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**ABSTRACT**

This paper examines the impacts of work experience acquired while youth were in high school (and college) on young men's wage rates during the 1980s and 1990s. Previous studies have found evidence of sizeable and persistent rates of return to working while enrolled in school, especially high school, on subsequent wage growth. Such findings may represent causal effects of having acquired work experience while still enrolled in school, but they may also be the result of failure to fully account for individual differences in young adults' capacities to acquire such skills and be productive in the work force later in life. We re-examine the *robustness* of previous attempts to control for unobserved heterogeneity and selectivity. We explore more general methods for dealing with dynamic forms of selection by explicitly modeling the educational and work choices of young men from age 13 through their late twenties. Using data on young men from the 1979 National Longitudinal Survey of Youth, (NLSY79), we find that the estimated returns to working while in high school or college are dramatically diminished in magnitude and statistical significance when one uses these dynamic selection methods. As such, our results indicate a decided lack of robustness to the inference about the effects of working while in school that has been drawn from previous work.



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## 1. Introduction

The transition from school to work for youth in the U.S. has been the focus of a great deal of academic research and the subject of educational and training policy over the last three decades. A key issue in this transition is the value to youth of acquiring work experience even before they leave high school. Proponents of having youth work while enrolled in school argue that such jobs serve to familiarize them with the world of work, foster the development of personal responsibility, good work habits and attitudes, and knowing how to deal with authority–traits that are essential for successful adult work careers. Furthermore, these early work experiences may provide students opportunities to apply what they have learned in school and learn what it takes to be successful in the world of work. Alternatively, critics of adolescent employment argue that maintaining heavy work schedules during the school year interferes with learning and academic performance and even may encourage students to drop out of school (see review in Schoenhals, Tienda and Schneider, 1998).

The consistency of the empirical evidence on the "returns" to working while in high school varies by the outcome considered. For example, there does not appear to be a consensus about whether working while in school adversely affects a youth's subsequent educational attainment, as measured by school performance (grades), grade completion and persistence in school. However, several studies agree that if there are harmful effects, they result from working substantial numbers of hours per week during the school year.[1]

In contrast, there appears to be an amazing consistency across numerous studies with respect to the effects of working while in (high) school on *subsequent* labor market success. First, a number of studies based on several different data sets find that working while in high school is

[1] See Greenberger and Steinberg (1986), Mortimer and Finch (1986), Barone (1993), Gade and Peterson (1980), Lillydahl (1990), Turner (1994), Eckstein and Wolpin (1998), Schoenhals, Tienda and Schneider (1998), and Tienda and Ahituv (1996). See Donahoe and Tienda (1999) for a review of this literature.

associated with higher employment rates and higher wages later in life.[2] For example, using longitudinal data on individuals who were high school seniors in 1972, Meyer and Wise (1982) find "a strong [positive] relationship between hours of work while in high school and weeks worked per year upon graduation" and that "persons who work while in high school also receive higher hourly wage rates than those who don't" (pp. 278-9). Furthermore, Ruhm (1997) finds "no evidence of detrimental effects of low to moderate amounts of student employment. To the contrary, job-holding in the senior year [of high school] is associated with substantially elevated future economic attainment, whether the latter is measured by earnings, wages, total compensation, occupational status, or the receipt of fringe benefits" (p. 738).

Second, the estimated returns to subsequent employment, wage rates and/or earnings from working while in school appear to be sizeable—between 5-10 percent per year for wage rates—and larger than the returns to either part-time or full-time work experience acquired during early adulthood. Meyer and Wise (1982), for example, estimate returns to wages from a year of post-high school work experience at 3-5 percent, measured four years after graduation, whereas the returns to working while in high school are 6-9 percent.[3]

Third, several studies find that the labor market "gains" for working while in high school persist well after leaving high school.[4] For example, Carr, Wright and Brody (1996) find that the levels of employment and wage rates remain higher among those who worked in high school compared to those who did not as many as 12 years after leaving high school.

[2] See Stevenson (1978), Stephenson (1981), Meyer and Wise (1982), Ehrenberg and Serman (1987), Stern and Nakata (1989), D'Amico (1984), Mortimer and Finch (1986), Marsh (1991), Carr, Wright and Brody (1996), Ruhm (1997), and Chaplin and Hannaway (1997) and Ahituv, Tienda and Hotz (1998).

[3] These effects are net of any differential effects of working while in high school relative to post-graduate work experience have on subsequent employment rates as Meyer and Wise (1982) adjust for the former effects in their analysis. Meyer and Wise also find that the impacts of working while in school have stronger positive effects on the probability of working and hours of work four years after graduation than does post-graduation work experience.

[4] See Carr, Wright and Brody (1996), Ruhm (1997) and Chaplin and Hannaway (1997).

Taken together, these findings give credence to claims that acquiring work experience at early ages is essential for instilling the attitudes and habits that comprise the "work ethic" and that such experiences permanently affect a youth's subsequent success in the world of work. From a policy perspective, such findings provide support for state and local governmental efforts to develop work-based learning and cooperative education programs and for recent federal efforts, under the School-to-Work Opportunities Act of 1994, to encourage such programs.[5]

It is important, however, to ask whether these estimated effects of working while in school on subsequent labor market outcomes are causal or simply spurious correlations. Acquisition of work experience by youth may increase human capital that, in turn, supports higher wage rates and more stable employment later in life. This is the conclusion drawn by Ruhm (1997) in his recent study of the effects of work experience gained while in high school on subsequent wages and employment. He notes that his "investigation indicates that student employment raises future productivity through skills, knowledge, work habits, and experience provided on-the-job by far more than it detracts from educational human capital investments" (p. 770).

It is also conceivable that the estimated relationship between early work experience acquired during high school and subsequent labor market success is spurious. These estimated effects may reflect the persistent role of unobserved (or hard-to-measure) differences in initial skills, ability, and/or familial "connections" that influence both the likelihood that youth acquire early work experience and the degree of labor market success later in life. The potential for such an *unobserved heterogeneity explanation* is noted by Meyer and Wise (1982):

> Working in high school may be an indication of personal characteristics not gained through work, but associated with work in high school as well as greater labor force par-

[5] The School-to-Work Opportunities Act of 1994 provides "venture capital" to states and communities to encourage programs that provide work-based learning opportunities that engage "employers as partners with educators in providing opportunities for all students to participate in high-quality work experiences."

ticipation following graduation. It is not that the demand is greater for persons who work in high school, but that these persons have a greater propensity to work (p. 306).

This argument might explain why several studies have found that the returns to working while in school do not seem to diminish even 10 years after leaving school—a result that seems somewhat inconsistent with plausible models of human capital investment.[6]

In this paper we reconsider the evidence on the positive returns to working while in high school (and college) on the subsequent *wages* of young men.[7] We seek to ascertain the *robustness* of previous findings to controls for unobserved heterogeneity and the selectivity of experience acquisition. Some of the previous studies have attempted to account for this selectivity and the potential correlation between early work experience and subsequent wages due to unobserved persistent factors, such as ability or family background. Commonly instrumental variables (IV) estimators are used to purge the latter relationship of the influence of such selectivity and/or omitted variables. As we discuss below, there are serious questions about the likelihood of finding an adequate set of instruments in this context.

Herein, we employ an alternative strategy for dealing with heterogeneity that has previously not used in this particular literature.[8] Our approach to dealing with heterogeneity is distinct from earlier work on the returns to in-school work in three ways. First, we explicitly model the full range of life cycle school and work choices, the human capital accumulation of youth, and the effects of the latter on subsequent wages from adolescence through early adulthood. More

[6] If higher wages are simply the result of acquiring more work experience (i.e., human capital) and the skills acquired from such experience depreciate over time, one would expect the returns from high school work experience to diminish with age as well as become less important than those from post-graduation work experience, all other things equal.

[7] We restrict our attention to the returns of early work experience for youth's wage growth since wage rates constitute the most commonly measure of an individual's labor market productivity used in labor economics. Ahituv, Tienda and Hotz (1998) examine the consequences of early work experience for employment rates.

[8] The econometric approach we employ has been used by Heckman (1982) to analyze the impacts of work experience on the labor supply of women, by Cameron and Heckman (1994) in analyzing the returns to wages of a GED and by Cameron and Heckman (1996, 1997) in estimating the effects of family background in the grade progression of youth.

precisely, we model the participation decisions of young men with respect to a full set of educational, work and military activities and we model them jointly with the observed wage patterns of those who work.

Second, we attempt to control for unobserved, person-specific heterogeneity by using a factor-analytic, random effects specification adapted from the work of Heckman and Singer (1984). A key issue in the estimation of the effects of earlier events on subsequent choices is the "initial conditions" problem. When estimating parameters generating a stochastic process with dependence among time-ordered outcomes, the process should be initialized at a relevant starting point. The initial conditions problem arises when the sequence of the process has not been modeled. In our application this problem arises if we fail to model the determinants of the entire sequence of initial educational and work choices made by youth.[9] To address this problem, we exploit a particularly rich longitudinal data set—the 1979 National Longitudinal Survey of Youth, (NLSY79)—that contains sufficient information to model virtually all young men's labor market and schooling choices that are likely to be at the discretion of young men. Using this data and the econometric methods noted above and elaborated below allows us to generate relatively robust estimates of the *true* (as opposed to spurious) effects of past work and schooling decisions on subsequent employment and wage outcomes.[10]

The third and final distinguishing feature of our analysis is the use of temporal and geographical variation in local labor market conditions, and thus the demand for labor, facing young men to help identify the effects of early work experience on subsequent labor market outcomes.

[9] See Heckman (1981a, 1981b), Heckman (1982), Flinn and Heckman (1982a, 1982b), and Heckman and Singer (1984) for more on the initial conditions problem in economic contexts and estimation strategies for accounting for this problem in dynamic models of individual-level behavior.

[10] In the terminology of dynamic models, the methods we employ are particularly well-suited to distinguish between structural *lagged occurrence dependence* and unobserved heterogeneity.

Previous studies have found these sources of variation to be crucial in identifying of structural effects of past decisions on subsequent labor market success.[11]

The remainder of the paper is organized as follows. In Section 2, we describe the structure of the longitudinal data taken from the National Longitudinal Survey of Youth (NLSY79) and definitions of variables used in the analysis. Section 3 describes the life cycle patterns of work and schooling experiences of young men from age 13 through age 28. We also examine the life cycle patterns for wages over early adulthood. Consistent with previous studies, our raw data suggests a positive relationship between wage rates and accumulated experience of working while in school. However, we also find that the young men who acquire substantial amounts of such work experience tend to come from more advantaged backgrounds and ultimately tend to achieve higher levels of education. The latter finding indicates potential for the types of endogeneity, or selection bias in attributing the observed correlations between work while in school and subsequent wages noted above.

Section 4 outlines our adaptation of the Cameron-Heckman model for dealing with such forms of selection bias in dynamic settings. Therein, we discuss how our econometric approach and the data we use provide estimates of the effects of lagged choices, such as working while in school, on wages that are robust to certain forms of persistent unobserved heterogeneity. In Section 5, we present the results of our estimation of the returns to early work experience on the wage growth of young men. We find that including a relatively rich set of background conditions and indicators of labor market conditions in wage equations reproduces the positive effects of working while in school on subsequent wages found in previous studies. However, such effects are dramatically diminished in magnitude and statistical significance once we control for unobserved heterogeneity via our random effects specification. As such, our results indicate a decided

[11] See, for example, Cameron and Heckman (1994) and Sanders (1995).

lack of robustness to the inferences about the benefits of working while in school that have been drawn from previous work. We summarize our conclusions from this analysis and their implications in Section 6.

## 2. Data

In this study, we use data on young men from the National Longitudinal Survey of Youth 1979 (NLSY79). The NLSY79 follows a sample of U.S. youth between the ages of 14 to 21 as of 1 January 1979. The original sample consisted of a national probability sample of men and women, and oversamples of several targeted groups–namely blacks, Hispanics, poor whites and military enrollees–from these age cohorts. For most of the sample members interviews were conducted (or attempted) in each subsequent year; we make use of the longitudinal data gathered from the 1979-1990 interviews. Over this 12-year period, the NLSY79 exhibits a low attrition rate of just over 10 percent of the original sample.

These annual interviews gathered detailed information on the respondent's schooling, training and military experiences as well as week-by-week histories of jobs held and their attributes—including occupation, industry, typical hours worked and hourly wage rates. During the initial interview in 1979 an attempt was made to gather some retrospective information on these outcomes, although this information is inevitably incomplete.

In this paper, we use data for men drawn from the national probability sample and the black and Hispanic oversamples. The inclusion of these two oversamples enhances our ability to draw reliable inferences for the black and Hispanic subgroups. We also restrict our analysis to those respondents who were between the ages of 13-16 in 1978 and who would be between 24-28 at the 1990 interview. This restriction was made to ensure that we obtained as complete a set of information as possible on all early employment experiences for these young men. By focusing on these younger cohorts, we avoid heavy reliance on retrospective information about the la-

bor force activities gathered in the initial 1979 interview as would be required for the older cohorts in the NLSY79. Except for individuals who participate in informal, remunerated work prior to the legal age for work (i.e., 14), this sample selection enables us to obtain prospective information on the entire process of school departure and labor market entry. Given these sample restrictions, our analysis sample consists of 2,570 young men, including 1,265 whites, 797 blacks, and 511 Hispanics.

