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Gender gap in wage returns to job tenure and experience ☆

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Abstact

We present empirical evidence on gender disparities in wage returns to job tenure and experience. We find that the overall wage return on an extra year of labor market experience is lower for women than men. A decomposition analysis shows that the wage return to job tenure is substantially lower for women than men, and that the wage return to experience is higher for women than men. These gender differences are robust to various estimation procedures and are especially pronounced for more educated workers. We hypothesize that these observed gender disparities in wage returns are driven by the fact that women are less attached to their jobs than men. We present some supportive evidence for our hypothesis, namely, that women are more likely to quit their jobs, receive substantially fewer hours of company provided training, and a much higher fraction of women expect to not work at age 35 due to family related reasons.

JEL Classification: J16; J24; J31; J41
Keyword: Gender Wage Gap; Returns to Tenure; Returns to Experience

1. Introduction

The changing role of women in the labor market is an unparalleled transformation of the twentieth century. The dramatic increase in labor force participation, catch up in educational attainment, legal battles of equal pay for equal work, and the narrowing, but still persistent, gender

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wage gap remain key research issues across various disciplines. A major focus in the economics literature is the earnings disparity across women and men. Recent empirical studies (Blau and Kahn, 1997; O'Neill and Polachek, 1993; Wellington, 1993) attribute an important part of the narrowing of the gender wage gap to the marked increase in both women's labor force participation rates and accumulation of labor market experience. In this paper we present an empirical analysis of gender differences in wage returns to an extra year of job tenure and labor market experience. The decomposition of wage returns into a firm-specific and general component allows us to identify a potentially important source of gender disparities in earnings dynamics.

In our empirical analysis we use the National Longitudinal Surveys of Youth (NLSY) to estimate wage returns to tenure and experience. Our sample consists of a panel of young women and men that spans the first decade and a half of their careers. We find that the sum of wage returns to tenure and general experience is lower for women than men. The decomposition analysis, however, shows that the wage return to tenure is substantially lower for women than men, and that the wage return to general experience is slightly higher for women than men. These findings are robust to various estimation procedures and model specifications, and are especially strong among more educated workers.

Despite their growing attachment to the labor market, women are likely to be less attached to their employers and jobs compared to men especially during the early part of their careers. Women in their twenties and thirties experience life cycle events such as marriage, childbirth, and family care responsibilities that make them more prone to employment interruptions and gaps. If such life cycle events lead to less durable employment relationships for women then a variety of theoretical considerations imply lower wage returns to tenure and higher wage returns to experience for women compared to their male counterparts. First, if women are more likely to quit their jobs then the theory of firm-specific human capital investments predicts that women are more likely to invest in general skills that are portable than in firm-specific skills. Such strategic considerations in investments in human capital can explain why returns to tenure are lower and returns to experience are higher for women than men. Second, bonding and selection models (Lazear, 1981; Salop and Salop, 1976) that imply back-loaded compensation designs are also consistent with our findings. An important corollary of these models is that women who anticipate more frequent job changes in the future will have less incentives to select into jobs with back-loaded compensation.[1] Third, lower returns to tenure for women could be due to employer discrimination based on rational expectations about women's attachment to jobs. For example, if employers engage in statistical discrimination then the perception of women as "less" stable workers could lead employers to systematically not hire women into jobs with opportunities of specific training or learning.[2] These theoretical considerations suggest that if women are indeed less attached to their employers then wage returns to tenure are likely to be lower, and wage returns to experience possibly higher for women than men.

Since gender disparities in returns to tenure and experience can be explained by the hypothesis that women have weaker ties to their employers, we begin our empirical section with an analysis of gender disparities in labor market and job attachments. First, we present a turnover analysis that shows women are more likely to quit their jobs than their male counterparts. Second, we use a

[1] Note that Hersch and Reagan (1997), citing evidence that returns to tenure tend to be greater for female than for male workers, develop an agency model of wage contracts that shows efficient wage-tenure profiles are steeper for women than men as a direct result of their shorter working life.

[2] We do not provide a summary of the extensive literature on gender discrimination here. For an excellent survey of the literature see the article by Altonji and Blank in the Handbook of Labor Economics (1999).

small sample on formal training programs and show that women receive substantially fewer hours of company provided training compared to men. Third, we explore a survey instrument on expectations about future labor force participation, and find that a nontrivial fraction of women in their late teens and early twenties expect not to be in the labor force at age 35 due to family related reasons. By comparison hardly any men expect to be out of the labor force for family related reasons at age 35. All of this evidence points to the fact that women expect and are indeed more likely to be less attached to their employers.

The implications of our hypothesis about weaker ties to employers among women is predicated on various strategic human capital investment considerations. As a consequence, we present all of our analyses on gender disparities for high and low educated workers separately. If education is a proxy for lower discount rates and greater trainability then we would expect gender differentials to be more pronounced for our more highly educated sample. The observed gender disparities in wage returns, and in labor force and job attachments are consistently stronger among our sample of more educated workers.

The remainder of the paper is organized as follows. In the next section, entitled "Related Literature," we discuss a variety of findings on the gender wage gap. In Section 3 we present our empirical results in various sub sections. First, we describe the NLSY data and present summary statistics of the key variables. Second, we present preliminary evidence on gender differences in quit rates, training incidence and duration, and on expectations related to future labor force participation. Third, we outline our estimation framework. Fourth, we present and discuss our estimates of within-job wage growth and returns to tenure and experience across women and men. Finally, we address some potential biases in the estimation of gender wage returns. Section 4 concludes with a brief summary and discussion of further extensions.

2. Related literature

Prior studies have documented the effects of job tenure and experience on the gender wage gap, where the primary focus has been to assess the contribution of gender differences in actual experience and labor force interruptions (Light and Ureta, 1990; Kim and Polachek, 1994; Wellington, 1993; Filer, 1993). These studies conclude that gender differences in participation rates, timing of work experience, and accumulated experience are not only key determinants of earnings, but the convergence of these work history characteristics across women and men is an important source of the recent narrowing of the gender wage gap. In this section we briefly review this literature and highlight some findings that suggest wage returns to tenure are higher for women than men, contrary to what we find in our paper.

Light and Ureta (1995) find that the overall wage returns to tenure and experience are higher for men than women and that women experience a smaller drop in wages when they re-enter the labor market after a nonworking spell compared to their male counterparts. Somewhat surprisingly they also find that the wage returns to tenure are almost three times larger for women compared to men. It should be noted however that the magnitudes of their estimates of returns to tenure are extremely small for both men and women. These low estimates could be due to the instrumental variables (IV) model they implement, since IV typically over estimates the returns to experience and under estimates the returns to tenure.[3] Moreover, the authors use the National Longitudinal Survey where missing data on weeks worked can cause measurement error of the tenure variable (Spivey, 1995),

[3] See Topel (1991) for a careful discussion of the reasons why returns on tenure are consistently under estimated with IV. Also see Altonji and Williams (2005) for a rebuttal.

and their sample is restricted to very young workers aged 24 to 30 years. We try to attenuate some of these restrictions in our analysis by implementing multiple estimation methods, and by using the NLSY where measurement error is less likely to occur and the oldest worker is 46 years of age.

