



# National Longitudinal Surveys



U.S. Department of Labor  
Bureau of Labor Statistics

## Discussion Paper

**Transitions from School to Work:  
A Survey of Research Using the  
National Longitudinal Surveys**

Audrey Light

April 1994

Report: NLS 94-18

The National Longitudinal Surveys (NLS) program supports many studies designed to increase understanding of the labor market and methods of data collection. The *Discussion Papers* series incorporates some of the research coming out of the program. Many of the papers in this series have been delivered as final reports commissioned as part of an extramural grant program, under which grants are awarded through a competitive process. The series is intended to circulate the findings to interested readers within and outside the Bureau of Labor Statistics.

Persons interested in obtaining a copy of any Discussion Paper, other NLS reports, or general information about the NLS program and surveys should contact the Bureau of Labor Statistics, Office of Economic Research, Washington, DC 20212-0001, or call (202) 606-7405.

Material in this publication is in the public domain and, with appropriate credit, may be reproduced without permission.

Opinions and conclusions expressed in this document are those of the author(s) and do not necessarily represent an official position of the Bureau of Labor Statistics or the U.S. Department of Labor.

**Transitions from School to Work:  
A Survey of Research Using the National Longitudinal Surveys**

Audrey Light  
The Ohio State University

April 1994

This paper was funded by the U.S. Department of Labor, Bureau of Labor Statistics under Contract Number J-9-J-0-0065. Opinions stated in this paper do not necessarily represent the official position or policy of the U.S. Department of Labor.

---

## PREFACE

Data in this report are from the National Longitudinal Surveys (NLS) which are sponsored by the Bureau of Labor Statistics (BLS). The Bureau contracts with the Center for Human Resource Research of The Ohio State University to manage the surveys and provided user services. The NLS were begun in the mid-1960's with the drawing of four samples: Young Men who were 14-24 years old as of April 1, 1966, Young Women who were 14-24 years old as of January 1, 1968, Older Men who were 45-59 years old as of April 1, 1966, and Mature Women who were 30-44 years old as of April 1, 1967. Each sample originally had about 5,000 individuals with oversamples of blacks. In the early 1980's, the Young Men and Older Men surveys were discontinued. The two women's surveys continue and are currently collected every 2 years. The Bureau of the Census collects the data for BLS.

In 1979, a new cohort was begun with a sample of over 12,000 young men and women who were 14-21 years of age as of January 1, 1979. It includes oversamples of blacks, Hispanics, economically disadvantaged whites, and youth in the military. The military oversample was discontinued after the 1984 survey, and the economically disadvantaged white oversample was discontinued after the 1990 survey. This survey is called the Youth cohort, and the cohort members have been interviewed every year since it began. The data collection for the Youth cohort is undertaken by NORC (National Opinion Research Center), a social science research center affiliated with the University of Chicago.

For a detailed explanation of the NLS, see *NLS Handbook 1994* (Center for Human Resource Research, The Ohio State University). For information about the NLS, write to National Longitudinal Surveys, Bureau of Labor Statistics, Office of Research and Evaluation, 2 Massachusetts Ave., NE, Room 4915, Washington, DC 20212-0001, call (202) 606-7405, or Internet JAIN\_R@ORE.PSB.BLS.GOV.

## TABLE OF CONTENTS

	<u>Page Number</u>
1. INTRODUCTION	1
2. WORK WHILE IN SCHOOL	4
A. Prevalence of work while in school	4
B. Effects of work while in school on educational and labor market outcomes	5
3. LEARNING ON AND OFF THE JOB	10
A. Human capital earnings functions	12
B. Formal private sector training	17
C. Reenrolling in school	20
D. High school equivalency exams	23
4. VOLUNTARY JOB SEARCH AND MOBILITY	25
A. Determinants of job mobility	26
B. Effects of job mobility on wages	28
5. UNEMPLOYMENT AND NONEMPLOYMENT	31
A. Search methods	32
B. Effects of unemployment on wages	34
C. Persistence in unemployment	35
6. CONCLUDING REMARKS	39
REFERENCES	41

## 1. INTRODUCTION

The person who completes his or her desired level of schooling and immediately begins a career of continuous employment is not representative of the entire youth population. For many young people, the transition from school to work is far less “clean.” Consider the following aspects of the school-to-work transition:

- Students often hold jobs while they attend school. These jobs are not always confined to vacation periods and, as a result, many students gain a substantial amount of work experience. In-school work experience is likely to affect both educational outcomes and subsequent labor market behavior, so researchers who analyze school-to-work transitions must acknowledge that work and school are not mutually exclusive.
- The distinction between school and work is blurred further when young workers participate in informal and formal job training programs, and especially when they return to degree-granting institutions for additional study. We must recognize that school-to-work transitions are not necessarily “once and for all” if we are to understand fully the relationship between skill acquisition and tangible measures of labor market success such as earnings.
- As a group, young people spend a surprising amount of time neither working nor attending school. In many cases, nonemployment reflects voluntary and, presumably, beneficial job search, but it can also reflect an inability to locate or maintain a satisfactory job. The amount of time a young person spends in nonemployment influences labor market outcomes, so it is important to understand why a durable employment relationship is often so elusive.

This report surveys the literature that uses data from the National Longitudinal Surveys of Labor Market Experience (NLS) to analyze transitions from school to work. The phenomena described above—work while in school, participation in job training, reenrollment in school, job search, and nonemployment—are given a considerable amount of attention in this literature. However, these phenomena are intrinsically related to such broader issues as skill acquisition (including the costs of and benefits to schooling), the determinants of earnings, and job mobility. As a result, the “school-to-work literature” encompasses all of these areas.

The NLS is ideally suited to the analysis of these issues because it surveys a large number of young people over an extended period of time. The NLS consists of five separate surveys, three of which focus on young people. The Young Men cohort began in 1966 with a sample of 5,225 men between the ages of 14 and 24, and interviewed them annually or biannually through 1981. The Young Women cohort began in 1968 with a sample of 5,159 women who were 14-24 years old, and is still in progress. The most recent interview occurred in 1993 and another is scheduled for 1995. The Youth cohort (commonly referred to as the NLSY) began in 1979 with 12,686 men and women who were 14-21 years old at the end of 1978. Annual interviews were conducted through 1993, with another scheduled for 1994 and biannual interviews planned for the future.<sup>1</sup>

During each annual or biannual interview, respondents are questioned extensively about their school, work, and nonemployment experiences. They report information on educational attainment, school enrollment, current jobs (*e.g.*, wages, hours worked, starting dates, industry, and occupation), jobs that began and ended since the last interview, and the amount of time spent unemployed and out of the labor force. The NLSY also collects information on formal and informal job training and job search methods. In addition, it relies heavily on an "event history" approach, which produces extremely detailed information. For example, the NLSY includes a week-by-week report on respondents' labor force status and hours of work and (starting in 1980) a month-by-month report on school enrollment status. In addition, the NLSY contains information on virtually every job and nonemployment spell that occurs during the observation period, including starting and ending dates. When used in conjunction with the information collected on demographic characteristics, family background, residential location, and other factors, the data from all three cohorts permit any number of "school-to-work" issues to be analyzed.

Another attractive feature of the NLS is that it permits racial comparisons. Blacks were oversampled in the Young Men and Young Women cohorts so that they represent about 30% of the original sample, with whites making up the rest.<sup>2</sup> The NLSY oversampled black, hispan-

---

<sup>1</sup>The remaining two cohorts are the Older Men and the Mature Women. The Older Men cohort began in 1966 with 5,020 men ages 45-59 and ended in 1983, with a follow-up interview in 1990. The Mature Women cohort began in 1967 with 5,083 women ages 30-44 and is still in progress. The respondents were last interviewed in 1992 and will be interviewed again in 1995 when the Mature Women and Young Women are combined into a single cohort. It should also be noted that many of the children of the NLSY respondents have been surveyed biannually since 1986.

<sup>2</sup>Respondents classified as non-white, non-black represent a negligible fraction of the original samples. Note that the term "original sample" is used because attrition caused the composition of the samples to change slightly over

ic, and economically disadvantaged non-black, non-hispanic youth. The original sample is 25% black, 16% hispanic, and 59% non-black, non-hispanic. Of the latter group, 27% are economically disadvantaged.

The rest of the report is organized as follows. Section 2 discusses the issue of work while in school. More than a dozen studies have used the NLS to assess the amount of work experience gained by students and relate it to various educational and labor market outcomes. The discussion in Section 2 describes the samples, work experience measures and outcomes used by each study and summarizes the general findings.

Section 3 summarizes the vast literature that examines early-career skill acquisition and its effect on labor market outcomes. The first subsection shows how NLS data have contributed to the estimation of "human capital earnings functions," which are used to assess the effects on earnings of schooling, work experience, and other indirect measures of skill. The next three subsections focus on specific methods used by young people to enhance their skills: formal job training programs, reenrollment in school, and the completion of high school equivalency exams. In all three areas, the literature examines young workers' reasons for obtaining the additional training and its effect on labor market outcomes.

Section 4 looks at the "good" type of job turnover that is often referred to as "job shopping" or "job matching." In recent years, researchers have devoted considerable attention to identifying the causes and wage consequences of early-career job turnover. The evidence largely supports the notion that young workers' labor market outcomes are as much a function of their ability to locate productive employment situations through search as their ability to invest in additional skills. NLS data have been used for a sizeable share of the research in this area, so an exhaustive survey is beyond the scope of this report. Instead, Section 4 summarizes a sample of studies that identify the determinants of early-career job mobility and assess its effects on wage growth.

Unfortunately, much of the job search that characterizes the early career does not correspond to "job shopping," but instead reflects the inability to locate or retain a job. An overview of this aspect of the school-to-work transition appears in Section 5. Section 6 contains concluding comments.

---

time.



## 2. WORK WHILE IN SCHOOL

### 2.A. Prevalence of work while in school

A large number of studies use the NLS to document the extent to which students combine work and school. This phenomenon can be measured a number of different ways: one can simply enumerate the number of students holding jobs at a point in time, or one can measure the intensity of work effort by looking at the hours worked per week or the weeks worked per year. Furthermore, researchers can focus on specific ages or grade levels, and on specific gender and/or race groups. Table 1 summarizes the approaches taken in 13 studies and reports a selection of findings with respect to the prevalence of work while in school. These findings can be summarized as follows:

- Students are more likely to work as they age or, alternatively, as they advance to higher grade levels. D'Amico (1984) and D'Amico and Baker (1984) report that 50% of white, male 10<sup>th</sup> grade students work a positive number of weeks during the school year, while 75% of 12<sup>th</sup> graders do so. Michael and Tuma (1984) report that 29% of 14 year old, white, male students work during the week prior to the 1979 interview (which typically occurred in April), while 53% of 17 year olds do so.<sup>3</sup> Light (1994) finds that 48% of white men hold jobs during their last observed exit from school, but the proportion falls to 38% for 12<sup>th</sup> graders and rises to 60% for those attending college or graduate school.
- Students are more likely to work part-time than full-time. Stephenson (1979, 1981a, 1982a) reports that 33% of white men work part-time during their last year of school, while only 29% work full-time. Stern and Nakata (1989) report that among high school seniors who work, the average work intensity is about 16 hours per week. Ruhm (1994) reports an average work intensity of 19 hours per week. Steel (1991) finds that 17 and 18 year olds average 25 hours a week, but about 30% of her sample consists of non-students. D'Amico (1984, 1986) and D'Amico and Baker (1984) measure work intensity in terms of weeks rather than hours and find that 75% of white men work some amount during 12<sup>th</sup> grade, but only 57% work more than half the school year. Ruhm (1994) finds that high school seniors work an average of just over half of all weeks during the academic year.

---

<sup>3</sup>Table 1 shows statistics reported by Michael and Tuma for all gender-race groups combined.

- In general, male students are slightly more likely than female students to work. Michael and Tuma (1984) find that among 14 year olds (of all race groups), 28% of males and only 22% of females work. Among 15 and 16 year olds, males continue to work in higher proportions than do females, but among 17 year olds females are slightly more likely than males to work (52% versus 49%).
- White students generally work more than nonwhite students. Steel (1991) examines 17 and 18 year olds (not all of whom are enrolled) and finds that, at a point in time, jobs are held by 58% of whites, 41% of Hispanics, and 35% of blacks. D'Amico and Baker (1984) report that among 12<sup>th</sup> grade males, whites work an average of 75% of the school year, while nonwhites average only 69%; similar statistics are reported for females. Furthermore, whites of both genders are more likely than nonwhites to work more than 20 hours per week and less likely to work only 1-10 hours.