Given our interest in a young men's accumulation of work, schooling and military experiences, we constructed a year-by-year classification of respondents' primary activity at each age, from 13 to 28. Using information form the NLSY79 Work and Schooling Histories and from other parts of its annual surveys, we classified respondents in one of the following six, mutually exclusive, activity categories:

(1) *School Only*;
(2) *School and Part-Time Work*;
(3) *Part-Time Employment (and no School Attendance)*;
(4) *Full-Time Employment*;
(5) *Enlisted in Military*;
(6) *Other (Non-School, Non-Work) Activities*.

In assigning these categories for each person-year, we ascertained if a young man was enlisted in the military during the calendar year when he was age *t*; if so, we classified him as being enlisted in the Military [activity (5)]. We then examined a youth's school attendance and reported hours and weeks worked at age *t*. If the youth reported going to school but not working during the year, they were assigned to either activity (3) or (4). The part-time employment category [activity (3)] was defined to include those young men who, at age *t*: (i) were not enrolled in school and worked less than 35 hours per week, on average and/or (ii) did not start an employment spell that lasted at least 50 weeks of a consecutive 52-week period. Young men at age *t* were classified in activity (4), full-time employment, if they were employed in one or more jobs for 50 weeks out

of a consecutive 52 week period and averaged at least 35 hours per week of work during the calendar year in which they reached age *t*. Of the remaining respondents who reported attending school during the year, they were assigned to activity (1) or (2), depending on whether they reported doing any work activity during the year. A youth of age *t* that was *not* assigned to one of the first six activities, was, by default, assigned to activity (6), which served as the residual category.

The assignment of activities at each age for NLSY79 male respondents form the outcomes in the dynamic, discrete-choice model used in our econometric analysis below. We also used these assignments over time to construct age-specific measures of each of the following types of experience:

(i) years of work experience while attending high school;
(ii) years of work experience while attending college;
(iii) years of part-time, non-school-related, work experience
(iv) years of full-time work experience
(v) years of attending school and not working,
(vi) years enlisted in the military;

as well as the

(vii) number of grades of schooling completed.

We used these activity definitions to construct, at each age, the accumulated number of years since age 13 of the following work "experience" variables: *work while attending high school; work while attending college*; *part-time, non-school-related work*; and *full-time work*. We also constructed the accumulated number of *years spent in school while not working (i.e., years of only schooling)* and *number of grades completed* to distinguish between the effects of school attendance and grade completion. Finally, we included measures of the accumulated number of years *enlisted in the military* and those spent in the residual category of *other activities*.

An important consideration for one of the estimation strategies we employ in Section 4 is the availability of data for the entire histories of work and schooling experiences of young men. Such comprehensive histories are needed to deal with the "initial conditions" problem noted in the Introduction and discussed further in Section 4. Our strategy for measuring a youth's accumulated experiences—and, thus, past choices—at each age exploits the richness of the longitudinal data available in the NLSY79.[12]

As noted in the Introduction, a key feature of the econometric strategy we use for estimating the causal effects of work experience gathered while in school is explicitly modeling the temporal correlation of *all* of the activity choices youth make through early adulthood. Therefore, to explicitly characterize all choices, including the initial ones, we model the annual choices for each youth from age 13 on. While the choice of 13 as the age to initialize the activity-choice process is arbitrary, we think starting at age 13 captures most, if not all, of the "choices" youth make about work, schooling and military activities. As of age 13, 97 percent of all young men in our sample were classified as being in the full-time school activity, Activity (1), with the remaining 3 percent distributed among the school and work activity [Activity (2)]. Thus, we are confident that by starting at age 13, we capture all of the work and military choices that these youth made during their early life course.

In Table 1, we provide descriptive statistics on the work, schooling and military experiences of the men in our sample at various ages. Use of the black and Hispanic oversamples from the NLSY79 allows us to present all tabulations separately by ethnic and racial groups as well as for the full sample. As can be seen from Table 1, among young men the incidence and extent of

[12] We note that several previous studies of the labor market activities of young men—e.g., Wolpin (1989), Lynch (1989), Gritz and MaCurdy (1992)—use accumulated work experience after the respondent had left school. As documented in Ahituv, Tienda, Xu and Hotz (1994) and in evidence presented below, a non-trivial proportion of young men accumulate significant amounts of work experience prior to leaving school. Moreover, these differences vary markedly by race and ethnicity. Thus, our attempt to include all work experience, starting at an early age (such as 13) seems further justified.

working while enrolled in high school and college is relatively high: 92 percent of the full sample worked at some time while enrolled in high school. There are, however, noticeable differences by race and ethnicity. White men were much more likely to work during high school (93 percent) relative to Hispanics (88 percent) or blacks (85 percent). Overall, the young men in our sample spent an average of 2.55 of their years in high school working; as with incidence, whites spent more time working while in high school (2.61 years) as compared to Hispanics (2.43 years) or blacks (2.25 years). Among those who attended college, 42 percent of our sample, work was quite common.[13] For the overall sample, 88 percent worked while in college, with some variation in that incidence across racial and ethnic groups.

Table 1 also provides information about the incidence and extent of other work, school, and military activities for the young men in our sample. As has been well-documented, white men attain substantially more education (an average of 13.36 grades completed) than do black (12.47) or Hispanic men (12.09) and these discrepancies are quite sizable. White men are much more likely to have worked at least one year on a full-time basis than Hispanics or blacks and are less likely to work on a part-time basis while not in school than either minority group[14].

Finally, it worth examining the racial and ethnic differences in the types of work experience acquired by young men. First, white and Hispanic men spent about the same number of years between the ages of 13 and 28 in some sort of work-related activity—9.47 years for whites and 9.42 years for Hispanics—and black men averaged 1 year less in the workforce than either whites or Hispanics (see Table 1). Second, while whites and Hispanics spend about the same amount of their early adulthood working in the civilian labor force, the nature of that experience is quite different. Hispanic men gain much less work experience while attending school and are

[13] As has been well-documented, the incidence of college attendance varies substantially by race and ethnicity, with whites (45 percent) attending college as much higher rates than blacks (31 percent) or Hispanics (28 percent). See Table 1.

[14] Recall that an individual is classified as having worked full-time during a given year if they had worked at least 50

more likely to work at a part-time job (and not attend school) compared to white men. Blacks acquire less full-time and work-while-in-school experience than either whites or Hispanics. Finally, as has been noted by others, black males are more likely to enlist in the military than is the case for white or Hispanic males.[15]

## 3. Simple Relationships between Working while in School and the Differences in Labor Market Wages and other Characteristics

We next examine the raw correlations between working while in high school (and college) and the subsequent wages of young men using the data from the NLSY79. Table 2, presents average wages by employment-enrollment status and the differences in these means for all workers (labeled "Mean Differences in Levels") and in the log of wage rates for individuals who worked at various ages (labeled "Mean Differences in Logs"). The former measure characterizes differences in the *levels* of wages while the latter characterizes *percentage* differences. Estimates are provided for blacks, whites and Hispanics at ages 17, 22, and 27. Both sets of estimates used data for the men in our sample who reported working and had a valid wage rate at the various ages recorded in the Table 2. As the sample sizes recorded in the table indicate, the number of men working—for which we observe a wage rate—vary by age and across race and ethnicity in our sample. Furthermore, these working samples may not be representative of all young men in these age and race/ethnic groups. We defer, until later, any attempt to account for the selectivity of observed wages. Estimates based on econometric methods that account for the potential selectivity of employment (and schooling) choices are presented in Section 5.

As revealed in Table 2, the differences in wages between young men who worked while in high school and those who do not are almost always positive and are typically statistically significant, whether measured in levels or logs. In particular, wages are between 6 to 19 percent

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weeks in the year for an average of at least 35 hours per week.

[15] See Mare and Winship (1984) and Kilburn (1993).

higher among those who worked in high school compared to those who did not at ages 22 and 27—roughly 5 and 10 years after high school graduation. Among those who attended college, the differences in wages between those who worked while in college and those who did not are almost always positive and are statistically significant at age 27 for all groups but blacks.

These estimates are consistent with the literature on the effects of working while in school noted in the Introduction. As found in previous studies, the size of the wage advantages of those who worked while in school do not appear to decline with age. In fact, the wage gap appears to increase from age 22 to 27. These patterns hold for both white and Hispanic men; they do not hold for black men. In fact, wage differences by in-school work status for blacks are not always positive and are seldom significantly different at the ages displayed in the table.

As noted above, the wage data used in Table 2 is for men who worked and had valid wage measures. It is worthwhile to examine how the subsequent employment and enrollment outcomes of young men vary by in-school work experience. In Table 3, we present average differences in mean employment rates according to whether young men worked in school. (Table 3 has much the same format as does Table 2.) Youth who acquired work experience while enrolled in high school or college achieved significantly higher employment rates than their counterparts who did not work. Again, this finding is entirely consistent with the apparent labor market "advantages" of in-school work experiences found in previous studies.[16]

We also provide, in Table 3, estimates of the mean differences in (a) years of non-school related part-time work experience, (b) years of full-time work experience (c) grades completed, and (d) years of school attended since age 13 according to employment-enrollment status. Consistent with the view that acquiring work experience while in school alters a young man's learning and labor force trajectories, these results show that young men who work while enrolled in

[16] See both Meyer and Wise (1982) and Ruhm (1997), for example.

high school or college have acquired significantly more formal education by any age. By age 28, young men who worked while in high school accumulated one more year of full-time work experience, on average, than young men who did not. These differences are statistically significant for all groups compared. By a similar age, youth who attended college and also worked accumulated 0.68 more years of experience than students who did not work while in college. The latter differences are larger (1.16 years) and statistically significant for blacks. In contrast, young men who worked while in high school accumulated 0.79 fewer years of non-school related, part-time work experience by age 28 relative to those who did not work in high school, and these differences were statistically significant for all groups except blacks. (A similar pattern obtains by whether or not college attendees worked during college.) To the extent that young men are assumed to enhance their skills by acquiring more education or by working full-time (and fewer skills by working in part-time employment situations), these findings about subsequent experiences also are consistent with the view that working while in school is associated with higher rates of skill acquisition.

In summary, the data presented in Tables 2 and 3 are entirely consistent with findings of previous studies which conclude that working while enrolled in school or college represents a productive investment in terms of its subsequent impact on market wages and, possibly, employment. However, it is also possible that these differences in wages simply reflect pre-existing differences and an age-related sorting process rather than real returns from educational investments and/or early work experiences. Stated differently, it is conceivable that more able or "better connected" youth acquire jobs during their high school and/or college years and that these same youth have better subsequent employment and schooling opportunities. Such a scenario is also consistent with the patterns shown in Table 3. As important, such advantages would also contribute to the wage differences by high school and college work status displayed in Table 2.

A systematic attempt to untangle the influence of various sources of heterogeneity, especially those that we cannot measure, is taken up later. For now, we examine the *prima facie* case for the "heterogeneity in ability and family background" explanation for the patterns found in Tables 2 and 3. Accordingly, Table 4 presents differences in an indicator of young men's aptitudes,[17] and a set of family background measures[18] according to high school and college work status. Consider, for example, the mean differences in the Armed Forces Qualifying Test (AFQT) by work status in high school. With the exception of blacks, young men who worked while in high school had higher AFQT scores than men who did not and these differences are statistically significant. Moreover, these differences (which average 11.72 points) are sizeable for all except black men, averaging around one-half of a standard deviation for the AFQT score.[19] Among those who attended college, average differences in AFQT scores are sizeable (11.57 on average) and statistically significant for all demographic groups.

A similar pattern emerges for differences in the educational attainment of these young men's mothers and their 1979 family incomes. Young men who worked during high school systematically came from wealthier and more educated households than youth who did not gain any work experience while enrolled in high school. Similar patterns obtain among college attendees. (In contrast to the evidence for maternal education and family income, we find small and statisti-

[17] As a part of a U.S. Department of Defense initiative, all respondents in the NLSY79 were administered the Armed Services Vocational Aptitude Battery (ASVAB) in 1980. This battery tested a range of aptitudes, including reading comprehension, word knowledge, mathematical knowledge and numerical operations, as well as a number of other skills. The sum of the scores on the work knowledge, arithmetic reasoning, paragraph comprehension and (one-half of the) numeric operations batteries comprise the Armed Forces Qualification Test (AFQT) which is used to assess the eligibility of individuals seeking to enlist in the U.S. armed services. This test has been found to be not only a good predictor of the likelihood that enlistees are successful in the military but also a good predictor of initial success in the civilian labor force.

[18] The family background variables were obtained from the 1979 wave of the NLSY79 in which both respondents and their parents were interviewed.

[19] The standard deviations for the AFQT test scores are 28.6, 18.3, 19.4, and 21.5 for the Hispanic, Black, White subsamples and for the full sample, respectively.

cally insignificant differences by employment-enrollment status in the incidence of young men coming from female-headed households.)

Thus, based on observed indicators of ability and family background, it appears that youth who worked while enrolled in high school or while attending college were more "advantaged" than the young men who did not acquire work experience while in school. We can control for these observable factors in a more refined statistical analysis of the returns to in-school work experience on subsequent labor market attainment. However, the evidence in Table 4 strongly suggests that the personal and family factors, including possibly unmeasured characteristics such as motivation or innate talents, could account for the positive correlations between in-school work status and subsequent wages gains displayed in Table 2. We argue that there is a strong *prima facie* case that both observed and unobserved sources of heterogeneity across youth are responsible for the causal link between working while in school and subsequent wages. As such, failure to account for this possibility may lead to spurious influences. In the remainder of the paper, therefore, we assess the robustness of previous findings about the apparent returns to in-school work experience using an econometric strategy that accounts for person- (and family-) specific sources of unobserved heterogeneity.

