonm	-0.003
	(0.016)
Pctfemtopm_lag4Xpctfemnonm	0.006
	(0.015)
Pctfemtopm_lag5Xpctfemnonm	0.009
	(0.016)
Constant	0.052***
	(0.017)
Observations	121467
Number of Firms	22885
Adjusted R-squared	0.021

Note: The model includes the full set of firm controls, year dummies and industry-specific trends as listed in the last column of Table 2. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel B: Implied Marginal Effects

	Implied Effect on Pctfemmidmanager at Different Values of Pctfemnonmanager						
Pctfemnonmanager =	*0.05*	*0.10*	*0.25*	*0.50*	*0.75*	*0.90*	*0.95*
Pctfemtopmanager	0.014	0.014*	0.016**	0.017***	0.019**	0.019*	0.020
	0.010	0.009	0.007	0.006	0.009	0.012	0.013
Pctfemtopmanager_lag1	0.015	0.016**	0.019***	0.024***	0.028***	0.031***	0.032***
	(0.008)	(0.007)	(0.005)	(0.005)	(0.007)	(0.009)	(0.010)
Pctfemtopmanager_lag2	0.029***	0.028***	0.025***	0.020***	0.015**	0.013	0.012
	(0.008)	(0.007)	(0.005)	(0.004)	(0.007)	(0.009)	(0.010)
Pctfemtopmanager_lag3	0.011	0.011	0.010*	0.009**	0.009	0.008	0.008
	(0.007)	(0.007)	(0.005)	(0.004)	(0.007)	(0.009)	(0.009)
Pctfemtopmanager_lag4	0.008	0.008	0.009*	0.010**	0.012**	0.013*	0.013
	(0.007)	(0.007)	(0.005)	(0.)004	(0.006)	(0.008)	(0.008)
Pctfemtopmanager_lag5	0.003	0.004	0.005	0.007*	0.010	0.011	0.011
	(0.008)	(0.007)	(0.006)	(0.004)	(0.006)	(0.008)	(0.009)
Five-year Cumulative	0.080***	0.081***	0.083***	0.088***	0.092***	0.095***	0.095***
Effect	(0.020)	(0.018)	(0.014)	(0.013)	(0.018)	(0.024)	(0.025)

TABLE 6: Percentage of Female Top Managers and Percentage of Female Middle Managers, Means By Race and Year

PANEL A: Percentage of Female Top Managers

Year	Pctfemtopmanagr	Pctwhitefemtopmanagr	Pctblkfemtopmanagr	Pcthispfemtopmanagr	Pctasianfemtopmanagr	Pctindianfemtopmanaer
1990	0.255	0.233	0.010	0.006	0.004	0.001
1991	0.261	0.239	0.010	0.007	0.005	0.001
1992	0.268	0.244	0.011	0.007	0.005	0.001
1993	0.277	0.251	0.012	0.007	0.006	0.001
1994	0.282	0.255	0.012	0.007	0.006	0.001
1995	0.287	0.259	0.013	0.008	0.006	0.001
1996	0.291	0.262	0.014	0.008	0.007	0.001
1997	0.298	0.267	0.014	0.009	0.007	0.001
1998	0.303	0.271	0.015	0.009	0.007	0.001
1999	0.310	0.273	0.017	0.010	0.008	0.001
2000	0.317	0.279	0.017	0.011	0.009	0.001
2001	0.324	0.285	0.017	0.012	0.009	0.001
2002	0.330	0.290	0.017	0.012	0.009	0.001
2003	0.338	0.297	0.018	0.012	0.010	0.001

Note: N = 315,530.

