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ABSTRACT

A study used the National Longitudinal Survey of Youth to track the earnings histories of high school students over a period of 12 years, starting in either their freshman or sophomore year of high school. Contrary to some previous research, the analysis failed to uncover any evidence of harmful effects of working during high school. Instead, jobs held during the senior year yielded substantial and lasting benefits. Moderate work (1-20 hours per week) had a strong positive influence on adult earnings. Those who showed no work activity as seniors had average earnings of about $16,000 a year, rising to over $20,300 for those working 1-10 hours a week. This was slightly above the annual earnings of those reported having worked either 11-20 hours a week (annual earnings almost $19,600) or more than 20 hours a week (barely $20,300). This pattern of adult earnings persisted if the data were disaggregated. For males as a group, adult earnings rose from about $18,600 for those reporting no work to just over $24,000 for those who reported working 1-10 hours a week. Earnings for adult women peaked at 11-20 hours of work as a senior compared to 1-10 hours for males. For whites as a group, earnings rose consistently with hours worked in school. (Contains 33 references.) (YLB)

EMPLOYMENT POLICIES INSTITUTE

THE EFFECTS OF HIGH SCHOOL WORK EXPERIENCE ON FUTURE ECONOMIC ATTAINMENT

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at Greensboro

May 1994

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The Employment Policies Institute is a non-profit research organization dedicated to expanding employment opportunities at all levels in America's economy. In particular, EPI believes that entry-level positions often provide the best job-training and education programs that many Americans, especially young Americans and those seeking to move from welfare to work, can have. By ensuring that these entry-level opportunities are preserved for those seeking a port of entry into the workforce, America can make substantial improvements in both unemployment and long-term productivity.

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EXECUTIVE SUMMARY

Teenage employment has historically been viewed with a certain ambivalence. While such employment is thought to form a bridge to the permanent working world, it is also feared that it detracts from efforts that should properly be dedicated to enhanced academic achievement. The concern, of course, is that by detracting from academic efforts teenage employment offers youth short-term earnings at the expense of lower lifetime earnings.

This study uses the *National Longitudinal Survey of Youth* (NLSY) to track the earnings histories of high school students over a period of 12 years, starting in either their freshman or sophomore year of high school. It finds that, contrary to some previous research, there is no harmful effect from teenage employment. Quite the contrary, seven to ten years after leaving high school (well after the normal end of a college education for those who continue on in school), those individuals with high-school work experience report average earnings that are higher than their peers who did not work while in school.

It is in the senior year of high school that we see significant increases in work behavior, increases that expand the number of respondents reporting long work hours in school and make possible evaluations of long-term earnings effects of different levels of in-school work hours.

Moderate work (1-20 hours per week) has a strong positive influence on adult earnings. Those who showed no work activity as seniors had average earnings of about $16,000 a year, rising to over $20,300 for those working 1-10 hours a week. This was slightly above the annual earnings of those reporting having worked either 11-20 hours a week (annual earnings of almost $19,600) or more than 20 hours a week (barely $20,300). While all of the working groups showed higher annual earnings than did the group with no work experience, this effect was greatest for those with only moderate work experience. In the sample, 49 percent reported no work experience as seniors, 11 percent worked 1-10 hours a week, 21 percent worked 11-20 hours, and 19 percent worked over 20 hours a week. (This is reported in Table 4 of the text.)

This pattern of adult earnings persists if we disaggregate the data. For males as a group, adult earnings rose from about $18,600 for those reporting no work to just over $24,000 for those who reported working 1-10 hours a week. This latter group earned slightly more than either of the groups that reported more hours of work. Again, all of the working groups reported higher annual earnings than did the non-working groups. (Reported in Table 5 of the text.)

A similar story can be told for women, the difference being that earnings for adult women peaked at 11-20 hours of work as a senior compared to 1-10 hours for males. For whites as a group earnings rose consistently with hours worked in school. Sample sizes were too small to permit accurate estimation for nonwhites. (Reported in Table 5 of the text.)

Not all students, even those with comparable in-school work histories, are the same of course. Some students will come from more privileged backgrounds that afford private secondary education, their parents will have differing levels of education, in addition to racial, ethnic and gender distinctions. These and other variables (see Table 1 in the text) were controlled for in the estimation so as to isolate their influence and permit the estimation of the work effect.

The results of that estimation were consistent with the above findings. In general light to moderate work commitments by high school seniors were found to have beneficial impacts on future economic

outcomes. The strongest impact was found to be in substantial improvements in hours of work and weeks worked per year rather than on wages. That is to say, individuals with senior year work experience showed modest gains in hourly wages with the main benefit arising from more consistent work patterns—less time spent unemployed or on partial work weeks. Work activity in either sophomore or junior years was found to have no or only slight benefits.

The transition from school to work is not infrequently a difficult one for American youths, and has led to renewed interest in how to both ease that transition and increase the earnings power of new entrants into the work force. As this study shows, one effective way to reach that goal is to encourage *moderate* work among students in their last year of school. Even though the type of work available to students is heavily dominated by service sector employment—jobs that we frequently vilify as dead-end "burger-flipping"—this report indicates that even this kind of employment imparts a value which serves students well in their future careers. This type of work is not considered to involve any general training activity—training that the worker takes to his or her next job and which increases the worker's value in that next job. Nevertheless, the increase in work force attachment—longer, more consistent work histories—along with higher pay shows that at least one type of general training does take place: student workers acquire the ability to hold jobs and adhere to the demands of the work place. As the data demonstrate, employers value this skill and reward it in the workplace.

Note on Data Sources:

The sample used in this study profiles youths that were first interviewed for the *National Longitudinal Survey of Youth* (NLSY) in 1979. This group has been reinterviewed annually since 1979, with responses available through the 1991 interview wave. The study group is restricted to those who were either high school freshmen or sophomores in the initial survey year and who remained in school through their normal completion date for high school.

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INTRODUCTION

During the middle 1970s, a number of prestigious commissions were convened to study the problems of adolescents (*e.g.*, National Commission on the Reform of Secondary Education, 1973; National Panel on High Schools and Adolescent Education, 1975; President's Science Advisory Committee, 1974). A common conclusion was that additional early work experience would foster the development of personal responsibility, smooth the transition from youth to adulthood, and improve educational performance and occupational attainment. Shortly thereafter, a number of federal initiatives, such as the Career Education Incentive Act of 1977, were passed with the goal of increasing the work experience of youths.

These recommendations were made in the absence of any hard empirical evidence that increased youth employment caused, or was even correlated with, favorable outcomes. Therefore, it is not surprising that a partial reappraisal occurred during the 1980s. The seminal research of Greenberger and Steinberg, and their coauthors (Greenberger and Steinberg, 1980; Greenberger *et al.*, 1982; Steinberg *et al.*, 1982a, 1982b) pointed to mixed and generally negative outcomes of student employment. This led the authors to conclude that "working is more likely to interfere with than enhance schooling; promotes pseudomaturity rather than maturity; is associated in certain circumstances with higher, not lower, rates of delinquency and drug and alcohol use; and fosters cynical rather than respectful attitudes toward work" (Greenberger and Steinberg, 1986: p. 235).

Economic theory also fails to provide unambiguous predictions concerning the efficacy of youth job holding. For example, the human capital model identifies both potential costs and benefits of working. Time spent working could detract from potentially more productive educational investments. On the other hand, the employment may provide skills and knowledge, which increase future productivity and could complement in-class learning.[1] Furthermore, early work experience could speed the process by which youths obtain positions where there is a good match between job requirements and worker qualifications.[2]

Rates of employment by in-school youth are at historically high levels. If this employment has the negative effects sometimes attributed to it (and, in particular, if it reduces school continuation rates and high school academic performance), the increased work propensities could play a role in explaining the wage stagnation that has been observed over the past 20 years and the relative reductions in wages experienced by young workers, particularly those without college educations.

Two shortcomings in previous research, however, make it difficult to know whether this is the case. First, most prior studies treat youth employment as an exogenous variable, ignoring the selection process that determines which students choose to work and how many hours they will be employed. Second, although the analyses have focused on educational achievement and employment outcomes shortly after high school completion, no information has been obtained on long-run labor market success.

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1 Similarly, sociologists have suggested zero-sum models whereby employment diverts time from academic pursuits and developmental models where work experience furthers the total development of the individual.

2 Topel and Ward (1992) provide evidence of frequent job changing for inexperienced workers and argue that this is an important source of wage and productivity increases.