## 4. Econometric Specifications for Modeling Wages and Selection

This section describes the econometric specifications used to analyze the effects of early work experience, especially that acquired while attending high school and college, on subsequent wage rates of youth. We investigate three approaches. The first, which we label as the *Selection on Observables* strategy,[20] controls for observable personal and background characteristics of young men that affect the likelihood of acquiring in-school work experience, as well as subsequent work experience, additional schooling, and the wage rates they achieve. This methodology

[20] See Heckman and Hotz (1989).

corresponds closely to that used by Meyer and Wise (1982), Ruhm (1997), and Chaplin and Hannaway (1997) in their assessments of the returns to education and experience. As a second strategy, we apply a variant of the maximum likelihood, selection-correction estimator first proposed by Heckman (1974, 1976) to account for contemporaneous sources of selectivity bias when wage rate offers are only observed for those who work. We denote this approach *Contemporaneous Selection Control*. Meyer and Wise (1982), Ruhm (1997), and Chaplin and Hannaway (1997) use this estimator in their work. Finally, we adapt the econometric framework developed by Cameron and Heckman (1992) for estimating dynamic, discrete-choice models and the wage processes associated with such choices while controlling for a person-specific random effect using the semi-parametric estimation strategy first outlined by Heckman and Singer (1984). The latter econometric model—denoted Dynamic Selection Control—accounts for more dynamic forms of selection bias and has not been utilized in previous studies of the causal effects of in-school work experience on subsequent wage rates. We describe each in turn.[21]

We begin by presenting the specification of the wage equation that is common to all three of the econometric approaches. Our conceptual formulation distinguishes three types of employment: part-time work, which takes place while attending school (activity 2); non-school related part-time work (activity 3); and full-time employment (activity 4). To allow for differences in the wage processes associated with these types of work experiences and the returns to different types of experiences and personal characteristics in each type of employment, we specify

[21] We note that several previous studies of the effects of working while in school on subsequent labor market success have relied on instrumental variable (IV) methods to instrument the in-school work experience variables in the estimation of wage equations. For example, Ruhm (1997) relies on family background and aggregate, location-specific variables as instruments for the work-while-in-school variables in his wage regressions. In preliminary analyses, not reported herein, we attempted to replicate this approach as well. We found that using the types of instruments advocated by Ruhm were particularly weak predictors of in-school work experience. As is well known, weak instruments can result in unreliable and biased parameter estimates. See Bound, Jaeger, and Baker (1995) for a discussion of the potential problems with using weak instruments. We also were concerned about the fact that these instruments were not plausibly able to deal with dynamic forms of selection bias. Accordingly, we do not employ IV estimators in the empirical analysis reported on below.

separate wage equations for each. In particular, we adopt the following Mincerian wage equation:

$$\begin{aligned} \ln W_{itj'} &= \beta'_{j'} Z_{it}^{w-s} + \delta'_{Sj'} S_{it} + \delta'_{Ej'} E_{it} + \delta'_{Pj'} P_i + \delta'_{Mj'} M_{it} + u_{itj'} \\ &= \beta'_{j'} Z_{it}^{w-s} + \delta'_{j'} X_{1it} + u_{itj'} \end{aligned}, \tag{4.1}$$

for employment types, $j' = 2$, 3, or 4, where $W_{itj'}$ denotes the hourly wage rate that individual $i$ would obtain in employment state $j'$ at age $t$, $Z_{it}^{w-s}$ is a vector of variables that measure the incidence and amount of in-school work experience acquired by age $t$; $S_{it}$ is a vector of measures of accumulated experience (grades completed, years in school) as of age $t$; $E_{it}$ is a vector of measures of accumulated (part-time, full-time and military) work experience as of age $t$; $P_i$ is a vector of observable personal characteristics (test scores, demographic characteristics, etc.) for the $i^{\text{th}}$ individual; $M_{it}$ is a vector of measures of *local labor market conditions* facing the individual at age $t$; and $u_{itj'}$ is the (unobserved) disturbance term. Our interest is in the estimation of the $\beta_{j'}$'s, the returns to work while enrolled in school. The inclusion of the other characteristics, denoted by the vector $X_{1it} \equiv (S'_{it}, E'_{it}, P'_i, M'_{it})'$, represent the observable factors that are traditionally controlled for in the estimation of wage equations. Under certain conditions, controlling for $X_{1it}$ also may account for the potential bias that arises when $Z_{it}^{w-s}$ is, itself, a function of unobservable factors represented by $u_{itj}$. In particular if

$$E(u_{itj} \,|\, Z_{it}^{w-s}) \neq 0 \tag{4.2}$$

but

$$E(u_{itj} \,|\, Z_{it}^{w-s}, X_{1it}) = 0 \tag{4.3}$$

holds, then controlling $X_{1it}$ constitutes a *Selection on Observables* strategy for eliminating the selection bias characterized by condition (4.2). As noted by Barnow, Cain and Goldberger (1980) and Heckman and Robb (1985), if condition (4.3) holds, then ordinary least squares methods,

applied to (4.1) for the $j$ = 2, 3, and 4, will produce unbiased estimates of the $\beta_{j'}$'s.

An obvious criticism of the *Selection on Observables* estimation methodology is that it fails to account for the potential selection bias associated with the fact that the wage data used to estimate (4.1) is only for observed wage rates, i.e., wages for individuals who are working in one of the three types of employment activities noted above. To account for this potential source of selectivity, it is useful to characterize a model of activity choice where the activities were defined in Section 2 above. We assume that for each activity there is a subjective payoff, or utility, to the $i^{\text{th}}$ youth engaging in activity $j$ at age $t$ that is denoted by $V_{itj}$ and that the associated utility index function is given by the following linear function:

$$\begin{aligned} V_{itj} &= \gamma_j' Z_{it}^{w-s} + \lambda_{Sj}' S_{it} + \lambda_{Ej}' E_{it} + \lambda_{Pi}' P_i + \lambda_{Mj}' M_{it} + \lambda_{Fj}' F_i + \varepsilon_{itj} \\ &= \gamma_j' Z_{it}^{w-s} + \lambda_j' X_{1it} + \varepsilon_{itj} \end{aligned}, \tag{4.4}$$

for all $j \in J$, where the vectors $Z_{it}^{w-s}$, $S_{it}$, $E_{it}$, $P_i$, and $M_{it}$ are defined above, $F_i$ is a vector of family background variables that influence a young man's activity choices, and $\varepsilon_{itj}$ is a state-specific unobservable variable. The $i^{\text{th}}$ individual at age $t$, is assumed to choose that activity $k$—from the set of $J$ (= 6) feasible activities—so as to maximize his utility. That is:

$$\text{Choose } k \text{ such that } V_{itk} = \max_{j \in J} \{V_{itj}\}.$$

The problem of selection bias in the estimation of the parameters of (4.1) can arise when $\varepsilon_{itj}$ and $u_{itj}$ are correlated for choices involving work, i.e., choices $j$ = 2, 3, 5 in our context. The extent to which

$$Cov(\varepsilon_{itj}, u_{it'j'}) \neq 0 \text{ for } t = t' \text{ and } j = j' \text{ but } Cov(\varepsilon_{itj}, u_{it'j'}) = 0 \text{ otherwise,} \tag{4.5}$$

where $j$, $j'$ = 2, 3, or 4, we say that the estimation of the parameters of the wage equation in (4.1) are subject to *contemporaneous selection bias*. This form of selection represents a slightly generalized form of the source of bias considered by Heckman (1974, 1976). As noted above, several of the studies of the returns to in-school work experience, e.g., Meyer and Wise (1984) and

Ruhm (1997), deal with this form of selection in their empirical analyses. In the empirical results presented below, we present estimates that account for this form of contemporaneous selection by invoking distributional assumptions for $\varepsilon_{itj}$ and $u_{itj}$ (bivariate normality) and use maximum likelihood estimation methods that allow Cov($\varepsilon_{t2}$,$u_{t2}$), Cov($\varepsilon_{t3}$,$u_{t3}$), and Cov($\varepsilon_{t4}$,$u_{t4}$) to be unknown constants that are estimated.

The above specification deals with contemporaneous forms of selectivity associated with the estimation of wage equations when wages are observed only if an individual works (i.e., a work-related activity is optimally chosen). However, this approach does not account for the potential endogeneity of $Z_{it}^{w-s}$—or $S_{it}$ and $E_{it}$ for that matter—in wage equations like (4.1). This endogeneity arises if the unobservables, $\varepsilon_{itj}$ and $u_{itj}$, are not only contemporaneously correlated, but are also correlated over time. More generally, if

$$Cov(\varepsilon_{itj}, u_{it'j'}) \neq 0 \text{ for all } t, t' \text{ and } j, j', \tag{4.6}$$

for all $j$, $j'$ = 2, 3, or 4, we say that the estimation of the parameters of the wage equation in (4.1) are subject to *dynamic selection bias*.[22] Theoretically, such non-zero correlations of $\varepsilon_{itj}$ and $u_{itj}$ at different ages arise because young men's decisions about whether or not to work while enrolled in school are likely affected by unobserved factors, e.g., unmeasured ability and family background factors, that also influence their wage offers at later ages. To our knowledge, previous research on the returns to subsequent wages of working while enrolled in school has not dealt with this dynamic form of selectivity.

To account for the potential influence of dynamic selection bias in estimating the parameters of the activity-specific wage equations given in (4.1), we proceed by assuming error structure is characterized by the following common *random effects factor* structure:

[22] See Cameron and Heckman (1992, 1998) for a more complete treatment of models subject to dynamic selection bias.

$$u_{itj'} = \kappa_{j'}\xi_i + \omega_{itj'}, \text{ for } j' = 2, 3, 4, \tag{4.7}$$

and

$$\varepsilon_{itj} = \alpha_j\xi_i + \nu_{itj}, \text{ for } j = 1,...,6, \tag{4.8}$$

where $\xi_i$ denotes a person-specific disturbance, or factor, $\alpha_j$ and $\kappa_{j'}$ are choice- and wage-specific factor loadings; $\nu_{itj}$ and $\omega_{itj'}$ denote idiosyncratic disturbance terms that are assumed to be uncorrelated with $\xi_i$. It follows that:

$$\begin{aligned}
&\text{Cov}(u_{itk'}, u_{it'j'}) = \kappa_{k'}\kappa_{j'}\text{Var}(\xi_i), \text{ for } t \neq t', \text{ and } k', j' = 2,3,4, k' \neq j', \\
&\text{Cov}(\varepsilon_{itj}, u_{it'j'}) = \alpha_j\kappa_{j'}\text{Var}(\xi_i), \text{ for } t \neq t', \text{ and for all } j, j' = 2,3,4, \\
&\text{Cov}(\varepsilon_{itj}, \varepsilon_{it'k}) = \alpha_j\alpha_k\text{Var}(\xi_i), \text{ for } t \neq t', j \neq k.
\end{aligned}$$

The estimation of the multi-state, discrete choice model specified in equations (4.1) and (4.4) through (4.8) is accomplished using the non-parametric maximum likelihood (NPML) strategy proposed by Heckman and Singer (1984) in which we use a discrete approximation to the distribution of $\xi_i$. In particular, we allow the number of discrete values for the distribution, $K$, the locations of the random variable (the $\xi_k$'s, $k$ = 1,...,$K$) and the associated probabilities ($p_k \equiv$ Pr($\xi_i$=$\xi_k$)) to be free parameters that are estimated in conjunction with $\theta$ and $\pi$. (See Appendix A for details on the form of the non-parametric likelihood function used in our analysis.)

## 5. Estimates for Alternative Selection Control Methods

In this section we present estimates for the econometric models of the choices made and wages received by young men during their transitions from school to work and examine the effects of in-school work experience on these outcomes. We first present the estimates for the models outlined in the previous section, paying particular attention to the impacts that family background, initial skills and local labor market conditions have on the acquisition of alternative types of work experience and on the wages young men command when they work. We then present estimates of the "net" returns to wages from in-school work experience at various ages and

for white, black and Hispanic men in order to assess the robustness of previous findings for this form of work experience.

Table 5 presents sample means for the variables used to measure personal and family background characteristics used as control variables in the empirical analyses. (These variables were defined in Section 2.) We exploited information available on the county and state in which the respondent resided at the time of each annual interview to develop several indicators of local labor market conditions for each respondent at each age (year) they were interviewed. The following indicators were measured based on respondents' county of residence: (a) the annual unemployment rate; (b) the average annual income per worker for those employed;[23] (c) the average annual income per worker for those employed in manufacturing jobs; (d) the average annual income per worker for those employed in service-sector jobs; (e) the annual percentage rate of growth in employment; (f) the employment-share-weighted annual percentage growth rate of manufacturing sector employment;[24] and (g) the employment-share-weighted annual percentage growth rate of service-sector employment.[25] Sample means for these variables are also included in Table 5.[26]

[23] The income-per-worker variables are expressed in 1000's of 1982 dollars.

[24] The employment share-weighted variables were constructed as follows. Let $E_{jkt}$ denote the total number of workers employed in industrial sector $j$ in county $k$ in year $t$ and let $E_{kt}$ denote total annual employment in the county in year $t$. Then the share of employment in the $j^{th}$ sector in year $t$ is $s_{jkt} = \frac{E_{jkt}}{E_{kt}}$ and the sector-specific growth rates are given by $g_{jkt} = s_{jk,t-1}\left(\frac{E_{jkt} - E_{jk,t-1}}{E_{jk,t-1}}\right)$.

[25] The unemployment rate data was obtained from the GEOCODE supplement to the NLSY79 while the remaining variables were constructed from annual, county-level data on industry-specific employment and average earnings that is distributed by the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce. The measures on industry-specific employment and wage income per worker are drawn primarily from information obtained from state unemployment insurance programs for all major industries at both county and state levels of aggregation.