Becker and Lindsay (1994) also find that wage-tenure profiles are steeper for women than men using the Panel Study of Income Dynamics from 1968 to 1987. Their analysis is based on a sample restricted to workers who stay with the same employer for at least five years.[4] This selection criterion of course over samples workers who are more attached to their jobs, and it is likely that among women this criterion would select the most durable employment relations. Hence it is not entirely surprising if wage returns to tenure are comparable or higher for women compared to men for a sample with this selection criterion. In our paper we present evidence on gender disparities in quit rates to assess whether women are in fact less attached to their employers.

In a recent study Banzhaf (2005) uses the same NLSY data and implements a structural model to address whether job turnover and wage growth vary by education and gender. She finds that in the first few years of tenure, women experience a higher return to tenure among a sample of more educated workers. However, after three years of tenure men continue to experience increasing wages with tenure while women experience declining wages.

Gender disparities in wage returns to tenure also have a direct link to the recent literature on the "family gap" in earnings for women with children.[5] Differential returns to marital and parental status explain a large fraction (in the order of 40%–50%) of the gender wage gap (Waldfogel, 1998a). One explanation is that employers may discriminate against women with children in terms of company provided training and promotions. A second noteworthy reason could be the lack of access to job-protected maternity leave that impedes progress of mothers in labor markets that value experience, tenure, and a good match between employer and employee (Waldfogel, 1998a,b). Lower wage returns to tenure for women are entirely consistent with this family penalty literature. An important policy issue, stressed in this literature, is the ramification of legislation such as the Family and Medical Leave Act (FMLA) on the family penalty.[6] A potentially interesting question for future research would be to ask whether the returns to tenure for women increase in the post 1993 period after the enactment of FMLA.

3. Empirical application

3.1. NLSY data, sample restrictions, and summary statistics

We use panel data from the NLSY (1979–1994) to estimate the returns to experience and tenure across women and men. Starting in 1979, 12,686 male and female youths, aged 14 to 22,

[4] Becker and Lindsay (1994) present an extension of Hashimoto's (1981) model of financing firm-specific investments to show that women will bear a higher cost of these investments because they are more likely to turn over. As a consequence, they argue that women will have steeper wage-tenure profiles than men. This result is sensitive to the implicit assumption that all workers receive the same amount of specific investment. In a less restrictive theoretical framework where the investments are endogenous, this result is unlikely to hold. As we stress in this paper, if women are more likely to separate from their employers then they are less likely to invest in specific skills and in jobs with backloaded compensation.

[5] See Waldfogel (1998b) for an excellent review of this literature.

[6] Waldfogel (1998a) presents evidence showing that women who are allowed maternity leave are more likely to return to their previous employers. Clearly such mandates will increase expected job duration and thus increase the likelihood of women receiving job specific investment opportunities. These effects will not only pertain to mothers but more generally to women since expectations about motherhood especially from the employers perspective is the more likely determinant of job specific investment opportunities.

were interviewed annually until 1994, the last year of our panel.[7] Although the NLSY records information about multiple jobs, we only consider the CPS designated job both because it is the main (or more recent) job, and because more information is available about the CPS job. The wage measure we use is the hourly wage deflated by the consumer price index (from the Economic Report of the President) with 1987 as the base year.

Our sample is restricted to white males and females who are neither self-employed nor employed in the agricultural or government sector. After excluding observations with missing values for our analysis variables we have 34,524 person-year observations. We apply other sample restrictions to exclude erroneous wage information and other data inconsistencies. First, we drop 764 person-year observations due to the following criteria: (a) if reported hourly wages are in excess of $100 or less than $1.00, (b) if real wage losses are in excess of 30% or real wage gains are in excess of 300% across contiguous survey years when the worker is on the same job, and (c) if nominal wage increases are in excess of 200% and is immediately followed by nominal wage decreases in excess of 50%, and vice versa.[8] Excluding these observations raise our estimates of wage returns to tenure substantially and decrease our estimates of wage returns to experience marginally. For example, consider the 5-year cumulative returns for those with high school or less years of schooling using one of our estimation procedures (Topel-IV): when we exclude these observations the 5-year cumulative returns to tenure increase from .026 to .176 for women and from .130 to .241 for men; and the 5-year cumulative returns to experience decrease from .230 to .170 for women and from .197 to .160 for men.[9] Clearly, excluding these observations work against our main conclusion that women have lower returns to tenure and higher returns to experience compared to their male counterparts. But we believe that these wage data are erroneous and should be excluded from our sample.

We make two further sample restrictions that make a minimal impact on our estimates. We exclude all individuals with less than 9 or more than 16 completed years of schooling. Although we lose 2,078 person-year observations, our estimates of returns to tenure and experience hardly change at all. finally we exclude a further 317 person-year observations due to inconsistencies between our tenure and experience variables. Note the construction of the experience variable is based on actual weeks worked and the cumulative tenure variable is based on the start and stopping dates of work with a specific employer. Due to employment breaks, it is possible that the tenure variable overstates the actual weeks worked. We implement a simple correction by dropping person-year observations where the changes in tenure exceed the changes in experience from one survey period to the next. Almost all of the coefficient estimates remain exactly the same after this exclusion.[10] Our final data sample consists of 31,365 person-year observations.

Table 1 shows the means and standard deviations (in parentheses) for the key variables by gender and education groups. The low education group is restricted to those between 9 and

[7] Since 1994 the NLSY data are collected only every two years, and as a result some inconsistencies arise in annual earnings in the off years. To avoid such problems we restrict our analysis to the years 1979–1994 of the NLSY.

[8] Note that the NLSY does not edit the values of hourly wages which are constructed from reported information about usual wages, time period of pay, and usual hours worked over that time period. Extreme recorded values for hourly wages top $25,000 and can be less than $0.01. One noteworthy point is that excluding observations with negative nominal within-job wage growth increases our estimates of within-job wage growth to levels comparable to Topel's (1991) estimates.

[9] The parallel set of estimates for the more than high school group are: 5-year cumulative returns to tenure increase from −.040 to .086 for women and from .155 to .258 for men; and 5-year cumulative returns to experience decrease from .453 to .421 for women and from .294 to .311 for men.

[10] We thank Audrey Light for alerting us to this issue.

