New Evidence on Gender Differences in Promotion Rates: An Empirical Analysis of a Sample of New Hires

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Using a large sample of establishments drawn from the Multi-City Study of Urban Inequality employer survey, we studied gender differences in promotion rates and in the wage gains attached to promotions. Several unique features of our data distinguish our analysis from the previous literature on this topic. First, we have information on the wage increases attached to promotions, and relatively few studies on gender differences have considered promotions and wage increases together. Second, our data include job-specific worker performance ratings, allowing us to control for performance and ability more precisely than through commonly used skill indicators such as educational attainment or tenure. Third, in addition to standard information on occupation and industry, we have data on a number of other firm characteristics, enabling us to control for these variables while still relying on a broad, representative sample, as opposed to a single firm or a similarly narrowly defined population. Our results indicate that women have lower probabilities of promotion and expected promotion than men do but that there is essentially no gender difference in wage growth with or without promotions.

Introduction

MUCH OF THE LITERATURE ON GENDER DIFFERENCES in the labor market concerns wages. A smaller literature focuses on gender differences in job assignment and, specifically, promotions. Ultimately, the two topics are linked, since promotions are typically accompanied by increases in wages. Although an understanding of gender differences in the career experiences of workers in firms requires an empirical analysis that accounts for both promotions and

wages, relatively few studies of gender differences in promotions have also considered gender differences in the wage changes attached to promotion. One reason that the omission of wages is problematic is that the concept of a promotion is quite broad. An observation of equal promotion rates between equally skilled and observationally similar women and men would be misleading if the promotions received by each group differed in quality, with men perhaps receiving the more desirable promotions. We can address this issue to some extent since the wage change attached to a promotion provides some indication of how large a step up the hierarchy a given promotion is, with larger steps usually being accompanied by larger wage increases.[1]

The empirical literature on gender differences in promotions investigates whether equally qualified men and women with similar observable characteristics have the same chances of receiving a promotion or, more generally, of advancing their careers. Studies in this literature differ in terms of the type of data used; some use data from one or a small number of firms or establishments (with data on many or all of the workers employed), and others use samples of workers (generally resulting in no more than one worker per establishment).

This literature has yielded mixed results. Some studies have found that promotion rates are lower for women than for men with similar observed characteristics (Acosta 2005; Cabral, Ferber, and Green 1981; Cannings 1988; Cobb-Clark 2001; McCue 1996; Olson and Becker 1983; Ransom and Oaxaca 2005; Spurr 1990). Others, such as Barnett, Baron, and Stuart (2000), Gerhart and Milkovich (1989), Hersch and Viscusi (1996), Spilerman and Petersen (1999), and Stewart and Gudykunst (1982) have found the reverse. Still other studies have found no significant gender difference in promotion rates. This was the finding in Hartmann (1987), Lewis (1986), Paulin and Mellor (1996), and Powell and Butterfield (1994). Similarly, Giulano, Levine, and Leonard (2005) found no gender difference in promotion rates, using data from a single, large, U.S. retail employer. And, in a longitudinal study of individual educators in Oregon and New York, Eberts and Stone (1985) found that a gender difference favoring men in the early 1970s diminished and became insignificant by the late 1970s, arguing that equal opportunity employment enforcement contributed to the decline. Finally, using personnel data for managerial, administrative, and professional occupations within a construction and engineering company, Petersen and Saporta (2004) found no gender differences in promotion after controlling for individual characteristics, though they found higher promotion

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[1] We do not mean to suggest that job quality differences are described only by wages. A large number of other factors, for example work–life balance, clearly determine the worker's perception of the "quality" of a promotion. Nonetheless, the extent of movement up the hierarchy is an important factor in assessing employers' treatment of observationally similar men and women.

rates for women in the absence of controls. Their evidence also contradicts the notion of a glass ceiling for women, since promotion rates were higher for men at the low end of the hierarchy and higher for women toward the top of the hierarchy.[2]

While many previous studies have considered only promotion probabilities and not the wage increases attached to promotions, several have studied both. McCue (1996) and Olson and Becker (1983) found lower promotion rates for women than for men, but comparable wage increases attached to promotions for the two groups. Gerhart and Milkovich (1989) also found comparable wage increases attached to promotions, though in that study promotion rates were higher for women than for men. Barnett, Baron, and Stuart (2000) and Hersch and Viscusi (1996) found that women had higher promotion rates but men had higher promotion-associated wage increases. Cobb-Clark (2001) found precisely the opposite pattern: men had higher promotion rates but women had higher wage increases attached to promotions.[3] Finally, using a panel of British households, Booth, Francesconi, and Frank (2003) found that after controlling for observed and unobserved worker heterogeneity, women are promoted at roughly the same rate as men but receive smaller wage increases from promotion.

Given the mixed empirical results concerning gender differences in promotions and the limited number of studies that analyze both promotion and compensation, further work in this area remains of interest. Our goal in this paper is to contribute to this literature by analyzing data on promotions and wages for a large sample of recently hired workers spanning many establishments. Our data are of a unique type that has not been used previously in this literature. The sample is from the Multi-City Study of Urban Inequality (MCSUI), a large, cross-sectional survey of employers (establishments) in four metropolitan areas of the United States in the mid-1990s. Many of the survey questions pertain to the establishment's most recently hired worker, including information

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[2] Similar findings of lower female promotion rates at low levels of the job hierarchy but higher promotion rates higher up in the hierarchy are reported by DiPrete (1989; Chapter 9), Lewis (1986), Rosenfeld (1992), Spilerman and Petersen (1999), and Tsui and Gutek (1984).

[3] While these studies used data from the United States, others have investigated gender differences in promotion rates outside the United States. As a whole, the international evidence is somewhat less favorable to women than is the evidence based on U.S. data. Studies finding lower promotion rates for women include Bamberger, Admati-Dvir, and Harel's (1995) study of two Israeli high-tech companies; Pekkarinen and Vartiainen's (2004) analysis of panel data on Finnish metal workers; Sabatier and Carrere's (2005) analysis of academic researchers in France; and Ranson and Reeves' (1996) study of computer professionals in a western Canadian city. Wright, Baxter, and Birkelund (1995) compare the United States, Canada, the UK, Australia, Sweden, Norway, and Japan, concluding that evidence of lower promotion rates for women is weaker in the United States than for the other countries. Also relevant is Winter-Ebmer and Zweimuller's (1997) finding, based on white-collar workers from the Austrian Microcensus, that women have to meet higher ability standards than men to achieve promotions.

on promotions, expected promotions, and wages, as well as measures of worker performance, tenure (i.e., the amount of time that has elapsed between the hiring and survey dates), and detailed worker and firm characteristics.

Several features of the data are particularly appealing for an analysis of gender differences in promotions. First, as mentioned, we have information not only on promotions but on the wage increases attached to promotions, allowing us to consider both in the same study. Second, the data include an extensive set of controls for worker and firm characteristics that are paramount in an analysis of gender differences in promotion rates or in any other labor market outcome. Of particular importance on the worker side are direct measures of productivity or job performance. The available measures in this literature are rarely job specific, and typically the best available proxy is the worker's educational attainment.[4] While we control for education and other worker characteristics, we can also control for performance more completely using numerical job-specific ratings reflecting supervisors' appraisals of worker performance, as well as the same supervisors' rating of the performance of "typical workers" in the same job into which the establishment's most recent worker was hired. This offers an unusual opportunity to control for job-specific worker performance in both an absolute and a relative sense. The data sets used in studies in the promotions literature based on broad, representative samples such as ours lack information on worker performance ratings.[5]

A potential deficiency of the performance ratings, however, is that they might be biased in a way that is correlated with gender. As noted in Blau, Ferber, and Winkler (2006), it has been found that identical papers were given higher ratings by students who believed the authors were male instead of female, and similar findings were reported in studies that asked raters to consider the qualifications of applicants for employment.[6] Bartol (1999) reviews several field and experimental studies of gender bias in performance appraisals, concluding that findings are contradictory, with some studies finding a bias and others finding no bias. Later in the paper we present some evidence that

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[4] In addition to educational attainment, Cobb-Clark (2001) controls for Armed Services Qualifying Test (AFQT) scores in her analysis using the National Longitudinal Survey of Youth (NLSY), though as an overall measure of ability the AFQT score is less directly informative than is a job-specific performance rating.

[5] The performance ratings in this survey have been exploited previously in Neumark (1999) in an analysis of gender and racial differentials in starting wages, though that study did not consider promotions or the wage growth arising from promotions. Neumark found some evidence consistent with employers having worse information about new female than new male employees that may partly explain the lower starting wages paid to women, though he notes that the evidence is not strong from the standpoint of statistical significance.

[6] Further information on gender bias in performance ratings can be found in the studies reviewed in Steinpreis, Anders, and Ritzke (1999) and in Valian (1998).

the gender of the immediate supervisor has no effect on the most recently hired worker's performance rating in the starting job. While this does not prove that the ratings in our data are unbiased, it does at least cast doubt on certain types of gender-related bias. Furthermore, if there is a bias against women in the performance appraisals, this would serve to lower our estimate of the "unexplained" gender gap in performance—yielding a conservative estimate of this difference (at least with respect to this factor).

In addition to the worker performance ratings, a further advantage of the MCSUI for our analysis is that it contains a number of firm characteristics that were unavailable for use as controls in earlier promotion studies. For example, the survey includes an indicator for nonprofit status. Our data show that women are more heavily represented in the nonprofit than in the for-profit sector; the fraction working in the for-profit sector is 74 percent for women versus 87 percent for men. Recent empirical work by DeVaro and Brookshire (2007) documents a pronounced difference in promotion rates between for-profit and nonprofit organizations, with promotions less likely in nonprofits. These considerations suggest that nonprofit status should be controlled in analyses of gender differences in promotion rates. To our knowledge, no prior studies of promotions have had access to data that would allow nonprofit status to be controlled. In addition to nonprofit status, we control for industry, establishment size, number of sites of operation, whether or not the firm is a franchise, and the percentage of workers covered by collective bargaining agreements.

