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This paper demonstrates that labor turnover is a significant factor in understanding wage growth since it affects both wage growth across jobs and wage growth within the job. Our analysis shows that young men who quit experience significant wage gains compared to stayers and compared to their own wage growth prior to the job change. Among older men, a quit increases wage growth only if the individual said he changed jobs because he found a better job. Yet in both age groups, individuals who expect to remain on the current job experience steeper wage growth per time period on that job. Thus labor turnover has offsetting effects on wage growth, leading to wage gains across jobs but flatter growth in shorter jobs. Our empirical analysis shows however that total life-cycle wage growth is positively related to current tenure. While early mobility may pay, individuals who are still changing jobs later in life experience lower overall wage growth.

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The question of why an individual's wages grow over and above economy-wide productivity growth is fundamental to the analysis of the earnings distribution. In fact, explanations of the earnings distribution such as human capital investments or random shock models are basically descriptions of the wage growth process for an individual.[1] Despite this importance, and mainly due to the lack of longitudinal data for a given individual, the empirical analysis of wage growth has lagged behind the empirical analysis of wage levels.[2] This paper is a partial attempt to remedy this asymmetry. We focus on documenting how the existence of labor turnover systematically affects the rate of growth in wages both across jobs and within the job. It will be our working hypothesis to interpret wage growth on the job to be the result of human capital investments, both general and specific to the job. We will also interpret wage growth across jobs as being due to changes in the individual's human capital stock due to "mobility" investments (e.g., search) and losses of specific training incurred when job separation takes place.

Given this framework we tackle two important questions in labor economics.[3] The first is a variation of the old question of whether mobility "pays." Note that the cross-section comparison of movers to stayers (or in the migration literature, migrants to non-migrants) does not necessarily provide an answer to the relevant question: does a person who moved during the time period under investigation do better

than he would have done had he stayed? Of course, the fact that the alternative wage is not observed once the individual's decision has been made has prevented researchers from answering this question. Recent econometric techniques dealing with selection bias in censored samples [Heckman (1978)] provide one method of approaching this problem. In this paper, however, we pursue a somewhat simpler approach that utilizes the longitudinal nature of our data. In particular, we will analyze the on-the-job progress of a given individual before and after the move.

A second related question we will analyze is the effect of labor turnover on wage growth within the job. It is quite obvious that mobility shifts the earnings profile after each separation occurs. It is less obvious, but equally important, that an individual's intentions to separate from a firm will affect the rate of growth of his earnings in the current job. In particular, we hope to establish that job immobility (i.e., longer tenure) is associated with steeper wage growth than would occur otherwise for a given individual.[4] This finding should prove useful on several grounds. First of all, it establishes that indeed wages grow with tenure for a given individual. Although this may seem like a somewhat trivial empirical result it should put to rest doubts about the interpretation of the observed positive relationship between wage levels and tenure. In particular, there exists the possibility that this positive correlation is entirely due to population heterogeneity. That is, there exists some unobserved individual characteristics which lead to low wages and high turnover rates for some persons, and to high wages and low turnover rates for other

individuals. Then a cross-section correlation of wages and tenure would be positive even if wages did not grow at all in the job.[5]

More importantly, by establishing that wage growth on the job is related to the separation probability, we can obtain some estimates of the importance of specific training in the labor market. In particular, as long as specificity is an important component of human capital investments, the human capital hypothesis predicts a positive correlation between investment costs per year and completed job tenure. Since lower probabilities of separation are associated with larger incentives to invest, we should observe steeper earnings profiles in longer jobs. Note that the prediction implies not only that wages grow on the job for a given individual, but that they grow faster the better the match (i.e., the longer tenure). Therefore, in a sense, the "gains to immobility" are due to the fact that job tenure "matters" over and above the accumulation of labor market exposure.

The purpose of this paper, therefore, is to provide a systematic empirical analysis of the relationship between wage growth and job turnover. We will use two data sets in the study: the National Longitudinal Surveys of Young and Mature Men. Section I provides a systematic examination of the relationship between labor turnover and wage growth across jobs. Section II analyzes the effects of job immobility on wage growth. In Section III we consider the implications of labor turnover for lifetime wage growth. Section IV briefly describes the effects of personal and labor market characteristics on individual wage growth. Finally, Section V summarizes the results of the study.

I. Labor Turnover and the Wage Profile Across Jobs

In this section we use the NLS Young and Mature Men samples to analyze the effects of labor turnover on wage growth across jobs. There are several important restrictions in our use of the data. First of all we define labor mobility to occur when an individual changes employers. Thus transfers within the same firm are viewed as part of the returns to staying in the job. Secondly, to simplify the empirical analysis we do not attempt to distinguish between local movers and individuals who changed jobs and migrated simultaneously. In other words, we ignore the role of geographic mobility and its interaction effects with job turnover on wage growth.[6] Third, our sample is composed of individuals who either did not change jobs at all in the period under investigation or who did not leave the labor force after the separation took place. Thus individuals who were either retired or in school at the beginning of the period or whose job separation was followed by either retirement or by a return to school are deleted from our sample.[7] For both data sets we concentrate on the interval between 1967 and 1973, and partition this long period into three two-year intervals, 1967-69, 1969-71, and 1971-73. We then pool the information in each of these intervals across the individuals in our sample, in effect tripling the number of observations.[8] The labor turnover variable is defined to equal unity if the employer at the end of the two-year period is not the same as the employer at the beginning of the two-year interval. Part A of this section reports the results of comparing the two-year price deflated wage growth of individuals who separated from their jobs during the period with the relevant wage increases reported by stayers. In

Part B we return to the question addressed earlier of whether mobility "pays" for a given individual.