[26] We filled all missing values for these control variables with zeros. We constructed dummy variables to characterize missing values of these control variables and included these dummies as regressors both the wage and utility index functions in all of our analyses.

The parameter estimates (and associated asymptotic standard errors) for the wage equations estimated for the *Selection on Observables*, the *Contemporaneous Selection Control* and the *Dynamic Selection Control* models are provided in Appendix B.[27] That table contains the estimates for the parameters of the valuation functions associated with 5 of the 6 activity states—the "School Only" state is the omitted category—for the (log) wage functions, and of the locations and points of support associated with the person-specific, common random factor, $\xi$.[28]

Our primary interest is in whether the returns to wages of working while enrolled in high school (or college) are robust to attempted controls for selection bias, especially dynamic forms of selection bias. In this context other statistical indicators of the "fit" of the three econometric models are also noteworthy. For example, with the exception of that associated with the "Other" activity, the factor loadings for the *Dynamic Selection Control* model are all significantly different from zero. Because the products of factor loadings characterize the covariances between $u_{itj}$ and $\varepsilon_{it'j'}$ in (4.1) and (4.4), the statistical significance of these loadings indicates that these disturbances are contemporaneously and serially correlated. Recall that correlation between the $u_{itj}$'s and $\varepsilon_{it'j'}$'s gives rise to the endogeneity of in-school work experience (as well as the schooling and other work experience variables) in (4.1) and (4.4) when estimating wage returns of work experience acquired while enrolled in school. In contrast, the contemporaneous correlations between $u_{itj}$ and $\varepsilon_{itj}$ in (4.1) and (4.4) in the *Contemporaneous Selection Control* model are statistically significant only for the full-time work activity index and its associated wage equation. While not conclusive, this evidence suggests that the serial correlation of activity choice and wage disturbances is important in characterizing the data.

[27] The parameter estimates for the activity choice index functions for the Contemporaneous and Dynamic Selection models are available upon request.

[28] Since the locations of the points of support for the distribution of $\xi$ is arbitrary, we restricted these values to lie in the interval [0,1].

While the parameter estimates in Appendix B provide a relatively rich characterization of the returns to wages of work experience acquired during school enrollment (as well as the returns to schooling and other forms of work experiences) for young men, the estimates themselves are difficult to interpret. Therefore Table 6 presents estimates (and standard errors) of the marginal impacts of having one additional year of various types of work and schooling experiences on wages of young men for the three econometric models implemented.[29] More precisely, we examine the effect of an additional year spent in:

(i) Full-Time School (and an extra grade is completed);
(ii) High School & Work (and an extra grade is completed);
(iii) College & Work (and an extra grade is completed);
(iv) Part-Time Work Only [Activity (3)];
(v) Full-Time Work Only [Activity (4)];

In addition, we calculate the following "net" return estimates,

(vi) Net Return to Work while in High School;
(vii) Net Return to Work while in College;

where the latter two entries are defined as the differences between entries (ii) and (i) and between (iii) and (i), respectively. All of the marginal effects yield the percentage change in wages due to a one year change in a particular form of experience. These effects are evaluated at three different ages—17, 22, and 27—to capture the effects at the ages that youth would typically graduate from high school or college, respectively, and in early adulthood.[30] Panels, A, B and C in Table 6 display the results for black, Hispanic and white men, respectively. These calculations were derived using the coefficients on the racial and ethnicity interactions with the various experience variables.

[29] The estimated returns presented in all three panels of Table 6 are evaluated at the age-specific (weighted) means of the variables included in the specifications of (4.1) and (4.4) and these means were calculated over the data for all young men.

[30] These effects are evaluated at the appropriate age-specific means of variables used in these calculations, given that work, schooling and the other experience variables enter the Contemporaneous and Dynamic Selection Control models nonlinearly.

First consider the estimated returns to wages from working while in school (high school and college) for the *Selection on Observables* and *Contemporaneous Selection* models. Focusing on the "net returns" of work experience while enrolled in high school or college to wages in full-time work, these estimates for both econometric models appear to be consistent with the findings of previous studies based on young men (e.g., Ruhm, 1997, who also uses data from the NLSY79).

For black men (Panel A) across the various ages, an extra year spent working while in high school results in a 2.1 to 2.9 percent higher hourly wage rate when working in full-time employment compared to not working while attending high school. These net returns for black men are very precisely estimated. The corresponding net returns to full-time wages for Hispanic men (Panel B) are between 1.7 to 2.5 percent, depending on the econometric specification and age at which the effect was evaluated. The estimates for Hispanics are less precisely estimated. For white men (Panel C), the estimates for returns to working in high school are between 2.2 and 3.0 percent, and, as for blacks, are precisely estimated. (The magnitudes of these net returns are roughly consistent with those found in the studies cited in the Introduction.)

Based on the first two econometric models and consistent with the findings in previous studies, the estimated net returns to full-time wage rates from spending an extra year working while enrolled in high school show little evidence of declining with age. For example, among black men (Panel A) the net return to an extra year of working while in high school only declines by between 0.3 to 0.6 percentage points from age 17 to 27. (The declines with age are similarly small for Hispanic and white young men.) Finally, there is little evidence of any wage returns to high school employment associated either with working while in high school *or* with part-time employment. For black and Hispanic men, these returns are frequently small, especially at older ages, and almost never estimated precisely. For white men, the corresponding net returns for

high school work are more sizeable and estimated with greater precision, at least at ages 22 and 27.

The *Selection on Observables* and *Contemporaneous Selection Control* models yield very similar patterns with respect to the net returns to wages of spending an extra year at work while in *college*. The estimated returns are almost always positive and statistically significant for the wages associated with full-time employment at various ages. Moreover, the estimated returns to working while in college tend to be substantially higher than returns for working while in high school. For black men, returns to college employment range from 4.9 to 5.6 percent (Panel A) and 4.6 to 5.1 percent for whites (Panel C). Hispanic men are the exception to this pattern, but relatively few are college-goers because large numbers withdraw from high school prematurely (Tienda and Ahituv, 1996). For this group the estimated full-time wage returns of spending an extra year working while enrolled in college are noticeably smaller, ranging between 1.1 and 1.7 percent, and are not statistically significant. For them the estimated net return to working while in college by age 27 are virtually identical to those achieved at age 22 for both the *Selection on Observables* and *Contemporaneous Selection Control* models. Finally, the net returns to wages associated with the "school and work" activity from an extra year of working while in high school or college are relatively small in magnitude and are imprecisely estimated for both Hispanics and whites. In contrast, the corresponding estimates are sizeable and statistically significant for black men and tend to be comparable in magnitude to the return from spending an extra year in full-time employment.

The conclusions about the benefits of working while enrolled in high school or college on young men's wages change markedly when dynamic forms of selection (and endogeneity) bias are taken into account. (These results are reported in the three panels of Table 6 under the heading *Dynamic Selection Control*.) Consider the returns to wages associated with full-time employment in the three panels. Based on the dynamic specification of person-specific unobserved

heterogeneity that underlies the *Dynamic Selection Control* model, the estimated returns to either working while enrolled in high school or college are substantially smaller than the corresponding estimates based on the first two methods of dealing with selection and endogeneity. Moreover, the estimates are almost never statistically significant. For black men, the estimated net return to wages from spending an extra year working while in high school ranges from .01 to 1.7 percent and is not statistically significant. The corresponding ranges of estimates for Hispanic and white men are –2.6 to –0.9 and –0.4 to 1.2 percent, respectively. In addition, while small, the estimated net returns decline for all three demographic groups, at least compared to the age 17 estimates. Finally, the returns to wages in school and work and part-time employment from an extra year working while attending college are markedly reduced and imprecisely estimated when implementing an econometric strategy that deals with the dynamic aspects of selection and endogeneity.

Using a model that accounts for dynamic selection also results in substantially different conclusions about the returns to wages associated with college employment. For black men the net returns are very small and almost always statistically insignificant. (The exception are the estimated net returns to wages associated with school and work.) For Hispanic and white men, the estimated net returns are actually *negative* and precisely estimated. The meaning of these negative returns is unclear. As noted above and revealed in the estimates presented in Appendix B, the net returns presented in Table 6 are calculated from specifications for the equations in (4.1) and (4.4) where polynomials in the work experience and schooling variables are used to allow for nonlinear effects of these variables. Based on some experimentation with these specifications, it appears that the negative estimates of net returns to college work experience for Hispanic and white men, when evaluated at older ages, result from using quadratic forms for the work and

schooling experience variables.[31] Thus, we caution against drawing strong conclusions based on the negative signs of the estimated returns to working while in school (high school or college) displayed in Table 6.

In sum, the apparently high returns to working while in high school or college that have been noted in the previous literature, at the very least, are *not robust* to dynamic selection bias controls of the type we have employed. Whether we can conclude that the returns to this form of work experience are, in fact, non-existent hinges on the appropriateness of our econometric methodology for dealing with dynamic forms of selection bias. To be sure, our use of a person-specific random effects (or factor structure) specification for characterizing the correlations of the errors in our wage and activity choice equations is limiting in that it does impose restrictions on the across-age covariance matrix for these disturbances. Furthermore, the robustness of this procedure is potentially susceptible to the initial conditions problem noted by Heckman and his collaborators. However, as we have noted above, we have attempted to minimize the latter issue by accounting for all of the educational and work choices made by young men from age 13 on in our empirical model. Moreover, we have used the relatively robust, non-parametric methods for characterizing the mixing distribution for the random effects. These two features of our econometric approach provide a relatively general framework within which to assess the returns to early work experience on subsequent wages. Thus, we would conclude that our estimates of these returns are likely to provide a more accurate picture of the net returns to experience acquired while enrolled in school than previous studies.

As a final note about the plausibility of the *Dynamic Selection Control* specification, consider the differences in the estimated returns to going to school full-time (and not working)

[31] When we omitted the quadratic terms for the in-school and other work experience variables, the resulting net returns estimates for Hispanic and white men were much smaller and not statistically significant when evaluated at ages 22 and 27. However, the coefficient on these quadratic terms tend to be precisely estimated and are jointly significant, which is why we included them in the results we present in Appendix B and, as a result, why we used them

guided by the three econometric specifications. The returns to full-time schooling are markedly larger based on the *Dynamic Selection Control* model as compared to those derived from the *Selection on Observables* and *Contemporaneous Control* specifications. For example, the annual wage returns to full-time schooling associated with full-time employment range from 9.9 to 14.0 percent for blacks, 13.2 to 18.2 percent for Hispanics and 11.3 to 15.3 percent for whites in the first two model specifications. In contrast, the estimates based on the *Dynamic Selection Control* specification imply that devoting full-time to school has much bigger payoffs than working while in high school or college. This differential is especially large for both minority groups. In fact, the returns to full-time schooling, especially high school, tend to be as large, if not larger, than the returns to full-time work experience, even at older ages. While not conclusive, the absolute and relative size of the returns to schooling associated with the *Dynamic Selection Control* model appear to be quite consistent with recent empirical estimates in the returns to schooling literature.[32]

## 6. Conclusion

In this paper we have assessed the robustness of earlier findings about the impacts of working while enrolled in school on subsequent wages of young men in the U.S. In particular, we have examined how robust these findings are to a particular method of controlling for person-specific unobserved sources of heterogeneity across young men. Our findings clearly suggest that previous conclusions about the sizeable and persistent returns to subsequent wages from working while enrolled in high school or college depends on how one accounts for dynamic forms of selection (and endogeneity) bias, at least for young men. To be sure, attempts to encourage the acquisition of work experience to facilitate the transition from school to work may

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to calculate the net returns presented in Table 6.

[32] See, for example, Card (1998) for a summary of this evidence.

have positive benefits for some youth, particularly disadvantaged and/or non-college bound youth. However, our evidence suggests that high wage benefits later in life are much less clear. Moreover, our results also indicate that efforts to increase a young man's skills via full-time schooling may have greater payoffs to subsequent wage attainment than will encourage youth to combine school with work. Finally, our findings provide further support for the need to account for dynamic forms of selection bias when analyzing the returns to schooling or other forms of experience recently noted by Cameron and Heckman (1998).

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**Table 1: Work and Schooling Experiences of Young Men, Selected Ages[1]**
[Data Source: NLSY79]

| | Black | Hispanic | White | Full Sample[3] |
|---|---|---|---|---|
| ***Proportion Having Experienced Various Activities by Age 28:*** | | | | |
| Worked while in High School | 0.85 | 0.88 | 0.93 | 0.92 |
| Attended College | 0.31 | 0.28 | 0.45 | 0.42 |
| Worked while in College, if Attended College | 0.85 | 0.89 | 0.89 | 0.88 |
| Worked Part-Time while Not Going to School | 0.70 | 0.66 | 0.53 | 0.57 |
| Worked Full-Time | 0.74 | 0.83 | 0.86 | 0.84 |
| Enlisted in the Military | 0.19 | 0.10 | 0.14 | 0.15 |
| Involved in Other Activities | 0.40 | 0.36 | 0.22 | 0.26 |
| ***Years of Experience Accumulated in Various Activities by Age 28:*** | | | | |
| Ave. No. Yrs. of High School & Worked Part-Time[2] | 2.25 | 2.44 | 2.62 | 2.55 |
| Ave. No. Yrs. of College & Worked Part-Time, if Attended College [2] | 2.45 | 2.68 | 3.10 | 3.01 |
| Ave. No. of Grades Completed | 12.47 | 12.09 | 13.36 | 13.13 |
| Ave. No. Yrs. Attended School since Age 13 | 7.30 | 7.00 | 7.73 | 7.61 |
| Ave. No. Yrs. of Non-School Related Part-Time Work[2] | 2.22 | 2.13 | 1.58 | 1.71 |
| Ave. No. Yrs. of Full-Time Work[2] | 3.59 | 4.46 | 4.57 | 4.42 |
| Ave. No. of Yrs. since Age 13 Spent in Some Work-Related Activity[4] | 8.47 | 9.42 | 9.47 | 9.56 |
| Ave. No. Yrs. in Military[2] | 0.79 | 0.46 | 0.63 | 0.64 |
| Ave. No. Yrs. in Other Activities[2] | 0.97 | 0.74 | 0.41 | 0.52 |
| Number of Observations | 571 | 797 | 1,265 | 2,573 |

[1]Standard deviations in parentheses.
[2]Years of experience measured from age 13 on.
[3]Full sample estimates use population weights to account for the oversampling of blacks and Hispanics in the NLSY79.
[4]Average of years spent in school-related and non-school-related work activities. It does not include time in the military.

