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The Role of Gender in Promotion and Pay over a Career

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Abstract

Using data from the National Longitudinal Survey of Youth (NLSY79), this paper considers the role of gender in promotion and subsequent earnings development and how this evolves over a career. In its use of three career stages, the study builds on earlier work using the NLSY79 that considers gender differences in the early career years alone. The raw data suggest reasonably favorable promotion outcomes for females over a career. But the advantages seem to be confined to less-educated females. And while there are strong returns to education for males through enhanced promotion probability and attendant wage growth in later career this is not the case for females. Although this latter finding is not inconsistent with fertility choices on the part of educated females, choice is seemingly only part of the explanation.

JEL Classification: J16, J31, J51, J62
Keywords: promotion, earnings, early/mid/peak career, gender, public sector, private sector

I. Introduction

The role of gender differences in promotion rates is the subject of a growing albeit unsettled empirical literature. Furthermore, that literature has expanded of late to consider the consequences of promotion. Without seeking to minimize the differences in finding and interpretation that have arisen (see below), there is now broad agreement that promotion plays a material role in general earnings development. The promotions literature has thus come to supplement a much older literature on the earnings function,[1] while contributing independently to the discussion of labor market structure and job hierarchies. The theoretical antecedents here include the notion of promotion as a prize, a means of incentivizing workers in a tournament-type framework (e.g. Rosen, 1986, and, more generally, Gibbons, 1998). Another model, now paying explicit attention to gender differences, has exploited the idea that equal-ability women have better alternatives to market work than their male counterparts. As a defense against higher quits, employers might well in these circumstances set higher promotion standards for females *and* be less likely to promote them (see, in particular, Lazear and Rosen, 1990).[2] A reverse application stresses that although an employer may discriminate against a group of workers when initially hiring them (i.e. by holding them to a more exacting standard) the employer may nevertheless subsequently favor that group when hiring from within (Fryer, 2007). This *belief flipping* model argues that, conditional on being hired, the discriminated-against group, which is relatively more talented that the undiscriminated-against group, will subsequently fare better (be more likely to be promoted) than the latter. In this dynamic model of statistical discrimination, ex ante pessimism is replaced by ex post

[1]Although promotion can clearly also be viewed as a consequence of human capital investment, or as indicative of the importance of job match considerations, which clearly complicates the task of discriminating between the various models.

[2]Yet other models include aspects of the informational content of promotions to competitor firms (e.g. Waldman, 1984).

optimism once the more exacting hiring standards have been applied.

At the empirical level, as we have intimated, there are disagreements regarding the impact of gender on promotion as well as the impact of promotion on earnings. The mixed results in large part reflect a literature that has typically examined a single firm (or small group of firms) or single occupation and/or that has a basis in cross-section analysis. That is to say, only a limited number of studies have used representative samples of workers across occupations and firms, and even fewer have deployed panel data estimation techniques. One goal of the present paper is to contribute to the debate by presenting new evidence on gender and promotion using a longer panel than the latter. In particular, we shall examine a panel that encompasses both mid- and peak-career development and not just early careers

The panel dataset through which we seek to offer a general analysis of gender as a factor in promotion and provide unbiased estimates of its effects is the 1979 National Longitudinal Survey of Youth (NLSY79). This survey has two main strengths. First, it is a nationally representative sample offering results that can be generalized. Second, since the data in question cover 30 years of a respondent's work history, they allow us to track progress over a reasonably long career profile.[3]

Although the NLSY79 has been used before in investigating gender and promotion, the present study not only examines longer employment histories but also seeks to chart the influence of education and broad sector. Education is likely to be of importance in influencing promotability and in mediating the returns to promotion. It may also assist our understanding of promotion and wage growth by career stage where high levels of education are associated with delays in motherhood (Miller, 2011). For its part, the public sector is of interest given the greater importance of the public sector in the mix of female employment.

[3]Another strength of the survey, albeit one not exploited here (other than to achieve a consistent measure of upward mobility within the firm across rounds of the survey) is that it provides alternative definitions of what it means to be promoted lacking from other representative datasets.

Arguably, the public sector might be in the vanguard of programs involving equal or even preferential treatment for women, affording them greater flexibility. Job assignment might also be more structured than in the private sector, with formalized hierarchies and longer promotion ladders. Alternatively, sheltered from competition, the public sector may admit of more discrimination in promotion than the private sector and/or may make less use of incentive mechanisms. Although the public sector has been largely neglected in the empirical literature, there is the hint that promotion chances may be lower for females in the public sector and among nonprofits than in the private sector (Cobb-Clark, 2001; Devaro and Brookshire, 2007).

After a brief discussion of the promotions literature, the paper addresses two main questions: first are there significant gender differences in the probability of promotion; and, second, do these translate into earnings differences? The answers are organized around career stage. Thus, having established the extent to which differences in promotion can be explained by the usual suspects – education, experience, family characteristics, and race – we examine the manner in which promotion and the earnings gap between the genders evolve over the stages of a career. Within this framework, we next examine how career trajectories are influenced by educational status and differ by broad sector. Finally, and related to educational differences, we ask whether the revealed gender differences can be explained by choice linked to the timing of fertility.

II. Gender, Promotion, and Earnings in the Empirical Literature

Past research on the determinants and consequences of promotion has tended to focus on individual firms or occupations, the rationale being that across-firm differences in promotion practices (and wage development) will be either ruled out or that the definition of a promotion will be rendered more transparent. The obvious limitation of such approaches is that their results may not be generalizable. More representative studies using larger samples

of workers and firms should tell us more about which patterns are relevant to the average worker, but where based on cross-section data will confront the usual causality issues raised by unobserved individual heterogeneity. Panel data such as those used in the present study hold out real promise in this regard, while also enabling us to consider the dynamic relationship between promotion and compensation.

Firm studies investigating promotions alone generally obtain negative findings (e.g. Stewart and Gudykunst, 1982; Cannings, 1988), although some studies suggest that ceilings may be confined to lower reaches of the job ladder (Jones and Makepeace,1996; Spilerman and Petersen, 1999; and Fernandez and Abraham, 2011).[4] Some firm studies considering promotion *and* wages include positive findings (e.g. Gerhart and Milkovich, 1989, report that females have more promotions and that promotions have a similar impact on earnings). But more often than not the results are unfavorable to women (e.g. Hersch and Viscusi, 1996, argue that greater promotions among women stem from their starting lower on the job ladders, while Ransom and, Oaxaca, 2005, point to the near exclusive assignment of some entry-level jobs to women and their virtual exclusion from management positions).

For their part, the extant industry studies are no more upbeat. They report that women receive lower initial job placements than males and where employed in similar entry positions are differentially promoted after being hired (Cabral, Ferber, and Green, 1981), or provide evidence of female job ladders that hit ceilings in certain grades (DiPrete and Soule, 1988), or suggest that women confront higher promotion thresholds in securing promotion (Pekkarinen and Vartiainen, 2006).

Since disparity of finding may be specific to the firm or industry under consideration

[4]Occupational studies are even more negative, although most report major improvement in gender gaps over time. See, inter al., Spurr, 1990; Spurr and Sueyoshi, 1994; Ginther and Hayes, 1999, 2003; McDowell, Singell, and Zilliak, 2001.

in these studies, what have we learned from analyses of data based on samples of workers intended to be more representative? We refer to studies based on the Quality of Employment Panel, the Panel Study of Income Dynamics, the Multi-City Study of Urban Inequality, the British Household Panel Survey, and, finally, the 1979 National Longitudinal Survey of Youth also used in the present empirical inquiry.

In a panel study of intra-occupational earnings differences using the Quality of Employment Panel, 1973-77, Olson and Becker (1983) confirm the finding that promotion contributes very substantially to earnings development. But the authors' fixed effect regression results suggest that while gender wage gains are equal, ceteris paribus, promotional opportunities are not. Echoing the industry studies, women are found to be held to a higher promotional standard than males. As a result, although the gender earnings gap narrowed by some 6 percent over the sample period, it would have narrowed by roughly 9 percent had men and women been promoted on the basis of the same criteria.

In a much larger-scale analysis – the previous study's final sample is just 408 individuals – McCue (1996) presents data on promotions involving a change in position from the 1976-88 survey years of the Michigan Panel Study of Income Dynamics. Promotions are compared with separations and transfers as well as with no changes in position. As far as wage growth is concerned, the author's estimates of the effects of promotion on wages relative to an absence of any change in position are approximately 10 percent for white males and black women and only slightly above (below) this for white women (black men). These values pertain to the first decade in the labor market. But promotions favor males. The author's hazard rate results for promotions indicate that black males, black females, and married white females have lower hazards than white males.

Blau and Devaro (2007) consider gender differences in promotion rates and remuneration in their analysis of a sample of new(est) hires from the Multi-City Study of

Urban Inequality, 1992-95. One advantage of this dataset is that it is comparatively rich in firm characteristics. Its disadvantage is the inability to control for unobserved individual heterogeneity. The authors' main findings are twofold. First, promotion rates are between 2.2 and 3.1 percentage points higher for men than women – where the mean promotion rate is around 9 percent – and is effectively unchanged with the inclusion of detailed controls for occupation and industry. The authors' wage-change-from-promotion regressions and within-job wage growth regressions (i.e. without promotion), on the other hand, show little difference between men and women.

These three studies all point in a similar direction: lower promotion rates for women but comparable gender returns from promotion. A dissenting study is Booth, Francesconi, and Frank's (1999) analysis of the 1991-1995 waves of the British Household Panel Survey (BHPS). The authors report that although women are no less likely than men to be promoted their earnings from promotion are adversely impacted. They offer a sticky floors model – with internal *and* external discrimination – to explain the failure of women to catch-up, remaining stuck at the base of the wage scale for the new grade.

In the final study considered here, Cobb-Clark (2001) examines the 1988-90 waves of the NLSY79. She seeks to decompose the gender gap in promotions (and earnings) into differences arising from characteristics and in returns to those characteristics. Cobb-Clark's random effects probit model indicates that women have a 5.8 percentage point lower probability of being promoted than corresponding males. Differences in the returns to characteristics (demographic, human capital, and job) explain the entire promotion gap. But the author's log wage growth equation points to wage gains for females that are 2.4 to 5.6 percent *higher* than for promoted men. At promotion, women experience between 7.0 to 8.1 percent extra wage growth; for men the relative payoff is less than 4.6 percent. The decomposition exercise now reveals a divergence in outcomes between women who get

ahead (see also McCue, 1996) and women who get left behind.

