Job changes and the return to seniority

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March 31, 2016

Preliminary version — comments welcome!

All identifying information about returns to seniority comes from loss of tenure in job changes. This paper uses a short panel representative of the U.S. college-educated population to estimate these returns, incorporating information about the characteristics of job changes. When job changes are treated as equivalent, the estimated returns to tenure are modest. However, when tenure is interacted with the type of transition, I find that loss of tenure returns is large when an individual changes both employer and type of job, but indistinguishable from zero when only the employer changes. These results imply that overall returns to tenure represent mainly the accumulation of skills that are matched to the current position and that tenure with an employer itself has minimal return. Transitions to a different type of job cause a deterioration in the skill match, making long-tenure workers more equivalent to short-tenure workers.

On average, wages rise with employee seniority. That relationship may help to reveal important features of the labor market, yet it has been troublesome for economists in various ways. One view has been that the relationship is evidence of employer-specific factors such as firm-specific human capital or deferred compensation (Hutchens, 1989). However, there has been recurring suspicion that much of the wage increase associated with tenure is an artifact of unobserved heterogeneity or failure to appropriately control for secular wage trends (e.g., Altonji and Shakotko 1987; Topel, 1991; Altonji and Williams, 2005; Buchinsky, Fougère, Kramarz and Tchernis, 2010). Another line of thought is that studies have confused employer effects with industry or occupation effects (Neal, 1995; Parent, 2000; Kambourov and Manovskii, 2009). The relationship between tenure and earnings has also played an important role in efforts to test for asymmetric employer learning (Schönberg, 2007; Pinkston, 2009).

This paper combines two ideas to provide insight into why wages rise with tenure. First, separately identifying the effects of experience and tenure relies on job changes; if nobody ever changed jobs, experience and tenure would be perfectly correlated and their effects could not be separately identified. Tenure effects therefore can only be identified via loss of tenure in job transitions. Therefore I focus attention on these transitions. Second, a hard distinction between firm-specific and general human capital can be misleading (Lazear, 2009), so change in job content is a key feature of job transitions and is potentially as important, or more important, than change of employer.

Using a newly available longitudinal component of the National Survey of College Graduates (NSCG), I first estimate how wages change with loss of tenure in different types of job transitions: different job with the same employer (SE-DJ), similar job with a different employer (DE-SJ), or different employer and different type of job (DE-DJ). These three job-to-job transition types are identified directly by NSCG respondents who reported a job change between October 2010 and February 2013. The longitudinal component also allows calculation of the change in tenure associated with job changes.

Results indicate that tenure loss has very modest effects for both men and women when these three types of job-to-job transitions are not distinguished. However, when tenure is interacted with the type of transition, DE-DJ transitions result in large losses, but losing tenure through a SE-DJ or DE-SJ transition

results in far smaller losses. The contrast between DE-SJ and DE-DJ transitions implies, first, that returns to employer tenure are minimal, since changing employer without changing type of job incurs only a small wage loss associated with loss of tenure. (Interpretation of SE-DJ transitions is complicated by the internal economics of employers, such as career ladders; tentative conclusions are discussed in section ??.) Second, given that returns to employer tenure are small, the results are consistent with returns to tenure representing mainly returns to human capital that accumulates on the job, but is not as well-matched with different positions.

These results are complementary to and, to a large extent, reinforce those of Kambourov and Manovskii (2009), who found that returns to occupational tenure in their PSID sample are far larger than returns to employer or industry tenure. The data and methodology here offer several advantages. First, the complementary approach taken here is to concentrate on job transitions coded according to respondents' own assessments of whether their jobs have changed. Recorded occupation, in contrast, is based on the coding of short job descriptions provided by respondents.[1] Second, although drawn from a narrower population (college graduates), the NSCG sample is substantially larger than the PSID, and thus allows separate estimation for men and women. Although the results do not differ qualitatively between men and women, for the most part job changes have larger effects for women.

As a whole, the results suggest that returns to employer tenure are minimal and that overall returns to tenure represent mainly the accumulation of skills that are matched to the current position. Transitions to a similar type of job cause little deterioration in this match, while transitions to a different type of job cause more substantial disruption of the skill match.

The next section develops a simple theoretical model of job transitions. Section 2 describes the NSCG sample and addresses several issues regarding the key variables. The empirical approach is described in section 3, followed by discussion of the results in section 4.

[1] Much of Kambourov and Manovskii's paper is devoted to difficulties with occupational coding. Their detailed analysis mitigates, but probably does not eliminate these. Occupations are also coded in NSCG data. Section 2 compares direct reports and occupational coding.

1 What does economic theory say about job transitions and tenure?

1.1 Skills

Deferring for the moment the issue of deferred compensation, there is no reason why tenure itself should affect wages. Instead, economists believe (hope?) that tenure is statistically related to processes that happen inside *specific* workplaces that affect a worker's productivity. Taken literally, a Mincer equation augmented with tenure (as used by most of the papers cited above) imposes very strong restrictions on those processes: it implies that when job changes take place the worker retains her accumulated returns to experience, but immediately loses all of her accumulated returns to tenure. In other words, the within-employer processes start over. This restrictive view is consistent with interpreting returns to tenure as returns to firm-specific human capital or loss of deferred compensation.