Table 1
Key Variables and Descriptive Statistics, National Longitudinal Surveys of Youth (NLSY) 1979–1994

Variable	High School or Less		More than High School	
	Male	Female	Male	Female
Real Hourly Wages (1987 Dollars)	7.91 (3.44)	5.94 (2.51)	10.49 (5.26)	8.34 (4.18)
Age (Years)	25.71 (4.05)	25.49 (4.17)	27.47 (3.52)	27.04 (3.56)
Education (Completed Years)	11.47 (0.94)	11.60 (0.84)	14.75 (1.26)	14.73 (1.23)
Tenure (Years)	2.73 (3.10)	2.39 (2.75)	2.73 (2.79)	2.51 (2.73)
Actual Experience (Years)	6.66 (3.97)	5.90 (3.71)	7.78 (3.63)	7.32 (3.58)
Married, Spouse Present	0.45 (0.50)	0.49 (0.50)	0.45 (0.50)	0.47 (0.50)
Union (Wages Set by Collective Bargaining)	0.21 (0.41)	0.12 (0.32)	0.10 (0.30)	0.07 (0.26)
Usual Weekly Hours Worked	42.80 (8.97)	36.73 (8.89)	43.97 (9.15)	38.36 (9.42)
Health Limits Amount or Type of Work	0.02 (0.12)	0.03 (0.16)	0.01 (0.11)	0.02 (0.15)
AFQT Score	42.52 (23.81)	42.09 (21.80)	70.97 (21.98)	67.16 (20.59)
Number of Individuals Number of Observations	1,892 11,245	1,807 9,372	1,040 5,064	1,201 5.645

12 years of completed schooling, and it includes high school graduates. The high education group is restricted to those between 13 and 16 years of completed schooling, including college graduates.[11] The mean ages are about the same across women and men within each of these two education groups. The most striking difference is in the mean hourly wages across women and men. Among the more educated workers, the mean wage for men is about $11 and for women it is about $8.50. That translates into an almost 30% gross wage premium for men. Among the less educated workers, this premium is almost 35%. This gender wage discrepancy is particularly striking given that the means of some standard human capital measures such as completed years of schooling and AFQT scores are very similar across women and men within each education group. Men also have slightly higher mean tenure and mean experience. Within education groups, women work in jobs that are less likely to be union represented and they work fewer hours per week.

In the next section we turn to our econometric framework to estimate wage returns to tenure and experience.

3.2. Estimation framework

In Section 3.4 below we present estimates of wage returns to tenure and experience from three different models, each of which have been extensively used and discussed in the literature. This section briefly describes the estimation strategies underlying each of these models and discuss their comparative advantages and disadvantages. Before we get to the specifics of these models, consider the standard human capital model of wage determination which underlies all three of these models:

$$y_{ijt} = X_{ijt}\beta_1 + T_{ijt}\beta_2 + F_{ijt}\gamma + e_{ijt}, \quad (1)$$

[11] Our wage analyses are presented for these two education groups separately. This classification follows Royalty (1998) who presents her mobility analyses along the same classification of low and high education groups. Alternative specifications yield qualitatively similar results.

where y_{ijt} is the log wage for individual i on job j at time t, X is total labor market experience, T is tenure (current job seniority) and F_{ijt} is a vector of other determinants of wages including higher order terms of experience and tenure. Henceforth we will drop $F_{ijt}\gamma$ for expository convenience. Parameters β_1 and β_2 represent the returns to an additional year of experience and tenure, respectively. The common interpretation of these coefficients is that β_1 represents the return on general human capital and β_2 represents the return on accumulated job-specific capital.

The error term is decomposed as:

$$e_{ijt} = \mu_i + \phi ij + \eta_{ijt} + v_{it},$$

where μ_i is a fixed individual specific error component, ϕ_{ij} is a fixed job match specific error component, η_{ijt} is a time varying job match specific component, and v_{it} is noise. Various hypothetical correlations between these error components and the two key independent variables — tenure and experience — give rise to bias estimates of returns to tenure and experience using standard OLS.[12] These correlations are systematic because they are the outcome of optimizing search behavior, i.e., workers searching for, finding and maintaining good (high wage) employment matches, and on account of individual heterogeneity. The OLS estimates are further confounded because the bias on the tenure and experience coefficients cannot be signed.[13]

To formalize these potential biases consider the following decomposition of the unobservables:

$$e_{ijt} = \phi_{ijt} + v_{it}, \tag{2}$$

where ϕ_{ijt} represents the stochastic component of wages that is idiosyncratic to a specific employment relationship, and a high value of ϕ implies a "good match." Now consider the correlation of experience and tenure with this unobservable component:

$$\phi_{ijt} = X_{ijt}b_1 + T_{ijt}b_2 + u_{ijt} \tag{3}$$

The job search process and increasing within-job wages imply that $b_1 > 0$; but the sign of b_2 is ambiguous. However, as Topel (1991) claims $b_1 + b_2 > 0$ since good jobs survive. These theoretical correlations are the source of potential biases that the various estimators presented below try to circumvent.

We consider three econometric models — due to Altonji and Shakotko (1987) and Topel (1991) — that are designed to address these potential biases resulting from job match heterogeneity and individual heterogeneity. The objective of all of these models is to provide tenure and experience coefficients that are more reflective of the "true" wage returns to tenure and

[12] The controversy about estimating returns on tenure has much to do with the current consensus among empirical labor economists that the estimated tenure effect is either small or absent (Altonji and Williams, 2005), while the negative effect of tenure on job turnover remains one of the most robust and widely documented findings in empirical labor. Since the size of the tenure effect on wages is typically interpreted as an indicator of the importance of firm-specific skills or of back-loaded compensation schemes, the small estimated coefficient appears to cast doubt on the workhorse theories of compensation and turnover. However, it is important to keep in mind that in the presence of firm-specific rents, Becker-type sharing models and dynamically consistent wage policies (Munasinghe, 2006) imply flatter wage-tenure profiles compared to the underlying productivity-tenure profiles. Hence small tenure effects on wages are consistent with high levels of firm-specific skill accumulation. These considerations suggest that even if the estimated gender differentials in returns on tenure are small, it may nevertheless represent much larger differences in firm-specific skill accumulation across women and men.

[13] The nature of these baises are explained in much greater detailed in Topet (1991), and Altonji and Williams (2005).

experience. Since all of these models have been extensively used and discussed in the literature, we will only briefly describe the estimation strategies underlying each of them. Although the size of the point estimates differ depending on which estimator is implemented (see Altonji and Williams (2005) for a more recent comparative assessment of these methods), in Section 3.4 below we present estimates from all three procedures and show that the gender disparities in returns to tenure and experience remain robust especially for our sample of more educated workers.

The first model we consider is Topel's (1991) two-step estimator (Topel-2S, from now on), which provides an unbiased estimate of the overall returns to an extra year of labor market experience, a lower bound of the returns to tenure, and an upper bound of the returns to general labor market experience. Although the second step estimates of returns to experience and tenure are themselves not unbiased, the direction of bias is implied by theory and the bias is symmetrical across the two estimates. An important issue that we explore in Section 3.5 below is whether this bias is different across women and men.

The first step of Topel-2S is to estimate within-job wage growth from the first difference of Eq. (1) for individuals who do not change jobs, which eliminates fixed job and individual effects:

$$y_{ijt} - y_{ijt-1} = \beta_1 + \beta_2 + e_{ijt} - e_{ijt-1} \tag{4}$$

If $e_{ijt} - e_{ijt-1}$ has zero mean and is serially independent then OLS applied to Eq. (4) above will yield a consistent and efficient estimate of within-job wage growth, $\beta_1+\beta_2$.[14]

The second step entails the estimation of the returns to experience and tenure. Since $X=X_0+T$ we can rewrite Eq. (1) as follows:

$$y - T\left(\widehat{\beta_1 + \beta_2}\right) = X_0\beta_1 + \epsilon, \tag{5}$$

where $\epsilon=e+T\,((\beta_1+\beta_2)-T\left(\widehat{\beta_1 + \beta_2}\right))$, and $\widehat{\beta_1 + \beta_2}$ is the estimate of the sum of the returns on experience and tenure from the first step. Eqs. (4) and (5) define Topel's two-step model of estimating returns to tenure and experience. Provided $b_1>0$ and $(b_1+b_2)>0$ for reasons mentioned previously, we estimate an upper bound for experience and a lower bound for tenure. Since these are well settled properties of job search models, Topel's two-step method leads to biased estimates where the direction of bias is well defined.