## **2.B. Effects of work while in school on educational and labor market outcomes**

In addition to describing the amount of work experience gained by students, the studies listed in Table 1 also examine the relationships between in-school work experience and both educational and labor market outcomes. The majority of researchers working in this area are motivated by concern over youth unemployment rates that are often alarmingly high. As a result, they seek to learn whether students who work while in school have improved labor market outcomes, in which case programs that help students to find jobs would be warranted. This particular policy issue explains why the focus is more often on work experience gained by high school students than on work by more advanced students.<sup>4</sup>

It is not immediately obvious whether in-school work experience should be encouraged, for it bears both costs and benefits. Students benefit to the extent that they gain marketable skills or learn interviewing and job search techniques. Early work experience can also foster feelings of self reliance and instill good work habits. Furthermore, the money earned from student jobs is nonnegligible, and can be used for college or other worthwhile pursuits. However, holding

---

<sup>4</sup>Light (1994) asks whether estimated returns to experience and schooling are sensitive to the "type" of schooling and work experience controlled for, so her results are not discussed in this section.

a job while still in high school can also impose costs. Students who work must divert time and energy toward their jobs and away from studying, extra-curricular activities, and socializing. Quite naturally, the primary concerns are that they will leave school prematurely and/or suffer a decline in academic performance.<sup>5</sup>

To learn whether in-school work experience is, in fact, related to either academic progress or labor market success, researchers typically estimate simple, single-equation models in which a particular labor market or educational outcome forms the dependent variable. Measures of in-school work experience are included as explanatory variables, along with other controls. Among the studies listed in Table 1, the following outcomes are used as dependent variables:

#### **SCHOOLING OUTCOMES**

- Class rank in high school (D'Amico, 1984; D'Amico and Baker, 1984).
- Hours spent studying in high school (D'Amico, 1984; D'Amico and Baker, 1984).
- Free time in high school (D'Amico, 1984; D'Amico and Baker, 1984).
- Whether respondent finishes high school, college (D'Amico and Baker, 1984).
- Whether enrolled two years after age 14-17 (Michael and Tuma, 1984).
- Highest grade completed, 7-10 years later (Ruhm, 1994).
- Months enrolled 1-2 years after age 17-18 (Steel, 1991).

#### **LABOR MARKET OUTCOMES**

##### **Earnings and wages:**

- Hourly wage, reported 1 and 3 years after high school (D'Amico, 1986; D'Amico and Baker, 1984).
- Hourly wage, reported in 1970, which is a varying number of years after high school and college (Griliches, 1980).
- Hourly wage, reported 2 years after age 14-17 (Michael and Tuma, 1984).
- Hourly wage, reported 1-2 years after high school, college (Stephenson, 1979; 1981a; 1981b; 1982a).
- Hourly wage, reported 1-3 years after high school, averaged (Stern and Nakata, 1989).
- Hourly wage, weekly wage, annual earnings, reported 6-9 years after high school (Ruhm, 1994).

##### **Other job characteristics:**

- Duncan occupation index, 1 and 3 years after high school (D'Amico and Baker, 1984).

---

<sup>5</sup>These arguments are made by D'Amico (1984, 1986), D'Amico and Baker (1984), Steel (1991), and Stern and Nakata (1989).

- Duncan occupation index, 6-9 years after high school (Ruhm, 1994).
- Whether employer provides health insurance, retirement benefits, 6-9 years after high school (Ruhm, 1994).

**Labor supply:**

- Weeks unemployed, 1 year after high school (D'Amico, 1984; D'Amico and Baker, 1984).
- Weeks unemployed, 1-2 years after high school and college (Stephenson, 1979, 1981b).
- Weeks unemployed, 1-3 years after high school (Stern and Nakata, 1989).
- Weeks employed, 1-2 years after age 17-18 (Steel, 1991).
- Weeks employed, 2 years after high school (Stephenson, 1981b).
- Whether employed, 2 years after age 14-17 (Michael and Tuma, 1984).
- Hours worked, 2 years after age 14-17 (Michael and Tuma, 1984).
- Hours worked, 6-9 years after high school (Ruhm, 1994).

As the preceding list suggests, Ruhm (1994) looks at "long term" effects of work while in school, while his predecessors (Griliches (1980) excepted) focus on labor market outcomes within 1-3 years of leaving school. This is only one characteristic that distinguishes Ruhm's work from the earlier, "first generation" studies, so his results are discussed separately at the end of this subsection. First, the conclusions reached by the "first generation" studies are summarized as follows:

Measures of educational outcomes or success are generally found to be unrelated to in-school work experience. Michael and Tuma (1984) find that being employed at age 14-17 is unrelated to enrollment status two years later, while Steel (1991) finds that being employed at age 17-18 is unrelated to enrollment status 1-2 years later. A statistically insignificant relationship between working in high school and class rank is reported by D'Amico (1984) and D'Amico and Baker (1984), regardless of the intensity of the work experience. However, they also find a negative relationship between relatively intensive work experience and time spent studying by white high school students (male and female), although not by blacks.

These analyses reveal either no relationship or a small, positive relationship between in-school work experience and subsequent wages. Michael and Tuma (1984) and D'Amico (1986) find that working in high school is unrelated to wages earned a year or two later. Griliches (1980)

reports that work experience accumulated in high school has no effect on subsequent wages, but that experience gained in college has a positive effect that is about half as large as the effect of post-school experience. According to Stephenson (1979), both whites and blacks who work full-time during their last year of high school earn higher hourly wages a year later than do their counterparts who worked part-time or not at all. Estimates presented in D'Amico and Baker (1984) suggest that the timing of the relationship between in-school work and subsequent wages may be important: working relatively intensively in high school is positively associated with wages earned one year later for females (white and nonwhite), while it is positively associated with wages earned *three* years later for males.

The strongest relationships between in-school work experience and labor market outcomes emerge when measures of subsequent employment or unemployment are used as dependent variables. Michael and Tuma (1984) report that 14-17 year old high school students who hold jobs are more likely than their nonemployed counterparts to hold jobs two years later. Furthermore, work while in school is positively associated with the number of hours per week worked by those who hold jobs two years later. Stephenson (1981b) finds a positive association among women between working full-time while in high school and weeks worked immediately after leaving high school. Stephenson (1979) finds that working either full-time or part-time in school is associated with less subsequent unemployment for whites, although not for blacks. D'Amico and Baker (1984) find that working in high school is negatively related to the time spent unemployed the first year out of high school for all gender-race groups.

These "first generation" studies reveal a number of interesting relationships, but the results must be interpreted with caution. For the most part, these analyses suffer from two shortcomings. First, they ignore the fact that unobserved factors may influence the decision to work while in school as well as subsequent educational and labor market outcomes. For example, individuals who live in communities with ample job opportunities for youth will be more likely than other students to work while in school and also more likely to work shortly after leaving school. Similarly, an individual who must work for a year or two to save money for college is likely to begin working while still in high school and continue for the entire period being observed by these researchers. In many cases, "tastes" or aptitudes might be the unobservable factors that drive both the school

and work decisions. Unless the effects of such unseen factors are controlled for, valid statements about causality cannot be made. That is, one cannot determine whether individuals have certain labor market outcomes because they worked while in high school, or because of unobservables that also influenced their decision to work while in high school.

Second, the studies discussed here typically look at very short-term enrollment and labor market outcomes (although Griliches (1980) makes some attempt to examine the wages of men who are several years out of school). As a result, they neglect the important question of how the effects of in-school work experience change over the early career. They also fail to provide information on how the relationships differ for individuals who receive several years of post-secondary schooling, since they have generally been excluded from the analyses.

The study by Ruhm (1994) exploits additional information provided by the NLSY in an attempt to address these shortcomings. His sample consists of males and females from the nationally representative cross-sectional sample of the NLSY who are in grades 9-10 in 1979. He measures their in-school work experience during grades 10-12, but looks at their labor market outcomes in 1988-90 and their schooling attainment in 1991. For those who complete high school "on time," this information is reported 6 or more years after graduation.

In addition to examining a broader horizon than his predecessors, Ruhm also addresses the fact that in-school work experience is not exogeneously determined. First, he controls for a large array of personal and family characteristics in an attempt to hold constant factors that may induce a correlation between in-school work experience and subsequent employment and enrollment outcomes. Alternatively, he uses a statistical method to control for the self-selection process that compels some (but not all) high school students to work. Upon comparing these strategies, he argues that the first is an adequate means of controlling for the factors that may induce a spurious correlation between in-school work experience and the various dependent variables.

A general finding that emerges in Ruhm's analysis is that employment experience gained during the senior year of high school "matters," while experience gained earlier in life does not. Specifically, he finds that an increase in hours worked during the senior year of high school is associated with (a) a higher Duncan index on jobs held 6-9 years later, (b) an increased likelihood of holding a job that provides health insurance, and (c) an increased likelihood of receiving retirement

benefits. (Note that only the first of these nonwage benefits has been analyzed by his predecessors.) He also finds that hours worked in high school are positively associated with subsequent earnings, wages, and hours worked. In comparing a high school senior who works 10 hours during the “observation week” to a senior who does not work, Ruhm finds that, 6-9 years later, the “worker” will (a) have a 14.3% higher annual income, (b) work an additional 100 hours per year, and (c) have a 5% higher average hourly wage. In-school work experience appears to be beneficial in that it improves a variety of labor market outcomes several years later.

Ruhm addresses a number of issues that his predecessors neglect, but it is interesting to note that many of the studies summarized here reach a common conclusion: in-school work experience is associated with a small increase in subsequent wages, and a much larger increase in subsequent labor supply. (This explains why Ruhm finds a bigger effect on annual income than on hourly wages, for changes in the former reflect the combined effect of changes in labor supply and wages.) This general finding is consistent with an argument made by Lazear (1977). Using data from the Young Men cohort, Lazear looks at men who attend school in 1966 but not in 1968, and who work in both years. This allows him to estimate a wage change model that identifies the size of the wage boost associated with leaving school. He finds that leaving school causes wages to jump roughly 15% *beyond* any wage growth due to increases in schooling attainment, work experience, or hours worked.<sup>6</sup> To justify this finding, Lazear argues that students do not necessarily choose jobs that pay the highest wages. Instead, they favor jobs that are conveniently located, allow flexible hours, and are generally compatible with the demands of school. One can conjecture that students learn a great deal about finding and retaining employment from this early work experience, but that these jobs teach them relatively few concrete skills that are later parlayed into higher wages.

### 3. LEARNING ON AND OFF THE JOB

Whereas the preceding section addresses the fact that students often work while they learn, this section focuses on the fact that young people invariably learn while they work. Innate ability and education received prior to entering the labor force are important determinants of earnings,

---

<sup>6</sup>Evidence that, *ceteris paribus*, workers who are enrolled in school earn lower wages than nonstudents can also be found in Light and Ureta (1993) and Light (1994).

but so too are the skills acquired once the career is underway. By studying early-career skill acquisition in all its forms, researchers have learned a great deal about life cycle earnings growth and earnings differences among “seemingly similar” youth.<sup>7</sup>

Most research in this area uses the human capital model of wage determination to interpret the economic role of learning. This model, as originally stated by Becker (1962, 1964) and Mincer (1958, 1974), holds that a given worker’s wage is closely linked to his or her productivity. Therefore, workers have an incentive to enhance their productivity by investing in their own “human capital.” The cost of such human capital investments often includes tuition and other out-of-pocket expenses. Another component of the cost is foregone earnings, for workers who are learning new skills are less productive than they otherwise would be and, therefore, lower paid. Consider an individual who completes high school, attends four years of college, and then enters the labor force. The four years of college (as well as the preceding years of school) are considered to be a period of “full-time” investment during which the individual *could have* earned a substantial amount of money. Those foregone earnings are part of the cost of the college investment. Foregone earnings also exist when an individual undertakes the less formal, less intensive form of skill investment often referred to as on-the-job training. The worker’s earnings are nonzero during the investment period, but they are still lower than what they would be if all his or her efforts were devoted to working. Again, the gap between actual and potential earnings is part of the investment cost.<sup>8</sup>

The reason individuals will accept lower (and sometimes zero) earnings while investing in human capital is because they expect the investment to pay off in the form of higher future wages. In fact, individuals are believed to weigh the expected returns against the expected costs when deciding whether to stay in school, return to school, or undertake on-the-job or off-the-job training.<sup>9</sup> If the expected benefit exceeds the expected cost, then an optimizing individual will choose to undertake the particular investment. This formulation of the decision process explains why intensive human capital investment characterizes the early career, for young people generally

---

<sup>7</sup>Skill acquisition has also proven to be related to job turnover behavior. That subject is taken up in Section 4.