Lazear (2009) has made a persuasive case that little human capital is truly firm-specific. Instead, individuals hold portfolios of skills, each of which is valuable to a subset of employers. Because of on-the-job learning, an individual's portfolio is generally most valuable to her current employer—the match between skills and skill needs improves over time. Lazear's insights suggest a different perspective on the roles of experience and tenure in the evolution of an individual's earnings. First, at least some of the returns to tenure will be associated with the nature of the work, rather than the employer. Switching type of job *and* employer should result in larger losses than switching employer only. Lazear's model, therefore, implies that the earnings losses associated with loss of tenure will depend on how well matched an individual's skill portfolio is to the requirements of the new job.

The remainder of this section develops a simple model to illustrate how different types of job transitions result in different consequences from loss of tenure. The key points illustrated by the model are intuitive. First, even though tenure falls to zero, voluntary job transitions do not generally occur if they involve a pay cut (holding constant non-wage features of jobs and willingess to search for a high quality match).

Second, if returns to tenure represent the improving match between an individual's portfolio of skills and the skill requirements for her job, then DE-DJ transitions result in the greatest disruption of the skill match, so the association between change in tenure and change in wage should be strongest in these transitions.

To be more specific, assume that a currently employed individual possesses stocks of general and employer-specific skills, denoted as K_g, and $K_e(\tau_e)$. $K_e(\tau_e)$ accumulates with tenure employer tenure (τ_e). I ignore accumulation of K_g, per se, instead focusing below on improvement of the match between the individual's skills and her job.

The worker's productivity in an existing position is $W_0 = \lambda(\tau_p)K_g + K_e(\tau_e)$, where $\lambda > 0$ and $\lambda'(\tau_p) > 0$. K_g can be conceptualized as indexing the general level of the worker's specific skills, while $\lambda(\tau_p)$ captures the quality of the match between those skills and the specific position in question.[2]

With respect to skills, suppose that two kinds of job transitions are possible: either the worker moves to the same type of job, allowing her to carry over $\lambda(\tau_p)$, or she moves to a different type of job, in which case she starts with a random λ. That is, if λ_0 refers to the old job and λ_1 to the new job, then

$$\lambda_1(0) = I_{\text{same}}\,\lambda_0(\tau_p) + (1 - I_{\text{same}})\lambda(0)$$

where I_{same} is an indicator for same type of job and $\lambda(0)$ is realization of a positive random variable.

For simplicity assume that the screening and interviewing process fully reveals $\lambda_1(0)$, so that it is known at the time of a wage offer. If the proposed match involves a new employer, $K_e(\tau_e)$ becomes zero. If it involves a new type of job, the probability that $\lambda_1(0) < \lambda_0(\tau_p)$ grows with τ_p because $\lambda'(\tau) > 0$. Thus the

[2]This structure is intended as a simple substitute for a model in which workers have a vector of specific skills and match quality is described by a distance between that vector and the employer's vector of skill needs. The idea that on-the-job skill acquisition improves the match between these vectors (shrinks the distance) is captured by the assumption that $\lambda'(\tau_p) > 0$.

worker's productivity and wage in the proposed match are given by

$$W_1 = \begin{cases} \lambda_0(\tau_p)K_g & \text{between-employer, similar job} \\ \lambda(0)K_p & \text{between-employer, new type of job.} \end{cases}$$

The worker is in one of two states. She either has the option to continue her job at wage $W_0 = \lambda_0(\tau_p)K_g + K_e(\tau_e)$ or she must find a new job. In the former case, she will accept an offer if and only if $W_1 > W_0$. Since any potential transition to a new employer involves losing the value of $K_e(\tau_e)$, a higher wage offer necessarily implies $\lambda(0) > \lambda_0(\tau_p)$. In other words, her reservation wage increases with position tenure.[3] Empirically then, voluntary transitions will not be associated with wage declines, even though position and/or employer tenure falls to zero. This does not imply, however, that the correlation between tenure and log wage *changes* is negative, since the log wage increases are not necessarily correlated with tenure. The bottom line is that the conventionally assumed relationship between tenure and wage *level* is broken in voluntary transitions.

When a transition is involuntary, the worker's reservation wage is lower than W_0. From a new firm's point of view, she brings to the table either $\lambda_0(\tau_p)K_g$ or $\lambda(0)K_g$, depending on whether she is interviewing for a similar or different position. In the former case, it is likely that $\lambda(0) < \lambda_0(\tau_p)$, because during her tenure with her previous employer, the worker's on-the-job skill acquisition (and neglect of depreciating skills) was guided by the specific needs of her employer. In either case, wages typically decline, so there is a positive relationship between (employer and/or position) tenure and wages (both fall). If the worker interviews for positions like her previous job, her average wage loss will be lower than if she interviews for a different type of job because she brings a better skill match to the new job.

In this framework, then, involuntary between-employer transitions are where workers on average experience losses associated with tenure, and those losses are larger when there is a change in job content, as well as an employer change. When transitions are voluntary, the correlation between loss of tenure and wage change is ambiguous.

[3] Jovanovic (1979) made essentially the same point.