A. Comparing Movers to Stayers

Table 1 contains coefficients on dummy variables that indicate the individual's mobility status over a two-year interval. These coefficients are taken from regressions using absolute or percentage wage growth over the two-year period as the dependent variable and holding constant a set of standardizing variables listed in the note to the table.[9] It is important to note that these standardizing variables are measured as of the beginning of the two-year period.

The coefficients of the separation dummies may be broadly interpreted as estimates of the "gains" to mobility. Table 1 shows that among the young men a quit is associated with an increase in earnings but for the older men a quit has either a negative or zero effect on wage growth. Thus, for example, young men who quit receive a wage increase of 11 cents an hour more than those who stayed, while for older men the wage increase is approximately minus 3 cents an hour.[10] On the other hand, in both samples being laid off from a job leads to lower wage growth than for stayers, although in the young men's sample the difference is not very significant. For the older men, however, layoffs reduce wage growth over the two-year period by about 19 cents per hour. An interesting result is obtained by making a direct comparison of quits versus layoffs. In the case of young men, a quit is worth about 14 cents more than a layoff; while for the older men, a quit is worth 16.3 cents more than a layoff. Thus although who gains and loses relative to stayers varies over the life cycle, the gains to

TABLE 1
The Effects of Turnover on Wage Growth Across Jobs
Comparing Movers and Stayers[a]
Dependent Variable is ΔW or ΔlnW
(t-values are given in parentheses)

	Absolute Growth			Percentage Growth		
	1.1	1.2	1.3	1.4	1.5	1.6
			A. NLS Young Men (N = 3665)			
QUIT	.1139			.0184		
	(2.02)			(1.31)		
LAYOFF	-.0264	-.0397	-.0485	-.0253	-.0299	-.0322
	(-.35)	(-.53)	(-.64)	(-1.35)	(-1.60)	(-1.72)
JOBREL		.1800			.0382	
		(3.07)			(2.62)	
PERS		-.3545	-.3605		-.1269	-.1284
		(-3.14)	(-3.19)		(-4.53)	(-4.59)
PUSH			.0540			.0055
			(.72)			(.30)
PULL			.2984			.0688
			(4.09)			(3.81)
			B. NLS Mature Men (N = 4745)			
QUIT	-.0259			-.0488		
	(-.29)			(-2.05)		
LAYOFF	-.1888	-.1907	-.1927	-.0972	-.0979	-.0982
	(-2.08)	(-2.10)	(-2.13)	(-4.00)	(-4.03)	(-4.04)
JOBREL		.1342			.0047	
		(1.31)			(.17)	
PERS		-.4641	-.4651		-.1951	-.1953
		(-2.81)	(-2.82)		(-4.42)	(-4.43)
PUSH			-.0973			-.0283
			(-.79)			(-.85)
PULL			.5999			.0711
			(3.46)			(1.53)

[a]Other variables held constant are EDUC, EXPER, JOB, ARMY, UNION, HLTH, MAR, WLFP, WW, WKSUN, SIZE, UN, D67, D69.

quitting as opposed to being laid off remain relatively constant with age.

Of course, it is not surprising that quitters do better than individuals who were laid off at all ages. What is puzzling is that quitters do not do better than stayers systematically over the life cycle. Further analysis of this result can be conducted with the information provided in the NLS on the reasons for the quit. Thus we decompose the variable QUIT (= 1 if change was voluntary, 0 otherwise) into two kinds of voluntary changes: a quit that is due to job-related reasons and a quit that is due to personal reasons.[11] The reader should, of course, note that these reasons are reported after the separation took place and hence there may be some element of rationalization on the worker's part which may contaminate the results we report. The coefficients of JOBREL (job-related quits) and PERS (personal quits) are shown in columns 1.2 and 1.5 of Table 1. The results are quite striking. In both samples we now find that individuals who quit for personal reasons had significantly smaller wage growth than stayers, while men who had a job-related quit experienced higher wage growth than stayers. This latter effect is quite significant for the young men's sample, but less significant in the older men NLS. The results, therefore, imply a very significant differential in the gains from quitting by reason of quitting. Moreover, it is also of interest to note that layoffs and quits for personal reasons have similar qualitative effects on wage growth. This might be due to the fact that both these types of separations have a large exogenous and unexpected component, so that these individuals would have had less search while on the job than individuals whose quit was premeditated.

A further decomposition of the variable QUIT is examined in columns 1.3 and 1.6 by segmenting job-related quits into quits due to dissatisfaction with the current job (PUSH) and quits occurring because the individual found a better job (PULL).[12] One may argue that it is irrelevant whether the change was due to a pull or a push since basically the voluntary separation occurred because the individual's opportunities were better in the new job. That is, it is irrelevant whether the quit was due to the fact that the present job was bad or to the fact that the new job was better. Either way, the new job improved the individual's situation relative to the old job. Although essentially correct, this line of argument ignores an empirical peculiarity of the data: most of the individuals who said they were pushed from the current job gave reasons relating to the non-wage aspects of the job. Thus there is no obvious reason to expect any kind of wage increase for this group. Indeed, Table 1 shows that the effect of quits on wage growth differs significantly depending on whether the quit was a pull or a push. Thus a pull always leads to significantly higher wage growth than that experienced by stayers while a push does not seem to affect wage growth at all. In general, the results in Table 1 suggest that the nature of a quit is a very important determinant of the gains to mobility. Moreover, the results obtained with the detailed decomposition of QUIT provide one explanation, though not a very convincing one, of the fact that the QUIT coefficient varies over the life cycle. In particular, a quit is more likely to be due to finding a better job at younger ages, while at older ages the quit is mainly due to dissatisfaction with the current job. These results, however, are not

entirely consistent with the matching view of labor turnover since the matching process--and therefore quits due to dissatisfaction with the present employer--is more likely to take place early in the life cycle. The fact that our data show the opposite is somewhat puzzling.