The contribution of an analysis using these data may be illustrated by considering some contrasting studies. McCue (1996) analyzes promotions using the Panel Study of Income Dynamics, and Booth, Francesconi, and Frank (2003) use the British Household Panel Survey. While both data sets are nationally representative panels with detailed worker characteristics, they are thin on firm characteristics.[7] Furthermore, neither of these data sets contains job-specific measures of worker performance. In contrast, case studies of single firms or small numbers of firms are able to control for firm and job characteristics very precisely, but only by restricting the analysis to one or a small number of firms from which it may be difficult to draw general inferences (e.g., Giulano, Levine, and Leonard 2005; Ransom and Oaxaca 2005). Like the studies using broader samples, these single-firm analyses lack individual performance ratings. Our data represent a middle ground that

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[7] Using data on white men and women from the NLSY, Cobb-Clark (2001) controlled for a limited set of firm characteristics (dummies for two firm-size groups, whether the worker is covered by a collective bargaining agreement, whether the employer has multiple locations, and whether the firm is in the public sector).

we see as a useful complement to this literature, particularly given the unique presence of worker performance ratings. We work with a broad, representative sample (though representative of the population of establishments in four major U.S. metropolitan areas rather than a nationally representative sample of workers). At the same time, we are able to control for firm characteristics more precisely than is usually possible with such a broad sample, though inevitably not as precisely as in case studies.

Competing explanations for gender differences in promotion rates may be classified into two broad categories: those that are based on productivity or female preferences for different types of jobs and those that are based on discrimination or broader structural factors. The productivity-/preference-based explanations suggest that outcomes (such as promotion rates) may be less favorable for women than men due to gender differences in productivity or in job-related preferences (e.g., for authority or demanding positions). Productivity differences could arise due to gender differences in schooling and other premarket training as well as labor force attachment. Job-related preferences may be influenced by socialization, among other factors. Gender differences in productivity or job preferences could also arise from the division of labor in the family. For example, Becker (1985) argues that since housework is more effort-intensive than other household activities such as leisure, and since women have historically performed a greater share of housework than men, married women spend less energy on each hour of market work than men working the same number of hours. This yields lower market wages for women and also induces women to economize on energy expended on market work by seeking less demanding jobs. If this explanation is correct, the presence of job-specific performance ratings offers us a unique opportunity to address productivity-related explanations for gender differences in promotion rates.

Theories of gender discrimination based on personal tastes could take the form of prejudice on the part of employers, customers, or coworkers (Becker 1957). In the case of employer-based prejudice, this would imply that supervisors prefer to manage men rather than women. To the extent that this preference is stronger for higher-level positions, gender differences in promotion could result. For example, it could be that many managers prefer women in low-level jobs, but not in managerial ones (Eagly and Karau 2002).

Theories of statistical discrimination, following early work by Phelps (1972) and Arrow (1973), could also yield gender differences in promotions or wage growth even in the absence of personal prejudice. In such models, employers facing imperfect information about worker productivity rely on certain group characteristics (such as gender) as signals of individual productivity. Lazear and Rosen (1990) offer one such story that gives rise to gender discrimination in promotions. In their model, the employer rationally discriminates against

women because gender is correlated with some unobserved factor (such as one's productivity in nonmarket work, which is assumed to be higher for women than for men) that is relevant to promotions and thereby serves as a signal to the employer.

Either the productivity/preferences or discrimination explanations could lead to promotion differences that are associated with differences in the types of jobs men and women hold. As we have seen, Becker (1985) provides a rationale for women to prefer less demanding jobs. And, models of statistical discrimination suggest that employers may prefer not to hire women for jobs that typically have long promotion ladders.[8] Thus, we explicitly investigate the extent to which differences in occupation can explain the residual gender gap in promotion rates. As is well known, the distribution of employment across occupations is quite different for women versus men. If women are more heavily concentrated in occupations with lower promotion rates, this could potentially account for the gender difference in promotions. It is also possible that gender differences in firm characteristics are important for understanding promotion differences. While previous analyses have explored the role of occupation, our data contain information on firm characteristics that have not been available in earlier studies, so it is interesting to see the incremental value of these firm characteristics in explaining the gender gap in promotions. As noted above, one possibility is that women are more heavily represented in the nonprofit sector where promotion rates tend to be lower.

While it is not possible to ascertain whether gender differences in occupation distributions and firm characteristics are due to personal preferences, discrimination, or a combination of the two, it is still of interest to learn the extent to which they constitute the *mechanism* generating observed gender differences in promotion rates. Furthermore, the sociology literature emphasizes the importance of sex segregation as a causal mechanism that induces other gender differences in careers (Reskin and Bielby 2005). As noted in Reskin and Bielby (pp. 71–72), "By concentrating men and women in different jobs, segregation exposes them to more or less similar employment practices and reward systems that can, in turn, exacerbate or moderate sex differences in other work outcomes." More generally, sociologists point out that "structural roles in which individuals find themselves affect their tastes, outlooks, power, social networks, and group loyalties in ways that could not have been anticipated in advance" (England and Farkas 1994, p. 345). To some extent then the

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[8] There is evidence from the sociology literature that longer job ladders tend to be found in jobs and firms that are predominantly male (Petersen and Saporta 2004, p. 877), and that the step sizes between levels of the promotional hierarchy are larger for jobs that are predominantly male, implying that promotions yield greater advancement for men than women (Barnett, Baron, and Stuart 2000).

occupation and industry variables may capture some of these effects. More-over, it is likely that the unexplained component of the gender gap in our promotion models reflects the impact of such structural factors as well as the impact of discrimination and other unmeasured factors. An unexplained component of the gender promotion gap, even in models such as ours that control for reported job-specific worker productivity, is consistent with Granovetter's (1994, p. 207) observation that "Even if productivity were easily gauged, promotions often result from motives or causes not clearly related to it, but easily understandable when relevant social structures and motives are analyzed."

A potential limitation of our analysis, as with most other analyses of promotions, is that the empirical definition of a promotion is broad, so that a promotion might mean something different for men than for women. The data are not sufficiently rich to rule out this possibility. While we can observe the wage differences arising from promotions, it might be that promotions differ in some other respect (such as prestige) than the compensation attached to jobs. Another limitation is that our analysis is restricted to one worker per establishment, in particular the most recently hired worker. Ideal data would contain multiple workers per establishment with longer average job tenures than experienced by our sample of recent hires. Furthermore, while we can control for worker characteristics and occupation, we do not observe the hierarchy of jobs in these establishments. For each establishment we observe only a "slice" of the hierarchy, namely the position into which a worker was hired and the position into which s/he has been or could potentially be promoted.

Data: MCSUI

We use data from the MCSUI, a cross-sectional employer telephone survey collected between 1992 and 1995. There are 3510 establishments in the data, and the sampling universe consists of four metropolitan areas: Atlanta, Boston, Detroit, and Los Angeles. The survey respondent was the owner in 14.5 percent of the cases, the manager or supervisor in 42 percent, a personnel department official in 31.5 percent, and someone else in 12 percent. Screening identified a respondent who actually carried out hiring for the relevant position, and the survey instrument took 30–45 minutes to administer on the telephone, with an overall response rate of 67 percent. For more information about the data, see Holzer (1996). Our analysis is based on the entire sample, except for seventeen cases we deleted in agriculture, forestry, and fishing.

Data were collected in two subsamples and then merged to produce the final release. The first subsample, covering slightly less than two-thirds of

the cases, was drawn from regional employment directories provided by Survey Sampling, Inc. based on local telephone directories. This subsample (called the SSI sample) was stratified by establishment size (25 percent one to nineteen employees, 50 percent twenty to ninety-nine employees, 25 percent one hundred or more employees) and was designed to be self-weighting. It was restricted to employers who had hired a worker within the previous 3 years for a position that did not require a college degree. The second subsample was drawn from the current or most recent employer reported by respondents in the companion MCSUI household survey, which over-sampled low-income areas and areas with high concentrations of racial minorities. This subsample is *not* restricted to jobs not requiring a college degree. Sampling weights adjust for all of these considerations, and we use these weights throughout our study.[9]

A substantial fraction of survey questions asks about the most recently hired worker, and these questions form the basis for the empirical analysis. The survey asks whether the most recently hired worker has been promoted by the survey date, and the employer's response to this question is the main dependent variable in the first part of our analysis. We also present results using a measure of expected promotion as the dependent variable, in particular the employer's answer to whether or not the most recently hired worker is expected to be promoted within the next 5 years (regardless of whether a promotion was received by the survey date). The MCSUI data also contain a number of variables measuring wages and the wage growth attached to promotions. Four variables pertain to the wages of the most recently hired worker: starting wage, current wage at the time of the survey, wage the employee is expected to receive if promoted, and highest wage an employee in this position (the one into which the most recent worker was hired) could attain without a promotion.[10] The reported time frames for these wage questions were either hourly, weekly, monthly, or annually, and we converted all responses to hourly wages measured in 1990 dollars, deflated using the CPI-UX. The second part of our analysis uses three dependent variables that we construct from these four wage questions, as explained in the next section.

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[9] As stated in the codebook, "[the weights] make use of the link to the MCSUI household file, for those firms that were sampled in this manner, thereby taking account of the household sampling structure and response rates. They also adjust for the fact that the Boston and Los Angeles firm samples were incomplete, and the fact that the SSI sample deliberately omits jobs that require college degrees . . . When the observations in the employer database are weighted by this variable the result should be a representative sample of firms, such as would occur if a random sample of employed people were drawn from each city" (see Holzer et al. [1998], p. 98.).

[10] The questions are as follows: "What is the actual starting wage/salary?"; "What is his/her current wage/salary?"; "What is the highest wage or salary that any employee in this position could expect to be paid without promotion?"; "If promoted, what would this employee's wage or salary be?"