**Table 2: Average Hourly Wage Rates by Employment-Enrollment Status, at Selected Ages**
[Data Source: NLSY79]

| | Number of Observa-tions | Worked | Did Not Work | Mean Difference in Levels | Mean Difference in Logs |
|---|---|---|---|---|---|
| ***Work Status in High School:***[1] | | | | | |
| ***At Age 17*** | | | | | |
| Hispanic | 438 | 3.99 | 4.09 | -0.09 | -0.061 |
| Black ($N$ = 631) | 631 | 3.93 | 4.47 | -0.54 | -0.007 |
| White | 1,138 | 3.72 | 3.84 | -0.12 | -0.035 |
| Full Sample | 2,207 | 3.77 | 4.02 | -0.26 | -0.039 |
| ***At Age 22*** | | | | | |
| Hispanic | 463 | 6.57 | 6.66 | -0.09** | 0.161* |
| Black | 665 | 5.87 | 5.27 | 0.60* | 0.068 |
| White | 1,125 | 6.74 | 5.70 | 1.04** | 0.139** |
| Full Sample | 2,253 | 6.61 | 5.67 | 0.94*** | 0.141*** |
| ***At Age 27*** | | | | | |
| Hispanic | 429 | 9.82 | 8.26 | 1.56* | 0.194** |
| Black | 623 | 8.60 | 8.91 | -0.31 | -0.016 |
| White | 1,089 | 11.17 | 10.27 | 0.90 | 0.181** |
| Full Sample | 2,141 | 10.75 | 9.69 | 1.05 | 0.172*** |
| ***Work Status in College:***[2] | | | | | |
| ***At Age 22*** | | | | | |
| Hispanic | 133 | 6.80 | 5.92 | 0.87 | 0.229 |
| Black | 199 | 6.15 | 6.08 | 0.07 | 0.037 |
| White | 501 | 6.62 | 6.66 | -0.04 | 0.037 |
| Full Sample | 833 | 6.58 | 6.55 | 0.03 | 0.050 |
| ***At Age 27*** | | | | | |
| Hispanic | 118 | 11.36 | 7.84 | 3.58** | 0.479** |
| Black | 187 | 10.37 | 8.59 | 1.79* | 0.168 |
| White | 491 | 13.06 | 10.56 | 2.50*** | 0.211*** |
| Full Sample | 796 | 12.72 | 10.19 | 2.53*** | 0.224*** |

[1]Calculated for all men in sample.
[2]Calculated only for men who attended college.
"*" Denotes significant at 10% level; "**" Denotes significant at 5% level; and "***" Denotes significant at 1% level.

**Table 3: Employment Rates, Accumulated Work Experience and Grades Completed by Employment-Enrollment Status, at Selected Ages**

[Data Source: NLSY79]

| | Work Status in High School[1] | | | | Work Status in College[2] | | | |
|---|---|---|---|---|---|---|---|---|
| | No. of Obs. | Worked | Did Not Work | Mean Difference | No. of Obs. | Worked | Did Not Work | Mean Difference |
| ***Employment Rates:*** | | | | | | | | |
| *At Age 17* | | | | | | | | |
| Hispanic | 509 | 0.83 | 0.21 | 0.61*** | | | | |
| Black | 796 | 0.74 | 0.10 | 0.64*** | | | | |
| White | 1,258 | 0.85 | 0.12 | 0.73*** | | | | |
| Full Sample | 2,563 | 0.84 | 0.13 | 0.71*** | | | | |
| *At Age 22:* | | | | | | | | |
| Hispanic | 499 | 0.87 | 0.51 | 0.36*** | 138 | 0.91 | 0.56 | 0.36*** |
| Black | 781 | 0.77 | 0.61 | 0.16*** | 234 | 0.81 | 0.42 | 0.39*** |
| White | 1,223 | 0.85 | 0.75 | 0.11** | 545 | 0.89 | 0.50 | 0.38*** |
| Full Sample | 2,503 | 0.84 | 0.68 | 0.16*** | 928 | 0.88 | 0.50 | 0.38*** |
| *At Age 27:* | | | | | | | | |
| Hispanic | 459 | 0.91 | 0.75 | 0.16** | 122 | 0.97 | 0.60 | 0.37*** |
| Black | 717 | 0.83 | 0.72 | 0.11** | 217 | 0.84 | 0.55 | 0.29*** |
| White | 1,145 | 0.92 | 0.81 | 0.11** | 514 | 0.95 | 0.67 | 0.28*** |
| Full Sample | 2,321 | 0.91 | 0.78 | 0.13** | 853 | 0.94 | 0.65 | 0.29*** |
| ***Grades Completed:*** | | | | | | | | |
| *By Age 18:* | | | | | | | | |
| Hispanic | | 10.67 | 9.68 | 0.99*** | | | | |
| Black | | 10.94 | 10.63 | 0.31* | | | | |
| White | | 11.29 | 10.60 | 0.68*** | | | | |
| Full Sample | | 11.20 | 10.51 | 0.68*** | | | | |
| *By Age 23:* | | | | | | | | |
| Hispanic | | 11.78 | 10.42 | 1.36*** | | 14.34 | 12.32 | 2.02*** |
| Black | | 12.15 | 11.70 | 0.45* | | 14.51 | 12.46 | 2.04*** |
| White | | 12.97 | 11.36 | 1.61*** | | 15.03 | 12.74 | 2.29*** |
| Full Sample | | 12.77 | 11.35 | 1.42*** | | 14.94 | 12.68 | 2.25*** |
| *By Age 28:* | | | | | | | | |
| Hispanic | | 12.23 | 10.78 | 1.45*** | | 15.00 | 13.15 | 1.85*** |
| Black | | 12.51 | 12.21 | 0.30 | | 14.86 | 13.72 | 1.14*** |
| White | | 13.44 | 11.98 | 1.47*** | | 15.68 | 13.69 | 1.99*** |
| Full Sample | | 13.23 | 11.93 | 1.30*** | | 15.56 | 13.67 | 1.89*** |

[1]Calculated for all men in sample.

[2]Calculated only for men who attended college.

"*" Denotes significant at 10% level; "**" Denotes significant at 5% level; and "***" Denotes significant at 1% level.

**Table 3 (Continued)**

| | Work Status in High School[1] | | | | Work Status in College[2] | | | |
|---|---|---|---|---|---|---|---|---|
| | No. of Obs. | Worked | Did Not Work | Mean Difference | No. of Obs. | Worked | Did Not Work | Mean Difference |
| ***Years Attended School:*** | | | | | | | | |
| *By Age 18:* | | | | | | | | |
| Hispanic | | 4.80 | 4.53 | 0.27** | | | | |
| Black | | 4.93 | 4.77 | 0.16* | | | | |
| White | | 4.88 | 4.70 | 0.18** | | | | |
| Full Sample | | 4.88 | 4.70 | 0.18*** | | | | |
| *By Age 23:* | | | | | | | | |
| Hispanic | | 6.83 | 5.61 | 1.22*** | | 8.78 | 7.00 | 1.78*** |
| Black | | 7.08 | 6.46 | 0.62*** | | 8.86 | 6.56 | 2.30*** |
| White | | 7.33 | 5.93 | 1.40*** | | 9.00 | 6.50 | 2.49*** |
| Full Sample | | 7.26 | 6.05 | 1.21*** | | 8.97 | 6.53 | 2.44*** |
| *By Age 28:* | | | | | | | | |
| Hispanic | | 7.15 | 5.62 | 1.53*** | | 9.85 | 7.46 | 2.39*** |
| Black | | 7.40 | 6.70 | 0.70** | | 9.76 | 6.42 | 3.34*** |
| White | | 7.84 | 6.01 | 1.83*** | | 10.03 | 6.76 | 3.27*** |
| Full Sample | | 7.73 | 6.17 | 1.56*** | | 9.99 | 6.74 | 3.25*** |
| ***Years of Non-School Related Part-Time Work Experience:*** | | | | | | | | |
| *By Age 23:* | | | | | | | | |
| Hispanic | | 1.11 | 1.47 | -0.36 | | 0.35 | 0.69 | -0.34 |
| Black | | 1.08 | 1.06 | 0.01 | | 0.26 | 0.67 | -0.41** |
| White | | 0.81 | 1.23 | -0.42** | | 0.20 | 0.71 | -0.51*** |
| Full Sample | | 0.87 | 1.20 | -0.34*** | | 0.22 | 0.71 | -0.49*** |
| *By Age 28:* | | | | | | | | |
| Hispanic | | 2.05 | 2.83 | -0.78* | | 1.06 | 1.48 | -0.41 |
| Black | | 2.20 | 2.31 | -0.10 | | 1.09 | 1.37 | -0.27 |
| White | | 1.52 | 2.45 | -0.92*** | | 0.80 | 1.57 | -0.78*** |
| Full Sample | | 1.65 | 2.44 | -0.79*** | | 0.84 | 1.54 | -0.70*** |
| ***Years of Full-Time Work Experience:*** | | | | | | | | |
| *By Age 23:* | | | | | | | | |
| Hispanic | | 1.53 | 1.03 | 0.51** | | 0.69 | 0.91 | -0.22 |
| Black | | 1.04 | 0.74 | 0.30 | | 0.55 | 0.42 | 0.14 |
| White | | 1.33 | 1.30 | 0.03 | | 0.57 | 0.99 | -0.42** |
| Full Sample | | 1.30 | 1.11 | 0.19 | | 0.57 | 0.91 | -0.33** |
| *By Age 28:* | | | | | | | | |
| Hispanic | | 4.60 | 3.14 | 1.47*** | | 3.65 | 3.18 | 0.47 |
| Black | | 3.71 | 2.91 | 0.79** | | 3.13 | 1.97 | 1.16** |
| White | | 4.62 | 3.78 | 0.84** | | 3.62 | 3.02 | 0.59 |
| Full Sample | | 4.49 | 3.47 | 1.02*** | | 3.57 | 2.88 | 0.68** |

[1]Calculated for all men in sample.
[2]Calculated only for men who attended college.
"*" Denotes significant at 10% level; "**" Denotes significant at 5% level; and "***" Denotes significant at 1% level.

**Table 4: Personal and Family Background Characteristics by Employment-Enrollment Status, at Selected Ages**

[Data Source: NLSY79]

| | Work Status in High School[1] | | | Work Status in College[2] | | |
|---|---|---|---|---|---|---|
| | Worked | Did Not Work | Mean Difference | Worked | Did Not Work | Mean Difference |
| ***AFQT Test Score:*** | | | | | | |
| Hispanic | 56.32 | 41.80 | 14.52*** | 72.03 | 52.15 | 19.88*** |
| Black | 47.34 | 47.74 | -0.40 | 61.11 | 49.95 | 11.16*** |
| White | 72.58 | 62.81 | 9.77*** | 84.27 | 73.87 | 10.40*** |
| Full Sample | 67.92 | 56.20 | 11.72*** | 81.17 | 69.60 | 11.57*** |
| ***Mother's Educational Attainment:*** | | | | | | |
| Hispanic | 8.66 | 7.04 | 1.62*** | 10.34 | 8.94 | 1.40 |
| Black | 11.14 | 10.90 | 0.24 | 12.32 | 11.12 | 1.20*** |
| White | 12.12 | 11.26 | 0.86*** | 13.11 | 11.73 | 1.38*** |
| Full Sample | 11.76 | 10.74 | 1.02*** | 12.90 | 11.52 | 1.38*** |
| ***Family Income in 1979 (1000 of $):*** | | | | | | |
| Hispanic | 14.02 | 11.83 | 2.19 | 18.92 | 15.85 | 3.07 |
| Black | 11.38 | 11.64 | -0.26 | 14.12 | 9.12 | 5.00*** |
| White | 23.38 | 18.57 | 4.81*** | 28.09 | 22.46 | 5.63*** |
| Full Sample | 21.04 | 16.24 | 4.80*** | 26.12 | 20.53 | 5.59*** |
| ***In Female Headed Household at Age 14:*** | | | | | | |
| Hispanic | 0.24 | 0.24 | 0.00 | 0.21 | 0.31 | -0.10 |
| Black | 0.35 | 0.33 | 0.02 | 0.33 | 0.35 | -0.02 |
| White | 0.09 | 0.05 | 0.04 | 0.09 | 0.11 | -0.02 |
| Full Sample | 0.14 | 0.15 | -0.01 | 0.12 | 0.15 | -0.03 |

[1]Calculated for all men in sample.

[2]Calculated only for men who attended college.

"*" Denotes significant at 10% level; "**" Denotes significant at 5% level; and "***" Denotes significant at 1% level.

