Job mobility and wage growth: evidence from the NLSY79

Data from the 1979 National Longitudinal Survey of Youth provide an unusually complete history of employment experiences; analyses of why workers separate from their employers, frequencies of these separations, and job mobility's impact on earnings reveal that today's labor markets are far more dynamic than previously realized

Audrey Light

Longitudinal data have contributed immeasurably to our understanding of individuals' labor market activities, especially when it comes to analyzing job mobility and wage growth. Without the ability to "see" workers move from employer to employer, we would know very little about why workers separate from their employers, how often separations occur, and how job mobility affects earnings.[1] Analyses of these issues have revealed labor markets to be far more dynamic than was previously realized.

One phenomenon that has received considerable scrutiny is the persistent, voluntary job mobility of young workers. In the mid 1970s, economists began using search-theoretic models to explain why information costs compel workers to systematically "shop" for a better job.[2] The idea is that workers cannot immediately locate firms where their skills are valued the most highly, so upon accepting a job offer they continue to search for an even better outside opportunity. Workers might also learn over time that their current job is not as productive as they initially predicted. New information regarding outside offers or the current job is predicted to lead to a worker-initiated job separation. Empirical researchers have used longitudinal data to determine which theoretical models are supported by the data and to identify the contribution of "job shopping" to life-cycle wage growth.

A related issue of long-standing concern is the effect of job *immobility* on wage growth. Human capital models predict that wages rise with job seniority when workers "lock in" and invest in firm-specific skills. Because these skills cannot be transferred to a new job if a separation occurs, workers and firms agree to share the costs and benefits of the investment—and the worker's return on the shared investment takes the form of within-job wage growth above and beyond any gains due to the acquisition of general (transferable) skills. A variety of agency models provide alternative explanations for upward sloping wage-tenure profiles. In these models, employers defer wages as a means of discouraging workers from quitting or shirking; stated differently, they require workers to "post a bond" as an incentive to sustain the employment relationship.[3] Longitudinal data have proved to be essential for assessing the merits of these theoretical models and identifying the effect of tenure on wages.

Knowledge of the relative contributions of job mobility and immobility to life-cycle wage growth is fundamental to a number of important policy issues. For example, the well-being of low-skill labor market entrants is highly dependent on whether they are consigned to a lifetime of low-wage jobs, or whether they can advance in the wage distribution via life-cycle wage growth. As a result, policymakers might ask what can be done to enhance workers' wage growth. If job-specific skill investments are an important source of wage growth, then policies that promote on-the-job training might be useful to the low-wage population. If "job shopping" provides the lion's share of wage growth, then programs that provide job-search assistance might be warranted.

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Of course, not all job separations are worker-initiated quits, so it is equally important to focus attention on issues related to involuntary job displacements. Researchers have relied on longitudinal data to determine which workers are particularly vulnerable to layoffs; which industries are the most volatile; and how wages are affected in both the short run and the long run when workers are displaced from their jobs.

Advantages of NLSY79 data

Analysts have been studying job mobility and wage growth for decades, but they gained an important new data source when the 1979 National Longitudinal Survey of Youth (NLSY79) was launched. The NLSY79 plays a central role in this type of research because it provides an unusually complete history of each respondent's employment experiences, including a record of virtually every job held. In this section, the key attributes of these data are highlighted; additional details can be found in the *NLSY79 User's Guide*.[4]

During each interview, NLSY79 respondents report information on every job currently in progress or held since the last interview. When the first interview was conducted in 1979, respondents who were older than 18 retrospectively identified each job held since age 18. (The 12,686 respondents ranged in age from 14 to 22 at that time; 43 percent were older than 18.) For the younger respondents, the job history begins between ages 15 and 17. As a result of this sampling and data collection strategy, analysts can initialize respondents' careers at a uniform point in the life cycle (the 18th birthday, the first exit from school, and so forth) and obtain a remarkably complete record of jobs held from that point forward for a large sample of individuals.

While the advantage of sampling young people is that complete histories (without left-censoring) are obtained, NLSY79-based research has necessarily been limited to early-career activities. The NLSY79 has taken a back seat to other longitudinal surveys—most notably, the Panel Study of Income Dynamics (PSID)—for the study of job mobility and wage growth among prime-age workers. Now that the youngest respondents (those born in 1964) have entered their 40s, however, the NLSY79 will be increasingly useful for the analysis of job mobility in the mid-career.