PANEL B: Percentage of Female Middle Managers

Year	Pctfemmidmanagr	Pctwhitefemmidmanagr	Pctblkfemmidmanagr	Pcthispfemmidangr	Pctasianfemmidmngr	Pctindianfemmidmnger
1990	0.283	0.252	0.015	0.010	0.004	0.001
1991	0.291	0.258	0.017	0.010	0.005	0.001
1992	0.299	0.266	0.017	0.010	0.005	0.001
1993	0.302	0.269	0.017	0.010	0.005	0.001
1994	0.305	0.270	0.018	0.011	0.005	0.001
1995	0.309	0.269	0.021	0.012	0.005	0.001
1996	0.313	0.274	0.020	0.012	0.006	0.001
1997	0.317	0.275	0.021	0.013	0.006	0.001
1998	0.320	0.277	0.022	0.013	0.006	0.001
1999	0.327	0.281	0.024	0.015	0.007	0.002
2000	0.334	0.285	0.025	0.016	0.007	0.002
2001	0.337	0.286	0.026	0.017	0.008	0.001
2002	0.342	0.289	0.027	0.017	0.007	0.001
2003	0.348	0.295	0.026	0.018	0.008	0.002

Note: N = 315,530.

Table 7: Within-Race Relationships Between the Percentage of Female Middle Managers and Lagged Percentage of Female Top Managers (Fixed Effects Estimates)

Panel A: White Women

	Dependent Variable: Pctwhitefemmidmanager
Pctwhitefemtopmanager	0.004
	(0.006)
Pctwhitefemtopmanager_lag1	0.024***
	(0.005)
Pctwhitefemtopmanager_lag2	0.027***
	(0.005)
Pctwhitefemtopmanager_lag3	0.012***
	(0.005)
Pctwhitefemtopmanager_lag4	0.005
	(0.004)
Pctwhitefemtopmanager_lag5	0.003
	(0.005)
Constant	0.088***
	(0.017)
Observations	123050
Number of Firms	23045
Adjusted R-squared	0.012

PANEL B: Black Women

	Dependent Variable: Pctblkfemmidmanager
Pctblkfemtopmanager	-0.077***
	(0.026)
Pctblkfemtopmanager_lag1	0.022*
	(0.012)
Pctblkfemtopmanager_lag2	0.011
	(0.010)
Pctblkfemtopmanager_lag3	0.005
	(0.012)
Pctblkfemtopmanager_lag4	0.002
	(0.011)
Pctblkfemtopmanager_lag5	0.034**
	(0.014)
Constant	-0.020***
	(0.005)
Observations	123050
Number of Firms	23045
Adjusted R-squared	0.036

PANEL C: Hispanic women

	Dependent Variable: Pcthispfemmidmanager
Pcthispfemtopmanager	-0.059***
	(0.016)
Pcthispfemtopmanager_lag1	0.007
	(0.013)
Pcthispfemtopmanager_lag2	0.027*
	(0.016)
Pcthispfemtopmanager_lag3	0.016
	(0.012)
Pcthispfemtopmanager_lag4	0.006
	(0.016)
Pcthispfemtopmanager_lag5	-0.005
	(0.014)
Constant	-0.010**
	(0.004)
Observations	123050
Number of Firms	23045
Adjusted R-squared	0.022

PANEL D: Asian Women

	Dependent Variable: Pctasianfemmidmanager
Pctasianfemtopmanager	-0.044**
	(0.018)
Pctasianfemtopmanager_lag1	0.021
	(0.013)
Pctasianfemtopmanager_lag2	0.011
	(0.010)
Pctasianfemtopmanager_lag3	-0.002
	(0.014)
Pctasianfemtopmanager_lag4	0.011
	(0.010)
Pctasianfemtopmanager_lag5	0.016*
	(0.009)
Constant	-0.003
	(0.002)
Observations	123050
Number of Firms	23045
Adjusted R-squared	0.005

PANEL E: Native American Women

	Dependent Variable: Pctindianfemmidmanager
Pctindianfemtopmanager	0.022
	(0.060)
Pctindianfemtopmanager_lag1	-0.006
	(0.023)
Pctindianfemtopmanager_lag2	0.032
	(0.041)
Pctindianfemtopmanager_lag3	0.006
	(0.023)
Pctindianfemtopmanager_lag4	-0.006
	(0.030)
Pctindianfemtopmanager_lag5	0.019
	(0.020)
Constant	0.002
	(0.001)
Observations	123050
Number of Firms	23045
Adjusted R-squared	0.001

Note: All models include the full set of firm controls and year dummies as listed in the last column of Table 2. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.