**Table 5: Means of Exogenous Variables Used in (Log) Wage Equation and Activity Choice Estimation**
(Standard Deviations in Parentheses)
[Data Source: NLSY79]

| Variable | Black | Hispanic | White |
|---|---|---|---|
| Foreign Born | 0.02 | 0.23 | 0.02 |
| | (0.13) | (0.42) | (0.14) |
| AFQT Score | 47.40 | 54.77 | 72.02 |
| | (18.29) | (20.65) | (19.37) |
| *Percentage Missing AFQT Score* | 3.60 | 5.90 | 4.30 |
| Mother's Educational Attainment | 11.11 | 8.48 | 12.07 |
| | (2.49) | (4.33) | (2.32) |
| *Percentage Missing Mother's Education* | 9.20 | 10.00 | 4.50 |
| Father's Educational Attainment | 10.61 | 8.98 | 12.51 |
| | (3.18) | (4.71) | (3.24) |
| *Percentage Missing Father's Education* | 26.20 | 21.40 | 6.70 |
| Family Income in 1978 (1000's of 1982$) | 11.41 | 13.77 | 23.04 |
| | (8.36) | (10.37) | (13.82) |
| *Percentage Missing Family Income* | 19.50 | 17.20 | 18.00 |
| In Female-Headed Family at Age 14 | 0.35 | 0.24 | 0.09 |
| | (0.48) | (0.43) | (0.28) |
| State UE Rate | 2.82 | 3.05 | 3.00 |
| | (0.94) | (1.10) | (1.05) |
| *Percentage Missing UE Rate* | 8.50 | 7.00 | 7.10 |
| Growth Rate in County Employment | 0.017 | 0.024 | 0.022 |
| | (0.030) | (0.028) | (0.032) |
| Growth Rate in County Manu. Employment | 0.011 | 0.013 | 0.013 |
| | (0.017) | (0.012) | (0.017) |
| Growth Rate in County Service Sector Empl. | 0.001 | 0.003 | 0.002 |
| | (0.012) | (0.011) | (0.012) |
| *Percentage Missing County Empl. Growth Data* | 1.10 | 1.10 | 1.00 |
| County Income/Worker | 11.96 | 12.26 | 12.20 |
| | (3.05) | (3.53) | (2.93) |
| County Income/Worker in Manu. Sector | 22.31 | 21.88 | 22.74 |
| | (6.20) | (5.49) | (5.21) |
| County Income/Worker in Service Sector | 13.50 | 14.29 | 12.80 |
| | (2.90) | (2.99) | (2.48) |
| *Percent. Missing County Income/Worker Data* | 9.10 | 4.90 | 12.60 |
| Percentage of Sample in Ethnic/Racial Group | 15.03 | 7.23 | 77.73 |
| Number of Individuals in Sample | 797 | 511 | 1,265 |
| Number of Person Years | 12,364 | 7,890 | 19,569 |

**Table 6: Effects of an Additional Year of School, Work and Other Types of Experience on Wages Rates**
(Asymptotic Standard Errors in Parentheses)

**Panel A: Blacks**

| *An Additional Year Spent in:* | *Change in log of Wage Associated with:* School & Work | | | Part-Time Work Only | | | Full-Time Work Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Selection on Observables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observables* | *Contemp. Selection Control* | *Dynamic Selection Control* |
| ***Evaluated at Age 17:*** | | | | | | | | | |
| Full-Time School (& Gain Add. Grade) | .014 | .009 | .029* | .043** | .034** | .100*** | .033*** | .021** | .099*** |
| High School & Work (& Gain Add. Grade) | -.001 | -.006 | -.002 | .010 | -.001 | .085*** | .061*** | .045*** | .116*** |
| Part-Time Work Only | .036 | .054 | .041 | .055*** | .038* | .044*** | .026*** | .021*** | .019** |
| Full-Time Work Only | .209*** | .218** | .190*** | .040*** | .055*** | .051*** | .101*** | .065*** | .094*** |
| Net Return to Work while in High School[a] | -.015 | -.015* | -.031* | -.034 | -.035*** | -.015 | .029*** | .024*** | .017 |
| ***Evaluated at Age 22:*** | | | | | | | | | |
| Full-Time School (& Gain Add. Grade) | .047*** | .047*** | .069*** | .065*** | .057*** | .128*** | .048*** | .038*** | .132*** |
| High School & Work (& Gain Add. Grade) | .046*** | .047*** | .055*** | .056*** | .050*** | .105*** | .072*** | .060*** | .133*** |
| College & Work (& Gain Add. Grade) | .110*** | .107*** | .115*** | .063*** | .067*** | .097*** | .099*** | .095*** | .136*** |
| Part-Time Work Only | .030 | .045* | .034 | .052*** | .037* | .042*** | .028*** | .023*** | .021*** |
| Full-Time Work Only | .182*** | .192*** | .166*** | .041*** | .053*** | .051*** | .094*** | .063*** | .088*** |
| Net Return to Work while in High School[a] | -.001 | .0001 | -.015 | -.008 | -.007 | -.023 | .023*** | .022*** | .0001 |
| Net Return to Work while in College[b] | .063*** | .060*** | .045** | -.002 | .009 | -.031 | .051*** | .056*** | .004 |
| ***Evaluated at Age 27:*** | | | | | | | | | |
| Full-Time School (& Gain Add. Grade) | .055*** | .055*** | .079*** | .069*** | .062*** | .134*** | .052*** | .042*** | .140*** |
| High School & Work (& Gain Add. Grade) | .054*** | .056*** | .064*** | .062*** | .056*** | .111*** | .075*** | .064*** | .139*** |
| College & Work (& Gain Add. Grade) | .117*** | .114*** | .122*** | .068*** | .071*** | .103*** | .101*** | .096*** | .141*** |
| Part-Time Work Only | .022 | .034* | .025 | .048*** | .036** | .039*** | .031*** | .026*** | .023*** |
| Full-Time Work Only | .093*** | .100*** | .087*** | .043*** | .044*** | .051*** | .072*** | .057*** | .067*** |
| Net Return to Work while in High School[a] | -.001 | .001 | -.014 | -.008 | -.006 | -.023 | .023*** | .021*** | -.001 |
| Net Return to Work while in College[b] | .062*** | .059*** | .044** | -.001 | .009 | -.031 | .049*** | .054*** | .001 |

[a]Estimate is difference between "High School & Work (& Gain Add. Grade)" and "Full-Time School (& Gain Add. Grade)."
[b]Estimate is difference between "College & Work (& Gain Add. Grade)" and "Full-Time School (& Gain Add. Grade)."
"*" Denotes significant at 10% level; "**" Denotes significant at 5% level; and "***" Denotes significant at 1% level.

## Table 6: (Continued)

## Panel B: Hispanics

| *An Additional Year Spent in:* | *Change in log of Wage Associated with:* School & Work | | | Part-Time Work Only | | | Full-Time Work Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Selection on Observables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observables* | *Contemp. Selection Control* | *Dynamic Selection Control* |
| ***Evaluated at Age 17:*** | | | | | | | | | |
| Full-Time School (& Gain Add. Grade) | .052*** | .048*** | .069*** | .007 | .000 | .085*** | .058*** | .051*** | .141*** |
| High School & Work (& Gain Add. Grade) | .032 | .026*** | .033 | .008 | -.002 | .085*** | .083*** | .070*** | .132*** |
| Part-Time Work Only | .067*** | .084*** | .068*** | .057*** | .040 | .047*** | .026*** | .020*** | .015* |
| Full-Time Work Only | .217*** | .226*** | .203*** | .063*** | .078 | .074*** | .115*** | .078*** | .112*** |
| Net Return to Work while in High School[a] | -.020 | -.021* | -.036 | .001 | -.002* | .000 | .025** | .019** | -.009 |
| ***Evaluated at Age 22:*** | | | | | | | | | |
| Full-Time School (& Gain Add. Grade) | .085*** | .085*** | .109*** | .028 | .023* | .113*** | .074*** | .068*** | .175*** |
| High School & Work (& Gain Add. Grade) | .079*** | .080*** | .090*** | .055*** | .049*** | .106*** | .094*** | .085*** | .149*** |
| College & Work (& Gain Add. Grade) | .090*** | .087*** | .094*** | .046* | .050*** | .078** | .087*** | .086*** | .101*** |
| Part-Time Work Only | .061*** | .075*** | .061*** | .054*** | .039** | .045*** | .027*** | .022*** | .017** |
| Full-Time Work Only | .191*** | .200*** | .179*** | .063*** | .076*** | .074*** | .108*** | .077*** | .105*** |
| Net Return to Work while in High School[a] | -.007 | -.006 | -.020 | .026 | .026** | -.007 | .019* | .017** | -.025 |
| Net Return to Work while in College[b] | .005 | .002 | -.015 | .018 | .027 | -.035 | .013 | .017 | -.073*** |
| ***Evaluated at Age 27:*** | | | | | | | | | |
| Full-Time School (& Gain Add. Grade) | .093*** | .094*** | .119*** | .033 | .028** | .119*** | .078*** | .072*** | .182*** |
| High School & Work (& Gain Add. Grade) | .087*** | .089*** | .099*** | .060*** | .055*** | .111*** | .097*** | .089*** | .155*** |
| College & Work (& Gain Add. Grade) | .097*** | .094*** | .101*** | .051** | .054*** | .084*** | .088*** | .087*** | .106*** |
| Part-Time Work Only | .053*** | .064*** | .052** | .050*** | .038*** | .042*** | .030*** | .026*** | .019*** |
| Full-Time Work Only | .102*** | .108*** | .100*** | .065*** | .068*** | .074*** | .086*** | .071*** | .084*** |
| Net Return to Work while in High School[a] | -.006 | -.005 | -.019 | .027 | .027** | -.008 | .019* | .017** | -.026 |
| Net Return to Work while in College[b] | .003 | .000 | -.017 | .018 | .026 | -.035 | .011 | .015 | -.076*** |

[a]Estimate is difference between "High School & Work (& Gain Add. Grade)" and "Full-Time School (& Gain Add. Grade)."
[b]Estimate is difference between "College & Work (& Gain Add. Grade)" and "Full-Time School (& Gain Add. Grade)."
"*" Denotes significant at 10% level; "**" Denotes significant at 5% level; and "***" Denotes significant at 1% level.

## Table 6: (Continued)

### Panel C: Whites

| *An Additional Year Spent in:* | *Change in log of Wage Associated with:* School & Work | | | Part-Time Work Only | | | Full-Time Work Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Selection on Observables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observables* | *Contemp. Selection Control* | *Dynamic Selection Control* |
| ***Evaluated at Age 17:*** | | | | | | | | | |
| Full-Time School (& Gain Add. Grade) | .043*** | .038*** | .059*** | .007 | -.002 | .085*** | .041*** | .030*** | .113*** |
| High School & Work (& Gain Add. Grade) | .035*** | .029*** | .035*** | .026** | .016 | .100*** | .072*** | .056*** | .125*** |
| Part-Time Work Only | .069*** | .086*** | .070*** | .077*** | .060** | .070*** | .056*** | .049*** | .041*** |
| Full-Time Work Only | .224*** | .234*** | .208*** | .073*** | .089*** | .082*** | .115*** | .079*** | .112*** |
| Net Return to Work while in High School[a] | -.009 | -.010 | -.024** | .019 | .017 | .014 | .030*** | .025*** | .012 |
| ***Evaluated at Age 22:*** | | | | | | | | | |
| Full-Time School (& Gain Add. Grade) | .077*** | .076*** | .099*** | .028*** | .021* | .113*** | .057*** | .048*** | .146*** |
| High School & Work (& Gain Add. Grade) | .082*** | .082*** | .091*** | .073*** | .067*** | .120*** | .082*** | .071*** | .142*** |
| College & Work (& Gain Add. Grade) | .074*** | .072*** | .078*** | .077*** | .081*** | .111*** | .105*** | .102*** | .122*** |
| Part-Time Work Only | .063*** | .077*** | .063*** | .074*** | .059*** | .068*** | .058*** | .051*** | .043*** |
| Full-Time Work Only | .197*** | .207*** | .185*** | .073*** | .087*** | .082*** | .109*** | .077*** | .106*** |
| Net Return to Work while in High School[a] | .005 | .006 | -.008 | .045*** | .046*** | .007 | .025*** | .023*** | -.004 |
| Net Return to Work while in College[b] | -.002 | -.004 | -.021 | .049** | .060** | -.002 | .048*** | .054*** | -.024** |
| ***Evaluated at Age 27:*** | | | | | | | | | |
| Full-Time School (& Gain Add. Grade) | .084*** | .085*** | .109*** | .033*** | .026** | .119*** | .060*** | .052*** | .153*** |
| High School & Work (& Gain Add. Grade) | .090*** | .091*** | .101*** | .078*** | .073*** | .126*** | .085*** | .074*** | .148*** |
| College & Work (& Gain Add. Grade) | .081*** | .079*** | .086*** | .082*** | .086*** | .117*** | .106*** | .103*** | .127*** |
| Part-Time Work Only | .055*** | .066*** | .054*** | .070*** | .058*** | .065*** | .060*** | .055*** | .045*** |
| Full-Time Work Only | .108*** | .116*** | .105*** | .076*** | .079*** | .082*** | .086*** | .072*** | .084*** |
| Net Return to Work while in High School[a] | .006 | .006 | -.008 | .045*** | .046*** | .006 | .025*** | .022*** | -.005 |
| Net Return to Work while in College[b] | -.004 | -.006 | -.023* | .050*** | .059** | -.002 | .046*** | .051*** | -.026*** |

[a]Estimate is difference between "High School & Work (& Gain Add. Grade)" and "Full-Time School (& Gain Add. Grade)."
[b]Estimate is difference between "College & Work (& Gain Add. Grade)" and "Full-Time School (& Gain Add. Grade)."
"*" Denotes significant at 10% level; "**" Denotes significant at 5% level; and "***" Denotes significant at 1% level.