The NLSY79 provides much more than a simple tally of cumulative jobs held over the career. At each interview, respondents report the start date and stop date of any job that began and/or "permanently" ended since the last interview. Because the recall period is relatively short and respondents report dates rather than time elapsed since the job began or ended (which would invite them to "round" their responses), analysts obtain high-quality data. Measurement error is inevitable in all survey data, but the NLSY79 is acknowledged to identify job durations and job tenure more cleanly than other surveys.[5]

In addition to start and stop dates, such job characteristics as industry, occupation, class of employer, rate of pay, and weekly hours are identified for most jobs. These characteristics are usually known for as many as five unique jobs held between each interview, although some characteristics are identified only when the job lasts at least 9 weeks and the respondent works at least 10 hours per week. When jobs last long enough to span interviews, multiple reports of these characteristics are recorded. For example, if a job begins 3 months before the 1980 interview and ends 3 months after the 1983 interview, the respondent reports his current wage, occupation, hours worked, and so forth during the 1980, 1981, 1982 and 1983 interviews; the stop date is then identified in 1984.

When respondents report that a job has ended, they are asked to provide their reason for leaving and whether a new job was lined up before they left. Analysts must contend with missing data, ambiguous responses (especially when reasons are recorded as "other"), and the possibility of misclassification, but they can make considerable progress in distinguishing between involuntary separations (layoffs, firings) and voluntary "quits." In combination with job start and stop dates, these data also allow analysts to classify job exits as "job to job" or "job to nonemployment."

The survey also identifies temporary nonwork spells within jobs—specifically, the start and stop date of each "within-job gap" lasting at least 1 week, along with the reason for not working. This information allows analysts to identify nonwork spells due to strikes, temporary layoffs, health-related leaves of absence, and so forth that do not lead to the permanent termination of the employment relationship. Moreover, the detailed information on work and nonwork spells collected at each interview is used to create three weekly "work history" arrays. One array identifies each respondent's labor market status (working, out of the labor force, active military service, and so forth) during each week from January 1, 1978, onward. Another array identifies the usual hours worked on all jobs held during each week, and the third array identifies the number of jobs held during each week. These variables allow analysts to construct extraordinarily detailed measures of cumulative labor market experience and job tenure, and to identify transitions between employment, unemployment, and nonemployment spells, as well as transitions into and out of jobs.

As discussed in other articles in this issue, the NLSY79 also contains detailed data on schooling attainment and enrollment, job training, geographic location, household composition, family formation, and much more. These data provide a rich set of controls for models of job durations, job exit probabilities, and wages, and they allow researchers to study the interdependence of job mobility and other events such as school completion, migration, and marriage.

Overview of NLSY79-based research

Given the range of substantive issues that compel analysts to study job mobility and the advantages of using NLSY79 data for this purpose, it should come as no surprise that the existing NLSY79-based literature is very large. Rather than attempt a comprehensive survey of the literature, this article describes a dozen studies that, as a group, illustrate the ways in which NLSY79 data have been used to explore mobility- and wage-related issues.

In the first set of studies, analysts identify the determinants of job mobility by estimating models of job durations or separation probabilities. Studies of this nature include those by Henry S. Farber, Derek Neal, Anne Beeson Royalty, and Madeline Zavodny.[6] Farber focuses on the timing of job separations and the extent to which observationally equivalent workers differ in their separation probabilities. He finds, among other things, that the hazard rate rises with job tenure for about 3 months and declines thereafter—a pattern that is consistent with the view that agents gather information before deciding that a separation is optimal. Subsequent research has distinguished between different types of job separations. For example, Neal considers both "simple" job changes, where workers perform the same type of work on both jobs, and "complex" job changes that entail a change of career as well as a change of employer. His analysis lends support to the idea that workers first search for a suitable career and then concentrate on finding the best employer match within that career. Royalty reconsiders the conventional wisdom that women are more likely than men to leave their employers for nonemployment, but perhaps less likely to quit for a better job. By distinguishing between job-to-job and job-to-nonemployment transitions and estimating separation models for workers in distinct gender-schooling groups, she learns that this pattern only applies to less educated workers; men and women with more than 12 years of schooling prove to have similar separation patterns. Zavodny asks whether technology-intensive industries (measured by computer usage, the fraction of workers in science and engineering, and so forth) have more or less job stability than other industries. She finds that overall separation rates are lower in "high tech" industries than in "low tech" industries, but that the difference is entirely due to lower quit rates in the technology-intensive industries; among less educated workers, involuntary separations may be more likely in technology-intensive industries than in other sectors.