Note that the OLS estimate $\widehat{\beta_1}$ from Eq. (5) above is an overestimate of the true returns to experience because X_0 is correlated with ϵ. Hence our estimate of returns on tenure, $\widehat{\beta_2} \equiv \widehat{\beta_1 + \beta_2} - \widehat{\beta_1}$, is a lower bound of the average return on seniority. These implications of the two-step procedure can be explicitly derived by applying OLS to (4) and (5) and computing the expectations of $\widehat{\beta_1}$ and $\widehat{\beta_2}$ as follows:

$$E\left(\widehat{\beta_1}\right) = \beta_1 + b_1 + \gamma_{X_0T}(b_1 + b_2) \tag{6}$$

$$E\left(\widehat{\beta_2}\right) = \beta_2 - b_1 - \gamma_{X_0T}(b_1 + b_2), \tag{7}$$

where $\gamma_{X_0\,T}$ is the least squares coefficient from a regression of tenure on initial experience, X_0. Notice that the biases of the estimates of the returns to tenure and experience are equivalent but of opposite sign.

[14] We test whether wage innovations are serially correlated, and find some evidence that this is the case for highly educated women. We discuss the implications of this result in Section 3.5.

The second related model (Topel-IV, from now on) arises by noting that the error term in Eq. (1) contains an individual specific component in addition to the job specific component. The latter component drives the bias detailed in (6) and (7), but this prior discussion omits the potential bias that could result from heterogeneity in the individual specific component. Theoretical considerations imply that individual heterogeneity will bias down the estimated return to experience and bias up the estimated return to tenure.[15] This is an important source of bias to address in our gender analysis since the extent of individual heterogeneity is likely to differ across women and men. Topel (1991) proposed instrumenting initial experience with actual experience to remove the bias from individual heterogeneity in the second step. Hence the Topel-IV procedure is defined analogously to the Topel-2S estimator by Eqs. (4) and (5), as earlier, but X_0 in Eq. (5) is instrumented by X. We present estimates from this IV procedure to correct for potential bias that could stem from individual heterogeneity in addition to the estimates from Topel-2S.

The third and final model is based on Altonji and Shakotko (1987) (AS, from now on) who proposed an instrumental variables estimator to address bias problems in estimating returns to tenure due to individual and job match heterogeneity in the wage equation. The main instrumental variables for the tenure variables T_{ijt} and T_{ijt}^2 are the deviations of the tenure variables around their means for the sample of observations on a given job match. By construction, these instruments are uncorrelated with both the individual specific error component (μ_i) and the job match error component (ϕ_{ij}). Let $\overline{T_{ij}}$ be the mean of tenure for individual i over the sample observations in job j. Define $\tilde{T}_{ijt}$ to be the deviation of T_{ijt} from the job mean, with $\tilde{T}_{ijt} = T_{ijt} - \overline{T_{ij}}$. Let $\left(\tilde{T}_{ijt}\right)^2 = T_{ijt}^2 - \overline{\left(T_{ij}\right)^2}$. The instrumental variables procedure is a two stage least squares estimator in which $\tilde{T}_{ijt}$ and $(\tilde{T}_{ijt})^2$ serve as instrumental variables for T and T^2 in Eq. (1). If T_{ijt} is also uncorrelated with the transitory error component η_{ijt} then it is a valid instrumental variable. Due to the correlation between general experience and job match heterogeneity, the AS estimator is also biased.

The expression of the bias is:

$$\widehat{\beta_2} - \beta_2 = -b_1 - \gamma_{XT}(b_1 + b_2) \tag{8}$$

where b_1 and b_2 are as defined in Eq. (3) above.

Clearly neither the AS nor the Topel-2S estimators are ideal. The advantage of AS is that it uses an instrument that is exogenous to tenure. But it does not address the endogeneity of actual labor market experience. This procedure is also more susceptible to measurement error since the instruments are deviations from the mean of job-specific tenure. Although Topel-2S estimates of returns to tenure and experience are biased, they are well defined in the sense that they are of the same magnitude albeit of opposite sign. Moreover, in the absence of heterogeneity of within-job wage growth rates, the first step yields a consistent estimate of the sum of the returns to tenure and experience.

3.3. Gender disparities in labor market and job attachment

Before presenting our estimates of wage returns to tenure and experience, we first present some supporting evidence on gender disparities related to labor market and job attachment.

3.3.1. Turnover

Since our explanation of gender differences in wage returns to tenure and experience is based on the hypothesis that women are less attached to their employers, we first present some direct

[15] These opposing biases are discussed in both Topel (1991) and Altonji and Williams (2005).

Table 2
Gross Annual Turnover Rates, NLSY 1979–1994 (Number of person-years in parentheses)

	High School or Less			More than High School		
	Separation	Quit	Laidd Off	Separation	Quit	Laidd Off
Men	36% (10, 438)	23% (10, 438)	13% (4, 762)	31% (4,762)	23% (4, 4762)	8% (4,762)
Women	40% (8,854)	30% (8,854)	10% (8,854)	35% (5,343)	28% (5,343)	7% (5,343)

evidence of gender disparities in quit and overall separation rates. Table 2 shows average turnover rates for the NLSY sample that we use to estimate wage returns. The overall separation rates are higher for women compared to men across both high and low education groups. These gender disparities are even larger for quit rates. We confirm these patterns within a regression framework where we include a wide array of control variables. Table 3 presents the marginal effects from a Probit model specification. The coefficients on the female indicator variable show that quit rates are higher for women than men in both education groups. Moreover, married women have substantially higher quit rates compared to their married male counterparts. The evidence on overall separation rates confirms that married women have higher separation rates compared to married men and single women. However,for the high education group the coefficient on the female indicator variable is positive but insignificant. In the last two columns, we present the same results for a subsample restricted to individuals who are at least 25 years of age. The exclusion of very young workers ensures that the individuals in the more educated sample have completed their schooling and that women have entered their prime child-bearing years. Broadly speaking the coefficients show that both quit and separation rates are higher for women than men for this subsample. Overall these results suggest that women are indeed less attached to their employers than men.