<sup>8</sup>The gap between actual and potential earnings is lessened when the employer agrees to bear part of the cost. This is likely to occur when the skills being acquired are highly specialized and cannot be transferred to a new employer.

<sup>9</sup>Of course, skill acquisition “pays off” in ways other than higher future earnings. It may lead to jobs that are valuable along nonwage dimensions, and it may enhance one’s enjoyment of life for reasons unrelated to work and pay. A comprehensive list of the nonwage returns to education is provided in Haveman and Wolfe (1984).



face enormous benefits and low costs relative to what they will face later in life.

This investment-based view of skill acquisition makes it clear that the early career is as much a time for learning as a time for working. Furthermore, it is apparent that no evaluation of young workers' labor market outcomes can be complete without an understanding of their human capital investment decisions. The rest of this section summarizes the extensive literature that uses the NLS to explore these issues. Because the topic is so broad, the discussion is divided into several areas. The first subsection selectively summarizes research on the estimation of "human capital earnings functions" in which the estimated effects of general labor market experience, job seniority, and schooling are interpreted as the returns to "skill." This core topic has received so much scrutiny that, in lieu of a complete survey, attention is focused on the unique advantages of using NLS data. The second subsection discusses research that utilizes the extraordinary amount of job training information elicited by the NLS. The remaining two subsections examine two special aspects of early-career learning: the first is the phenomenon of receiving one's formal schooling discontinuously, while the second concerns the increasingly common practice of taking a high school equivalency examination rather than receiving a diploma.

### **3.A. Human capital earnings functions**

Much of our empirical evidence of the importance of skill acquisition has been obtained via the estimation of "human capital earnings functions," which are empirical analogues of the theoretical human capital model described above. In such earnings (or wage) functions, the logarithm of annual earnings, weekly earnings, or average hourly wages serves as the dependent variable and the independent variables include controls for a wide range of personal, family, job-related, and market characteristics that are likely to influence earnings. The precise specification varies from study to study, but the models invariably include a number of "human capital variables" that are intended to control for individuals' skill levels. These variables include schooling attainment (*e.g.*, years of school completed), which controls for the skills learned in school, and labor market experience (*e.g.*, cumulative years worked since first leaving school), which proxies the amount of "general" skill gained in the labor market. For many applications, it is also desirable to control for job tenure (seniority) as a proxy for the "specific" skill acquired with the current employer.

(General skills are defined as those that can be transferred from one employer to another, while job-specific skills are particular to a given employer.) As will be discussed below, a measure of innate ability such as IQ score is often a useful control in these functions as well.

One of the challenges facing researchers since this empirical approach was introduced by Mincer (1958, 1974) is to obtain suitable measures of individuals' work experience. Mincer performed his original empirical work using data from the decennial Census, which reports individuals' ages and schooling completion levels but not the actual amount of work experience they have accumulated. As a result of this data deficiency, Mincer and other researchers were forced to substitute age for work experience or use a measure of potential experience defined as "age minus years of schooling minus six."<sup>10</sup> When individuals do not work continuously upon leaving school, potential experience can become an extremely inaccurate approximation of actual work experience. It is particularly inadequate for the analysis of women's earnings because women often decrease their labor supply during their child-bearing years. As a result, potential experience overstates women's actual work experience (and their on-the-job skill investments) even more than it overstates men's, which leads to distorted inferences about the determinants of gender wage differentials. In addition, as Light (1994) shows, potential experience produces biased estimates of early-career wage growth when youth begin working prior to leaving school and when they return to school after beginning work.

The NLS Young Women, Young Men, and Youth cohorts have been used extensively to "correct" these problems, for all three provide detailed information on actual work experience. The Young Men and Young Women cohorts report the number of weeks worked during each year of the observation period, while the Youth cohort provides weekly observations on individuals' hours of work. Information on actual work experience is also contained in the Mature Women and Older Men cohorts of the NLS and in the Panel Study of Income Dynamics (PSID), but they do not focus exclusively on young people (although the PSID includes some youth). The Young Women, Young Men, and Youth cohorts are the only large, nationally representative data sets that allow researchers to control for all the work experience acquired during the important initial

---

<sup>10</sup>Researchers using the Current Population Survey face the same data constraint. The standard specification includes both the age or experience measure and its square, which is why controlling for age and schooling is not equivalent to controlling for "age minus schooling minus six."

stages of the work life.

Garvey and Reimers (1980) and Filer (1993) use NLS data to construct measures of predicted work experience. This is a particularly valuable application, for it provides users of Census and Current Population Survey (CPS) data a prescription for improving their experience measures. Using a sample drawn from the Young Women cohort, Garvey and Reimers model cumulative actual work experience as a function of variables that are available in the Census and CPS—for example, schooling attainment, health status, marital status, and age. The estimates from their race-specific experience models can then be used to predict the amount of work experience for individuals with given characteristics. Garvey and Reimers estimate human capital wage functions in which they alternately control for (a) actual work experience as reported in the NLS (b) potential work experience, and (c) predicted work experience. When actual work experience is used, the estimate for the linear experience term implies that a white woman's wage will grow 13% during her first year in the labor force. The wage growth is estimated to be only 7.8% when potential experience, but 14.1% when predicted experience is used. These estimates reveal that the use of potential experience causes women's human capital accumulation and wage growth to be dramatically understated. They also show how information available in the NLS can aid users of the Census and CPS to construct experience measures that are closer to the "truth" than potential experience.<sup>11</sup>

Light and Ureta (1993) observe that the longitudinal nature of the NLS allows researchers to not only construct detailed measures of cumulative work experience, but also to measure experience noncumulatively. Instead of including "years of actual experience" and its square among the independent variables, they control for an array of experience variables that measure the amount of time spent working during each year of the career. This specification (which Light and Ureta refer to as the "work history" model) captures differences across workers in the patterns by which a given amount of actual work experience is accumulated. Among a group of workers who accumulate 6 years of experience in the first 8 years after leaving school, for example, some might wait for

---

<sup>11</sup>Filer (1993) extends the method proposed by Garvey and Reimers by using a pooled sample from the Young Women and Mature cohorts to estimate work experience, and estimating the predicting functions within 3-digit occupation categories. He, too, finds that a measure of predicted measure of work experience is generally more accurate than the crude measure of potential experience originally proposed by Mincer.

2 years before beginning work, some might work for 6 years and then stop working, and others might work 75% of each year. The work history model controls for these various work patterns and, presumably, for unobserved heterogeneity in human capital investment patterns.

Using data from the Young Men and Young Women cohorts, Light and Ureta compare estimates from three alternative wage models: the first includes potential experience and its square among the regressors, the second controls for (cumulative) actual experience and its square, and the third controls for the fraction of time spent working during each year of the career. To compare the estimates across specifications and genders, consider an individual who works continuously for the first 8 years after leaving school. The potential, actual, and work history specifications imply that a man's wage will rise 66%, 73%, and 210%, respectively, while a woman's will rise 24%, 61%, and 78%. These estimates indicate that the use of potential experience causes the returns to general human capital to be understated for men and women alike; furthermore, they indicate that measuring actual experience cumulatively causes the returns to be understated as well. To underscore the value of the work history model, Light and Ureta show that 12% of the observed gender wage gap is attributable to the fact that workers differ in the patterns by which a given amount of work experience is accumulated.

NLS data have also proven to be invaluable to researchers in estimating the returns to schooling. When individuals' inherent abilities are not controlled for in human capital earnings functions, the estimated returns to schooling suffer from "ability bias." That is, it is not possible to determine whether the estimates reflect the "value added" of educational investments, or whether they merely reflect the fact that more able individuals tend to receive more schooling *and* earn higher wages. NLS data have a number of features that enable researchers to properly control for ability bias, not the least of which is the inclusion of several ability measures.

Griliches (1976, 1977) uses data from the Young Men cohort to assess the usefulness of including ability measures in human capital earnings functions. He considers two alternative measures of ability: one is an IQ score collected in 1969 from respondents' high schools, and one is a score on a "knowledge of the world of work" test administered by the NLS in 1966. In Griliches (1976), he estimates a simple model in which the log of wages reported in 1969 is regressed on years of school completed, a work experience measure, and a small set of environmental and personal

characteristics. When no ability measure is included, the estimated coefficient for schooling is 0.065, which suggests that an additional year of education raises wages by 6.5%. When IQ scores are included, the estimated return to schooling falls to 5.9%, and when “knowledge of the world of work” scores are included instead of IQ, the estimated return falls to 5.3%. This simple experiment documents the seriousness of ability bias and demonstrates one method of correcting for it with NLS data.

Blackburn and Neumark (1993) use Griliches’s approach to determine whether changes in the magnitude of ability bias are at least partially responsible for the fact that college graduates’ wages grew relative to high school graduates’ during the 1980s. Using data for white, male respondents in the NLSY, they select the first wage reported by each youth after the completion of school as their dependent variable. Years of school completed is included among the regressors, and this measure is interacted with a time trend to capture secular changes in the estimated return to schooling. Their ability measure is scores from the Armed Services Vocational Aptitude Battery (ASVAB), which was administered to 94% of NLSY respondents in 1980.

When the ability measure is omitted from the specification, Blackburn and Neumark obtain a positive, statistically significant coefficient for the schooling-time interaction, which is consistent with the widely held view that returns to schooling rose during this period of time. This effect continues to hold when controls for ability are added to the wage model. That is, they find no evidence in support of the notion that changes in ability bias are responsible for the secular increase in the relative earnings of college graduates. However, by controlling for the interaction between schooling, calendar time, *and* ability, they find that increases in the returns to schooling were received primarily by high-ability individuals. Simply put, schooling investments invariably “pay off” for young people in the form of higher wages, but the 1980s was a period during which academically able youths earned increasingly large returns relative to their less able counterparts.

Bishop (1990) uses the same NLSY data to gain additional insights into the mechanism by which young people’s academic skills translate into rewards in the labor market. He estimates a series of human capital functions (separately by calendar year) in which the dependent variables are, in turn, hourly wages and annual earnings. In addition to controlling for a host of personal and family background variables, he controls for scores on individual components of the ASVAB

test. In this way, he can determine how different types of narrowly defined skills affect early-career wages and earnings. Bishop's findings are somewhat counter-intuitive, although they are consistent with results found with other data sets. For young men, measured achievement in such academic areas as mathematics, science, and verbal pursuits have no effect on wages and earnings, while "low level" skills such as technical ability and computational speed have positive effects. For young women, both mathematical and verbal abilities are positively correlated with wages and earnings, although achievement in science and technical areas is not.<sup>12</sup> On the basis of these findings, Bishop argues that U.S. students perform poorly on science and mathematics proficiency tests because the lack of labor market rewards discourage them from concentrating their efforts in these areas. His results undermine the widely-held belief that educational investments "pay," for they suggest that youth have difficulties signalling their academic achievements to employers encountered early in their careers. Bishop's conclusions are quite provocative, and suggest a need for further exploration of the relationships between measurable skills and labor market earnings.

### **3.B. Formal private sector job training**

A useful feature of the NLS (particularly the NLSY) is that it asks respondents about training received in the private sector. This training includes the type of on-the-job training that is sufficiently formal to be quantified, off-the-job training received at business and vocational schools (which are distinct from the "regular" high schools and colleges discussed in the next subsection), and apprenticeships. The Young Men cohort asks respondents about the longest training spell experienced since the last interview, while the NLSY asks about the duration and type of up to four spells experienced per year. A number of researchers have used these data to augment the indirect measures of on-the-job training contained in work experience and tenure data.

Lillard and Tan (1992) analyze the training data in the Young Men cohort as part of an extensive study that also examines the Older Men and Mature Women cohorts of the NLS, the Current Population Surveys, and the Employment Opportunities Pilot Projects Survey (EOPP).

---

<sup>12</sup>Rumberger and Daymont (1982) look at the effects on wages of courses taken in high school rather than ASVAB scores. They find that credits in academic courses have a positive but statistically insignificant effect on men's post-high school wages, and a small, positive effect on women's.

