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2 Transitions between Employment and Nonemployment

John Ballen and Richard B. Freeman

2.1 Introduction

In recent years, analyses that treat unemployment as a dynamic rather than a static phenomenon have provided important insights into the nature and causes of joblessness. One issue of concern in studying joblessness is whether unemployment is better thought of as a temporary state experienced by many individuals as part of their normal job-search process (Feldstein 1973) or as a relatively permanent state experienced by a only few (Clark and Summers 1982). Another issue is the dependence of the length of time unemployed on the number of past occurrences of unemployment (Ellwood 1982; Heckman and Borjas 1980). From the perspective of a dynamic analysis of unemployment, the factors that influence the transition between spells of employment and unemployment (or nonemployment), and thus the number of occurrences and the lengths of time in either state, are the underlying determinants of the magnitude and nature of the problem of joblessness.

This paper applies the dynamic analysis to the nonemployment problem of out-of-school inner-city black youths—the demographic group now facing the most severe joblessness in the United States. In 1980 the rate of unemployment among 18- to 19-year-old blacks, who were out of school was 36 percent, and the unemployment rate among 20- to 24-year-old blacks who were out of school was 24 percent. Because of low labor-force participation, the rate of nonemployment (unemployed + out of the labor force/population) was 64 percent among 16- to 19-year-olds and 40 percent among 20- to 24-year-olds.[1]

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What is the relative contribution to these high rates of long spells of nonemployment as opposed to many incidences of nonemployment? Are the labor market prospects of these youths adversely affected by previous nonemployment and positively affected by previous employment? What determines the length of spells of employment or nonemployment, and what determines the number of occurrences of each state? Does the dynamic of employment and nonemployment among black inner-city youths differ from that of other youths?

To answer these questions, we examine data on the employment and nonemployment experiences of inner-city black youths from the NBER Survey of Inner City Black Youths and data on the employment and nonemployment experiences of all black and white youths in the youth cohort of the 1979 National Longitudinal Surveys (NLS). We use the monthly time line of the NBER survey to calculate the employment and nonemployment status of inner-city black youths at two-week intervals over a year and examine the transitions between the two states. We use the questions in the NLS on activities between survey dates to calculate comparable data for a period of about two years and analyze these transitions as well. Because of the nebulous differences between the state of unemployment and the state of being out of the labor force represented in these kinds of data (Poterba and Summers 1983; Clark and Summers 1982), we concentrate on movements between employment and its converse, nonemployment. As the meaning of employment and nonemployment and the patterns of transitions are likely to be very different for youths in school from those of youths out of school, we limit our analysis to out-of-school youths.

This chapter first examines the rate of nonemployment among various groups of youths by age and over time; the number of occurrences of nonemployment and employment and the duration of nonemployment and employment spells; and the transition matrices across the two states. Next it analyzes the determinants of the transition probabilities, notably, their dependence on the past number of previous spells and the length of the most recent spell. Finally, we investigate the possible effects of incidences and spells of employment and nonemployment on wages.

2.2 Patterns of Employment Transitions

The standard analysis of employment activity over the life cycle envisages a moderate amount of time employed in the early years of working life—as youths search for the job appropriate to their talents, training, and tastes—followed by an extended period in which they hold down relatively permanent jobs.

The degree to which the normal pattern of increased employment activity with age holds for inner-city black youths is an important factor

in judging their joblessness problem. If employment rises rapidly with age, reducing the gap between blacks' employment rate and that of other comparable individuals, the low rates of employment early in life may be judged less important than if employment rises slowly with age.

Table 2.1 presents evidence from the NBER and NLS data sets on the cross-sectional pattern of employment rates by age for all out-of-school inner-city black youths and for all black and white youths, by level of education. Because the employment rate (or its converse) is a limited dependent variable, varying between 0.00 and 1.00, the choice of a metric for measuring changes is an important methodological consideration. Accordingly, the table records two such measures: the absolute change and the logistic change relative to the difference between the employment rate and its upper bound.

There are two findings. First, among all out-of-school inner-city black youths, the rate of increase in employment with age is only moderate, showing no sign of a rapid movement toward the upper bound of 1.0 or toward the employment rate of whites. A similar pattern is obtained for

Table 2.1 **Cross-Sectional Evidence on the Percentage of Out-of-School Youths Employed, by Age and Education**

	Change in Odds Ratio of Employment			High School Dropouts		
Age	Rate of Employment (E)	Absolute Change (ΔE)	Δ[E/1-E]	Rate of Employment (E)	Absolute Change (ΔE)	Δ[E/1-E]
			NBER Blacks			
16–17	—	—		—		
18–19	.39	—		.38	—	
20–21	.49	.10	.16	.39	.01	.02
22–24	.51	.02	.00	.39	.00	.00
			NLS Blacks			
16–17	—	—		.25	—	
18–19	.53	—		.51	.26	.35
20–21	.65	.12	.26	.61	−.10	.20
22–24	.76	.11	.31	.50	−.11	−.28
			NLS Whites			
16–17	—	—		.58	—	—
18–19	.74	—		.69	.12	.29
20–21	.74	.00	.00	.64	−.05	−.08
22–24	.94	.20	.56	.86	.22	.61

Source: NBER survey, sample defined: not in school or military for year covered by questionnaire; sample sizes: all youths-1,067; high school dropouts-615. NLS, sample defined: male, age-16, no military hours worked in 1978, 1979, or 1980, not enrolled in school 1978-80; sample sizes: all youths-823; dropouts-415.

Note: Sample definitions and sample sizes for future tables are the same as these unless otherwise noted.

NLS black youths, with increases in the employment rate from ages 18–19 to ages 22–24 that are far below those needed to close the gap with white youths. Among whites, by contrast, there is a sharp rise in the early twenties, bringing their employment rate to .94.

Second, among black high school dropouts in the inner city, there is essentially *no* improvement in employment rates by age. Although there is some possibility this finding may be influenced by the undersampling of older black youths in the NBER survey, the evidence on sampling bias does not support such an interpretation, as indicated by Bound (in this volume). Moreover, even in the NLS, where the rate of employment by age rises for black high school dropouts from ages 16–17 to ages 18–19, the changes in the rates for the ages beyond 18–19 are insignificant. On the other hand, among white high school dropouts the rate rises considerably in the early twenties, such that the gap between blacks and whites is even greater than it was in the late teen years.

The contribution of a slow rise in employment with age to the joblessness problem of blacks 20 to 24 years old can be put another way. Given the extremely low levels of employment among teenaged black youths, an exceptionally steep relationship between age and employment is necessary for employment among youths in their twenties to reach "reasonable" levels. The data in table 2.1 show that rather than being exceptionally steep, the age–employment rate relationship flattens quickly among black youths, especially among the dropouts.

Because the cross-sectional evidence compares different persons at one specific time, it is possible that it presents a misleading picture of true longitudinal changes over the life cycle. It may be that the older youths in the sample had *lower* rates of employment when they were teenagers than the younger youths and thus greater increases in rates than implied by cross-sectional comparisons. Or it may be that the younger youths will have higher rates of employment when they are older and thus greater increases in rates than indicated by comparisons with older youths. To examine these possibilities, we have compared rates of employment for black youths of the same age over time, using published Current Population Survey (CPS) data. Those data show no greater increase in rates of employment among black teenagers in the late 1970s and no greater increase in rates of employment among blacks 20 to 24 years old in the early 1980s.[2]

To document further that rates of employment for inner-city and other black youths fail to rise substantially with age, we have tabulated employment rates for the same youths over time. In the NBER survey we compare employment rates for youths from the first month covered in the monthly time line to the last month. In the NLS we compare employment rates from 1979 to 1981. Table 2.2 records the results of this longitudinal analysis of employment with age (and time). The pat-

terns of changes over time are quite consistent with the cross-sectional comparisons, giving no indication of extremely rapid increases in employment rates as youths age. But since the NBER data cover only one year and since the NLS sample sizes are small, we eschew detailed comparisons here.

Neither the cross-sectional nor the longitudinal comparisons isolate a pure life-cycle or age effect. The former may also reflect "cohort" effects, while the latter may also reflect pure "time" effects (notably, changes in business-cycle conditions). Still, the most plausible interpretation of the patterns in tables 2.1 and 2.2 is that part of the black youth employment problem is attributable to the failure of employment to rise with age as much as it could, or perhaps should. This interpretation, in turn, calls attention to the transition between nonemployment and employment as youths age, and to the factors underlying the transition probabilities, as important elements in the persistence of low levels of employment as black youths age.