In sum, the more representative U.S. studies of promotion and earnings reach a broadly similar conclusion that promotion favors males with a somewhat more nuanced position on earnings growth from promotion – with Cobb-Clark in particular finding that wage change benefits can benefit (certain) women over men. But the time frame of these studies offers only a snapshot of a career. And while we would concur with Cobb-Clark's (2001: 6) assessment that "the theoretical literature is not much help in sorting out the observed causal relationships," our study of career stages while not testing competing theoretical models nevertheless seeks to provide a longer-term framework to help illustrate the ways in which gender may enter the promotion process. Moreover, as intimated earlier, we shall assess the extent to which our findings on promotions and wage growth are informed by choice via the fertility decision

III. Data

Our dataset, the NLSY79, provides a nationally representative panel of data for the cohort of individuals aged 14 to 22 years in 1979 who have been interviewed regularly since that year. We use the core cohort, excluding the oversample of Hispanic, black and low income youth as well as the military. Further, we do not consider self-employed individuals or those who work for no pay. Moreover, for our wage growth regressions we focus only upon those individuals who are not only currently working full time (which is also a requirement for our promotion regression sample) but also who have worked more than 35 hours a week in the past calendar year. Here the intention is to exclude wage increases resulting from transitions between part-time jobs and full-time jobs (in either direction) in our analysis of promotions and wages. Having also excised those with missing information on any of the variables used

in the analysis, or without data on hourly wages (or reporting hourly wages of over $1,000),[5] our sample comprises 18,658 person-year observations (15,684 for the wage growth regressions) over 11 waves of the survey – 1988, 1989, 1990, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010. The 11 waves in question are those in which promotion questions are asked.[6] In our analysis, we shall refer to the years 1988, 1989, and 1990 as the "early career" phase. This is because the NLSY respondents were then aged between 23 and 33 years. For those later rounds of the survey in which promotion questions were asked, we distinguish two additional career stages; specifically, a "mid career" phase for the four rounds of the data from 1996 to 2002 (when respondents are aged 31-45 years) and a "peak career" phase[7] comprising the four rounds from 2004 to 2010 (respondents are aged 39-53 years).

The NLSY79 has a number of advantages over other datasets in addition to those noted earlier. One is that we can obtain the individual's actual labor market experience from the number of weeks worked since the last interview. This corrects for the potential measurement error in the standard experience variable based on age and education, since

[5] We also dropped several observations with data errors, such as were revealed by earnings histories indicating wage increases of more than 100% followed by declines of more than 50% and then by increases of more than 100% in the following round – or a sequence of similar rates of decline followed in turn by large increases and subsequent large dips. Moreover, we dropped any observations indicating real wage increases (declines) of more than 400% (40%).

[6]Promotion-related questions were asked also in 1984. However, in this survey year no measure of firm size was collected. As we wish to include this variable, our baseline analysis will exclude 1984. As a practical matter, however, excluding (dummies for) firm size did not materially affect the signs or significance levels of the coefficients of interest even though firm size is a significantly positive determinant of promotion probability, log wages, and log wage growth. Regressions including the 1984 data, excluding the firm size regressors, are available from the authors upon request.

[7]As a robustness check, we also defined career stages by age groups instead of by data rounds, excluding anyone outside the age range in the newly-specified rounds of the data. Results were mostly unaffected.

women may work more discontinuously than men. Another is that it contains detailed information on promotions beginning in 1984, then (after a gap) annually between 1988 and 1990 and, finally, biennially from 1996 onwards. (The survey itself became biennial in 1994.) Nevertheless, the promotion question has changed over time, requiring adjustments in our data selection and analysis. In the 1988, 1989, and 1990 surveys, the promotion question relates to promotion on the current job in circumstances in which the respondent had worked with the current employee for at least 9 weeks. However, this tenure condition was no longer applied to the promotion questions in surveys conducted after 1996. In the interests of consistency, we restricted our sample throughout to workers with at least 9 weeks of tenure with their current employer.

Regardless of the tenure condition, the promotion question always concerns in-house promotions, namely with the current employer. In this treatment, therefore, all promotions are internal in nature.[8] But in our regression analysis we shall also include a dummy variable for changing employers since the last interview, because individuals who are new at their jobs may be less likely to be promoted to the extent that they may not have accrued enough time on the job to demonstrate performance, or to have built up enough tenure to qualify for promotions that are automatic in nature. Conversely, they may be more likely to be promoted; for example, a woman who changes jobs by reason of her husband's relocation may accept a job for which she is overqualified, and thereby rise quickly in the new job hierarchy.

There have also occurred changes in the type of promotions that respondents are asked to report. Most notably, since 1996 the promotion question asks about promotions that are position changes, whereas earlier surveys did not impose this restriction. However, even

[8]The promotion question is asked for up to 5 jobs held since the date of the last interview. We will use the answer for the *current job* – that is, the job held at the date of interview – as our promotion outcome. Addison, Ozturk, Wang (2014) have shown that promotions on the current job cover more than 90 percent of all recorded promotions.

though position change is a requirement for the promotion questions, not all promotions bring about a change in responsibility.[9] Another important detail regarding the promotion question relates to the change in structure of the survey. As we have noted, the NLSY79 became biennial in 1994 so that any question that asks respondents to report events "*since the date of last interview*" now captures events occurring over two years. As respondents are more likely experience a promotion with their current employer since the date of last interview if it is over a two-year period than a single year, we may be underestimating promotions in early career or overestimating them in later years when we do not make adjustments. We checked for potential biases stemming from this data collection feature by *biennializing* our data for the early years and re-ran our models for a modified measure of promotions as a robustness check. We return to this issue in discussing our regression results.

Although labor market activity has been surveyed in great detail in the NLSY79 since its inception, the occupational codes are not recorded consistently across rounds of the survey. Between 1979 and 2000, the occupations are coded according to both the 1970 and 1980 census codes. Since 2002, however, jobs are exclusively identified using the 2000 codes[10] to capture the new and emerging occupations. We mapped these occupational codes

[9]Thus, unlike Pergamit and Veum (1999), we did not impose any filters to distinguish "true" promotions.

[10]According to NLSY79 Attachment 3: Industrial and Occupational Classification Codes (https://www.nlsinfo.org/sites/nlsinfo.org/files/attachments/121217/att300.pdf), jobs are coded by 3-digit 2000 Census Codes in the 2002 survey, by 4-digit 2002 Census Codes in 2004 survey, and by 4-digit 2003 Census Codes in 2006-2010 surveys. Based on the codes in Attachment 3, there is an implied "0" in the 4-digit codes, so dividing it by 10 gives us the same 3-digit codes as in 2000 Census Codes, except for the unemployed, military, those not in the labor market, and occupations that are in practice "uncodable," none of which is included in our sample.

so as to be able to study the full extent of the promotion data panel available to us.[11] We also mapped all industry codes observed over different NLSY79 rounds to 3-digit 2000 Census Industry Codes,[12] and followed Pergamit and Veum's (1999) methodology to generate 10 industry groups.

In our analysis we used a "balanced" panel of individuals, which required individuals to be observed in at least two out of three rounds in the early career stage and not absent in more than two rounds in later stages. Appendix Table 1 defines the variables we use in our analysis and reports the descriptive statistics for our sample as well as for everyone, including those respondents who do not satisfy our inclusion criteria for later years and therefore do not enter our balanced panel. Respondents in the balanced panel have slightly higher AFQTs, more years of schooling, higher wages, and are more likely to be male and union affiliated than those in the general sample who satisfy our sample restrictions but fail to do so consistently and therefore do not enter our balanced panel. These differences in samples

[11]We used the crosswalks provided by David Dorn (2009) and Autor and Dorn (2013), giving 3-digit occupation codes—or 1990dd—that can serve as a link between occupation codes of 1970, 1990, and 2000 census. We first use their crosswalk linking 1970 and 1990dd and then the crosswalk linking 2000 and 1990dd, so that all occupations in our sample will be measured by 1990dd codes in a consistent fashion. We further utilized Autor and Dorn's aggregation to group all occupations to the one-digit level as follows: *management/professional/technical/financial/sales/public security*, *administrative support and retail sales*, *low-skill service*, *precision production and craft*, *machine operators, assemblers and inspectors*, and *transportation/construction/mechanics/mining/agricultural*.

[12]In the 1979 through 2000 rounds of the survey, industries are classified according to 1970 codes. Beginning in 2002, the 2000 census codes are used. To match the industry codes, we first used the mapping provided in the Census Bureau's Technical Report #59 (Table 3) to link industry 1970 codes to 1980 codes. Between 1980 and 1990, there are slight changes of the industry codes and we used the information provided by Unionstats (http://unionstats.gsu.edu/IndOcc_80-90.htm accessed on June 5, 2013) to make the requisite changes and mapped 1980 codes to 1990 codes. Finally, we merged in the 2000 industry codes using the crosswalks between the 1990 and 2000 census. The crosswalk is available from http://www.census.gov/people/io/files/indcswk2k.pdf).

should be kept in mind when interpreting our results and in comparing mid- and peak career promotion and wage growth estimates with those in the literature.[13]

Figure 1 identifies our three career stages and charts averages of the annual/biennial promotion rates since the date of the last interview, also plotting the 95 percent confidence interval around these averages so as to facilitate comparisons between male and female rates. Table 1 gives average values of promotion rates over each career stage, adding material on corresponding levels of and growth rates in real pay for promoted and non-promoted individuals. Looking at each piece of descriptive information in turn, two trends are evident in the figure. First, and predictably, as workers age their promotion rates decline. Second, females on average enjoy higher promotion rates than do males in the later career years. In the early career years, male promotion rates are about 5 percentage points higher than those of females in any survey year, each being statistically significant. But in the mid-career

[13]The table also provides descriptive statistics for those individuals who satisfy our sample restrictions in at least one round of the early career years but not in any of the subsequent career segments. We call these individuals "early leavers." Comparing early leavers (in the first column of the table) with "early career" individuals in our balanced and unbalanced panels (third and second columns, respectively) provides some interesting differences. We see that early leavers had higher AFQT scores than their counterparts in either of the other two early career groups. They also had more years of schooling, albeit only significantly so compared with the general unbalanced sample ("early all"). They were also more female in composition, while containing a lower percentage of blacks and individuals with children. Leavers also had less tenure on the current job, despite having greater prior labor market experience. Leavers were also more likely to be found in low-skill service and administrative support type occupations and less likely to come from machine operation and assembly, transportation occupations, and manufacturing industry. Further, they were more prone to work in small firms and in the private sector than either of the other two early career groups. Finally, even if they received a significantly higher average wage, they were promoted less and were also less likely to be union affiliated. We also identified a group we term "mid career exits," namely individuals we observe at least once in both early and mid career in our sample but not in the peak career years. These individuals were more similar to the general population than the early leavers but more female than the balanced panel. They were also less Hispanic and less likely to be married compared with the early leavers and the general population in early career (the "early all" category).

(1996-2002) years, the advantage switches over to females: and for any year in this interval and in peak career (2004-2010) their rates are as high as those of males – actually higher whenever the differences are significant. As promotions have been found to be important components of wage growth, one might expect this reversal in promotion trends to ameliorate the gender pay gap over the career of our workers.

[Figure 1 and Table 1 near here]

However, the summary values in Table 1 show that in early career even though their promotion rates are lower, females have slightly higher wage growth when promoted than do males. More importantly, females experience higher relative returns to promotion (12.6% versus 7% for males; 12.7% versus 5.8% for females). Moreover, even though female promotion rates are improving on average over the course of their careers relative to males the same is not true of promotion-related earnings. In fact, reversals are the order of the day: while promoted males realize 17 percent wage growth in mid career and 13.4 percent in peak career, the corresponding values for females are only 14.9 percent and 11.2 percent. The differences are economically significant and even though we cannot reject the null on a two-sided test, male returns are significantly higher than female returns at the 15 percent level.