Lillard and Tan categorize private sector training reported in the NLSY into four categories: "regular school," company training, business and vocational school, and other types of training. They first group these four types together and assess their effects on earnings by estimating an earnings function. They find that workers who have received some training in the past year receive a 9.5% increase in earnings, on average, while training that occurred 2 years ago is associated with a 10.8% increase in earnings. As the time since training increases beyond 2 years, the effect on earnings falls steadily, so that training that took place 11 years ago has no impact on current earnings. When they disaggregate the training measures by type and repeat the analysis, they find that company training has the largest effect on earnings, followed by business and technical school. Company training is associated with a 16.9% increase in earnings in the first year, with the effect declining 1.3% for every year that has elapsed since the training. The effect of business and technical school is only 1% the first year, but 10.6% the second year; this effect, too, diminishes at a rate of 1.3% per year thereafter.

Lillard and Tan also estimate the probability of experiencing unemployment as a function of having received private sector training. They find that young men who have received some training in the recent past have significantly lower probabilities of experiencing unemployment. Just as the effect of training on earnings diminishes over time, so does the effect on unemployment. When the training experience is 12 years or more in the past, it has no discernible effect on unemployment probabilities. However, the favorable effect of company training is longer-lived than the effects of other types of private sector training.

In a series of papers, Lynch (1989a, 1991a, 1991b, 1992) analyzes the more recent and also more detailed training data contained in the NLSY. She focuses on three types of private sector training: company provided training (which she refers to as on-the-job training), training received through business, vocational, and technical schools (off-the-job training), and apprenticeships. In analyzing a sample of non-military men and women who have *not* graduated from college (Lynch 1992), she identifies a number of observable characteristics that influence the probability of receiving a certain type of training. For example, men are less likely than women to receive off-the-job training, but more likely to receive on-the-job training or apprenticeships. The longer individuals have been working for their current employers, the less likely they are to receive off-

the-job training. High school graduates are more likely than high school dropouts or individuals with some college to serve as apprentices, and they are also the most likely to receive off-the-job training. As the national unemployment rate rises, the probability of receiving on-the-job training falls, but the likelihood of an apprenticeship rises. Finally, Lynch finds that past participation in on-the-job training is associated with an increased probability of current participation.

Using the same sample, Lynch examines the effects of the three types of training on wages. In the spirit of Lillard and Tan (1989), she estimates wage functions in which past and current training is controlled for in various ways. Past training refers to training completed prior to joining the current employer, while current training is tied to the current employer. She finds that a past apprenticeship that lasted 10 weeks is associated with a 5% increase in current wages, while 10 weeks of past off-the-job training are associated with a 2% increase. On-the-job training with a previous employer, however, appears to be unrelated to current wages. When she examines the effect of current training (that is, training completed with the current employer), on-the-job training has a pronounced effect on wages: 10 weeks of company-provided training is associated with 2% higher wages. These results remain largely unchanged when she corrects for the underlying selection process that sorts workers into the various training categories.

Based on these findings, Lynch argues that on-the-job training is primarily job-specific, for workers receive a reward for their training only while they remain employed by the same company that provided the training. Off-the-job training and apprenticeships appear to lack a job-specific component, for the evidence suggests that workers who invest in these types of training receive wage benefits only when they switch to new jobs. These arguments receive additional support in Lynch (1991a), where she finds that on-the-job training serves to lower the hazard rate out of first jobs, while off-the-job training and apprenticeships increase job exit rates.

In summary, the research by Lynch and Lillard and Tan suggests that formal, quantifiable types of job training are a big factor in the early career. Lillard and Tan (1989) report that roughly 25% of the young men in their sample receive some form of private sector training (including additional "regular" schooling), while Lynch (1992) reports that 21% of individuals in the NLSY receive training. As the evidence summarized here suggests, young workers have an incentive to continue to learn new skills by participating in job training programs, for it is a significant



determinant of early-career wages and earnings.

### 3.C. Reenrolling in school

A number of researchers have used data from the NLS to investigate the surprisingly common practice of returning to “regular” school (as opposed to enrolling in job training programs) after a period of nonenrollment. The simplest formulation of the human capital model predicts that individuals will invest in schooling (as well as out-of-school training) as early in life as possible. However, financial constraints keep some young people from completing the optimal level of school prior to entering the labor force. In addition, new information about the costs and benefits of additional school investments may persuade young workers to reenroll. For example, an individual who loses his or her job may find that additional schooling is less costly and, therefore, more desirable than it once was. The studies summarized in this section seek to determine what type of individuals receive their schooling discontinuously, why they do so, and what impact it has on their subsequent earnings. Table 2 provides an overview of this research.

The first NLS-related study to tackle this subject is by Griliches (1980). Using the Young Men cohort, he selects a sample of men who were out of school and working in 1970, and determines that 9% previously interrupted their schooling. He finds that these “interruptors” tend to attain higher schooling levels and have higher IQ scores than their continuously schooled counterparts, which indicates that reenrolling in school is not a sign of disadvantage. He then estimates a simple wage function in which the logarithm of the 1970 wage is regressed on a small number of controls (including years of schooling and IQ scores) plus a dummy variable indicating whether the individual has interrupted his schooling. He finds that this indicator has a positive but statistically insignificant effect on wages, as does an additional regressor measuring the length of the interruption. To justify this finding he argues that individuals choose to return to school only if it is beneficial for them to do so—that is, if they will *not* be penalized in the labor market. The finding of “no effect,” therefore, simply reflects the underlying decision-making processes of the respondents in the sample.

Griliches’ conclusions can only be viewed as suggestive, for his analysis suffers from two problems. First, he does not directly analyze the selection process that causes some men to return

to school, so he can only conjecture about its effects on the estimates. Second, his variables that measure schooling interruptions are based on retrospectively reported information, which is far less accurate than data that subsequently became available.

Marcus (1984, 1986) also uses the Young Men cohort, but rather than relying on retrospective information he looks at the enrollment status reported by respondents during each interview from 1966 to 1973. This annually reported enrollment information reveals that 28% of respondents cease being enrolled and then return to school, with the average nonenrollment spell lasting 2.4 years. In his 1984 paper, Marcus estimates a wage function in which the usual "years of schooling" variable is replaced with two variables: years of school completed prior to the interruption, and subsequent schooling. In addition, he controls for the length of the interruption and the square of total years of schooling. The estimates from this model imply that, for example, the return to completing the 14<sup>th</sup> year of school is 7.0% if there is no break between grades 13 and 14, and 7.6% if there is a 1 year interruption. In general, he finds that there is no penalty to interrupting one's schooling if the interruption lasts less than 2 years. He also finds that, holding constant the length of the interruption, the wage penalty is smaller for those in high school than for those at post-secondary levels.

Marcus does a better job than Griliches of exploiting the reenrollment data available in the NLS, but he fails to make inroads into the selectivity issue. Both of these "first generation" studies find that schooling interruptions have no negative effect on wages, but neither estimates their effect net of the underlying selection process that distinguishes "interruptors" from their continuously schooled counterparts.

Light (in press) differs from her predecessors by addressing the selection issue and also by using the NLSY rather than the Young Men cohort. Beginning in 1980, the NLSY has asked respondents for a month-by-month report of their enrollment status, which allows very short enrollment and nonenrollment spells to be identified. This feature of the data, coupled with the fact that Light follows individuals for 11 years (versus 7 years for Marcus), suggests that higher reenrollment rates should be found. In fact, Light (1993, in press) reports that slightly more than one-third of white men who leave school between 1979 and 1988 reenroll at least once by the 1989

interview. <sup>13</sup>

By examining the relationship between unobserved wage shocks and transitions back into school, Light (in press) finds evidence that the decision to reenroll is correlated with unobserved, time-invariant factors (*e.g.*, ability and family influences) but not with transitory unobservables. She then estimates a discontinuous wage function in which individuals who reenroll in school are allowed to follow different wage paths during the pre-return and post-return periods, and she controls for the correlation between the independent variables and unobserved, time-invariant factors. In this way, she obtains estimates of the effects of reenrollments that are unbiased by the underlying selection process. She finds that individuals who *will* return to school proceed along the same wage paths as those who will not, and then receive a sizeable wage boost upon completing additional schooling. For example, a young man who finishes high school, works for 1 year, and then attends (but does not complete) college receives a 10% wage boost, on average. A similar individual who works for 2 years before reenrolling receives only an 8.7% return.

However, Light also finds that individuals who complete their schooling prior to beginning their careers receive an even larger return. For example, a high school graduate who advances to grades 13-15 without an interruption receives a 19.8% return to the additional schooling. Because the returns to schooling among “non-interruptors” are so much higher than those for “interruptors,” Light shows that the estimated returns to continuous schooling investments are significantly understated by a wage model that fails to distinguish between the two types of individuals.

In companion papers, Marcus (1986) and Light (1993) estimate reenrollment models rather than wage models in order to identify the factors that explain the decision to return to school. Marcus estimates a discrete choice model in which the probability of reenrolling between 1966 and 1973 is the dependent variable. He finds that increased schooling, increased schooling attainment of the respondent’s mother, and past military service increase the likelihood of returning to school. These are “positive” traits, and so this finding is consistent with Griliches’s (1980) claim that higher schooling and IQ levels characterize young men who return to school. Marcus also

---

<sup>13</sup>The reenrollment figures reported by Marcus (1984, 1986) and Light (1993, in press) are in line with those found by Spletzer (1990) in the National Longitudinal Survey of the High School Class of 1972. According to Spletzer, 30% of individuals who graduated from college within 7 years of completing high school experienced a schooling interruption.

finds, not surprisingly, that the probability of reenrolling declines as labor market experience accrues. Furthermore, he finds that "earnings luck" is negatively associated with the probability of reenrolling; that is, young men whose annual earnings are higher than the predicted level derived from an earnings function are less likely to reenroll. However, he finds that the effect is very small and that it falls to zero when average hourly wages are used rather than annual earnings.

Borus and Carpenter (1982) estimate a discrete choice model of the decision to return to school that is similar to the one estimated by Marcus, but they confine the sample to high school dropouts observed in the 1979-80 NLSY. In other words, they look only at the decision to return to high school. They find that the probability of reenrollment falls with age, and that family background and school characteristics have virtually no effect. This suggests that the decision to complete high school might differ from the decision to return at the post-secondary schooling.

Light (1993) treats the decision to reenroll as a continuous-time problem by estimating a proportional hazard model for the waiting time to reenrollment. In this way, she is able to examine how *changes* in individuals' labor market status influence the decision to invest in additional schooling. If individuals postpone schooling because they cannot finance it, then we would expect them to work intensively during the nonenrollment period. If they decide to return to school when they find themselves unemployed or "under-employed," however, we would find just the opposite. The descriptive analysis and hazard model estimates presented by Light provide support for both hypotheses. Among at least half of the "returners" there is no evidence that poor labor market outcomes (as measured by hours or weeks worked) drive the reenrollment decision. In particular, she finds that 50% of the "returners" work an average of 40 hours per week or more during the entire year prior to their reenrollment, and 60% experience no unemployment during that year. However, the hazard model estimates reveal a definite relationship between leaving unemployment and returning to school.

### **3.D. High school equivalency exams**

In two recent papers, Cameron and Heckman (1990, 1993) use the NLSY to determine whether individuals who receive a high school credential via an equivalency exam are "equivalent" to those who take the more traditional route of graduating from high school. According

to Cameron and Heckman, 14% of individuals receiving a high school credential in 1987 did so via a certified exam, which is almost a three-fold increase over the 1968 percentage. Given the increasing popularity of exam certification, it is worth asking whether young people choosing this option differ from high school graduates in their educational and labor market outcomes. This investigation is particularly important because many data sets, including the Current Population Survey (CPS), do not distinguish between exam certified individuals and high school graduates.

Cameron and Heckman compare the performance of high school dropouts, exam (GED) certified individuals and high school graduates on the Armed Forces Qualifying Test (AFQT). Approximate scores for this test can be constructed from the scores for the ASVAB, which was administered to 94% of NLSY respondents in 1980; AFQT scores are widely regarded as useful means of measuring various skills that are valued in the work place. Using a combined sample of white, black, and hispanic men, Cameron and Heckman find the mean scores of high school graduates, GED certified individuals, and dropouts to be 70.0, 57.7, and 41.4, respectively. Using other samples and also looking at other points of the distribution, they consistently find that this ranking holds.

They also find that high school graduates have more favorable schooling and labor market outcomes than do GED certified persons. Only 43% of GED certified young men attend a 2-year or 4-year college, while 63% of high school graduates do so. The mean hourly wage reported by high school graduates at age 25 is roughly a dollar more than the mean wage reported by GED certified persons, while their average annual income is \$3,500 more and they average about 4 additional hours per year. In fact, these summary statistics show GED certified persons to be more similar to high school dropouts than to high school graduates.