Wages are the outcome of interest in the next set of studies discussed. To maintain the focus on mobility-related research, studies that model wages as a function of past job mobility and/or current tenure, among other factors, are considered.[7] Pamela J. Loprest, Kristen Keith, and Abagail McWilliams conduct gender comparisons of the contemporaneous wage change associated with a change of employer. Loprest finds that men receive more wage growth than women over a 4-year period, and that this premium is largely due to a higher return to mobility. Keith and McWilliams find that between-job wage gains are greater for workers (both men and women) who engage in formal job search prior to their separation, but that men are more likely than women to conduct such activities. Audrey Light and Kathleen McGarry ask how "overall" mobility (defined as the number of job separations in the first 8 years of the career) affects both the level and slope of men's wage paths. They find that immobile workers have the highest and steepest wage paths, followed by moderately mobile men whose mobility appears to conform to "job shopping," while highly mobile workers fare the worse in terms of both wage levels and wage growth.

Turning to studies that focus on the wage-tenure relationship, Bernt Bratsberg and Dek Terrell assess race differences in the returns to tenure, using various instrumental variables to contend with the fact that tenure is endogenous to the wage-generating process. They find that estimated tenure slopes are sensitive to the estimation method, but are roughly similar for black and nonblack workers (all of whom are terminal high school graduates in their sample). However, blacks receive significantly lower returns than nonblacks to general labor market experience. The human capital interpretation of these findings is that blacks invest less intensively than whites in skills that are transferable across jobs, but receive similar returns to investments in firm-specific skills. The role of firm-specific skill investments is given a closer look by Daniel Parent, who estimates wage models that include measures of both job tenure (time with the current employer) and industry tenure (time with the current industry). He finds that tenure effects virtually disappear when industry tenure is included as a control, which suggests that workers are investing in skills that are specific to their industry rather than their current job. Randall J. Olsen's study is distinguished by the fact that he jointly estimates models of wages and job mobility. His unified, structural approach to assessing the relationship between job mobility on wages suggests that cumulative work experience (general skill acquisition) and job mobility are more important sources of early-career wage growth than is tenure (firm-specific skill acquisition).

Empirical patterns

In this section, some of the basic relationships between job mobility and wage growth seen in the NLSY79 are highlighted—specifically, the distribution of cumulative jobs held by NLSY79 respondents in the first 8 years of their careers, and the unconditional relationships between job mobility and both cumulative and year-to-year wage growth.

The first step of the analysis is to define a career start date—that is, the date when individuals make a transition from school

to work. Many NLSY79 respondents are observed combining school and work or cycling between the two activities, so a judgment call is needed to determine when their work lives begin. Therefore, careers are initialized at the start of the first school exit that lasts at least 12 months.[8] A total of 5,321 respondents, not enrolled in school at the time of their 1979 interview, are eliminated from the sample. Reported school enrollment data are used to determine career start dates for the 7,365 remaining respondents. This date falls between April 1979 and June 1990 for all respondents, and precedes May 1983 for 75 percent of the sample.

In order to track job mobility and wages over a reasonably long period of time (but not so long that right-censoring affects a significant number of careers), respondents are required to be observed for 8 years beyond the start of the career. This selection rule eliminates 51 individuals who drop out of the survey before their 8-year window ends. To avoid having to contend with missing data, respondents who miss one or more interviews during the 8-year observation period are also eliminated. This leaves a final sample of 5,654 respondents.

Table 1 summarizes the number of jobs held by these 5,654 respondents between the beginning and end of the 8-year observation period. The cumulative job count includes jobs that are in progress at the start of the career, as well as any job whose start date precedes the end of the 8-year window. Table 1 shows that men are slightly more mobile than women during the first 8 years of their career: the mean job count is 4.8 for men and only 4.3 for women, and a higher proportion of men than women (25 percent versus 20 percent) hold seven or more jobs. At the other extreme, 11-12 percent of women and men hold no jobs or a single job during the period of observation. In contrast to these relatively small gender differences, table 1 reveals that job mobility varies dramatically across schooling levels. To assess the relationship between mobility and schooling, the men are classified into a "high school" subsample (those whose highest grade completed at the career start date is no greater than 12) and a "college" subsample. The high school sample averages 5.2 jobs during the 8-year window, which is almost one job more than the mean for the college sample. Almost one-third of high school educated men holds seven or more jobs, versus only 18 percent of the college sample.