IV. The Empirical Model

We do not structurally model promotion probability and its consequences but instead follow the same theoretical route as Cobb-Clark (2001) in constructing our empirical models. In this framework, the probability that worker i of gender g is promoted in job j at time t, $Prob(P_{ijt} = 1)$, is determined as a function of a latent index Y – let us call it an *index of promotability* after Cobb-Clark – as follows:

$$Y^*_{ijt} = \alpha_{gt} + \beta X_{ijt} + \varepsilon_{it}, \qquad (1)$$

$$Prob(P_{ijt} = 1) = Prob(Y^*_{ijt} > 0),$$

where X_{ijt} is a vector of the worker's demographic, human capital and job related characteristics, such as education, (the unexplained portion of the) *Armed Services Vocational Aptitude Battery* [ASVAB] test score (which we use as a measure of *unobserved ability*), marital status, number of children, tenure with the current employer, labor market experience prior to the current employer, the local unemployment rate, collective bargaining coverage/union status, and the occupation, sector and industry of the job. Finally, ε_{it} is the unobserved factors that determine the promotion probability at time *t* for worker *i*.

We first estimated the promotion model treating the data as pooled cross-section using logistic regression and then allow ε_{it} to have a fixed individual component that is correlated with observed characteristics. We fit this panel data specification using conditional logistic regression with fixed effects. All the estimations were undertaken using STATA 13. We note parenthetically previous studies (viz. Booth, Francesconi, and Frank, 1998; Cobb-Clark, 2001) used a random-effect (RE) model to estimate the gender gap in promotion.

We are interested in the consequences of promotions as materialized in wage growth. To assess the relative wage gains from promotion we estimate a log-wage growth equation, defined as follows:

$$\Delta lnW_{it} = lnW_{it} - lnW_{it-1} = \gamma_t(Z_{ijt}) - \gamma_{t-1}(Z_{ijt-1}) + \delta P_{ijt} + \nu_{it} - \nu_{it-1}, \qquad (2)$$

where Z_{ijt} comprises a vector of human capital and job characteristics as well as indicators of labor market conditions and P_{ijt} is the promotion indicator, which is by definition a *change* from the last period's status. There are likely to be a number of unobserved determinants of wage growth that are correlated with observed covariates such as education and occupation, that is $\nu_{it} = u_{it} + \epsilon_i$ and $\text{Corr}(\epsilon_i, Z_{ijt}) \neq 0$. The wage growth equation factors out the fixed

individual unobserved effects, allowing us to estimate equation (2) using OLS.[14] We are assuming returns to characteristics such as tenure, experience, schooling and sector are time variant and returns to promotion vary by gender, education, and career stage as well as sector.

V. Findings

(a) Promotion disparity by gender

Table 2 reports the estimates from promotion probability models.[15] The first three models treat the data as cross section and ignore the possibility of time-constant individual specific unobserved factors in equation (1). For the specification in Model 4, we utilize the panel nature of our data and allow the unobserved factors to be correlated with the observed covariates. We use logistic regression for the first three models and conditional fixed effects logistic regression for the last model using Stata 13.

To make the gender differences visually distinct we report the coefficient estimates for each model in two columns. The first column will give the coefficient estimates for the main variable and the second column (bolded) will report the estimate for that variable when interacted with the female dummy. (The coefficient estimate for the female dummy indicator itself is provided in the first row of the table.) Thus, looking at the two sets of figures side by

[14]Observe that since the current employer may be a new employer, the previous wage is not necessarily the wage received immediately before the promotion event but conceivably that with a different employer the worker had at the date of last interview.

[15]These estimates ignore the change in survey data collection frequency. Estimates with biennialized early career data are very similar and are available from the authors upon request. We also ran separate regressions for each career stage. However, in estimating Model 4, this setup results in the loss of many observations – since one is less likely to observe promotions over the course of three to four rounds as compared with ten 10 rounds of data – and conditional logit estimation cannot use observations with no change in the outcome variable. Nevertheless, the resulting estimates are mostly unchanged in sign and magnitude although they are estimated with much less precision.

side, we can assess how the factor contributes to *promotability* and also how this contribution varies by gender. In all these models, males in the private sector with at most a high school diploma are the base (excluded) group.

[Table 2 near here]

Our first task is to determine whether the promotion trends in the raw data (from Figure 1 and Table 1) disappear when we control for the usual human capital controls – such as education, tenure, experience, and *unobserved ability* – together with firm size, unionization, sector, occupation, and industry of employment. Under Model 1, we only allow the constants to differ by gender and career stage, to capture the change in average incidence of promotions and also changes in gender differences as workers age. We see that controlling for human capital variables does not erase the decline in promotion incidence (the coefficient estimate for mid-career is -0.230 and for peak career it is -0.548, implying for males in the private sector roughly a 20 percent decline in promotions in midcareer and a 46 percent decline in peak career compared to the early career phase). Nor does it obscure the female-favoring trends in gender difference in *promobility* over the career. We see that while women are on average estimated to be about 15 percent less likely ($\exp^{-0.163}$) to be promoted than males in the early career phase, the gender gap is closed over the next two stages and females come to gain a slight edge; specifically, their promotion probability is about 7.5 percent higher in mid career ($\exp^{0.235-0.163}$-1=0.075) and about 1 percent greater in peak career ($\exp^{0.176-0.163}$-1=0.013). Each of these estimates is statistically significant.

In the first model, we also see that promotion probability in early career is about 20 percent higher ($\exp^{0.186}$) in the public sector on average compared to the private sector. We would next like to see if this is the case for both genders. Public sector jobs may be more structured in terms of career ladders and they are more highly unionized. Moreover, there may be gender differences in occupational choice in the public sector, which may in turn lead

to differences in career progression. Thus, in Model 2 we also allow public and private sector employees to have different averages by gender, all else equal. We see that once we allow public sector employment to contribute differently to the promotion probability of males and females, gender disparity is smaller in private sector ($\exp^{-0.126}$-1=-0.118) compared to that in the public sector ($\exp^{-0.126-0.203}$-1 = -0.280) in the early career. This gender disparity favoring females in promotion rates in the private sector persists in mid- and peak career (the coefficient estimates are 0.176 for mid-career and 0.179 for peak career, meaning that females are about 5 percent more likely to be promoted vis-à-vis males in each of these later career stages), even if in this model only the difference in mid career is statistically significant.[16]

We next allow gender to affect promotion probability differently, not only by sector and career stage but also by educational attainment within these dimensions and work with a full set of interactions. Thus far, our estimates do not seem to be consistent with the glass ceilings that females are said to confront as they age because females are more likely on average to be promoted than males. However, glass ceilings may be more of a concern for highly educated groups than the less educated. Moreover, there is the possibility of glass doors initially preventing women acquiring jobs with lots of advancement opportunities (statistical discrimination) but permitting higher rates once these doors are negotiated (i.e. *belief flipping* following statistical discrimination). This phenomenon might also be expected to reflect educational status. Another possibility is the timing of fertility choice, as age at first birth is on average increasing in education level. In Model 3, where we allow differential

[16]Women in the public sector are less likely to be promoted than their private-sector counterparts in early career, but more likely in mid- and peak career. However, while economically material ($\exp^{-0.203}$-1=-0.184, that is 18% less in early career, and $\exp^{0.051+0.103+0.323}$-1 or 53% more in mid career and $\exp^{0.051+0.475-0.063}$-1 or 60% in peak career) neither difference is statistically significant. The decline in promotion rates over the career is less severe for males in the public sector ($\exp^{-0.623}$ versus $\exp^{-0.623+0.475+0.05}$). In fact, male public sector employees are about 70% likely to be promoted in peak career than are male private-sector employees.

affects by educational attainment (in addition to the sector of employment), we see that female gains in promotion probability relative to males seem to be for less educated women (in both sectors) moving from early career to mid and peak career. Gender disparities in promotion rates are much stronger for the least educated group than the average effect we have thus far estimated. For this educational group in early career, females in the private sector are about 33 percent less likely ($e^{-0.396}$-1=0.33) to be promoted than their male counterparts. (They are also disadvantaged in public sector as well, although on this occasion while the female interaction coefficient (0.017) is positive, it is small in magnitude and statistically insignificant.) Females in the higher education groups are more likely to be promoted than their less educated female counterparts in early career. In particular, female college graduates in the private sector are about 83 percent more likely ($\exp^{0.607}$-1=0.83) to be promoted than the lowest educated group. These females also about 23 percent more likely ($\exp^{0.607-0.396}$-1=0.23) to be promoted than their male private-sector counterparts. This premium disappears by midcareer, when these female college graduates are not only less likely to be promoted than in the early career stage but also less likely compared to males of similar educational background and also females with less education. As can be seen, the gender disparity is especially large for this education group in the public sector compared to all other groups in later career stages.

Finally, in Model 4 we exploit the panel nature of our data and allow for unobserved fixed factors that are potentially correlated with the observed determinants of promotion probability. Incorporating unobserved factors does not reduce the disparities, and in fact makes them larger and more significant in some cases (even though we lose about 463 individuals/5000 observations due to lack of change in the promotion outcome over the 10 years of data). In this model, too, we see that reversal of the male-female disparity in

promotion probability is for the lowest education group. In the highest education group, females lose ground to males and this is more significant in the public sector.

In sum, the promotion results indicate that the reversal of gender disparity in promotion probability that we observe in the raw data is still on average what we find ceteris paribus. However, there are differences among females by education status and sector. Although females of the highest education group are more likely to be promoted than males in early career in private sector and just as likely to be promoted in public sector, they lose ground over the next two career stages in both sectors, but especially in public sector. What we observe as changes in gender promotion disparity favoring females are to be seen as a combination of much higher promotion rates for less educated females and much lower rates for males in general.

We will next inquire into the returns to promotion and seek to explain the existence or lack of gender disparity in wage growth in light of our promotion regression findings, before turning finally to determine whether the disadvantage we estimate for educated females in late career stages is informed by the fertility timing differences of higher and lesser educated women.

(b) Returns to promotion by gender: the role of education and sector through the career stages

A critical component of any study of promotion is the analysis of its consequences. Accordingly, we next discuss our wage growth estimates, emphasizing the role of promotion along with education, gender, and sector by career stage.[17] In Table 3 we report the estimates

[17]As mentioned earlier, the BLS changed data collection frequency after 1994, making the survey biennial. As a result, the returns to promotion in early career data are not directly comparable to the mid- and peak career values, and running a regression on the whole data without proper adjustments would imply biased estimates. We chose to perform separate regressions to avoid losing a year of observations (while *biennializing* promotion rates).

for equation (2) estimated separately for each career stage. We report the estimates in a similar format to Table 2; thus, for each career stage, the first column of results is for the main variable and the second bolded column contains the estimates for the variable interacted with the female dummy. The new dimension we are exploring here is wage growth due to promotion (although the first panel of the table contains results for wage growth in the absence of promotion). We assume that promotion contributes to wage growth differently by education and sector in addition to there being gender differences; thus, in the shaded second panel for each regression, we present the interactions with the promotion status dummy. Finally, in the bottom panel of the table, we report coefficient estimates for variables representing changes in a worker's situation, such as divorce, a new birth, a move to a new employer, and a change in union status or sector of employment.