Finally, one way of measuring the magnitude of the wage increase due to PULL is to calculate the present value of this increase assuming both that the individual works full-time until his retirement and that the wage increase due to the quit is general in the sense that it remains with him throughout his working life.[13] From column 1.3 the observed wage increase is worth $2,940 for the young men and $570 for the older men. Obviously the longer payoff period for young men clearly increases the return on mobility investment.

B. Wage Growth Prior to, During, and After the Move

In the previous section we conducted an analysis calculating the "gains" to mobility by comparing movers to stayers. As was pointed out earlier, this procedure could create problems if population heterogeneity is an important phenomenon in the labor market. The existence of heterogeneity raises two distinct types of problems. First, the separation dummies that compare movers to stayers can be proxying unobserved individual characteristics indicating both the propensity for turnover and the individual's ability to "grow" on the job. Since individuals with high propensities for turnover find it harder to "hold onto a job," population heterogeneity would create a negative correlation between wage growth and the separation probabilities. Moreover, if one reason stayers stay in the job is their better progress (or prospects for progress), clearly this would further bias downwards the "gains" to mobility.

Thus unless we resort to somewhat more complicated statistical procedures, ordinary least squares comparisons of movers to stayers will yield hopelessly biased estimates of the returns to moving. A correct answer to the question of whether the individual gained by moving can be obtained only by a comparison of the individual's new wage progress to that which he would have obtained had he stayed at the previous job. Clearly the relevant alternative wage is unavailable once the individual's separation decision is taken. A simple approximation, however, exists if we utilize fully the longitudinal nature of our data. For example, suppose we have a sample of individuals who either did not change jobs between 1967 and 1973 or who changed only during 1969 and 1971. Thus the basic difference between the two groups of men lies in their 1969-71 separation propensities. Suppose that we estimate wage growth equations similar to those given in columns 3 and 6 of Table 1 for each of the subperiods: 1967-69, 1969-71, and 1971-73 as a function of the 1969-71 separation probabilities. The coefficients on these dummies can then be studied to show how the mover's wages were growing <u>before</u> he changed jobs, <u>during</u> the period in which he changed jobs, and <u>after</u> the job change took place. If we are willing to assume that the effect of the 1969-71 mobility dummy on 1967-69 wage growth is indicative of how movers were doing in the job prior to separation, we can then determine conclusively whether a mover gained from moving by analyzing the behavior of the separation dummies over the six-year period. In particular, the individual improved his situation by moving if the mobility coefficient is more positive after the move

than before the move. Thus by looking at changes in the mobility coefficient we are, in effect, controlling for population heterogeneity since these unobserved individual characteristics are assumed to be constant over time.

The results of estimating these equations are presented in Table 2. Panels A and B give the results for young and older men using the sample of men who either moved during 1969-71 only or who did not move at all during the six-year period. To show how these results should be interpreted, consider in detail the effect of being "pushed" from the 1969 job on the wage profile of young men. We find that prior to the separation, individuals who were "pushed" from the job had significantly lower wage growth than individuals who stayed in that job subsequently. Two factors explain this result. Clearly, the movers were not progressing well on the job and eventually quit because of this. Secondly, if the job was a mismatch, as it eventually turned out to be, and if this information was known to both firm and worker, the incentives for investment in the job were weak, leading to smaller wage growth.[14] During the 1969-71 period, when the move actually occurred, we find that these same individuals had larger wage growth than stayers. Again, assuming that the difference between movers and stayers in the 1967-69 period was the correct comparison between the mover's old job and the stayers' job, clearly the positive coefficient of PUSH on 1969-71 wage growth provides very strong evidence that the movers improved their situation significantly through job mobility. Moreover, we find that these gains were not temporary since the comparison of movers to stayers in the 1971-73 period (after the move took place) yields the finding that

TABLE 2

The Effects of Turnover on Wage Growth Across Jobs
Comparing Individuals to Themselves[a]

Dependent Variable is ΔW or ΔlnW
(t-values are given in parentheses)

	Absolute Growth			Percentage Growth		
	67-69	69-71	71-73	67-69	69-71	71-73
			A. NLS Young Men (N = 392)			
LAYOFF	.0885	-.0391	.0579	.0785	.0201	.0575
	(.57)	(-.23)	(.47)	(1.24)	(.39)	(1.14)
PERS	-.1250	-.3029	.2169	-.0320	-.1223	.1347
	(-.59)	(-1.34)	(.80)	(-.37)	(-1.75)	(1.95)
PUSH	-.2455	.3083	-.0440	-.0693	.1105	.0153
	(-1.66)	(1.94)	(-.23)	(-1.15)	(2.26)	(.32)
PULL	-.1027	.6174	.3287	.0384	.1784	.0599
	(-.57)	(3.23)	(1.44)	(.53)	(3.02)	(1.03)
			B. NLS Mature Men (N = 1016)			
LAYOFF	.2111	-.5501	.1534	.0802	-.1818	.0579
	(.99)	(-2.80)	(.69)	(1.75)	(-3.45)	(.95)
PERS	-.2156	-1.1024	-.1143	-.0301	-.3780	.0062
	(-.44)	(-2.46)	(-.23)	(-.29)	(-3.13)	(.04)
PUSH	.1202	-.0932	-.2345	.0129	-.0437	-.0098
	(.32)	(-.27)	(-.59)	(.16)	(-.47)	(-.09)
PULL	.1083	-.6126	-.7372	.0407	-.0656	-.1102
	(.22)	(-1.37)	(-1.45)	(.39)	(-.54)	(.79)