In table 2, the cumulative job count over the 8-year observation period is linked to cumulative wage growth. For this exercise, attention is confined to 4,189 respondents for whom a "valid" wage (an average, hourly wage between $1 and $1,000) is reported to have been earned within 9 months of the career start date and the career end date. Each average hourly wage is divided by the gross domestic product (GDP) implicit price deflator, and the 8-year difference in log-wages is used as the measure of cumulative wage growth.

Table 2 reveals that, on average, overall wage growth declines with mobility for both men and women. Among women who hold a single job in 8 years, the average change in log-

Table 1. Distribution of number of jobs held during first 8 years of career

Number of jobs	Women		Men					
	All schooling levels		All schooling levels		Schooling less than or equal to grade 12		Schooling greater than grade 12	
	Number	Percent of sample	Number	Percent of sample	Number	Percent of sample	Number	Percent of sample
0	87	3.0	58	2.1	42	2.5	16	1.4
1	265	9.2	241	8.7	106	6.4	135	12.1
2	423	14.7	353	12.7	180	10.9	173	15.5
3	446	15.5	374	13.5	193	11.7	181	16.2
4	442	15.4	408	14.7	240	14.5	168	15.0
5	370	12.9	325	11.7	198	12.0	127	11.4
6	283	9.8	313	11.3	194	11.7	119	10.6
7	218	7.6	240	8.7	164	9.9	76	6.8
8	132	4.6	173	6.2	132	8.0	41	3.7
9	96	3.3	94	3.4	72	4.4	22	2.0
10 or more	117	4.1	196	7.1	136	8.2	60	5.4
All	2,879	100.0	2,775	100.0	1,657	100.0	1,118	100.0
Mean	4.3	–	4.8	–	5.2	–	4.3	–
Standard deviation	2.6	–	2.9	–	2.9	–	2.7	–
Maximum	17	–	19	–	19	–	15	–

Table 2. Wage growth during first 8 years of career by number of jobs held

Number of jobs	Women			Men								
	All schooling levels			All schooling levels			Schooling less than or equal to grade 12			Schooling greater than grade 12		
	Number of observations	Mean	Standard deviations	Number of observations	Mean	Standard deviation	Number of observations	Mean	Standard deviation	Number of observation	Mean	Standard deviation
1	123	.59	.56	137	.66	.71	42	.40	.44	95	.77	.77
2–3	557	.57	.68	562	.68	.69	257	.58	.64	305	.77	.71
4–6	836	.46	.63	858	.51	.63	489	.43	.60	369	.63	.65
7 or more	491	.40	.68	625	.47	.77	435	.45	.77	190	.51	.76
All	2,007	.49	.66	2,182	.55	.70	1,223	.46	.67	959	.66	.71

NOTE: Wage growth is defined as $\ln(W_8)-\ln(W_1)$, where W_1 and W_8 are average hourly wages reported at the beginning and end of the 8-year observation period. Sample sizes are smaller than in table 1 because of missing wages.

Table 3. Percent of weeks employed during first 8 years of career by number of jobs held

Number of jobs	Women			Men								
	All schooling levels			All schooling levels			Schooling less than or equal to grade 12			Schooling greater than grade 12		
	Number of observations	Mean	Standard deviation	Number of observations	Mean	Standard deviation	Number of observations	Mean	Standard deviation	Number of observations	Mean	Standard deviation
1	123	90.0	22.0	137	94.4	16.2	42	87.6	22.2	95	97.3	11.7
2–3	557	83.6	23.5	562	87.1	23.0	257	78.9	28.7	305	94.0	13.5
4–6	836	77.4	23.1	858	80.4	21.6	489	74.4	23.5	369	83.3	15.6
7 or more	491	74.8	19.0	625	77.2	18.3	435	73.6	18.7	190	85.2	14.7
All	2,007	79.2	22.7	2,182	82.0	21.4	1,223	75.5	23.4	959	90.4	14.9

NOTE: The work history "status array" is used to identify the cumulative number of weeks worked (excluding within-job employment gaps) during the 8-year observation period. Only respondents who report wages at the beginning and end of this period are included in each sample.

wage is 0.59. The average wage gain is virtually the same among women who hold 1-2 jobs, but it is considerably smaller (0.40–0.46) among the more mobile women. A similar pattern is seen among the men, although their average wage growth is markedly higher than the women's. However, when the sample of men is broken down by schooling attainment, the negative correlation between overall mobility and overall wage growth holds only for the more highly schooled men. Among the high school sample, the average change in log-wage is 0.58 for those who hold 2-3 jobs, but only 0.40–0.46 for men in any other mobility category, including those who hold a single job in 8 years.