Studies by Becker and Lindsay (1994) and Sicherman (1996) confirm our finding that women quit jobs at a higher rate than men. In addition, Light and Ureta (1995) find that women have longer and more frequent non-working spells than men in their early careers, and that women tend to require relatively more time to accumulate a given amount of work experience. Banzhaf (2005) finds that women are less likely to remain in the labor market in the NLSY conditional on working

Table 3
Turnover Regressions (marginal coefficients from Probit model specifications)

	All Ages		Age 25+ Years	
	Separation	Quit	Separation	Quit
High School or Less				
Female	0.006 (0.013)	0.080 (0.012)	0.011 (0.024)	0.075 (0.02)
Married	−0.053 (0.099)	−0.040 (0.008)	−0.078 (0.011)	−0.047 (0.010)
Female*Married	0.033 (0.014)	0.045 (0.013)	0.045 (0.017)	0.035 (0.015)
Sample Size	22,896	22,896	13,145	13,145
More than High School				
Female	0.013 (0.018)	0.027 (.016)	0.082 (0.026)	0.061 (0.023)
Married	−0.057 (0.013)	−0.022 (.012)	−0.056 (0.013)	−0.022 (0.012)
Female*Married	0.064 (0.018)	0.043 (.016)	0.060 (0.019)	0.038 (0.017)
Sample Size	14,710	14,710	10,723	10,723

Note: Controls variables include Age, Age Squared, Tenure, Experience, their interaction terms with Female, and Year indicators. Standard errors are in parentheses below the coefficient estimates.

Table 4
Training Incidence and Intensity: All Formal Training Programs versus Formal Company Provided Training Programs, NLSY 1986–1993

	Obs	All Training			Company Provided Training		
		Incidence	Total Hours	Hours if Training	Incidence	Total Hours	Hours if Training
High School or Less							
Men	336	26.5%	46.9	179	20.5%	25.4	125
Women	303	27.4%	36.0	127	18.2%	13.9	69
More than High School							
Men	313	47.6%	72.4	158	42.8%	59.4	149
Women	298	40.3%	40.0	93	33.9%	24.7	75

in the previous period and less likely to enter the labor market if previously not employed. All of these findings support the view that women are relatively less attached to their jobs. To the extent that women expect, and do experience, shorter job durations, the lower estimated rate of return on tenure for women is consistent with our strategic choice hypothesis.

In contrast, studies by Farber (1994) and Royalty (1998) of young women and men have not found significant gender differences in separation probabilities. Note that both these studies focus on samples of workers who are younger than the workers in our sample. For example, Royalty (1998) includes in her sample individuals who may still be in school and where the oldest individual is still less than 30 years of age. Imposing these same restrictions on the NLSY data we also find that the coefficient on the female indicator variable is insignificant for more educated workers. Farber (1994) only includes individuals who have been in the labor market for at least three continuous years. This sample selection criterion clearly over samples women who are more attached to the labor market. Our point of course is to understand whether women overall are more or less attached to their jobs compared to men. Our analysis highlights significant gender differences in turnover for individuals in their middle twenties and thirties who are more likely to have greater family commitments.

3.3.2. Incidence and intensity of training

Starting in 1987, the NLSY contain detailed information on formal job training programs that include the incidence and hours of training. More importantly, this training information is available for both company and non-company provided training programs. Since company provided training is more likely to be firm specific than non-company provided sources of training, we can ask whether women receive less company provided training than men.[16]

Table 4 shows the incidence and mean hours of total training and of company provided training. Since detailed training information is collected from 1987 onwards, our sample is restricted to those who start a new job in 1987 (or after) and continue on the same job for two further periods. Hence the incidence rate represents the percent that receive any hours of training during the first three survey periods on a specific job. Men receive more training than women across all subsamples. Average hours are higher for men than women for both total and company-

[16] Our preliminary analysis is not a substitute for a rigorous analysis of gender disparities in training. Our objective is to present summary statistics about gender disparities in company provided training that is consistent with the differential wage returns to tenure across gender. Other studies (see below) have provided a more thorough analysis of training disparities across gender.

provided training. In addition, men have a higher incidence of company provided training. Among more educated workers, men have higher incidence rate for training (48% versus 40%) and for company provided training (43% versus 34%) than women. The discrepancies are less pronounced for the lower education group, although the training hours are greater for men than women for all types of training. These differences across the high and low education groups are clearly consistent with the hypothesis that investments in training are greater among the more educated. This is also confirmed by the lower training incidence rate for the less educated group overall. The more dramatic finding is the difference in average hours of training across gender. Within the higher education group, men on average receive substantially more hours of total training — over 50% more — than women. The gender disparity in total training among more educated workers is mainly due to the fact that men receive more than double the number of average hours of company provided training than women — mean of 59 hours for men versus 25 hours for women.

Royalty (1996) investigates whether gender disparities in company provided training could be due to differences in expected job duration. She not only finds that predicted turnover is significantly related to the likelihood of receiving company provided training, but that the positive effect of being male on the probability of receiving company training is reduced by about 25% when estimated turnover rates are included in the estimation. However, as also noted by Royalty, there remains some advantage to men in the receipt of company training that is not explained by observables, including the turnover probabilities. Hence these training disparities could indeed be a consequence of employer discrimination.

The type and quantity of training women and men receive have important ramifications for returns on tenure and experience. The observed gender differences in returns to tenure and experience could indeed be the result of gender differences in training.[17] There is an extensive literature on gender differences in training that suggests that women receive less training then men (Royalty, 1996; Olsen and Sexton, 1996; Hill, 1995; Lynch, 1992; Altonji and Spletzer, 1991).[18] Further evidence from the NLSY is provided by Lynch (1992), who looks at a sample of non-college-graduates from 1980-83, and finds that males are more likely to receive on-the-job training and to be in apprenticeships while women are more likely to receive off-the-job training. There are of course major limitations to using data from formal training programs, especially given how little of such training is received. However, if reported training is just a small (but proportional) component of actual training then these reported differences in training may also reflect gender disparities in actual training levels. More importantly, note that our primary concern is on the more general issue of differential wage returns to tenure and experience since wage returns reflect not only returns to formal training (as identified in the NLSY and in many of the training studies cited above), but also returns to informal training, learning by doing, and other incentive-based compensation policies. As a consequence the major focus of our paper is on the gender differences in wage returns on tenure and experience.

[17] Indeed, weaker job attachment implies that women are less likely to invest in on-the-job training. See Barron et al. (1993). Of course, gender differences in company provided training could be due to strategic investment decisions on the part of the employee or due to employer discrimination.

[18] As mentioned earlier, gender disparities in wage returns on tenure could be due to factors other than just company provided training differentials such as back-loaded pay structures designed to elicit work effort or to incent self selection of less mobile workers. Information on wage contracts and employment practices are, however, extremely rare, except perhaps in firm level data that includes personnel records.

Table 5
Expectations of Labor Force Participation at Age 35, NLSY 1979–1984

	Obs	% Expecting to be Working at age 35	% Not Expecting to be in Labor Force at age 35 due to Family Reasons
High School or Less			
Women	21,744	67.0%	26.9%
Men	23,640	86.6%	1.7%
More than High School			
Women	13,734	79.9%	16.5%
Men	12,060	91.8%	1.1%

3.3.3. Expectations about future labor force attachment

Expectations about future labor force participation will affect current human capital investment decisions. Such expectations are likely to have implications for whether individuals will invest in general or specific forms of human capital. If an individual anticipates a long absence from the labor market then she is more likely to make smaller overall investments. However, interruptions of a limited duration are unlikely to dampen overall levels of investment, but may have strategic impact on the type of investments. For example, a career interruption for family related reasons may imply a separation from an employer but not a substantial reduction in the overall time spent in the labor market. Thus individuals who anticipate family related career interruptions in the future will be more likely to invest in general skills than in firm-specific skills.