(continued on next page)

TABLE 2 (concluded)

	Absolute Growth			Percentage Growth		
	67-69	69-71	71-73	67-69	69-71	71-73
		C. NLS Young Men (N = 1032)				
LAYOFF	.0922	.1157	-.5305	.0515	.0163	-.0069
	(1.90)	(1.40)	(-.43)	(1.47)	(.60)	(-.22)
PERS	-.1040	-.1187	.0417	-.0223	-.0465	.0521
	(-.80)	(-.92)	(.22)	(-.41)	(-1.09)	(1.07)
PUSH	-.1801	.1637	-.0467	-.0363	.0535	-.0028
	(-1.91)	(1.75)	(-.34)	(-.91)	(1.74)	(-.08)
PULL	-.0033	.2202	-.0197	.0477	.0587	-.0144
	(-.03)	(2.01)	(-.12)	(1.02)	(1.62)	(-.35)
		D. NLS Mature Men (N = 1379)				
LAYOFF	.1552	-.1687	-.1519	.0183	-.0455	-.0518
	(.89)	(-1.00)	(-.82)	(.47)	(-1.03)	(-1.08)
PERS	-.2006	-.3616	.4840	-.0096	-.1559	.1579
	(-.55)	(-1.03)	(1.24)	(-.12)	(-1.68)	(1.56)
PUSH	.0220	-.0223	-.1771	-.0340	.0327	-.0248
	(.08)	(-.08)	(-.58)	(-.53)	(.45)	(-.31)
PULL	-.0096	-.1769	.1511	.0294	-.0016	-.0453
	(-.03)	(-.44)	(.34)	(.32)	(.00)	(-.39)

[a]The variables (excluding JOB) held constant in Table 1 are held constant here.

there is no difference in the wage progress of the two groups. Therefore, we can safely conclude that individuals who moved used job mobility as a tool to achieve a better wage package.

The reader can easily verify that almost (qualitatively) identical results are obtained for the other types of voluntary separations in the NLS Young Men's sample. For the mature men, this exercise yields somewhat mixed results. The reason is probably due to the fact that the separation dummies have very low means. For example, the frequencies of PUSH, PULL and PERS are .0098, .0059, and .0059, respectively.

It may be argued that these findings are seriously biased by the existence of a selectivity bias since our sample consists of individuals who either did not change jobs at all or who moved in only the 1969-71 period, so that the move was, in a sense, successful. In fact, the use of an unrestricted sample where we include all individuals and relate their wage growth in all three periods to their 1969-71 separation behavior, barely affects our results as can be seen in Panels C and D of Table 2. If anything, we obtain somewhat more reasonable results for the mature men.

II. Labor Turnover and Wage Growth Within the Job

In the previous section we have shown that labor turnover affects the wage profile across jobs. In this section we demonstrate how labor turnover also affects the earnings profile within the job. In Part A we present a simple framework for analyzing the relationship between labor turnover and on-the-job wage growth and in Part B we document empirically that labor turnover systematically affects the slope of the earnings profile within the job.

A. A Framework for Analyzing On-the-Job Wage Growth

One way in which on-the-job wage growth can be studied is to interpret it as the result of human capital investment. If no mobility occurs during the period t-1 to t, then the absolute change in the individual's earnings capacity during that period can be written as:

$$\Delta E_t = E_t - E_{t-1} = r_n C_{t-1} \tag{1}$$

where E_t is earnings capacity at experience year t; C_t denotes dollar investment costs in t; and r_n is the rate of return to post-school investments on the current (n^{th}) job. Note that C_t is composed of all investment costs borne by the individual. That is, it is composed of general investments as well as the share of specific training costs paid by the individual.

The change in earnings capacity given by equation (1) is unobserved. However, if all investment costs are foregone earnings, observed earnings, Y_t, are defined by $Y_t = E_t - C_t$. Thus equation (1) can be rewritten as:

$$\Delta Y_t = r_n C_{t-1} - (C_t - C_{t-1}) = r_n C_{t-1} + \beta_n \tag{2}$$

where $\beta_n = -(C_t - C_{t-1})$. Since, by assumption, no job change has occurred, observed wage growth on the job is composed of the returns to on-the-job training plus the change in investment costs from period to period. If the investment profile is assumed to be continuous and linearly declining (within the job), the change in investment costs is given by the constant rate of decline in investment in the current job, β_n. Thus observed wage growth incorporates the saving in investment costs as job tenure increases.

To convert equation (2) into observables, we hypothesize that investment costs are a negative function both of previous experience and of current job experience.[15] That is, more investment is undertaken the younger the individual was when he started the job and the shorter the tenure on the job. Of course, both these implications must be qualified by the fact that at low levels of tenure there is a considerable amount of learning taking place as both the individual and firm consider whether the job match is worthwhile. Moreover, at younger ages, as the individual learns about the labor market, "job shopping" might lead to an initial increase in investment. Thus it is possible that human capital investments may be zero or rise initially both with age and with job tenure. We assume that these matching periods are reasonably short so that our linear approximations do not greatly distort reality. In particular, if π_n measures experience prior to the current job and e_n measures current job tenure, a simple relation determining investment costs would be:[16]

$$C_t = C_{on} - \sigma_n \pi_n - \beta_n e_n \tag{3}$$

Note that C_{on} measures the level of investment that would take place initially if the current job were the first job in the life cycle. Substituting (3) into (2) yields:

$$\Delta Y_t = (r_n C_{on} + \beta_n + r_n \beta_n) - r_n \sigma_n \pi_n - r_n \beta_n e_n \tag{4}$$

Thus a simple regression of wage growth on previous and current experience gives coefficients that are proportional to the effect of aging both prior to the job and within the job.