## Appendix A
## The Non-Parametric Maximum Likelihood Estimator for the Generalized Dynamic Selection Model

The estimation of the multi-state, discrete choice model specified in equations (4.1) and (4.4) through (4.8) is accomplished using the non-parametric maximum likelihood (NPML) strategy proposed by Heckman and Singer (1984). Let $d_{itj}$ denote the indicator variable for the choice of activity $j$ by the $i^{\text{th}}$ individual at age $t$, where $d_{itj}$ =1 if activity $j$ is chosen and $d_{itj}$ = 0 otherwise, where

$$\sum_{j=1}^{J} d_{itj} = 1, \text{ for all } i,t \, .$$

Also let

$$\theta = (\beta_2', \delta_2', \beta_3', \delta_3', \beta_4', \delta_4', \gamma_1', \lambda_1', \gamma_2', \lambda_2', \ldots, \gamma_6', \lambda_6')',$$
$$\pi = (\kappa_2, \kappa_3, \kappa_5, \alpha_1, ..., \alpha_6)'$$

denote the vectors of equation parameters and factor loadings, respectively. The objects of estimation are $\theta$ and $\pi$.

Conditional on the $\xi_i$'s, the structure of the econometric model is a combination of a standard discrete choice model with activity-specific wage regressions. We assume that the idiosyncratic disturbances (the $\nu_{itj}$'s and the $\omega_{itj}$'s) are normally distributed, where the $\nu_{itj}$'s are assumed to have unit variances. The conditional probability of choosing activity $k$, given $\xi_i$, $Z_{it}^{w-s}$, the $X$'s, $\theta$ and $\pi$, is given by

$$\begin{aligned} \Pr\left(d_{itk}=1 \middle| Z_{it}^{w-s}, X_{2it}, \theta, \pi, \xi_i\right) &\equiv P_{itk}(\xi_i) \\ &= \int_{\eta=-\infty}^{\infty} \Phi(A_{it}^{1,k}+\eta)\ldots\Phi(A_{it}^{k-1,k}+\eta)\Phi(A_{it}^{k+1,k}+\eta)\ldots\Phi(A_{it}^{J,k}+\eta)\phi(\eta)d\eta \end{aligned} \tag{A.1}$$

where $\Phi(\cdot)$ and $\phi(\cdot)$ are the standard normal distribution and density functions, respectively and

$$A_{it}^{j,k} = (\gamma_j' - \gamma_k')Z_{it}^{w-s} + (\lambda_j' - \lambda_k')X_{2it} + (\alpha_j - \alpha_k)\xi_i \text{, for all } j,k, j \neq k.$$

Note, too, that the density function characterizing the (log) wage equation is given by:

$$\phi\left(B_{itj'}\right), \text{ for all } j' = 2,3,4, \tag{A.2}$$

where

$$B_{itj'} = \frac{\ln W_{itj'} - \beta'_{j'} Z_{it}^{w-s} - \delta'_{j} X_{1it} - \kappa_{j'} \xi_i}{\sigma_{\omega_{j'}}},$$

and $\sigma^2_{\omega_{j'}}$ is the variance of $\omega_{itj'}$. It follows that the contribution to the *conditional* (on $\xi_i$) likelihood function for the $(i,t)^{\text{th}}$ observation is given by:

$$\ell_{it}(\theta,\pi,\xi_i) = \left[P_{it1}\right]^{d_{it1}} \left[P_{it2}\phi(B_{it2})\right]^{d_{it2}} \left[P_{it3}\phi(B_{it3})\right]^{d_{it3}} \left[P_{it4}\phi(B_{it4})\right]^{d_{it4}} \left[P_{it5}\right]^{d_{it5}} \left[P_{it6}\right]^{d_{it6}} \tag{A.3}$$

To form the *unconditional* likelihood function, one proceeds by using a discrete approximation to the distribution of $\xi_i$, letting the number of discrete values for the distribution, $K$, as well as the locations of the random variable (the $\xi_k$'s, $k = 1,...,K$) and the associated probabilities ($p_k \equiv \Pr(\xi_i=\xi_k)$) be free parameters that are estimated in conjunction with $\theta$ and $\pi$. In particular, the contribution for the $i^{\text{th}}$ individual to the unconditional likelihood function is:

$$\ell_i(\theta,\pi,\xi_1,\ldots,\xi_K, p_1,\ldots, p_{K-1}) = \sum_{k=1}^{K} \prod_{t=13}^{T_i} \ell_{it}(\theta,\pi,\xi_k)\, p_k \ . \tag{A.4}$$

where $T_i$ is the $i^{\text{th}}$ individual's highest age available in the data, where $T_i \leq 28$.[33] The complete (log) likelihood function is given by

$$L(\theta,\pi,\xi_1,\ldots,\xi_K, p_1,\ldots, p_{K-1}) = \sum_{i=1}^{N} \log \ell_i(\theta,\pi,\xi_1,\ldots,\xi_K, p_1,\ldots, p_{K-1}) \,. \tag{A.5}$$

Because the "activity" choice component of our specification is a multinomial discrete choice model, the standard requirements for model identification apply; in particular, we require the imposition of a set of normalizations on parameters characterizing the $V_{itj}$'s. In our analysis,

[33] The number of points of support, $K$, is a chosen in the maximization of the likelihood function.

we normalize the coefficients associated with valuation function for Activity 1 (*School Only*) to zero, i.e., $\gamma_1 = \mathbf{0}$, $\lambda_1 = \mathbf{0}$, and $\alpha_1 = 0$.

## Appendix B
## Coefficient Estimates for lnWage Equations
## for Alternative Estimation for Models with and without Heterogeneity Control
[Data Source: NLSY79, 1978-92]

| Variables | School & Work | | | Part-Time Work Only | | | Full-Time Work Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Selection on Observ-ables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observ-ables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observ-ables* | *Contemp. Selection Control* | *Dynamic Selection Control* |
| **LnWage Equations:** | | | | | | | | | |
| $\kappa$(Factor Loading) | | | 0.7534*** | | | 1.7449*** | | | 2.3218*** |
| | | | (0.0381) | | | (0.0667) | | | (0.0625) |
| Constant | 1.4009*** | 1.5268*** | 1.1732*** | 1.2116*** | 1.3486*** | 0.2281 | 0.9249*** | 1.1601*** | -0.0785 |
| | (0.0958) | (0.1755) | (0.0980) | (0.1283) | (0.2558) | (0.1733) | (0.0696) | (0.1331) | (0.1102) |
| Black | 0.1571** | 0.1545** | 0.1444* | -0.2624** | -0.2545** | -0.2312* | -0.0985 | -0.0801 | -0.1282 |
| | (0.0717) | (0.0771) | (0.0736) | (0.1202) | (0.1246) | (0.1391) | (0.0707) | (0.0886) | (0.1023) |
| Hispanic | -0.1815** | -0.1872** | -0.1625* | -0.0771 | -0.0893 | -0.0800 | -0.0662 | -0.0954 | -0.1092 |
| | (0.0871) | (0.0875) | (0.0887) | (0.1389) | (0.1304) | (0.1462) | (0.0638) | (0.0864) | (0.0860) |
| Age = 14 in 1978 | -0.0045 | -0.0050 | -0.0075 | -0.0352** | -0.0348* | -0.0320 | -0.0089 | -0.0102 | -0.0061 |
| | (0.0112) | (0.0124) | (0.0120) | (0.0174) | (0.0190) | (0.0224) | (0.0070) | (0.0109) | (0.0136) |
| Age = 15 in 1978 | -0.0221* | -0.0235* | -0.0195* | -0.0584*** | -0.0594*** | -0.0516** | -0.0205** | -0.0223** | -0.0089 |
| | (0.0113) | (0.0126) | (0.0121) | (0.0171) | (0.0191) | (0.0218) | (0.0068) | (0.0112) | (0.0137) |
| Age = 16 in 1978 | -0.0187* | -0.0169 | -0.0291** | -0.0189 | -0.0170 | -0.0536** | -0.0542*** | -0.0538*** | -0.0649*** |
| | (0.0117) | (0.0135) | (0.0124) | (0.0179) | (0.0198) | (0.0228) | (0.0073) | (0.0115) | (0.0147) |
| Foreign Born | -0.0035 | -0.0047 | 0.0011 | 0.0034 | 0.0053 | 0.0242 | 0.0156 | 0.0128 | 0.0608** |
| | (0.0189) | (0.0194) | (0.0215) | (0.0309) | (0.0298) | (0.0394) | (0.0120) | (0.0168) | (0.0232) |
| AFQT | 0.0005** | 0.0003 | 0.0003 | 0.0038*** | 0.0040*** | 0.0017*** | 0.0031*** | 0.0033*** | 0.0010*** |
| | (0.0002) | (0.0003) | (0.0002) | (0.0004) | (0.0006) | (0.0005) | (0.0001) | (0.0003) | (0.0003) |
| Missing AFQT | 0.0560** | 0.0482 | 0.0665** | 0.1225** | 0.1294*** | 0.0471 | 0.1428*** | 0.1478*** | 0.0602* |
| | (0.0269) | (0.0339) | (0.0305) | (0.0410) | (0.0397) | (0.0536) | (0.0164) | (0.0265) | (0.0303) |
| State UE Rate | -0.0065 | -0.0064 | -0.0065 | -0.0262** | -0.0301*** | -0.0311** | -0.0337*** | -0.0336*** | -0.0286*** |
| | (0.0054) | (0.0055) | (0.0053) | (0.0097) | (0.0107) | (0.0097) | (0.0042) | (0.0056) | (0.0048) |
| Black $\times$ UE Rate | -0.0119 | -0.0123 | -0.0098 | 0.0080 | 0.0077 | 0.0188 | 0.0175** | 0.0195** | 0.0093 |
| | (0.0084) | (0.0084) | (0.0082) | (0.0138) | (0.0130) | (0.0148) | (0.0077) | (0.0093) | (0.0081) |
| Hispanic $\times$ UE Rate | -0.0002 | 0.00003 | 0.0033 | -0.0059 | -0.0051 | 0.0086 | -0.0194** | -0.0170** | -0.0166** |
| | (0.0099) | (0.0094) | (0.0101) | (0.0136) | (0.0128) | (0.0135) | (0.0071) | (0.0083) | (0.0082) |
| Missing UE Rate | -0.0224 | -0.0057 | -0.0232 | -0.1078* | -0.0893* | -0.1041** | -0.0868** | -0.0423 | -0.1075*** |
| | (0.0263) | (0.0343) | (0.0264) | (0.0563) | (0.0535) | (0.0516) | (0.0273) | (0.0314) | (0.0249) |
| Growth Rate in County Employment | 0.0158 | 0.0220 | -0.1262 | 0.6697* | 0.6299* | 0.2785 | 0.6595** | 0.5175** | -0.1851 |
| | (0.2229) | (0.2206) | (0.2213) | (0.3870) | (0.3473) | (0.3758) | (0.2338) | (0.2280) | (0.2110) |
| Growth Rate in County Manu. Employment | 0.4619 | 0.5129 | 0.3761 | -0.0827 | -0.1203 | 0.0438 | -0.2059 | -0.3655 | -0.1721 |
| | (0.3410) | (0.3193) | (0.3360) | (0.5794) | (0.4289) | (0.5621) | (0.3944) | (0.2810) | (0.3219) |