Methods

Our analysis consists of two main parts. In the first part, we estimate probit models for the probability of promotion. In addition, we report results for the probability of expected promotion, though we consider the results regarding received promotions to be of greater interest since they reflect actual, observed outcomes as opposed to subjective expectations about the future. Our goal here is to analyze the extent to which (1) reported productivity and (2) observable characteristics (i.e., occupation and type of firm) account for any observed gender difference in promotions, when controlling for other measured worker characteristics. We thus report how the gender effect in models of promotion probability changes across a variety of specifications. We begin with a baseline specification that includes only sex, race, age and age^2, tenure and tenure^2, and educational attainment as explanatory variables. We then consider four extensions of the baseline: (1) adding only job-specific worker performance ratings, (2) adding performance ratings and occupation controls, (3) adding performance ratings and firm characteristics (including industry controls), (4) adding performance ratings, occupation controls, and firm characteristics. The second part of our analysis concerns wage growth since entering the establishment (focusing on the impact of promotion), potential within-job wage growth in the absence of a promotion, and the expected wage growth attached to expected promotions. Finally, we test one possible source of gender discrimination in promotions by using information on the gender of the most recently hired worker's immediate supervisor. We explain our methods in more detail in the following subsections.

We acknowledge that some of the variables we use as controls in our analyses might be considered endogenous, and in particular might be affected by differences in employers' treatment of equally qualified men and women. We have already considered this issue for the performance appraisal variables. Another example would be tenure, the amount of time that has elapsed between the hiring date and the survey date, which could reflect gender differences in involuntary terminations, ceteris paribus, or be influenced by worker responses to perceived differences in treatment at the firm. Also, gender differences in occupations or firm types could be due in part to gender discrimination. As noted above, to the extent such variables are influenced by labor market discrimination, controlling for them could downward bias our estimate of discrimination—the unexplained gender gap in promotions. At the same time, the unexplained gap may in part be due to the impact of unmeasured characteristics related to the productivity or preferences of men and women; an example would be differences between men and women in their preferences for various types of work or for degrees of authority within

an organization. In this case, our estimate of discrimination could be biased upward. These considerations suggest caution in interpreting the unexplained gender gap in promotion as an estimate of discrimination.

Probability of Promotion. We estimate probit models for the probabilities of promotion (and expected promotion), focusing on how the gender coefficient changes across specifications that include various combinations of the following control variables: age (and age^2), race, tenure (and tenure^2), educational attainment, job-specific performance ratings, occupation and industry controls, establishment size, number of sites of operation, for-profit status, percentage of workers covered by collective bargaining agreement, and whether establishment is a franchise. These variables are defined in Table 1.[11]

Specification 1 includes only the baseline controls (age, age^2, tenure, tenure^2, race, and educational attainment). As we shall see in the next section, a statistically significant gender gap in promotion rates (favoring men) is found in the baseline model and also unconditionally. A potential explanation for the lower promotion rate of women is that the gender difference reflects productivity differences between men and women. While the baseline specification includes the productivity proxies like education and tenure generally used in analyses of this kind, an attractive and unique feature of the MCSUI is that it includes job-specific worker performance ratings. Specification 2 adds these performance ratings to the baseline controls from specification 1. We then address "location-based" explanations for gender differences in promotions. To more precisely identify the role of gender differences in employment by occupation versus firm, in specification 3 we first add only occupation controls along with performance ratings to the baseline model; in specification 4 we then add only firm characteristics to the baseline and (reported) worker productivity controls. Finally, in specification 5 we include baseline controls, performance ratings, occupation controls, and firm characteristics.

As noted above, we also repeat the analyses described above using "expected promotion" as a dependent variable. We are inclined to put less weight on these results since they relate to expectations regarding promotion, which may or may not be realized. However, they do provide interesting supplementary information, especially in light of the focus in the data set on recently hired workers.

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[11] One relevant variable that is not contained in the MCSUI is the worker's employment experience prior to entering the firm. While we do not observe this variable, we do control for tenure with the firm. More importantly, we control for the worker's job-specific performance in addition to educational attainment. Since prior work experience would be included in a promotion equation mainly to capture a worker's skills and ability, it might be argued that it is unnecessary when a direct measure of prepromotion performance is available.

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TABLE 1

VARIABLE DEFINITION

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Group	Name	Definition and comments
Baseline controls	Tenure	Length of time worker has been with firm, measured in weeks in the survey and converted to years in the regression analysis
	Tenure^2	
	Age	Age as of the survey date and measured in years
	Age^2	
	Black	Dummy equaling 1 if worker is black
	Hispanic	Dummy equaling 1 if worker is Hispanic
	Other non-white	Dummy equaling 1 if worker is neither black, white, nor Hispanic
	Less than high school*	Dummy equaling 1 if worker has less than a high school degree
	High school	Dummy equaling 1 if highest education level is a high school degree (omitted category)
	More than high school	Dummy equaling 1 if worker has more than HS degree but less than a college degree
	College degree or more	Dummy equaling 1 if worker has a college degree or more
Job-specific worker performance ratings	Performance of most recent hire in starting job	"On a scale of 0–100 where 50 is average and 100 is the best score, how would you rate this employee's performance in this job?" (the job into which the worker was hired)
	Performance of typical worker in that same job	"On a scale of 0–100, how would you rate the typical employee's performance in this job?"

Occupation controls (10)	1. Managerial	Includes executive, administrative, and managerial occupations
	2. Scientists, engineers, doctors, lawyers	Includes engineers, surveyors, and architects; natural scientists and mathematicians; social scientists, religious workers, lawyers; health diagnosing and treating practitioners
	3. Teachers, librarians, counselors	Also includes writers, artists, entertainers, and athletes
	4. RNs, pharmacists, and dieticians	Also includes therapists and physicians' assistants
	5. Technologists and technicians	Both "health" and "non-health"
	6. Marketing and sales occupations	
	7. Administrative support Occupations, including clerical	(omitted category)
	8. Service occupations	
	9. Craft, construction, and transportation occupations	Includes mechanics and repairers; construction and extractive occupations; precision production occupations; transportation and material moving occupations
	10. Production workers and laborers	Includes handlers, equipment cleaners, helpers and laborers
Firm characteristics (including industry controls)	For-profit	Dummy equaling 1 if establishment is for-profit
	Franchise	Dummy equaling 1 if establishment is a franchise
	Number of sites	Number of sites of operation for the firm
	Establishment size	
	Union	Percentage of workers at establishment covered by collective bargaining agreement
	Industry controls (8)	Services, manufacturing (omitted category), retail trade, wholesale trade, finance, transportation, construction and mining, public administration

*This category includes 35 workers who completed only the eighth grade, 160 who attended some high school, and 8 who completed a GED.

Analysis of Wages. We consider three dependent variables pertaining to wages, derived from the four wage variables described in the previous section: wage growth since entering the firm, within-job wage growth attainable in the starting position without a promotion, and expected wage growth attached to expected promotion. We estimate ordinary least square (OLS) regressions for each of our three dependent variables, using the entire set of controls. Our wage dependent variables are defined as follows:

1. wage growth since entering the firm $\equiv$ ln(current wage) – ln(starting wage)

2. within-job wage growth attainable in the starting position without a promotion $\equiv$ ln(highest wage attainable in starting position without a promotion) – ln(starting wage)

3. expected wage growth attached to expected promotion $\equiv$ ln(expected wage the worker will receive if promoted from the starting position) – ln(current wage)

In the regression for the first of these dependent variables, of principal interest is the coefficient on the dummy variable indicating whether the worker has already received a promotion by the survey date. This parameter provides information about the average additional wage growth associated with having been promoted as compared with not having been promoted. A potential problem with this interpretation is that obviously, individuals who have been promoted may differ from those with similar measured characteristics who have not been promoted. If they are, for example, a positively selected group, they may have earned more than otherwise similar individual even if they had not received a promotion. Unfortunately, we lack a variable that could identify a simultaneous model of promotions and wage determination. While we acknowledge that it may not be possible to give a causal interpretation to the coefficient on a promotion indicator in an OLS wage regression, the estimated return to promotion does yield interesting descriptive information, which is at least suggestive of the extent of gender differences in returns to promotion.[12]

The second of these dependent variables, potential within-job wage growth, is interesting because the consequences of not getting promoted may differ

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[12] Another issue is that the data do not indicate how many promotions the worker has received since being hired. So if some workers have been promoted more than once since the starting date, the estimated promotion effect will overestimate the average wage increase associated with a single promotion. However, since the sample is one of recent hires, only 9 percent of whom have been promoted by the survey date, we think this is unlikely to be a serious problem; few of these workers will have had time to be promoted more than once since the hiring date.

between men and women. For example, one possibility is that higher promotion rates for men are counterbalanced by higher rates of anticipated within-job wage growth for women. It is therefore important to consider expected wage growth in the absence of promotions in addition to the wage growth attached to received and expected promotions. The wording of the question pertaining to the "highest wage attainable without a promotion" refers to "any employee in this position" rather than to the specific individual. On the one hand, a positive feature of this wording is that this information is available for all workers, whether or not they have been promoted. On the other hand, a potential measurement problem is that it is not necessarily the case that the focal worker (i.e., the most recent hire) would have achieved the indicated wage. So, for example, suppose the most recent hire is female and that the establishment engages in wage discrimination against women. The highest wage that this worker could receive in her starting position is unobserved in the data, and the answer the respondent reports as the highest wage attainable in that position could pertain to the maximum a male could expect to receive in the same position. In light of this issue, the results based on this dependent variable should be interpreted cautiously. If it is true that the "highest wage attainable" in the position is more likely to be defined by what a male could attain than by what a female could attain, this would cause us to underestimate gender differences in compensation.

We define the third dependent variable, expected wage increase attached to expected promotion, only for those workers for whom a promotion is expected, estimating the model only for these workers.[13] For this regression, we also report a specification that includes the promotion dummy on the right-hand side as a control.

A theoretical model based on "sticky floors" was proposed in recent work by Booth, Francesconi, and Frank (2003). The term "sticky floors" refers to the situation in which women are promoted as often as men but receive lower wage gains attached to the promotion. In firms with formal wage scales, women remain stuck to the lower wage levels on the wage scale of their new, higher job grade following promotion. This can arise either due to women's inferior market alternatives or to less favorable responses on the part of their employer to bids for their services from outside employers. The authors found evidence consistent with their model's main predictions, using panel data spanning the years 1991–1995 from the British Household Panel Survey.

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[13] If we also include those workers for which a future promotion was not expected but an actual promotion had already been received—defining the "wage change attached to promotion" as the log difference between the current (postpromotion) wage and the starting (prepromotion) wage—we add only eight observations to the male regression and nine observations to the female regression, and the results are virtually unchanged.