This summary of findings is drawn from the descriptive portion of the two studies, but these results are also borne out by a more rigorous econometric analysis. Furthermore, the econometric analysis reveals that inferences about the economic returns to a high school education are quite sensitive to whether a distinction is made between exam certified individuals and high school graduates. When the two groups are treated as one, Cameron and Heckman estimate the wages of 4-year college graduates to be 21% higher than the wages of high school graduates. When they are identified separately, however, this estimated wage gap falls to 19.6%. In short, young men

who take the GED exam earn a smaller economic reward than do young men who graduate from high school.

#### 4. VOLUNTARY JOB SEARCH AND MOBILITY

In addition to investing in general and job-specific skills, young workers also invest a considerable amount of time in job search. This section discusses the "good" type of job search that is largely voluntary and that is typically associated with significant wage growth.<sup>14</sup> The involuntary search efforts of unemployed workers are discussed in Section 5.

In providing theoretical explanations for the propensity of young workers to change jobs, researchers have emphasized two issues. The first is the interrelatedness of job turnover and certain types of human capital investment. As noted in Section 3, some of the on-the-job training undertaken by young workers teaches them highly specialized skills that cannot be transported to new firms. Such skill investments serve to deter job turnover because once the investment cost is paid, there is a strong incentive to maintain the employer-employee relationship until the investment "pays off." In fact, it has been argued (Becker, 1962; Hashimoto, 1981) that employers and workers are likely to share the cost of job-specific skill investments in order to create a joint incentive to prevent job separations. This human capital view of job turnover indicates that it might be costly to young workers because it is incompatible with job-specific skill investments that, in turn, lead to within-job wage growth.

The second issue is that young workers face a great deal of uncertainty about their job prospects. This issue has led to a number of "job matching" models that justify how mobility can be beneficial even when it occurs at the expense of job-specific human capital investments. Simply put, a worker with a given stock of skills can increase his wage by moving to a job where his skills are better matched with the employer's needs. Underlying this view is the recognition that workers are heterogeneous in the amount and type of skills they possess, while employers differ in their technologies. As a result, workers face a dispersion of wage offers reflecting the manner in which their productivity varies across firms. Incomplete information prevents workers from

---

<sup>14</sup>At this point, it is particularly important for readers to note that "job" is used throughout this report to refer to a spell with a given employer, and not to a position, title, or occupation.

immediately locating their best match when they enter the labor market; moreover, the receipt of *new* information drives much of their job mobility. Workers may change jobs upon learning that their current match is less productive than they previously believed, or when they discover a new opportunity that dominates their current match. Either way, their early-career job turnover can be viewed as the process of “shopping” for increasingly better matches.<sup>15</sup>

Researchers have frequently turned to NLS data to document the amount of early-career job turnover that occurs and to investigate the empirical implications of these theoretical arguments. One strand of empirical research involves estimating job separation models to identify the determinants of job mobility. Another approach is to estimate wage models which identify the effects of job change on wage growth. Of course, wages and job turnover are not determined in isolation, and many models estimate the two processes simultaneously or take account of one in estimating the other. The discussion that follows begins with the determinants of job mobility and then turns to the subject of wage growth.

#### **4.A. Determinants of job mobility**

In estimating job turnover models, researchers have paid particular attention to the relationship between job seniority and the probability of separation. If job mobility is closely linked to the absence of substantial investments in specialized skills, then current tenure should be negatively correlated with the probability of job separation. If job mobility reflects matching behavior, there could be either a negative or positive relationship between job tenure and separation probabilities. A negative relationship is generally predicted by models that assume match quality is observable at the outset of the match (Burdett 1978, Jovanovic 1979b). In such models, workers change jobs when they discover a better one, but the probability of doing so is likely to fall over time. The opposite prediction emerges from the class of matching models that argue that workers move on to better matches when their current ones prove to be less productive than was initially expected (Johnson 1978, Jovanovic 1979a). These models assume that a job match’s quality is revealed only through “experience,” so separation probabilities should rise and then fall with tenure.

These issues have been investigated by a large number of researchers who, over time, have

---

<sup>15</sup>Examples of theoretical studies that formalize these views include Burdett (1978), Johnson (1978), and Jovanovic (1979a, 1979b).

used increasingly sophisticated econometric techniques. Table 3 lists several of these studies and provides an overview of their methodology and findings.

The earliest investigations of these issues included Borjas and Rosen (1980), Mincer and Jovanovic (1981), and Blau and Kahn (1981). Each of these studies uses data from the early years of the Young Men cohort (and Blau and Kahn use the Young Women cohort as well), and each estimates a simple, binary choice model in which the probability of a job separation between adjacent NLS interviews is expressed as a function of tenure, labor market experience, and a small set of additional controls. All three studies find a strong, negative relationship between current tenure and the probability of separation. Blau and Kahn estimate the model separately for four race-gender groups and find the tenure effect to be significantly more pronounced for men than for women, but similar for blacks and whites. Taken at face value, the finding of a negative relationship between job tenure and separation probabilities is consistent with human capital theory, and inconsistent with a “learning” type of matching model.

A shortcoming of these early studies is that they do not control for unobserved factors that might make some workers “movers” and others “stayers.” This type of population heterogeneity could produce the estimated relationship between tenure and job mobility for reasons unrelated to either firm-specific human capital or job matching. In more recent research that takes advantage of subsequent advances in econometric and computing techniques, Light and Ureta (1992), Farber (1992), and Omori (1993) reexamine the relationship of interest after controlling for unobserved heterogeneity.

Light and Ureta (1992) estimate proportional hazard models for job separations using data from the Young Men and Young Women cohorts. After controlling for unobserved, time-invariant personal characteristics, they find evidence of negative duration dependence in the hazard rate out of jobs—that is, the hazard rate falls as tenure accrues. This negative relationship is more pronounced for men than for women. Comparing 24-25 year old men and women with a common set of modal characteristics, Light and Ureta find that a man with no tenure has a 14% chance of leaving his current employer in the next 6 months; after 12 months on the job this probability falls to 11%, and after 24 months it falls to 9%. The corresponding figures for women are 34%, 30%, and 26%. These predictions, which do not utilize information on unobserved separation



propensities, indicate that men are also significantly less likely than women to separate from their jobs. When the predictions are recomputed for workers whose unobserved characteristics make them “stayers,” however, Light and Ureta find that women are less likely than men to leave their jobs.

Omori (1993) uses data for white, college-educated men from the 1979-87 NLSY. He, too, estimates a proportional hazard model for job exits, but he looks exclusively at job-to-job transitions, which are more likely to correspond to job matching than the job-to-“anything” transitions examined by Light and Ureta. In addition, he allows the hazard rate to vary over the course of an employment spell at 1-month intervals. (Light and Ureta use 3-month intervals after finding that they yield the same results as 1-month intervals.) Omori finds that the job-to-job hazard rate initially *rises* with tenure, and then falls after workers reach about 6 months of tenure. This result is consistent with those job matching models in which workers quit upon receiving new (and negative) information about their current productivity.

Evidence supporting “learning” models is also found by Flinn (1986) and Farber (1992). Farber uses the 1979-88 NLSY to examine the monthly job separation probabilities of workers who have made “long term” transitions to the labor force (defined as reporting work as the primary activity for three consecutive interviews). After carefully controlling for past turnover behavior and other controls for heterogeneity, Farber finds that the hazard rate out of jobs rises with tenure for the first 3 months and then declines. Flinn uses 1966-71 data from the Young Men cohort to estimate a highly stylized matching model in which the underlying behavioral process is modelled rather than observed mobility outcomes. The estimated parameters of his matching model are largely consistent with the same theories that predict the positive duration dependence found by Omori and Farber.

#### **4.B. Effects of job mobility on wages**

A number of studies have estimated wage models that capture the effects of voluntary job changes on wage growth. One of the goals of this research is to assess the tradeoff between within-job wage growth which may correspond to investments in firm-specific human capital and the between-job wage growth brought about by a job change.

Borjas and Rosen (1980) use data from the Young Men cohort to estimate the change in wages between 1971 and 1975 for a sample of whites who are employed throughout that period of time. They estimate the wage change model separately for the 35% of the sample who change jobs between 1971 and 1973 and for those who do not, after applying a "selectivity correction" to account for each man's decision to be a "mover" or "stayer." They find that "movers" receive significantly less wage growth the greater is their job tenure in 1971 (prior to the job change). Taking 1971 tenure as a proxy for the amount of specific human capital acquired prior to the job change, this finding indicates that specific investments do not completely deter job mobility, but do impose extra mobility costs. Workers who change jobs despite having built up considerable skills at their old jobs benefit from doing so, but the wage gains they receive from the job change are not as great as they would have been had their tenure (and prior wages) been less.

Bartel and Borjas (1981) use a slightly different strategy to assess the relationship between within-job wage growth that occurs prior to a move and the subsequent wage growth brought about by a job change. Using 1967-73 data from the Young Men cohort, they identify those workers who change jobs between the 1969 and 1971 interviews (and their reasons for changing) and those who do not. They then estimate wage change equations for the 1967-69, 1969-71, and 1971-73 periods. This enables them to compare the wage growth received by "movers" and "stayers" prior to any job change, at the time of the job change, and subsequent to it. They find that workers who quit their jobs for the self-reported reason that a "better" job was found receive 18% more wage growth than "stayers" during the period surrounding their job change. Prior to the move, their wage growth is 3.8% higher than that of "stayers" and subsequent to the move it is 6% higher, but neither of these estimated differences are statistically significant. Among workers who quit because they are dissatisfied with their old jobs, however, the contemporaneous wage gain is smaller (11%) and the pre-move wage growth is 7% lower than that of "stayers." It is difficult to infer from these estimates which form of job matching is dominant in the data, but it certainly appears that individuals who engage in "job shopping" receive considerable wage gains from doing so.

Mincer and Jovanovic (1981) provide additional evidence that early-career job mobility is beneficial—or, more accurately, that it does not merely reflect an inability to "settle down"

and undertake valuable skill investments. Using 1967-73 data from the Young Men cohort, they estimate a simple wage change equation in which experience, job tenure, and the number of past job changes are included among the controls. The measure of prior moves proves to have an insignificant effect on wages, and the estimated returns to tenure and experience are invariant to its inclusion or exclusion. On the basis of this finding, Mincer and Jovanovic argue that persistent, early-career job mobility does not deter workers from eventually undertaking job-specific human capital investments.

Theoretical job matching models often assume that young workers locate new jobs while still working for their old employers and, therefore, spend negligible amounts of time in nonemployment. Studies by Holzer (1987), Antel (1991), Parsons (1991), and Wolpin (1992) contradict this notion by showing that job changes that seem to correspond to job shopping behavior often entail intervening spells of unemployment. Wolpin uses the 1979-86 NLSY to develop a structural job search model that produces estimates of the probability of receiving a job offer while employed and unemployed. He finds these probabilities to be 0.24 (0.61) and 0.55 (0.65), respectively, for white (black) men. Using 1969-71 data from the Young Men cohort, Antel finds that 40% of job quitters have a spell of unemployment between jobs. Parsons examines 1980-81 data from the NLSY and finds that only half the workers who quit for voluntary, nonpersonal reasons have a job lined up when they do so.

Parsons also finds that wage levels on the "old" jobs are positively correlated with the probability that a job-to-job (as opposed to job-to-unemployment) transition will be undertaken. That is, workers with relatively low wages appear to be more willing to quit their jobs and engage in full-time search, presumably because the cost of doing so is relatively low. Antel provides corroborative evidence by estimating a simultaneous model of wages and job mobility with the Youth data. He finds that wage gains associated with job changes are twice as big for workers who have an intervening spell of unemployment as for workers who move directly from one job to another. Antel interprets this as evidence that it pays for "job shoppers" to undertake the intensive search that is allowed when they are not working. Together, the evidence presented by Antel and Parsons is consistent with the "learning" type of matching model in which separations occur when workers receive negative signals about their current productivity and not necessarily

when they have an alternative job offer in hand.

## 5. UNEMPLOYMENT AND NONEMPLOYMENT

Sections 2 and 3 discuss the many issues arising from the fact that work and school (or, more generally, "learning") can and do occur simultaneously. For many youth, however, significant amounts of time are spent neither working nor attending school. These young people may be searching for a job (and not merely "shopping" for a better job), or they may not even be participating in the labor force. Nonparticipation sometimes corresponds to positive activities such as child-rearing or travel, but all too often young people leave the labor force after growing discouraged about their inability to locate a job. Furthermore, individuals who are not working, attending school, or actively searching for a job may be incarcerated or participating in illicit activities.