A survey instrument in the NLSY allows us to study gender disparities in labor force expectations. From 1979 to 1984, respondents are asked, "What would you like to be doing at age 35?" Table 5 presents the responses across women and men. First, in the second column we present the percent of women and men who expect to be working at age 35. Among the less educated workers 67% of women and 87% of men expect to be working. And among the more educated these numbers are 80% and 92%, respectively. Clearly, more educated women are a lot more likely to report that they would be working at age 35 compared to less educated women (80% versus 67). This disparity across education is much smaller among men (92% versus 87%). The key point however is that these large disparities in labor force attachment are primarily due to the fact that women expect to be out of the labor force for family related reasons. As the last column of Table 5 illustrates, less than 2% of men (in either education group) expect to be out of the labor force at age 35 due to family related reasons. By contrast, about 27% of less educated women and 17% of more educated women expect to be out of the labor force due to family related reasons at age 35. These reports tell us that women indeed expect to have career interruptions in their prime child-bearing and child-rearing ages, which in turn would imply that they are less likely to be attached to their employers.[19]

[19] A striking illustration of rapidly changing work expectations of women is documented in two surveys of young women aged 14 to 21 conducted a decade apart. In a 1969 survey less than 30% of the respondents expected to work at age 35, and just ten years later in 1979 over 70% of a similarly aged cohort of young women expected to work at age 35. No doubt, these dramatic changes in expectations are likely to have important implications for human capital investments of women (O'Neill, 1990).

Table 6
Within-Job Wage Growth, NSLY 1979–1994 (Estimates from Topel's First-Step)

	Obs	Estimated of $\beta_1+\beta_2$	Standard Errors
High School or Less			
Women	4,792	0.079	0.0049
Men	6,100	0.090	0.0049
More than High School			
Women	3,003	0.100	0.0074
Men	2,894	0.118	0.0086

3.4. Wage returns to tenure and experience

Table 6 presents estimates of within-job wage growth from the first step of Topel's two-step model. The model is under-identified by one parameter because first differences imply identical unit changes for both experience and tenure. Therefore the constant term reflects the wage increase due to an additional year of labor market experience — i.e. the joint wage returns to tenure and general experience. Note that the overall return to labor market experience is higher for men than women in both the high and low education groups. An additional year of labor market experience is associated with about a 15 percent higher wage growth rate for men compared to women in both education groups. This finding of lower overall returns to labor market experience for women has been documented in many previous studies (e.g., Loprest, 1992; Light and Ureta, 1995). We now turn to our estimates of gender disparities in wage returns to tenure and experience from the three models discussed in Section 3.2 earlier.

Table 7 presents the five-year cumulative returns to tenure and experience based on Topel-2S, Topel-IV, and AS procedures. These cumulative returns to tenure and experience, shown in the second and third columns, respectively, are presented for women and men across the high and low education groups, and they include the effects of higher order terms of tenure and experience.[20] The main finding is that the returns to tenure are substantially smaller for women than they are for men, and that the returns to experience are somewhat larger for women than they are for men. These findings are robust across the different model specifications, and the gender differentials are especially striking among more educated workers. For example, the estimates from Topel-IV show that the five-year cumulative wage returns to tenure are almost three times greater for men than they are for women, and that the five-year cumulative wage returns to experience are about 40% more for women than they are for men. Note that the total return (shown in the last column) to an extra year of labor market experience is lower under AS than under Topel-2S and Topel-IV procedures.[21]

A comparison of the estimates of gender disparities in returns to experience across Topel-2S and Topel-IV among more educated workers (bottom panel of Table 7) show that the proposed

[20] The full set of regression coefficients can be found in Appendix Tables 1 and 2.

[21] The total return under Topel-2S and Topel-IV in principle should be the same since they are based on Topel's first-step estimate. The slight disparities that appear in Table 7 are due to computations that approximate the cumulative returns to tenure and experience, which are then simply added up to give the value presented in the last column entitled total return.

Table 7
Five-Year Cumulative Wage Returns to Tenure and Experience

		Obs	Return to Tenure	Return to Experience	Total Returns
High School or Less					
Topel-2S	Women	6,015	0.268	0.089	0.357
	Men	6,873	0.291	0.116	0.407
Topel-IV	Women	6,015	0.167	0.183	0.350
	Men	6,873	0.246	0.157	0.403
AS	Women	9,372	0.094	0.203	0.297
	Men	11,245	0.099	0.181	0.280
More than High School					
Topel-2S	Women	3,367	0.228	0.261	0.489
	Men	2,835	0.338	0.224	0.562
Topel-IV	Women	3,367	0.098	0.410	0.498
	Men	2,835	0.272	0.288	0.560
AS	Women	5,645	0.072	0.255	0.327
	Men	5,064	0.132	0.199	0.331

Note: These cumulative wage returns are calculated from regression coefficients of Topel-2S, Topel-IV, and AS procedures, respectively. The detailed regression results are included in Table 1 and Table 2 of the Appendix.

heterogeneity correction in the latter procedure increases the return to experience for women substantially more (from .26 to .41) than it does for men (from .22 to .29). This finding implies that the extent of correlation between initial experience and individual heterogeneity is stronger for women, and hence using actual experience as an instrument in Topel-IV increases the positive female-male gap in wage returns to experience. The corollary is that the negative gender gap in wage returns to tenure also increases since the return to tenure is estimated by subtracting the return to experience from the total return to an extra year of labor market experience. Thus this correction for individual heterogeneity lends even more support to our hypothesis that women invest less in firm-specific skills and more in portable general skills, especially among more educated workers where strategic human capital investments are likely to matter more.

The key inference question is whether the observed gender differences in these wage returns are significant. The computation of correct standard errors requires not only that the error terms in the wage equation for men and women are uncorrelated, but also other stringent assumptions. In particular, we need to assume that the error terms from Topel's first and second steps are uncorrelated, and more significantly, that the estimates of the returns to tenure and experience are unbiased. Under these assumptions we compute standard errors that show that the marginal returns to tenure and experience are significantly different across women and men. This conclusion holds for values of experience and tenure up to five years for the Topel-IV estimates. The problem of course with these computed standard errors is that we know from theoretical considerations that the estimates of returns to experience and tenure are biased. Since biased estimates are composed of the true estimate and a bias term, computing an appropriate standard error requires that we make arbitrary assumptions about the variance of the bias term. These considerations temper any pretense of providing a conclusive statistical test of gender differences in the point estimates of the returns to tenure and experience. However, the discussion in the next section on whether the systematic biases inherent in our estimates are different across women and men suggests that our estimated gender disparities in wage returns to tenure and experience are in fact a lower bound of the true gender disparities.