Since we also address wage increases attached to promotion in our study, we will also evaluate the "sticky floors" hypothesis on our sample of promotion decisions for recent hires in establishments in four American metropolitan areas.

Gender Discrimination Arising from Employer Prejudice. In both the promotion analysis and the wage analysis, the set of control variables is extensive and includes job-specific performance ratings to capture (reported) worker productivity in a more detailed way than is possible with the usual controls for educational attainment. This raises the question of how remaining gender differences in promotions or wage growth should be interpreted. One conventional interpretation is that the residual gender gap is due to discrimination. However, as noted above, in this as in other similar analyses, such differences in promotions (or wage growth) could reflect unobserved differences between men and women that are correlated with promotions. While our data do not allow us to decompose the unexplained promotion difference into the part due to discrimination and the part due to unobserved heterogeneity, some indirect evidence allows us to speculate about the nature of the gender discrimination that might be present in promotion decisions.

The MCSUI data contain information allowing us to investigate the possibility of gender discrimination based on personal prejudice on the part of the employer. We observe the gender of the most recently hired worker's immediate supervisor, who likely exerts strong influence on this worker's promotion prospects if not determining them entirely. We define the following dummy variable:

> *Male supervisor*: dummy equaling 1 if the most recently hired worker's immediate supervisor in the starting job is male, and 0 otherwise.

We include this variable and its interaction with the *male* dummy variable in the probit models for promotion and expected promotion. Taste-based discrimination against women (such that male supervisors tend to under-promote women relative to men) would imply a negative coefficient on *male supervisor*, and a positive coefficient on (*male × male supervisor*).[14] In our wage models (which are estimated separately for men and women) we include the *male supervisor* dummy as a control and report its coefficient. Widespread

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[14] Note that the key expectation would be a positive coefficient on (*male × male supervisor*) since the main effect of *male supervisor* could be influenced by the propensity of male versus female supervisors to promote in general. So for example, if male supervisors tend to be present in work settings where positions have longer job ladders associated with them, both men and women might have higher promotion rates when they have a male supervisor. However, in the presence of gender discrimination, the interaction of male and male supervisor is expected to be positive.

discrimination based on personal prejudice on the part of the employer should imply a negative and statistically significant coefficient when this dummy is included in the equations for women.[15]

Of course, the foregoing assumes that female supervisors do not discriminate against their female subordinates in promotion decisions and wage decisions. A theory that is at odds with this assumption is the "queen bee syndrome," as defined by Staines, Tavris, and Jayaratne (1974). According to this view, women who are individually successful in male-dominated environments and attain positions of high status are more likely to endorse gender stereotypes. That is, they tend to view the women they supervise as competitors and possess negative attitudes toward them, making them more likely to discriminate against these female subordinates. However, the empirical analysis in Terborg et al. (1977) suggests that women with higher education levels hold the most favorable attitudes toward female managers. If one's level in a promotional hierarchy is an increasing function of education, then these results are in conflict with the queen bee syndrome. From the perspective of our analysis, if women as well as men discriminate against women, then women's adverse promotion or wage outcomes may not be associated with supervisor gender, but this finding would not necessarily imply that there was no employer discrimination against women. Moreover, it is worth emphasizing that this exercise is only pertinent to taste-based theories of discrimination in which the prejudicial views are held by the employer, and not to prejudice by customers or coworkers or due to statistical discrimination.

Empirical Results

Summary statistics for all variables in our analysis are displayed in Table 2 for the subsamples of males and females. The fraction of males in the sample is 48 percent. This is significantly lower than the fraction of males in the working population. But recall that the survey is a random sample of recent hires (one per establishment), not a random sample of workers. Given this sampling scheme, if we consider the gender of the most recently hired worker it is not surprising that this worker is roughly equally likely to be a man as a woman. The fact that the fraction of female workers is higher in our sample than in the working population does not present problems for our analysis, since our goal in this paper is to compare differences in employer behavior toward women and men in a sample of new hires spanning many establishments.

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[15] We again note that, considering the preceding footnote, the stronger prediction would be that the coefficient on male supervisor be larger in the male than in the female equations.

TABLE 2

Weighted Means and Standard Errors

	Male	Female	Difference
Dependent variables			
Promotion since hired	0.106	0.076	0.030*
	(0.014)	(0.011)	(0.017)
Expected promotion in next 5 years	0.688	0.631	0.057*
	(0.023)	(0.024)	(0.033)
Wage growth since entering	0.049	0.041	0.009
establishment[a]	(0.006)	(0.007)	(0.009)
Within-job wage growth without	0.296	0.295	0.002
promotion[a]	(0.016)	(0.014)	(0.021)
Expected wage growth attached	0.266	0.237	0.029
to expected promotions[b]	(0.023)	(0.021)	(0.031)
Worker characteristics			
Tenure (in weeks)	6.494	6.847	−0.353
	(0.553)	(0.485)	(0.735)
Age	31.0	30.7	0.252
	(0.435)	(0.398)	(0.590)
White	0.590	0.688	−0.098**
	(0.026)	(0.020)	(0.033)
Black	0.169	0.151	0.018
	(0.017)	(0.014)	(0.022)
Hispanic	0.163	0.112	0.051**
	(0.020)	(0.013)	(0.024)
Other non-white	0.078	0.049	0.029*
	(0.013)	(0.010)	(0.016)
Performance of most recent hire	78.123	79.888	−1.765*
in starting job (0–100)	(0.838)	(0.612)	(1.037)
Performance of typical worker	74.833	77.404	−2.571**
in that job (0–100)	(0.789)	(0.556)	(0.965)
Less than a high school degree	0.065	0.037	0.028**
	(0.008)	(0.007)	(0.011)
High school degree	0.385	0.336	0.049
	(0.024)	(0.020)	(0.031)
More than a high school degree	0.252	0.316	−0.064**
	(0.019)	(0.022)	(0.029)
College degree or more	0.298	0.312	−0.013
	(0.032)	(0.027)	(0.041)
Occupations			
Managerial	0.094	0.132	−0.038
	(0.021)	(0.023)	(0.031)
Scientists, engineers, doctors, lawyers	0.082	0.023	0.059**
	(0.028)	(0.007)	(0.028)
Teachers, librarians, counselors	0.033	0.110	−0.077**
	(0.009)	(0.023)	(0.024)
RNs, pharmacists, and dieticians	0.013	0.022	−0.009
	(0.011)	(0.006)	(0.012)
Technologists and technicians	0.042	0.037	0.005
	(0.008)	(0.010)	(0.012)

TABLE 2 (cont.)

	Male	Female	Difference
Marketing and sales occupations	0.156	0.131	0.025
	(0.017)	(0.012)	(0.021)
Administrative support	0.135	0.398	−0.264**
occupations, including clerical	(0.017)	(0.022)	(0.028)
Service occupations	0.109	0.085	0.024
	(0.012)	(0.011)	(0.017)
Craft, construction, and	0.189	0.029	0.159**
transportation occupations	(0.017)	(0.006)	(0.018)
Production workers and laborers	0.147	0.032	0.115**
	(0.013)	(0.007)	(0.015)
Firm characteristics			
For-profit status	0.869	0.737	0.132**
	(0.020)	(0.024)	(0.031)
Franchise	0.068	0.074	−0.005
	(0.010)	(0.013)	(0.017)
Number of sites	68.778	66.122	2.656
	(17.099)	(11.585)	(20.647)
Establishment size	1175.282	253.120	922.142
	(924.607)	(26.123)	(924.683)
Union (% covered)	17.052	14.501	2.551
	(2.191)	(2.033)	(2.988)
Industries			
Mining and construction	0.030	0.012	0.019**
	(0.007)	(0.003)	(0.008)
Manufacturing	0.271	0.137	0.134**
	(0.020)	(0.014)	(0.025)
Transportation	0.058	0.044	0.014
	(0.012)	(0.011)	(0.017)
Wholesale trade	0.107	0.072	0.035
	(0.020)	(0.014)	(0.025)
Retail trade	0.179	0.148	0.031
	(0.019)	(0.016)	(0.025)
Finance	0.036	0.089	−0.053**
	(0.007)	(0.011)	(0.014)
Services	0.298	0.485	−0.187**
	(0.028)	(0.024)	(0.037)
Public administration	0.016	0.012	0.004
	(0.006)	(0.005)	(0.008)
Number of observations	820	887	

NOTES: Statistical significance of the difference in means between males and females is denoted by * for the 10-percent level and ** for the 5-percent level.
[a]Calculated on the subsample for which wage change data are available ($n = 628$ for men, $n = 654$ for women) as in the analysis of Table 5.
[b]Calculated on the subsample for which a promotion is expected and wage data are available ($n = 405$ for men, $n = 400$ for women) as in the analysis of Table 6.

The first row of Table 2 reveals that unconditionally, promotion rates are higher for men than for women. The fraction of received promotions is relatively small for both sexes (10.6 percent for men and 7.6 percent for women) because in a sample of recent hires most workers will not have been with the firm long enough to have received a promotion. Nonetheless, the gender difference of 3 percentage points is large in relative magnitude (39.5 percent) and is statistically significant. As seen in the second row, rates of expected promotion are also higher for men than for women, and the fraction of expected promotions is relatively high for both sexes (68.8 percent for men and 63.1 percent for women); recall that the relevant question concerns the expectation of promotion within the relatively long window of the "next 5 years." And, the gender difference of 5.7 percentage points, while also statistically significant, is smaller in relative magnitude (9 percent). With respect to wage growth since starting the job, potential for within-job wage growth in the absence of promotion, and the expected wage growth attached to expected promotions, the means are slightly higher for men, but the differences are not statistically significant.[16]

The male and female subsamples are similar in average age and tenure with the firm. Men are more likely to have less than a high school degree and women are more likely to have some college; the fraction with a college degree or more is similar for men and women. With regard to race and ethnicity, the female workers are more likely than the males to be white and less likely to be Hispanic or "other non-white." The average performance of the most recently hired worker in the starting position is somewhat higher for women than for men, as is the average performance of the typical worker in that position. A potential explanation for the latter result is that establishments for which the most recent hire is female may be more likely to hire women, so that the "typical worker" in the relevant position is likely also to be female. As suggested in our sample and noted earlier in Neumark (1999), women appear to have higher job performance on average than do men.

Focusing on the gender differences in means that are statistically significant, men are more highly represented than women in the following occupational groups: "scientists, engineers, doctors, and lawyers" (by 6 percentage points), "craft, construction, and transportation" (by 16 percentage points), "production workers and laborers" (by 11.5 percentage points), and women are more highly represented than men in "teachers, librarians, counselors" (by 8 percentage

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[16] Wage levels, as opposed to wage growth, are higher for men than for women. The average hourly starting wage was $9.87 for men in our main estimation sample and $9.31 for women, though the difference is statistically insignificant ($t = 0.82$). The average hourly current wage (as of the survey date) was $10.42 for men and $9.56 for women, with the difference in means statistically significant only at the 10-percent level on a one-tailed test ($t = 1.31$). All wages are deflated to 1990 dollars using the CPI-UX.

points) and in "administrative support occupations, including clerical" (by 26 percentage points). Across industries, men are more highly represented in mining and construction (by 2 percentage points) and manufacturing (by 13 percentage points), while women are more highly represented in finance (by 5 percentage points) and services (by 19 percentage points). The only other firm characteristic with a noteworthy gender difference is for-profit status (86.9 percent for men and 73.7 percent for women).

Probability of Promotion. We next ask whether the gender difference in promotion rates observed in the first row of Table 2 persists after controlling for worker and firm characteristics, as well as how it changes across different specifications of control variables. As seen in our baseline specification of the promotion probit (column 1 of Table 3), the difference in the predicted probability of promotion between men and women (evaluating the other covariates at their means) is 2.8 percentage points, virtually the same as the unconditional gender difference in promotion rates in the first row of Table 2.[17] As seen in column 2 of Table 3, in the presence of controls for job-specific worker performance ratings the gender effect actually increases slightly to 3.1 percentage points, remaining significant at the 5-percent level. This result casts some doubt on the hypothesis that women's lower promotion rate in the baseline model is due to lower reported female productivity.

Another potential explanation for the gender difference in promotions is differences in the types of jobs held by women versus men. If women are more heavily concentrated in occupations with lower promotion rates, this could potentially account for the gender differences in promotions. In this event, adding controls for occupation would reduce the magnitude of the gender effect. As seen in column 3, the gender effect decreases only modestly to 2.5 percentage points and remains statistically significant at the 10-percent level. A hypothesis test that the coefficient of male is the same between columns 2 and 3 cannot be rejected ($t = 0.71$).

It is also possible that the gender differences pertain to firm characteristics; we have particularly noted for-profit status as a potentially important gender difference in employment by firm. Comparing columns 2 and 4, we see that the gender effect decreases to 2.5 percentage points in the presence of for-profit status and other firm characteristics, and it remains significant at the

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[17] As in the recent papers by Booth, Francesconi, and Frank (2003) and Giulano, Levine, and Leonard (2005), our analysis pools men and women in a single equation. We have also considered separate promotion equations for men and women, and these results are available upon request. The gender effects of interest that are found by estimating separate promotion models for men and women are qualitatively similar to those we present here.

TABLE 3

Probability of Promotion

	(1)	(2)	(3)	(4)	(5)
Male	0.028	0.031	0.025	0.025	0.022
	(2.21)**	(2.47)**	(1.80)*	(2.25)**	(1.75)*
Black	0.044	0.044	0.042	0.048	0.046
	(1.78)*	(1.84)*	(1.88)*	(2.09)**	(2.13)**
Hispanic	0.015	0.019	0.019	0.028	0.028
	(0.74)	(0.95)	(0.95)	(1.36)	(1.40)
Other non-white	0.098	0.090	0.087	0.078	0.077
	(1.75)*	(1.76)*	(1.91)*	(1.88)*	(2.02)**
Age	−0.230	−0.239	−0.319	−0.174	−0.222
	(0.59)	(0.67)	(0.93)	(0.55)	(0.71)
Age^2	0.347	0.337	0.415	0.274	0.306
	(0.65)	(0.70)	(0.90)	(0.63)	(0.72)
Tenure (in years)	0.357	0.332	0.322	0.287	0.284
	(6.75)**	(6.64)**	(6.72)**	(6.24)**	(6.32)**
Tenure^2	−0.126	−0.118	−0.113	−0.102	−0.099
	(4.16)**	(4.10)**	(3.99)	(4.01)**	(3.94)**
Less than a high school degree	−0.041	−0.039	−0.040	−0.034	−0.036
	(2.84)**	(2.99)**	(3.35)**	(3.11)**	(3.39)**
More than a high school degree	0.004	0.001	0.002	0.001	0.001
	(0.26)	(0.10)	(0.13)	(0.11)	(0.09)
College degree or more	−0.063	−0.064	−0.065	−0.058	−0.060
	(4.55)**	(5.05)**	(4.44)**	(4.70)**	(4.31)**
Performance of most recent hire in starting job (divided by 100)	•	0.208	0.210	0.191	0.195
		(4.43)**	(4.65)**	(4.38)**	(4.61)**
Performance of typical worker in that job (divided by 100)	•	−0.061	−0.061	−0.050	−0.055
		(1.41)	(1.47)	(1.28)	(1.45)
Firm characteristics					
For-profit status	•	•	•	0.037	0.036
				(3.41)**	(3.16)**
Franchise	•	•	•	0.006	0.005
				(0.27)	(0.21)
Number of sites (divided by 1000)	•	•	•	0.004	0.003
				(0.42)	(0.32)
Establishment size (divided by 1000)	•	•	•	−0.006	−0.005
				(1.13)	(0.88)
Union (divided by 100)	•	•	•	−0.031	−0.033
				(1.78)*	(1.93)*
Occupation controls	•	•	10	•	10
Industry controls	•	•	•	8	8
Number of observations			1826		

Note: Entries are probability derivatives evaluated at the means of all variables for continuous variables. For discrete independent variables, cell entries measure the change in predicted probabilities when the dummy independent variable increases from 0 to 1. Z-statistics are in parentheses. * and ** denote statistical significance at the 10-percent and 5-percent levels, respectively.

TABLE 4

PROBABILITY OF EXPECTED PROMOTION

	(1)	(2)	(3)	(4)	(5)
Panel A					
Male	0.054	0.053	0.039	0.032	0.033
	(1.67)*	(1.69)*	(1.12)	(1.05)	(0.99)
Promoted already	•	•	•	•	•
Panel B					
Male	0.045	0.044	0.034	0.023	0.028
	(1.39)	(1.39)	(0.98)	(0.76)	(0.84)
Promoted already	0.288	0.279	0.274	0.258	0.254
	(9.48)**	(8.80)**	(8.38)**	(8.58)**	(8.43)**
Occupation controls	•	•	10	•	10
Industry controls	•	•	•	8	8
Number of observations			1711		

NOTE: Both probits contain the same configurations of control variables as in Table 2. Cell entries are probability derivatives evaluated at the means of all variables for continuous variables. For discrete independent variables, cell entries measure the change in predicted probabilities when the dummy independent variable increases from 0 to 1. Z-statistics are in parentheses. * and ** denote statistical significance at the 10-percent and 5-percent levels, respectively.

5-percent level. However, a hypothesis test that the coefficient of male is the same between columns 2 and 4 cannot be rejected ($t = 0.71$). Finally, if both occupation controls and firm characteristics are included, a comparison of columns 2 and 5 reveals that the gender effect decreases to 2.2 percentage points, achieving significance at the 10-percent level. However, a test of the hypothesis that the male coefficient is the same between columns 2 and 5 cannot be rejected ($t = 0.87$). In summary, neither the job-specific performance ratings nor the occupation controls and firm characteristics change the estimated gender gap in promotions very much.

We also repeated the analysis using "expected promotion" as a dependent variable, though we note that employer views on expected promotion may reflect expectations about differentials in quits and family leave by sex, particularly in this relatively young sample of recent hires. Results for probability of expected promotion are displayed in Table 4. Panel A of Table 4 reports results from models that include the same configurations of explanatory variables as in Table 3. Panel B is the same, except that it also includes a control for whether the most recent hire had already been promoted by the survey date, since whether or not a future promotion is anticipated may plausibly be affected by whether or not one has already been received. We note, however, that if the gender difference in promotions received as of the survey date reflects discrimination, this is held constant in our model of expected promotion that includes received promotions as a control. In any case, the pattern of results in both panels of Table 4 is similar. The probability

of expected promotion is roughly 4 to 5 percentage points higher for men than for women in both the baseline specification and in the specification that adds worker performance ratings. In panel A, these results are statistically significant at the 10-percent level, and that is also the case in panel B if a one-tailed test is used as the criterion for significance. While the absolute gender difference is larger than was the case for actual promotions, the ceteris paribus gender difference is considerably smaller *relative* to the mean. Moreover, unlike our results for actual promotion, the inclusion of either occupation controls or firm characteristics shrinks the gender gap in expected promotions and renders it statistically insignificant in both panels. Thus, there seems to be more support for location-based explanations for the gender gap in expected promotions than there was in Table 3 for received promotions.[18]

Across all specifications in Table 4 the coefficient on the received promotion dummy was positive, statistically significant, and large in magnitude. Other things equal, workers who have already received a promotion by the survey date are more likely (by more than 25 percentage points) to have a promotion expected within the next 5 years. One potential explanation for this is unmeasured worker characteristics such as ability. We think this explanation is unlikely, however, since the magnitude of the effect remains virtually unchanged when worker performance ratings are added to the baseline specification. If unobserved worker ability is the driving force, and if the job-specific performance ratings at least partially capture worker ability (which seems a reasonable assumption), then the magnitude of the coefficient on received promotion should clearly decrease when performance controls are added to the model. An alternative explanation for the finding is that there are unobserved firm and job characteristics such as detailed industry and occupation that are correlated with promotions. This too, however, seems unlikely. If the promotion coefficient is picking up unobserved detailed industry and occupation variables, then the magnitude of the promotion coefficient should change when our (coarser) occupation and industry controls are included in the specification, since the detailed categories are likely correlated with their coarser aggregates. In fact, the promotion coefficient is relatively insensitive to the inclusion of occupation controls or firm characteristics. Another potential explanation is the commonly observed workplace practice of offering promotion "fast tracks." Fast tracks in promotions mean that workers who have been promoted quickly in the past are likely to be promoted quickly again in the future,