Table 4 is designed to make interpretation of the results contained in Table 3 easier by providing average marginal effects for the promotion indicator by sector, gender, education, and career stage. We will use the two tables simultaneously in our discussion of wage growth results. Finally, our discussion will also incorporate the calculations of wage growth resulting from promotion shown in Table 5 to provide insights into the relative importance of promotions to wage growth for each subsample.

[Tables 3 and 4 near here]

Looking at the early career estimates in Table 3 we see that, for males in the private sector with at most a high school education, promotion increases wage growth by about 4.6 percentage points. For females with the same educational background in the private sector, the returns are 2.3 percentage points higher (although this gender difference is not significant). We also fail to observe any significant increase or decrease in returns by education level even though wage growth in the absence of promotion is higher in the private

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Pooling all career stages and running only one regression yielded very similar results. All estimates are available upon request.

sector with increased education (among males, it is 1.2 percentage points higher for those with some college and 1.8 percentage points higher for college graduates than for those individuals with just a high school education). Female college graduates realize higher returns to promotion in the private sector in early career as well as being more likely to be promoted (As noted later, this concatenation almost doubles the amount of promotion-driven wage growth for females compared to males.) These results are, moreover, very similar to those reported by Cobb-Clark (2001; Table 4).[18]

In the early career phase in the public sector, females with some college have higher returns to promotion, not only vis-à-vis other females but also compared to males. They have lower wage growth than their male counterparts if not promoted (about 4.3 percentage points lower [(-0.004-0.039)*100] but when promoted their wage growth is 7.1 percentage points higher [(0.023-0.047-0.037+0.132)*100]. On the other hand, female college graduates and females with at most a high school degree fare worse than their male counterparts. Even though wage growth is higher for non-promoted high school graduate females than for their male counterparts, males in this education group realize higher wage growth when promoted. Female college graduates, however, have lower wage growth than males irrespective of promotion, resulting in a 4.2 percentage point difference in returns to promotion [(0.023-0.047+0.007-0.026)*100 from Table 3, or (0.107-0.065)*100 from Table 4].

In the mid-career phase, we observe a dampening in the wage returns to promotion, recalling that we are now calculating wage growth over two years in the mid (and peak)

[18]One thing to keep in mind when looking at these results is the nature of the promotions in our data; they are in-house promotions and as such negatively correlated with having a new job (see Appendix Table 2). In this career stage, when external mobility is at its peak and may result in better job matches, it is not altogether surprising that highly educated individuals who are promoted do not always enjoy higher returns.

career portion(s) of our data, not the annual measure of the early period.[19] Promoted high school graduate males realize 7.2 percentage points higher wage growth than their non-promoted counterparts in the private sector. Female high school graduates have slightly lower returns to promotion (2.1 percentage points) but this gender difference is not statistically significant. Compared to the early career years, the gains from promotion for those with some college education increase for both genders in the private sector. In the public sector, however, females lose ground (their returns decline from 12.1 percentage points to 5 percentage points) while males gain an additional 3 percentage points (from 4.9 to 8 percentage points) in returns to promotion.

The public sector records higher wage growth than the private sector for the lowest educated females in this career stage. (Their wage growth is 5.8 percentage points higher than in the private sector and 6 percentage points higher than that of males.) However, when promoted they realize much lower wage growth returns in the public sector (about 3.1 percentage points lower than males). And from Table 4, we see that this translates into only about 1 percentage point higher wage growth. Female college graduates in the public sector receive lower wage growth than the least educated females in this sector if not promoted, but not when they receive a promotion. Such females also receive modestly higher wage growth when promoted than their male counterparts (6.3 percentage points versus 5.8 percentage points). In the private sector by contrast, promoted females with a college degree obtain returns to promotion that are 2 percentage points lower than their male counterparts (i.e. the wage returns to promotion are 6.5 percentage points for males and 4.1 percentage points for females).

[Table 5 near here]

[19]In fact, in estimates using "biennialized" data we obtain negative coefficients for the interaction terms of mid career and the promotion dummy as well as peak career and the promotion dummy.

The peak career results given in the final two columns of Table 3 taken in conjunction with the wage return calculations from Tables 4 and 5 reveal some interesting and significant wage growth differences by sector, gender, and education. Wage growth for females in the lowest educational category is lower in both sectors in the absence of promotion than for their male counterparts but higher when promoted; as a result, they have much higher returns to promotions.[20] In the private sector, the average marginal effects reported for the promotion variable in Table 4 indicate that these less-educated females on average enjoy 7.5 percentage-points higher wage growth when promoted as compared with a 6.2 percentage-point return for males. In the public sector the difference is even starker: females in the lowest educational category have almost double the return to promotion (4 percentage points versus 2.1 percentage points for males). More educated females on the other hand are not so fortunate; not only are they less likely to be promoted, but they also gain less from a public sector promotion in peak career than their male counterparts; looking at the lower right corner of Table 4 we see that males enjoy much stronger returns to promotion than females, some 4 percentage points more in the case of college graduates and 14.3 more for those with some college.

In Table 5, using the counterfactual (non-promotion) wage growth generated for the promoted, we combine the estimates from observed promotion and wage growth rates to present a more direct measure of the importance of promotion to wage growth. Our calculations for *the share of wage growth attributable to promotion* closely resemble the figures obtained by Cobb-Clark (2001; Table 5) for early career, and thus provide a nice baseline. Female high school graduates have almost double the share of wage growth from promotions since, as discussed above, they not only have higher returns to promotion but also

[20]Although this result is not significant in the pooled model, if we estimate the model for workers in the private and public sectors separately we can confirm the significance of the differences.

are more likely to be promoted. In Table 4 we saw that female college graduates have much lower wage growth than males in mid career. When combined with their lower promotion probability in the private sector during this phase, the result is that promotion accounts for a much lower proportion of wage growth for this group (17.9% for males and just 12.05% for females). In the public sector, on the other hand, although their promotion probability is low, the returns to promotion for female college graduates are much higher – about 60 percent more – than those received by their male counterparts (14.4% versus 8.9%). Differential rates of promotion and wage growth in the public sector in the peak career years for the college educated translate into a huge gender gap in terms of the payoff to promotion; specifically, while male wage growth from promotions is 54.8 percent in this phase it is just 10.3 percent for females.

Returning to Table 3 and looking at the balance of the coefficient estimates shown in the bottom panel of the table, we note that changing employers tends to harm wage growth – most notably in peak career. The lack of importance of inter-firm mobility to wage growth in early career may reflect the offsetting contributions of external and internal mobility, as individuals who are not changing employers are more likely to be promoted. However, moving to a larger firm pays off in all career stages. And even though it decreases wage growth in the early career years, an increase in unemployment seemingly has the opposite effect in peak career, which might conceivably reflect labor hoarding. For its part, gaining union coverage translates into a wage increase, although this is less important in peak career compared to earlier years, which career result may also be said to apply to changing sector of employment.

In sum, Tables 3 through 5 tell us that more highly educated women not only receive fewer promotions than males in mid- and peak career but also that in most cases these promotions are accompanied by much reduced wage growth as well. The result is that a much

smaller share of wage growth is attributable to promotion. This is the case for female college graduates in the private sector and for both college graduates and those with some college in the public sector. The disparity is most notable in the public sector where the contribution of promotion to wage growth in peak career for more highly educated women is one-fifth that of males among college graduates and a little over one twenty-fifth that of males among those with some college.

(c) Why are educated women disadvantaged in promotion in later career?

Our findings regarding promotions and the education level of women may in part reflect the timing of career breaks taken by women for childbirth. Female college graduates may be postponing childbirth until their mid-career years, while women with at most a high school education may be having children early on and delaying their career progression until mid career. Miller (2011) reports large returns to earnings from delayed fertility, especially for college-educated females. Appendix Table 4 shows that on average individuals in the highest educational group give birth to their first child six years later than the least educated. Moreover, having a child in any career stage is negatively correlated with promotion and wage growth for women, even though its contribution is positive for males. Addison, Ozturk, and Wang (2014) report that women without children are more likely to be promoted than men and also on average compared to women with children. However, they do not compare favorably to women whose children are no longer young by the end of early career phase. We want to know if these differences in the timing of fertility help explain some of the patterns uncovered earlier, and in particular whether they reduce the significance of gender disparities in promotions and the returns to promotion that we have estimated.

Clearly, a later start to fertility affects when educated women receive the shock to their career progressions. Education level may be capturing this difference in timing as the

two variables are highly correlated. In fact, if we were to re-estimate the model replacing the education dummies with a "late start" indicator for fertility (denoting first birth either at or after age 30 or at or after age 35), we observe similar estimates, with the *late start* variable now capturing the large penalty experienced by females in peak career.[21] However, fertility timing is palpably not the whole story. We see this in the following robustness checks in which we first re-estimate Model 3 from our promotion regression (see Table 2) by allowing fertility-related changes to affect men and woman differently, and then restricting our sample to workers who either (i) did not have any children after age 25 or (ii) are without children.

[Table 6 near here]

Results are given in Table 6. The first column of the table follows the original format of Model 3, in which number of children is not interacted with the female dummy variable. The second column introduces this interaction term to the regression. The coefficient estimate for the number of children variable in the original model is positive and insignificant. However, allowing for differences between genders in response to the number of children, we see that the argument is associated with a decreased promotion probability for females even if the main effect remains positive. In the third column of Table 6, where we restrict our sample to individuals with *no late fertility* – that is no new births after age 25 – our estimates for late-career promotion prospects for female college graduates are unaffected. The sample contains relatively few individuals who never had children,[22] but even for female college graduates in this group the estimates reported in the fourth column of the table indicate significantly lower promotion probability, especially for those in the public sector. Nor for that matter does controlling for time invariant individual unobserved factors for the *no late fertility* group moderate our estimates (see the last set of result in Table 6).

[21]These estimates are available upon request.

[22]As a matter of fact, there are no childless women with some college education in the public sector in peak career, and so no coefficient estimate to report for this interaction term.

Results for wage growth are remitted to Appendix Table 5. The wage growth regressions are estimated with a *new birth* argument that is interacted with the female dummy as well as for the restricted sample of individuals with no late fertility. In these estimates, there is a significant negative effect in the first period for females from new births, though the effect is positive for males. The gender difference in the sign of the coefficient estimates persists through the career years; while statistically insignificant, the economic effect is material and comparable to earlier years. In sum, although fertility timing and birth event are significant factors in both promotion probability and wage growth, they do not erase the gender differences we estimate.

VI. Conclusions

In the present treatment, we have sought to provide 'career-updated' estimates of the role of gender in promotions and of the consequences of such promotions. We build on past studies from the NLSY that, while offering an improvement on an earlier literature in terms of their representativeness and panel nature, only consider individuals at the early stages of their careers. Apart from being able to exploit data on promotion and earnings for individuals now also at later stages of their careers, we were also motivated to examine the role of education and broad sector (private vs. public) since there were intriguing hints in NLSY studies and the wider literature that promotional opportunities as well as the returns to promotions might be strongly influenced by educational background and sector.