3.5. Potential biases

In this section we consider some potential biases of our estimates of returns to tenure and experience that are likely to differ systematically across women and men, and assess their implications for our estimates of the gender disparities in returns to tenure and experience. In particular, we focus on biases that could arise from gender differences in job search effort and heterogeneity of within-job wage growth rates, and present evidence to show that the true gender gap in returns to tenure are likely to be even larger than what our estimates suggest.[22]

3.5.1. Gender differences in job search

In Section 3.2 we claimed that the estimate of returns to experience is biased due to job search. The standard assumption in job matching and job search theories is that workers sample new job offers from a stable distribution and that offers arrive randomly at an exogenous rate. If the true returns to experience and tenure are zero — $\beta_1=0$ and $\beta_2=0$ — then this optimal job search process implies that the current wage of an individual is the maximum of all the job offers received. Since the number of job offers increase with experience, current wages are correlated with experience even though we have assumed that the true return to experience is zero. This job search process is the reason that we suppose that our return to experience is biased — i.e. $b_1>0$. Note that this argument (based on Topel, 1991) is predicated on the simplifying assumption that outside job offers arrive at an exogenously given rate. Workers however are likely to adjust their search effort in order to elicit job offers at different rates, and it is likely that search effort for new jobs will be systematically different across men and women for precisely the same reasons that women are less likely to invest in job specific skills. If women are less attached to jobs then they would invest less in job search compared to their male counterparts, implying a weaker correlation between initial experience and the bias term on returns to experience (b_1).[23] Thus the bias in our estimates of returns to experience would be smaller for women than men. The implications of endogenous job search effort for differences in wage returns between women and men are obvious: our positive estimate of the female-male gap in returns to experience is likely to be bigger, and correspondingly, the large negative gap in returns to tenure is likely to be an underestimate of the true gap. Moreover, if women value other non-pecuniary dimensions of jobs more than men then even the same levels of search effort are unlikely to generate comparable wage offers across women and men, implying again, a weaker correlation between experience and the bias term on returns to experience (b_1).

One implication of lower levels of job search effort and placing relatively more weight on job characteristics such as hours and location of work than wages (Kahn and Griesinger, 1989) is that mobility wage gains should be smaller for women than men. Loprest (1992) using the same NLSY data shows that mobility wage gains for women are about half of what they are for men, and attributes part of the gender discrepancy to choice of hours, location and occupation. Light and Ureta (1995) also provide evidence that mobility wage gains are smaller for women. In addition, we confirm that this pattern holds for our sample, especially for workers between the

[22] Bratsberg and Terrell (1998) have a more extensive discussion on the sensitivity of both the AS and Topel estimators to various considerations that could lead to bias in their estimators, including choice of metric of tenure and experience. Using the same NLSY data, they argue that their key conclusion — black workers receive a comparable or even higher return to tenure than white workers, but earn a far lower return to general labor market experience — holds because these biases do not necessarily compromise the comparison across races. Our discussion here focuses on considerations we think might lead to biases that differ systematically across women and men.

[23] Sandell (1980) presents some evidence to suggest that unemployed married women invest too little in job search.

ages of 20 and 30. This gender difference in mobility wage gains only strengthens our findings on gender gaps in returns to tenure and experience since it suggests that the true gender disparities in returns to experience and tenure are even larger than the gaps we have estimated.

3.5.2. Heterogeneity of within-job wage growth

In Section 3.2 we claimed that Topel's first step generated consistent estimates of overall returns to an extra year of labor market experience if within-job wage increases are serially uncorrelated. In this section we address whether within-job wage increases are indeed serially uncorrelated for women and men. For example, if jobs differ in wage growth rates and the source of wage growth is due to firm-specific factors then high growth jobs are more likely to survive. As a consequence, Topel's first step would over estimate the return to an extra year of labor market experience because our data would over represent high growth jobs. The key implication of heterogeneity of within-job wage growth rates is that it would tend to bias up our estimate of returns to tenure. Note that we obtain the return to tenure by subtracting the estimate of returns to experience from our estimate of the overall within-job wage increase from one period to the next. Our objective in this section is to test whether there is evidence of such heterogeneity, and if so, whether the bias resulting from it might be different across women and men.

To test for within-job wage growth heterogeneity we follow a test proposed by Topel. His exposition begins by rewriting the wage growth model in Eq. (4):

$$y_{ijt} - y_{ijt-1} = \beta_1 + \beta_2 + \eta_{ijt} + v_{ijt} - v_{ijt-1},$$

where $\eta_{ijt} = \phi_{ijt} - \phi_{ijt-1}$. Note that if this permanent component of wage increase is specific to an employment relationship then high wage growth jobs are more likely to survive. In the observed sample of within-job wage growth we would expect $E\eta > 0$ if high (low) anticipated values of η_{ijt} are more (less) likely to survive in the future. Denote R_t as the remaining life a job from time t. Then the following condition

$$0 \le E(\eta_t | R_t \ge 0) < E(\eta_t | R_t \ge 1) < E(\eta_t | R_t \ge 2) < \ldots,$$

says that the expected value of wage innovations are larger for jobs that survive for longer time periods. A simple procedure to test whether wage innovations are larger for longer duration jobs is to assess whether the residual of current wage growth is positively correlated with the remaining life of the job as indicated in the above expression (Topel, 1991). To implement this procedure we modify Topel's first step in Eq. (4) by first adding a linear term to indicate the remaining time left on the job. To allow for non-linear effects we can of course include indicator variables to estimate separate effects of jobs that end in period $t+1$, $t+2$, $t+3$, and $t+4$. Table 8 presents evidence of within-job wage growth rates across jobs that end in the near and distant future. The first column labeled "t" tests whether the relationship between remaining tenure and current wage growth is linear. The remaining 4 columns are the coefficients on indicator variables for remaining years on the current job. Since jobs that last for more than 4 periods are the omitted category, negative and decreasing coefficients on these time indicator variables would be evidence of within-job wage growth heterogeneity. Except for the group of women with more education, we find no evidence of the above inequalities.[24] This suggests the presence of heterogeneity of wage innovations for

[24] We find, like Topel and Ward (1992), that the evolution of within-job wages follows a random walk for men. Moreover, we also find that there is no evidence of positive serial correlation of within-job wage innovations for less-educated women.

Table 8
Evidence on Heterogeneous Within-Job Wage Growth Rates (Relationship between Remaining Job Duration and Current Wage Growth)

Remaining Job Duration in Years					
	t	t+1	t+2	t+3	t+4
High School or Less					
Women (Obs=4,759)	0.001 (0.001)	−0.005 (0.007)	−0.005 (0.008)	0.006 (0.009)	0.003 (0.01)
Men (Obs=6,048)	0.001 (0.001)	−0.006 (0.006)	−0.018 (0.007)	−0.0003 (0.008)	−0.010 (0.009)
More than High School					
Women (Obs=2,985)	0.004 (0.001)	−0.027 (0.009)	−0.035 (0.010)	−0.024 (0.012)	−0.021 (0.013)
Men (Obs=2,869)	0.0008 (0.0015)	−0.003 (0.009)	−0.006 (0.010)	0.0005 (0.012)	−0.009 (0.013)

Note: Standard errors are in parentheses.

our sample of more educated women. The preceding discussion then implies that our estimate of wage returns to tenure for more educated women is likely to be an over estimate, suggesting that the implied gender gap in wage returns to tenure is likely to be even larger than the gaps we estimate in Section 3.4.