This paper addresses both shortcomings. First, in order to control for difficult to observe differences between workers and nonworkers, an unusually comprehensive set of controls for background characteristics is included in the analysis below. Estimates are also obtained using instrumental variable procedures, which minimize the correlation between the proxies used for student employment and unobservables which influence future economic attainment. Second, labor market outcomes are observed seven to ten years after the scheduled date of high school graduation, thus providing the first available information on the long-term effects of student employment. This investigation focuses upon the amount of employment held by high school students. Examining the effects of differences in job characteristics or of work by college students is beyond the scope of this analysis and is reserved for future study.[3]

Previous Research

The effects of high school employment have been widely studied since the late 1970s. Most frequently, researchers have examined the relationship between student work and academic performance. Employment probabilities and wage rates, in the period shortly following high school completion, have also received some attention.[4] Samples, time periods, and study methodologies vary widely, reducing the probability of arriving at consensus. This section briefly summarizes the findings and shortcomings of the previous research.

Academic achievement has been measured in a variety of ways including grade-point averages, test scores, high school completion rates, study times, and involvement in school activities. Many investigators have included more than one of these indicators. There is currently no consensus whether student employment improves or worsens school performance, although the data do suggest that the beneficial effects, if any, are maximized at intermediate hours of work, while harmful impacts are most likely for heavy work commitments. For example, Barone (1993), Greenberger and Steinberg (1980), Greenberger *et al.* (1982), Mortimer and Finch (1986), Steinberg and Dornbusch (1991), and Steinberg *et al.* (1993) find that high school employment is associated with lower grade-point averages. Conversely, Gade and Peterson (1980), Lillydahl (1990), Meyer and Wise (1982), and Schill *et al.* (1985) detect either no effects or beneficial impacts at low or intermediate work hours.[5] Interestingly, D'Amico (1984) presents evidence indicating that despite reducing the amount of studying and time spent on school activities, student employment correlates with higher class rank for white males (with no effect for females or minorities) and with higher rates of school completion and college attendance. This suggests that working students may allocate their time more efficiently than their counterparts.

The results pertaining to future employment outcomes are more clear-cut. High school employment is unambiguously associated with elevated rates of future job holding and increased earnings (see D'Amico, 1984; Marsh, 1991; Meyer and Wise, 1982; Mortimer and Finch, 1986; Stephenson, 1981; Stern and Nakata, 1989; and Stevenson, 1978). It is not obvious, however, whether these represent long-term benefits of student employment or transitory gains which will disappear over time. Indeed, some re-

3 Greenberger and Steinberg (1986), Greenberger *et al.* (1982), Stern and Nakata (1989), and Stern *et al.* (1990) examine the role of job characteristics.

4 Researchers have also studied the effects of youth unemployment on future outcomes (*e.g.*, Ellwood, 1982; Smith, 1985) and, as mentioned, on the types of jobs held by students.

5 A similar lack of consensus is found in research examining the effects of employment by college students. For instance, Harvey (1982) uncovers negative effects of college employment, Hood *et al.* (1992) find the highest GPAs among students working 7-14 hours/week, and Ehrenberg and Sherman (1987) contrast positive effects of on-campus employment with negative impacts of off-campus jobs.

searchers have argued that work by youths improves initial employment outcomes but reduces human capital investments and so has a negative long-term impact. Unfortunately, virtually all previous studies have focused on the period immediately following school completion, making it difficult to infer life cycle effects.[6]

Beyond the aforementioned ambiguities and shortcomings, most previous research suffers from a fundamental shortcoming that seriously limits its usefulness. The choice of youths regarding whether or not to work (and if so for how many hours) does not occur randomly. Instead, it is likely to be the result of a complicated selection process, unknown to the researcher. The correlations between student employment and the outcome measures could be the result of unobserved confounding factors, rather than being due to any causal effects of the work itself. For example, Weiss (1988) has argued that the large earnings premium associated with high school graduation results because individuals who complete school possess large amounts of unobservable traits he groups under the rubric of "stick-to-itiveness." Using the same analogy, if individuals with low amounts of "stick-to-itiveness" are relatively likely to work as students (presumably because they do not like school), then youth employment may be associated with negative future outcomes, even in the absence of a causal effect.[7] Spurious correlation is still more problematic when, as in many studies, only rudimentary controls for differences in observable characteristics are included. Even a more comprehensive set of covariates is unlikely to eliminate the selection bias, however, unless it includes good proxies of the underlying attributes that determine the employment decision.

These methodological problems are further aggravated when nonrepresentative convenience samples are used or when subsamples are selected in ways that introduce unobserved differences between workers and nonworkers. To illustrate this problem, consider Steinberg *et al.*'s (1982) influential longitudinal study of students at four high schools in Orange County, California. Their initial sample included 3,101 students who were present on two testing days at each school. From this group, they selected all persons holding their first job and a random sample of those who had never worked (n=1,000). Of these one thousand students, 667 completed questionnaires in March of 1979. For the longitudinal analysis, they deleted all respondents who were working at the survey date or who had ever worked. This reduced the sample size to 319, of whom they were able to reinterview 228 the next year. Fifty-two of these students were excluded because they had worked during the intervening period but were no longer doing so. Thus, the group analyzed included 176 individuals or 5.7 percent of the original (and nonrepresentative) sample. More damaging than the small sample size is the likelihood that biases (some of known and some of unknown directions) were introduced at each stage of the sampling process.[8] This makes it difficult to know how any results should be interpreted.

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6 Exemptions include Mortimer and Finch (1986) and Stevenson (1978), who followed respondents for several years after graduation. Data for these studies is from the 1960s and early 1970s, however, and so provides limited information on recent high school students, who work more than did earlier cohorts.

7 Steinberg and Dornbusch (1991) and Steinberg *et al.* (1993) provide evidence showing that, compared to nonworkers, employed high school students had lower grades and educational expectations, spent less time studying, and were less engaged in school even before they started working. Some researchers (*e.g.*, Lillydahl, 1990, Meyer and Wise, 1982) have used multi-equation models or analysis of the time structure of model residuals in attempting to separate causation from correlation. These results have met with limited success.

8 To give two examples, the restriction to students present at school during two testing days biases the sample against individuals with high rates of absenteeism, while the deletion of persons having held but left jobs selects out students with histories of unstable employment.

Data

This study uses data from the National Longitudinal Survey of Youth (NLSY). The NLSY is a nationally representative sample of 12,686 men and women who were 14 through 21 years of age on January 1, 1979. Respondents have been interviewed annually since 1979 and information through the 1991 interview is used below. Consequently, we are able to follow this sample for nine to ten years after their normal exit from high school, well into their late twenties.

The sample for this study is restricted to respondents who: 1) were freshman or sophomores in high school in 1979, 2) remained enrolled in school through at least the date of scheduled high school graduation (two years if a sophomore in 1979 and three years if a freshman), 3) and, were members of the original cross-sectional sample of noninstitutionalized civilian youths.[9]

These exclusions reduce the sample size to 1,149 (588 males and 561 females). Of these, 1,067 respondents (545 men and 522 women) continued to be interviewed in 1991, a continuation rate of 92.9 percent.

The NLSY has at least three advantages for studying the effects of high school employment. First, it is the only survey to follow a recent cohort of students for a sufficient period to allow examination of the long-term effects of working. Second, it contains unusually rich information on background variables that may jointly influence the decision to obtain employment during school and subsequent economic attainment. Third, it includes extensive retrospective information on employment in the period since the previous interview.

The primary variables of interest are work hours during the respondent's sophomore, junior, and senior years in high school. This was measured by work hours in the week prior to the survey interview. Linear and quadratic terms for hours worked are included to allow employment to have a nonlinear effect on future economic attainment. In addition to a standard set of demographic variables (sex, race, region, residence in an SMSA or urban area), detailed information on family backgrounds and individual characteristics is available in the NLSY and controlled for in the analysis. This included religion, parent's educational attainment, attitudes towards school and education, number of siblings, the presence of magazines, newspapers, and library cards in the household, cigarette and drug use, country of origin of the respondent and his or her parents, and language spoken in the home. Most of the family background variables were measured at the 1979 interview date, which is concurrent with or precedes the sophomore year of high school.