| Variables | School & Work | | | Part-Time Work Only | | | Full-Time Work Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Selection on Observ-ables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observ-ables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observ-ables* | *Contemp. Selection Control* | *Dynamic Selection Control* |
| Growth Rate in County Service Employmnt. | -0.0332 | -0.0525 | 0.2491 | -2.0080** | -1.8521** | -1.5242* | -0.1009 | 0.3359 | 0.0513 |
| | (0.4964) | (0.4676) | (0.4865) | (0.9043) | (0.8000) | (0.8381) | (0.5499) | (0.5305) | (0.4474) |
| Missing County Employment Growth Data | 0.2649*** | 0.2683*** | 0.2530*** | 0.3771*** | -0.1887** | 0.3481*** | 0.4503*** | -0.1140** | 0.3802*** |
| | (0.0260) | (0.0749) | (0.0260) | (0.0350) | (0.0753) | (0.0445) | (0.0158) | (0.0506) | (0.0250) |
| County Income/Worker | 0.0105*** | 0.0100*** | 0.0102*** | 0.0037 | 0.0036 | 0.0058 | 0.0110*** | 0.0107*** | 0.0101*** |
| | (0.0026) | (0.0030) | (0.0027) | (0.0039) | (0.0040) | (0.0045) | (0.0014) | (0.0021) | (0.0020) |
| County Income/Worker in Manu. Sector | -0.0010 | -0.0010 | -0.0004 | -0.0012 | -0.0012 | 0.0004 | 0.0014** | 0.0016* | 0.0014* |
| | (0.0010) | (0.0011) | (0.0010) | (0.0016) | (0.0016) | (0.0018) | (0.0006) | (0.0009) | (0.0009) |
| County Income/Worker in Service Sector | 0.0163*** | 0.0165*** | 0.0152*** | 0.0236*** | 0.0236*** | 0.0176*** | 0.0172*** | 0.0174*** | 0.0127*** |
| | (0.0025) | (0.0029) | (0.0026) | (0.0034) | (0.0037) | (0.0041) | (0.0014) | (0.0021) | (0.0020) |
| Missing County Income/Worker Data | 0.2641*** | 0.2639*** | 0.2105*** | -0.1791* | 0.3763*** | -0.1199 | -0.1044* | 0.4590*** | -0.1051** |
| | (0.0486) | (0.0287) | (0.0497) | (0.0968) | (0.0400) | (0.0821) | (0.0528) | (0.0245) | (0.0506) |
| Grades Completed | -0.1242*** | -0.1369*** | -0.1573*** | -0.0556** | -0.0553** | -0.0992*** | -0.0311** | -0.0407** | -0.1010*** |
| | (0.0192) | (0.0254) | (0.0200) | (0.0227) | (0.0271) | (0.0289) | (0.0108) | (0.0168) | (0.0169) |
| Black × Grades Completed | 0.0002 | 0.0007 | 0.0001 | 0.0235** | 0.0233* | 0.0159 | 0.0204*** | 0.0191** | 0.0168* |
| | (0.0104) | (0.0112) | (0.0109) | (0.0097) | (0.0122) | (0.0124) | (0.0057) | (0.0082) | (0.0092) |
| Hispanic × Grades Completed | 0.0285** | 0.0290** | 0.0232* | 0.0272** | 0.0278** | 0.0215 | 0.0149** | 0.0163* | 0.0176* |
| | (0.0125) | (0.0125) | (0.0130) | (0.0124) | (0.0138) | (0.0147) | (0.0059) | (0.0085) | (0.0089) |
| $(\text{Grades Completed})^2$ | 0.0060*** | 0.0065*** | 0.0071*** | 0.0033** | 0.0034*** | 0.0048*** | 0.0024*** | 0.0027*** | 0.0052*** |
| | (0.0008) | (0.0011) | (0.0009) | (0.0010) | (0.0012) | (0.0012) | (0.0004) | (0.0007) | (0.0006) |
| Years in School with No Work | 0.0434** | 0.0311 | 0.0643*** | -0.0263 | -0.0432 | 0.0803** | 0.0077 | -0.0022 | 0.0763*** |
| | (0.0158) | (0.0220) | (0.0165) | (0.0239) | (0.0364) | (0.0326) | (0.0115) | (0.0158) | (0.0195) |
| Black × Yrs. of School & No Work | -0.0294** | -0.0300** | -0.0302** | 0.0130 | 0.0125 | -0.0009 | -0.0292*** | -0.0289*** | -0.0303** |
| | (0.0121) | (0.0134) | (0.0126) | (0.0159) | (0.0168) | (0.0192) | (0.0072) | (0.0104) | (0.0121) |
| Hispanic × Yrs. of School & No Work | -0.0196 | -0.0197 | -0.0133 | -0.0271 | -0.0262 | -0.0216 | 0.0023 | 0.0040 | 0.0109 |
| | (0.0156) | (0.0158) | (0.0161) | (0.0202) | (0.0185) | (0.0235) | (0.0081) | (0.0113) | (0.0130) |
| $(\text{Yrs. of School \& No Work})^2$ | 0.0019 | 0.0035 | 0.0029* | 0.0040* | 0.0051 | 0.0021 | 0.0029** | 0.0035** | 0.0060** |
| | (0.0019) | (0.0026) | (0.0020) | (0.0025) | (0.0032) | (0.0035) | (0.0013) | (0.0017) | (0.0022) |
| Years of High School in which Worked | 0.0409** | 0.0369*** | 0.0521*** | 0.0085 | -0.0053 | 0.1105*** | 0.0580*** | 0.0457*** | 0.1321*** |
| | (0.0136) | (0.0136) | (0.0137) | (0.0172) | (0.0274) | (0.0205) | (0.0079) | (0.0123) | (0.0131) |
| Black × Yrs. of HS & Work | -0.0358** | -0.0356*** | -0.0367** | -0.0401** | -0.0399** | -0.0305* | -0.0307*** | -0.0299*** | -0.0260** |
| | (0.0125) | (0.0127) | (0.0130) | (0.0149) | (0.0163) | (0.0181) | (0.0060) | (0.0094) | (0.0104) |
| Hispanic × Yrs. of HS & Work | -0.0313** | -0.0314** | -0.0250* | -0.0457** | -0.0459** | -0.0356* | -0.0032 | -0.0019 | -0.0104 |
| | (0.0141) | (0.0143) | (0.0148) | (0.0165) | (0.0182) | (0.0202) | (0.0073) | (0.0102) | (0.0116) |
| $(\text{Yrs. of HS \& Work})^2$ | 0.0046* | 0.0056** | 0.0055** | 0.0085** | 0.0097*** | -0.0015 | -0.0007 | 0.0003 | -0.0029* |
| | (0.0024) | (0.0025) | (0.0024) | (0.0027) | (0.0034) | (0.0033) | (0.0013) | (0.0018) | (0.0020) |
| Years of College in which Worked | 0.0571*** | 0.0542*** | 0.0676*** | 0.0510** | 0.0552** | 0.0939*** | 0.0795*** | 0.0813*** | 0.1007*** |
| | (0.0153) | (0.0158) | (0.0153) | (0.0205) | (0.0241) | (0.0252) | (0.0075) | (0.0113) | (0.0109) |
| Black × Yrs. of College & Work | 0.0359** | 0.0348** | 0.0363** | -0.0377** | -0.0379* | -0.0297 | -0.0259** | -0.0264** | -0.0030 |
| | (0.0140) | (0.0158) | (0.0142) | (0.0185) | (0.0200) | (0.0220) | (0.0082) | (0.0111) | (0.0120) |
| Hispanic × Yrs. of College & Work | -0.0124 | -0.0137 | -0.0076 | -0.0582** | -0.0593*** | -0.0543** | -0.0326*** | -0.0326** | -0.0388** |
| | (0.0183) | (0.0175) | (0.0189) | (0.0192) | (0.0228) | (0.0231) | (0.0095) | (0.0129) | (0.0141) |

| Variables | School & Work | | | Part-Time Work Only | | | Full-Time Work Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Selection on Observ-ables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observ-ables* | *Contemp. Selection Control* | *Dynamic Selection Control* | *Selection on Observ-ables* | *Contemp. Selection Control* | *Dynamic Selection Control* |
| (Yrs. of College & Work)$^2$ | -0.0014 | -0.0009 | -0.0018 | 0.0016 | 0.0001 | 0.0002 | -0.0018 | -0.0025 | -0.0021 |
| | (0.0022) | (0.0025) | (0.0022) | (0.0035) | (0.0045) | (0.0041) | (0.0014) | (0.0019) | (0.0019) |
| Years of Part-Time Work & No School | 0.0690*** | 0.0861*** | 0.0701** | 0.0774*** | 0.0601** | 0.0702*** | 0.0561*** | 0.0489*** | 0.0413*** |
| | (0.0204) | (0.0272) | (0.0213) | (0.0120) | (0.0269) | (0.0101) | (0.0046) | (0.0069) | (0.0066) |
| Black × Yrs. of Part-Time Work | -0.0327 | -0.0321 | -0.0286 | -0.0220** | -0.0223*** | -0.0259*** | -0.0298*** | -0.0283*** | -0.0223*** |
| | (0.0268) | (0.0214) | (0.0272) | (0.0080) | (0.0078) | (0.0073) | (0.0046) | (0.0062) | (0.0062) |
| Hispanic × Yrs. of Part-Time Work | -0.0021 | -0.0025 | -0.0019 | -0.0199* | -0.0200** | -0.0233** | -0.0306*** | -0.0291*** | -0.0263*** |
| | (0.0231) | (0.0240) | (0.0240) | (0.0104) | (0.0087) | (0.0098) | (0.0052) | (0.0065) | (0.0069) |
| (Yrs. of Part-Time Work Only)$^2$ | -0.0039 | -0.0055 | -0.0045 | -0.0022 | -0.0005 | -0.0013 | 0.0012 | 0.0016 | 0.0010 |
| | (0.0041) | (0.0037) | (0.0042) | (0.0015) | (0.0028) | (0.0012) | (0.0009) | (0.0011) | (0.0010) |
| Years of Full-Time Work | 0.2246*** | 0.2349*** | 0.2093*** | 0.0728*** | 0.0894*** | 0.0818*** | 0.1156*** | 0.0789*** | 0.1125*** |
| | (0.0113) | (0.0176) | (0.0119) | (0.0112) | (0.0266) | (0.0116) | (0.0053) | (0.0140) | (0.0035) |
| Black × Yrs. Of Full-Time Work | -0.0150 | -0.0154 | -0.0185 | -0.0327*** | -0.0343*** | -0.0309** | -0.0143*** | -0.0143*** | -0.0179*** |
| | (0.0155) | (0.0155) | (0.0172) | (0.0095) | (0.0091) | (0.0092) | (0.0040) | (0.0041) | (0.0026) |
| Hispanic × Yrs. of Full-Time Work | -0.0067 | -0.0074 | -0.0055 | -0.0102 | -0.0109 | -0.0079 | -0.0006 | -0.0007 | -0.0004 |
| | (0.0134) | (0.0145) | (0.0143) | (0.0089) | (0.0089) | (0.0087) | (0.0039) | (0.0041) | (0.0025) |
| (Yrs. of Full-Time Work)$^2$ | -0.0162*** | -0.0166*** | -0.0145*** | 0.0004 | -0.0015 | 0.0000 | -0.0041*** | -0.0010 | -0.0039*** |
| | (0.0020) | (0.0024) | (0.0021) | (0.0015) | (0.0031) | (0.0016) | (0.0006) | (0.0012) | (0.0004) |
| Years in Military | 0.1483** | 0.1569*** | 0.1471** | 0.0223 | 0.0149 | 0.0738** | 0.0456*** | 0.0444*** | 0.0639*** |
| | (0.0459) | (0.0429) | (0.0501) | (0.0241) | (0.0249) | (0.0281) | (0.0113) | (0.0130) | (0.0173) |
| Black × Yrs. in Military | 0.0070 | 0.0060 | 0.0062 | 0.0215 | 0.0203 | 0.0174 | 0.0204** | 0.0187* | 0.0261** |
| | (0.0349) | (0.0297) | (0.0360) | (0.0169) | (0.0172) | (0.0200) | (0.0080) | (0.0102) | (0.0126) |
| Hispanic × Yrs. in Military | -0.0330 | -0.0357 | -0.0125 | 0.0328 | 0.0345 | 0.0275 | -0.0101 | -0.0123 | -0.0103 |
| | (0.0371) | (0.0342) | (0.0483) | (0.0278) | (0.0238) | (0.0278) | (0.0104) | (0.0129) | (0.0158) |
| (Yrs. in Military)$^2$ | -0.0176 | -0.0177* | -0.0163 | -0.0022 | -0.0008 | -0.0072 | 0.0017 | 0.0021 | 0.0009 |
| | (0.0127) | (0.0101) | (0.0139) | (0.0052) | (0.0052) | (0.0060) | (0.0028) | (0.0025) | (0.0039) |
| Years in Other Activities | -0.0195 | -0.0138 | -0.0263 | -0.0046 | -0.0126 | 0.0206 | 0.0247*** | 0.0247** | 0.0166 |
| | (0.0493) | (0.0334) | (0.0488) | (0.0144) | (0.0204) | (0.0159) | (0.0070) | (0.0114) | (0.0133) |
| Black × Yrs. in Other Activities | 0.0044 | 0.0082 | 0.0141 | 0.0181 | 0.0215 | 0.0195 | 0.0017 | 0.0030 | 0.0019 |
| | (0.0563) | (0.0410) | (0.0551) | (0.0132) | (0.0155) | (0.0152) | (0.0085) | (0.0123) | (0.0131) |
| Hispanic × Yrs. in Other Activities | 0.0132 | 0.0168 | 0.0119 | 0.0099 | 0.0121 | 0.0041 | -0.0145* | -0.0137 | 0.0067 |
| | (0.0711) | (0.0546) | (0.0693) | (0.0187) | (0.0190) | (0.0216) | (0.0098) | (0.0133) | (0.0156) |
| (Yrs. in Other Act.)$^2$ | 0.0105 | 0.0102 | 0.0088 | 0.0051** | 0.0061** | 0.0025 | -0.0003 | -0.0003 | 0.0015 |
| | (0.0188) | (0.0081) | (0.0178) | (0.0024) | (0.0031) | (0.0026) | (0.0013) | (0.0021) | (0.0027) |
| $\sigma_\omega^2$ | | | 0.1411*** | | | 0.1545*** | | | 0.0908*** |
| | | | (0.0014) | | | (0.0021) | | | (0.0006) |
| Cov($u_{tj}$,$\varepsilon_{tj}$) | | -0.0695 | | | -0.1083 | | | -0.2042*** | |
| | | (0.0773) | | | (0.1567) | | | (0.0726) | |
| Log-Likelihood Function | | -44425.3 | -41996.7 | | | | | | |
| Number of Individuals | 2,573 | | | | | | | | |
| Number of Person-Years | 39,823 | | | | | | | | |

| **Points of Support for Dynamic Selection Control Model** | | |
|---|---|---|
| | *Location* | *Probability Mass* |
| Support Point 1 | 0.0000 | 0.0140*** |
| | | (0.0037) |
| Support Point 2 | 0.3146*** | 0.1752*** |
| | (0.0121) | (0.0128) |
| Support Point 3 | 0.4652*** | 0.4330*** |
| | (0.0137) | (0.0165) |
| Support Point 4 | 0.5979*** | 0.3094*** |
| | (0.0160) | (0.0157) |
| Support Point 5 | 0.7505*** | 0.0648*** |
| | (0.0197) | (0.0072) |
| Support Point 6 | 1.0000 | 0.0037 |