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In-school work experience and the returns to two-year and four-year colleges

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Abstract

Building on the existing education literature, we address two interrelated questions. First, how sensitive are estimated returns to two-year and four-year colleges to the inclusion of in-school work experience? Second, do the estimated returns to in-school work experience vary by type of educational institution attended? Regarding the first question, we find that in-school work experience is an important determinant of earnings, and that if in-school work experience is not taken into account, estimated returns to schooling estimates will be upwardly biased. Returns to education categories that do not involve the awarding of a degree, such as attending a two-year college, appear to be especially sensitive to the inclusion of in-school work experience. