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ABSTRACT

Getting Ahead: The Determinants of and Payoffs to Internal Promotion for Young U.S. Men and Women[*]

Using data from the National Longitudinal Survey of Youth, this paper examines the role of gender in the promotion process and the importance of promotions in the relative labor market outcomes of young men and women in their early careers. Specifically, how do the factors related to promotion differ for men and women? How do gender differences in promotion translate into differences in subsequent wage growth? To what extent does the promotions gap contribute to the gender wage gap? In answering these questions, alternative definitions of "promotion" will be considered.

Getting ahead matters—particularly for women. The results indicate that women are less likely to be promoted. This gender gap in promotions—the magnitude of which depends on the measure of promotion considered—is explained by differences in the returns to characteristics. Had men and women in our sample faced the same promotion standard, promotion rates would have been higher for women than for men. Furthermore, the share of overall wage growth attributable to promotion is much larger for women than for men reflecting a bifurcation in outcomes between women who get ahead and women who get left behind. Eliminating gender differences in the determinants of and wage payoffs to promotion would contribute to a narrowing of the gender wage gap.

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I.   Introduction

Historically, economists interested in the role of gender in the labor market have analyzed differences in labor market outcomes, most commonly wage rates, for men and women. Recently, economists have begun to strive for a better understanding of the labor market mechanisms or processes that can give rise to gender differences in outcomes. Labor market mobility—for example, quits, job changes, or promotions—has been of particular interest because of its importance in determining relative outcomes.

This research adds to this expanding literature by reconsidering the role of gender differences in the promotion process and the importance of promotions in the relative labor market positions of young men and women in their early careers. In addressing this issue, a sample of white men and women drawn from the U.S. National Longitudinal Survey of Youth (NLSY) will be analyzed. The primary focus will be on self-reported internal "promotion" and several alternative measures of promotion will be considered. Because previous studies have not assessed the extent to which promotions for men and women may be influenced by macroeconomic conditions, information about industry and occupation employment growth rates calculated from the Current Population Survey (CPS) and labor-market unemployment rates will be incorporated into the analysis. This research also adds to the previous literature by explicitly considering the sources of gender differences in promotion rates and the role of differential promotion rates in changes in the gender wage gap. Throughout the analysis the panel nature of the NLSY data will be used to take individual heterogeneity into account.

Getting ahead matters—particularly for women. The results indicate that women are less likely to be promoted. This gender gap in promotions—the magnitude of which depends on the measure of promotion considered—is explained by differences in the returns to characteristics. Had men and women in our sample faced the same promotion standard, promotion rates would have been higher for women than for men. Furthermore, the share of

overall wage growth attributable to promotion is much larger for women than for men reflecting a bifurcation in outcomes between women who get ahead and women who get left behind. Eliminating gender differences in the determinants of and wage payoffs to promotion would contribute to a narrowing of the gender wage gap.

The previous literature on the relationship between gender and promotion will be reviewed in the following section of the paper, while the theoretical framework for the analysis is outlined in Section III. Following that, the details of the data will be discussed. In Section V, an analysis of promotion determinants for young NLSY men and women will be presented. The gender gap in the probability of promotion will be decomposed into a component due to differences in productivity-related characteristics and a component due to differences in the returns to characteristics. Section VI considers the consequences of promotion for both wage growth and changes in the gender wage gap. Finally, some general conclusions will be discussed in Section VII.

II. The Promotion Chances of Men and Women

Empirical studies of the relationship between gender and promotions fall into one of three categories: studies of workers in specific occupations, studies of workers in a single firm, or, less commonly, studies of representative samples of workers across occupations and firms.[1] Most of these studies are cross-sectional and there have been only a handful of studies exploiting panel data techniques (Olson and Becker, 1983; McCue, 1996; Booth, *et al.,* 1998). Though many studies conclude that the probability of promotion is lower for women (Hachen, 1988; Spurr 1990; Long *et al.*, 1993; Paulin and Mellor, 1996; Pergamit and Veum, 1999), this is not a universal finding. Some studies find that gender has no significant effect on promotion (Jones and Makepeace, 1996; Hartman, 1987; Booth *et al.*, 1998), while others conclude that women are significantly more likely to be promoted (Hersch and Viscusi,

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[1] See Spurr (1990), Hersch and Viscusi (1996), and McCue (1996) for recent reviews.

1996). Still others suggest that the gender differential depends on other factors such as the time period (Eberts and Stone, 1985) or specific group of workers considered (Farber, 1977; DiPrete and Soule, 1988; McCue, 1996; Audas, *et al.*, 1997).

Differential promotion chances for men and women can generate a gap in relative wages in at least two related ways. First, promotions may themselves directly influence wages and wage growth. Second, the promotion process may be important in generating overall labor market segregation that is in turn related to relative wage rates.

There is little consensus regarding the relative wage gains that result specifically from promotion. Hersch and Viscusi (1996) find that the wage returns for promotion are much larger for male public utility workers, though Gehart and Milkovich (1989) find little evidence of a gender gap in the returns to promotion in manufacturing. Results from representative workers across industries and occupations are similarly mixed (Olson and Becker, 1983; McCue, 1996; Booth, *et al.*, 1998; Pergamit and Veum, 1999). It is difficult to know what produces this variation in results since the studies differ on a number of dimensions, including the time period studied, the data analyzed, and the econometric methods used to deal with the endogeneity of promotion in determining wages. Less is known about whether gender differences in promotion are an important source of overall labor market segmentation, though it seems reasonable to expect that there might be some relationship.[2] This remains an important question for future research because of the critical role of job segregation in generating gender differences in labor market outcomes (Bielby and Baron, 1986).

In spite of a relatively large empirical literature and a somewhat smaller theoretical literature, there remains much we do not know about the role of gender in the promotion process. Among other things, the existing literature leaves one wondering about the role of

macroeconomic conditions. Rosenbaum (1979) is one of the few researchers to address this issue and he concludes that promotion rates are higher in periods of greater firm growth. He considers only white men, however, so it is not possible to say whether the same is true for women.

In addition, while many studies have assessed the relationship between gender and promotion, there is remarkably little consensus about what that relationship is. This most likely reflects the focus on assessing promotions within single occupations or firms and the subsequent difficulty in knowing the extent to which the results may be generalized to broader labor market groups. We do not know what it is about the specific occupations, firms or time periods analyzed that might be responsible for the divergent results across these previous studies.

In addition to its panel nature, one of the advantages of NLSY data over these alternative data sources is that we can explicitly consider alternative definitions of what it means to be "promoted".[3] This is important because Pergamit and Veum (1999) provide strong evidence that the determinants of and payoffs to promotion depend on the specific definition of "promotion" being considered.[4]

This research builds upon these previous studies by considering alternative measures of promotion while taking individual heterogeneity into account. Furthermore, rather than simply considering the determinants of promotion for men and women, the gender differential in the probability of promotion will also be decomposed into two components: one which

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[2] Interestingly, there is evidence that gender segregation does affect promotion chances. Hachen (1988) finds that employment in female-dominated occupations increases upward authority job shifts for women.

[3] In addition, the sequencing of questions in the PSID results in only those individuals indicating that they had experienced a position change being asked whether or not that position change was a promotion. The NLSY data suggest, however, that many workers report that they have in fact been promoted although there has been no change in their position (Pergamit and Veum, 1999).

[4] At the same time, in order to utilize the more detailed information about the type and timing of promotion found in the 1990 NLSY data the authors chose to focus on a cross-section of respondents who were interviewed in both 1989 and 1990. Thus, they do not use the panel nature of the NLSY data to take individual heterogeneity into account.

results from differences in underlying human capital characteristics and a second which results from differences in returns to those characteristics. This latter exercise is important in light of Pergamit and Veum's (1999) conclusion that their results provided "suggestive" evidence of discrimination in the promotion process. In addition, variation in the wage payoff to promotion is assessed and a series of simulations provides evidence about how we might have expected the gender wage gap to change under alternative scenarios. Finally, throughout the analysis information about industry and occupation employment growth and local labor-market unemployment rates will be used to account for differences in macroeconomic conditions.

III. Modeling the Role of Gender in the Promotion Process

The Theoretical Framework

Theoretical models of promotion have explicitly incorporated gender into the promotion process by assuming that relative opportunities inside and outside the firm—whether at other firms or at home—differ for men and women. For example, Booth, *et al.* (1998) assume that within the firm women in higher job levels are subject to a Becker-type discrimination factor. Consequently, women have the same promotion chances as men, but have lower wage gains upon promotion because the firm is less likely to retain women by matching their outside offers.[5]

Milgrom and Oster (1987) assume that women in lower job levels have relatively fewer outside opportunities because they are less visible to other employers. Once promoted women become visible to other employers leading firms to try to hide productive women by not promoting them. Lazear and Rosen (1990), on the other hand, assume that women in higher job levels have superior opportunities in non-market production. Women must have

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[5] Lower wage gains upon promotion are also consistent with women having lower outside opportunities after promotion. Lazear and Rosen (1990) make the opposite assumption and get the opposite prediction.

higher ability to get promoted because they are more likely to leave the firm taking with them firm-specific human capital.[6] Both models imply that while women are less likely to be promoted, wage growth after promotion will be higher. In a similar vein, Kuhn (1993) considers a model in which the firm shares training costs in some jobs but not in others. If there are exogenous gender differences in quit rates, competitive, profit-maximizing firms will create separate job ladders for male and female employees.

In general, however, the theoretical literature is not much help in sorting out the observed empirical relationships. Predictions about relative promotion probabilities and subsequent wage growth depend critically on the following. First, is relative productivity inside versus outside the firm assumed to be greater for men or for women? Second, are differences in relative productivity assumed to exist before promotion in lower job levels, after promotion in higher job levels, or both? Various theoretical predictions about promotion rates and subsequent wage growth can be generated by varying the answers to the above two questions. We are as a result left with few empirically testable hypotheses.[7] Combined with a lack of consensus in the existing empirical literature, it becomes even more difficult to sort out the stylized facts.

The following extends Olson and Becker's (1983) model of promotions to allow the probability of promotion to depend in part on the firm having a job opening at a higher level. The objective is not to generate a set of testable hypotheses or to test competing theoretical models, but rather to provide a framework that can be used to highlight the ways in which gender may enter the promotion process and to guide the choice of variables in the estimation.

The probability of individual i being promoted to job j is a function of: 1) the probability that the firm decides to fill job j, 2) the probability that the expected value of

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[6] See Krowas (1993) for an extension of Lazear and Rosen (1990) to additional periods.
[7] See also Spurr (1990) on this point.

individual i's marginal product in job j exceeds some standard, and 3) the probability that the expected value of individual i's marginal product exceeds all other applicants.

Suppose jobs are assumed to have some inherent marginal product that is constant across individual workers but may vary over time. (See Thurow, 1975.) If firms decide to fill job j whenever economic conditions for the firm in period t are such that the value of this job-specific marginal product exceeds some threshold level the probability the firm will fill job j is given by:

$$P(VMP_{jt}^* > c_{jt}) \tag{1}$$

where VMP_{jt}^* is the value of the job-specific component of marginal product and c_{jt} is the relevant threshold.

Suppose further that the probabilities that individual i will meet the promotion standard and be the most qualified applicant are given by:

$$P[E(VMP_{ijt}) > s_{jt}]$$
$$P[E(VMP_{ijt}) > E(VMP_{njt})] \tag{2}$$

where $E(VMP_{ijt})$ is a worker's expected value of marginal product for all $i = 1...N$, s_{jt} is the promotion standard, and n is the next most qualified job applicant. Finally, a worker's marginal product is assumed to depend in part on the job itself, but also on the human capital the worker brings to the job. Specifically,

$$VMP_{ijt} = b_1 Z_{ijt} + VMP_{jt}^* + v_i + \varepsilon_{ijt} \tag{3}$$

where Z_{ijt} is individual characteristics that vary across jobs and time, v_i is an unobserved individual-specific effect, and ε_{jt} is a random error term. Promotion occurs whenever equations (1) and (2) both hold.

The Role of Gender

Given this general framework, gender may enter the promotion process in a variety of ways. First, structural changes in the economy may cause it to be more profitable to fill some jobs rather than others. To the extent that men's and women's jobs are segregated, this raises the possibility that the opportunities for promotion may differ for men and women.[8] Whether any differential promotion opportunities generated by structural change tend to favor men or women remains an empirical question.[9]

Of course, gender may also enter into the promotion equation if men and women differ in their endowments of those observed and unobserved human capital characteristics associated with productivity in the new job. While this clearly leads to differential productivity, and hence differential promotion chances we do not normally think of this as discrimination. Labor market discrimination, on the other hand, would imply that women are held to higher promotion standards so that while s_{jt} applies to men, the promotion standard is $s_{jt} + D$ for women where $D > 0$ (Olson and Becker, 1983). In this case, even if men and women were equally productive, women would be less likely to be promoted. Alternatively, the desire to achieve affirmative action goals might result in firms setting a lower promotion standard for women.

One can also think of promotion discrimination as a Becker-type taste for discrimination that implies an added cost to promoting women and reduces the value of their marginal productivity in the new job. Alternatively, the theoretical models reviewed above are in essence models of statistical discrimination in which men and women differ in their unobserved probabilities of leaving the firm. This would imply that the firm perceives the marginal productivity associated with particular human capital characteristic to be less for

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[8] This simply says that $P(VMP_{jt} > c_{jt})$ differs in men's and women's jobs.

women than for men. In either case, the perceived value of marginal product for women would be less than for men with the same human capital endowment resulting in lower promotion rates for women even if the promotion standard were the same.

IV.   Data

This study will analyze a sample of white men and women drawn from the NLSY which provides panel data for the cohort of individuals aged 14 to 22 in 1979. In the 1988-1990 waves, NLSY respondents were asked whether their job responsibilities had increased and whether they had received any promotions with their current employer.[10] Individuals responding that they had been promoted were asked about the outcome of the promotion (in particular, did it result in reporting to a different supervisor). Due to the panel nature of the data, we are also able to directly measure the outcome of a promotion by observing the annual wage changes of promoted and non-promoted workers.

The sample is restricted to white men and women not in the military sample who were interviewed in the NLSY in each year between 1988 and 1990. Self-employed individuals and those working for no pay have been dropped from the sample. The analysis is further restricted to promotions in "current jobs" in which respondents had been employed for eight weeks and usually worked more than 35 hours per week. These latter two restrictions are necessary because the promotion questions were asked only of these individuals. "Current jobs" are those in which respondents are currently employed or if not currently employed, the most recent job. A small number of observations were dropped because reported hourly wages were less than $1.50 or more than $300.00 or because they contained missing information on one of more other key variables (most notably AFQT scores). These

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[9] There is evidence to suggest that men and women fare differently through the peaks and toughs of the business cycle (Goodman, 1994) raising the possibility that relative promotion opportunities may depend on macroeconomic factors.

[10] Respondents were also asked about promotions in 1996, but, a number of changes in the specific questions asked and the survey methodology led me to drop the 1996 data in order to maintain consistency. (See Cobb-Clark and Dunlop, 1999.)

restrictions resulted in observations for 2076 men (4985 observations) and 1809 women (3885 observations). Of these, 1239 men and 830 women were asked about promotions in all three years.[11] Given these sampling restrictions, the results discussed below are most informative about gender differences in promotion rates among young, white, full-time workers with relatively continuous labor market attachment. Workers—particularly women—with weaker labor market attachment are likely to be underrepresented in the data. In light of this, it is likely that the results provide a conservative estimate of the gender gap in promotions among young workers. Estimates of the gender gap in promotions obtained from alternative samples will be considered further below. Finally, employment growth rates for detailed occupations and industries are calculated from the Current Population Survey (CPS) and appended to each record.[12]

There are advantages and disadvantages to using NLSY data to study promotions.[13] Analyzes of single firms, and to a lesser extent, analyzes of specific occupations allow general work conditions to be controlled which is clearly an advantage. At the same time, that approach does not allow us to draw conclusions about how these same firm characteristics affect promotion (Hersch and Viscusi, 1996). Thus, it is important to also analyze representative groups of workers (like the NLSY) even though some of the relevant characteristics of an individual's work environment might be unobserved.[14] Like other worker-based data sources, the NLSY provides a measure of self-reported promotion which as McCue (1996) notes, does rely on some commonly perceived notion of what it means to be

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[11] Note that because the NLSY asks about promotion "since the date of the last interview" the sample has been restricted to individuals interviewed in all three years to avoid particularly long spells between interviews. Individuals may not, however, have been asked about promotion in all three years either because they had not been employed for eight weeks or because they usually worked less than 35 hours.

[12] Employment growth was calculated as the log change in current employment from the average employment in the previous two years. Growth rates were calculated for 41 occupations and 45 industries.

[13] See also Pergamit and Veum (1999).

[14] Abraham and Medoff (1985) are among those who criticize the use of nationally representative data to study promotions saying that at best we would learn something about the average promotion process.

promoted.[15] Finally, our focus is necessarily restricted to internal promotions. While this is common to almost all empirical studies of promotion it does raise the possibility that our perceptions about gender and promotions may be distorted by gender differences in the tendency for workers to be promoted when changing firms or to leave the firm in the absence of promotion.[16] Pergamit and Veum (1999), however, suggest that NLSY data do not provide strong evidence directly linking promotion receipt and subsequent job turnover.

In Table 1 the promotion rates for men and women are presented. Individuals in the sample reported an overall promotion rate of 26.1 percent per year between 1988 and 1990. The overall promotion rate was significantly higher for men (27.0 percent) and than for women (24.9 percent). In addition, a total of 18.9 percent of the sample reported both that they had been promoted and that their job responsibilities had increased. Only 8.6 percent of individuals reported both being promoted and reporting to a higher level supervisor. Using these latter two definitions of promotion the gender gap in the rate of promotion becomes insignificant. These overall promotion rates are somewhat higher than the 9.2 percent and 11.6 percent reported for a representative sample of British men and women (Booth *et al*. 1998). This is not particularly surprising since the NLSY represents a cohort of young individuals—aged 23 to 30 in 1988—who are likely to be making fairly rapid career progress.[17] Descriptive statistics for the men and women in the sample are presented in Appendix Table A1.

Table 1 here

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[15] This does have the advantage of allowing us to identify promotions independently from wage changes (Killingsworth and Reimers, 1983).

[16] Booth, *et al*., (1998) appear to be able to identify workers who were promoted when changing employers, but focus only on internal promotions to maintain consistency with their theoretical model. See Eberts and Stone (1985), Johnson and Stafford (1974), and Long, Allison, and McGinnis (1993) for examples of studies that do make some allowance for external promotion in their analysis.

[17] In 1996, the promotion rate of NLSY individuals was approximately 16 percent (Cobb-Clark and Dunlop, 1999).

V. Getting Ahead: Gender Differences and the Promotion Process

Estimating the Determinants of Promotion

The theoretical framework outlined above suggests that promotion is a function of: 1) the probability that the firm decides to fill the position; 2) the probability that the worker meets some standard; and 3) the probability that the worker is the most qualified candidate. Unfortunately, existing data sets do not provide information about the expected productivity of other workers who were considered, but not selected, for a given promotion. This prevents the inclusion of a worker's relative productivity in the analysis.[18]

Given this, the promotability of worker i to job j in time t (P_{ijt}^*) is assumed to be given by the following:

$$P_{ijt}^* = Z_{ijt}\gamma + u_i + v_{ijt} \tag{4}$$

where Z_{ijt} is a vector of worker characteristics (both human capital and demographic) affecting expected productivity and the firm and labor market characteristics (occupation and industry growth rates) which influence productivity and the probability of the firm deciding to fill job j. Finally, u_i is an individual-specific effect and ε_{ijt} is a random error term.[19]

We do not directly observe promotability, but we do observe actual promotions. We begin by coding workers as having been promoted whenever they report having received a promotion with their current employer since the last interview (or since the start of the job). The focus is on this definition of promotion because it is most consistent with previous studies. Alternative definitions of promotion are considered in subsequent parts of the paper.

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[18] The 1990 NLSY does ask promoted individuals whether other individuals had also been considered for the promotion. Only about one third of respondents indicated that they had competed with others for their promotion (Pergamit and Veum, 1999). Unfortunately, the NLSY does not provide any information about the characteristics of these other individuals.

[19] Both u_i and ε_{ijt} are assumed to be normally distributed with zero means and independent of one another.

One of the advantages of using NLSY data to study gender differences in promotion is that we have good measure of actual labor market experience. This is important because potential experience measures based on age and education are particularly problematic for women who may have more discontinuous labor market histories. Both tenure with the current employer and pre-employer labor market experience will be included in the model[20] and age will be omitted from the analysis.[21] Much of the previous literature estimates a linear (Hersch and Viscusi, 1996) or quadratic (Booth, *et al*., 1998) relationship between employer tenure and promotion, however, specification tests provide strong evidence that the relationship for young workers is better captured by a cubic. At the same time, specification tests suggested that education is best captured by a quadratic function.

Table 2 presents the estimated determinants (marginal effects) of promotion obtained from a random-effects probit model.[22, 23] The model was estimated first for all workers and then separately for men and women using the unbalanced sample.[24]

Table 2 here

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[20] Each year information is obtained about the number of hours worked since the last survey. This information was summed to create a full-time equivalent weeks of experience measure. Overall experience was then divided into experience obtained before and after being employed with the current employer.

[21] Age is sometimes used to control for life cycle or ageing effects. Because NLSY respondents are young and within a narrow age range (24 to 32 in 1989) it seems unnecessary to allow for either of these effects.

[22] All estimation was done in STATA 6.0. Likelihood ratio tests rejected the hypothesis that individual effects were not present in the data and a random-effects model was adopted. (See Booth, *et al.*, 1998 who also use a random-effects model to estimate the determinants of promotion.) However, the random-effects methodology is limited by the assumption that there is no correlation between any of the explanatory variables and the individual effects themselves. Conditional fixed-effects logit models would not require this assumption, but would also not allow us to estimate the gender gap in promotions or to calculate marginal effects. Similarly NLSY data are not well suited to the estimation of duration models because the time of promotion is known only in the more detailed 1990 data. (See McCue, 1996 for estimation of this type of model using PSID data.) Given this I have chosen to focus on the random-effects results in spite of the potential correlation problem. Results from alternative estimation strategies are considered further below and are available upon request.

[23] The marginal effects are the change in the probability for an infinitesimal change in each variable evaluated at the total sample means. The marginal effects calculated at the gender-specific means are virtually identical. Note that the continuous approximation has been used for all discrete variables and that robust standard errors are used throughout the analysis. Probit coefficients are available upon request.

[24] Estimates for the balanced sample are substantially the same with the exception that very young children do not significantly reduce the probability of promotion for women in the balanced sample. Additionally, the gender gap in the probability of promotion is 5.8 percentage points in the unbalanced sample versus 6.7 percentage points in the balanced sample.

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Young white women captured in the NLSY are estimated to have a 5.8 percentage point lower probability of being promoted than similar young men. This lower promotion rate for women is consistent with other U.S. studies based on samples of representative workers (Olson and Becker, 1983; Hachen, 1988; McCue, 1996; Pergamit and Veum, 1999). In contrast, Booth, *et al*. (1998) find that British women have a about 2.5 percent higher probability of being promoted, although this gap disappears once occupation is controlled.[25]

Married women appear to have a lower probability of being promoted, though the effect is not significant. Young children reduce the probability of promotion for young women by 8.8 percentage points, but are not significantly related to the promotion rate of young men.[26] It is unclear is whether this reflects demand-side factors on the part of firms or supply behavior on the part of women themselves. Interestingly, however, the overall gender gap in promotions is not driven exclusively by differences in the effect of young children on the probability of getting ahead. The gender gap in promotions is 5.4 percentage points among men and women without young children and 5.2 percentage points among those with no children at all.

There are also gender differences in the importance of education for getting ahead. Education is not significantly related to the promotion of women, but there is a strong quadratic relationship between education and the probability of promotion for men. The probability of promotion increases with additional education for men, reaching a maximum at approximately 13 years of education, and declining thereafter.[27] Net of other factors, higher AFQT scores are associated with a small decrease in the probability men will be promoted.[28]

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[25] Ignoring the presence of individual effects and estimating a standard probit model reduces the gender gap in promotion rates from 5.8 to 5.4 percentage points. Excluding the low-income supplementary sample increases the gender gap to 6.9 percentage points. These results are available upon request.

[26] Including part-time workers in the sample strengthens the negative effect of marriage, but mitigates the effect of children somewhat. The magnitude of the gender gap remains much the same, however.

[27] Pergamit and Veum (1999) in contrast conclude that education is not significantly related to promotion for either men or women. Their conclusion appears to stem from the linear specification of the effects education on promotion. Re-estimating equation (5) without the quadratic term also results in insignificant education

In other ways the promotion process appears to operate similarly for men and women. In particular, there are similarities in the way in which career paths before and after joining the current employer influence promotion. The returns to employer tenure are the same for men and women, and for both men and women the probability of promotion increases with employer tenure reaching a maximum at approximately three years and then beginning to decline. Eventually at very high levels of employer tenure the estimated probability of promotion begins to increase again. There is a positive relationship between the number of previous jobs held and one's promotion chances with the current employer. Still, labor market experience acquired before joining one's current employer is negatively related to the probability of being promoted in the current job. Thus, it is those individuals previously making a number of rapid job changes who are relatively likely to be promoted.

Firm structure itself influences the probability of promotion for both men and women in a similar way. Promotion rates are higher in firms operating in multiple locations. Workers appear to benefit from being employed in firms with large internal labor markets perhaps because of more opportunities for internal transfer. Relative to the private sector, women in public sector firms are less likely to report being promoted and all workers covered by collective bargaining agreements are promoted less frequently.

Finally, promotion is closely tied to occupation. Relative to technicians, workers in other occupations—particularly those in relatively unskilled occupations such as operatives and laborers—are less likely to report being promoted. Professionals and managers are somewhat more likely to be promoted. Not surprisingly, the magnitude of these occupational differences is sensitive to the definition of occupational groups. When occupation is omitted from the model, industrial and occupational employment growth has a positive influence on promotions, particularly for women. Once differences in occupations are taken into account,

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effects for men whether or not the full 1988 – 1990 NLSY data are used or whether the sample is restricted to only 1990 as in Pergamit and Veum's case.

however, these effects for the most part disappear. Promotion rates also vary over time. Relative to 1988, male promotion rates were 7.8 percentage points lower in 1989 and 6.3 percentage points lower in 1990 while female promotion rates were 3.1 percentage points lower in 1989.

Consistent with the theoretical framework outlined above, these results support the view that promotion chances are in part determined by the probability that firms decide to fill higher-level positions. Promotion opportunities do appear to be related to firm circumstances, local labor market characteristics, and macroeconomic conditions, but in ways that differ for men and women. Future research attempting to examine gender differences in promotion would benefit from careful consideration of the role of demand-side factors and occupation in the promotion process. Furthermore, though the pattern of promotion rates across occupations is similar for men and women, the relative magnitude of occupational differences in promotion varies by gender implying that job ladders differ for men and women even within occupation. Thus, analyses of promotion that are based upon a single occupation may not be readily generalized. Finally, differences between these and other results based on U.S. data and those obtained by Booth, *et al.* (1998) using a similar model and British panel data raise the possibility that labor market institutions play an important role in the relative promotion rates of men and women.

Considering Alternative Definitions of Promotion:

In an effort to determine the robustness of the above results, equation (4) was re-estimated using two alternative definitions of promotion.[29] (See Appendix Tables A2 and A3.) First, individuals were coded as having been promoted whenever they reported both that they had received a promotion and that as a result their job responsibilities had increased.

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[28] 1989 AFQT percentile scores are used throughout the analysis.

[29] See Pergamit and Veum (1999) for cross-sectional results for several additional definitions of "promotion" using the 1990 NLSY data.

Second, a promotion was assumed to have occurred whenever a worker reported both a promotion and as a result of that promotion that he/she now reported to a different supervisor. Using the former definition of promotion reduces the gender gap in promotions from 5.8 to 3.8 percentage points, while the latter definition results in a gap of 1.0 percentage points.

Clearly, the size of the gender gap depends on the definition of promotion used. It is unclear whether this results from real differences in the qualitative aspects of promotions for men and women or from differences in the tendency to report having been promoted. It does raise the possibility that the use of different definitions of promotion is in part responsible for the wide range of estimates of the gender gap in promotions that exists in the literature.

The Source of the Gender Gap in Promotions

What is the source of the gender gap in the probability of being promoted? To what extent is it consistent with labor market discrimination? This section addresses these questions by decomposing differences in the promotion rates of young men and women into both returns- and characteristics-related components.

Recall that Z is a vector of individual and job characteristics that influence promotion, while γ is a vector of returns to those characteristics. Let $\hat{Z}_j$ capture the characteristics of a representative person of gender j with $j = f, m$ for women and men respectively.[30] The predicted gender gap in the probability of promotions is given by:

$$\hat{p}_m - \hat{p}_f = \Phi(\hat{Z}_m \hat{\gamma}_m) - \Phi(\hat{Z}_f \hat{\gamma}_f) \tag{5}$$

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[30] The curvature of the normal distribution implies that using the sample means $\overline{Z}_j$ to characterize the representative person results in predicted probabilities of promotion that are too small relative to the sample averages. Furthermore, the problem is greater for women than for men causing the gender gap in promotions to be overstated. Doiron and Riddell (1994) experienced a similar problem in their analysis of unionization. They propose defining a representative person ($\hat{Z}_j$) such that he (she) has a predicted probability of, in this case, promotion equal to the gender-specific sample average and such that his (her) endowments are in the same proportion as the average endowments for the men (women) in the sample. In effect, $\hat{Z}_j = a_j \overline{Z}_j$ where $a_f = .95$ and $a_m = .96$ is a gender-specific scaling factor. See Doiron and Riddell (1994) for details.

where Φ is the standard normal cumulative distribution function and $\hat{\gamma}_j$ is the vector of returns associated with promotions-related characteristics. Due to the non-linearity of the cumulative normal distribution, the gender gap in the probability of promotion is a non-linear function of $\hat{Z}_j$ and $\hat{\gamma}_j$ making standard decompositions impossible. To avoid this Doiron and Riddell (1994) suggest using a linear approximation. Specifically,

$$\hat{p}_m - \hat{p}_f = \Phi(\hat{Z}_m \hat{\gamma}_m) - \Phi(\hat{Z}_f \hat{\gamma}_f) \cong \frac{\partial \Phi(\psi)}{\partial \psi}(\hat{Z}_m \hat{\gamma}_m - \hat{Z}_f \hat{\gamma}_f) \qquad (6)$$

where $\psi = (N_m \hat{Z}_m \hat{\gamma}_m + N_f \hat{Z}_f \hat{\gamma}_f)/(N_m + N_f)$ is simply the predicted probability of promotion for the representative man and woman weighted by the respective sample sizes N_m and N_f.[31] By adding and subtracting $\frac{\partial \Phi(\psi)}{\partial \psi} \hat{Z}_m \hat{\gamma}_f$ from the right hand side of equation (6) we can decompose the promotions gap into returns- and characteristics-related components in the following manner:

$$\hat{p}_m - \hat{p}_f \cong \frac{\partial \Phi(\psi)}{\partial \psi}\left[\hat{Z}_m(\hat{\gamma}_m - \hat{\gamma}_f) + \hat{\gamma}_f(\hat{Z}_m - \hat{Z}_f)\right] \qquad (7)$$

The decomposition given by equation (7) is obviously not unique. To assess the robustness of the results, two decompositions of the promotion gap are considered. The one given by equation (7)—which I call decomposition A^P (which weights by male characteristics)–and decomposition B^P (which weights by female characteristics) and results from adding and subtracting $\frac{\partial \Phi(\psi)}{\partial \psi}(\hat{Z}_f \hat{\gamma}_m)$ from (6). The results of both are presented in Table 3.

Table 3 here

On average young men have a probability of promotion that is just over two percentage points higher than that of young women. This gap in promotions is explained by differences in the returns to characteristics, with differences in the characteristics of men and

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[31] The first term on the right hand side is the standard normal probability density function evaluated at ψ.

women serving to reduce the overall gap. Depending on the decomposition used, the differences in the returns to demographic, human capital, and job characteristics discussed above combine to explain between 225 and 362 percent of the actual gap. Women given their own characteristics, but men's returns, would have been expected to have a promotion rate of 29.4 percent compared to an actual rate of 24.9 percent. Alternatively, men would have had a promotion rate of only 20.3 percent (compared to an actual rate of 27.1 percent) if they had been facing women's returns.[32] Similar results are found when we consider our two more restrictive definitions of promotion.[33] Although the magnitude of the gender gap in promotions depends on our notion of what a promotion is, it remains the case that irrespective of how promotion is defined and the particular decomposition used the gap is explained by differences in the returns to characteristics.

These results are consistent with labor market discrimination indeed playing a role in promotion outcomes for young U.S. workers. At the same time, however, differences in the returns to men's and women's characteristics may be driven to a degree by unobserved heterogeneity which is not accounted for in the estimation process. For example, specialization within the household (Polachek, 1975b) or differences in expectations about lifetime labor force attachment (Polachek, 1975a) imply that human capital investment after labor market entry may differ for men and women in ways that are not captured by standard experience measures.

VI.   The Consequences of Promotion

In addition to understanding the gender gap in promotion rates, it is also important to assess the consequences of promotion for workers and the implications of promotion

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[32] These predictions were calculated using STATA's population average random effects model. See the STATA manual for more details.

[33] These results are consistent with Olson and Becker (1983) who also conclude that if the women in their sample had been promoted according to the male standard 32 percent of women would have been promoted compared to an actual rate of 19 percent. Similarly if men had been facing the female promotion standard, promotion

differentials for relative labor market outcomes. Do men and women receive the same payoff from promotion? Further, do any gender differences in either promotion rates or in subsequent wage growth affect the gender wage gap?

Wage Growth As a Result of Promotion

Although the NLSY does not provide information about changes in job level resulting from promotion, wage growth provides a measure of the payoff to a promotion. To assess the relative payoffs to promotion, I estimate the following annual log-wage-growth equation:

$$\Delta \ln W_i = \ln W_{i1} - \ln W_{i0} = (\beta_1 X_{i1} - \beta_0 X_{i0}) + (u_i - u_i) + (\varepsilon_{i1} - \varepsilon_{i0}) \qquad (8)$$

where X_i is a vector of human capital characteristics, job characteristics (including position in the firm), and labor market conditions. Promotion is viewed as a change in position. Adding and subtracting $\beta_1 X_{i0}$ to the right-hand side of equation (8) results in:

$$\Delta \ln W_i = \beta_1 (X_{i1} - X_{i0}) + (\beta_1 - \beta_0) X_{i0} + (\varepsilon_{i1} - \varepsilon_{i0}) \qquad (9)$$

The specific form of the equation to be estimated depends on how the returns to characteristics change over time. If the returns are constant so that $\beta = \beta_1 = \beta_0$, then wage growth is solely determined by changes in X_i. This constant returns assumption was tested and rejected, however, and initial characteristics were retained in the model.[34]

Often it is reasonable to assume that promotion is endogenous to wage levels. The standard solution to this problem is to use an instrumental variables approach,[35] but it can be difficult to make a case for excluding some variables from the wage equation while including them in the promotion equation. Consideration of wage growth—rather than wage levels— allows the effects of any unobserved, time-invariant, individual effects to be removed without

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rates for men would have fallen from 20 percent to 11 percent.

[34] Alternatively, Keith and McWilliams (1997) argue that the change in returns to characteristics can be captured by $\beta_1 = \beta_0 + \delta\beta_0$ implying that wage growth is a function of the initial wage level in addition to changes in X_i. The difficulty with this approach is that individual effects are not removed from the wage growth equation. Loprest (1992) includes some of the X's believed to determine wages rather than initial wages.

having to rely on the specification of the promotion process and finding suitable instruments. Therefore, I analyze the role of promotions in generating wage growth, while acknowledging that the wage gains from promotion may be overstated if there are omitted time-varying factors that are both positively related to wage growth and the probability of promotion.

Equation (9) was estimated by OLS separately for men and women, as well as for the total sample. Though NLSY data do not provide information about initial job level we can measure changes in job levels using our three alternative definitions of promotion. The coefficients on female, promotion, and a female/promotion interaction are reported in Table 4 for each of the three definitions of promotion.

Table 4 here

Promotions are positively related to wage growth, particularly for women. Women experience wage gains at promotion that are 2.4 to 5.6 percent higher than for promoted men. At promotion, women experience approximately 7.0 to 8.1 percent extra wage growth, while for men the relative payoff from promotion is less than 4.6 percent.[36] Differences between these estimates and others in the literature (see Becker and Olson, 1983; Booth, *et al.*, 1998; Pergamit and Veum, 1999.) may imply that factors such as workers' ages, prevailing labor market institutions, and the period of analysis all influence the extent to which promotions are translated into higher wages.

The Share of Wage Growth Attributable to Promotion

Additional insights into the relative wage payoff to promotions to men and women can be gained by decomposing total wage growth for men and women into a proportion

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[35] See Booth *et al.*, (1998) who adopt this methodology.

[36] In contrast, Pergamit and Veum (1999) find that promotion resulted in somewhat higher wage growth for NLSY men than for NLSY women although the difference is not significant. This finding appears to be due to the authors' focus on the 1990 NLSY cross-section as using equation (9) to estimate wage growth between 1989 and 1990 confirms their result.

resulting from promotion and a proportion occurring in the absence of promotion.[37] Average

wage growth, $\Delta \overline{W}_j$, can be decomposed into a weighted average of the wage growth for non-

promoted $(\Delta \overline{W}_j^n)$ and promoted $(\Delta \overline{W}_j^p)$ workers as follows:

$$\Delta \overline{W}_j = (1 - \overline{p}_j)\Delta \overline{W}_{j,p=0}^n + \overline{p}_j \Delta \overline{W}_{j,p=1}^p \tag{10}$$

where $\overline{p}_j$ is the probability of promotion for gender j. Let $\Delta \overline{W}_{j,p=o}^p$ equal the wage growth

that promoted workers would have had if they had not been promoted. Adding and

subtracting $\overline{p}_j \Delta \overline{W}_{j,p=0}^p$ to the right hand side of equation (10) results in:

$$\Delta \overline{W}_j = [(1 - \overline{p}_j)\Delta \overline{W}_{j,p=0}^n + \overline{p}_j \Delta \overline{W}_{j,p=0}^p] + \overline{p}_j (\Delta \overline{W}_{j,p=1}^p - \Delta \overline{W}_{j,p=0}^p) \tag{11}$$

The right hand side term of equation (11) can be interpreted as the wage growth that would

have prevailed had no one been promoted, while the second term on the right hand side

captures the extra wage growth that promoted workers received upon promotion. The share

of overall wage growth attributable to promotion (S_j) is defined as:

$$S_j = \frac{\overline{p}_j (\Delta \overline{W}_{j,p=1}^p - \Delta \overline{W}_{j,p=0}^p)}{\Delta \overline{W}_j} \tag{12}$$

Although there is little difference in overall annual wage growth for NLSY men and

women between 1987 and 1990 (see Table 5), the wage payoffs to promotion are much larger

for women. Promoted women experienced an average wage growth of more than 10 percent,

while the wages of non-promoted women grew at a fraction of that rate. The gap in wage

growth between promoted and non-promoted men is much smaller. Using the wage growth

of non-promoted workers as a measure of what promoted workers would have earned had

they not been promoted, we find that the share of total wage growth attributable to promotion

(between 16.3 and 43.0 percent) is much larger for women than for men.

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[37] This is an adaptation of McCue's (1996) method for decomposing the contribution of promotion and other types of mobility to overall wage growth.

Using the experiences of non-promoted workers as a measure of what would have happened to the wages of promoted workers had they not been promoted is reasonable so long as promoted workers are randomly selected with respect to the characteristics influencing wage growth. Given that this is not likely to be the case, estimates from equation (10) are used to predict $\Delta \overline{W}^{p}_{j,p=0}$.

Not surprisingly, the estimated wage growth for promoted workers in the absence of promotion is larger than the actual wage growth experienced by workers not promoted implying that promotion is positively related those characteristics that lead to higher wage growth. Taking this into account reduces—but does not eliminate— the relative gap in the proportion of total wage growth due to promotions. For women, as much as 38.7 percent of wage growth occurs at promotion, while for men at most 29.6 percent results from promotion.

Promotion and Changes in the Gender Wage Gap

Given the large gender differences in the determinants of and returns to promotion outlined above, it is interesting to consider how the promotion process itself influences the gender wage gap. This section considers this issue through a number of simulations that highlight the relationship between promotion and changes in the gender wage gap.

Equation (13) shows the gender wage gap in period 1 as a percent of the same wage gap in period 0. Specifically,

$$\Delta Gap = \frac{\tilde{W}_1^W}{\tilde{W}_1^M} \Bigg/ \frac{\tilde{W}_0^W}{\tilde{W}_0^M} \tag{13}$$

where $\tilde{W}$ is the geometric mean of wages. The right-hand side of equation (13) is greater than one whenever the gender wage gap is smaller in period 1 than in period 0.

Taking logs of both sides of equation (13) and rearranging results in:

$$\ln(\Delta Gap) = \left[\overline{\ln W_1^W} - \overline{\ln W_0^W} \right] - \left[\overline{\ln W_1^M} - \overline{\ln W_0^M} \right] \tag{14}$$

where the first term represents the wage growth for women between periods 0 and 1 while the second represents the wage growth of men.[38] If the gender wage gap has narrowed over time the right-hand side of equation (14) will be positive. A widening gap occurs whenever equation (14) is negative. Recalling equation (10) we can view overall wage growth for both women and men as a weighted average of the wage growth accruing to promoted and non-promoted workers as follows:

$$\ln(\Delta Gap) = (1 - \overline{p}_W) \Delta \overline{W}_{W,p=0}^n + \overline{p}_W \Delta \overline{W}_{W,p=1}^p - (1 - \overline{p}_M) \Delta \overline{W}_{M,p=0}^n + \overline{p}_M \Delta \overline{W}_{M,p=1}^p \tag{15}$$

where all terms are defined as before.

We are now in a position to consider how annual wage growth (and hence the gender wage gap) would have differed had the determinants of and payoffs to promotion been the same for men and women. Table 6 presents the results of a number of simulations in which men and women are assumed to retain their own productivity-related characteristics, but are alternatively subjected to the promotion standards and wage returns faced by the opposite gender. Equation (15) is then used to assess how the gender wage gap would have been expected to change as a result.

Table 6 Here

In 1987 the NLSY men in our sample earned $8.42, while women earned on average $6.86. Between 1987 and 1990 the gender wage gap between young women and men was constant, narrowing by only about 0.0016 log points per year on average. We begin by considering what would have happened if NLSY women had retained their own characteristics, but faced the same promotion process as men. Similarly, Scenario 2 simply

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[38] To see this note that $\ln \tilde{W} = \overline{\ln W}$.

assigns men the same promotion process as women.[39] This exercise indicates that eliminating gender differences in the way in which productivity-related characteristics affect promotion would in and of itself have resulted in an average annual reduction in the gender wage gap that was approximately three times as large as the reduction that actually occurred.[40]

This conclusion is weakened somewhat when women are assumed to face not only the same promotion process as men, but also the same wage returns. Scenario 3 suggests that in this case, the change in the gender wage gap would have narrowed by 1.7 times are much. When both men and women are subjected to male returns the gender differentials in promotion probabilities and the wage gains to promotion are reduced. Thus, the wage growth of men and women is more similar and there is a smaller change in the gender wage gap over time. When both men and women are subjected to female returns, however, women are approximately 4.5 percentage points more likely to be promoted. Additionally, the wage gains to promotion remain somewhat higher for women. Thus, if men had faced the same promotion and wage process as women, the gender wage gap would have narrowed more than eight times as much as it actually did.

VI.   Conclusion

A better understanding of the promotion process is important for at least two reasons. First, in spite of a relatively large empirical literature assessing the relationship between gender and promotions, there is remarkably little consensus about what this relationship is. In short, the stylized facts remain unclear. Second, promotion appears to be closely tied to wage growth, particularly for women. As a result, any gender differences in the promotion process have implications for the gender wage gap.

This study contributes to our understanding of the relationship between gender and

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[39] Here the wage growth of promoted and non-promoted men and women are retained at their actual level.

promotion by considering alternative measures of promotion and by taking advantage of panel data for workers employed in a range of occupations and industries. Previous work which focuses primarily on estimating the gender gap in promotions in single occupations or firms leaves unanswered the question: How widely do the results apply? The differences for men and women in the estimated relationships between, for example, occupation, firm size, collective bargaining status, and labor market sector on the one hand and promotions on the other suggest the answer is—not widely at all.

Young women are less likely to get ahead than similar young men, but the size of the gap depends on how promotion is measured. Differences in the way in which "promotion" is measured may be at least a partial explanation for the wide divergence in empirical estimates of the promotion gap. The gender gap in promotions is explained by differences in the returns to characteristics. For women, the number of small children is more closely related to getting ahead than is education. Given their own characteristics, but men's promotion process, women would have a predicted probability of promotion of 29.4 percent compared to an actual rate of 24.9 percent. Men's probability of promotion, on the other hand, would fall from 27.1 percent to 20.3 percent if they retained their own characteristics but faced the same promotion standard as their female counterparts. Thus, although the gender gap in promotions is not large and may be drive to an extend by unobserved heterogeniety, it is consistent with a form of hidden discrimination in which during the late 1980s young women got over the promotion hurtle by being more qualified than their male counterparts. Interestingly, Olson and Becker (1983) reached a similar conclusion about the promotion process almost two decades earlier. Eliminating gender differences in the promotion process has important implications for narrowing the gender wage gap.

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[40] Olson and Becker (1983) reach a similar conclusion in their analysis of promotion in the 1970s.

Getting ahead matters. Regardless of the definition of promotion considered, the gap in wage growth between promoted and non-promoted workers is much larger for women than for men. Women who do not get a head appear to fall further behind. Whether this results from behavior on the part of workers or on the part of firms is unclear. Data sets which allow us to identify gender differences in the probability of being offered a promotion from differences in the probability of accepting a promotion would be useful for sorting this out. We also need to carefully consider whether differences a firm's ability to retain non-promoted men and women contribute to an explanation of these results.

Taken together these results imply that promotion standards are higher for women, but women who are promoted have faster wage growth. Perhaps relative to men, promoted women are a more select group. Perhaps promoted women are promoted further. Whether this results because women have worse outside opportunities in lower job levels as Milgrom and Oster (1987) suggest or whether it results because women have better outside opportunities in higher job levels as Lazear and Rosen (1990) suggest remains to be seen. Future research that generates testable hypotheses and tests alternative theoretical models will be necessary to sort out competing explanations.

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Table 1: Type of Promotion by Year and Gender

(Percent)

	Total	1988	1989	1990
All Workers				
Promoted	26.1	29.6	24.2	24.6
Promoted/Responsibilities Increased	18.9	23.3	18.9	14.7
Promoted/Report to New Supervisor	8.6	12.5	9.7	3.9
N	8870	2894	2991	2985
Men				
Promoted	27.0	30.9	24.6	25.8
Promoted/Responsibilities Increased	19.4	24.3	19.7	14.5
Promoted/Report to New Supervisor	8.7	12.8	9.7	3.8
N	4985	1619	1685	1681
Women				
Promoted	24.9	27.9	23.7	23.0
Promoted/Responsibilities Increased	18.2	22.0	17.8	15.0
Promoted/Report to New Supervisor	8.5	12.2	9.8	3.8
N	3885	1275	1306	1304

31

(Random Effects Probit Marginal Effects[A] and z-Statistics)

	Total		Men		Women	
	Margin	z-stat	Margin	z-stat	Margin	z-stat
Demographic Characteristics						
Female	-0.058	-4.57				
Married	-0.013	-1.11	-0.001	-0.07	-0.023	-1.57
Presence of Child Aged 0	-0.021	-1.09	0.004	0.15	-0.072	-2.46
Presence of Child Aged 1 —5	0.000	-0.01	-0.010	-0.48	0.010	0.55
Human Capital Characteristics						
Education	0.075	3.83	0.099	3.90	0.033	1.04
Education^2	-0.003	-3.99	-0.004	-3.88	-0.001	-1.23
AFQT Score	0.000	-1.00	-0.001	-2.01	0.000	0.71
Number of Previous Jobs	0.007	4.70	0.008	3.81	0.006	3.03
Pre-Employer Experience/100	-0.032	-2.88	-0.026	-1.68	-0.045	-2.59
Pre-Employer Experience^2/1000	0.035	2.26	0.029	1.46	0.054	1.89
Employer Tenure	0.002	8.78	0.002	5.93	0.002	6.96
Employer Tenure^2/100	-0.001	-9.16	-0.001	-6.03	-0.001	-7.27
Employer Tenure^3/1,000,000	0.008	8.35	0.007	5.38	0.010	6.74
Occupation[B]						
Managers and Professionals	0.043	1.67	0.026	0.71	0.063	1.89
Sales	0.007	0.23	-0.022	-0.51	0.043	1.12
Administration/Support	0.002	0.06	-0.051	-1.15	0.046	1.30
Service	-0.055	-1.77	-0.098	-2.17	-0.011	-0.28
Precision Craft	-0.033	-1.11	-0.054	-1.34	-0.058	-1.03
Operators/Laborers (inc. Tansport)	-0.100	-3.46	-0.115	-2.88	-0.098	-2.38
Employer Characteristics						
0 - 100 Employees	-0.024	-1.59	-0.040	-1.78	-0.014	-0.76
100 to 499 Employees	-0.010	-0.57	-0.028	-1.15	0.009	0.44
Covered by Collective Bargaining	-0.081	-4.83	-0.083	-3.76	-0.078	-3.14
Employer Has Multiple Locations	0.057	4.79	0.068	3.99	0.040	2.54
Public Sector Firm	-0.036	-1.83	-0.003	-0.09	-0.061	-2.46
Labor Market Characteristics						
Unemployment 6 - 8.9%	-0.008	-0.67	-0.013	-0.76	-0.006	-0.38
Unemployment 9.0+ %	0.041	2.05	0.014	0.51	0.072	2.57
Occupational Growth Rate	0.072	0.55	-0.115	-0.60	0.249	1.49
Industry Growth Rate	0.235	2.08	0.225	1.49	0.188	1.15
Miscellaneous						
1989	-0.057	-4.83	-0.078	-4.72	-0.031	-1.95
1990	-0.044	-3.52	-0.063	-3.51	-0.027	-1.64
Being in Balanced Sample	0.035	2.79	0.044	2.37	0.021	1.30
N	8870		4985		3885	

[A]The continuous approximation is used to calculate the marginal effects for discrete variables.
[B]Technicians are the omitted category

Table 3: Decomposition of Gender Gap in Probability of Promotion and Wages into Characteristics- and Returns-Related Components
(Levels and Percent)

I Promotion

Levels	Actual	Predicted		
Women	0.249	0.249		
Men	0.270	0.270		
Gap	0.022	0.022		

	Decomposition A^P		Decomposition B^P	
Decomposition of Promotion Gap	**Level**	**Percent**	**Level**	**Percent**
Characteristics	-0.057	-261.5	-0.027	-125.2
Returns	0.079	361.5	0.049	225.2
Approximation Error	0.000	0.0	0.000	0.0
Total Gap	0.022	100.0	0.022	100.0

II Promotion Resulting in an Increase in Responsibilities

Levels	Actual	Predicted		
Women	.182	.182		
Men	.194	.194		
Gap	.012	.012		

	Decomposition A^P		Decomposition B^P	
Decomposition of Promotion Gap	**Level**	**Percent**	**Level**	**Percent**
Characteristics	-0.042	-343.7	-0.027	-225.9
Returns	0.054	443.7	0.040	325.9
Approximation Error	0.000	0.0	0.000	0.0
Total Gap	0.012	100.0	0.012	100.0

III Promotion Resulting in a Change of Supervisors

Levels	Actual	Predicted		
Women	0.085	0.085		
Men	0.087	0.087		
Gap	0.002	0.002		

	Decomposition A^P		Decomposition B^P	
Decomposition of Promotion Gap	**Level**	**Percent**	**Level**	**Percent**
Characteristics	-0.007	-399.1	-0.011	-639.4
Returns	0.009	499.1	0.013	739.4
Approximation Error	0.000	0.0	0.000	0.0
Total Gap	0.002	100.00	0.002	100.0

Table 4: The Effect of Promotion on Wage Growth by Gender and Type of Promotion
(OLS coefficients and t-statistics)

	Total		Men		Women	
Promotion						
Promoted	0.0467**	(4.39)	0.0458**	(4.22)	0.0698**	(6.15)
Female	-0.0063	(-0.85)				
Interaction	0.0213	(1.38)				
Promotion/Increased Responsibilities						
Promoted	0.0447**	(3.63)	0.0445**	(3.59)	0.0805**	(7.31)
Female	-0.0081	(-1.16)				
Interaction	0.0344**	(2.11)				
Promotion/Report to New Supervisor						
Promoted	0.0168	(1.11)	0.0181	(1.18)	0.0745**	(4.90)
Female	-0.0076	(-1.19)				
Interaction	0.0563**	(2.67)				

** Significant at five percent.

Notes: Other controls included in the regression but not reported are a quadratic in education and pre-employer experience, a cubic in employer tenure, 1989 AFQT score, firm size, occupational and industrial employment growth, number of jobs and dummies for being newly married or divorced, experiencing a birth, getting or losing collective bargaining, increases or decreases in unemployment, getting sick or well, changing jobs, interrupted employer tenure, being in the balanced sample and years.

Table 5: Proportion of Total Wage Growth Attributable to Promotion
by Gender and Type of Promotion
(Percent)

	Promotion		Promotion/ Increased Responsibilities		Promotion/ Report to New Supervisor	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Total Wage Growth	4.3%	4.4%	4.3%	4.4%	4.3%	4.4%
Rate of Promotion	27.2	24.8	19.6	17.9	8.7	8.5
Actual Wage Growth						
Promoted Workers	8.3	10.2	8.5	11.7	6.7	12.1
Non Promoted Workers	2.7	2.5	3.2	2.8	4.0	3.7
Share of Total Wage Growth Due to Promotion	35.7	43.0	24.5	35.9	5.5	16.3
Predicted Wage Growth						
Promoted Workers in Absence of Promotion	3.7	3.3	4.1	3.7	4.9	4.7
Share of Total Wage Growth Due to Promotion	29.6	38.7	20.5	32.3	3.8	14.3

Table 6: Expected Change in the Gender Wage Gap Given Alternative Promotion Standards and Wage Payoffs

(Log Points and Relative to Actual)

	Log Points	Expected Change in Gender Wage Gap	
		Log Points	Relative to Actual
Average Annual Change in Gender Wage Gap:	-0.0016		
Scenario 1:			
Male Returns in Promotion/Own Returns in Wage Growth			
Promotion		-0.0051	3.17
Promotion Resulting in More Responsibilities		-0.0051	3.14
Promotion Resulting in a New Supervisor		-0.0030	1.85
Scenario 2:			
Female Returns in Promotion/ Own Returns in Wage Growth			
Promotion		-0.0055	3.41
Promotion Resulting in More Responsibilities		-0.0041	2.54
Promotion Resulting in a New Supervisor		-0.0019	1.19
Scenario 3:			
Male Returns in Promotion/ Male Returns in Wage Growth			
Promotion		-0.0028	1.72
Promotion Resulting in More Responsibilities		-0.0039	2.42
Promotion Resulting in a New Supervisor		-0.0016	0.97
Scenario 4:			
Female Returns in Promotion/Female Returns in Wage Growth			
Promotion		-0.0131	8.12
Promotion Resulting in More Responsibilities		-0.0136	8.38
Promotion Resulting in a New Supervisor		-0.0128	7.89

Table A1: Characteristics of Workers by Promotion and Gender
(Percent except as noted)

	TOTAL		MEN		WOMEN	
	Percent	std.	Percent	std.	Percent	std.
Wages (1983/1984 Dollars)						
Log Wages (log points)	1.976	0.464	2.057	0.464	1.872	0.442
Wages (dollars)	8.150	7.094	8.844	7.826	7.258	5.908
Demographic Characteristics						
Married	0.565	0.496	0.579	0.494	0.547	0.498
Number of Children in Household (integer)	0.738	0.996	0.738	1.011	0.739	0.977
Presence of Child Aged 0	0.084	0.277	0.096	0.294	0.068	0.252
Presence of Child Aged 1 —5	0.238	0.426	0.255	0.436	0.216	0.411
Human Capital Characteristics						
Years of Education	13.261	2.444	13.124	2.547	13.437	2.292
AFQT (1989)	53.261	27.700	53.266	29.083	53.254	25.821
Pre-Employer Experience (weeks)	261.527	166.549	284.733	173.639	231.751	151.898
Employer Tenure (weeks)	179.841	161.327	185.758	165.443	172.248	155.578
Number of Jobs Held (integer)	7.733	4.277	7.825	4.337	7.614	4.195
Health Limitations	0.034	0.180	0.028	0.165	0.041	0.198
Had a Break with Employer	0.102	0.303	0.093	0.291	0.114	0.318
Occupation						
Managers and Professionals	0.258	0.438	0.221	0.415	0.306	0.461
Technicians	0.047	0.212	0.045	0.208	0.050	0.218
Sales	0.094	0.293	0.093	0.291	0.096	0.294
Administration/Support	0.168	0.374	0.069	0.254	0.294	0.456
Service	0.092	0.289	0.079	0.270	0.108	0.311
Precision Craft	0.142	0.349	0.232	0.422	0.025	0.157
Operators/Laborers (inc. Tansport)	0.198	0.399	0.259	0.438	0.121	0.326
Employer Characteristics						
0 - 100 Employees	0.596	0.491	0.629	0.483	0.552	0.497
100 – 499 Employees	0.223	0.416	0.208	0.406	0.243	0.429
500+ Employees	0.181	0.385	0.163	0.369	0.205	0.404
Covered by Collective Bargaining	0.150	0.357	0.171	0.376	0.123	0.329
Employer Has Multiple Locations	0.683	0.465	0.665	0.472	0.706	0.456
Public Sector Firm	0.103	0.304	0.087	0.282	0.124	0.330
Labor Market Conditions						
Occupational Growth	0.033	0.044	0.033	0.043	0.033	0.046
Industry Growth	0.032	0.047	0.030	0.048	0.035	0.045
Area Unemployment						
0 — 5.9%	0.647	0.478	0.638	0.481	0.658	0.475
6.0 — 8.9%	0.275	0.447	0.274	0.446	0.277	0.448
9+%	0.078	0.268	0.088	0.283	0.065	0.247
N	8870		4985		3885	
Balanced N	2123		1293		830	

Table A2: Determinants of the Probability of Promotion and Increased Responsibilities

(Random Effects Probit Marginal Effects[A] and z-Statistics)

	Total		Men		Women	
	Margin	z-stat	Margin	z-stat	Margin	z-stat
Demographic Characteristics						
Female	-0.038	-3.66				
Married	-0.015	-1.55	-0.015	-1.00	-0.016	-1.31
Presence of Child Aged 0	-0.018	-1.12	0.012	0.55	-0.068	-2.70
Presence of Child Aged 1 —5	-0.003	-0.28	0.001	0.06	-0.006	-0.37
Human Capital Characteristics						
Education	0.047	2.95	0.066	3.18	0.020	0.76
Education^2	-0.002	-3.36	-0.003	-3.34	-0.001	-1.08
AFQT Score	0.000	-1.01	-0.001	-2.20	0.000	0.88
Number of Previous Jobs	0.004	3.25	0.005	3.00	0.003	1.82
Pre-Employer Experience/100	-0.011	-1.15	-0.002	-0.17	-0.025	-1.75
Pre-Employer Experience^2/1000	0.012	0.93	0.000	0.32	0.030	1.27
Employer Tenure	0.001	6.23	0.001	3.46	0.002	6.02
Employer Tenure^2/100	0.000	-6.74	0.000	-3.42	-0.001	-6.66
Employer Tenure^3/1,000,000	0.005	6.42	0.003	3.13	0.008	6.45
Occupation[B]						
Managers and Professionals	0.062	2.88	0.067	2.13	0.057	2.08
Sales	0.023	0.93	0.020	0.55	0.028	0.87
Administration/Support	0.023	0.99	0.027	0.74	0.029	0.99
Service	-0.019	-0.72	-0.031	-0.80	-0.010	-0.31
Precision Craft	-0.016	-0.63	-0.018	-0.54	-0.047	-1.01
Operators/Laborers (inc. Tansport)	-0.070	-2.91	-0.072	-2.12	-0.077	-2.25
Employer Characteristics						
0 - 100 Employees	0.001	0.11	-0.010	-0.54	0.008	0.48
100 to 499 Employees	0.015	1.11	0.011	0.54	0.017	0.99
Covered by Collective Bargaining	-0.053	-3.84	-0.065	-3.48	-0.040	-1.96
Employer Has Multiple Locations	0.047	4.80	0.056	3.99	0.033	2.53
Public Sector Firm	-0.066	-4.00	-0.044	-1.79	-0.081	-3.81
Labor Market Characteristics						
Unemployment 6 - 8.9%	-0.007	-0.67	-0.009	-0.63	-0.006	-0.48
Unemployment 9.0+ %	0.019	1.14	0.007	0.30	0.030	1.30
Occupational Growth Rate	0.060	0.54	-0.134	-0.82	0.180	1.30
Industry Growth Rate	0.049	0.53	0.075	0.60	-0.010	-0.08
Miscellaneous						
1989	-0.042	-4.38	-0.052	-3.77	-0.031	-2.41
1990	-0.084	-7.80	-0.116	-7.39	-0.053	-3.77
Being in Balanced Sample	0.029	2.83	0.035	2.27	0.020	1.53
N	8870		4985		3885	

[A]The continuous approximation is used to calculate the marginal effects for discrete variables.
[B]Techicians are the omitted category

Table A3: Determinants of the Probability of Promotion and Reporting to a New Supervisor

(Random Effects Probit Marginal Effects[A] and z-Statistics)

	Total		Men		Women	
	Margin	z-stat	Margin	z-stat	Margin	z-stat
Demographic Characteristics						
Female	-0.010	-1.89				
Married	-0.003	-0.51	-0.006	-0.75	0.000	0.03
Presence of Child Aged 0	-0.005	-0.61	0.003	0.27	-0.015	-1.11
Presence of Child Aged 1 —5	0.003	0.52	0.006	0.68	0.001	0.09
Human Capital Characteristics						
Education	0.022	2.60	0.034	2.99	0.008	0.55
Education^2	-0.001	-2.80	-0.001	-2.95	0.000	-0.82
AFQT Score	0.000	-2.97	-0.001	-4.00	0.000	0.14
Number of Previous Jobs	0.002	3.25	0.003	3.57	0.001	1.20
Pre-Employer Experience/100	0.006	1.21	0.016	2.20	-0.008	-0.95
Pre-Employer Experience^2/1000	-0.007	-0.96	-0.161	-1.84	0.013	0.97
Employer Tenure	0.000	4.05	0.000	2.67	0.001	3.31
Employer Tenure^2/100	0.000	-3.79	0.000	-1.89	0.000	-3.67
Employer Tenure^3/1,000,000	0.001	3.61	0.001	1.67	0.003	3.61
Occupation[B]						
Managers and Professionals	0.038	3.34	0.050	2.94	0.030	1.91
Sales	0.020	1.50	0.035	1.82	0.006	0.34
Administration/Support	0.011	0.86	0.021	1.08	0.009	0.51
Service	-0.001	-0.07	-0.001	-0.06	-0.003	-0.16
Precision Craft	0.001	0.09	0.004	0.25	-0.003	-0.12
Operators/Laborers (inc. Tansport)	-0.023	-1.76	-0.020	-1.11	-0.023	-1.20
Employer Characteristics						
0 - 100 Employees	-0.010	-1.58	-0.017	-1.84	-0.005	-0.61
100 to 499 Employees	0.002	0.34	0.002	0.15	0.002	0.18
Covered by Collective Bargaining	-0.022	-3.04	-0.026	-2.73	-0.017	-1.44
Employer Has Multiple Locations	0.031	5.86	0.032	4.28	0.029	3.79
Public Sector Firm	-0.025	-2.84	-0.015	-1.17	-0.033	-2.72
Labor Market Characteristics						
Unemployment 6 - 8.9%	0.001	0.29	-0.002	-0.25	0.004	0.55
Unemployment 9.0+ %	-0.003	-0.40	-0.008	-0.71	0.002	0.18
Occupational Growth Rate	0.066	1.08	-0.044	-0.50	0.156	1.85
Industry Growth Rate	0.009	0.18	0.013	0.20	0.009	0.12
Miscellaneous						
1989	-0.020	-4.22	-0.028	-4.18	-0.012	-1.82
1990	-0.074	-11.72	-0.089	-9.76	-0.062	-6.92
Being in Balanced Sample	0.006	1.22	0.004	0.49	0.010	1.43
N	8870		4985		3885	

[A]The continuous approximation is used to calculate the marginal effects for discrete variables.
[B]Techicians are the omitted category

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