Although our investigation of the role of gender, education, and sector has produced some often interesting diversions on the promotion-earnings theme, as reflected in the detailed pattern of interaction coefficients, the main findings of the present exercise can be summarized as follows. First, we found that private sector females with at most a high school education – our lowest educational category – are significantly less likely to be promoted in early career compared to males. Further, they receive fewer promotions than their more

educated female counterparts (i.e. those having some college and college graduates). Second, however, these females are much more likely to be promoted in mid- and peak career, not only compared to their own early career experience but also compared to their contemporaries (i.e. males and females with more schooling). Third, these promotion patterns are repeated in mid- and peak career - at least for public sector females with at most a high school education. Fourth, although more educated females lose their edge to the least skilled females, males enjoy significant returns to their schooling in terms of promotions. Finally, these discrepancies in the promotion returns to schooling are also manifested in our wage growth analysis. Women with either some college or with college or more not only lag behind in promotions in mid- and peak career but do not receive the higher wage growth associated with promotions of their male counterparts.

These findings regarding promotions and the education level of women reflect in part the timing of career breaks taken by women for childbirth. College educated females are delaying child birth until their mid-30s, representing the start of their mid-career years, while women with at most a high school education are having children early and delaying their career progression until mid career. However, fertility timing does not erase the gender differences promotion probability and returns to promotion among the highly educated, suggesting that the lack of returns in later career years for more highly educated women may also be a consequence of glass ceilings or shorter career ladders. Alternatively, such women may be using their leverage with employers not for promotions and, instead of "leaning in," seek more flexibility on their jobs in order to achieve a work family life balance and in that sense choosing not to "have it all."

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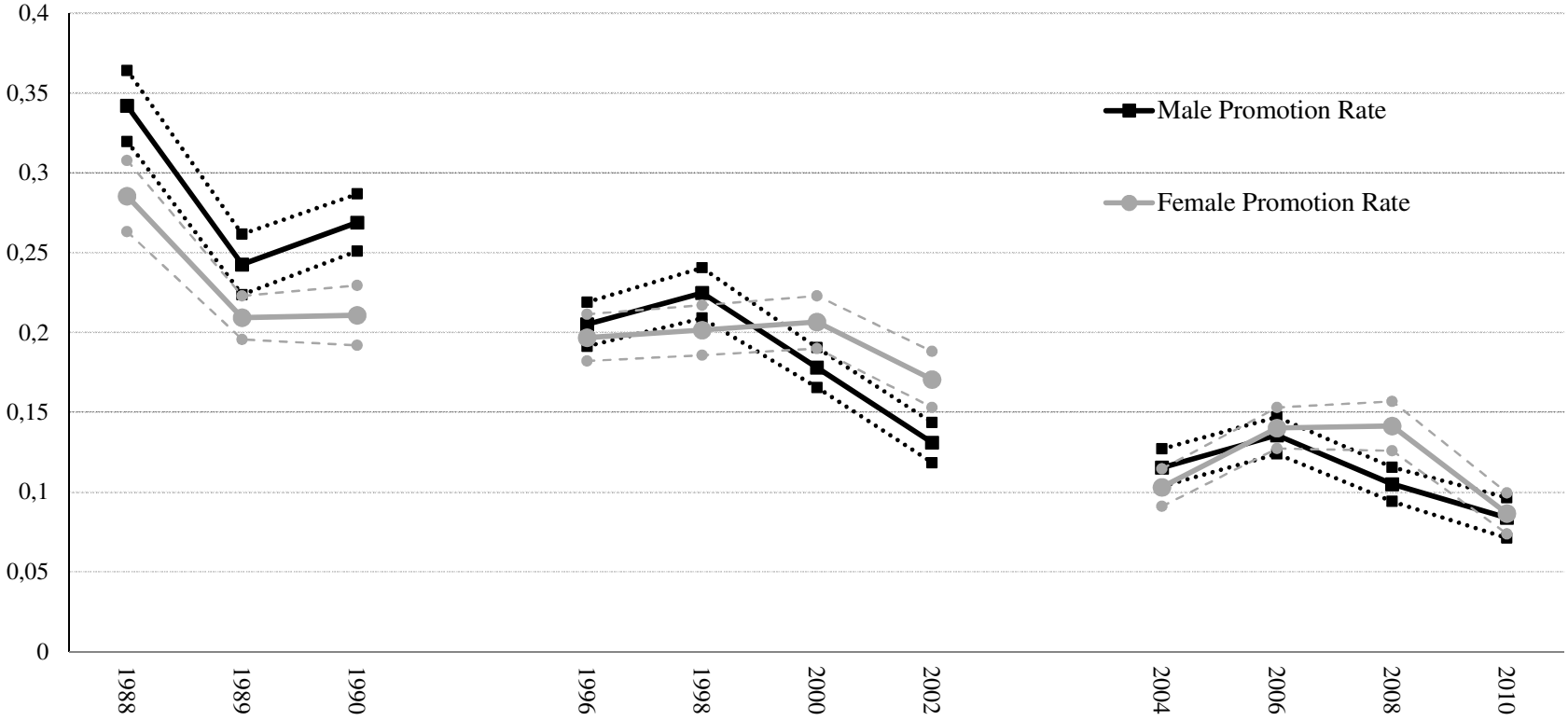
TABLES and FIGURES

Figure 1: Promotion Rates by Gender over a Career



Note: Dashed lines connect 95% confidence interval upper and lower points around the mean promotion rate at any given year

Table 1: Promotion Probability and Wage Growth by Promotion Status, by Gender and Career Stage

		Early Career	Mid Career	Peak Career
Males	Promotion rate	0.286	0.183	0.100
	Real pay	19.37	25.72	28.85
	Real pay growth	0.086	0.100	0.054
	Non-promoted	0.070	0.084	0.045
	Promoted	0.126	0.170	0.134
Females	Promotion rate	0.247	0.195	0.115
	Real pay	15.73	20.67	22.92
	Real pay growth	0.075	0.096	0.058
	Non-promoted	0.058	0.083	0.051
	Promoted	0.127	0.149	0.112
Are gender differences significant?				
ltl-stats	*Promotion rate*	*3.05*	*1.15*	*1.89*
	Real pay	*16.2*	*14.3*	*12.8*
	Real pay growth	*1.64*	*0.75*	*0.77*
	Non-promoted	*1.60*	*0.26*	*1.06*
	Promoted	*0.07*	*1.43*	*0.98*

Note: Early career wage growth and promotion rates are calculated over a single year since the previous interview. Wage growth rates in the later career stages, however, are calculated over (approximately) two years as the survey became biennial in 1994.

Table 2: Promotion Probability and Gender

	Coefficient Estimates for Main Variables and their Interaction with the Female Indicator							
	Cross Sectional Models (LOGIT)						Panel Data Model (XTLOGIT, FE)	
	MODEL 1		MODEL 2		MODEL 3		MODEL 4	
	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction
(Less than college in private sector)		**-0.163***		**-0.126+**		**-0.396****		-
		[0.070]		**[0.075]**		**[0.123]**		
Public sector	0.186*	-	0.051	**-0.203**	0.290	**0.017**	0.906*	**-1.073+**
	[0.073]		[0.142]	**[0.201]**	[0.227]	**[0.399]**	[0.407]	**[0.638]**
Some college	0.142**	-	0.140**	-	0.137	**0.191**	-	-
	[0.052]		[0.052]		[0.108]	**[0.177]**		
College or more	-0.014	-	-0.011	-	-0.296**	**0.607****	-	-
	[0.057]		[0.057]		[0.107]	**[0.173]**		
Some college•Public sector	-	-	-	-	-0.456	**-0.212**	-0.517	**0.064**
					[0.352]	**[0.581]**	[0.594]	**[0.896]**
College or more•Public sector	-	-	-	-	-0.212	**-0.404**	-0.953+	**0.785**
					[0.306]	**[0.495]**	[0.510]	**[0.773]**
Mid career	-0.230**	**0.235***	-0.240**	**0.176+**	-0.396**	**0.562****	-0.028	**0.659****
	[0.084]	**[0.093]**	[0.087]	**[0.100]**	[0.114]	**[0.166]**	[0.153]	**[0.179]**
Mid career•Public sector	-	-	0.103	**0.323**	-0.288	**0.624**	-0.705+	**1.267***
			[0.180]	**[0.265]**	[0.334]	**[0.533]**	[0.407]	**[0.605]**
Mid career•Some college	-	-	-	-	0.036	**-0.402**	0.062	**-0.447+**
					[0.157]	**[0.251]**	[0.170]	**[0.270]**
Mid career•College or more	-	-	-	-	0.446**	**-0.754****	0.637**	**-0.886****
					[0.141]	**[0.240]**	[0.153]	**[0.257]**
Mid career•Some college•Public sector	-	-	-	-	1.004*	**-0.404**	1.525**	**-1.113**
					[0.481]	**[0.749]**	[0.575]	**[0.865]**
Mid career•College or more•Public sector	-	-	-	-	0.162	**-0.225**	0.468	**-0.918**
					[0.435]	**[0.663]**	[0.507]	**[0.745]**
Peak career	-0.548**	**0.176+**	-0.623**	**0.179**	-0.728**	**0.321**	-0.096	**0.370+**
	[0.123]	**[0.106]**	[0.127]	**[0.116]**	[0.154]	**[0.199]**	[0.226]	**[0.213]**
Peak career•Public sector	-	-	0.475*	**-0.063**	0.236	**0.207**	-0.103	**1.022**
			[0.190]	**[0.285]**	[0.339]	**[0.553]**	[0.418]	**[0.632]**
Peak career•Some college	-	-	-	-	-0.050	**0.070**	-0.078	**0.098**
					[0.187]	**[0.293]**	[0.204]	**[0.317]**
Peak career•College or more	-	-	-	-	0.372*	**-0.469+**	0.564**	**-0.563+**
					[0.163]	**[0.280]**	[0.177]	**[0.298]**
Peak career•Some college•Public sector	-	-	-	-	0.321	**-0.254**	0.772	**-1.086**
					[0.513]	**[0.799]**	[0.614]	**[0.935]**
Peak career•College or more•Public sector	-	-	-	-	0.297	**-0.391**	0.700	**-1.372+**
					[0.443]	**[0.697]**	[0.522]	**[0.790]**
Number of observations	18658		18658		18658		13815	
Number of individuals							1456	

Note: All models include controls for race, ethnicity, the *unexplained* portion of the ASVAB score, marital status, number of children, firm size, unionism, unemployment, quadratic tenure with the current employer, quadratic labor market experience prior to the current employer, and industry and occupation on the current job. Standard errors are reported in brackets. **,*, and + indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 3: Wage Growth and Gender by Promotion Status over Career Stages