We can introduce the relationship between labor turnover and on-the-job wage growth by noting that C_{on} will vary systematically with the probability of separation. That is, since a part of dollar investment costs is specific to the current job, there will be a positive correlation between the level of the investment profile (measured by C_{on}) and expected completed job duration. In other words, the individual (and the firm) will invest more in longer jobs because they can both collect the returns to specific training over a longer period of time. Simultaneously, those individuals who have invested more on the job will have an incentive to stay longer.[17] Denoting t_n^* as expected completed tenure in the job as of the beginning of the job, this implies:

$$C_{on} = \alpha_n + \rho_n t_n^* \tag{5}$$

If longitudinal data are used, information on t_n^* is generally available as long as actual events closely parallel expectations. If we make the simplifying assumption that actual completed tenure equals t_n^* as a first-order approximation, and if we observe a sample of individuals changing jobs at some point during the survey, then it is possible to estimate the parameter ρ_n (times a constant). In particular, rewrite t_n^* as:

$$t_n^* = e_n + R_n \tag{6}$$

where e_n is current job tenure and R_n is time remaining in the current job. Using equations (4)-(6) we can derive:

$$\Delta Y_t = (r_n \alpha_n + \beta_n + r_n \beta_n) - r_n \sigma_n \pi_n + r_n (\rho_n - \beta_n) e_n + r_n \rho_n R_n \qquad (7)$$

The human capital hypothesis would predict that the coefficient on R_n is positive, i.e., wage growth is steeper in longer jobs. It is important to note that this relationship cannot be measured by observing the coefficient on current tenure, e_n. As equation (7) shows, the coefficient on e_n is ambiguous because longer observed tenure (as of the time of the survey) implies both that the individual is older (the aging effect β_n) and that more will be invested since for given R_n the job will be longer (the investment effect ρ_n). The key to demonstrating that labor turnover and on-the-job wage growth are related is the availability of longitudinal data which enable us to observe an individual's completed tenure.[18]

It is important to note, however, that an alternative interpretation can be given to the observation of a positive coefficient on R_n. One could simply argue that in jobs where an individual is progressing, i.e. where his wages are growing faster than they would elsewhere (perhaps because of better opportunities for investment), the individual will have an incentive to stay. Again, we would observe a positive correlation between on-the-job wage growth and completed job tenure. Actually, either interpretation highlights the importance of human capital in explaining labor turnover.

B. Empirical Results on Wage Growth Within the Job

Table 3 presents the results of estimating equation (7) on both NLS samples. In both cases, we selected a group of individuals who had stayed on the job between 1967 and 1969 but who had changed jobs at any time during 1969 and 1973. Thus we have a sample of individuals for whom time remaining on the job is observed.[19] The equations in Table 3 relate wage growth in 1967-69 to previous experience (PREV), current job tenure (JOB), time remaining on the job measured as of 1967 (REMTEN), and a set of standardizing variables listed in the footnote to Table 1. As before, the wage growth equations are estimated in two alternative ways: in column 3.1, the absolute change in wages over the 1967-69 period is the dependent variable, while in column 3.2, the percentage change in wages is analyzed.

Although the results are not statistically very strong, the coefficient of time remaining on the job, REMTEN, has the right sign and seems to be more significant for the older men sample.[20] For example, an extra year of job tenure in the older men sample increases the hourly wage rate by about 2.5 cents more over the two-year time period under investigation. An interesting exercise that can be carried out is to ask how much does the positive correlation between completed tenure and wage growth contribute to total wage gains on the job? This calculation can be done roughly in the following way. First of all, in terms of yearly earnings (i.e., 2,000 hours supplied to the labor market), we obtain the increase in annual earnings of expecting to stay one additional year on the job by multiplying .0125 by 2,000;[21]

TABLE 3

Effects of "Time Remaining on the Job" on 1967-69 Wage Growth[a,b]

	3.1 Absolute $Y_{69} - Y_{67}$	3.2 Percentage $\ln Y_{69} - \ln Y_{67}$
	A. NLS Young Men (N = 156)	
PREV	-.0120	-.0109
	(-.56)	(-1.53)
JOB	-.0500	-.0225
	(-1.47)	(-2.00)
REMTEN	.0827	.0238
	(.87)	(.76)
	B. NLS Mature Men (N = 747)	
PREV	-.0144	-.0045
	(-2.13)	(-1.62)
JOB	-.0195	-.0062
	(-2.90)	(-2.25)
REMTEN	.0241	.0013
	(1.26)	(.16)

[a]The variables held constant in Table 1 (except D67 and D69) are also held constant here.

[b]The sample is restricted to individuals who stayed on the job between 1967 and 1969 but left that job between 1969 and 1973.

this amount is $25.70. The individuals in our sample, in fact, stayed 20 years on the job (15 years prior to the survey and 5 after the survey). Therefore, from an ex ante point of view, staying an additional 20 years on the job is equivalent to an increase in annual earnings of $514. The present value of this increase in annual earnings over the completed job span (20 years of tenure) is $4,446. Thus there is substantial wage growth on the job over and above that obtained if there were no positive correlation between wage growth and completed job tenure. In the case of young men, even though the coefficient of REMTEN is 8.4 cents, the completed tenure is significantly smaller, only 6.6 years (2.9 years before the survey, 3.7 years after the survey). Thus the present value of the wage gains due to the correlation between completed job tenure and wage growth is $2,700.[22] Of course, we recognize that the insignificance of REMTEN in our equations indicates the need for further research on this question.