2.2.1 Decomposition of Employment and Nonemployment

As a first step in examining the dynamics of nonemployment among inner-city black youths, we have decomposed the annual rates of employment and nonemployment into the number of times youths were in those states and the duration of time in those states. To obtain a complete accounting of youths' time over the period of concern, we include uncompleted spells in some calculations. We also examine completed spells separately, for the purpose of analyzing spells per se. Our calculations are based on the monthly time-line module of the NBER survey, which asks youths about their primary and secondary activities over a 50-week period. The NLS survey uses a work-history set of questions to determine employment status over 150 weeks. For purposes of comparison with the NBER survey, we also tabulated transitions for white youths in the NLS over a 50-week period in 1979–80.

Lines 1–4 of table 2.3 present a complete decomposition of the rates of employment and nonemployment, using the following formulas:

(1)
rate of employment = (% of youths in employment at least once)
× (# of times youths are employed)
× (average length of the employment spells)

(2)
rate of nonemployment = (% of youths in nonemployment at least once) × (# of times youths are not employed) × (average length of the nonemployment spells).

Table 2.2 **Longitudinal Evidence on the Percentage of Out-of-School Youths Employed, by Age and Education, 1979–81**

NBER Blacks				NLS Blacks				NLS Whites		
Age	Rate of Employment (*E*)	Absolute Change (*WE*)	*WE*/1-*E*	Age	Rate of Employment (*E*)	Absolute Change (*WE*)	*WE*/1-*E*	Rate of Employment (*E*)	Absolute Change (*WE*)	*WE*/1-*E*
					All Youths					
18–19	.33			18–19	.53			.74		
19–20	.39	.06	.18	20–21	.67	.14	.30	.73	−.01	−.04
20–21	.50			20–21	.65			.74		
21–22	.49	−.01	−.02	22–23	.72	.07	.20	.77	.03	.12
22–24	.55			22–24	.76			.94		
24–26	.51	−.04	−.07	24–26	.64	−.12	−.50	.90	−.04	−.67
					High School Dropouts					
16–17	.18			16–17	.25			.58		
17–18	.27	.09	.11	18–19	.50	.25	.33	.65	.07	.17
18–19	.29			18–19	.51			.69		
19–20	.38	.09	.13	20–21	.64	.13	.27	.67	−.02	−.06
20–21	.35		.06	20–21	.61		.21	.64		
21–22	.39	.04		22–23	.69	.21		.67	.03	.08
22–24	.45	−.06	−.11	22–24	.50		−.34	.86		
24–26	.39			24–26	.33	−.34		.93	.07	.50

The rate of employment (nonemployment) is calculated by dividing the total number of person-weeks spent in the state by the total number of person-weeks in the sample. Thus, equations (1) and (2) are identities.

Several related aspects of the dynamics of black youth employment and nonemployment are illustrated in lines 1–4 of table 2.3. First is the remarkably large proportion (24 percent) of blacks in the NBER survey who were never in the state of employment (the converse of the percentage employed in line 2) vis-à-vis the negligible proportions of whites and blacks in the NLS who were never employed. This finding confirms the fact that the NBER survey has indeed identified youths who are, in some sense, nonparticipants in normal economic life. It also reinforces the Clark and Summers (1982) position on the concentration of nonemployment among a minority of youths: 54 percent of all the weeks in nonemployment in the NBER survey is accounted for by those youths who were *never* employed.

Second, note that the mean number of times a youth is in a state, given that he is in it at least once, varies only slightly across the groups. Third, the average duration of spells (including uncompleted spells) shows considerable differences in lengths of nonemployment spells between blacks in the NBER Survey and whites in the NLS and between blacks and whites in the NLS. The data show that blacks in both the NBER survey and the NLS remained employed for shorter periods and nonemployed for longer periods than did whites, with the biggest percentage difference in the length of time not employed.

To determine the contribution of incidences and duration of spells to the enormous differences in employment and nonemployment rates between blacks and whites, we have taken log differences between the various components of employment rates in table 2.3 and obtained the following:

	NBER blacks vs. NLS whites	NLS blacks vs. NLS whites
log difference in employment rates	−.405	−.214
ln % in state	−.244	−.031
ln # times in state	−.071	.010
ln duration	−.088	−.193
log difference in nonemployment rates	.781	.541
ln % in state	.392	.145
ln # times in state	−.043	.018
ln duration	.435	.378

Note: Totals need not add because of rounding.

Table 2.3 **Number of Incidences and Durations of Spells of Employment and of Nonemployment**

	One Year				Three Years			
	NBER Blacks		NLS Whites		NLS Blacks		NLS Whites	
	E	*N*	*E*	*N*	*E*	*N*	*E*	*N*
1. Rates for Total Sample	.52	.48	.78	.22	.63	.37	.78	.22
2. Percentage in State at Least Once	.76	.74	.97	.50	.96	.80	.99	.69
3. Number of Times in State, in State at Least Once	1.22	1.36	1.31	1.42	2.11	2.36	2.09	2.32
4. Average Duration of Spells (2-week spells)	14.1	11.9	15.4	7.7	23.3	14.8	28.3	10.11
5. Proportion of Sample with Completed Spells	.23	.15	.16	.25	.53	.54	.46	.55
6. Number of Completed Spells	1.16	1.14	1.28	1.25	2.07	2.02	2.00	1.97
7. Average Length Completed Spells (2-week intervals)	6.7	5.2	5.4	5.0	11.16	8.97	11.54	7.6

Source: Tabulated from the surveys based on number of transitions.
Notes: E = employed, N = nonemployed. The NBER sample = 1,067; the NLS sample of whites = 610; and the NLS sample of blacks = 213.

From these calculations, differences in the proportion of youths who are never employed are a major cause of the employment rate difference between blacks in the NBER survey and whites in the NLS and are a significant cause of nonemployment rate differences. Differences in the duration of spells are the dominant factor in the comparisons of blacks and whites in the NLS.

Lines 5–7 in table 2.3 examine completed spells. Because completed spells have to have begun and ended in the time period covered by the survey, the spells are necessarily short, making the mean of the completed spells noticeably smaller than the mean of the uncompleted spells. Comparison of the length of completed spells between blacks and whites in a sample like this is highly misleading, as can be seen in line 7, which shows blacks having spells of about the same length as those of whites, or longer spells. The reason for this is that many long spells of employment for whites had not ended in the period covered by the survey.

2.2.2 Transition Probabilities

Lengths of time in states and movements between them depend on transition probabilities. When the probabilities of leaving states are large, spells will be short and incidences in states numerous. When the probabilities of leaving are small—zero in the case of an absorbing state—the opposite is true. The key way to pursue a dynamic analysis of employment and nonemployment is to create matrices of transition probabilities between the two states.

Table 2.4 records the average biweekly transition probabilities between employment and nonemployment for the NBER and NLS samples. The NBER probabilities were calculated from the monthly time line. The NLS probabilities were obtained from the job-history questions about breaks in employment, organized to produce a time line, as described in appendix A. For both calculations we took averages of probabilities across youths and across time, ignoring issues of both heterogeneity among youths and the possible dependence of transition probabilities on the past history of the individual, such as his number of times and length of time in the state. Formally, if P_{ij}^{kt} is the probability that that individual k will go from state i to state j in period t, the averages in the table are:

$$P_{ij}^{\cdot\cdot} = \sum_{t}\sum_{k} P_{ij}^{kt} = \sum_{u} P_{ij}^{\cdot t} = \sum_{k} P_{ij}^{k\cdot}, \tag{3}$$

where the dots signify averages over the relevant index.

The elements in the matrices show that P_{EN} is greatest for blacks in the NBER survey and smallest for whites in the NLS, and that P_{NE} is smallest for blacks in the NBER survey and largest for whites in the

Table 2.4 **Matrices of Transitions Between Employment and Nonemployment**

	All Youths				High School Dropouts			
	Age at the Outset							
	16–19		20–24		16–19		20–24	
NBER Blacks								
	E	*N*	*E*	*N*	*E*	*N*	*E*	*N*
E	.950	.050	.967	.033	.947	.053	.955	.045
N	.041	.959	.041	.959	.039	.961	.037	.963
NLS Blacks								
	E	*N*	*E*	*N*	*E*	*N*	*E*	*N*
E	.96	.04	.97	.03	.95	.05	.96	.04
N	.06	.94	.06	.94	.05	.95	.06	.94
NLS Whites								
	E	*N*	*E*	*N*	*E*	*N*	*E*	*N*
E	.97	.03	.98	.02	.96	.04	.97	.03
N	.08	.92	.10	.90	.08	.92	.09	.91

Source: Tabulated as average of biweekly transition probabilities from the relevant surveys. NBER transitions based on one year; NLS transitions based on three years.