As mentioned earlier, individuals may also lose tenure rents when they seek jobs with more desirable non-wage characteristics. Since it is generally impossible to identify those cases in data, the potentially observable implications implications of the logic in this section are: (1) Wage change will be positively associated with change in employer tenure in between-employer (DE-SJ and DE-DJ) transitions (provided employer tenure is important). (2) The association is stronger in DE-DJ transitions than in DE-SJ transitions.

Reality, of course, differs from the preceding description in several ways that are relevant when these ideas are confronted with data. First, there are different degrees to which a new job can be "different" and, therefore, the skill match at the new job is not entirely random. The empirical analysis that follows is based on the assumption that the skill match generally deteriorate more when respondents judge that they have moved to a "different type" of job. Second, many workers switch jobs for reasons beyond termination or higher pay, including, in particular, different non-wage characteristics, such as looking a new job that fits better with family responsibilities.

1.2 Deferred compensation

The assertion that there is nothing about tenure itself that should affect wages is less clearly defensible with respect to models of deferred compensation. Lazear's (1979) model of back-loaded compensation, for example, directly revolves around an employee's time with a firm. In principle the relationship between compensation and tenure can be identified by comparing employees' compensation profiles with their productivity profiles within a firm (for example, Medoff and Abraham, 1980).

A key feature of deferred compensation as an explanation for returns to tenure is that it is linked specifically to the employer, so there should be no difference between the effects in DE-SJ and DE-DJ transitions if it is the predominant reason for people with more tenure to be paid more. [work on this]

If returns to tenure represent deferred compensation, it is important to recognize that there is a complicated selection process behind job changes similar

to that described in the previous section that affects whether an individual will appear to have lost earnings when her employer tenure drops to zero. Consider first what happens if she is searching while employed. Holding non-wage features constant, she will not agree to move to a new firm if the expected present value of earnings at the new firm is not at least as high as it is at her current employer. Therefore, we would not expect a drop in earnings as implied by the augmented Mincer equation.

On the other hand, if the individual is displaced, removing the option of remaining with an incumbent employer reduces her reservation wage, so it is possible that earnings will be lower at a new job.

In the broades sense the main conclusion of this section is that the association between tenure and wage changes at job transitions necessarily depends on the circumstances of the transition, in particular, whether it is a transition to a job with much different skill requirements and whether the transition is voluntary.

2 Data

2.1 Sample definition

The samples for the 2010 and 2013 National Survey of College Graduates were designed to be representative of the college-educated segment of the U.S. population. Overall, the 2010 and 2013 surveys include, respectively, 77,188 and 104,599 respondents with at least a bachelor's degree. A subset of 37,654 respondents from the 2010 NSCG were surveyed again in 2013.[4]

Because the focus of this paper is job transitions, the dependent variable used throughout is the change in the log of current annual salary per hour on the respondent's principal job between the 2010 and 2013 reference weeks.[5] The

[4]Prior to the 2013 survey, the NSCG was strictly cross-sectional. Starting with the 2010 and 2013 surveys the NSCG has employed a rotating-panel design.

[5]The survey provides no way to know how many respondents were paid hourly or how those who were calculated their annual pay. In the 2010-2013 CPS outgoing rotation groups, XX

salary question explicitly excludes other forms of compensation, including any kind of variable pay.[6] Excluding those who were not working full time (at least 35 usual hours per week) during both reference weeks restricts the sample to 20,852 respondents.

I exclude individuals who were self-employed, in active military service, or public school elementary or secondary teachers in either year because the research question is irrelevant to them.[7] Respondents who indicated that they had retired from a previous position between the surveys were excluded, but those who indicated that retirement took place before the 2010 survey were included. In other words, cases where there was a transition from a pre-retirement job to a post-retirement job are excluded. Finally, respondents who received a degree between surveys or who were enrolled in a degree program at the time of the 2013 survey were dropped. These exclusions reduce the sample size to 13,118, comprising 5,003 women and 8,115 men. A small number of additional individuals were excluded if their full-time salary was below 52 times the federal minimum wage times their weekly hours.

2.2 Job transitions

In 2013, respondents who indicated they were working during the reference weeks for the 2010 and 2013 surveys were asked whether they were working for (1) the "same employer *and* in same type of job," (2) "same employer *but* in different type of job," (3) "different employer *but* in same type of job," or (4) "different employer *and* in different type of job (the emphasis on "and" or "but" is in the questionnaire). As mentioned earlier, (1)–(4) are denoted as SE-SJ, SE-DJ, DE-SJ, and DE-DJ, respectively. The numbers of different transition types are reported in 1.

percent of college graduates reported being paid on an hourly basis.

[6] Hourly earnings in the Current Population Survey outgoing rotation groups, hourly rate of pay in the National Longitudinal Survey of Youth, and hourly pay in the PSID share this limitation. There is a separate question about total earnings during the previous calendar year, but there is no way using these data to ensure that all earnings derive from the principal job.

[7] For public school teachers, the relationship between salary and tenure is contractually determined by the nearly ubiquitous "steps and lanes" system.

Table 1: Number of transitions

	Women			Men		
	Total	Termination	Promotion	Total	Termination	Promotion
No change	4128	0	0	6943	0	0
SE-DJ	336	42	232	410	36	310
DE-SJ	440	114	222	844	247	479
DE-DJ	252	68	126	333	115	155

Notes: Terminations include all individuals who listed termination as a reason for job change. Promotions include all individuals who listed promotion/raise as a reason except those who also listed termination.