III. Labor Turnover and Lifetime Wage Growth

Parts I and II of our paper have shown the role that labor turnover plays in determining wage growth both across jobs and within the job. We have observed that individuals who change jobs voluntarily experience wage gains while individuals who stay on the job appear to experience steeper wage growth within the job. Thus one can not predict a priori whether turnover leads to smaller or larger lifetime wage growth. In this section we suggest how this question can be answered.

It might seem appropriate to estimate an earnings function of the form:

$$Y_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 e + \alpha_4 e^2 \qquad (8)$$

where t is total labor force experience and e denotes current job tenure.

This type of earnings function is essentially based on the argument that on-the-job training is composed both of general and specific training. The coefficients of t capture the growth of the individual over the life cycle, while the coefficients of e measure any growth which is specific to the current job over and above the growth which would have occurred due to general labor force experience. Thus, in principle, the estimation of (8) would provide some insight into the importance of job specific skills in determining the observed wage structure. Unfortunately, a problem with this interpretation arises when (8) is applied to a cross-section of individuals. In particular, consider an extreme case in which there is no specific training and thus α_3 and α_4 are truly zero. If individuals self-select themselves into different types of jobs because they differ in their propensities to separate--in other words, there is population heterogeneity--it may be that individuals who match into a "good" job receive high wages and therefore show low propensities to separate and individuals with "bad" matches receive low wages and are therefore observed to have high propensities to separate.[23] In this case, in the cross-section α_3 may turn out to be positive artificially! Thus the cross-section estimates of (8) may not be very meaningful in analyzing the relationship between turnover and lifetime wage growth.

Using longitudinal data, however, we can provide a solution to this problem. In particular, consider the equation:

$$Y_t - Y_0 = \gamma_1 t + \gamma_2 t^2 + \gamma_3 e + \gamma_4 e^2 \qquad (9)$$

where Y_0 gives earnings in the first year of the life cycle. Thus by

looking at wage growth we net out any individual differences that are unobserved but affect the individual's earnings throughout the life cycle. The coefficients γ_i (i = 1, ... 4) can be interpreted as the effects of experience and job tenure on total life cycle wage progress. In particular, consider the extreme case in which there is no specific training. Clearly the coefficients γ_1 and γ_2 simply capture scale effects and are expected to be positive and negative respectively. If there is only general training, there is no obvious reason as to why length of current job tenure provides any additional information on total life cycle wage growth. In fact, if mobility "pays" (that is, there are non-negative gains associated with changing jobs), longer tenure implies a smaller propensity for separation. If there is serial correlation in this propensity over the individual's life cycle, this implies less turnover in the individual's previous experience t-e. But under the assumption that mobility pays, the net effect of current tenure should then be negative! On the other hand, if wage progress over the life cycle is a function not only of total experience but of current job tenure, we would expect γ_3 and γ_4 to be positive and negative respectively in equation (9). If this is the case, however, the results can be interpreted as an indication of the fact that specific training is an important component of wage determination.[24] In other words, job tenure matters over and above the passage of labor market exposure.

Unfortunately, the two data sets we use in this paper do not contain any information on initial earnings in the life cycle. Moreover, in the Young Men NLS the individuals are much too young and both labor

market experience and job tenure too short to get any robust estimates of the parameters. However, in the older men NLS we do have a measure of labor market progress made by the individual over the life cycle since we are given the Duncan scale for the initial and current occupations. One distinct advantage of using the Duncan scale is the fact that the measure of "earnings" is of a more permanent nature.[25] Table 4 presents the lifetime earnings growth regression estimated for the Older Men NLS. In each case the linear job tenure coefficient is positive and significant indicating that holding total labor force experience constant, longer job tenure is associated with higher levels of total life cycle wage growth. Therefore, the results unambiguously show that while mobility that takes place early in the life cycle may pay, individuals who have finally settled in a firm experience larger lifetime wage growth than individuals who are still changing jobs.

IV. Effects of Other Variables

In the previous sections we have documented that turnover is an important determinant of wage growth. In this section we explore in more detail the other determinants of wage growth for both the Young and Mature NLS samples. The basic results are presented in Table 5 where wage growth regressions are estimated separately for stayers, quitters and layoffs in both age samples. In order to conserve space we present only the results using arithmetic wage growth.

The effects of the other variables are interesting. For example, education has a strong positive effect on the wage growth of young men. Moreover, within the young men's sample, education

TABLE 4

Effects of Job Tenure on Lifetime Wage Growth

	NLS Mature Men $DEP = Y_t - Y_o$	
	Coefficient	t
Constant	-24.1973	
EDUC	.4470	(2.13)
EXPER	1.8399	(2.04)
$EXPER^2$	-.0284	(-2.23)
JOB	.4860	(3.29)
JOB^2	-.0077	(-1.78)
R^2	.028	

TABLE 5

Effects of Other Variables on Wage Growth
Dependent Variable is ΔY_t

	Young Men					
	Stayers		Quitters		Layoffs	
	Coeff.	t	Coeff.	t	Coeff.	t
D67	.0020	(.03)	.0927	(.54)	.2099	(1.12)
D69	-.0467	(-.40)	-.0331	(-.08)	-.0806	(-.23)
EDUC	.0250	(2.69)	.0710	(2.35)	.0796	(2.71)
EXPER	-.0094	(-1.40)	.0123	(.53)	.0103	(.49)
JOB	-.0068	(-.94)	-.0488	(-1.40)	.0209	(.59)
ARMY	-.0018	(-1.27)	-.0028	(-.57)	-.0005	(-.11)
UNION	-.0713	(-1.80)	-.1051	(-.66)	-.0766	(-.55)
HLTH	-.0684	(-1.02)	-.2184	(-1.08)	-.0959	(-.53)
MAR	.0934	(1.90)	-.0883	(-.53)	-.2598	(-1.61)
WLFP	-.1032	(-1.83)	.0855	(.44)	.5517	(2.51)
WINC	.0014	(1.06)	.0033	(.75)	-.0057	(-.98)
WKSUN	-.0023	(-.51)	-.0027	(-.26)	.0054	(.96)
SIZE	.0057	(3.09)	.0140	(2.12)	.0020	(.31)
UN	-.0086	(-.75)	.0010	(.03)	.0381	(1.01)
R^2	.029		.021		.049	
N	2145		1046		474	