In a recent study, Klerman and Karoly (1993) use the NLSY to document the extent of nonemployment among young men. Klerman and Karoly classify respondents into four labor force states: working full-time, working part-time/not in school, in school/not working full-time, and not working/not in school. Classifications are based on respondents' activities during the week surrounding their birthdays for each year they are surveyed, and are reported separately by schooling attainment and age. Klerman and Karoly report that, among high school dropouts between the ages of 17 and 21, 20-22% are neither working nor in school. Even when these men are in their mid-20s, roughly 15% are not attending school or holding jobs. These percentages are lower among men with higher schooling completion levels, but still alarmingly high. At ages 18 and 19, over 15% of high school graduates are neither working nor attending school; this percentage falls steadily with age, but is still in the double digits (10.1%) for 22 year olds. At ages 23 and 24, 7-8% of young men who attended or *completed* college are nonemployed and nonenrolled. Clearly, a college education does not provide a guarantee that a young man's next activity will be employment.

There are many reasons to be concerned about youth nonemployment, particularly because it may have long-lasting effects on individuals' labor market prospects. Young people who are

not working or attending school are typically not acquiring human capital that will lead to higher earnings in the future; in fact, an individual's stock of skills may *depreciate* during an extended period of nonemployment. Furthermore, extended periods of nonwork are likely to have negative effects on individuals' motivation and work habits. Even when nonemployment has no real effect on productivity, potential employers may *assume* that it does and decline to hire applicants with extensive gaps in their work histories.<sup>16</sup>

Researchers have used the NLS extensively to identify the determinants of early-career nonemployment and assess its costs. This section summarizes a sample of studies that explore search efforts undertaken by unemployed youth, the effects of unemployment on subsequent wages, and the determinants of unemployment. For a more wide-ranging review of this topic (that also focuses on NLS-based research), readers are referred to Howe and Frazis (1992).

#### 5.A. Search methods

The Youth cohort of the NLS has asked respondents hypothetical questions about jobs and wages they might be offered to aid researchers in understanding their willingness to work. Borus (1982) analyzes the responses to a set of questions from the 1979 interview in which respondents were asked whether they would accept jobs in seven different occupations if they were paid, alternatively, \$2.50, \$3.50, and \$5.00 per hour. The seven occupations are typical "youth" jobs and included washing dishes, working in a factory, working as a supermarket cashier, and cleaning up neighborhoods. Borus regresses respondents' yes/no answers on a set of demographic, family background, and environmental characteristics and finds that increases in county-wide unemployment rates are associated with increases in young people's reported willingness to work at fairly low-level jobs for only \$2.50 per hour (which is below the prevailing minimum wage). Furthermore, increases in county-wide per capita income are associated with decreases in the same dependent variable. These relationships are consistent with search theory, which predicts that labor force participants should lower their "reservation wages" (and, in some sense, increase their willingness to work) in response to poor economic conditions.

The questions analyzed by Borus are hypothetical and, as a result, do not necessarily reflect

---

<sup>16</sup>These arguments are made throughout the literature. See, for example, Becker and Hills (1983) and Lynch (1989).

the search behavior of unemployed youth. Holzer (1987, 1988) makes use of a more revealing set of questions in the 1981 NLSY in which job seekers are asked to identify the method or methods actually used to find a job. In addition, they are asked which methods generated job offers and job acceptances, and how long each method was used. Holzer (1988) finds that informal methods—specifically, advice from friends/relatives and direct, unsolicited job applications—are far more popular among youth than state employment agencies, newspapers, or other methods. More than 80% of unemployed youth report using these informal methods, with 18% of those using them receiving an offer and 12-14% accepting an offer. Barely more than half the unemployed youth use the remaining types of methods, with only 8-10% receiving and 4-5% accepting a job offer. From these figures, it appears that job seekers behave rationally by relying on those methods that have lower costs and higher expected returns. This finding is borne out in Holzer's econometric analysis.

In his 1987 paper, Holzer focuses on the special problems faced by black job seekers. He shows that blacks are less likely than whites to use each of the five search methods listed above, and are also less likely to receive a job offer from any given method. This is particularly true of the direct application method: 21% of whites using this method receive an offer, while only 9% of blacks do so. In fact, Holzer finds that differences in the efficacy of the two informal search methods account for almost 90% of the difference in employment probabilities between blacks and whites. This is not due to an unwillingness among blacks to accept job offers, but rather to an inability to generate offers using informal search methods. Holzer's finding puts the unemployment problem facing black youth in a rather grim light by suggesting that such environmental factors as inadequate social contacts, a lack of nearby job vacancies, and employer discrimination may be important barriers to employment.

Wolpin (1987) and Stern (1989) both use the NLSY to estimate structural search models which yield estimates of such parameters as reservation wages, application costs, and the probability of receiving an offer. With these estimates in hand, they are able to predict the effects of hypothetical government subsidies on expected unemployment durations. Wolpin finds that a government program that helps to lower search costs (*e.g.*, by transmitting information between employers and job seekers) will actually increase expected search durations. This occurs

because unemployed youth raise their reservation wages and effectively “hold out” for better jobs in response to the subsidy. A smaller, but qualitatively similar effect is found by Stern when he introduces a 10% increase in search costs and finds that expected search durations fall by 8%. A government program that increases the probability of an offer being received in a given period of time could have the same effect, but Wolpin finds that it serves to lower expected search durations. For example, raising the offer probability from 1% to 5% lowers expected unemployment durations by 60%. Although these studies produce estimates that are theoretically plausible, it should be noted that a number of restrictive assumptions are made in order to implement the estimation techniques. As a result, the findings should be viewed as merely suggestive until further refinements of the models are undertaken.

#### **5.B. Effects of unemployment on wages**

It is widely believed that unemployment is quite costly, particularly if it occurs frequently or for prolonged periods of time. Not only does unemployment often result in a loss of current income, but it can cost workers additional human capital and, as a result, decrease future wages. In addition, employers might assume that past unemployment experiences reflect a lack of productivity, and pay workers less than they otherwise would.

Becker and Hills (1980, 1983) investigate these propositions by controlling for past unemployment experiences in a wage function. Using data from the Young Men cohort of the NLS, Becker and Hills (1983) select a sample of individuals who leave high school in 1966, 1967, or 1968. They observe each individual’s unemployment experiences during the year he leaves high school and the following year, and then see how it is related to wages earned in 1976. They find that individuals who experience no unemployment during the first two years after high school earn the highest wages several years later, with individuals who undergo two or more job changes earning slightly more than those who stay with their initial employer. Early-career unemployment experiences have a negative effect on 1976 wages, especially if the unemployment is long-lived. White men who experience 5 weeks of unemployment earn \$6.01 per hour, on average, in 1976, while those with 26 weeks of unemployment earn only \$5.11. For black men, the corresponding figures are \$4.86 and \$3.97. It is not possible to tell whether a lack of human capital accumulation

is responsible for these long-run effects, but it is clear that prolonged early-career unemployment is associated with fairly substantial wage loss.

Investigations of the type undertaken by Becker and Hills are inherently limited, for only individuals who succeed in leaving nonemployment are selected into the sample. Any negative effects of nonemployment are underestimated because the chronically nonemployed (who are likely to experience the greatest losses) are missing from the analysis. Furthermore, only part of the story is told by efforts to link nonemployment at one point in the career with wages in another. The more pressing issue is whether the individual who succeeds in finding a job will retain it, or whether her past nonemployment experiences increase the likelihood that she returns to nonemployment. The determinants and costs of nonemployment are best assessed in a more dynamic framework than the one used by Becker and Hills.

### 5.C. Persistence in unemployment

For the reasons stated above, researchers have focused more attention on learning whether unemployment or nonemployment is a persistent event than on determining its effects on future wages. The questions that have been posed in the literature include the following:

- Does the fact that an individual experienced some amount of nonemployment in the past increase the likelihood of his becoming nonemployed? This type of relationship is referred to as *occurrence dependence* by Heckman and Borjas (1980).
- Does the *duration* of past nonemployment spells have an effect on the duration of a current spell? Heckman and Borjas (1980) refer to this as *lagged duration dependence*.
- Does the duration or intensity of past employment experiences affect the duration of a current nonemployment spell? This issue is raised because controlling for past nonemployment durations is not equivalent to controlling for the amount of employment experience that has been gained. For example, individuals who were nonworkers for two of the last five years may have all gained three years of work experience, but the number of hours worked could vary considerably. There is even more ambiguity when the data allow for a distinction between employment, unemployment, and other types of nonwork.



- Does the current duration of a nonemployment spell affect the probability that it will end in the next period? Throughout the literature, this type of relationship is referred to as *duration dependence* (e.g., Heckman and Borjas (1980), Flinn and Heckman (1982)). If spells grow less likely to end the longer they last, the hazard rate out of nonemployment is said to exhibit negative duration dependence.
- If “dependence effects” are found, are they real or do they merely reflect unobserved heterogeneity? For example, occurrence dependence could arise because nonemployment experiences cause individuals to be stigmatized or to lose valuable skills. These effects, in turn, would contribute directly to the likelihood that they are laid off or fired in the future. However, occurrence dependence could just as well reflect the fact that some people have unobserved, time-invariant qualities that make them chronic nonworkers, while others do not. This type of population heterogeneity would lead to repeated nonemployment spells for some people, but it would not be the case that nonemployment experiences *cause* future nonemployment. To distinguish between true and spurious dependence effects, researchers must carefully control for unobserved, underlying heterogeneity.

In one of the first studies to define and examine these issues, Heckman and Borjas (1980) use data for white, high school graduates from the Young Men cohort. To be selected into the sample, individuals had to complete high school by 1969 and be observed from that point through the 1971 interview. As a result, the analysis is restricted to the first 2-3 years after high school graduation. Heckman and Borjas estimate a continuous time model of heterogeneity and state dependence which, operationally, amounts to using *differences* in durations between successive employment and nonemployment spells as dependent variables in a linear regression model. They find no evidence of occurrence dependence or lagged duration dependence in either type of spell, after controlling for unobserved, individual heterogeneity. They find weak evidence of *positive* duration dependence for both nonemployment and employment spells, which means the probability of leaving a spell increases as the spell wears on. While this latter result is theoretically plausible (especially for nonemployment spells, since job seekers are entirely likely to lower their reservation wages as their unemployment spell wears on), Heckman and Borjas warn that this finding is not

very robust because it is based on untested distributional assumptions.

Lynch (1989b) uses data from the NLSY to reexamine the subject of duration dependence. She selects a sample of men and women who experience an employment spell followed by a nonemployment spell, and estimates a proportional hazard model (separately by gender) for each type of spell. In estimating the nonemployment hazard, she controls for a large array of observables that are intended to proxy the probability of receiving a job offer and the probability of accepting an offer. These controls include local unemployment rates, race, schooling, job training, health and marital status, and the duration of the last nonemployment spell. She finds strong evidence for negative duration dependence—that is, as a nonemployment spell wears on, the probability of reemployment falls. This inference is made in the absence of a rigorous correction for unobserved heterogeneity, but Lynch performs a number of experiments to assess the effect of unobserved factors and argues that they do not bias her results.

Lynch also uses her hazard model estimates to predict expected nonemployment durations for various gender-race groups. Her estimates imply that a white male with “typical” characteristics (including only 11 years of schooling) can expect a nonemployment spell to last 7.2 weeks. If he completes college, this duration falls to 2.6 weeks; if he is nonwhite, the duration is 14.1 weeks. A “typical” woman with only 11 years of schooling can expect her current nonemployment spell to last 5.4 weeks if she is white and 24 weeks if she is nonwhite. For a white, female, college graduate, the expected nonemployment duration is 1.2 weeks. With these predictions, Lynch underscores the fact that nonemployment durations depend strongly on demographic characteristics and other personal, job-related, and market characteristics in addition to individuals’ past nonemployment experiences.

Stephenson (1982), McCall (1989), and Omori (1994) focus on the relationships between past employment experience and current nonemployment spells. Stephenson examines individuals from the Young Women cohort who leave school in 1970, do not attend college, and report complete work histories between 1970 and 1973. He models the transition from nonwork to work as a function of several personal and market-related characteristics, as well as employment experiences gained prior to becoming nonemployed. His results, however, are mixed: he finds that having held a job in high school increases the rate of transition from nonemployment to employment, but that

having held a job at the time of *leaving* high school lowers the transition rate.