Respondents' reports of having a different employer are almost certainly reliable, but it is less clear whether "different type of job" is sufficiently reliable to be usable. The NSCG includes a series of questions about 13 work activities (e.g., "accounting, finance, contracts", "computer programming, systems or application development," or "teaching"), which allow a partial assessment (partial because the list of activities is not exhaustive and the activities are broadly defined). Respondents were asked to indicate for each whether they typically spent at least 10 percent of their time on each activity (yes or no). They were also asked to indicate the two that used the most time.

Figure 1 shows the empirical CDF of matches on these 13 work-activity questions between survey rounds by type of transition and change in occupational coding (discussed below). The figure indicates that the distribution of number of matches is consistently shifted to the left for respondents who experienced SE-DJ and DE-DJ transitions compared to individuals who indicated no job change or DE-SJ transitions. Table 2 shows that those who experienced SE-DJ or DE-DJ transitions were also far less likely to have matches on their two most important activities. Thus "different type of job" clearly reflects greater change in the task composition of the job than does "same type of job."

Occupational coding is an alternative way to measure change in job content. It is arguably inferior, however, at least for the NSCG data. Only about two-thirds of those who report "different type of job" are coded in different occupations,

Figure 1: CDF of work-activity matches by transition type

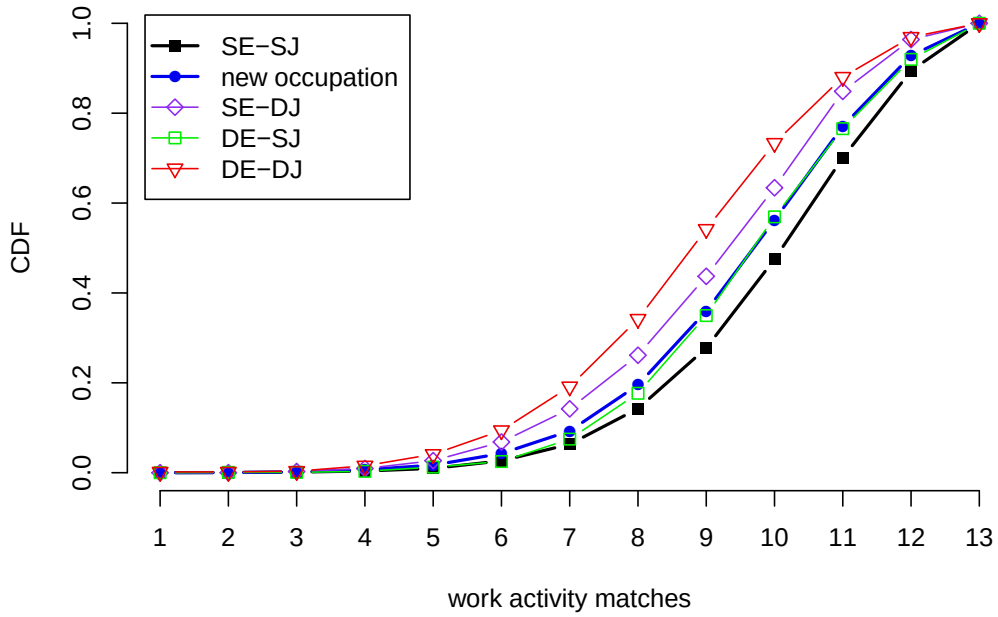

Table 2: Main work activity matches between 2010 and 2013 (percent)

	Self reports				
	unchanged	SE-DJ	DE-SJ	DE-DJ	New occ.
Primary	56.9	35.0	51.2	27.5	48.1
Secondary	29.3	18.8	24.2	16.1	24.2

while about one-third of those who report "same type of job" are coded in different occupations. Most telling, perhaps, 31 percent of those who responded that they were in the same job with the same employer were coded as changing occupations. Part of the reason for the first discrepancy may be that the occupational coding scheme is somewhat coarse outside academic and science occupations. For instance, only three management-related occupations are separately identified, but 23 different kinds of post-secondary educators. On the other hand, coarse occupational coding is unlikely to explain why a third of SE-SJ and DE-SJ individuals are coded in different occupations in 2010 and 2013. Figure 1 indicates that changes in occupational coding are less consistent with changes in work activities than are the self-reported transitions. The point is reinforced by table 2, which shows that nearly as many individuals indicate no change in their primary and secondary activities as those who said they continued to work in the "same type of job."

The question about job changes is followed by a series of yes/no questions about reasons for the job and/or employer change. These overlap: an individual can indicate, for example, that a transition happened both for location reasons and because of a termination. The two used below are "pay, promotion opportunities" and "laid off or job terminated." These two are of particular interest because they most clearly identify voluntary and involuntary transitions. The frequency of these reasons by transition type is shown in table 1.