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[18] As in our analysis of received promotions, we also considered separate equations for men and women in the analysis of expected promotions. Our results on the gender effect of interest were qualitatively similar to those we report here.

even controlling for performance. A number of theoretical models yield this prediction (Bernhardt 1995; Meyer 1991; Prendergast 1992).[19]

Analysis of Wages. Columns 1 and 3 of Table 5 display regression results for the dependent variable "wage growth since entering the establishment."[20] Of principal interest is the coefficient on the promotion dummy variable, which suggests that for both women and men, promotions are associated with average wage increases of about 7 to 8 percent over the starting wage. The Oaxaca (1973) decompositions in the last row of the table indicate that regardless of whether the male or female weights are used, there is little difference between women and men in the wage growth experienced since the starting date.[21] An interesting result is that worker and firm characteristics matter for female wage growth but not for male wage growth. Focusing on results that achieve statistical significance at the 10-percent level, female wage growth is negatively associated with both tenure and the percentage of employees covered by a collective bargaining agreement, and positively associated with

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[19] Another interpretation of the positive coefficient on received promotions is that some establishments are experiencing and expecting growth, so promotion rates will be higher in the past and future. To address this, following DeVaro and Brookshire (2007) we construct a measure of the monthly net change in employment for each establishment. The survey asked the respondent employer what the net change in the establishment's total number of employees has been since the start of 1992 (or 1993 for a small subset of observations collected by Kirschenman, Moss, and Tilly [KMT] toward the end of the data collection effort). Using the interview dates (which range from June 8, 1992, to March 15, 1995), for each observation we compute a variable called "months" measuring the number of months that elapsed between the start of 1992 (or 1993 for the KMT observations) and the survey date, using the day of the month to compute fractional months. Since no interview dates were recorded for the KMT observations, for these we set the survey dates to March 15, 1995, the midpoint of the data collection period for these observations. We then define a monthly net change measure as follows:

Net change = (net change since start of 1992)/(establishment size × months)

When this variable is included as a control to the specifications in Table 4, Panel B, the coefficient on received promotions remains positive and statistically significant in all cases and roughly the same in magnitude. This suggests that the positive relationship between received and expected promotions reflects more than just differences in monthly employment growth rates across establishments.

[20] The subsamples in this table are smaller than in the promotion analysis of Table 3, due to missing values in the wage variables. Since the primary goal in this paper is to study gender differences in promotion rates, our preferred set of estimates for promotion probabilities are those reported in Table 3 that use all available observations. However, we also checked to see how our main results would change when the models for promotions were estimated on the smaller subsample from the wage analysis. Results are in Appendix Table A2 (descriptive statistics for this smaller subsample are also reported in Appendix Table A1). Given the reduction in the sample size, the gender effects in Table A2 are estimated with lower precision than in Table 3 and sometimes fail to achieve statistical significance at conventional levels. Nonetheless, the Z-statistics always exceed 1. Furthermore, the magnitude of the effect ranges from 2 to 2.6 percentage points, which closely match what we found in Table 3.

[21] As noted above, wage levels, as opposed to wage growth, are higher for men than for women, although not always significantly so.

TABLE 5

Wage Changes from Promotions and Within-Job Wage Growth without Promotions

	Males		Females	
	Wage growth	Within-job wage growth	Wage growth	Within-job wage growth
Worker characteristics				
Tenure (in years)	0.094*	0.027	0.181**	−0.036
	(1.92)	(0.30)	(2.52)	(0.39)
Tenure^2	−0.016	−0.002	−0.143**	−0.023
	(0.42)	(0.04)	(4.51)	(0.45)
Age (divided by 100)	0.484	1.036	0.750*	−0.223
	(1.30)	(1.40)	(1.79)	(0.30)
Age^2	−0.577	−1.582	−0.916	0.229
	(1.12)	(1.64)	(1.58)	(0.23)
Black	0.016	0.028	0.009	−0.034
	(0.90)	(0.74)	(0.61)	(1.41)
Hispanic	0.007	−0.027	0.042**	0.042
	(0.50)	(0.95)	(2.65)	(1.60)
Other non-white	−0.034	−0.023	0.057**	−0.003
	(1.46)	(0.50)	(2.13)	(0.08)
Performance of most recent hire in starting job (divided by 100)	0.054	−0.428**	0.115**	0.069
	(1.35)	(4.08)	(3.61)	(1.18)
Performance of typical worker in that job (divided by 100)	−0.041	0.121	0.009	−0.191**
	(0.87)	(1.03)	(0.20)	(2.21)
Less than high school degree	0.009	0.010	−0.009	−0.036
	(0.48)	(0.26)	(0.45)	(0.72)
More than high school degree	−0.008	−0.015	0.007	0.008
	(0.50)	(0.42)	(0.55)	(0.40)
College degree or more	0.006	−0.022	−0.029	−0.019
	(0.25)	(0.52)	(1.45)	(0.61)
Promoted already	0.083**	•	0.068**	•
	(2.80)		(2.45)	
Firm characteristics				
For-profit status	0.010	0.035	−0.006	0.037
	(0.46)	(0.95)	(0.30)	(1.26)
Franchise	0.046	0.046	0.020	0.055
	(1.61)	(1.00)	(0.84)	(1.27)
Number of sites (divided by 1000)	0.011	0.054	0.015*	0.008
	(1.29)	(1.29)	(1.78)	(0.60)
Establishment size (divided by 1000)	0.002	−0.0005	0.007	0.012
	(0.56)	(0.08)	(0.72)	(0.87)
Union (divided by 100)	−0.011	−0.031	−0.028**	0.048
	(0.81)	(1.02)	(2.03)	(0.93)
Occupation controls	10	10	10	10
Industry controls	8	8	8	8
Number of observations	628	628	654	654
R^2	0.16	0.18	0.19	0.13
Oaxaca decomposition (measured in percentage points)	−0.388	−1.355	0.681	3.074

NOTE: t-statistics are in parentheses. * and ** indicate significance at the 10-percent and 5-percent levels, respectively.

Hispanic or other non-white status (relative to whites), job-specific performance, and number of sites of operation. Of these factors, only tenure has a statistically significant association (positive in sign) with male wage growth.[22]

Columns 2 and 4 of Table 5 display regression results for the dependent variable "within-job wage growth without a promotion." The Oaxaca decompositions in the last row of the table indicate that when male weights are used the difference favors women whereas when the female weights are used the difference favors men. These relatively small differences on the order of 1 percentage point parallel the unconditional results from Table 2, which revealed essentially no gender difference in within-job wage growth. While the conditional results in columns 2 and 4 of Table 5 also suggest no substantial gender difference, recall that they may underestimate the gap favoring men, since, as explained above, the dependent variable is based on a question about the highest wage that *any* employee in this position (meaning the starting position of the most recent hire) could expect to attain without a promotion. The results in columns 2 and 4 of Table 5 should therefore be interpreted with caution.

Table 6 displays the regression results for the dependent variable "expected wage growth attached to expected promotions" that we estimate only on the subsample of workers for whom a promotion is expected.[23] Columns 2 and 4 are the same as columns 1 and 3, respectively, except for the inclusion of a dummy indicating whether a promotion has already been received. The main result is that when the promotion dummy is excluded from the regression, we find a small difference favoring women when the male weights are used and a small difference favoring men when the female weights are used, though in both cases these differences are well below 1 percentage point. When the regression controls for received promotions, the Oaxaca decompositions using either set of weights reveal differences favoring men (0.3 percentage points using male weights and 1.7 percentage points using female weights). Relative to the mean wage change attached to expected promotions, which is 25 percent, these gender differences range from a 0.5 percent change favoring women (when the promotion dummy is excluded and male weights are used) to a 6.7-percent change favoring men (controlling for received promotions and using female weights). The midpoint of this range is near the unconditional

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[22] Another approach for investigating gender differences in the wage growth attached to promotion is to focus only on the subsample of promoted workers. Though the sample size is small ($n = 149$), a regression of wage growth on a gender dummy and the full set of controls for the sample of promoted workers yields an estimated coefficient of −0.044 on the male dummy, with a standard error of (0.044).

[23] We could not take an analogous approach for received promotions (that is, estimating a model of the wage increase in the subsample of promoted workers) since the subsample of received promotions is too small.

TABLE 6

EXPECTED WAGE GROWTH ATTACHED TO EXPECTED PROMOTIONS

	Males		Females	
	Expected wage growth	Expected wage growth controlling for promotion	Expected wage growth	Expected wage growth controlling for promotion
Worker Characteristics				
Tenure (in years)	0.074	0.387**	−0.143	−0.082
	(0.45)	(2.45)	(0.68)	(0.39)
Tenure^2	−0.355**	−0.527**	0.133	0.133
	(2.08)	(3.15)	(0.77)	(0.78)
Age (divided by 100)	1.192	1.234	1.530	1.636
	(1.48)	(1.62)	(1.44)	(1.55)
Age^2	−1.672	−1.688*	−2.518*	−2.677*
	(1.63)	(1.74)	(1.71)	(1.83)
Black	−0.041	−0.046	−0.064*	−0.056*
	(1.10)	(1.21)	(1.93)	(1.71)
Hispanic	0.007	0.007	0.020	0.021
	(0.22)	(0.23)	(0.61)	(0.62)
Other non-white	−0.156**	−0.136**	−0.038	−0.036
	(2.99)	(3.02)	(0.75)	(0.70)
Performance of most recent hire in starting job (divided by 100)	−0.125	−0.086	0.116	0.138
	(0.94)	(0.69)	(1.14)	(1.35)
Performance of typical worker in that job (divided by 100)	−0.179	−0.193	−0.115	−0.104
	(1.47)	(1.61)	(0.54)	(0.49)
Less than high school degree	0.025	0.026	−0.093	−0.096
	(0.44)	(0.45)	(1.33)	(1.36)
More than high school degree	−0.058*	−0.059*	−0.065**	−0.060*
	(1.71)	(1.81)	(2.07)	(1.95)
College degree or more	−0.094**	−0.121**	0.028	0.023
	(2.12)	(3.10)	(0.41)	(0.33)
Promotion received	•	−0.194**	•	−0.113**
		(5.35)		(3.70)