The effect of the above variables on labor market outcomes of individuals was measured by their impact on annual earnings, weeks worked, and hours employed during the previous calendar year, as well as hourly wages at the survey date (current or most recent job). The labor market outcomes are measured as reported at the 1989 through 1991 interview dates (for the preceding calendar years). The values of these variables were averaged over the three-year period to smooth the effects of transitory fluctuations and reduce the number of observations which are lost due to missing values.[10]

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9 In addition to the cross-sectional sample, the NLSY includes a supplemental sample of Hispanic, black, and economically disadvantaged white youths (n=5,295) and a sample of 17-to-21 year-olds enlisted in the military as of September 30, 1989 (n=1,280). See Center for Human Resource Research (1992) for further information on the NLSY.

10 Corresponding three-year averages of the time-varying regressors are also used. If values of a variable are missing for one or more years, the averages are calculated over the years for which data is available.

The average values of key demographic and family background variables are presented in Table 1. Column a) displays averages for all respondents to the NLSY, while column b) restricts the sample to respondents remaining in the sample through the end of the analysis period. Roughly half the sample are women, one-sixth are nonwhite (black or Hispanic), one-third are Catholic, and one-fifth are Southern Baptists. The mothers of over two-thirds of respondents graduated from high school, with somewhat higher education levels observed for the fathers. Fewer than 3 percent of sample members are foreign-born, compared to around twice as many of their parents; however, a foreign language was spoken in the home of more than one in ten individuals. The typical respondent has three siblings.

Three-quarters of the sample grew up in an urban area and two-thirds in a metropolitan location. A large majority of sample members were exposed to magazines and newspapers and at age 14 lived in households with library privileges. Over 90 percent of respondents attended public schools and al-

Table 1
Sample Means for Selected Characteristics

	All Respondents	Respondents Interviewed in 1991
Demographics		
Female	48.8%	48.9%
Black	11.8	11.5
Hispanic (Nonblack)	6.1	6.3
Foreign Language Spoken in Home	10.9	11.2
Foreign Born	2.6	2.7
Number of Siblings	3.0	3.0
Education		
Attends Public School	92.8	92.8
Negative Attitude Towards School	15.5	15.3
Highest Grade Expected	14.3 yrs	14.3 yrs
Residence		
In Urban Area	74.1	74.6
In SMSA	66.1	66.4
Household Resources at Age 14		
Magazines	73.1	73.9
Newspapers	84.2	84.3
Library Card	74.0	74.1
Drug Use		
Used Cigarettes by Soph. Year	61.8	62.4
Used Marijuana or Hashish by Sophmore Year	7.8	7.9
Religion		
Baptist	19.0	18.2
Catholic	33.1	33.6
Jewish	1.1	1.0
Characteristics of Mother		
Foreign Born	5.8	6.2
High School Graduate	69.8	69.7
College Graduate	11.1	10.8
Characteristics of Father		
Foreign Born	5.7	5.8
High School Graduate	67.1	67.5
College Graduate	18.4	18.4
N	1,149	1,067

Note: Unless otherwise specified, all variable were obtained from 1979 interviews and refer to 1979. Respondent is defined to have negative attitudes toward school if they respond that either of the statements "most of my classes are boring" or "I don't feel safe at this school" are "very true" or if they say that they are "very dissatisfied" with school.

most one-sixth had negative attitudes towards their school. The average individual expected to complete slightly more than two years of college. More than 60 percent had smoked a cigarette by their sophomore year in high school but fewer than one in twelve had tried marijuana or hashish by that age. Interestingly, respondents remaining in the sample through 1991 had virtually identical characteristics as the full sample, suggesting that attrition occurred fairly randomly.

Frequency and Amount of High School Employment

Table 2 provides descriptive information on high school employment. Column (a) refers to the full sample and column (b) to persons interviewed in 1991. There is again little evidence of attrition bias, although employment rates are marginally higher for persons interviewed throughout the period of investigation. The analysis in the remainder of this paper is therefore restricted to the 1,067 individuals continuing in the sample through 1991.

Table 2
High School Employment As Measured by Status in Week Prior to Survey

	Sophomores		Juniors		Seniors	
	(a)	(b)	(a)	(b)	(a)	(b)
Percent Working	27.9%	28.3%	42.4%	43.3%	50.3%	50.8%
Ave. Hours/Week	3.3 hr	3.3hr	6.6hr	6.7hr	9.4hr	9.6hr
Ave. Hours/Week if Employed	11.9hr	11.8hr	15.5hr	15.5hr	18.7hr	18.9hr
Hours Worked in Week Prior to Survey						
0	72.3%	71.8%	57.6%	56.6%	49.7%	49.2%
1-10	16.2	16.3	15.4	15.8	11.3	11.3
11-20	8.1	8.5	17.1	17.5	20.5	20.5
21-30	2.2	2.3	7.6	7.7	13.4	13.8
31-40	0.7	0.7	2.0	2.1	4.1	4.2
>40	0.5	0.4	0.4	0.4	1.0	1.0

Notes: Full sample included in column (a), n= 1,149. Column (b) includes respondents interviewed in 1991, n= 1,067.

Work experience rises steadily throughout the high school years. Twenty-eight percent of sophomores were employed during the week prior to the survey. This increases to 43 percent for juniors and to 51 percent of high school seniors. Given the large fraction of nonworking students, average employment hours are modest, rising from slightly over three hours per week for sophomores to around ten hours per week for seniors. Employed sophomores, juniors, and seniors work an average of 12, 16, and 19 hours per week, respectively. Only 3 percent of sophomores, 11 percent of juniors, and 19 percent of seniors worked more than 20 hours in the week before the interview and just 1, 2, and 5 percent, respectively, were employed over 30 hours. Thus, a relatively small proportion of high school students have the heavy employment commitments that have raised particular concern in previous research.

The average high school senior works three times as much as the typical sophomore and 50 percent more than the average junior. Furthermore, job holding is the norm rather than the exception for seniors. Thus, we might expect that beneficial or detrimental effects of high school employment will be most pronounced when considering senior year employment.

Table 3 describes differences in high school work experience by sex and race. Although it is possible, in principle, to provide separate statistics for blacks and Hispanics, the small sample sizes make this impractical and so the two groups are combined and described as "nonwhites." Males are more likely to work than females, especially prior to their senior year. The gender differential exceeds 28 percent for sophomores (31.6 percent vs. 24.6 percent), 18 percent for juniors (47 percent vs. 39.7 percent), but is

just 2 percent for seniors (51.4 percent vs. 50.2 percent).[11] Because boys holding jobs work more hours than corresponding girls, the sex disparity in average hours worked is even larger. Nonetheless, the gender gap again declines as the grade level increases.

The second panel of Table 3 illustrates the sharp differences in job holding between whites and nonwhites. White sophomores are twice as likely to work as their minority peers (30.9 percent vs. 15.3 percent). The race differential exceeds 67 percent for juniors (46.7 percent vs. 27.9 percent), and 59 percent for seniors (54.4 percent vs. 34.2 percent). Among employed students, however, there is little evidence that whites work more hours than nonwhites.[12] If anything, the reverse is true. This suggests that the employment disparities may be the result of differences in opportunities rather than tastes. If student work is beneficial, this could be one reason why nonwhites receive relatively low earnings later in life.

Table 3
High School Employment By Sex and Race

	Sophmores		Juniors		Seniors	
	Male	Female	Male	Female	Male	Female
Percent Working	31.6%	24.6%	47.0%	39.7%	51.4%	50.2%
Ave. Hours/Week	4.1 hr	2.6 hr	7.9 hr	5.5 hr	10.1 hr	9.0 hr
Ave. Hours/Week if Employed	12.8 hr	10.5 hr	16.8 hr	13.9 hr	19.7 hr	17.9 hr
Hours Worked in Week Prior to Survey						
0	68.4%	75.4%	53.0%	60.3%	48.6%	49.8%
1-10	16.7	15.9	15.4	16.1	11.9	10.5
11-20	10.5	6.5	18.0	17.1	18.4	22.8
21-30	2.6	1.9	9.7	5.6	14.5	13.0
31-40	1.3	0.0	3.3	0.8	4.8	3.6
>40	0.6	0.2	0.6	0.2	1.8	0.2
	White	Nonwhite	White	Nonwhite	White	Nonwhite
Percent Working	30.9%	15.3%	46.7%	27.9%	54.4%	34.2%
Ave. Hours/Week	3.5 hr	2.5 hr	7.3 hr	4.2 hr	10.2 hr	6.6 hr
Ave. Hours/Week if Employed	11.4 hr	16.3 hr	15.6 hr	15.0 hr	18.8 hr	19.2 hr
Hours Worked in Week Prior to Survey						
0	69.1%	84.7%	53.3%	72.1%	45.6%	65.8%
1-10	18.3	7.4	16.4	12.6	12.1	7.4
11-20	9.4	4.8	19.4	9.0	21.7	15.3
21-30	2.5	1.1	8.6	3.7	14.7	9.5
31-40	0.6	1.1	1.9	2.6	4.9	1.1
>40	0.2	1.1	0.5	0.0	1.0	1.1

Note: Sample includes respondents interviewed in 1991. Sample sizes are 545, 522, 877, and 190 for males, females, whites, and nonwhites, respectively.