2.3 Tenure variable

Employed respondents were asked for the start date (month and year) of their current principal job, from which I calculate tenure at the reference weeks of the two surveys (October 1, 2010 and Feburary 1, 2013). It is clear in the overall context of the questionnaire that "principal job" refers to the combination of employer and position, but less clear from the question itself taken out of context. It appears that a minority of respondents reported when they the started with their current employer, rather than the start of their current position. The extent of confusion between employer and position start dates can be assessed by examining the 1,752 individuals in the regression samples who reported a within-employer (SE-DJ) job change. Among these, 294 report an increase in

tenure of 28 months, exactly the length of the interval between surveys. However, only two of the 294 report that their 2013 principal job started during October 2010, the only circumstance in which the change in position tenure could be 28 months.[8]

The emphasis in this paper is on between-employer transitions. There the confusion between employer and position start date among a minority of respondents generally causes the measure of change in position tenure to be biased downwards (to larger negative numbers in most cases) since position and employer tenure on the 2013 job can differ little for job changers. That is, most of the change in measured tenure comes from the loss of the tenure at the 2010 job, which is overstated, not from the tenure accrued at the 2013 job. The econometric consequences are discussed later. Apart from this confusion, there is little evidence of error in the start dates. In particular, the start dates for individuals reporting DE-SJ and DE-DJ transitions appear to be quite consistent with 28 months between reference weeks: only 37 are before October 2010, and none is earlier than February 2010. Among those who reported no job transition, there were no start date discrepancies larger than three months.[9] A small number of individuals with obviously problematic start dates (e.g., the start date for the 2013 job earlier than that of the 2010 job) were excluded.

[Table ?? presents descriptive statistics . . .]

3 Empirical strategy

The usual approach to estimating returns to tenure is based on the standard Mincer model augmented with tenure variables. To clarify the central points I

[8]The cluster at 28 months is the only significant spike in the distribution of change in tenure for SE-DJ transitions (the next largest is 19 people). There are also 40 individuals with change in tenure greater than 28 months, but these are not necessarily errors because a secondary job in 2010 could have become a principal job in 2013.

[9]This is intended only as indirect evidence about measurement error for those who changed positions. The tenure of non-changers has no bearing on the regression results.

omit higher-order terms and additional controls.

$$S_{it} = \beta_0 + \beta_1 X_{it} + \beta_3 PT_{it} + \beta_4 ET_{it} + \mu_i + \theta_{ip} + \eta_{ie} + \varepsilon_{it} \tag{1}$$

where S_{it} is the log wage, X_{it} is potential experience PT_{it} is position tenure in years, ET_{it} is employer tenure, θ_{ip} is a position fixed effect, and η_{ie} is an employer fixed effect.

It is impossible to estimate equation (1) directly on the NSCG data because there is no start date for employer, so it is impossible to calculate ET. By differencing equation (1) separately for different transition types, this problem can be mostly circumvented. Differencing also eliminates the measurement error associated with respondent confusion between position and employer start date described in section 2.3 (if the respondent is consistent), and, of course, differencing removes μ_i.

For an individual who does not change jobs, differencing over a two-year interval produces (suppressing t because the panel has only two waves)[10]

$$\Delta S_i = 2\beta_1 + 2\beta_3 + 2\beta_4 + \Delta\varepsilon_i.$$

This equation for non-changers makes obvious that they provide no way to separately identify the effects of experience and tenure. For a SE-DJ transition, the analogous equation is

$$\Delta S_i = 2\beta_1 + 2\beta_4 + \alpha\beta_3 \Delta PT_i + \Delta\theta_{ip} + \Delta\varepsilon_i.$$

The parameter α has been introduced to allow for the possibility that within-employer transitions could result in only partial loss of return to position tenure. It will be zero if the salary change is unrelated to position tenure. For example, two individuals with the same salary but different position tenure could be promoted to identical positions at the same salary, in which case there would be no relationship between loss of position tenure and wage change.

In a DE-SJ transition, differencing produces

$$\Delta S_i = 2\beta_1 + \beta_3 \delta \Delta PT_i + \beta_4 \Delta ET_i + \Delta\eta_{ie} + \Delta\varepsilon_i.$$

[10]The interval between the 2010 and 2013 surveys is actually 2 years and 4 months, but for clarity I present the empirical model as though the interval were exactly two years.

If positions are truly similar, the introduced parameter, δ, will be be close to zero—loss of position tenure carries no penalty.

Finally, for an individual experiencing a DE-DJ move,

$$\Delta S_i = 2\beta_1 + \beta_3 \Delta PT_i + \beta_4 \Delta ET_i + \Delta\theta_{ip} + \Delta\eta_{ie} + \Delta\varepsilon_i.$$

Defining *NC SEDJ*, *DESJ*, and *DEDJ* as indicators for no change and the three transition types, the equations above can be combined:

$$\begin{aligned}\Delta S_i = 2\beta_1 &+ 2(\beta_3+\beta_4)NC_i + 2\beta_4 SEDJ_i + \beta_3\alpha SEDJ_i\,\Delta PT_i \\ &+ \beta_3\delta DESJ_i\,\Delta PT_i \;+ \beta_4 DESJ_i\,\Delta ET_i \\ &+ \beta_3 DEDJ_i\,\Delta PT_i + \beta_4 DEDJ_i\,\Delta ET_i + \Delta\theta_{ip} + \Delta\eta_{ie} + \Delta\varepsilon_i\end{aligned}$$