(continued on next page)

TABLE 5 (concluded)

	Mature Men					
	Stayers		Quitters		Layoffs	
	Coeff.	t	Coeff.	t	Coeff.	t
D67	.0531	(.97)	1.124	(2.24)	.7686	(3.68)
D69	-.0078	(-.14)	.6508	(1.28)	.5883	(2.86)
EDUC	.0033	(.41)	.1082	(1.71)	-.0061	(-.19)
EXPER	-.0081	(-1.68)	.0731	(1.83)	.0105	(.54)
JOB	.0011	(.60)	-.0266	(-1.36)	-.0019	(-.25)
UNION	-.0146	(-.35)	.0773	(.17)	.5189	(3.49)
HLTH	-.0210	(-.43)	.2883	(.81)	.1391	(.78)
MAR	.0022	(.03)	.2708	(.46)	-.5184	(-2.14)
WLFP	.0116	(.28)	.5285	(1.36)	.0370	(.23)
WW	.0046	(.93)	-.1899	(-1.01)	-.0005	(-.29)
WKSUN	-.0064	(-1.29)	.0027	(.14)	-.0037	(-.87)
SIZE	.0025	(1.48)	.0032	(.23)	-.0177	(-2.61)
UN	-.0011	(-.10)	.0224	(.21)	.0234	(.57)
R^2	.004		.060		.130	
N	4213		252		280	

affects the wage growth of men who separated from the job much more strongly than that of stayers. In the older men sample, however, education has a significant effect only for those who quit. Therefore the results seem to suggest that education helps to increase the gains from mobility for young men and the gains from quitting at older ages.

The coefficients of experience are quite interesting in the young men's sample. In particular, as predicted in Part II, experience has a negative effect on the wage growth of stayers. Note, however, that experience is positive (though very weak) for both quitters and layoffs, indicating that the accumulation of labor market experience may be helpful in creating the gains from mobility. A similar pattern is found for older men: experience has a negative effect on the wage growth of stayers, a positive effect on the wage growth of quitters and a zero effect on the wage growth of people who were laid off.

Other variables of some interest include a union coefficient which seems to have a zero or negative effect on the wage growth of stayers. Marital status and the labor force participation status of the wife have significantly positive and negative effects respectively on the wage growth of the young men stayers. These effects can be interpreted by arguing that marriage increases the labor market investment incentives of males (perhaps due to the household division of labor), while if the wife works these incentives are diminished.

Finally, one of the most significant variables in the regression is the size of the local labor market. This variable has a strong positive effect on the wage growth of stayers. Surprisingly, it has a

negative effect on the wage growth of older men who were laid off from their jobs.

V. Summary

In this paper we have presented a systematic empirical analysis of wage growth in the National Longitudinal Surveys of Young and Mature Men. We have demonstrated that labor turnover is a significant factor in understanding wage growth since it affects both wage growth across jobs and wage growth within the job. Some specific findings are summarized below.

1. Although the gains to quitting appear to be positive for young men and zero or negative for older men, this was clarified by distinguishing among three types of quits: quits due to finding a better job, quits due to being dissatisfied with the current job and quits due to personal reasons. It was then shown that in both age groups, individuals who quit because they said they found a better job experienced significant wage gains. At older ages a quit is mainly due to dissatisfaction with the current job and these types of quits do not in general significantly increase earnings. Since the nature of a quit changes over the life cycle, this is the reason for the age differences in the impacts of quits on wages.

2. We extended our analysis of the wage gains from mobility by comparing not only movers and stayers but individuals to themselves in the sense that we analyzed the individual's wage profile before, during and after the move to determine whether it had been significantly affected by mobility. It was shown that at least for the young men, this type of exercise led to the conclusion that a mover significantly gained from his actions.

3. Labor turnover and wage growth within the job are related through the observed positive correlation between wage growth and completed job tenure. Individuals who expected to remain on the job an additional year experienced steeper wage growth in the current period, ceteris paribus.

4. Since labor turnover was therefore found to have offsetting effects on wage growth, i.e. leading to wage gains across jobs but flatter growth in shorter jobs, its effect on lifetime wage growth could not be predicted. Our empirical analysis showed, however, that, even after holding total labor force experience constant, there exists a strong positive correlation between length of current tenure and total life-cycle wage growth. Thus, while early mobility may pay, individuals who are still changing jobs later in life experience lower overall wage growth.

In summary, this paper has tried to show that labor turnover affects not only the growth of wages across jobs but also the rate at which wages grow on the job. It is therefore an important factor that must be taken account of in any study of the earnings distribution.

APPENDIX A

Variable List

QUIT = 1 if individual changed jobs voluntarily.

LAYOFF = 1 if the individual changed jobs involuntarily.

JOBREL = 1 if individual quit for job-related reasons (see footnote 11).

PERS = 1 if individual quit for personal reasons (see footnote 11).

PUSH = 1 if individual quit because of dissatisfaction with current job (see footnote 12).

PULL = 1 if individual quit because he found better job (see footnote 12).