Sample Sizes:

	All Youths		High School Dropouts	
	16–19	20–24	16–19	20–24
NBER blacks	307	760	234	358
NLS blacks	72	141	55	68
NLS whites	213	397	155	137

NLS. These relationships were of course, implied by the table 2.3 decomposition. In addition, note that the transition probabilities for blacks show only modest improvement with age: although P_{EN} drops, P_{NE} does not increase for blacks. Indeed, the P_{NE} transition probability is lower for older blacks than it is for younger whites. It is this pattern of transitions that underlies the sluggish improvement in the employment position of blacks as they age.

It is important to recognize that the probabilities in the table differ between blacks and whites by significant amounts; the key probabilities are the off-diagonal elements (P_{EN} and P_{NE}), and it is their ratio, rather than their absolute difference, that underlies the differential employment experiences.

The simplest way to apply the table 2.4 transition matrices to the employment and nonemployment rates is to assume that the matrices are Markovian and then to calculate the steady-state distribution of

youths between employment and nonemployment generated by the equation:

$$s = Ps, \tag{4}$$

where $P = (P_{ij})$ and $s = \begin{pmatrix} E \\ N \end{pmatrix}$ for the two states of employment. For the steady-state rate of employment (E) and nonemployment (N), the solution to equation (4) yields:

$$E = P_{EN}/(P_{EN} + P_{NE}) \tag{5}$$

$$N = 1 - \mathrm{E}.$$

Estimates of the steady-state rates, and comparisons of these rates to the actual distributions of youths between states, are given in table 2.5. The predicted states are comparable to, but not identical to, the actual states, indicating that the table 2.4 matrices do, in fact, underly the observed patterns but that the simple Markov assumption does not strictly hold. Table 2.5 also presents the results of an experiment in which we replace the P_{EN} and P_{NE} transition probabilities for blacks with those for whites, in order to determine which transition is a greater cause of the white-black differences in employment. If the P_{EN} differences are the more important cause, the problem of nonemployment is largely one of *holding* a job. On the other hand, if the P_{NE} differences are more important, the problem is more one of *finding* a job in the first place. As can be seen in the last two columns of the table, black nonemployment rates fall much more when we replace the P_{NE} for blacks with that for whites than when we replace the P_{EN} for blacks with that for whites. These results imply that much of the differences in employment dynamics is attributable to differences in the ability to obtain work in the first place. It should be noted that these findings are consistent with those of other studies that show quit rates and turnover among blacks are not very different from quit rates and turnover among whites.[3]

2.3 Determinants of Transition Probabilities

Transition probabilities differ among persons. In this section we examine some of the potential determinants of differences among the youths in our survey to see which youths have better or worse transition probabilities. In addition, we examine the dependence of the probabilities on the individual's past work history. If a bad employment history makes escape into employment difficult, and a good employment history raises employment prospects, we will have both negative

Table 2.5 **Predicted and Actual Distributions of Nonemployed Youths**

	Actual	Predicted from Transition matrix	Predicted with White P_{NE}	Predicted with White P_{EN}
All Youths				
1. NBER, Black, 16–19	.59	.55	.38	.45
2. NBER, Black, 20–24	.43	.45	.25	.33
3. NLS, Black, 16–19	.46	.40	.33	.33
4. NLS, Black, 20–24	.32	.33	.23	.25
5. NLS, White, 16–19	.29	.27	—	—
6. NLS, White, 20–24	.17	.16	—	—
High School Dropouts				
7. NBER, Black, 16–19	.61	.56	.51	.56
8. NBER, Black, 20–24	.55	.55	.33	.45
9. NLS, Black, 16–19	.52	.50	.38	.44
10. NLS, Black, 20–24	.43	.40	.31	.33
11. NLS, White, 16–19	.35	.33	—	—
12. NLS, White, 20–24	.27	.25	—	—

Source: Actual distributions tabulated from NBER survey and NLS. Predicted distributions using equation (5) and the data in table 2.4. Sample sizes are the same as in table 2.4.

and positive "vicious circles." If there is no such dependence, and differences in transition probabilities are largely the result of differences among persons that existed before their entry into the labor market, the transition-to-employment problem is potentially more long-term for those individuals and thus less apt to be solved by such labor market developments and interventions as increased demand or training programs.

Because there are various ways to model the dependence of transition probabilities on past work histories, we report a variety of related tests. Some of our tests treat the entire sample of individuals. Others, designed to isolate "true" state dependence from heterogeneity among individuals, focus on smaller samples. Although the assumptions needed for any single test of the nature of transitions may render it fallible, the entire set yields consistent results, thereby strengthening our belief in the findings.

The analysis indicates that the transition-to-employment problem for young blacks is influenced by two phenomena. First, incidences of nonemployment severely limit inner-city black youths' chances for employment, apparently because employers do not trust youths with spotty work records. Second, the duration of employment does not help inner-city blacks as much as it helps whites, apparently, at least in part, because black youths tend to hold "dead end" jobs.

2.3.1 Regression Analysis

Table 2.6 presents the results of a regression analysis of the transition probabilities P_{EN} and P_{NE} on the number of incidences of the initial state in the past, the length of the ongoing state, and a host of background variables, which are both of interest in themselves and of value as controls for differences among respondents. The regression results are reported for the linear form:

$$P_{ij}^{kt} = a + bT_i^{kt} + cN_i^{kt} + dX^{kt} + U_{ij}, \tag{6}$$

where T_i represents the length of time in i up to period t, and X^{kt} signifies the background variables for the individual.

The calculations show a fairly consistent and reasonable pattern for the determination of transition probabilities. Examining the transition from employment to nonemployment first, we see that it depends as we might expect on certain background factors. For example, youths who commit illegal acts have a higher probability of leaving employment, while those with more stable family status and greater age have lower probabilities. The only difference between the samples is in time in the state, which lowers P_{EN} for blacks and whites in the NLS but not, surprisingly, for blacks in the NBER survey, where it has essentially no effect.

The regressions for the nonemployment-employment transition show a consistent pattern of negative effects of time-in-state and produce coefficients on the background variables generally opposite in sign to those found in the P_{EN} regression. Perhaps the most salient result here is the *negative* effect of age on P_{NE} for inner-city blacks, which suggests that it is more difficult for these youths to leave nonemployment as they age, a result in line with our findings about the age-employment relationship.

The second half of table 2.6 shows the means of the independent variables. Note that in some cases the means differ considerably between the transitions that began in E and those that began in N. A typical P_{EN} observation is more likely than a P_{NE} to involve a respondent who had a high school diploma or was married or the head of the household and is less likely to involve one who had engaged in illegal activities. This is another way of stating that those factors help determine the probability of a respondent being in one of the two states.

2.3.2 State Dependence

A key issue in analyzing the employment transitions is the extent to which the length of time in a spell or the incidence of spells affects transition probabilities (Ellwood, 1982 Heckman and Borjas, 1980). In seven of the eight calculations in table 2.6, we find a negative relationship between time in a state and the transition probability that is

indicative of such dependence. The results obtained in the regressions could be attributed, however, to heterogeneity among persons and the sorting of them by time in the state rather than by true dependence on past work history.

To determine if the regressions results can be attributed to true dependence, we must compare the situation of the *same* respondent over time before and after he experienced a break in state, thereby eliminating heterogeneity among respondents as a possible cause of statistical significance.