	Coefficient Estimates for Main Variables and their Interaction with the Female and Promotion Status Indicators					
	Early Career		Mid Career		Peak Career	
No Promotion	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction
(Less than college in private sector)		**-0.004**		**0.002**		**-0.006**
		[0.012]		**[0.009]**		**[0.009]**
Public sector	0.003	**0.020**	-0.004	**0.060****	0.036**	**-0.008**
	[0.023]	**[0.039]**	[0.016]	**[0.028]**	[0.015]	**[0.024]**
Some college	0.012	**0.001**	0.013	**0.005**	0.007	**0.017**
	[0.012]	**[0.019]**	[0.009]	**[0.015]**	[0.009]	**[0.014]**
College or more	0.018	**-0.010**	0.034**	**-0.004**	0.029**	**0.002**
	[0.011]	**[0.019]**	[0.009]	**[0.015]**	[0.008]	**[0.014]**
Some college•Public sector	-0.003	**-0.039**	0.008	**-0.061**	-0.041+	**0.034**
	[0.036]	**[0.057]**	[0.026]	**[0.041]**	[0.023]	**[0.035]**
College or more•Public sector	-0.006	**-0.022**	0.015	**-0.092****	-0.070**	**0.052**
	[0.032]	**[0.050]**	[0.022]	**[0.035]**	[0.021]	**[0.032]**
Gains from Promotion						
Promoted (*Less than college in private sector)*	0.046**	**0.023**	0.072**	**-0.021**	0.062**	**0.013**
	[0.013]	**[0.025]**	[0.014]	**[0.023]**	[0.018]	**[0.030]**
Promoted•Public sector	0.045	**-0.047**	-0.01	**-0.031**	-0.041	**0.006**
	[0.044]	**[0.082]**	[0.046]	**[0.067]**	[0.048]	**[0.072]**
Promoted•Some college	-0.009	**-0.037**	-0.011	**0.022**	-0.002	**-0.031**
	[0.022]	**[0.037]**	[0.023]	**[0.036]**	[0.030]	**[0.046]**
Promoted•College or more	-0.007	**0.007**	-0.007	**-0.003**	-0.015	**-0.006**
	[0.020]	**[0.035]**	[0.020]	**[0.033]**	[0.025]	**[0.043]**
Promoted•Some college•Public sector	-0.032	**0.132**	0.028	**0.001**	0.137+	**-0.131**
	[0.074]	**[0.121]**	[0.062]	**[0.090]**	[0.073]	**[0.107]**
Promoted•College or more•Public sector	0.023	**-0.026**	0.003	**0.061**	0.108+	**-0.053**
	[0.061]	**[0.102]**	[0.059]	**[0.086]**	[0.061]	**[0.096]**
Other changes						
New birth	0.011	-	0.005	-	0.024	-
	[0.010]		[0.009]		[0.022]	
Getting married or divorced	0.005	-	-0.004	-	0.002	-
	[0.010]		[0.009]		[0.011]	
Moving to or from public sector	0.045**	-	0.024	-	-0.027	-
	[0.018]		[0.015]		[0.022]	
Gaining or losing union coverage	0.016+	-	0.024**	-	0.015	-
	[0.009]		[0.009]		[0.010]	
Moving to or from a bigger firm	0.009+	-	0.010**	-	0.010**	-
	[0.005]		[0.004]		[0.005]	
Change in unemployment rate	-0.002	-	-0.001	-	0.002+	-
	[0.002]		[0.001]		[0.001]	
New employer	0.006	-	-0.019**	-	-0.026**	-
	[0.011]		[0.009]		[0.010]	
Number of observations	4,303		5,867		5,514	
R-squared	0.044		0.047		0.031	

Note: All regressions also control for change in industry and occupation, and quadratics in tenure and experience. Change variables are created as X_t-X_{t-1}. *New birth* and *New employer* are 0-1 dummy indicators and *Change in unemployment* is continuous. Changes in marital status, sector, firm size and unionism can take the values -1, 0 and 1; for example, the *Getting married or divorced* variable is +1 if the individual gets married, -1 if divorced (or widowed) and 0 if there is no change (the individual is still single or married). Standard errors are reported in brackets. **,*, and + indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 4: Marginal Effect of Promotion on Wage Growth, by Sector, Education and Gender across Career Stages

		Early Career		Mid Career		Peak Career	
		Males	Females	Males	Females	Males	Females
Private	Less than college	0.046	0.069	0.072	0.051	0.062	0.075
		[0.013]**	[0.021]**	[0.014]**	[0.018]**	[0.018]**	[0.025]**
	Some college	0.037	0.023	0.062	0.063	0.060	0.042
		[0.017]*	[0.021]	[0.018]**	[0.020]**	[0.025]*	[0.024]$^{+}$
	College or more	0.039	0.070	0.065	0.041	0.047	0.054
		[0.015]*	[0.020]**	[0.014]**	[0.019]*	[0.018]**	[0.024]*
Public	Less than college	0.091	0.067	0.062	0.010	0.021	0.040
		[0.042]*	[0.066]	[0.044]	[0.045]	[0.044]	[0.049]
	Some college	0.049	0.121	0.080	0.050	0.157	0.014
		[0.056]	[0.064]*	[0.037]*	[0.038]	[0.050]*	[0.049]
	College or more	0.107	0.065	0.058	0.063	0.114	0.074
		[0.039]**	[0.038]$^{+}$	[0.034]$^{+}$	[0.034]$^{+}$	[0.034]**	[0.044]$^{+}$

Note: Marginal effects are generated using the *margins* command in Stata after running wage growth regressions. The *margins* command generated wage growth estimates if all individuals were promoted and if none were promoted. We test the equality of these two estimates using the *lincom* command, and report the standard deviation of the difference in brackets. **,*, and + indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 5: Wage Growth from Promotion

		Early Career		Mid Career		Peak Career	
		Males	Females	Males	Females	Males	Females
Private	Less than college	22.349	31.955	17.494	17.591	19.822	33.075
	Some college	23.919	11.699	16.534	15.496	20.364	10.969
	At least college	16.565	32.997	17.896	12.045	15.751	11.424
Public	Less than college	34.702	22.266	14.590	3.391	5.097	16.186
	Some college	28.172	40.221	25.703	16.173	50.472	2.147
	At least college	38.136	31.009	8.854	14.388	54.751	10.271

Note: Each cell contains *Percent promoted•(wage growth of the promoted - wage growth of the promoted in the absence of promotion)/wage growth.* All rates except the counterfactual for wage growth of the promoted sans promotion are observed values.

Table 6: Promotion Probability and Fertility

	MODEL 3								MODEL 4	
	Original Model		Female•Number of Children		No Late Fertility[a]		Childless		No Late Fertility	
	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction
		-0.396**		**-0.321***		**-0.404+**		**-0.168**		-
		[0.123]		**[0.130]**		**[0.214]**		**[0.287]**		-
Some college	0.137	**0.017**	0.143	**0.173**	0.113	**0.258**	0.333	**-0.02**	-	-
	[0.108]	**[0.399]**	[0.108]	**[0.177]**	[0.208]	**[0.297]**	[0.241]	**[0.385]**	-	-
College or more	-0.296**	**0.191**	-0.283**	**0.559****	-0.519*	**0.597+**	-0.25	**0.314**	-	-
	[0.107]	**[0.177]**	[0.107]	**[0.175]**	[0.221]	**[0.314]**	[0.249]	**[0.378]**	-	-
Number of children	0.005	-	0.026	**-0.066+**	-0.03	**-0.008**	-	-	-	-
	[0.018]	-	[0.022]	**[0.037]**	[0.065]	**[0.086]**	-	-	-	-
Public sector	0.29	**0.607****	0.291	**0.016**	0.377	**-0.356**	1.946**	**-2.089+**	1.564	**-2.225**
	[0.227]	**[0.173]**	[0.227]	**[0.399]**	[0.506]	**[0.767]**	[0.740]	**[1.097]**	[1.211]	**[1.430]**
Some college•Public sector	-0.456	**-0.212**	-0.459	**-0.206**	-0.719	**0.101**	-1.581	**0.331**	0.62	**-1.453**
	[0.352]	**[0.581]**	[0.352]	**[0.581]**	[0.791]	**[1.130]**	[1.026]	**[1.682]**	[1.669]	**[2.009]**
College or more•Public sector	-0.212	**-0.404**	-0.21	**-0.389**	0.72	**-0.885**	-0.952	**0.494**	-1.229	**1.474**
	[0.306]	**[0.495]**	[0.306]	**[0.495]**	[0.665]	**[0.971]**	[0.863]	**[1.276]**	[1.450]	**[1.728]**
Mid career	-0.396**	**0.562****	-0.399**	**0.596****	-0.525*	**0.673***	-0.440+	**0.753+**	-0.086	**0.780****
	[0.114]	**[0.166]**	[0.114]	**[0.168]**	[0.207]	**[0.273]**	[0.267]	**[0.388]**	[0.274]	**[0.294]**
Mid career•Public sector	-0.288	**0.624**	-0.288	**0.634**	-1.19	**2.281***	-1.784	**2.504+**	-2.547+	**3.944***
	[0.334]	**[0.533]**	[0.334]	**[0.533]**	[0.898]	**[1.138]**	[1.090]	**[1.514]**	[1.437]	**[1.633]**
Mid career•Some college	0.036	**-0.402**	0.037	**-0.395**	-0.016	**-0.912***	-0.077	**-1.025+**	-0.088	**-0.688**
	[0.157]	**[0.251]**	[0.157]	**[0.251]**	[0.298]	**[0.430]**	[0.348]	**[0.562]**	[0.329]	**[0.467]**
Mid career•College or more	0.446**	**-0.754****	0.440**	**-0.736****	0.685*	**-0.721+**	0.575+	**-0.870+**	0.808**	**-0.820+**
	[0.141]	**[0.240]**	[0.141]	**[0.240]**	[0.288]	**[0.420]**	[0.329]	**[0.516]**	[0.313]	**[0.452]**
Mid career•Some college•Public sector	1.004*	**-0.404**	1.005*	**-0.426**	2.493*	**-1.999**	1.772	**-0.984**	3.170+	**-3.101**
	[0.481]	**[0.749]**	[0.481]	**[0.749]**	[1.165]	**[1.518]**	[1.413]	**[2.166]**	[1.698]	**[2.045]**
Mid career•College or more•Public sector	0.162	**-0.225**	0.161	**-0.245**	-0.046	**-1.01**	0.619	**-0.759**	1.663	**-3.016**
	[0.435]	**[0.663]**	[0.435]	**[0.663]**	[1.073]	**[1.384]**	[1.241]	**[1.731]**	[1.585]	**[1.856]**
Peak career	-0.728**	**0.321**	-0.723**	**0.364+**	-0.879**	**0.546+**	-0.587+	**0.776+**	-0.191	**0.740***
	[0.154]	**[0.199]**	[0.154]	**[0.200]**	[0.267]	**[0.308]**	[0.336]	**[0.412]**	[0.404]	**[0.339]**
Peak career•Public sector	0.236	**0.207**	0.233	**0.218**	-1.244	**2.238+**	-2.209+	**3.073+**	-2.695+	**4.107***
	[0.339]	**[0.553]**	[0.339]	**[0.553]**	[1.149]	**[1.357]**	[1.294]	**[1.681]**	[1.602]	**[1.792]**
Peak career•Some college	-0.05	**0.07**	-0.05	**0.073**	-0.177	**-0.25**	-0.643	**-0.224**	-0.264	**0.162**
	[0.187]	**[0.293]**	[0.187]	**[0.293]**	[0.343]	**[0.483]**	[0.408]	**[0.610]**	[0.384]	**[0.533]**
Peak career•College or more	0.372*	**-0.469+**	0.361*	**-0.448**	0.15	**-0.172**	-0.284	**-0.394**	0.43	**-0.374**
	[0.163]	**[0.280]**	[0.163]	**[0.280]**	[0.335]	**[0.480]**	[0.382]	**[0.574]**	[0.364]	**[0.518]**
Peak career•Some college•Public sector	0.321	**-0.254**	0.327	**-0.272**	2.436+	**-2.252**	2.511	**-**	3.306+	**-3.586**
	[0.513]	**[0.799]**	[0.513]	**[0.799]**	[1.394]	**[1.716]**	[1.596]	**-**	[1.920]	**[2.268]**
Peak career•College or more•Public sector	0.297	**-0.391**	0.301	**-0.409**	0.819	**-1.945**	2.017	**-2.838**	2.603	**-3.925+**
	[0.443]	**[0.697]**	[0.443]	**[0.697]**	[1.305]	**[1.609]**	[1.439]	**[1.942]**	[1.751]	**[2.035]**
Number of observations	18658		18658		6025		4033		4277	
Number of individuals									460	

Note: [a]The *No late fertility* group consists of those individuals who did not have any additional children after age 25. Standard errors are reported in brackets. **,*, and + indicate statistical significance at the 0.01, 0.05 and 0.10 levels, respectively.