What are the explanations for the patterns seen in table 2? To the extent that "job shopping" dominates early-career mobility (that is, to the extent that workers move to jobs where their skills are more highly valued), it should be associated with wage growth. However, high mobility can also go hand in hand with a high frequency of involuntary discharges and/or a tenuous attachment to the workforce. Workers who are frequently fired or have frequent nonwork spells are not expected to receive substantial amounts of wage growth.

To explore some of these issues, the work history "status array" is used to identify the number of weeks in which respondents are known to be working during the 8-year window. In table 3, sample means for this employment measure (expressed as a percentage of total weeks) are reported for the same sample of workers used for table 2. Table 3 reveals that the average percentage of weeks worked declines with job mobility for each group of workers. In the "all schooling levels" groups, the average worker (male or female) who holds only one job in 8 years works at least 90 percent of the time, while average work effort falls to around 75 percent for workers who hold seven or more jobs. Clearly, the negative relationship between overall mobility and overall wage growth seen in table 2 reflects the fact that highly mobile workers tend to be nonemployed for a substantial portion of their

Table 4. Annual wage growth for job movers and job stayers

Number of jobs	Women			Men								
	All schooling levels			All schooling levels			Schooling less than or equal to grade 12			Schooling greater than grade 12		
	Number of observations	Mean	Standard deviation	Number of observations	Mean	Standard deviation	Number of observations	Mean	Standard deviation	Number of observations	Mean	Standard deviation
Job stayer ..	13,085	.048	.44	14,265	.050	.44	7,173	.045	.40	7,092	.054	.48
Job mover ..	3,637	.027	.62	3,755	.046	.69	2,277	.042	.60	1,478	.052	.81
Voluntary job mover	2,959	.044	.61	3,210	.060	.70	1,869	.055	.61	1,341	.068	.80

NOTE: Wage growth is defined as the 1-year change in log average hourly wages (or one-half the 2-year change) during the 8-year observation period. Job movers change employers between wage reports; the subsample of voluntary movers excludes those who report that they moved because of a layoff, discharge, end of temporary job, or plant closing.

early careers. Workers who change jobs less often are much more likely to work continuously—and, perhaps, to engage in productive "job shopping." Whether the above-average wage growth of workers who undergo moderate mobility is due to work continuity, job mobility, or a combination of the two cannot be determined from tables 2 and 3.

Rather than look exclusively at cumulative wage growth, the analysis concludes with an examination of year-to-year changes in employers and log-wages. Beginning with each worker's entire sequence of reported wages during the 8-year observation period, the change in log-wages for each successive pair of wages is computed and confined to those differences where the elapsed time between wages is approximately 1 year (10-14 months) or 2 years (20-28 months); the 2-year differences are divided in half.[9] Each year-to-year change in log-wages is then classified according to whether the two wages were earned on the same job or on different jobs.

Table 4 reports the mean log-wage changes for job stayers and job movers. Among women, the average wage change is quite a bit higher (0.048) for job stayers than for job movers (0.027), while for each sample of men these two means are almost identical. The bottom row of table 4 reports mean changes in log-wages for a subsample of movers who make voluntary job changes—defined as any change *not* reported as a layoff, discharge, plant closing, or end of temporary work; all quits and all separations for which the reason is "other" or unknown are considered to be voluntary. By crudely narrowing the sample to job changes that might be voluntary, much larger mean changes in log-wages are obtained. Women receive an average, annual boost in log-wages of 0.044–0.048 regardless of whether they maintain their current job or undergo a voluntary job transition. For men, the average wage boost associated with a voluntary job change is about 0.01 log points higher than the average wage change for job stayers, although the difference in means is not always statistically significant at conventional levels. Nonetheless, table 4 suggests that the average wage gain associated with a voluntary job change is quite substantial for all groups of workers.