Table 2.7 presents the results of four different tests of the incidence and duration dependence of transitions based on such comparisons for black and white youths. Before examining the results, recognize that

Table 2.6 **Linear Probability Estimates of the Determinants of Transition Probabilities (standard errors in parentheses)**

	P_{EN}			P_{NE}		
	NBER Blacks	NLS Blacks	NLS Whites	NBER Blacks	NLS Blacks	NLS Whites
Mean (×100) of Dependent Variable	3.67	2.91	2.23	4.10	5.98	9.16
Dependent Variables						
Time in State	.020	−.056	−.040	−.066	−.084	−.083
	(.024)	(.009)	(.004)	(.027)	(.022)	(.028)
Age	−.17	−.037	−.27	−.16	.063	.112
	(.09)	(.167)	(.08)	(.09)	(.280)	(.250)
Illegal Activities	1.40	.15	.84	.38	.71	−1.56
	(.40)	(.39)	(.22)	(.40)	(.73)	(.69)
Years of School	−.17	−.19	−.16	.42	.11	1.26
	(.18)	(.18)	(.09)	(.20)	(.23)	(.29)
H.S. Diploma	−1.32	−1.37	−1.47	.16	.64	−1.69
	(.50)	(.52)	(.29)	(.57)	(.95)	(1.04)
Grades in School[b]	−.24	—	—	.17	—	—
	(.18)			(.19)		
Married	−.67	−.93	−.63	.82	.50	3.40
	(.58)	(.57)	(.18)	(.85)	(1.51)	(.79)
Head of Household	−.30	−.31	−.13	.51	1.61	2.19
	(.53)	(.39)	(.18)	(.71)	(.80)	(.69)
Other Controls	—[c]	—[d]	—[d]	—[c]	—[d]	—[d]

Table 2.6 (continued)

	NBER Blacks		NLS Blacks		NLS Whites	
	N	*E*	*N*	*E*	*N*	*E*
Means for the Independent Variables are:						
Time in State	9.54	10.0	16.0	24.0	11.1	26.4
Age	20.6	21.2	19.7	20.1	19.5	20.1
Illegal Activities	.27	.21	.29	.29	.31	.17
Years of School	10.8	11.3	10.1	10.9	9.9	11.0
H.S. Diploma	.33	.55	.26	.52	.31	.62
Grade in School[b]	2.86	3.02	—	—	—	—
Married	.05	.09	.05	.12	.23	.39
Head of Household	.07	.11	.29	.37	.43	.57

Note: These means are based not on persons but on transitions, so that persons count more than once. Sample sizes are NBER (P_{EN}) = 13,475, (P_{NE}) = 12,133; NLS blacks (P_{EN}) = 9,595, (P_{NE}) = 5,320; and NLS whites (P_{EN}) = 32,305, (P_{NE}) = 8,341.

[a]Because the same persons are counted several times, the standard errors are not appropriate for normal statistical tests that assume independence of errors over time.

[b]Variable not measured in NLS.

[c]Other controls for the NBER: sample were dummy variables for Chicago and Boston and for both parents present in the household at age 14.

[d]Other controls for the NLS samples were dummy variables for both parents present in the household at age 14; for residence in South at age 14; and for mother or father working when the youth was age 14.

all the tests suffer from potentially serious measurement problems. First, the sample size for some is extremely limited because of the small number of respondents who had experienced the requisite changes in state or completed spells. Second, and related, are questions about the representativeness of respondents fulfilling the conditions. When a test is limited to five percent of a sample, one is suspicious that conclusions based on that five percent are generalizable. Third are potential problems of measurement error in the tests: random measurement error is, in general, more likely to be a major problem in longitudinal analyses than in cross-sectional work.[4] Granting these problems, the tests for heterogeneity as opposed to state dependence still provide valuable information on the impact of past work history on current employment problems. The detailed calculations underlying the tests are given in appendix B.

The first test, for duration dependence, was developed by Chamberlain (1982). It is based on the idea that when there is duration dependence, various incidences of a state should occur close together in time rather than being separated by time in the other state. For

Table 2.7 **Test of Incidence and Duration Dependence of Transitions, Corrected for Heterogeneity**

	NBER Blacks	NLS Blacks	NLS Whites
Duration			
1. Chamberlain Duration Test			
P_{NE} Lowered by Duration of Nonemployment	Yes	No	No
P_{EN} Lowered by Duration of Employment	No	Yes	Yes
Incidence			
2. Counting Test Incidence			
P_{EN} Higher After Spell of Nonemployment	Yes	No	No
P_{NE} Higher After Spell of Employment	No	No	No
3. Mean Spell Test of Incidence			
P_{EN} Higher After Spell of Nonemployment	Yes	No	No
P_{NE} Higher After Spell of Employment	?	No	No
4. Heckman-Borjas Test of Incidence			
P_{EN} Higher After Spell of Nonemployment	Yes	No	No
P_{NE} Higher After Spell of Employment	Yes	No	No

Source: See appendix B for details of these tests.

example, consider the possible pattern of employment and nonemployment at six different times, such that a youth is employed four times and not employed two times. If employment duration reduces the chance of nonemployment, (P_{EN}), then it is more likely that the times the youth is employed will occur in a sequence than would be the case if employment duration has no affect on P_{EN}. Writing observed states over time in parentheses, we see that the pattern (E,E,E,N,E,N) is more likely to occur than the pattern (E,E,N,E,E,N) if there is a dependence effect.

As discussed in appendix B, we have performed a variety of tests of this sort for the three samples, examining different timing sequences. The results of these tests show a very different pattern for black youths

in the NBER survey than for black or white youths in the NLS. The duration of nonemployment marginally hurts inner-city black youths—in the sense that the longer a spell of nonemployment, the lower are their chances of moving into employment—but does not hurt other youths. More strikingly, the duration of employment helps other youths significantly by reducing the probability of moving into nonemployment, but it does not help inner-city black youths.

The remaining tests in table 2.7 are for incidence dependence. They test whether a spell of nonemployment raises the chances a youth will leave employment after the spell over his chances of leaving employment before the spell. Formally, if P^0_{EN} is the transition probability before nonemployment and P^1_{EN} is the transition probability after nonemployment, the tests measure whether P^1_{EN} is less than P^0_{EN}. On the other side, the tests for incidence dependence of employment measure whether P^1_{NE} is greater than P^0_{NE}, that is, whether a spell of employment raises the chances of escaping nonemployment.

The "counting" test in line 2 of table 2.7 simply compares the lengths of spells before and after a completed intervening spell. The test compares two types of spells—completed spells before and after the intervening spell, and uncompleted spells before and after the intervening spell—based on the hypothesis that longer uncompleted spells imply longer completed spells. We do not include cases in which one spell is completed and the other is uncompleted because of potential biases. When one spell is shorter than another but uncompleted, it could become longer in the future, making mixed comparisons risky. The results of the counting tests show incidence dependence for nonemployment among inner-city black youths but not among the other groups.

The third test in the table compares the mean length of spells before and after the incidence. A parametric extension of the counting test, this test gives essentially the same results. The magnitude of the effect of an incidence of nonemployment in the NBER sample is, by the estimated regression, fairly sizable: an average spell of employment is 32 percent lower after a spell of nonemployment than it is before.

Finally, line 4 of the table presents the results of the Heckman-Borjas test of incidence dependence, which is based on comparisons of spells with various intervals. The test checks for whether nonemployment and employment are clumped together in the data. The results are generally similar to those in the other incidence tests, showing that an incidence of nonemployment hurts inner-city black youths but not other groups. There is, however, one difference between this and other tests: there is also evidence of incidence dependence in employment for NBER youths though not for other youths.

On the basis of these results, it is tempting to conclude that the transition problem of inner-city black youths is largely a result of the negative impact of nonemployment on the chances these youths will

later gain jobs, and possibly to the lack of a positive impact of employment on their chances for remaining employed. Since, as we saw in table 2.5, much of the high nonemployment rate among inner-city youths in the NBER survey is due to small probabilities in the P_{NE} transition, the finding that nonemployment hurts them provides an appealing explanation of the overall dynamics of nonemployment. We are wary of drawing such a strong conclusion from these results, however. Although it is plausible that inner-city black youths are more affected by their work histories than other black youths, we would have greater faith in this conclusion if the tests for state dependence for blacks in the NLS gave results closer to those for the NBER inner-city sample than to those for whites in the NLS. As they did not, the conclusion requires additional buttressing.

2.4 Explanations of the Dependence Patterns

One way to support the finding that nonemployment among inner-city blacks reduces their chances of getting a job while employment does not increase their chances of getting a job is to examine the possible economic forces that might cause such dependence patterns. In this section we examine the possibility that the observed patterns are due, at least in part, to the job market in which the youths find themselves. In particular, we look at the effects of the employer's hiring criteria and the nature of the jobs obtained by inner-city black youths on their transition probabilities.