11 Gender differences in student employment have also been observed by D'Amico (1984); Gade & Peterson (1980); Michael and Tuma (1984); and Steinberg and Dornbusch (1991).

12 Using NLSY data, Steele (1991) also finds that whites more often work than nonwhites but with no differences in hours conditional on working.

Table 4

Average Values of Outcome Variables By High School Employment Hours in Week Prior to Survey

Employment Hours	N	Annual Income[1]	Hourly Wage[2]	Annual Weeks Worked[3]	Annual Hours Worked[3]
All Respondents	1,067	$18,061	$10.43	42.1 wks	1,787 hrs
Sophmore Year Employment					
0	765	17,332	10.46	41.5	1,767
1-10	174	18,682	10.57	43.2	1,793
11-20	91	21,004	10.51	43.8	1,836
>20	35	21,682	8.55	44.4	2,034
Junior Year Employment					
0	604	16,575	10.39	41.0	1,721
1-10	168	19,519	10.74	44.0	1,893
11-20	187	19,645	10.41	42.9	1,829
>20	108	21,365	10.17	43.7	1,916
Senior Year Employment					
0	525	16,035	10.22	39.8	1,681
1-10	120	20,338	10.08	43.8	1,831
11-20	219	19,589	10.86	44.2	1,853
>20	203	20,307	10.69	44.7	1,961

Note: Sample includes respondents interviewed in 1991. Care should be taken in interpreting the values of cells where there were few respondents.
1) Annual incomes refer to total wage and salary income (i.e. wages, salary, commissions, and tips before taxes or deductions) reported for the survey year preceding the interview date. This is averaged over the last three years to smooth out transitory fluctuations.
2) Wage rates refer to the current or most recent job.
3) Weeks and hours worked refer to the annual values reported for the survey year preceding the interview date. This is averaged over the last three years to smooth out transitory fluctuations.

Labor force commitment increases with high school grade level for all sex and race groups. The typical working student is employed fewer than 10 hours per week as a sophomore and between 10 and 20 hours as a junior or senior. The proportion working more than 20 hours weekly, although relatively small for all subgroups and grade levels, triples between the sophomore and junior year (increasing from 3.4 percent to 10.2 percent in the full sample) and rises by an additional 86 percent (to 19 percent) during the senior year of high school. Given their relatively low sophomore year employment rates, the increases are even larger for women than for men.

High School Employment and Future Economic Attainment

This section presents descriptive information on the relationship between high school employment and future labor market outcomes. Table 4 illustrates how economic attainment varies with student work hours and reveals several interesting patterns. First, incomes, weeks employed, and hours worked are positively correlated with youth labor market experience. Second, the association increases with the high school grade. Thus, senior year job holding is more closely related with these outcomes than sophomore or junior work hours. Third, the correlation between student employment and future wage rates is weaker. Timing of the employment, however, remains important. Whereas sophomore work experience is negatively related to future wages and there is no association between junior year employment and wages, a slight positive correlation is observed for senior year job holding.

Table 5 provides information on the relationship between senior year work hours and economic outcomes for sex and race subsamples. The findings are generally similar to those obtained for the full sample, although the small number of nonwhites with senior year work experience makes it difficult to evaluate the impact of student employment for this group.

Figures 1 through 3 further illustrate the relationship between student employment and future economic attainment. The figures show predicted values of the labor market outcomes as functions of work hours in the three high school grades, with predictions obtained by regressing the dependent variables on student work hours and work hours squared. The quadratic specification is used because the returns to employment are often maximized at intermediate hours of work. The figures reveal patterns that are consistent with the descriptive information in Table 4. High school employment is associated with higher future earnings, employment hours, and (to a lesser extent) weeks worked. The employment effect is typically maximized at between 20 and 40 hours of work per week, which exceeds the labor market commitments of the vast majority of students. For hourly wages, the pattern is more complicated. Whereas light to moderate employment responsibilities during the sophomore and junior years either have no effect on or slightly raise future wages, long hours are associated with low subsequent wages. Conversely, future wages are relatively low for seniors working few hours but higher for those spending more time on jobs.

Table 5

Average Values of Outcome Variables By Senior Year Employment Hours, Sex, and Race

Senior Year Employment Hours	N	Annual Income[1]	Hourly Wage[2]	Annual Hours Worked[3]	Annual Hours Worked[3]
Males					
0	265	$18,634	$10.80	42.6 wks	1,885 hrs
1-10	65	24,082	10.72	44.2	1,950
11-20	100	22,972	10.98	46.3	2,059
>20	115	23,479	12.21	45.7	2,123
Females					
0	260	13,386	9.65	36.9	1,473
1-10	55	15,912	9.35	43.3	1,691
11-20	119	16,748	10.74	42.5	1,678
>20	88	16,161	8.77	43.5	1,749
Whites					
0	400	16,854	10.71	40.9	1,726
1-10	106	19,476	10.18	44.2	1,851
11-20	190	20,387	10.31	44.9	1,886
>20	181	20,532	10.86	44.8	1,957
Nonwhites					
0	125	13,412	82.65	36.3	1,539
1-10	14	26,863	9.29	40.5	1,678
11-20	29	14,370	14.33	39.5	1,637
>20	22	18,457	9.38	43.8	1,988

Note: Sample includes respondents interviewed in 1991. Care should be taken in interpreting the values of cells where there were few respondents.

1) Annual incomes refer to total wage and salary income (i.e. wages, salary, commissions, and tips before taxes or deductions) reported for the survey year preceding the interview date. This is averaged over the last three years to smooth out transitory fluctuations.

2) Wage rates refer to the current or most recent job.

3) Weeks and hours worked refer to the annual values reported for the survey year preceding the interview date. This is averaged over the last three years to smooth out transitory fluctuations.

Table 6

OLS Estimates of Economic Attainment on High School Employment Hours

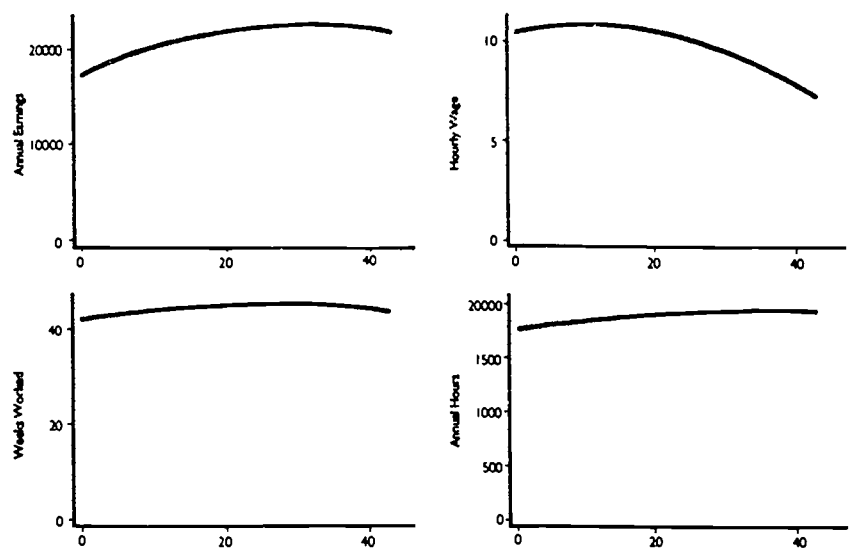
Outcome Variable/Model Specification	Sophomore Year		Junior Year		Senior Year	
	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared
Log Earnings						
(a)	.0147 [.157]	-2.5E-4				
(b)			.0209 [.007]	-4.3E-4		
(c)					.0225 [.001]	-4.7E-4
(d)	.0044 [.861]	-7.3E-5	.0111 [.209]	-1.8E-4	.0191 [.024]	-4.4.E-4
Log Wages						
(a)	.0116 [.035]	-3.9E-4				
(b)			.0137 [.005]	-3.7E-4		
(c)					.0072 [.010]	-1.0E-4
(d)	.0063 [.104]	-2.9E-4	.0102 [.100]	-2.9E-4	.0047 [.135]	-5.6E-5
Weeks Worked						
(a)	.2641 [.092]	-.0051				
(b)			.3035 [.033]	-.0079		
(c)					.3639 [.000]	-.0065
(d)	.1078 [.690]	-.0020	.1143 [.678]	-.0042	.3239 [.001]	-.0056
Hours Worked						
(a)	10.30 [.133]	-.1397				
(b)			11.87 [.016]	-.1880		
(c)					12.21 [.000]	-.0886
(d)	1.621 [.831]	-.0176	4.740 [.745]	-.1100	10.67 [.001]	-.0696

Note: Sample includes respondents interviewed in 1991. Outcome measures are three-year averages for the 1989-91 period or previous calendar year. Table displays regression coefficients. P-Value of the hypothesis that the coefficients on hours worked and hours worked squared are jointly equal to zero (obtained from an F test) is shown in brackets. Sample sizes are 1,002 and 1,008 for the (log) wage and earnings regressions and 1,065 in the weeks and hours worked equations.

Econometric Estimates

The positive relationship between student employment and future economic outcomes could result from spurious correlation between youth work experience and other factors that are the actual cause of the favorable subsequent labor market performance. For example, persons with advantaged backgrounds may have superior access to jobs both in high school and after graduation. If so, socioeconomic differences, rather than high school employment, may cause the disparity in economic attainment. Regression analysis is next employed to examine this possibility.

Figure 1



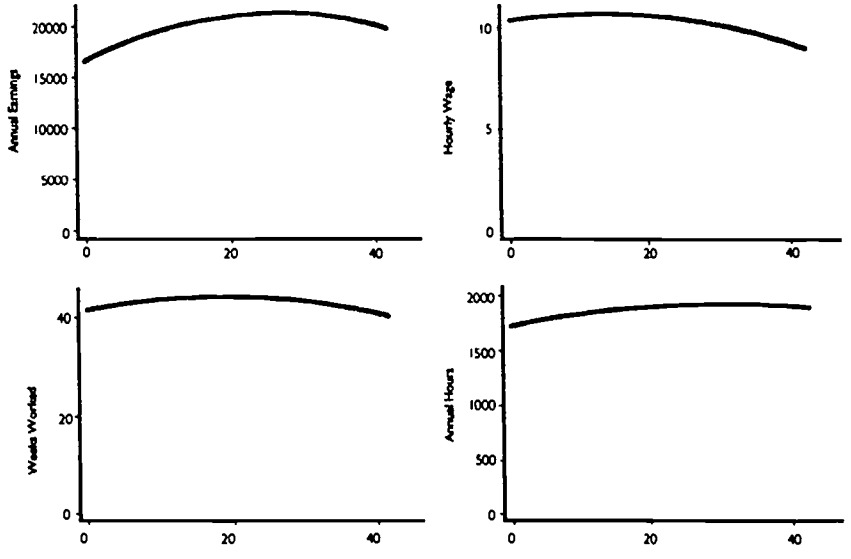
Economic Attainment by Sophomore Work Hours

The basic equation estimated throughout the analysis is:

$$Y_i = X_i\beta + \gamma H_i + \delta H_i 2 + \varepsilon i ,$$

where Y_i is the value of the outcome variable for individual i, X the set of covariates, H a vector of high school employment variables, and ε the regression disturbance term. An advantage of using several measures of high school employment in a single regression is that the effects of different types of job holding can be separated. For example, the impact of senior year employment can be obtained, holding constant hours of work during the sophomore and junior years. Including linear and quadratic terms for work hours allows for a nonlinear impact (*e.g.*, work may improve future outcomes up to a point and then have a negative impact upon them). The predicted effects of work-

Figure 2

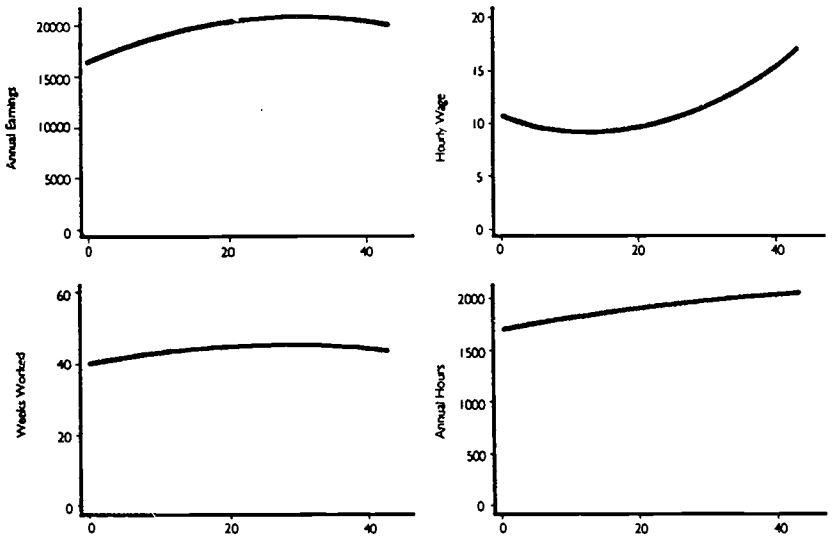


Economic Attainment by Junior Work Hours

ing h hours in the jth high school grade (compared to nonworkers) is equal to $\hat{\gamma}_j h_j + \hat{\delta}_j h_j 2$, where $\hat{\gamma}_j$ and $\hat{\delta}_j$ are the regression coefficients obtained from estimating the above equation, and where the subscript refers to the grade level.[13]

It should also be noted that the natural logarithm of annual earnings and hourly wages, rather than their levels, are dependent variables in the regressions. This usage is both conventional in the literature and provides the convenient interpretation that a one-unit difference in the regressors changes earnings or wages by a given *percentage* (rather than dollar amount). To obtain these percentages, the appropriate transformation of the regression coefficient is used below.[14]

Figure 3



Economic Attainment by Senior Work Hours

In addition to high school work hours, two sets of supplemental covariates are controlled for in some of the regressions. The first are standard demographic variables indicating ethnic status (black, Hispanic, white), sex, marital status (single vs. currently married), geographic region (northeast, north central, south, west), residence in an SMSA or in an urban area, the local unemployment rate (<3 percent, 3-6 percent, 6-9 percent, 9-12 percent, 12 percent), and high school class at the 1979 survey date (freshman vs. sophomore). Schooling is excluded from this set of variables because high school work hours may have a strong impact on educational attainment. If so, including it would lead to biased estimates of the effect of student job holding. Values averaged over the 1989-91 survey dates are used for time-varying regressors.

The second set of demographic covariates include potentially important characteristics for which data has typically been unavailable to previous researchers. These consist of dichotomous variables indicating whether the respondent and his or her parents are foreign-born (three covariates), whether a foreign language was spoken at home (in 1979), if magazines, newspapers, or library cards were in the home at age 14 (three variables), if the respondent considered his school boring, unsafe, or was very dissatisfied with it (one covariate), if a public high school was attended, whether he or she had smoked cigarettes or used marijuana or hashish by the sophomore year of high school (two regressors), and if the individual was Catholic, Jewish, or Baptist (three variables). The number of years of schooling expected to be completed and number of siblings are also controlled for. With the exception of drug and cigarette use (where data was obtained in 1981), information for these variables was obtained from the 1979 survey.

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13 Using calculus, it is also possible to show that if $\hat{\gamma}_j$ is positive and $\hat{\delta}_j$ is negative, the dependent variable reaches a maximum at j/2j hours per week of work.