THIS BRIEF ANALYSIS HAS DEMONSTRATED that the typical worker holds about five jobs in the first 8 years of the career, but that workers vary considerably in their mobility rates. Highly mobile workers receive less cumulative wage growth, on average, than their less mobile counterparts—a difference that is at least partially attributable to the fact that employment continuity is negatively correlated with mobility. Finally, there is cursory evidence that workers who change jobs voluntarily receive significant contemporaneous wage boosts that, on average, are at least as large as the wage gains received by job stayers. Each of these patterns has been explored in greater detail in other studies, and the NLSY79 will undoubtedly reveal much more about these relationships in the future. □

Notes

[1] Throughout this article, job mobility refers to a change of employer, and not to an intra-firm change in position, rank, or work assignment.

[2] Examples of such models include Kenneth Burdett, "A Theory of Employee Job Search and Quit Rates," *American Economic Review*, Vol. 68, no. 1, 1978, pp. 212–220; and Boyan Jovanovic, "Job Matching and the Theory of Turnover," *Journal of Political Economy*, Vol. 87, No. 5, part 1, 1979, pp. 972–990.

[3] For a model of firm-specific human capital, see Gary Becker, "Investment in Human Capital: A Theoretical Analysis," *Journal of Politi-*

cal Economy, Vol. 70, No. 1, pp. 9–49. Agency models include Edward Lazear, "Why is There Mandatory Retirement?" *Journal of Political Economy*, Vol. 87, No. 6, 1979, pp. 1261–84; and Joanne Salop and Steven Salop, "Self-Selection and Turnover in the Labor Market," *Quarterly Journal of Economics*, Vol. 90, No. 4, 1976, pp. 619–627.

[4] The *NLSY79 User's Guide* is available at **http://www.bls.gov/nls/79guide/nls79usg.htm**.

[5] In contrast, the PSID makes it considerably more difficult to identify unique jobs and to measure tenure on each job. See James N. Brown and Audrey Light, "Interpreting Panel Data on Job Tenure," *Journal of Labor Economics*, Vol. 10, No. 3, 1992, pp. 219–257.

[6] See Henry S. Farber, "The Analysis of Interfirm Worker Mobility," *Journal of Labor Economics*, Vol. 12, No. 4, 1994, pp. 554–593; Derek Neal, "The Complexity of Job Mobility Among Young Men," *Journal of Labor Economics*, Vol. 17, No. 2, 1999, pp. 237–261; Anne Beeson Royalty, "Job-to-Job and Job-to-Nonemployment Turnover by Gender and Education Level," *Journal of Labor Economics*, Vol. 16, No. 2, 1998, pp. 392–443; and Madeline Zavodny, "Technology and Job Separation Among Young Adults," *Economic Inquiry*, Vol. 41, No. 2, 2003, pp. 264–278.

[7] Studies that control for past job separations include Kristen Keith and Abagail McWilliams, "The Returns to Mobility and Job Search by Gender," *Industrial and Labor Relations Review*, Vol. 52, No. 3, 1999, pp. 460–477; Audrey Light and Kathleen McGarry, "Job Change Patterns and the Wages of Young Men," *Review of Economics and Statistics*, Vol. 80, No. 2, 1998, pp. 276–286; and Pamela J. Loprest, "Gender Differences in Wage Growth and Job Mobility," *American Economic Review*, Vol. 82, No. 2, 1992, pp. 526–532. Studies that focus on the wage-tenure relationship include Bernt Bratsberg and Dek Terrell, "Experience, Tenure, and Wage Growth of Young Black and White Men," *The Journal of Human Resources*, Vol. 33, No. 3, 1998, pp. 658–682; Daniel Parent, "Industry-Specific Capital and the Wage Profile: Evidence from the National Longitudinal Survey of Youth and the Panel Study of Income Dynamics," *Journal of Labor Economics*, Vol. 18, No. 2, 2000, pp. 306–323; and Randall J. Olsen, "Job Switching, Earnings Growth and the Rate of Return to Tenure," Ohio State University working paper, November 2001.

[8] For a discussion of the ambiguity in career start dates, see Audrey Light, "Estimating Returns to Schooling: When Does the Career Begin?" *Economics of Education Review*, Vol. 17, No. 1, pp. 31–45.

[9] Because interviews were conducted annually from 1979 to 1994, and the 8-year observation period ends well before 1996 for most respondents, the majority of successive wage reports are approximately 1 year apart. One-half the 2-year differences is used to avoid discarding wage data for those respondents whose 8-year period extends in the mid-1990s; these are invariably younger respondents who stay in school a relatively long time. For this exercise, the dependent variable is again the average hourly wages divided by the GDP implicit price deflator.