2.4.1 The Nonemployment-Employment Transition

To examine the incidence dependence of nonemployment, we conducted telephone interviews with 18 randomly selected employers located in a primarily black district (Roxbury) of one of the cities (Boston) in the NBER survey. The purpose of our interviews was to determine how employers react to different work histories of youths. If employers place great weight on incidences of nonemployment in choosing whom to hire, the finding that many incidences of nonemployment hurt a youth's chances of finding a job will be supported and traceable to these employers. If employers place little or no weight on the duration of the youth's last spell of nonemployment, our weak rejection of duration dependence of nonemployment will also receive support. On the other hand, if employers state that they ignore incidences of nonemployment but tend to reject job applications from youths with long spells of nonemployment, our finding will be in doubt.

Table 2.8 lists the questions we asked, and the number and percentage of employers giving various responses. Our first question concerned the candidate characteristics in which employers were

most interested. As can be seen, there were essentially no skill requirements for the types of jobs of concern, and employers were primarily interested in the youths' being "good workers" in terms of dependability, namely, showing up, making an honest effort, looking presentable, and so on. Before asking about the weight placed on different aspects of a youth's work history, we asked the employers if they did in fact ask about past work records. Eighty-three percent answered "yes," and we limited the remaining questions to those employers.

The important result from our interviews, shown in table 2.8, is that most employers did regard "a casual work history with many jobs" as a negative indicator of the youths' work talents, but they did *not* regard a long period of nonemployment as being a "strike" against the youth. Sentiments expressed about youths with spotty work records ranged from "He wouldn't be working for me" to "I'm not looking for headaches." Of the employers who judged youths on their work records, all but one stated they would *never* hire a youth with many spells of unemployment or many different jobs. Managers claimed that their previous experience had indicated to them that youths with spotty work records had high absenteeism and turnover rates, because the youths were planning to work for just a short while to pick up spending money. Finally, we also asked employers if their attitudes toward youths depended on the age of the youths. Eleven employers said they would be more biased against a youth with a spotty work record if he were older than if he were younger because they believed that older youths who exhibited such work records were simply not interested in working. This last response suggests that incidence dependence interacts with age to screen out older workers who get caught in a recurring pattern of short-term jobs.

The results of the employer survey thus confirm our statistical finding about the incidence dependence and lack of duration dependence of nonemployment. At the same time, however, the reasons offered by employers for their hiring criterion—that workers with spotty work records are poor workers—suggest two possible reasons why the incidence dependence result "passed" our heterogeneity tests. One possibility is that employers engage in statistical discrimination,[5] shying away from youths with spotty records (even when the youths are potentially good workers) because of a perceived correlation between spotty records and bad personal work characteristics. The other possibility, which leads us into an entirely different point of view, is that the omitted personal attributes of youths change over time. More specifically, when a youth has numerous incidences of nonemployment, he is in fact not "really interested" in working, whereas when the same youth has few incidences, he in fact is likely to be a good employee.

Table 2.8 **Employer Selection Criteria and the Incidence of Nonemployment Effects**

Question	Answer	Responses (Out of 18)	Percentage of Responses
1. When you interview a candidate for employment, what characteristics are you most interested in?			
	Cleanliness, neatness, honesty, dependability, attitudes	11	61%
	Past education, maturity	9	50%
	Education	7	39%
	Graduation from high school	4	22%
2. Do you ask about a youth's past work record?	Yes	15	83%
3. Is it a strike against the youth if he has been out of work for a long period of time before applying for a job?			
	No	13	72%
	Yes, less than one year	2	11%
	Yes, greater than one year	3	17%
4. Is it a strike against the youth if he has had a casual work history with many jobs and many periods of employment?	Yes	14	78%
5. Are your attitudes toward a youth who exhibits a poor work record different if the youth is 18 or 19 from your attitudes if he were in his early twenties?	Yes	14	78%

Source: Black Youth Employers Survey, 18 Roxbury employers. See appendix C.

From this perspective, the incidences reflect potentially changeable attitudes rather than permanent personal characteristics.

2.4.2 The Employment-Nonemployment Transition

To examine the finding of a relative lack of duration dependence in employment on ensuing employment, we have explored the hypothesis that a large part of the problem results from the types of jobs held by the inner-city black youths. If these are more "dead end" jobs, with little opportunity for learning or advancement, than those of other youths, the lack of duration dependence may be attributable to the jobs themselves. Nevertheless the question why the black youths are more likely to end up in those jobs would still remain unanswered.

Table 2.9 shows the percentage of black youths in the NBER survey employed in various occupations, by age. The table shows that most of the black youths were in low-level occupations with relatively flat age-earnings profiles; a bare 5 percent were professionals or managers and just over 15 percent were in any white-collar job, whereas some 40 percent were in laborer or service jobs. That the jobs held by black youths are not the sorts of jobs to induce extended periods of employment is supported by answers to NBER survey questions regarding the nature of the work performed and the proportions who looked upon their jobs as having long-term career possibilities. As illustrated in table 2.10, relatively few inner-city youths worked in jobs that required considerable education or on-the-job training. As a result, few regarded their current jobs as having long-term possibilities and few intended to stay for an extended period. We therefore conclude that the lack of duration dependence in employment for black youths is real and due in part to the types of jobs held by these youths.

2.4.3 Wage Consequences of Initial Nonemployment

The seriousness with which one views youth nonemployment depends in large measure on whether one believes youth nonemployment creates long-term economic problems for youths or whether one believes the youths' problems diminish rapidly with age. We have seen that the increase in employment is modest with age over a short span of years and that at least one aspect of youth nonemployment has adverse consequences for the future, but we have not examined the overall consequences of nonemployment on the youths' wages. A priori, one expects wages to be adversely affected by nonemployment at this stage of youths' work life. We would expect wages to rise sharply early in the work life, so that youths who miss early work experience would suffer substantially in terms of wages, at least in the short run.

Table 2.11 presents estimates of the impact of work experience on wages in two stages of the NLS survey that enabled across-year com-

Table 2.9 **Types of Jobs Held by Black Out-of-School Youths**

Occupation	Percentage Distribution of Inner-City Black Youths, by Age		
	16–17	18–19	20–24
1. Professional, Technical and Kindred Workers	4.55	1.20	3.16
2. Managers and Administrators, except Farm	0.0	0.80	2.21
3. Sales Workers	5.68	3.20	1.90
4. Clerical and Kindred	7.95	13.60	13.27
5. Crafts and Kindred	10.23	13.60	14.53
6. Operatives, except Transport	7.96	14.00	15.96
7. Transport Equipment Operatives	2.27	2.00	6.00
8. Nonfarm Laborers	18.18	15.60	12.48
9. Private Household Workers	1.14	0.0	0.16
10. All Other Service Workers	42.04	36.00	30.33
Sample Size:	88	250	633

parisons. The table first records the results of regressions of log wages on incidences and duration of nonemployment. Second, it presents the results of regressions of first differences in wages on first differences in the same independent variables, thereby contrasting the positions of the *same* youth over time. Although the level regressions do not isolate causality, they do enable us to determine whether nonemployment is associated with low wages for the *same* youths, distinguishing the possible extent to which a specific set of youths bear the brunt of economic distress.

The level regressions in table 2.11 indeed show that youths with less work experience have lower wages later on in life. The second set of regressions eliminate heterogeneity effects by a first-differencing procedure. Although this set shows smaller effects than those in the first set, a relationship between wages and work experience for blacks is

Table 2.10 **Perceived Characteristics of the Jobs Held by Inner-City Black Youths**

Perceived Characteristic	Percentage Responding
1. This level of education needed for their job:	
Less then high school	32.2
High school graduate	14.1
Some college	1.7
College degree or more	2.1
2. Time for average person to do job:	
Less then two weeks	43.9
Two weeks to one month	22.7
One to two months	16.8
Two to six months	9.4
Six + months	7.3
3. Regard current job/ most recent job as having long-term career possibilities:	
Long-term	24.8
Temporary	71.2
Don't know	4.0
4. Intend to stay working on job for greater or equal to:	
Less than 1 month	2.3
One month	16.4
Three months	15.9
Six months	9.7
One year	55.7

Source: NBER survey. Sample size limited to out-of-school youths who answered the questions. Sample sizes ranged from 1,540 to 1,668.

still evident. (The results for whites are contrary.) We therefore conclude that nonemployment may breed low wages as well as future nonemployment among black youths.

2.5 Conclusion

This chapter has examined the problem of black youth nonemployment from the perspective of the dynamic transition between employment and nonemployment. Subject to problems of model specification and of survey differences that make comparisons difficult, there are four substantive findings.