APPENDIX

Appendix Table 1. Definition of the Variables and Descriptive Statistics (1988-1990 and 1996-2010 rounds of the NLSY79)

					Balanced Panel[a]					
		Early		*Early (All)*		*Early*		*Mid*		*Peak*	
		N=1128		*N=9580*		*N=5284*		*N=6895*		*N=6652*	
Variable	**Description**	**Mean**	**St.D**	**Mean**	**St.D**	**Mean**	**St.D**	**Mean**	**St.D**	**Mean**	**St.D**
Age	Age of the individual at the interview date	28.34	2.27	28.34	2.33	28.40	2.33	38.58	3.11	46.23	3.14
AFQT[b]	AFQT score	0.56	0.29	0.53	0.29	0.54	0.28	0.54	0.28	0.54	0.28
Education	Maximum years of education reported over the data period	13.97	2.65	13.90	2.59	14.02	2.52	14.06	2.54	14.06	2.53
(High school or less)[c]	Less than 13 years of schooling	0.39	0.49	0.43	0.50	0.41	0.49	0.41	0.49	0.41	0.49
Some college	13 to 15 years of schooling	0.26	0.44	0.25	0.43	0.26	0.44	0.26	0.44	0.26	0.44
College or more	More than 15 years of schooling	0.34	0.48	0.32	0.47	0.33	0.47	0.33	0.47	0.33	0.47
Female	Gender dummy =1 if female, 0 otherwise	0.53	0.50	0.43	0.49	0.38	0.49	0.38	0.49	0.38	0.49
Black	Race dummy=1 if Black, 0 otherwise	0.08	0.28	0.12	0.32	0.12	0.33	0.11	0.32	0.11	0.32
Hispanic	Enthnicity dummy=1 if Hispanic, 0 otherwise	0.07	0.25	0.07	0.25	0.07	0.25	0.06	0.25	0.06	0.24
Married	Marital status dummy =1 if married, 0 otherwise	0.54	0.50	0.54	0.50	0.56	0.50	0.67	0.47	0.67	0.47
Number of children	Number of children individual has at time t	0.65	0.97	0.84	1.06	0.88	1.06	1.57	1.25	1.73	1.29
Tenure with current firm	Number of years worked at the current job (total weeks/52)	3.22	3.00	3.72	3.14	4.00	3.20	8.01	6.07	11.34	8.24
Prior labor market experience	Number of years worked prior to current job (total weeks/52)	5.12	2.98	4.94	2.90	4.85	2.90	10.10	5.89	14.08	7.88
(Small firm)[c]	Firm with less than 100 employees	0.62	0.49	0.57	0.49	0.55	0.50	0.51	0.50	0.51	0.50
Medium firm	Firm with 100-499 employees	0.21	0.41	0.23	0.42	0.24	0.43	0.27	0.44	0.27	0.44
Large firm	Firm with more than 500 employees	0.17	0.38	0.20	0.40	0.21	0.41	0.22	0.42	0.22	0.41
State unemployment rate	Level of unemployment at state level	5.83	2.23	6.14	2.39	6.20	2.44	5.48	2.57	5.61	1.75
Agriculture, forestry, fishing, and hunting & mining	Industry dummies. Different industry headings are combined after Pergamut and Veum (1996).	0.02	0.13	0.02	0.14	0.02	0.15	0.02	0.12	0.01	0.11
Construction		0.08	0.27	0.07	0.25	0.06	0.23	0.07	0.25	0.07	0.26
(Manufacturing)[c]		0.18	0.38	0.23	0.42	0.24	0.43	0.23	0.42	0.20	0.40
Wholesale trade & retail trade		0.12	0.33	0.14	0.34	0.13	0.34	0.11	0.31	0.12	0.32
Transportation and warehousing & information & utilities		0.10	0.30	0.11	0.31	0.11	0.31	0.12	0.32	0.10	0.31
Finance and insurance & real estate and rental and leasing		0.07	0.25	0.06	0.24	0.06	0.25	0.06	0.23	0.07	0.25
Professional, scientific, and technical services & management, administrative and support, and waste		0.13	0.33	0.09	0.29	0.08	0.27	0.08	0.27	0.07	0.26
Educational services & health care and social assistance		0.11	0.32	0.11	0.31	0.11	0.32	0.14	0.35	0.17	0.37
Arts, entertainment, and recreation & accomodations and food services		0.10	0.31	0.07	0.26	0.06	0.23	0.04	0.20	0.03	0.17
Other services		0.10	0.30	0.11	0.31	0.12	0.32	0.13	0.34	0.10	0.30

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Variable	Description	*Leavers* *N=1128* Mean	St.D	*Early (All)* *N=9580* Mean	St.D	*Early* *N=5284* Mean	St.D	*Mid* *N=6895* Mean	St.D	*Peak* *N=6652* Mean	St.D
Management, professional, technical, financial, sales and public security	Occupation dummies. Different occupation groups are combined after Dorn (2009).	0.38	0.49	0.36	0.48	0.37	0.48	0.45	0.50	0.46	0.50
Administrative support and retail sales		0.26	0.44	0.23	0.42	0.23	0.42	0.18	0.38	0.20	0.40
(Low-skill Service)[c]		0.09	0.29	0.07	0.25	0.06	0.23	0.05	0.22	0.04	0.20
Precision production and craft		0.03	0.17	0.03	0.18	0.04	0.18	0.05	0.21	0.04	0.20
Machine operators, assemblers, and inspectors		0.07	0.25	0.10	0.30	0.10	0.30	0.08	0.27	0.06	0.24
Transportation, construction, mechanics, mining, agricultural		0.15	0.35	0.19	0.39	0.18	0.39	0.17	0.38	0.18	0.39
Public sector	Individual is a public sector employee	0.08	0.27	0.12	0.32	0.14	0.34	0.17	0.38	0.20	0.40
Union member and/or covered[d]	Individual is a union member and/or covered under a collective bargaining agreement	0.12	0.33	0.17	0.38	0.19	0.39	0.23	0.42	0.23	0.42
Real wage[e]	Real wage at the current job	18.19	8.48	17.55	7.97	17.87	7.99	23.73	13.93	26.65	18.18
Real wage growth[e]	Change in the real wage since the date of last interview	0.09	0.34	0.08	0.31	0.08	0.30	0.09	0.30	0.05	0.29
Log real wage[e]	log of the real wage at the current job	2.79	0.48	2.77	0.44	2.79	0.43	3.04	0.49	3.10	0.67
Promoted	Promotion dummy=1 if promoted at the job with the current employer since the date of last interview, 0 otherwise	0.22	0.41	0.26	0.44	0.27	0.44	0.19	0.39	0.11	0.31

Notes:

[a]Individuals are observed in 2 out of 3 years in the early career stage and not absent in more than two rounds in later stages.

[b]In the regressions we used standardized residuals from a regression of ASVAB scores on education and age of the respondent (as of 1980) instead of the AFQT scores as measures of unobserved ability after Blackburn (2004) and Hansen et al (2004).

[c]Omitted categories given in parentheses.

[d]Union membership or coverage data is collected in different ways across different waves of the NLSY79, which will require us to devise a common definition of unionism in our analysis. Over the early survey years – 1988, 1989, and 1990 – individuals were asked only if they were covered by a collective bargaining agreement. If they answered in the affirmative, respondents were then asked if they were a union member. After 1994, the union affiliation question was asked first and then the coverage question asked only of those responding in the negative (i.e. of the non-union members). Here we will use a 'unified' or 'composite' measure of unionism by including those who are either union members or covered by a union agreement as a definition, and assume that all union members are covered. Furthermore, due to an error in the NLSY questionnaire, information on union affiliation and collective bargaining was not collected for a number of employees in 1994. Specifically, 1130 of the employed individuals in our final sample were not asked the unionism question (i.e. whether they were union members and, if not, whether they were nonetheless covered on the job by a collective bargaining agreement). We imputed unionism values to these individuals by selectively utilizing other arguments using a methodology similar to that of Booth, Budd, and Munday (2010).

[e]For these statistics we only use the data if the observation is in the sample for the wage regressions; this leads to a loss of some 10% of observations in each group.

Appendix Table 2: Promotion Probability and Gender, Results for Other Coefficient Estimates of Interest

	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Unobserved ability[a]	0.087**	0.090**	0.084**	
	[0.025]	[0.025]	[0.026]	
Black	0.050	0.050	0.029	
	[0.073]	[0.073]	[0.074]	
Hispanic	-0.006	-0.009	-0.041	
	[0.084]	[0.084]	[0.085]	
Married	0.038	0.035	0.033	0.051
	[0.044]	[0.044]	[0.045]	[0.066]
Number of children	0.004	0.005	0.005	-0.082+
	[0.018]	[0.018]	[0.018]	[0.044]
Tenure with current firm	-0.073**	-0.074**	-0.077**	-0.136**
	[0.012]	[0.012]	[0.012]	[0.018]
Tenure with current firm squared	0.001	0.001	0.001	0.001*
	[0.000]	[0.000]	[0.000]	[0.001]
Prior labor market experience	-0.02	-0.02	-0.025+	-0.102**
	[0.013]	[0.013]	[0.013]	[0.021]
Prior labor market experience squared	-0.001	-0.001	0	0.001
	[0.000]	[0.000]	[0.000]	[0.001]
New employer	-0.455**	-0.455**	-0.464**	-0.550**
	[0.070]	[0.070]	[0.070]	[0.076]
Medium firm	0.193**	0.192**	0.194**	0.290**
	[0.049]	[0.049]	[0.049]	[0.068]
Large firm	0.358**	0.359**	0.353**	0.314**
	[0.052]	[0.052]	[0.052]	[0.082]
State unemployment rate	-0.008	-0.008	-0.01	-0.029*
	[0.008]	[0.008]	[0.008]	[0.012]
Constant	-0.570**	-0.565**	-0.419**	
	[0.141]	[0.141]	[0.152]	
Number of observations	18,658	18,658	18,658	13,815
Number of individuals				1,456

Note: [a]Standardized residuals from a regression of ASVAB scores on education and age of the respondent(as of 1980). All models also include industry and occupation dummies.