McCall (1989) uses tenure on the last job as his measure of past employment experience. Using data from the 1979-86 NLSY, he focuses specifically on nonemployment spells following the first job after leaving school. Furthermore, he looks only at individuals who left their first jobs for reasons other than pregnancy and the end of temporary work, in order to eliminate those nonemployment experience that are, in some sense, expected or desired. He models the log of the nonemployment duration as a function of personal and environmental characteristics, plus the log of tenure on the preceding job. Since "old" tenure and current joblessness are interrelated, he also corrects for the endogeneity of the tenure measure by substituting predicted values. He finds that tenure on the preceding job is associated with decreased nonemployment durations for women, but not for men. For women, an increase in tenure on the last job from six months to one year is associated with a seven week decline in the expected duration of nonemployment. In light of this evidence, McCall argues that workers who accumulated more tenure on their last job also accumulated more human capital, and so they have an added incentive to search intensively for a new job in order to put their skills to use. Why this effect is gender-specific is left unanswered.

Omori (1994) estimates a proportional hazard model for nonemployment spells using data for white, college educated males from the 1979-87 NLSY. He controls for scores of observable factors including past employment and nonemployment experiences, and also controls for unobserved, individual heterogeneity. He finds that cumulative past nonemployment experience has a negative, but statistically insignificant effect on the hazard rate out of nonemployment. However, he finds that the hazard rate is higher for the first-time nonemployed than for individuals experiencing a repeat nonemployment spell. Omori interprets this as evidence that young people "learn to search through search"—that is, the job search skills acquired during their previous nonemployment spells help them to leave subsequent nonemployment more quickly. In addition, he finds that the months of employment gained prior to the current nonemployment spell and the number of hours worked both have small, positive, statistically significant effects on the hazard rates. This is consistent with McCall's argument that previous employment experience gives workers the skills or motivation needed to find a job when they find themselves out of work.

## 6. CONCLUDING COMMENTS

As the research summarized in this report makes clear, a young person's transition from school to work does not necessarily occur at an easily identified point in time. Instead, many students acquire sizeable amounts of work experience before they ever leave school, while others gain very little work experience by the time they are months or even years out of school. Furthermore, many young people intersperse spells of formal schooling or job training throughout their early careers, which indicates that the transition from school to work is not a "once and for all" event.

Because the transition from school to work is such a complex phenomenon, understanding why young workers differ in their career outcomes is not an easy task. Young people experience multiple and often overlapping spells of formal schooling, on-the-job training, off-the-job training, employment, job search, and nonemployment. These transitions lead to frequent, unobserved changes in their skill levels and, more generally, in their productivity levels, and also in the perceptions that others (especially current and potential) employers have of them. To understand why one young person earns more than another, or why one is continuously employed while another is not, researchers must unravel the relationships between all of these observed and unobserved factors.

The data contained in the Young Men, Young Women, and Youth cohorts of the NLS are unrivaled in their ability to allow researchers to understand the various events that characterize the early career. This report has reviewed a portion of the literature that uses the NLS to address such topics as:

- How work while in school affects subsequent schooling decisions, labor supply, wages, and other measures of labor market "success," both in the short run and in the long run.
- Why work experience affects wages, and how to assess its effects.
- Which young workers receive job training and how it affects wages.
- How the quantity and quality of formal schooling affect wages, and how to assess the returns to schooling.

- Which young people choose to make discontinuous schooling investments, and how it affects wages.
- Which young people choose to substitute a high school equivalency exam for a regular diploma, and how it affects wages.
- Why job mobility is so common in the early career, and how it affects wages.
- Why nonemployment is so common in the early career, and how it affects future wages and labor supply.

Because of the importance of the issues and the richness of the data, the body of research that explores these and other aspects of school-to-work transitions will invariably grow in the years to come.

## REFERENCES

- Antel, John J. "The Wage Effects of Voluntary Labor Mobility With and Without Intervening Unemployment." *Industrial and Labor Relations Review* 44 (January 1991): 299-306.
- Bartel, Ann P. and George J. Borjas. "Wage Growth and Job Turnover: An Empirical Analysis." In Sherwin Rosen, editor, *Studies in Labor Markets*. Chicago: University of Chicago Press, 1981.
- Becker, Brian E. and Stephen M. Hills. "Teenage Unemployment: Some Evidence of Long-Run Effects on Wages." *The Journal of Human Resources* 15 (Summer 1980): 354-372.
- \_\_\_\_\_ and \_\_\_\_\_. "The Long-Run Effects of Job Changes and Unemployment Among Male Teenagers." *The Journal of Human Resources* 17 (Spring 1983): 197-212.
- Becker, Gary S. "Investment in Human Capital: A Theoretical Analysis." *Journal of Political Economy* 70 (October 1962 Supplement): 9-49.
- \_\_\_\_\_. *Human Capital: A Theoretical Analysis with Special Reference to Education*. New York: Columbia University Press, 1964.
- Bishop, John H. "The Productivity Consequences of What is Learned in High School." *Journal of Curriculum Studies* 22 (March/April 1990): 101-126.
- Blackburn, McKinley L. and David Neumark. "Omitted-Ability Bias and the Increase in the Return to Schooling." *Journal of Labor Economics* 11 (July 1993): 521-544.
- Blau, Francine D. and Lawrence M. Kahn, "Race and Sex Differences in Quits by Young Workers." *Industrial and Labor Relations Review* 34 (July 1981): 563-577.
- Borjas, George J. and Sherwin Rosen, "Income Prospects and Job Mobility of Younger Men." In Ronald G. Ehrenberg, editor, *Research in Labor Economics*, Volume 3. Greenwich, CT: JAI Press, 1980.
- Borus, Michael E. "Willingness to Work Among Youth." *The Journal of Human Resources* 17 (Fall 1982): 581-593.
- \_\_\_\_\_ and Susan A. Carpenter. "Choices in Education." In Michael E. Borus, editor, *Pathways to the Future*, Volume 2. Columbus, OH: Center for Human Resource Research, The Ohio State University, 1982.
- Burdett, Kenneth, "A Theory of Employee Job Search and Quit Rates." *American Economic Review* 68 (March 1978): 212-220.
- Cameron, Stephen V. and James J. Heckman. "Educational and Training Transitions: Determinants of Youth Schooling and Training Transitions." Chicago: University of Chicago mimeo, March 1990.
- \_\_\_\_\_ and \_\_\_\_\_. "The Nonequivalence of High School Equivalent." *Journal of*

*Labor Economics* 11 (January 1993, Part 1): 1-47.

D'Amico, Ronald. "Does Employment During High School Impair Academic Progress?" *Sociology of Education* 57 (July 1984): 152-64.

\_\_\_\_\_. "Why Does Work in High School Matter?" In Ronald D. D'Amico, et al., *Pathways to the Future*, Volume 6. Columbus, OH: Center for Human Resource Research, The Ohio State University, 1986.

\_\_\_\_\_ and Paula Baker. "The Nature and Consequences of High School Employment." In Paula Baker et al., *Pathways to the Future*, Volume 4. Columbus, OH: Center for Human Resource Research, The Ohio State University, 1984.

Donohue, John J. "Determinants of Job Turnover of Young Men and Women in the United States: A Hazard Rate Analysis." In T.P. Schultz, editor, *Research in Population Economics*, Volume 6. Greenwich, CT: JAI Press, 1988.

Farber, Henry S. "Evaluating Competing Theories of Worker Mobility." Washington, D.C.: NLS Discussion Paper 92-5, March 1992.

Filer, Randall K. "The Usefulness of Predicted Values for Prior Work Experience in Analyzing Labor Market Outcomes for Women." *The Journal of Human Resources* 28 (Summer 1993): 518-537.

Flinn, Christopher J. "Wages and Job Mobility of Young Workers." *Journal of Political Economy* 94 (June 1986): 88-110.

\_\_\_\_\_ and James J. Heckman. "New Methods for Analyzing Structural Models of Labor Force Dynamics." *Journal of Econometrics* 18 (January 1982): 115-168.

Garvey, Nancy and Cordelia Reimers. "Predicted Vs. Potential Work Experience in an Earnings Function for Young Women." In Ronald Ehrenberg, editor, *Research in Labor Economics*, Volume 3. Greenwich, CT: JAI Press, 1980.

Griliches, Zvi. "Schooling Interruptions, Work While in School and the Returns from Schooling." *Scandinavian Journal of Economics* 82 (1980): 291-303.

\_\_\_\_\_. "Wages of Very Young Men." *Journal of Political Economy* 84 (August 1976, Part 2): S69-S85.

\_\_\_\_\_. "Estimating the Returns to Schooling: Some Econometric Problems." *Econometrica* 45 (January 1977): 1-22.

Hashimoto, Masanori. "Firm-Specific Human Capital as a Shared Investment." *American Economic Review* 71 (June 1981): 475-482.

Haveman, Robert H. and Barbara L. Wolfe. "Schooling and Economic Well-Being: The Role of Nonmarket Effects." *The Journal of Human Resources* 19 (Summer 1984): 377-407.

Heckman, James J. and George J. Borjas. "Does Unemployment Cause Future Un-

employment? Definitions, Questions and Answers from a Continuous Time Model of Heterogeneity and State Dependence." *Economica* 47 (August 1980): 247-283.

Holzer, Harry J. "Informal Job Search and Black Youth Unemployment." *American Economic Review* 77 (June 1987a): 446-452.

\_\_\_\_\_. "Job Search by Employed and Unemployed Youth." *Industrial and Labor Relations Review* 40 (July 1987b): 601-611.

\_\_\_\_\_. "Search Method Use by Unemployed Youth." *Journal of Labor Economics* 6 (January 1988): 1-20.

Howe, David K. and Harley J. Frazis. "What Researchers have Learned from the National Longitudinal Surveys About Youth Unemployment." Washington, D.C.: Bureau of Labor Statistics Report 828, August 1992.

Johnson, William R. "A Theory of Job Shopping." *Quarterly Journal of Economics* 92 (May 1978): 261-277.

Jovanovic, Boyan. "Job Matching and the Theory of Turnover." *Journal of Political Economy* 87 (October 1979a): 972-990.

\_\_\_\_\_. "Firm Specific Capital and Turnover." *Journal of Political Economy* 87 (December 1979b): 1246-1260.

Klerman, Jacob Alex and Lynn A. Karoly. "The Transition to Stable Employment: Milling Around?" Santa Monica, CA: RAND mimeo, December 1993.

Lazear, Edward P. "Schooling as a Wage Depressant." *The Journal of Human Resources* 12 (Spring 1977): 164-176.

Light, Audrey. "The Effects of Interrupted Schooling on Wages." *The Journal of Human Resources* (in press).

\_\_\_\_\_. "Labor Supply Fluctuations and the Decision to Reenroll in School." Columbus, OH: The Ohio State University mimeo, June 1993.

\_\_\_\_\_. "When Does the Career Begin?" Columbus, OH: The Ohio State University mimeo, February 1994.

\_\_\_\_\_ and Kathleen McGarry. "Job Change Patterns and the Wages of Young Men." Los Angeles: UCLA mimeo, March 1993.

\_\_\_\_\_ and Manuelita Ureta. "Panel Estimates of Male and Female Job Turnover Behavior: Can Female Nonquitters be Identified?" *Journal of Labor Economics* 10 (April 1992): 156-181.

\_\_\_\_\_ and \_\_\_\_\_. "Early Career Work Experience and Gender Wage Differentials." Columbus, OH: The Ohio State University mimeo, December 1993.

Lillard, Lee A. and Hong W. Tan. "Private Sector Training: Who Gets it and What Are Its Effects?" In Ronald Ehrenberg, editor, *Research in Labor Economics*, Volume



13. Greenwich, CT: JAI Press, 1992.

Lynch, Lisa. "The Role of the Private Sector in Training." In *Proceedings of the 42nd Annual Meeting of the Industrial Relations Research Association*. Atlanta: Industrial Relations Research Association, 1989a.

\_\_\_\_\_. "The Youth Labor Market in the Eighties: Determinants of Reemployment Probabilities for Young Men and Women." *Review of Economics and Statistics* 71 (February 1989b) 37-45.

\_\_\_\_\_. "The Role of Off-the-Job vs. On-the-Job Training for the Mobility of Women Workers." *American Economic Review* 81 (May 1991a): 151-156.

\_\_\_\_\_. "The Impact of Private Sector Training on Race and Gender Differentials and the Career Patterns of Young Workers." Washington, D.C.: NLS Discussion Paper 92-8, July 1991b.