Note that $\Delta\theta_{ip} = 0$ or $\Delta\eta_{ie} = 0$ in the NC, SE-DJ, and DE-SJ conditions. In addition, there is a different unobserved selection process for each transition type. Therefore, I assume that

$$\Delta\theta_{ip} + \Delta\eta_{ie} = \mu_x + u_i \tag{2}$$

where μ_x is the mean change in the match-specific components for transition type x and u_i is uncorrelated with the regressors (μ_x and u_i are identically zero if there is no transition). I consider two classifications of transitions: $x \in \{SEDJ, DESJ, DEDJ\}$ and $x \in \{SEDJ, DESJ, DEDJ\} \times \{T, P, OR\}$, where *T, P,* and *OR* denote termination, promotion/raise, and other reason. In other words, the conditional mean of the change in the match specific terms is incorporated into the coefficients on the transition dummies. For simplicity the remainder of this section uses only the first classification. Reparameterizing the model with *NC* as the reference category,

$$\begin{aligned}\Delta S_i = 2\beta_1 &+ 2(\beta_3+\beta_4) + \big(\mu_{\text{SEDJ}} - 2\beta_3\big)SEDJ_i + \beta_3\alpha SEDJ_i\,\Delta PT_i \\ &+ \big(\mu_{\text{DESJ}} - 2\beta_3 - 2\beta_4\big)DESJ_i + \beta_3\delta DESJ_i\,\Delta PT_i \;+ \beta_4 DESJ_i\,\Delta ET_i \\ &+ \big(\mu_{\text{DEDJ}} - 2\beta_3 - 2\beta_4\big)DEDJ_i + \beta_3 DEDJ_i\,\Delta PT_i + \beta_4 DEDJ_i\,\Delta ET_i \\ &+ u_i + \Delta\varepsilon_i\end{aligned}$$

Finally, since the NSCG records only the start date for the current *position,* assume that $\Delta PT_i \approx \Delta ET_i$ for employer changers to obtain a model that can

be estimated from NSCG data:

$$\begin{aligned}\Delta S_i = {} & 2\beta_1 + 2(\beta_3+\beta_4) + \big(\mu_{\text{SEDJ}} - 2\beta_3\big) SEDJ_i \\ & + \big(\mu_{\text{DESJ}} - 2\beta_3 - 2\beta_4\big) DESJ_i + \big(\mu_{\text{DEDJ}} - 2\beta_3 - 2\beta_4\big) DEDJ_i \\ & + \beta_3\alpha SEDJ_i\,\Delta PT_i + (\beta_3\delta+\beta_4) DESJ_i\,\Delta PT_i \\ & + (\beta_3+\beta_4) DEDJ_i\,\Delta PT_i + u_i + \Delta\varepsilon_i\end{aligned} \tag{3}$$

Under the assumption that $\Delta PT_i = \Delta ET_i$ is a good approximation, $(1-\delta)\beta_3$ is identified from the last two coefficients and that β_4 and β_3 are identified when $\delta = 0$. Since employer tenure must be at least as long as position tenure, substituting ΔPT for ΔET biases the estimate of $\beta_3\delta+\beta_4$ upwards and, therefore, also biases the estimate of β_4 upwards.[11]

The augmented Mincer model typically includes quadratic tenure terms. I follow that lead, which complicates the algebra above. The key point, however, is that the interactions with $DESJ_i$ capture the effect of loss of employer tenure and some, possibly small, effect of loss of position tenure because that is the nature of a DESJ transition. The interactions with $DEDJ_i$ capture both effects in full.

When a quadratic potential experience term is added to equation (1), equation (3) gains a linear potential experience term. However, because the change in tenure is generally not the time between survey weeks except in the no-change case, when a quadratic in tenure is added to (1), the extra terms in (3) involve interactions with $(PT^2_{i,2013} - PT^2_{i,2010})$. Lastly, note that if a common linear wage trend were added to equation (1), its effect would be incorporated into the intercept in (3).

4 Results

Columns 1 and 4 of table 3 estimate a version of the empirical model that distinguishes transition types only via intercept shifts. The result is that the estimated

[11] Since this kind of error is concentrated in tenure on the 2010 job (which is more likely to include a position change), it will be mitigated somewhat if the relationship between tenure and earnings is concave.

effects of losing tenure are modest.[12] (Without dummies for transition types in columns 1 and 4, tenure has a small *negative* effect.)

Estimates of equation (3) (including quadratic terms) are presented in columns 2 and 5. (Parallel regressions that replace respondents' direct report of "different type of job" with change in occupation are shown in the appendix.) There are three important features of these regressions. First, the estimated effects for DE-SJ transitions do not approach statistical significance and the point estimates are small: for a job held for five years the loss is essentially zero for men and only 3 percent for women. Since these estimates include both the effect of loss of employer tenure (β_4) and the effect of loss of position tenure when moving to a similar job ($\delta\beta_3$), they imply that both are minimal.

Second, the earnings penalty from tenure loss is highest by a wide margin in DE-DJ transitions, and is far larger than suggested by columns 1 and 4. Leaving a job held for five years in a DE-DJ transition costs men about 12 percent of salary and women 17 percent. The fact that earnings losses associated with tenure loss are highly concentrated in DE-DJ transitions and are much smaller or nearly absent for DE-SJ moves, strongly suggests that the effects in the DE-DJ case are mainly due deterioration of the match between skills and position.