EDUC = years of education.

EXPER = potential experience since date of completion of schooling.

JOB = years of job tenure.

ARMY = years in the military (Young Men only).

UNION = 1 if individual was a member of a union.

HLTH = 1 if individual's health limits kind or amount of work.

MAR = 1 if individual married with spouse present.

WLFP = 1 if individual's wife was employed.

WW = wife's wage rate (Older Men)

WINC = wife's earnings (Young Men).

WKSUN = weeks unemployed during the two-year interval.

SIZE = size of labor force in 1960 of area in which individual lives.

UN = unemployment rate in area in which individual lives.

D67 = 1 if observation refers to 1967-69.

D69 = 1 if observation refers to 1969-71.

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FOOTNOTES

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[1]See Mincer (1970) and Sahota (1978) for surveys of alternative explanations of the determinants of the earnings distribution.

[2]Some exceptions are found in the papers by Lazear (1976) and Wise (1975).

[3]In previous work (Bartel and Borjas, 1977) we have analyzed the problem of why people move. Here we concentrate on establishing the consequences of labor turnover for the individual's wage-experience profile.

[4]Jovanovic (1978) provides a model that predicts wage growth on the job based on the matching process between the individual and the firm.

[5]An extensive discussion of the role and effects of heterogeneity in the labor market is given in the Heckman article in this volume. Further analysis of the problem, with labor turnover used as the focus, is provided by Jovanovic and Mincer in this volume.

[6]See Bartel (1977) for a detailed analysis of the relationship between job turnover and migration.

[7]These sample selection rules are far more serious than they appear to be. In particular, in the extreme age groups sampled in the NLS, a significant portion of turnover may be due to either retirement or school enrollment changes.

[8]There are two important qualifications to be noted here. First, in the young men's NLS, many individuals were enrolled in school in the early years of the survey. Since we concentrate on the labor market behavior of men permanently attached to the labor force, we do not have observations for these individuals in the early years so that pooling cross-section and time series less than triples the number of observations. Secondly, the efficiency of ordinary least squares can be improved upon by utilizing one of the many methods now available for pooling cross-section and time-series. We do not pursue this refinement in this paper.

[9]An exact description of these variables is given in Appendix A.

[10]Recall that these numbers refer to the gains made over the two-year period. To obtain annual effects of labor mobility, simply divide the coefficients by two.

[11]A job-related quit is one that occurred because (a) the individual was dissatisfied with wages, hours, working conditions, and/or location of his job, (b) he disliked his fellow employees, or (c) he found a better job. A personal quit is one that occurred because of (a) health problems or (b) family reasons. For young men, 85 percent of the quits were job-related while for the older men 73 percent were job related.

[12]PUSH is defined as a quit that occurred because (a) the individual was dissatisfied with wages, hours, working conditions or location of his job; or (b) he disliked his fellow employees. PULL is a quit where the individual reports he found a better job. Among the young men 50 percent of job-related quits were "pulls" while for the older men only 35 percent of these quits were "pulls."

[13]The calculation uses the formula:

$$PV = 2{,}000 \cdot (\Delta W) \int_{o}^{T-1969} e^{-rt}\, dt$$

where ΔW is the absolute wage increase, 2,000 hours are worked each year, and T is the year of retirement. For young men, T-1969 is 43 years while for older men it is 10 years. We assume r equals 10 percent.

[14]This hypothesis will be explored in detail in Part II.

[15]These implications follow easily from life-cycle optimization models developed by Ben-Porath (1967), Becker (1975) and Heckman (1976).

[16]The implications of this investment function for the wage level equation are derived in Borjas (1975, 1978).

[17]If firm and individual investments are positively correlated, then clearly the firm too has a smaller incentive to lay off the worker, further lowering the probability of separation.

[18]Although the derivations in this section are in terms of absolute wage growth, similar equations can be derived for percentage wage

growth. In particular, the analysis would then be conducted in terms of time-equivalent investment ratios. These ratios, in turn, would then be expected to decline both over the life cycle and within the job. Moreover, if higher levels of investment can only take place by spending a larger portion of work time investing, one would expect a positive correlation between these investment ratios and completed job tenure. Thus the analysis may carry over to percentage wage growth.

[19]These sample restrictions, of course, raise the possibility of sample selection bias; see Heckman (1978) for a thorough discussion of this problem.

[20]There are two possible reasons for the insignificance of REMTEN in the Young Men NLS. First, these men are in the very early years of their jobs when investment may not be taking place. Second, the usable sample is very small because during 1967-69 approximately half of the individuals were enrolled in school and are deleted from the sample; among the remaining 50 percent, the job separation rate is very high thus resulting in further deletions. It is interesting to note that by enlarging the young men's sample to include individuals who did not leave the job by 1973 and assigning an arbitrary value of 10 for REMTEN for these individuals, the REMTEN coefficient becomes positive and significant.

[21]We use .0125 rather than .025 because the wage growth equations refer to two-year intervals.

[22]Note that the coefficient of REMTEN is never significant in column 3.2 when we deal with percentage wage growth. In principle, the correlation between investment and completed tenure need hold only in terms of dollar investment costs and not in terms of time-equivalent investment ratios since it is not clear a priori how initial earnings capacities are correlated with completed job tenure.

[23]The problem of heterogeneity versus state dependence is discussed in detail in the Heckman and Jovanovic and Mincer papers included in this volume.

[24]Of course, the results could also be consistent with the hypothesis that wages grow on the job because of a successful "match" between employer and employee. In other words, an individual's mobility ultimately led to his finding a firm in which he was able to "move up the ladder."

[25]The Duncan Index is described in Reiss (1961). It is very highly correlated with earnings in the occupation.