Table 2.11 Effect of Nonemployment on the Wages of NLS Youth

	Dependent Variable		
	Log Wages_{t+1}		$\left(\text{Log Wages}_{t-2}\right) - \left(\text{Log Wages}_{t+1}\right)$
NLS Blacks			
1. Number of incidences of nonwork for those who worked period t	−.09 (.05)	1. Change in number of incidences t to $t+1$	−.07 (.05)
2. Average duration of nonemployment spell in period t	−.008 (.006)	2. Change in duration t to $t+1$	−.008 (.006)
NLS Whites			
1. Number of incidences of nonwork for those who worked period t	−.03 (.03)	1. Change in number	.04 (.02)
2. Average duration of nonemployment spell in period t	−.004 (.004)		−.002 (.003)

Note: The controls are personal characteristics, as in the previous tables. The sample sizes are 394 for NLS whites and 122 for NLS blacks.

First, the "normal" increase in the rate of employment among youths as they age is severely attenuated for inner-city black youths, especially those who have dropped out of high school. Overall, the increase in the rate of employment is less for black youths than for white youths, and it is sufficiently modest to suggest that the problem of joblessness will not disappear as the youths age.

Second, much of the difference in the rates of employment and nonemployment between inner-city blacks and other youths is attributable to shorter spells of employment and longer spells of nonemployment and to the large fraction of inner-city black youths who are never employed. When all black and white youths are compared, the duration

of nonemployment and employment is the key component of racial differences in employment experiences.

Third, the principal difference in transition probabilities between inner-city black, all black, and all white youths lies in the transition from nonemployment to employment, rather than that from employment to nonemployment. In part, this difference seems to be the result of the fact that inner-city black youths are more adversely affected by a spotty work record, particularly past incidences of nonemployment, while other youths are not so affected. We have traced this difference to the employer hiring criterion.

Finally, whereas all black and white youths appear to have reduced chances of moving from employment to nonemployment the longer they have been employed, inner-city black youths do not appear to exhibit such duration dependence. This result is found in most, though not all, of our statistical tests, and it is attributable to the dead-end types of jobs inner-city blacks obtain.

All told, the evidence in the paper suggests that high nonemployment among inner-city black youths is likely to extract a significant cost in their future careers, because the dynamics of their transition to work are notably worse than those of other groups of youths.

Appendix A
Calculations of Time Lines

NBER Time Line

The time line is composed of point estimates of the employment state of individuals at each biweekly point. If on the first of the month an individual was working, a one was recorded; if the individual was nonemployed, a zero was recorded, and similarly for the fifteenth of every month. The time line originally comprised 13 months; however, many interviewers failed to report the last biweekly interval. For this paper, that last interval is deleted and a time line with 25 biweekly intervals is used.

NLS Time Line

The time line consists of 75 intervals, which together make up a three-year biweekly work history of employment and nonemployment for each worker. The work status for each period is derived from the

yearly survey question regarding periods since the last interview (since January 1, 1978 for the 1979 survey) in which the respondent was not working or in the military. The question is asked of those workers who are at least 16 years of age and who earlier specified that they had not worked continuously since the last interview.

The 1979 question allows for the coding of six periods of no work, with the beginning and end of each period delineated by a standard week-numbering scheme. The time period covered by this question is January 1, 1978 to the date of the 1979 interview.

The 1980 question is different from the previous year in the following ways: it allows for the coding of only five periods; the beginning and end of each period is identified by month, day, and year; and the time period covered is from the previous year's interview to that year's interview. The 1981 question follows the same format.

The mechanics of deriving the employment status for each period from the questionnaire responses are as follows. Using the 1979 questionnaire responses, every other week starting with the first week in January is compared to the periods of nonemployment. If the week falls within a specified period, then it is coded appropriately. Such is the procedure until the week of the 1980 interview. Because of the increased specificity of that year's question, semimonthly rather than biweekly intervals are examined. Specific month-day responses for beginning and ending dates of periods of nonemployment are rounded to the half-month; and beginning with the rounded interview date, subsequent half-month intervals are compared to the endpoints of periods of nonemployment.

Since the 1981 question mirrors the 1980 question, the above procedure is confirmed after the 1980 interview until December 1980, at which time the desired three-year time interval is covered.

Two caveats should be mentioned in regard to this time line. First, because the questionnaire limits the number of periods of unemployment to six in 1979 and five in 1980 and 1981, respondents with greater numbers of periods of nonemployment are forced to understate the extent of their nonemployment. The effect of this limitation should be small, however, since only 15 respondents had at least six spells of nonemployment in 1979, while in 1980 and in 1981 8 had at least five spells of nonemployment.

Second, the mechanics of the time line are such that any nonemployment spell less than two weeks in duration (spells must be at least one week in duration to be coded by a respondent) is treated as if it is in fact two weeks in length. This procedure is sound, since all spells of nonemployment are picked up; however, calculations of lengths of spells are biased upward.

Appendix B
Tests of Table 2.7

Chamberlain Duration Dependence

The model proposed by Chamberlain (1982) tests whether an individual's history prior to the current spell, such as the time spent in the state, affects the distribution of time remaining in that state. The model allows each individual to have his own individual intercept and tests whether the distribution follows a Markov model. First, determine the states of each individual at preselected points during the year. Then, run through the states of each individual at these preassigned points and record whether he was employed (E) or nonemployed (N) at each particular point during the year. Finally, count and compare the number of sequences such as (E, N, E, N, N, N) with (E, N, N, E, N, N) and determine which occurs more often. Intuitively, if the first sequence is more probable than the second, we can infer that a person is either unemployed for a short period of time or unemployed for a much longer period of time. Thus, the individual does not have an equal probability of escaping nonemployment each half month. He is more likely to escape at the first point sample than at the second, and he therefore exhibits negative state dependence.

Equally spaced intervals were tested. For the NBER sample, points were selected at all possible two-, four-, six-, and then eight-week intervals. Then, the time line was searched for any of the eight patterns and the number found was recorded. For example, for the two-week intervals, states were matched to the eight patterns for weeks 2, 4, 6, 8, 10, and 12 and then weeks 4, 6, 8, 10, 12, 14, and so on until weeks 42, 44, 46, 48, 50, and 52. This process was repeated for 4-, 6-, and then 8-week intervals. The 8-week intervals compared patterns for weeks 2, 10, 18, 26, 34, and 42 and then for weeks 4, 12, 20, 28, 36, 44, and on until weeks 12, 20, 28, 36, 44, and 52.

For the NLS, equally spaced intervals were divided into three groups. The first included 2-, 4-, 6-, and 8-week intervals; the second, 10-, 12-, 14-, and 16-week intervals; and the third, 18-, 20-, 22-, and 24-week intervals.

Table 2.A.1 presents the results of the counts for the eight sequences that tell something about duration dependence. The first four sequences test duration dependence of nonemployment and the last four test duration dependence of employment. Each of the pairs of probabilities for the four tests can be used to estimate a duration-dependence parameter u. If u is one-half, which implies an equal probability for each of the two sequences in each pair, then duration dependence is rejected.

If u is significantly greater than one-half, then duration dependence is exhibited. For each of the two tests of nonemployment and employment duration dependence, two estimates are generated.

Duration dependence of employment for NLS whites and NLS blacks is the only significant result obtained (the estimate of u was significantly greater than .5). NBER blacks did not exhibit duration dependence of

Table 2.A.1 Chamberlain Duration Tests

Sequence Studied	Number of Intervening Biweekly Spells (Counts) 1–4	5–8	9–12	Total	u	χ^2	Significance
			NBER Blacks				
Nonemployment							
ENENNN vs.	19						
ENNENN	17				.52	.11	No
NNNENE vs.	29						
NNENNE	21				.58	1.28	No
Employment							
NENEEE vs.	18						
NEENEE	22				.45	—	No
EEENEN vs.	27						
EENEEN	29				.48	—	No
			NLS Blacks				
Nonemployment							
ENENNN vs.	80	235	140	455			
ENNENN	85	208	134	427	.52	.89	No
NNNENE vs.	127	185	108	420			
NNENNE	100	254	157	511	.45	—	No
Employment							
NENEEE vs.	176	426	490	1092			
NEENEE	146	392	244	846	.56	31.23	.001
EEENEN vs.	116	422	299	837			
EENEEN	139	351	289	779	.52	2.08	No
			NLS Whites				
Nonemployment							
ENENNN vs.	35	101	140	276			
ENNENN	34	70	134	238	.54	2.81	No
NNNENE vs.	57	126	108	291			
NNENNE	53	149	157	369	.44	—	No
Employment							
NENEEE vs.	68	179	490	737			
NEENEE	41	150	244	435	.63	77.82	.001
EEENEN vs.	34	128	299	466			
EENEEN	43	106	289	438	.52	.868	No

Note: u = duration dependence parameter.

employment, although the NBER sample size is admittedly small. No group exhibited significant duration dependence of nonemployment. Peculiarly, all three samples exhibited negative duration dependence of nonemployment.