Both types of bias we have considered in this section suggest that we are overestimating the returns to tenure for women compared to men. This leads to the conclusion that especially for highly educated workers, the gender difference in the return to tenure is even larger than what our estimates suggest.

These findings must be tempered with the possibility that under certain wage setting conditions lack of positive serial correlation in within-job wage growth is an inappropriate test to reject the hypothesis of heterogeneous wage growth rates among jobs (Munasinghe, 2006). Thus Topel's first step may be an over estimate of the overall returns to an additional year of labor market experience even if we have no evidence of positive serial correlation of within-job wage increases. However, these wage setting considerations also that show that the tenure-wage profile will be flatter than the tenure-productivity profile. Thus the over sampling of higher wage growth jobs is ameliorated by the fact that any estimate of the tenure effect on wages is likely to be an underestimate of the underlying increase in firm-specific productivity. The key point for our purposes is that the gender disparity in wage returns to tenure is nevertheless informative of differences in firm-specific skill accumulation across women and men.

4. Conclusion

We estimate returns to experience and tenure across a sample of women and men in their early careers. We confirm that the overall wage return to an additional year of labor market experience is higher for men than women. However, a decomposition of this overall return shows that especially among more educated workers, the return on tenure is substantially lower for women than for men, but that the return on experience is higher for women than men. These findings are consistent with the hypothesis that women in comparison to men might be less attached to jobs due to life cycle events such as marriage and child birth. Our interpretation is also compatible with some of the findings in Light and Ureta (1995), namely that for women the drop in earnings upon returning to work after a career interruption is smaller than it is for men, and the "catch up" to their

continuously employed counterparts is quicker. Further we show that women are more likely to quit their jobs than men, that the gender disparity in job training intensity is due to the fact that men receive substantially more company provided training than women, and that a much higher fraction of women expect to be out of the labor force at age 35 due to family related reasons. This body of evidence points to the fact that women are indeed less attached to their employers than men.

This paper suggests various further research directions. The first is to extend our empirical analysis by explicitly introducing instruments for women's commitment to the labor market and to specific jobs. For example, worker's expectations about job duration, future labor force participation, care for parents, and the timing of marriage and children can be utilized to refine the analysis presented in this paper. How do investments and the returns to experience differ across women who anticipate working in the labor market versus those who do not? Do women who expect to marry and have children later in life experience greater returns to labor market experience? Do women who expect long job durations experience higher returns to tenure? Answers to these questions could potentially help to clarify further whether the observed gender disparities in the wage returns to experience and tenure are a consequence of investment choice or discrimination on the part of employers.

Appendix

Table 1
Log Wage Regressions (High School or Less), NLSY 1979–94

Variable	Topel-2S		AS		Topel IV	
	Women	Men	Women	Men	Women	Men
Tenure	0.0621	0.0649	0.033	0.0316	0.0456	0.0578
	(0.0051)^	(0.0051)^	(0.006)	(0.005)	(0.0055)^	(0.0053)^
Tenure^2	−0.0029	−0.0028	−0.003	−0.003	−0.0029	−0.0028
	(0.0005)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0004)
Experience	0.0169	0.0254	0.0385	0.036	0.0335	0.0326
	(0.0015)	(0.0014)	(0.004)	(0.004)	(0.0024)	(0.002)
Experience^2	0.00002	−0.0007	−0.0003	−0.0005	0.00002	−0.0007
	(0.0004)	(0.0004)	(0.0003)	(0.0002)	(0.0004)	(0.0004)
Union	0.099	0.274	0.144	0.275	0.112	0.275
	(0.014)	(0.011)	(0.011)	(0.008)	(0.014)	(0.011)
SMSA	0.166	0.103	0.132	0.093	0.160	0.101
	(0.010)	(0.009)	(0.008)	(0.008)	(0.010)	(0.009)
Health	−0.067	−0.048	−0.074	−0.0265	−0.066	−0.046
	(0.026)	(0.035)	(0.022)	(0.026)	(0.026)	(0.035)
Hrs worked/wk	0.0046	0.002	0.004	0.0018	0.004	0.0019
	(0.026)	(0.0005)	(0.0004)	(0.0004)	(0.0005)	(0.0005)
AFQT	0.0033	0.0023	0.0033	0.0027	0.0033	0.0024
	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0002)
Constant	1.125	1.455	1.122	1.464	1.051	1.355
	(0.026)	(0.021)	(0.022)	(0.026)	(0.027)	
Obs	6,015	6,873	9,372	11,245	6,015	6,873
Adjusted R^2	0.1679	0.2203	0.2689	0.3068	0.151	0.2170

^ Estimated upper bound for standard errors.

Table 2
Log Wage Regressions (More than High School), NLSY 1979–94

Variable	Topel-2S		AS		Topel IV	
	Women	Men	Women	Men	Women	Men
Tenure	0.0468	0.0692	0.0281	0.0371	0.0244	0.0590
	(0.0078)^	(0.009)^	(0.0079)	(0.0087)	(0.008)^	(0.009)^
Tenure^2	−0.0012	−0.0022	−0.0028	−0.0024	−0.0012	−0.0022
	(0.0006)	(0.0007)	(0.0006)	(0.0008)	(0.0006)	(0.0007)
Experience	0.0533	0.0489	0.0453	0.0383	0.0757	0.0591
	(0.00246)	(0.0026)	(0.0065)	(0.007)	(0.004)	(0.004)
Experience^2	−0.0014	−0.0017	0.00001	−0.0004	−0.0014	−0.0017
	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Union	0.132	0.127	0.1602	0.1295	0.136	0.126
	(0.031)	(0.027)	(0.0203)	(0.0187)	(0.031)	(0.027)
SMSA	0.209	0.195	0.165	0.1959	0.205	0.191
	(0.0184)	(0.021)	(0.0136)	(0.0147)	(0.019)	(0.021)
Health	−0.064	−0.174	−0.103	−0.178	−0.045	−0.166
	(0.050)	(0.072)	(0.0353)	(0.0521)	(0.050)	(0.073)
Hrs worked/wk	0.003	−0.002	0.0024	−0.0018	0.0027	−0.0023
	(0.0007)	(0.0008)	(0.0006)	(0.0006)	(0.0008)	(0.0008)
AFQT	0.002	0.0014	0.0034	0.002	0.0021	0.0014
	(0.0003)	(0.0004)	(0.0003)	(0.0003)	(0.0004)	(0.0004)
Constant	1.244	1.751	1.294	1.755	1.124	1.683
	(0.051)	(0.057)	(0.041)	(0.0461)	(0.052)	(0.059)
Obs	3,367	2,835	5,645	5,064	3,367	2,835
Adjusted R^2	0.2373	0.2678	0.2742	0.2929	0.2192	0.02639

^ Estimated upper bound for standard errors.

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