14 The percentage change is $e^{\lambda} - 1$, where λ is the estimated regression coefficient.

Table 7

OLS Estimates of Future Earnings on High School Work Hours and Other Covariates

Group/Model Specification	Sophmore Year		Junior Year		Senior Year	
	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared
Full Sample						
(a)	.0044 [.861]	-7.3E-5	.0111 [.209]	-1.8E-4	.0191 [.024]	-4.4E-4
(b)	-3.6E-4 [.999]	1.4E-5	.0070 [.739]	-2.1E-4	.0171 [.042]	-4.1E-4
(c)	8.3E-4 [.780]	7.1E-5	.0034 [.915]	-1.3E-4	.0181 [.028]	-4.3E-4
Males						
(a)	.0132 [.330]	-3.8E-4	.0160 [.219]	-4.5E-4	.0170 [.049]	-4.3E-4
(b)	.0136 [.288]	-3.7E-4	.0082 [.641]	-2.4E-4	.0148 [.073]	-3.4E-4
(c)	.0152 [.281]	-3.8E-4	.0072 [.668]	-1.8E-4	.0154 [.065]	-3.8E-4
Females						
(a)	-.0208 [.654]	7.8E-4	.0061 [.871]	-9.7E-5	.0350 [.050]	-9.6E-4
(b)	-.0275 [.454]	.0011	.0051 [.887]	-6.8E-5	.0216 [.291]	-5.7E-4
(c)	-.0212 [.631]	8.3E-4	2.6E-4 [.975]	-7.5E-5	.0248 [.181]	-6.3E-4
Whites						
(a)	-.0028 [.672]	2.4E-4	.0035 [.140	1.5E-4	.0206 [.017]	-5.7E-4
(b)	-.0020 [.885]	1.4E-4	.0031 [.425]	5.7E-5	.0218 [.006]	-6.1E-4
(c)	-4.1E-4 [.728]	1.5E-4	-1.8E-4 [.508]	1.5E-4	.0232 [.004]	-6.4E-4
Nonwhites						
(a)	.0099 [.955]	-1.8E-4	.0294 [.530]	-.0012	.0013 [.440]	3.2E-4
(b)	.0226 [.768]	-5.2E-4	-8.3E-4 [.416]	-5.8E-4	-.0058 [.714]	3.6E-4
(c)	.0507 [.301]	-9.6E-4	.0093 [.048]	-.0014	-.0038 [.511]	4.3E-4

Notes: 1. Sample includes respondents interviewed in 1991. The dependent variable is the average annual income for the calendar years 1988-90. For time-varying covariates, values averaged over the 1989-91 survey interviews are used. Table displays regression coefficients. P-Value of the hypothesis that the coefficients on hours worked and hours worked squared are jointly equal to zero (obtained from an F test) is shown in brackets. 2. Model (a) includes only the covariates for hours worked and hours worked squared in the three high school classes. Model (b) adds for the high school grade in 1979, ethnic status (black, Hispanic, white), sex, marital status, geographic region (4 categories), residence in an SMSA or urban area, and the local unemployment rate (5 categories). Model (c) includes the covariates in (b), plus: whether the respondent and his/her parents are foreign-born, if a foreign language was spoken in the home when the respondent was a child, parents' educational attainment (3 categories), whether magazines, newspapers, or library card were in the home when the respondent was 14, number of siblings, religion (4 categories), educational attitudes (if the respondent considered his school boring, unsafe, or was very dissatisfied with the school), educational expectations, type of school at 1979 survey (public vs. private), and whether the respondent had smoked cigarettes or used marijuana or hashish by the sophomore year of high school.

Table 8

OLS Estimates of Wages, Weeks Employed, and Hours Worked on High School Work Hours and Other Covariates by Sex and Race

Group/Outcome Measure	Sophomore Year		Junior Year		Senior Year	
	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared
Full Sample						
Log Wages	.0038 [.304]	-1.9E-4	.0095 [.101]	-3.4E-4	.0018 [.338]	1.1E-5
Weeks Worked	.0854 [.737]	-.0014	.0744 [.515]	-.0041	.2607 [.003]	-.0043
Hours Worked	1.381 [.890]	.0060	2.164 [.869]	-.1050	11.56 [.001]	-.1165
Males						
Log Wages	.0066 [.177]	-2.6E-4	.0103 [.172]	-3.4E-4	-.0039 [.415]	1.4E-4
Weeks Worked	.1611 [.451]	-.0047	.0914 [.702]	-.0019	.2245 [.073]	-.0047
Hours Worked	5.755 [.697]	-.1888	.6416 [.713]	.0600	12.50 [.017]	-.1704
Females						
Log Wages	-.0057 [.844]	2.5E-4	.0111 [.411]	-4.4E-4	.0125 [.168]	-3.4E-5
Weeks Worked	.0121 [.475]	.0066	.0283 [.261]	-.0070	.3274 [.004]	-.0032
Hours Worked	-8.503 [.429]	.6256	3.001 [.413]	-.3308	13.70 [.006]	-.1025
Whites						
Log Wages	6.3E-4 [.625]	-1.1E-4	.0123 [.052]	-4.0E-5	4.6E-4 [.553]	4.9E-4
Weeks Worked	.0639 [.880]	-.0014	.0539 [.812]	-.0026	.2730 [.010]	-.0054
Hours Worked	2.300 [.947]	-.0521	-.1070 [.972]	.0512	14.27 [.004]	-.2488
Nonwhites						
Log Wages	.0189 [.183]	-5.4E-4	-.0021 [.729]	-9.2E-4	.0125 [.343]	-2.5E-4
Weeks Worked	.7390 [.273]	-.0146	.0894 [.795]	-.0069	-.0985 [.111]	.0110
Hours Worked	27.33 [.461]	-.5081	11.36 [.741]	-.5320	-15.41 [.010]	.9840

Note: See notes on Table 7. The specification estimated is the same as model (c) in that table.

Table 9

OLS Estimates of Economic Attainment on High School Work Hours and Other Covariates

	Sophomore Year		Junior Year		Senior Year	
	Work Hours	Work Hours Squred	Work Hours	Work Hours Squred	Work Hours	Work Hours Squred
Log Earnings						
(a)	.0050 [.528]	-1.E-5				
(b)			.0121 [.357]	-3.6E-4		
(c)					.0195 [.009]	-4.6E-4
Log Wages						
(a)	.0065 [.210]	-2.5E-4				
(b)			.0113 [.038]	-3.7E-4		
(c)					.0038 [.216]	-5.0E-4
Weeks Worked						
(a)	.1739 [.295]	.0033				
(b)			.2216 [.189]	-.0068		
(c)					.2864 [.001]	-.0052
Hours Worked						
(a)	6.830 [.365]	-.0941				
(b)			8.977 [.194]	-.1978		
(c)					12.24 [.000]	-.1387

Note: See notes on Table 7. The specification estimated is the same as model (c) in that table, except that controls for work hours in only a single grade are included.

For purposes of brevity, the vector of covariates described in the previous paragraph will be described as the "standard" set while the "extended" set of individual characteristics adds the additional controls described in this paragraph.

Table 6 presents ordinary least squares (OLS) estimates of regression equations which include linear and quadratic terms on hours worked but no other covariates. Models (a) through (c) separately control for employment in the sophomore, junior, and senior year of high school; model (d) includes work hours in all three grades. The single grade estimates will be biased away from zero if employment in one class

is positively correlated with job holding in another (since the coefficients will partially capture the effects of working in the earlier or later grades). Therefore, the estimates in models (a) through (c) are likely to provide upper bounds on the effects of student employment and we are most interested in the results of model (d).

Table 10
OLS and 2SLS Estimates of Economic Attainment on Senior Year Employment Hours

Group/ Outcome Measure	OLS Estimate		2SLS Estimate	
	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared
Full Sample				
Log Earnings	.0181 [.028]	-4.3E-4	.0361 [.902]	-.0011
Log Wages	.008 [.338]	1.1E-5	-.0299 [.405]	2.5E-4
Weeks Worked	.2607 [.003]	-.0043	1.910 [.435]	-.0458
Hours Worked	11.56 [.001]	-.1165	106.7 [.367]	-2..400
Log Earnings Estimates by Sex and Race				
Males	.0154 [.065]	-3.8E-4	.0823 [.589]	-.0014
Females	.0248 [.181]	-6.3E-4	.0523 [.792]	-.0020
Whites	.0181 [.028]	-4.3E-4	.0679 [.614]	-.0020
Nonwhites	-.0038 [.511]	4.3E-4	-.0776 [.756]	.0017

Note: Sample includes respondents interviewed in 1991. The dependent variable is the average annual income for the calendar years 1988-90. For time-varying covariates, values averaged over the 1989-91 survey interviews are used. Table displays regression coefficients. P-Value of the hypothesis that the coefficients on hours worked and hours worked squared are jointly equal to zero (obtained from an F test) is shown in brackets. In the 2SLS estimates, instruments are used for hours worked and hours worked squared in the senior year of high school. The first-stage equation includes additional covariates controlling for geographic region, residence in an SMSA or urban area, and the local unemployment rate when the respondent was a senior in high school.