Counting Test of Incidence

Incidence dependence of employment implies that an intervening spell of nonemployment will shorten the second spell of employment relative to the first; and similarly, incidence dependence of employment implies that an intervening spell of employment will shorten a second spell of nonemployment relative to the first. The counting test merely registers whether the second spell is longer or shorter than the first spell after the intervening spell. If the second spell is shorter than the first, incidence dependence is present.

A problem that arises in both the NBER survey and the NLS is that if individuals have uncompleted spells in a window of time, the interview date is placed adjunct to their work histories. Thus, there are four cases: (1) both spells are completed; (2) both spells are uncompleted; (3) the first spell is completed and the second is uncompleted; and (4) the first spell is uncompleted and the second, completed.

We use only cases (1) and (2) because of potential biases in the other two cases. Consider the fourth case, when the second spell is completed and the first is uncompleted. In that situation any finding that the second spell is shorter is valid; the first spell would only be larger than registered, but that is not the case if the second spell is larger. Conversely, in the third case table 2.A.2 gives the results of all counts.

From the table of counts, only the NBER sample displayed incidence dependence. The second spells were consistently shorter than the first. In both samples it is unlikely that the bias would change the results: The NLS sample displayed no evidence of incidence dependence, whereas the NBER sample displayed very significant evidence. The χ^2 for nonemployment dependence is 12.7, while the χ^2 for employment dependence is 8.8.

Regression Test

A test for the incidence dependence of nonemployment is a test of whether an intervening spell of nonemployment affects the mean duration of the subsequent spell of employment. Information on the length of a previous spell of employment and on a subsequent spell of employment after an intervening spell of nonemployment allows unbiased estimation. The previous spell length through the first-differencing tech-

Table 2.A.2 Incidence Dependence Counting Test

First Spell/ Second Spell	Second Spell Shorter Than First Spell	Length of Second Spell Equals Length of First Spell	Second Spell Longer Than First Spell
	NLS Whites, Nonemployment Incidence Dependence		
C/C	36	0	47
U/U	136	22	120
C/U	58	3	53
	NLS Whites, Employment Incidence Dependence		
C/C	13	0	10
U/U	143	28	157
C/U	141	4	43
	NLS Blacks, Nonemployment Incidence Dependence		
C/C	10	0	10
U/U	55	7	58
C/U	26	1	11
	NLS Blacks, Employment Incidence Dependence		
C/C	10	0	7
U/U	48	12	57
C/U	15	2	20
	NBER Blacks, Nonemployment Incidence Dependence		
C/C	38	3	14
U/U	18	10	11
C/U	25	4	15
	NBER Blacks, Employment Incidence Dependence		
C/C	84	9	50
U/U	11	3	8
C/U	25	7	18

Note: C = completed spell; U = uncompleted spell.

nique accounts for any unobserved heterogeneity. Specifically, the following model is estimated as a test for mean incidence dependence:

$$S_1 = a_i + BX_i + U_1 + e_1$$
$$S_2 = a_i + BX_i + U_2 + e_2, \tag{A1}$$

where $U_1 = 0$ before the intervening spell of nonemployment and $U_2 = 1$ after the intervening spell of nonemployment. By the first-differencing technique:

$$S_2 - S_1 = (a_i - a_i) + (B - B)X_i + (U_2 - U_1) + e_2 - e_1 \tag{A2}$$

and yields the expected value:

$$S_2 - S_1 = 1 + v, \tag{A3}$$

where S_1 = the length of the first spell of employment and S_2 = the length of the second spell of employment.

In this model a test of the mean incidence dependence of nonemployment is a test of whether the difference in the lengths of spells of employment after an intervening spell and the length of an employment spell before the intervening spell are significantly different from zero. A parameter estimate is obtained by regressing this difference on a column of 1s (ones). The criteria for selection into this test are two completed employment spells and an intervening nonemployment spell. Again, the first-differencing methodology factors away individual heterogeneity. A symmetrical test is used as a test of the restricted model for general spell dependence of employment. Specifically, the following model is tested for mean general spell dependence:

$$\text{(A4)} \qquad \begin{aligned} S_1 &= a_i + BX_i + U_1 + L_1 + e_1 \\ S_2 &= a_i + BX_i + U_2 + L_2 + e_2. \end{aligned}$$

In addition to equation A2, $L_1 = 0$, and L_2 = the length of the intervening spell of nonemployment. By the first-differencing technique:

$$\text{(A5)} \qquad \begin{aligned} S_2 - S_1 = (a_i - a_i) + (B - B)X_i \\ + (U_2 - U_1) + (L_2 - L_1) + (e_2 - e_1) \end{aligned}$$

and yields the expected value:

$$\text{(A6)} \qquad S_2 - S_1 - 1 + (L_2) + v, \text{ where } v = 1_2 - 1_1.$$

The coefficient results for both tests are presented below; standard errors are in parentheses. Again, the only individuals included were those with both spells uncompleted or both completed.

S_2 Coefficient and Standard Error (in parentheses) for Difference in Length of Spells

Employment Incidence		
NBER blacks	−3.01	(.67)
NLS whites	.012	(.86)
NLS blacks	3.38	(2.22)
Nonemployment Incidence		
NBER blacks	−3.6	(.64)
NLS whites	2.56	(.65)
NLS blacks	2.27	(1.92)

S_2 Coefficient and Standard Error for the Effect of Intervening Spell on Difference in Length of Spells

	Constant		Length of Intervening Spells	
Employment Incidence				
NBER blacks	−3.74	(1.04)	.0166	(.15)
NLS whites	−.08	(1.14)	.009	(.08)
NLS blacks	3.06	(3.4)	.028	(.22)
Nonemployment Incidence				
NBER blacks	−4.49	(1.25)	.201	(.14)
NLS whites	3.16	(2.34)	−.080	(.22)
NLS blacks	2.13	(2.70)	.017	(.22)

A more general test of incidence dependence tests not only whether the incidence of an intervening spell affects the length of a second spell, but also whether the length of the intervening spell affects the length of the second spell. The test proposed is similar to the test for mean incidence dependence, but the difference in the length of a spell before and after an intervening spell is conditional upon both the incidence of an intervening spell and the length of that nonemployment spell.

Heckman-Borjas Incidence Test

To perform the Heckman-Borjas test, a semimonthly time line is calculated that indicates whether a youth is employed or nonemployed for every 15-day interval. Consider the first six intervals, or three months, of the time line. Now consider time as counting on a work clock only if the time is spent in the employment state. Thus, time spent in a nonemployment state is designated as a point interruption of employment time. Consider the case of 24 periods and three-month intervals. For the 24 periods of the sample, employment time is divided into as many three-month intervals as are possible. Thus, a worker who is employed for the entire year will have four employment intervals, while a worker with at least one employment interruption will have from one to three employment intervals. For each three-month interval, the number and the location of the nonemployment interruptions are recorded. Then, all spells with one nonemployment interruption are considered and the location of that nonemployment interruption is recorded as having occurred after the first and before the seventh interval of employment. In the absence of mean incidence dependence of nonemployment, the distribution of interruptions should be uniform. Positive incidence dependence is indicated if there are more interruptions toward the end of the three-month interval, and negative incidence

dependence is indicated if there are more interruptions toward the beginning of the interval.

Intuitively, if nonemployment spells breed more nonemployment spells, an averaging over all spells should yield more interruptions toward the end of the intervals than at the beginning of the intervals. This technique is a first-difference technique in disguise, because the average length of an uninterrupted spell of employment before the first interruption is compared to the length of the employment spells after the interruption. The test for incidence dependence is again symmetrical.

The testing procedure is followed for interruptions of employment and nonemployment for various subsets of the data. The Kolmogorov-Smirnov (KS) test is used instead of the chi-square. The KS tests the cumulative distribution rather than the probability density function, and thus it has more predictive power in this analysis.