Appendix Table 3: Wage Growth and Promotion Rates, by Sector, Education Status, Gender, and Career Stage

			Early Career		Mid Career		Peak Career	
			Males	Females	Males	Females	Males	Females
Private	Less than college	Wage growth rate	0.050	0.043	0.060	0.061	0.024	0.024
		for promoted	0.083	0.097	0.124	0.108	0.081	0.102
		for non-promoted	0.039	0.029	0.049	0.050	0.020	0.016
		for promoted in absence of promotion[a]	0.036	0.032	0.053	0.057	0.015	0.018
		Promotion rate	0.253	0.203	0.140	0.184	0.078	0.092
	Some college	Wage growth rate	0.062	0.057	0.076	0.082	0.028	0.045
		for promoted	0.092	0.074	0.131	0.137	0.091	0.080
		for non-promoted	0.047	0.050	0.064	0.069	0.023	0.040
		for promoted in absence of promotion	0.054	0.045	0.067	0.076	0.030	0.035
		Promotion rate	0.326	0.275	0.187	0.186	0.085	0.123
	College or more	Wage growth rate	0.073	0.068	0.099	0.086	0.054	0.048
		for promoted	0.097	0.112	0.149	0.120	0.109	0.083
		for non-promoted	0.061	0.046	0.081	0.075	0.046	0.043
		for promoted in absence of promotion	0.060	0.046	0.082	0.080	0.047	0.041
		Promotion rate	0.329	0.336	0.261	0.232	0.137	0.139
Public	Less than college	Wage growth rate	0.061	0.060	0.047	0.093	0.048	0.045
		for promoted	0.120	0.104	0.102	0.103	0.072	0.095
		for non-promoted	0.040	0.046	0.040	0.090	0.045	0.038
		for promoted in absence of promotion	0.043	0.046	0.039	0.099	0.050	0.037
		Promotion rate	0.263	0.232	0.112	0.230	0.093	0.130
	Some college	Wage growth rate	0.070	0.051	0.080	0.084	0.030	0.059
		for promoted	0.128	0.144	0.138	0.125	0.159	0.070
		for non-promoted	0.051	0.031	0.059	0.070	0.015	0.057
		for promoted in absence of promotion	0.072	0.028	0.064	0.074	0.013	0.056
		Promotion rate	0.257	0.182	0.261	0.250	0.107	0.099
	College or more	Wage growth rate	0.090	0.045	0.098	0.063	0.030	0.051
		for promoted	0.179	0.102	0.140	0.127	0.118	0.104
		for non-promoted	0.056	0.031	0.089	0.054	0.014	0.046
		for promoted in absence of promotion	0.071	0.047	0.085	0.064	0.004	0.047
		Promotion rate	0.278	0.194	0.170	0.122	0.159	0.090

Note: [a]This is the predicted wage growth rate generated with the *margins* command for promoted individuals by sector, gender, education, and career stage in the absence of promotion.

Appendix Table 4: Timing and Incidence of Life Events and Promotion Rates, by Gender, Education and Sector over the Career

			Early Career			Mid Career			Peak Career		
			Less than college	Some college	College or more	Less than college	Some college	College or more	Less than college	Some college	College or more
Private	Male	Proportion married	0.598	0.583	0.554	0.672	0.639	0.782	0.669	0.659	0.800
		New birth rate	0.112	0.125	0.117	0.067	0.085	0.136	0.015	0.016	0.023
		Average age at first birth[a]	25.43	27.63	30.28	25.34	27.49	30.25	25.25	27.80	30.28
		Promotion rate	0.253	0.326	0.329	0.140	0.187	0.261	0.078	0.085	0.137
	Female	Proportion married	0.553	0.517	0.470	0.584	0.589	0.630	0.593	0.571	0.608
		New birth rate	0.089	0.063	0.078	0.043	0.048	0.075	0.002	0.009	0.008
		Average age at first birth	23.70	24.54	29.49	23.42	24.27	29.40	23.36	24.41	29.15
		Promotion rate	0.203	0.275	0.336	0.184	0.186	0.232	0.092	0.123	0.139
Public	Male	Proportion married	0.649	0.649	0.500	0.777	0.828	0.790	0.679	0.860	0.780
		New birth rate	0.114	0.095	0.079	0.061	0.067	0.174	0.010	0.007	0.014
		Average age at first birth	24.84	27.67	30.03	25.25	27.03	30.21	25.35	26.81	30.82
		Promotion rate	0.263	0.257	0.278	0.112	0.261	0.170	0.093	0.107	0.159
	Female	Proportion married	0.643	0.561	0.561	0.630	0.583	0.723	0.610	0.617	0.676
		New birth rate	0.125	0.091	0.111	0.010	0.030	0.086	0.008	0.007	0.000
		Average age at first birth	23.68	27.19	28.07	22.72	26.50	28.45	23.55	25.89	28.23
		Promotion rate	0.232	0.182	0.194	0.230	0.250	0.122	0.130	0.099	0.090

Note: [a]This is the age at the first-ever birth and does not vary for an individual by career stage. More or less constant averages indicate that the exits from the sample are not disproportionately for fertility-related reasons.

Appendix Table 5: Wage Growth and Fertility by Career Stage

	Early Career				Mid Career				Peak Career			
	Female•New Birth		No Late Fertility[a]		Female•New Birth		No Late Fertility		Female•New Birth		No Late Fertility	
	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction	Main	Female Interaction
		0.000		**0.002**		**0.002**		**0.006**		**-0.006**		**0.006**
		[0.011]		**[0.018]**		**[0.009]**		**[0.015]**		**[0.009]**		**[0.014]**
Public sector	0.002	**0.024**	0.001	**0.034**	-0.002	**0.059****	-0.009	**0.127*****	0.036**	**-0.007**	0.040	**-0.046**
	[0.022]	**[0.039]**	[0.047]	**[0.066]**	[0.015]	**[0.028]**	[0.031]	**[0.049]**	[0.014]	**[0.024]**	[0.029]	**[0.043]**
Some college	0.008	**0.003**	0.014	**-0.001**	0.014	**0.007**	0.015	**-0.011**	0.007	**0.015**	0.041**	**-0.025**
	[0.012]	**[0.018]**	[0.022]	**[0.031]**	[0.009]	**[0.015]**	[0.018]	**[0.025]**	[0.009]	**[0.014]**	[0.016]	**[0.023]**
College or more	0.019*	**-0.011**	0.014	**0.003**	0.033***	**0.000**	0.039**	**-0.02**	0.029***	**0.001**	0.029*	**0.014**
	[0.011]	**[0.018]**	[0.022]	**[0.032]**	[0.009]	**[0.015]**	[0.019]	**[0.027]**	[0.008]	**[0.014]**	[0.016]	**[0.024]**
Some college•Public sector	-0.002	**-0.042**	0.006	**-0.061**	0.009	**-0.064**	0.067	**-0.178****	-0.043*	**0.037**	-0.090**	**0.130****
	[0.035]	**[0.055]**	[0.077]	**[0.101]**	[0.025]	**[0.040]**	[0.053]	**[0.073]**	[0.022]	**[0.034]**	[0.043]	**[0.060]**
College or more•Public sector	-0.005	**-0.025**	0.004	**-0.008**	0.012	**-0.091*****	0.006	**-0.122***	-0.070***	**0.052**	-0.057	**0.106***
	[0.031]	**[0.049]**	[0.071]	**[0.092]**	[0.022]	**[0.035]**	[0.045]	**[0.065]**	[0.020]	**[0.032]**	[0.040]	**[0.057]**
Promoted	0.047***	**0.026**	0.027	**0.065**	0.067***	**-0.011**	0.104***	**-0.071***	0.057***	**0.012**	0.127***	**-0.041**
	[0.013]	**[0.024]**	[0.024]	**[0.041]**	[0.014]	**[0.022]**	[0.027]	**[0.038]**	[0.017]	**[0.029]**	[0.029]	**[0.044]**
Promoted•Public sector	0.045	**-0.056**	0.014	**0.012**	-0.007	**-0.037**	-0.098	**0.029**	-0.041	**0.014**	-0.135	**0.215**
	[0.044]	**[0.081]**	[0.100]	**[0.151]**	[0.046]	**[0.067]**	[0.142]	**[0.162]**	[0.046]	**[0.071]**	[0.131]	**[0.153]**
Promoted•Some college	-0.007	**-0.039**	0.006	**-0.100***	-0.003	**0.006**	-0.042	**0.043**	0.016	**-0.04**	-0.034	**0.000**
	[0.021]	**[0.036]**	[0.041]	**[0.060]**	[0.022]	**[0.035]**	[0.043]	**[0.063]**	[0.030]	**[0.045]**	[0.053]	**[0.073]**
Promoted•College or more	-0.008	**0.003**	0.01	**-0.085**	-0.003	**-0.013**	-0.108***	**0.094**	-0.011	**-0.004**	-0.046	**-0.007**
	[0.020]	**[0.035]**	[0.042]	**[0.063]**	[0.019]	**[0.033]**	[0.041]	**[0.058]**	[0.025]	**[0.042]**	[0.054]	**[0.073]**
Promoted•Some college•Public sector	-0.038	**0.149**	0.073	**0.078**	0.01	**0.029**	-0.016	**0.093**	0.113	**-0.083**	0.017	**-0.132**
	[0.071]	**[0.118]**	[0.164]	**[0.228]**	[0.061]	**[0.089]**	[0.166]	**[0.199]**	[0.070]	**[0.101]**	[0.174]	**[0.207]**
Promoted•College or more•Public sector	0.024	**-0.017**	0.02	**-0.091**	0.002	**0.069**	0.18	**0.029**	0.102*	**-0.057**	0.114	**-0.348**
	[0.061]	**[0.101]**	[0.133]	**[0.195]**	[0.059]	**[0.086]**	[0.163]	**[0.195]**	[0.059]	**[0.095]**	[0.153]	**[0.217]**
New birth	0.026**	**-0.041****	0.229	**0.000**	0.012	**-0.033***			0.033	**-0.051**		
	[0.011]	**[0.020]**	[0.195]	**[0.238]**	[0.010]	**[0.020]**			[0.023]	**[0.058]**		
Observations	4,470		1,397		6,094		1,941		5,729		1,813	
R-squared	0.045		0.051		0.047		0.065		0.031		0.06	

Note: [a]No late fertility group consists of those individuals who did not have any additional children after age 25. Standard errors are reported in brackets. **,*, and + indicate statistical significance at the 0.01, 0.05 and 0.10 levels, respectively. All models use the same set of covariates as the original regressions; full estimates are available upon request.

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