As in the descriptive analysis, small to moderate work commitments are associated with relatively favorable future economic outcomes. When work in only a single grade is accounted for (models a through c), the effects of junior and senior employment hours are pronounced and statistically significant for all four outcomes, as is sophomore job holding in the case of wages. Conversely, if employment in all three grades is controlled for, the effects sophomore and junior work hours are statistically insignificant for all measures of labor market success. The senior year employment coefficients are only slightly affected by the additional controls, however, with large and statistically significant effects continuing to be observed for future earnings, weeks worked, and employment hours (the wage impact becomes insignificant).[15]

OLS estimates for weeks worked and hours employed are potentially misspecified because they fail to take into account censoring of the data. Censoring occurs because of lower bounds on the dependent

15 Strong effects of sophomore and junior work are observed in models (a) and (b) because employment propensities are positively correlated across high school grades, with the result that the coefficients are partially capturing the effects of senior year employment.

variables at zero hours and weeks worked per year and an upper bound at 52 weeks of employment. To test whether the results change when this censoring is taken into account, a series of TOBIT models were estimated. TOBIT is a maximum-likelihood technique that accounts for left- and right-censoring by specifying a latent variable that is equal to the observed dependent variable if the latter is within the bound(s) and censored if it is equal to the upper or lower bound. The TOBIT estimates, which are summarized in Appendix Table A.1, are very similar to the OLS results, suggesting that little bias is introduced by failing to account for censored data. As OLS estimates are easier to interpret, they are focused upon exclusively in the remainder of the analysis.

Table 11

Change in Economic Attainment Associated with Senior Year Employment

	Hours Worked During Senior Year				
	10	20	30	40	P-Value
Full Sample					
Annual Earnings	15.8%	22.9%	19.4%	6.2%	.028
Hourly Wages	1.9%	4.1%	6.6%	9.4%	.338
Weeks Worked	2.2wks	3.5wks	4.0wks	3.5wks	.003
Hours Worked	104.0hrs	184.6hrs	242.0hrs	276.0hrs	.001
Earnings Change by Group					
Males	12.3%	16.9%	12.8%	0.8%	.065
Females	20.3%	27.6%	19.4%	-1.6%	.181
Whites	18.3%	23.1%	12.8%	-9.2%	.004
Nonwhites	0.5%	10.1%	31.4%	70.9%	.511

Note: Sample includes respondents interviewed in 1991. Table shows difference in predicted economic outcomes compared to persons not working during senior year of high school. P-value shows the probability that the null hypothesis of no difference is correct, given the observed outcomes. The difference in earnings (wages) is estimated as e^b-1, where b is the predicted difference in log earnings (wages) estimated from the regression coefficients. Estimates are obtained from OLS estimates of equations which include the set of covariates in model (c) of Table 7.

Tables A.2 and A.3 provide estimates, corresponding to those in model (d) of Table 6, for subsamples stratified by sex and race. The results are generally consistent with the full sample estimates but suggest that girls gain more from senior year employment than do boys. Nonwhites benefit less from low to moderate work hours and more from high work hours than do whites. Given the reduction in sample sizes, these effects are estimated with less precision (particularly for nonwhites) than for the full sample and so caution is needed in interpreting the differences between groups.

Regression Estimates With Covariates

The estimates above were obtained in the absence of controls for differences in factors other than work hours. If high school employment is spuriously correlated with individual characteristics or family background variables that influence future economic attainment, these regressions may yield an apparent effect of job holding, which actually results from unaccounted-for heterogeneity in individual characteristics. This possibility is next investigated by estimating regressions which include controls for the previously described basic and extended set of covariates.

Table 7 displays the high school employment coefficients, on future earnings, for three regression specifications. Model (a) accounts for work hours and is identical to model (d) in Table 6. Models (b) and (c), respectively, add controls for the basic and extended set of individual characteristics. If the previously estimated effect of student job holding is the result of spurious correlation, instead of a true causal effect, the employment coefficients will fall as supplementary controls are added. As shown in

the first three rows of Table 7, the estimated effects of sophomore employment, which were already small and insignificant, remain so with the inclusion of additional covariates. Similarly, once this is done, the junior year coefficients fall by more than half and no longer approach statistical significance. By contrast, the reduction in the predicted return to senior work experience is small and the full sample estimates continue to differ from zero at better than the 5 percent level of significance. Even with smaller sample sizes, the senior year employment effect on future earnings is significant at the 7 percent level for boys, the 19 percent level for girls, and the 1 percent level for whites.

Table 8 summarizes results of model (c), which includes the most extensive set of controls, for future wages, weeks worked, and hours employed. Job holding by high school seniors continues to be associated with substantial improvements in each of the outcomes, although the impact on hours and weeks worked is more pronounced than that on wages. Conversely, sophomore and junior hours have a statistically significant influence on the outcome variables in only one of fifteen cases.

If work hours are highly correlated across school grades, the effects of working during individual years may be hard to identify, resulting in imprecise estimates.[16] Thus, it is possible that including controls for job holding in all three grade levels, obscures difficult to measure but economically important employment effects in the sophomore and junior years. To test for this, regressions were estimated with the extended set of covariates included but work hours restricted to a single grade. These results are summarized in Table 9. Although the predicted effects of student employment are somewhat larger than the corresponding estimates in Tables 7 and 8, we again fail to reject the null hypothesis that sophomore employment has no effect on future outcomes and similarly are unable to do so for junior year work hours, except when considering wages. As expected, senior labor hours remain statistically significant and increase in size when employment in the other grades is excluded from the regressions.

Instrumental Variable Estimates

The equations estimated in the above section include a much broader set of covariates than have typically been available to previous researchers. This reduces but does not completely eliminate the possibility that the remaining student employment effect is actually the result of uncontrolled for individual differences. For example, highly motivated individuals could more often work in high school and also receive relatively high incomes later in their careers. To the extent that the covariates fail to account for heterogeneity in motivation, the effect of the latter may partially be proxied by the student employment variables.

There are at least two reasons to doubt that this source of bias is important. First, the estimated effects of senior year employment fall only slightly when controls for a broad array of potentially important covariates are added. Second, if high school employment is disproportionately obtained by students from low socioeconomic backgrounds, which might explain the negative effects of employment on academic achievement observed by some researchers, we would expect student job holding to be associated with low levels of future economic attainment rather than the neutral or favorable outcomes observed above.

To further reduce the possibility that the beneficial effects of senior year employment result from accounted-for heterogeneity, a set of two-stage least squares (2SLS) models were estimated. The 2SLS estimates are distinguished from those obtained by OLS because they use instrumental variables, rather than actual values for senior work hours, as regressors in the final equation. Thus, the dependent vari-

16 The correlation between sophomore and junior work hours is 0.319, between junior and senior hours it is 0.447, and between sophomore and senior employment it is 0.236.

able in the first stage regression is the number of hours (or hours squared) worked by the respondent in their senior year of high school. The predicted values obtained from these estimates, rather than actual work hours, are then used as covariates in the final regression, which corresponds to the estimating equation.

Two-stage least squares models will provide consistent estimates of the student employment effect if the constructed instrumental variables are correlated with actual work hours but uncorrelated with the error term of the second-stage equation. In the estimates below, the system of equations is identified by including controls for local unemployment rates, SMSA and urban status, and geographic region *during the respondent's senior year in high school* in the first-stage equation used to construct the instrumental variables.[17] The key assumption is that these characteristics influence senior year work hours but have no effect on future economic outcomes, once the corresponding variables for the later survey dates are controlled for. Although the 2SLS estimates will be consistent, provided that this assumption holds, they will be relatively inefficient if the identifying power of the variables excluded from the second-stage equation is low. Hence, we should not be surprised if the standard errors on the instrumental variable coefficients are large when using this procedure.

Key results of the two-stage least squares models are summarized in columns three and four of Table 10, with the extended set of covariates and actual (rather than instrumented) values of sophomore and junior year work hours controlled for. Columns one and two of the table provide corresponding OLS estimates for comparison. As expected, standard errors on the instrumental variable coefficients are high and we are never able to reject the null hypothesis of no student employment effect.[18] Nonetheless, comparison of the OLS and 2SLS results is instructive. For the full sample, senior year employment has a more positive predicted effect on future earnings, hours worked, and weeks employed in the 2SLS models, suggesting that OLS estimates of the returns to working are either unbiased or biased downwards. Similarly, the positive relationship between the earnings and senior grade work hours of males, females, and whites is stronger when actual values of these regressors are replaced by instrumental variables. The reverse is true for nonwhites and when wages are the outcome variable of interest. Noting these exceptions, the two-stage estimates generally suggest a further favorable impact of employment by high school seniors and provide little evidence of serious upward bias in the OLS results.