\_\_\_\_\_. "Private Sector Training and the Earnings of Young Workers." *American Economic Review* 82 (March 1992): 299-312.

Marcus, Richard D. "Measuring the Rate of Return to Interrupted Schooling." *Journal of Educational Statistics* 9 (Winter 1984): 295-310.

\_\_\_\_\_. "Earnings and the Decision to Return to School." *Economics of Education Review* 5 (1986): 309-317.

Maxwell, Nan L. "The Effect on Black-White Wage Differences of Differences in the Quantity and Quality of Education." *Industrial and Labor Relations Review* 47 (January 1994): 249-264.

McCall, Brian P. "An Empirical Analysis of Youth Joblessness Durations." In *Proceedings of the 42nd Annual Meeting of the Industrial Relations Research Association*. Atlanta: Industrial Relations Research Association, 1989.

Michael, Robert T. and Nancy Brandon Tuma. "Youth Employment: Does Life Begin at 16?" *Journal of Labor Economics* 2 (October 1984): 464-476.

Mincer, Jacob. "Investment in Human Capital and Personal Income Distribution." *Journal of Political Economy* 66 (August 1958): 281-302.

\_\_\_\_\_. *Schooling, Experience and Earnings*. New York: Columbia University Press, 1974.

\_\_\_\_\_ and Boyan Jovanovic. "Labor Mobility and Wages." In Sherwin Rosen, editor, *Studies in Labor Markets*. Chicago: University of Chicago Press, 1981.

Oi, Walter. "Labor as a Quasi-Fixed Factor." *Journal of Political Economy* 70 (December 1962): 538-555.

Omori, Yoshiaki. "The Job-to-job Transition Rate Among Young College-Educated Men." Storrs, CT: University of Connecticut mimeo, June 1993.

\_\_\_\_\_. "The Stigma Effects of Non-Employment." Storrs, CT: University of Connecticut mimeo, January 1994.

Parsons, Donald O. "The Job Search Behavior of Employed Youth." *Review of Economics and Statistics* 73 (November 1991): 597-604.

Ruhm, Christopher. "Is High School Employment Consumption or Investment?" Greensboro, NC: University of North Carolina at Greensboro mimeo, February 1994.

Rumberger, Russel and Thomas Daymont. "The Effects of High School Curriculum on Labor Market Success." In Michael E. Borus, editor, *Pathways to the Future*, Volume 2. Columbus, OH: Center for Human Resource Research, The Ohio State University, 1982.

Santos, Richard. "The Employment Status of Youths." In Michael E. Borus, editor, *Pathways to the Future*, Volume 1. Columbus, OH: Center for Human Resource Research, The Ohio State University, 1981.

\_\_\_\_\_. "Employment Prospects of Unemployed Youth." In Michael E. Borus, editor, *Pathways to the Future*, Volume 2. Columbus, OH: Center for Human Resource Research, The Ohio State University, 1982.

Spletzer, James R. "Post-Secondary Education and Labor Supply in the Early Stages of the Life Cycle." Ph.D. Dissertation, Northwestern University, 1990.

Steel, Lauri. "Early Work Experience Among White and Non-White Youths: Implications for Subsequent Enrollment and Employment." *Youth and Society* 22 (1991): 419-47.

Stephenson, Stanley P. "From School to Work." *Youth and Society* 11 (September 1979): 114-132.

\_\_\_\_\_. "In-School Labour Force Status and Post-School Wage Rates of Young Men." *Applied Economics* 13 (1981a): 279-302.

\_\_\_\_\_. "Young Women and Labor: In-School Labor Force Status and Early Postschool Labor Market Outcomes." *Youth and Society* 13 (December 1981b): 123-155.

\_\_\_\_\_. "Work in College and Subsequent Wage Rates." *Research in Higher Education* 17 (1982a): 165-178.

\_\_\_\_\_. "A Turnover Analysis of Joblessness for Young Women." In Ronald Ehrenberg, editor, *Research in Labor Economics*, Volume 5. Greenwich, CT: JAI Press, 1982b.

Stern, David and Yoshi-Fumi Nakata. "Characteristics of High School Students' Paid Jobs and Employment Experience After Graduation." In David Stern and Dorothy Eichorn, editors, *Adolescence and Work: Influences of Social Structure, Labor Markets, and Culture*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1989.

Stern, Steven. "Estimating a Simultaneous Search Model." *Journal of Labor Economics* 74 (July 1989): 348-369.

Wolpin, Kenneth I. "Estimating a Structural Search Model: The Transition From School to Work." *Econometrica* 55 (July 1987): 801-817.

\_\_\_\_\_. "The Determinants of Black-White Differences in Early Employment Careers: Search, Layoffs, Quits, and Endogenous Wage Growth." *Journal of Political Economy* 100 (June 1992): 535-560.

Table 1  
Summary of Findings on the Extent to Which Work and School Are Combined

Study	NLS Cohort	Sample	Measure of In-School Work	Selected Findings
D'Amico (1984, 1986) D'Amico & Baker (1984)	Y, 1979-82	Grades 9-12	Percent of weeks worked during school year	50% (75%) of white men work in grade 10 (12), 15% (57%) for more than half the year; less for minorities, women.
Griliches (1980)	YM, 1966-70	Complete at least grade 10 by 1970	Cumulative work experience while in school	48% work in high school, 63% in college; 24% average at least 20 hours a week.
Light (1994)	Y, 1979-91	First leave school in 1978-91	Hold job at time of last observed exit from school	48% of white men hold job, work 60% of last year of school, on average; college students work more than others.
Michael & Tuma (1984)	Y, 1979	Ages 14-17, in school in 1979	Whether employed week prior to 1979 interview	25% of 14 year olds work, 51% of 17 year olds; men more than women, whites more than blacks or Hispanics.
Ruhm (1994)	Y, 1979-91	Grade 9-10 in 1979	Whether employed interview week, grades 10-12; hours/week and weeks/academic year	28% of sophs, 43% of juniors, 50% of seniors work; seniors work 19 hrs/week, 52% of academic year, on average.
Steel (1991)	Y, 1979-81	Ages 17-18 in 1979	Whether employed at time of 1979 interview	58% of whites work, 41% of Hispanics, 35% of blacks; all average about 25 hours a week.
Stephenson (1979, 1981a, 1982)	YM, 1966-71	In school one year, out of school next; 1966-71	Whether working FT or PT or unemployed while in school	29% of whites work FT, 33% PT, 7% unemployed; less FT, PT work for blacks, more unemployment.
Stephenson (1981b)	YW, 1968-78	In school one year, out of school next;	Whether working FT or PT or unemployed while in school	46% work FT, 11% PT, 9% unemployed; (blacks and whites combined).
Stern & Nakata (1989)	Y, 1979-82	HS senior in 1979; terminal HS grads	Whether employed week prior to 1979 interview	51% work; average about 16 hours a week in 1978-79.

Note: Y=Youth, YM=Young Men, YW=Young Women.

Table 2

## Summary of Research on the Causes and Consequences of Reenrolling in School

Study	NLS Cohort	Sample	Model	Selected Findings
Borus and Carpenter (1982)	Y, 1979-80	Male and female high school dropouts	Probability that '79 dropouts reenroll by '80	Probability falls with age; most family, school characteristics insignificant.
Griliches (1980)	YM, 1966-70	Out of school and working in 1970	1970 cross-sectional wage function	Past school interruptions have positive but insignificant effect on log-wage.
Light (1993)	Y, 1979-89	White men who leave school in 1978-89	Hazard for waiting time to reenrollment	Unemployment reduces waiting time to reenrollment
Light (in press)	Y, 1979-89	White men who leave school in 1978-89	1979-89 wage function	Schooling increments raise wages, but less than "early" school
Marcus (1984)	YM, 1966-73	Out of school and working in 1973	1973 cross-sectional wage function	No wage penalty to interrupting school if break is short.
Marcus (1986)	YM, 1966-73	Men with usable 1966-73 enrollment histories	Probability of reenrolling, 1966-73	Positive "earnings luck" has little effect on reenrollment probability.

Note: Y=Youth, YM=Young Men.

Table 3  
Summary of Research on the Determinants of Job Mobility

Study	NLS Cohort	Sample	Model	Selected Findings
Blau and Kahn (1981)	YM, 1969-71; YW, 1970-2	Out of school and employed	Probability of quitting job between surveys	Tenure has strong negative effect, especially for men.
Borjas and Rosen (1980)	YM, 1971-75	Whites, out of school and employed	Probability of changing job between surveys	Tenure has strong negative effect; industry is determinant of mobility
Farber (1992)	Y, 1979-88	Nonmilitary, out of school	Hazard for job separations	Hazard rate <i>rises</i> with tenure for first 3 months, then falls.
Mincer and Jovanovic (1981)	YM, OM, 1967-73	No selection criteria given	Probability of changing job between surveys	Tenure has strong negative effect; number of past jobs has no effect.
Light and Ureta (1992)	YM, 1966-81; YW, 1968-85	Out of school and employed, ages 24-31	Hazard for job separations	Hazard rate falls with tenure, especially for men.
Omori (1993)	Y, 1979-87	Men, out of school, attended college	Hazard for job-to-job separations	Hazard rate <i>rises</i> with tenure for first 6 months, then falls.

Note: Y=Youth, YM=Young Men, YW=Young Women, OM=Older Men.

Table 4

## Summary of Research on the Persistence of Nonemployment

Study	NLS Cohort	Sample	Model	Selected Findings
Heckman and Borjas (1980)	YM, 1969-71	White high school graduates; leave school in 1969	Change in employment, unemployment durations	No evidence that past unemployment increases duration of current unemployment.
Lynch (1989b)	Y, 1982-83	Not employed, in school or in military in 1982	Hazard for nonemployment durations	Probability of reemployment falls with time, especially for men
McCall (1989)	Y, 1979-86	Leave school, leave first job during observation period	Duration of first nonemployment spell	Duration of past job decreases nonemployment spell for women only.
Omori (1994)	Y, 1979-87	White, college educated men	Hazard for nonemployment durations	Length of past nonemployment increases duration of current nonemployment.
Stephenson (1982)	YW, 1970-73	Leave school in 1970, no college attendance	Transition rates between employment and nonemployment	White women leave nonwork faster than black women.

Note: Y=Youth, YM=Young Men, YW=Young Women.

**National Longitudinal Surveys (NLS)  
Discussion Paper Series**

<u>Number</u>	<u>Author</u>	<u>Title</u>
01	Michael R. Pergamit	How the Federal Government Uses Data from the National Longitudinal Surveys
02	Norman M. Bradburn Martin R. Frankel Reginald P. Baker Michael R. Pergamit	A Comparison of Computer-Assisted Personal Interviews (CAPI) with Paper-and Pencil Interviews (PAPI) in the National Longitudinal Survey of Youth
03	Saul Schwartz Robert Hutchens George Jakubson	Dynamic Models of the Joint Determination of Labor Supply and Family Structure
04	A. Colin Cameron R. Mark Gritz Thomas MaCurdy	The effects of Unemployment Compensation on the Unemployment of Youth
05	Henry S. Farber	Evaluating Competing Theories of Worker Mobility
06	Frank L. Mott Paula Baker	Evaluation of the 1989 Child-care Supplement in the National Longitudinal Survey of Youth
07	Audrey Light Manuelita Ureta	Gender Differences in the Quit Behavior of Young Workers
08	Lisa M. Lynch	The Impact of Private Sector Training on Race and Gender Wage Differentials and the Career Patterns of Young Workers
09	Evangelos M. Falaris H. Elizabeth Peters	Responses of Female Labor Supply and Fertility to the Demographic Cycle
10	Anne Hill June E. O'Neill	A Study of Intercohort Change in Women's Work Patterns and Earnings
11	Arleen Leibowitz Jacob Alex Klerman Linda Waite	Women's Employment During Pregnancy and Following Birth
12	Lee A. Lillard	Work Experience, Job Tenure, Job Separation, and Wage Growth
13	Joseph G. Altonji Thomas A. Dunn	Family Background and Labor Market Outcomes



14	George J. Borjas Stephen G. Bronars Stephen J. Trejo	Self-Selection and Internal Migration in the United States
15	James J. Heckman Stephen V. Cameron Peter Z. Schochet	The Determinants and Consequences of Public Sector and Private Sector Training
16	R. Mark Gritz Thomas MaCurdy	Participation in Low-Wage Labor Markets by Young Men
17	Alan L. Gustman Thomas L. Steinmeier	Retirement in a Family Context: A Structural Model for Husbands and Wives