There is a statistically significant effect of loss of tenure in SE-DJ transitions for men, but the internal economics of firms (career ladders, for example) complicate interpretation of results for SE-DJ transitions. It is notable, however, that the tenure effect is small enough that main effect of an SE-DJ transition is larger than the loss from losing eight years of position tenure.

The third important feature of the regressions in columns 2 and 5 is the sign and economically important differences in the main effects of SE-DJ, DE-SJ, and DE-DJ transitions. These incorporate the effects of the means of changes in match-specific effects, $\Delta\theta_{ip}$ and $\Delta\eta_{ie}$. The signs (all positive) imply that, on average, transitions result in pay increases.[13]

[12] Recall that ΔPT is generally negative in transitions, so a positive coefficient corresponds to a loss of earnings.

[13] Note that equation (3) says that the estimated coefficients understate the change in match-specific components because they capture the change in pay between an old job in October 2010 and a brand new (zero tenure) job in February 2013 relative to the average change for

Table 3: Earnings effects of tenure lost from job changes

	Men			Women		
potential experience	−0.0025****	−0.0027****	−0.0025****	−0.0019****	−0.0022****	−0.0020****
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
ΔPT	0.0079****			0.0132****		
	(0.0020)			(0.0027)		
$PT_{13}^2 - PT_{10}^2$	−0.0002**			−0.0002***		
	(0.0001)			(0.0001)		
SEDJ (same employer, different job type)	0.0818****	0.0637****	0.0193	0.1261****	0.0750****	0.0472
	(0.0153)	(0.0165)	(0.0238)	(0.0189)	(0.0187)	(0.0322)
DESJ (different employer, same job type)	0.1050****	0.0794****	0.0046	0.1248****	0.0918****	0.0087
	(0.0132)	(0.0130)	(0.0266)	(0.0186)	(0.0197)	(0.0331)
DEDJ (different employer, different job type)	0.0742****	0.0950****	−0.0446	0.1498****	0.1678****	0.0396
	(0.0212)	(0.0255)	(0.0381)	(0.0247)	(0.0301)	(0.0508)
SEDJ×ΔPT		0.0087**	0.0096**		0.0038	0.0041
		(0.0043)	(0.0043)		(0.0049)	(0.0046)
SEDJ×$(PT_{13}^2 - PT_{10}^2)$		−0.0003*	−0.0003*		0.0000	−0.0000
		(0.0002)	(0.0002)		(0.0002)	(0.0002)
DESJ ×ΔPT		−0.0014	−0.0004		0.0054	0.0025
		(0.0040)	(0.0038)		(0.0073)	(0.0071)
DESJ ×$(PT_{13}^2 - PT_{10}^2)$		0.0003	0.0001		0.0001	0.0001
		(0.0002)	(0.0002)		(0.0004)	(0.0003)
DEDJ ×ΔPT		0.0281**	0.0235**		0.0395*	0.0344*
		(0.0124)	(0.0116)		(0.0232)	(0.0180)
DEDJ ×$(PT_{13}^2 - PT_{10}^2)$		−0.0009	−0.0008		−0.0011	−0.0010
		(0.0006)	(0.0006)		(0.0016)	(0.0012)
promotion×SEDJ			0.0595**			0.0541*
			(0.0234)			(0.0308)
termination×SEDJ			0.0094			−0.0940***
			(0.0414)			(0.0350)
promotion×DESJ			0.1285****			0.1470****
			(0.0260)			(0.0334)
termination×DESJ			−0.0226			−0.0170
			(0.0268)			(0.0373)
promotion×DEDJ			0.2271****			0.2213****
			(0.0413)			(0.0488)
termination×DEDJ			0.0048			−0.0314
			(0.0449)			(0.0499)
$\bar{R}^2$	0.0316	0.0329	0.0492	0.0431	0.0467	0.0713
N	8530	8530	8530	5156	5156	5156

Notes: Significance levesl: *** = 0.01, ** = 0.05, * = 0.1. Heteroskedasticity-robust standard errors in parentheses. PT = position tenure. Dependent variable is change in log salary.

Columns 3 and 6 employ the finer classification of transition types. The same conclusion about change in tenure emerges; in fact, the change in tenure effects are surprisingly similar to those in columns 2 and 5. The main effects for transition types in columns 3 and 6 are of some interest in their own right. The largest effects are for transitions involving promotions/raises. Surprisingly, the main effects of transitions involving terminations are not much different than the other types of transitions.

It might at first seem counterintuitive that there could be a penalty for loss of tenure when changing jobs for promotion or a raise, but that neglects the immediate effects of DE-SJ and DE-DJ transitions shown in table 3, which capture the change in match-specific fixed effects ($\Delta\theta_{ip}+\Delta\eta_{ie}$). For DE-DJ×promotion transitions these coefficients (0.2280 for men and 0.2215 for women) outweigh more than a decade of lost tenure. In other words, the estimates say that longer-tenure workers get raises, but these tend to be smaller percentages than shorter-tenure workers. (If the veteran worker gets a promotion to management, she gets the same salary as the hot-shot two-year employee.) This is a sharp contrast with what happens in DE-DJ×termination transitions. Here short-tenure workers more or less break even, so the penalties associated with loss of longer tenure are not offset.