Simulation Estimates

The econometric estimates indicate that employment by high school sophomores and juniors has either no effect or a small positive effect on future economic attainment, while job holding in the senior year has a stronger and much more beneficial impact. To show the latter finding more clearly, this section presents simulation estimates of the predicted difference in future labor market outcomes as a function of the number of hours worked by seniors, compared to students who are not employed. Predictions are obtained from OLS estimates of the model that includes the extended set of covariates. The first four rows of Table 11 present full sample results for each of the outcome variables. Rows 5 through 8 show earnings differentials for subsamples stratified by sex and race.

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17 The full set of regressors from the second-stage equation must also be included.

18 The correlation between the instrument for hours worked (hours worked squared) and the actual variable is 0.503 (0.474), reasonably high. This is primarily the result of controlling for characteristics that are also included in the second-stage equation, and so do not help to identify the model. The correlation between the predicted and actual employment variable, where the former is estimated exclusively using the latter covariates, is just slightly lower at 0.497 (0.466).

Compared to seniors who do not hold jobs, working 10 hours per week is associated with a 15.8 percent increase in earnings after seven to ten years, a 1.9 percent rise in hourly wages, and employment growth of 2.2 weeks and 104 hours per calendar year. Working 20 hours results in still larger increases of 22.9 percent, 4.1 percent, 3.5 weeks, and 185 hours, respectively. Beyond 20 hours, future earnings begin to decline (although remaining above the no work group beyond 40 hours), while wages and work hours continue to rise.

Senior year employment boosts the subsequent earnings of females by more than males—working 10 hours is associated with a 12.3 percent differential for boys but a 20.3 percent increase for girls. The gender disparity declines but is not eliminated until employment commitments exceed 30 hours per week. Although the small number of nonwhites in the survey (and imprecision of the resulting estimates) make it difficult to infer much about racial differences, there is some indication of larger benefits for whites than for minorities at low and intermediate levels of work.

Conclusion

Using data from the National Longitudinal Survey Youth Cohort, this study examines the effects of high school employment on labor market outcomes seven to ten years after the scheduled date of graduation. Contrary to some previous research, the analysis fails to uncover any evidence of harmful effects of working during high school. Instead, jobs held during the senior year yield substantial and lasting benefits. For example, seniors employed 20 hours a week are expected to earn 22.9 percent more seven to ten years after graduation than their counterparts who do not work at all, with still larger gains observed for female workers. These findings are obtained even after controlling for an unusually comprehensive set of individual and family background characteristics, which reduces the probability that they are the result of unobserved differences between workers and nonworkers.

Several caveats should be noted. First, the possibility remains that a still broader set of covariates would reduce the gains associated with working in the senior year of high school. Second, student work status is measured only in the week prior to the survey interview. It would be desirable to obtain information on work hours over a longer time period, to eliminate the effects of transitory fluctuations. Third, this study has focused exclusively on measurable economic outcomes. High school employment could have other negative effects that have not been considered. Fourth, the analysis has focused upon individuals who remain in school through the normal age of high school graduation. Finally, although this investigation covers a longer time period than previous research, there may be deleterious impacts of student job holding which do not show up until later in life.

These qualifications suggest the need for further analysis of the effects of high school employment. In particular, it is important to better understand the mechanisms by which the early work experience raises economic attainment and to further examine whether there are differences across demographic groups. However, concerns raised of extremely deleterious effects of working in high school appear to be misplaced. A tentative conclusion is that light to moderate work commitments should be encouraged, especially as students approach the end of their high school years.

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APPENDIX

Table A.1

TOBIT Estimates of Hours and Weeks Worked on High School Employment Hours

Outcome Variable/Model Specification	Sophomore Year		Junior Year		Senior Year	
	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared
Weeks Worked						
(a)	.5260 [.048]	-.0115				
(b)			.4640 [.027]	-.0107		
(c)					.6605 [.000]	-.0111
(d)	.2473	-.0061 [.578]	.1160	-.0043 [.862]	.6068	-.0100 [.000]
Hours Worked						
(a)	11.00 [.123]	-.1511				
(b)			12.69 [.018]	-.2144		
(c)					12.58	-.0906 [.000]
(d)	2.093 [.801]	.0117	5.305 [.744]	-.1355	10.84 [.001]	-.0658

Note: Table displays coefficients from TOBIT models. Sample includes respondents interviewed in 1991. Outcome measures are three-year averages for the 1989-91 period or previous calendar year. P-value of the hypothesis that the coefficients on hours worked and hours worked squared are jointly equal to zero (obtained from a Wald test) is shown in brackets. Sample size is 1,067. Forty-seven observations are left-censored at 0 hours and weeks worked. 403 observations are right-censored at 52 weeks in the weeks worked equation.

Table A.2

OLS Estimates of Economic Attainment on High School Employment Hours By Sex

Group/ Outcome Variable	Sophomore Year		Junior Year		Senior Year	
	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared
Log Earnings						
Males	.0132 [.330]	-3.8E-4	.0160 [.219]	-4.5E-4	.0170 [.049]	-4.0E-4
Females	-.0208 [.654]	7.8E-4	.0061 [.871]	-9.7E-5	.0350 [.050]	-9.6E-4
Log Wages						
Males	.0096 [.015]	-4.1E-4	.0114 [.139]	-3.5E-4	.0012 [.345]	3.9E-5
Females	-.0050 [.888]	1.7E-4	.0115 [.418]	-4.3E-4	.0183 [.026]	-5.3E-4
Weeks Worked						
Males	.1738 [.570]	-.0048	.2214 [.416]	-.0069	.1951 [.222]	-.0036
Females	-.1217 [.587]	.0099	.0469 [.434]	-.0065	.5691 [.001]	-.0113
Hours Worked						
Males	5.774 [.782]	-.1815	8.082 [.677]	-.2306	9.414 [.062]	-.0760
Females	-15.25 [.400]	.7903	4.063 [.571]	-.3205	19.99 [.004]	-3.252

Note: See notes on Table 6. Sample sizes are 511 (489) and 522 (484) for the wage and earnings regressions and 544 (421) in the weeks and hours worked equations for men (women).

Table A.3

OLS Estimates of Economic Attainment on High School Employment Hours By Race

Group/ Outcome Variable	Sophomore Year		Junior Year		Senior Year	
	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared	Work Hours	Work Hours Squared
Log Earnings						
Whites	-.0028 [.672]	2.4E-4	.0035 [.140]	1.5E-4	.0206 [.017]	-5.7E-4
Nonwhites	.0099 [.955]	-1.8E-4	.0294 [.530]	-.0012	.0013 [.440]	3.2E-4
Log Wages						
Whites	.0026 [.573]	-1.8E-4	.0105 [.107]	-2.9E-4	.0010 [.597]	2.0E-5
Nonwhites	.0131 [.339]	3.9E-4	.0017 [.836]	-1.5E-4	.0161 [.107]	-2.8E-4
Weeks Worked						
Whites	.0281 [.776]	9.3E-4	.0544 [.853]	-.0026	.338 [.004]	-.0068
Nonwhites	.2285 [.858]	-.0038	.1234 [.965]	-.0039	.0931 [.129]	.0050
Hours Worked						
Whites	-.6784 [.739]	.1309	.4095 [.903]	.0336	12.81 [.011]	-.1923
Nonwhites	.4612 [.961]	.0422	12.41 [.857]	-.3499	-6.278 [.023]	.6694

Note: See notes on Table 6. Sample sizes are 821 (179) and 830 (176) for the wage and earnings regressions and 876 (189) in the weeks and hours worked equations for whites (nonwhites).

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Christopher J. Ruhm received his Economics Ph.D. from the University of California at Berkeley in 1984. He is currently an Associate Professor in Economics at the University of North Carolina at Greensboro and is a Research Fellow at the Employee Benefits Research Institute. Prior to joining the UNCG faculty in 1991, he was an Assistant Professor at Boston University and a Postdoctoral Research Fellow at the Florence Heller Graduate School for Advanced Studies in Social Welfare at Brandeis University.

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