The decision to use three-month intervals was aribtrary. The effect of changing the length of the statistical interval is to select a slightly different sample to be tested each time. As the length of employment time composing one interval shortens, the youths with longer lengths of employment time who were deleted because they had two spells of unemployment in that time interval are now more likely to be included.

Table 2.A.3 presents the test of incidence dependence of nonemployment and employment. The table shows that in the NLS both employment and nonemployment incidence can be rejected, while the youths in the NBER survey exhibited both employment and nonemployment incidences.

Appendix C
Survey of Inner-City Employers

In order to test the impact of employers' screening and rejection of black youths with poor work records, John Ballen conducted a Survey of Inner-City Black Youth Employers. Telephone interviews were conducted with a randomly selected sample of employers in the Roxbury area, which comprises the Boston census tracts covered by the NBER Survey of Inner-City Black Youth. The criteria for inclusion in the sample were a Yellow Pages telephone directory listing and a Roxbury telephone exchange. All interviewees who began the survey completed it. Furthermore, over 75 percent of the managers approached agreed to answer the questionnaire. Eighteen interviews were completed with managers in charge of hiring at restaurants, grocery stores, movers, a machine shop, a food importer, a light-industry factory, and other work

Table 2.A.3 **Employment and Nonemployment Incidence Tests**

	Employment Incidence (N,E,N)					Nonemployment Incidence (E,N,E)				
Length of Interval	6	7	8	9	15	6	7	8	9	15
					NBER Blacks					
1	16	10	10	5	0	10	9	3	4	0
2	22	21	13	11	3	15	3	6	5	0
3	39	26	21	12	4	13	11	8	5	0
4	29	23	10	11	2	24	21	13	9	1
5	38	20	13	15	5	17	17	7	8	2
6	30	31	19	17	7	31	23	20	14	4
7		31	23		7		23	14	14	3
8			20	16	4			18	14	3
9				25	10				11	3
10					9					6
11					9					6
12					4					7
13					9					4
14					6					8
15					10					6
KS	1.5	1.3	1.4	1.68	1.64	1.6	2.1	1.98	1.74	2.18
a	.025	.05	.05	.01	.01	.02	.001	.001	.001	.001

1	26	8	5	1	15	9	5	2
2	19	8	4	1	29	20	10	3
3	15	9	8	0	31	17	9	4
4	26	18	8	0	18	8	7	2
5	19	11	5	2	30	22	13	4
6	25	12	5	1	19	16	9	0
7		12	12	5		13	9	3
8		11	7	1		14	9	4
9		16	9	3		19	12	2
10			9	1			6	3
11			8	5			11	1
12			7	1			9	1
13				2				1
14				1				1
15				4				1
16				1				1
17				1				3
18				2				3
19				2				1
20				3				1
21				2				2
22				2				2
23				0				2
24				4				4
KS	12	1.02	.93	.56	.085	.59	.51	.11
a	>.2	>2	>.2	>.2	>.02	>.2	>.2	>.2

Table 2.A.3 (continued)

	Employment Incidence (N,E,N)					Nonemployment Incidence (E,N,E)				
Length of Interval	6	7	8	9	15	6	7	8	9	15
					NLS Whites					
1		58	26	18	3		86	32	33	7
2		42	18	16	4		83	40	37	10
3		52	25	15	3		87	46	31	6
4		52	37	18	4		86	61	32	11
5		60	22	11	0		77	48	27	14
6		70	34	16	3		79	42	29	3
7			19	23	4			53	37	11
8			28	11	1			52	31	12
9			36	17	4			57	34	10
10				16	1				26	7
11				14	0				27	10
12				21	1				40	10
13					11					11
14					2					11
15					2					7
16					1					8
17					2					5
18					5					11
19					7					5
20					4					5
21					5					8
22					2					9
23					2					8
24					4					12
KS		1.02	.78	.29	1.12		0	1.25	.39	.23
a		>.20	>.20	>.20	>.15		>.2	.10	>.2	>.20

establishments in Roxbury. In all but two of the establishments surveyed, a majority of the workers were black.

The telephone interviews sought to determine the characteristics of youths that employers queried to determine which black youths they would hire. The interview questions were phrased in an open-ended manner, and the interviews were conducted as a probing discussion. The first question was: "When you interview a candidate for employment, what characteristics are you most interested in?" and the questions followed in the order given in table 2.7.

Notes

1. These data are from the U.S. Department of Labor (1981, p. 198).
2. CPS figures do not support either of these inferences. See data in U.S. Department of Labor (1981, p. 125).
3. See Blau and Kahn (1981).
4. See Freeman (1984).
5. See Aigner and Cain (1977).

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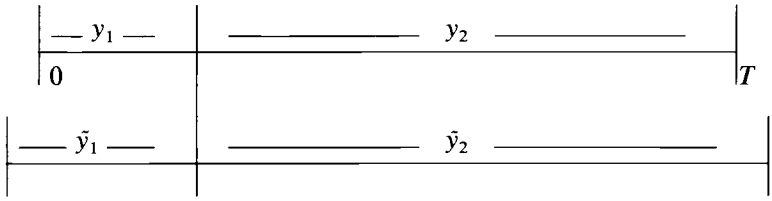
Comment

Gary Chamberlain

Ballen and Freeman use incidence-dependence counting tests to examine incomplete and complete spells of nonemployment. This comment sets out some of the econometrics of these tests. Start with the one-state case in which spells of type 1 are denoted y_1, spells of type 2 are denoted y_2, and completed spells are denoted $\tilde{y}_1$ and $\tilde{y}_2$.



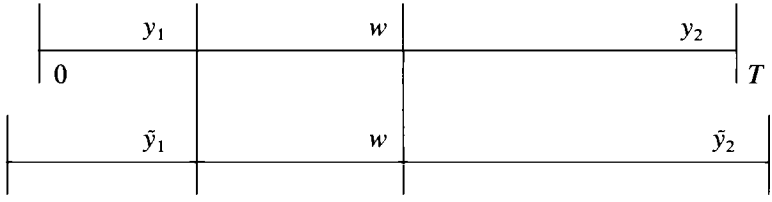
If $\tilde{y}_1, \tilde{y}_2$ i.i.d. $EXP(\lambda)$, then $y_1 \sim EXP(\lambda)$ and the density of y_1 conditioned on two uncompleted spells is:

$$f(y_1|I,I) = \frac{f(y_1)G(T-y_1)}{\int_0^T f(u)G(T-u)du} = \frac{\lambda e^{-\lambda y_1} e^{-\lambda(T-y_1)}}{\int_0^T \lambda e^{-\lambda u} e^{-\lambda(T-u)} du}$$

$$= \frac{e^{-\lambda T}}{e^{-\lambda T}\int_0^T du} = \frac{1}{T},$$

such that y_1 is uniformly distributed on $[0, T]$.

This formulation extends to the two-state case—an incomplete spell of type 1, a complete spell of type 2, and then an incomplete spell of type 1—as follows:



and

$$f(y_1,w|I,C,I) = \frac{\lambda e^{-\lambda y_1} g(w) e^{-\lambda(T-y_1-w)}}{\int_{u=0}^{T} \left(\int_{v=0}^{T-u} \lambda e^{-\lambda u}\, g(v) e^{-\lambda(T-u-v)}\, dv\right) du}$$

$$= \frac{g(w)e^{-\lambda(T-w)}}{\int_{u=0}^{T} \left[\int_{v=0}^{T-u} g(v)e^{-\lambda(T-v)}\, dv\right] du} = Ke^{\lambda w} g(w).$$

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The marginal density of y_1 is $f(y_1|I,C,I) = K\int_0^{T-y_1} e^{\lambda w}\, g(w)dw$. Now note that $y_2 = T-w-y_1$ and obtain the (y_2,w) density:

$$f(y_2, w|I,C,I) = Ke^{\lambda w}\, g(w) \qquad (0 \leq y_2 \leq T,\ 0 \leq w \leq T-y_2).$$

The marginal density of y_2 is therefore $f(y_2|I,C,I) = K\int_0^{T-y_2} e^{\lambda w}\, g(w)dw$. Hence, y_1 and y_2 do have the same distribution, and comparing the means of these uncompleted spells is justified. But since we need y_1 and y_2 to have exponential distributions to yield this result (the distribution of the intervening spell is irrelevant), we are jointly testing for incidence dependence and duration dependence. This is true of all these tests. Thus, all the counting tests are joint tests for both forms of dependence.