Table 4 focuses on the transitions associated with terminations and promotions/raises, excluding changers who don't mention termination or promotion/raise as a reason. Those who mention both termination and promotion (144 individuals) are counted as being terminated since the transition was involuntary, regardless of the desirability of the new job. Cell sizes for transitions are much smaller for these regressions, so estimates are imprecise, but the point estimates suggest some nuance in the distinction between termination and promotion. Tenure loss in a DE-SJ is costly for men if the transition is the result of termination, but not if it is the result of promotion. In the latter case, tenure loss in DE-DJ transitions is inconsequential.

For women, the earlier pattern repeats for both termination and promotion: small cost for tenure loss in DE-SJ transitions, large cost in DE-DJ transitions,

non-changers who accumulate 28 months of tenure.

Table 4: Earnings effects of tenure lost from job changes, termination and promotion

	Men		Women	
	Termination	Promotion	Termination	Promotion
potential experience	−0.0024****	−0.0025****	−0.0017****	−0.0021****
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
SEDJ (same employer, different job type)	0.0232	0.0839****	−0.0614	0.1003****
	(0.0745)	(0.0197)	(0.0532)	(0.0218)
SEDJ×ΔPT	0.0052	0.0103*	−0.0026	0.0035
	(0.0231)	(0.0056)	(0.0102)	(0.0065)
SEDJ×$(PT_{13}^2 - PT_{10}^2)$	−0.0003	−0.0003	0.0002	−0.0000
	(0.0010)	(0.0002)	(0.0003)	(0.0003)
DESJ (different employer, same job type)	0.0382*	0.1226****	0.0236	0.1706****
	(0.0230)	(0.0168)	(0.0437)	(0.0247)
DESJ ×ΔPT	0.0148**	−0.0080	0.0026	0.0105
	(0.0064)	(0.0078)	(0.0152)	(0.0141)
DESJ ×$(PT_{13}^2 - PT_{10}^2)$	−0.0003	0.0004	0.0001	−0.0004
	(0.0002)	(0.0005)	(0.0009)	(0.0011)
DEDJ (different employer, different job type)	0.0714	0.1509****	0.1056*	0.2481****
	(0.0452)	(0.0390)	(0.0551)	(0.0356)
DEDJ ×ΔPT	0.0434**	0.0022	0.0457*	0.0292
	(0.0181)	(0.0201)	(0.0272)	(0.0210)
DEDJ ×$(PT_{13}^2 - PT_{10}^2)$	−0.0014*	−0.0001	−0.0012	−0.0011
	(0.0008)	(0.0011)	(0.0017)	(0.0013)
$\bar{R}^2$	0.0170	0.0469	0.0134	0.0744
N	7341	7887	4352	4708

Notes: Significance levesl: *** = 0.01, ** = 0.05, * = 0.1. Heteroskedasticity-robust standard errors in parentheses. PT = position tenure. Dependent variable is change in log salary. Individuals who indicated their transition occurred for both reasons are treated as terminations.

though the estimates are imprecise.[14]

5 Conclusion

This paper is based on the observation that identifying information about returns to seniority comes from loss of tenure in job changes and estimates these returns with a focus on the characteristics of job changes: Did they involve a new employer? Did the content of the job change? When job-to-job transitions are treated as equivalent, the estimated returns to tenure are very modest. However, when tenure is interacted with the type of transition, I find that loss of tenure returns is large only when an individual changes both employer and type of job.

I infer from these results that returns to employer tenure are minimal and that overall returns to tenure mainly represent the accumulation of skills that are matched to the current position. Transitions to a different type of job cause a deterioration in this match, making long-tenure workers more equivalent to short-tenure workers.

[14] Testing whether the linear and quadratic tenure terms in DE-DJ transitions are jointly significant yields p-values of 0.06 for terminations (column 3) and 0.24 for promotions (column 4).

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Appendix

Table A-1: Earnings effects of tenure loss, using occupation coding

	Men	Women
potential experience	-0.0027^{****}	-0.0022^{****}
	(0.0003)	(0.0003)
SEDO (same employer, different occ.)	0.0129^{**}	0.0340^{****}
	(0.0056)	(0.0068)
SEDO$\times\Delta PT$	-0.0014	0.0014
	(0.0024)	(0.0031)
SEDO$\times(PT_{13}^2 - PT_{10}^2)$	-0.0001	-0.0003^{**}
	(0.0001)	(0.0001)
DESO (different employer, same occ.)	0.0956^{****}	0.1109^{****}
	(0.0191)	(0.0277)
DESO $\times\Delta PT$	0.0036	0.0080
	(0.0059)	(0.0086)
DESO $\times(PT_{13}^2 - PT_{10}^2)$	0.0001	0.0000
	(0.0003)	(0.0003)
DEDO (different employer, different occ.)	0.0754^{****}	0.1403^{****}
	(0.0152)	(0.0197)
DEDO $\times\Delta PT$	0.0075	0.0368^{***}
	(0.0059)	(0.0122)
DEDO $\times(PT_{13}^2 - PT_{10}^2)$	-0.0000	-0.0014
	(0.0002)	(0.0009)
$\bar{R}^2$	0.0303	0.0454
N	8530	5156

Notes: Heteroskedasticity-robust standard errors in parentheses. PT = position tenure.