Firm characteristics				
For-profit status	0.009	0.011	−0.003	0.004
	(0.22)	(0.24)	(0.06)	(0.08)
Franchise	0.063	0.067	−0.097*	−0.100*
	(1.05)	(1.13)	(1.69)	(1.76)
Number of sites (divided by 1000)	0.008	0.010	−0.055**	−0.057**
	(0.55)	(0.64)	(2.59)	(2.65)
Establishment size (divided by 1000)	−0.016**	−0.018**	−0.043**	−0.043**
	(2.03)	(2.19)	(3.56)	(3.56)
Union (divided by 100)	−0.020	−0.051	−0.007	−0.006
	(0.54)	(1.33)	(0.14)	(0.13)
Occupation controls	10	10	10	10
Industry controls	8	8	8	8
Number of observations	405	405	400	400
R^2	0.19	0.24	0.19	0.20
Oaxaca decomposition (measured in percentage points)	−0.147	0.296	0.652	1.681

NOTE: t-statistics are in parentheses. * and ** indicate significance at the 10-percent and 5-percent levels, respectively.

difference in means of 2.9 percentage points found in Table 2. An interesting point is that establishment size is statistically significant in these regressions but in none of our earlier models. Given that most labor market outcomes vary by size it is interesting that the probabilities of promotion and expected promotion, as well as wage growth since entering the firm, and within-job wage growth without a promotion appear not to be associated with establishment size. For both men and women, establishment size is negatively associated with the expected wage growth attached to expected promotions.

To summarize the wage analysis, our main finding is that promotions yield roughly similar wage increases for men and women. We interpret this as descriptively showing that the returns (in terms of higher wages) to promotion are the same or similar for women versus men. A causal interpretation cannot be attached to the promotion coefficient, since, as discussed above, a selection effect might be operating whereby unobserved characteristics (for example, unobserved components of worker ability) determine both promotions and the wage increases attached to expected promotions. The selection bias is likely to cause us to understate the extent to which wage increases attached to promotion are higher for men than for women. For example, if discrimination against women means that men are promoted farther down in the skill distribution than women, then promoted women are of higher average quality than promoted men. Thus, our finding of no observed gender difference in wage returns from promotion would actually imply a *lower* return for women than for men of equal quality. Similarly, we find little consistent evidence of gender differences in the expected wage change attached to expected promotions; our results suggest no meaningful difference if male weights are used and a modest difference favoring men if female weights are used.

The fact that the wage growth accompanying promotion is not smaller for women than for men is not consistent with the "sticky floors" model proposed by Booth, Francesconi, and Frank (2003) and tested using data from the British Household Panel Survey. Whereas they found roughly the same promotion rates for men and women but lower wage increases from promotion for women, we find that women are promoted less frequently than men but that the wage increases attached to promotion are roughly comparable for both sexes (as did McCue 1996 and Olson and Becker 1983).

A Test of the Consistency of the Observed Gender Differences with Employer Discrimination. To address taste-based models of gender discrimination, we now turn our attention to the gender of the most recent hire's immediate supervisor in the starting position, recalling that *male supervisor* is a dummy variable equaling 1 if the most recently hired worker's immediate supervisor

in the starting position was male, and 0 otherwise. There is a large gender difference in the likelihood of having a male supervisor. Seventy-eight percent of recently-hired men have a male supervisor versus only 41 percent of women.[24] This large, unconditional gender difference in the likelihood of having a male supervisor likely reflects underlying differences in representation of women across sectors.

Table 7 displays the results from incorporating the supervisor's gender into our models of promotion, expected promotion, and wage growth. In each case we present results from our most fully specified model, including, in addition to the baseline controls, performance measures, occupational dummies, and firm characteristics. In the models for the probabilities of promotion and expected promotion, taste-based discrimination (whereby male supervisors tend to under-promote women relative to men) would imply a negative coefficient on *male supervisor*, and a positive coefficient on the interaction of *male* and *male supervisor*. The results do not support this; whether the dependent variable is received promotions or expected promotions, the coefficients of interest frequently have the wrong sign and in all cases are far from statistically significant at conventional levels. In the lower panel of Table 7 we report the coefficients on *male supervisor* in the various wage growth models, which are estimated separately for men and women. In each model, the coefficient on *male supervisor* is statistically insignificant, casting doubt on the notion of gender discrimination based on male supervisor prejudice, although an alternative interpretation is that female supervisors also discriminate against their female subordinates in determining promotions and wages.

Giulano, Levine, and Leonard (2005) discuss an interpretation of these coefficients in the context of the theory of social roles (Eagly 1987). Social role theory argues that certain social roles (which generally coincide with social status norms) are expected of individuals by society based on the particular groups to which they belong. When workplace relationships deviate from the expected social roles (for example, when a female supervises a male), both supervisors and workers can become uncomfortable (Eagly 1987; Kanter

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[24] Using data from the NLSY for workers aged 17 to 25, Rothstein (1997) found that in 1982 the fraction of men with a male supervisor was 0.91 and the fraction of women with a male supervisor was 0.53. The decline for both women and men in the likelihood of having a male supervisor is consistent with the increasing participation rate for women during the 1980s. Future users of this variable in the MCSUI employer survey obtained from the ICPSR data archive should make note of a labeling error in the raw data. The variable containing the supervisor's gender is called "c35" in the codebook and equals 1 if the supervisor is female and 5 if male. The text labels attached to these observations are reversed, however, with "male" being assigned to females and "female" assigned to males. To avoid an error, the text labels should be ignored and only the underlying numerical codes (1 = female, 5 = male) should be used. We are grateful to Harry Holzer for his help in identifying this problem.

TABLE 7

EFFECT OF SUPERVISOR GENDER ON PROMOTION PROBABILITIES AND WAGE GROWTH

	Probability of promotion and expected promotion		
	Promotions	Expected promotions	Expected promotions[a]
Worker characteristics			
Male	0.249	−0.001	−0.015
	(1.25)	(0.01)	(0.09)
Male supervisor	0.095	0.044	0.047
	(0.61)	(0.36)	(0.38)
Interaction of male and	−0.099	0.122	0.124
male supervisor	(0.41)	(0.62)	(0.62)
Number of observations	1772	1667	1667
		Males	Females
Table 3, Within-job wage growth		0.037	−0.019
		(1.08)	(0.77)
		$n = 626$	$n = 661$
Table 4, Expected wage growth		0.038	−0.017
		(1.31)	(0.48)
		$n = 395$	$n = 397$
Table 4, Expected wage growth		0.044	−0.021
controlling for promotion		(1.54)	(0.59)
		$n = 395$	$n = 397$

NOTE: Z- and t-statistics are in parentheses. * and ** indicate significance at the 10-percent and 5-percent levels, respectively. The first three rows of cell entries are probit coefficients of the three worker characteristic variables (Male, Male supervisor, and the interaction of the two) on the probability of promotion or expected promotion. The second three rows of cell entries are OLS slope coefficients of the variable Male supervisor (the gender of the most recently hired worker's supervisor in the starting position) on actual or expected wage growth when this variable is added to the most controlled specifications in Tables 2, 3, and 4. The latter is done separately for both male and female workers, with the results appearing in separate columns.
[a]This specification includes a dummy indicator for received promotions as a control variable.

1977 as cited in Giulano, Levine, and Leonard 2005).[25] Though in the present context the relevant "role breaking" relationship would be a female supervising a male, Giuliano, Levine and Leonard (2005) consider other possible role-breaking relationships, such as young supervisors of older workers or non-white supervisors of white workers.

The discomfort experienced by both parties to a role-breaking relationship can lead to two different types of outcomes. On one hand, given that men belong to traditionally higher-status groups, a male worker supervised by a

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[25] As noted in Reskin and Bielby 2005 (p. 78), "Qualitative research suggests the possibility that men in predominantly female jobs advance more quickly than their female coworkers because their supervisors are uncomfortable with men doing customarily female jobs (Williams 1992). However, the advancement gap between the sexes stems in part from sex composition of jobs, according to quantitative analyses showing that men in predominantly female jobs are promoted more slowly than their counterparts in mixed-sex or predominantly male jobs (Budig 2002)."

woman is more likely to resent and disrespect the female manager than he would a male manager, and this might result in less desirable outcomes for the male worker (e.g., lower rates of promotion or expected promotion, or lower wage growth attached to promotions). In the context of our estimated models, this would imply that the sum of the *male supervisor* coefficient and the *male × male supervisor* coefficient was positive (so that male workers fare worse under a female supervisor than under a male supervisor). On the other hand, traditionally lower-status workers who find themselves in supervisory roles might defer to traditionally higher-status workers, refraining from exercising authority over them. This might lead to better outcomes for men supervised by women (such as higher rates of promotion or expected promotion, and higher wage increases attached to promotion). In the context of our estimated models, this would imply that the sum of the coefficients on *male supervisor* and *male × male supervisor* is negative (so that male workers fare better under a female supervisor than under a male supervisor). Since either or both of these possibilities could be present in the data and the reactions to role-breaking relationships could differ across establishments, social role theory does not offer a clear prediction on the signs of our coefficients in Table 7.

A potential concern discussed above is that a discriminating employer might give female workers lower performance ratings than similar male workers would receive. This could mask gender discrimination in promotions because men and women with equal performance reported by the supervisor received the same treatment (with respect to promotion and wages), while in fact women would have to be more productive than men to receive the same performance rating. To investigate this possibility, we checked for a relationship between the subjective performance rating and the gender of the immediate supervisor. If discrimination in performance evaluations were widespread in our sample, we would expect to see that women with male supervisors would have lower scores, on average, than women with female supervisors. In fact this is not the case.[26] However, we note that, as mentioned earlier, this result does not preclude the possibility of gender discrimination on the part of *both* male and female supervisors, or arising from the prejudices of customers or coworkers (as opposed to supervisors), or due to statistical discrimination.

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[26] A regression of the performance rating on *male*, *male supervisor*, and *male × male supervisor* (as well as the controls for worker characteristics, occupation, industry, and firm characteristics) yields a *male* coefficient of -0.007 ($t = 0.45$), a *male supervisor* coefficient of 0.009 ($t = 0.64$), and a *male × male supervisor* coefficient of -0.001 ($t = 0.04$). Since these estimates are far from statistically significant, this provides some evidence that the performance rating likely means the same thing for women as for men, at least under the assumption that male supervisors potentially discriminate against women and female supervisors do not.

Using data from a large U.S. retail employer, the recent study by Giulano, Levine, and Leonard (2005) found that when the worker and the immediate supervisor are of opposite genders, the promotion rate for workers is 8 percent to 11 percent lower. Female managers promoted employees at a higher rate than male managers and, as mentioned, no overall gender difference in promotion rates was found in that firm. In contrast, in our analysis, having a male supervisor does not have a statistically significant effect on promotion rates. While we are measuring an average effect across many firms, it is certainly possible that within a particular firm (as found by Giuliano, Levine, and Leonard), gender discordances in worker–supervisor pairs are associated with lower rates of promotion.

Conclusions

To conclude, it is useful to compare our main findings to those of the existing literature. We restrict our attention to the relatively few studies that have considered both promotions and the wage changes attached to these promotions. Our main finding is that rates of promotion are higher for men than for women, adjusting for included variables. The magnitude of this effect ranges from 2.2 to 3.1 percentage points (relative to a mean promotion rate of about 9 percent) across different specifications. It is reduced slightly (but not statistically significantly) by the presence of occupation controls, or industry and firm characteristics, or both occupation and firm/industry simultaneously. We also find relatively little gender difference in wage changes with or without promotions, or perhaps a slight edge to men. Our overall conclusion therefore matches McCue (1996) and Olson and Becker (1983), who both found lower promotion rates for women than for men, but wage increases attached to promotions that were comparable for the two groups. Our results on promotion probabilities also match the findings of Cobb-Clark (2001), although that study found a wage change favoring women, whereas we found relatively little gender difference in wage growth. Our findings on promotion probability contradict those of Gerhart and Milkovich (1989) and of Hersch and Viscusi (1996), since both of those studies found higher promotion rates for women. Gerhart and Milkovich (like us) found comparable wage increases attached to promotions, while Hersch and Viscusi found a difference favoring men.

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Appendix

TABLE A1

Weighted Means and Standard Errors (Wage Subsample)

	Male	Female	Difference
Dependent Variables			
Promotion since hired	0.113	0.077	0.036*
	(0.017)	(0.013)	(0.022)
Expected promotion in next 5 years	0.742	0.717	0.025
	(0.026)	(0.027)	(0.037)
Wage change since entering establishment	0.051	0.040	0.011
	(0.007)	(0.007)	(0.010)
Within-job wage growth without promotion	0.302	0.291	0.011
	(0.017)	(0.014)	(0.022)
Expected wage growth attached to	0.266	0.237	0.029
expected promotions	(0.023)	(0.021)	(0.031)
Worker characteristics			
Tenure (in weeks)	6.438	6.130	0.307
	(0.722)	(0.574)	(0.922)
Age	30.7	30.2	0.551
	(0.497)	(0.475)	(0.688)
White	0.552	0.656	−0.104**
	(0.031)	(0.025)	(0.040)
Black	0.169	0.172	−0.004
	(0.019)	(0.018)	(0.026)
Hispanic	0.196	0.109	0.087**
	(0.026)	(0.015)	(0.030)
Other non-white	0.083	0.062	0.021
	(0.017)	(0.013)	(0.021)
Performance of most recent hire	77.914	78.830	−0.917
in starting job (0–100)	(0.924)	(0.729)	(1.176)
Performance of typical worker	74.412	76.229	−1.817
in that job (0–100)	(0.964)	(0.582)	(1.125)
Less than a high school degree	0.066	0.035	0.031**
	(0.010)	(0.007)	(0.012)
High school degree	0.434	0.331	0.103**
	(0.030)	(0.023)	(0.038)
More than a high school degree	0.253	0.310	−0.057*
	(0.023)	(0.024)	(0.033)
College degree or more	0.247	0.324	−0.076
	(0.037)	(0.032)	(0.049)
Occupations			
Managerial	0.098	0.107	−0.009
	(0.027)	(0.021)	(0.034)
Scientists, engineers, doctors, lawyers	0.063	0.026	0.037
	(0.031)	(0.009)	(0.032)
Teachers, librarians, counselors	0.036	0.115	−0.079**
	(0.011)	(0.029)	(0.031)
RNs, pharmacists, and dieticians	0.017	0.026	−0.009
	(0.015)	(0.009)	(0.017)

TABLE A1 (cont.)

	Male	Female	Difference
Technologists and technicians	0.048	0.041	0.007
	(0.010)	(0.014)	(0.017)
Marketing and sales occupations	0.121	0.132	−0.011
	(0.017)	(0.015)	(0.023)
Administrative support occupations,	0.132	0.408	−0.276**
including clerical	(0.018)	(0.026)	(0.032)
Service occupations	0.121	0.078	0.043**
	(0.016)	(0.012)	(0.019)
Craft, construction, and	0.206	0.035	0.171**
transportation occupations	(0.021)	(0.008)	(0.022)
Production workers and laborers	0.159	0.031	0.127**
	(0.016)	(0.007)	(0.018)
Firm characteristics			
For-profit status	0.849	0.737	0.112**
	(0.027)	(0.030)	(0.040)
Franchise	0.065	0.069	−0.005
	(0.012)	(0.011)	(0.016)
Number of sites	77.219	65.045	12.175
	(23.860)	(14.928)	(28.133)
Establishment size	289.505	301.387	−11.882
	(85.314)	(34.476)	(91.977)
Union (% covered)	18.430	13.528	4.902
	(2.750)	(2.422)	(3.662)
Industries			
Mining and construction	0.024	0.016	0.008
	(0.006)	(0.005)	(0.008)
Manufacturing	0.313	0.150	0.163**
	(0.026)	(0.016)	(0.031)
Transportation	0.045	0.043	0.002
	(0.010)	(0.010)	(0.014)
Wholesale trade	0.085	0.057	0.028
	(0.015)	(0.013)	(0.020)
Retail trade	0.170	0.138	0.032
	(0.020)	(0.015)	(0.025)
Finance	0.037	0.097	−0.061**
	(0.008)	(0.013)	(0.015)
Services	0.301	0.497	−0.196**
	(0.035)	(0.029)	(0.045)
Public administration	0.020	0.013	0.005
	(0.009)	(0.005)	(0.009)
Number of observations	628	654	

NOTE: Statistical significance of the difference in means between men and women is denoted by * for the 10-percent level and ** for the 5-percent level. Means are computed on the subsamples from the analyses in Table 4, except for the variable Expected wage growth attached to expected promotions (this one is calculated on the subsample for which a promotion is expected and wage data are available [$n = 405$ for men, $n = 400$ for women] as in the analysis of Table 5).

TABLE A2

Probability of Promotion (Wage Subsample)

	(1)	(2)	(3)	(4)	(5)
Male	0.026	0.026	0.021	0.024	0.020
	(1.64)	(1.77)*	(1.21)	(1.80)*	(1.32)
Black	0.026	0.027	0.024	0.032	0.027
	(0.97)	(1.05)	(1.02)	(1.26)	(1.21)
Hispanic	0.006	0.009	0.011	0.016	0.015
	(0.29)	(0.45)	(0.50)	(0.77)	(0.75)
Other non-white	0.101	0.094	0.092	0.079	0.081
	(1.52)	(1.57)	(1.73)*	(1.75)*	(1.87)*
Age	−0.181	−0.180	−0.198	−0.197	−0.175
	(0.38)	(0.43)	(0.47)	(0.51)	(0.45)
Age^2	0.317	0.278	0.291	0.321	0.281
	(0.48)	(0.49)	(0.52)	(0.61)	(0.53)
Tenure (in years)	0.406	0.370	0.366	0.323	0.325
	(5.83)**	(5.70)**	(5.97)**	(5.45)**	(5.71)**
Tenure^2	−0.141	−0.126	−0.122	−0.111	−0.109
	(3.61)**	(3.56)**	(3.60)**	(3.36)**	(3.42)**
Less than a high school degree	−0.029	−0.025	−0.028	−0.023	−0.024
	(1.28)	(1.23)	(1.47)	(1.27)	(1.41)
More than a high school degree	0.018	0.016	0.016	0.017	0.019
	(1.00)	(0.95)	(0.91)	(1.14)	(1.16)
College degree or more	−0.060	−0.061	−0.060	−0.057	−0.057
	(3.53)**	(4.09)**	(3.29)**	(4.13)**	(3.58)**
Performance of most recent hire in starting job (divided by 100)	•	0.240	0.245	0.221	0.231
		(4.37)**	(4.57)**	(4.40)**	(4.69)**
Performance of typical worker in that job (divided by 100)	•	−0.091	−0.090	−0.083	−0.087
		(1.70)*	(1.69)*	(1.67)*	(1.76)*
Firm characteristics					
For-profit status	•	•	•	0.029	0.027
				(2.09)**	(2.07)**
Franchise	•	•	•	−0.003	−0.005
				(0.14)	(0.24)
Number of sites (divided by 1000)	•	•	•	0.006	0.006
				(0.60)	(0.58)
Establishment size (divided by 1000)	•	•	•	−0.005	−0.004
				(0.96)	(0.71)
Union (divided by 100)	•	•	•	−0.048	−0.049
				(2.43)**	(2.49)**
Occupation controls	•	•	10	•	10
Industry controls	•	•	•	8	8
Number of observations			1282		

NOTE: Entries are probability derivatives evaluated at the means of all variables for continuous variables. For discrete independent variables, cell entries measure the change in predicted probabilities when the dummy independent variable increases from 0 to 1. Z-statistics are in parentheses. * and ** denote statistical significance at the 10-percent and 5-percent levels, respectively. This table differs from Table 2 only in that it is estimated using a smaller subsample (corresponding to our wage growth analyses in Table 4).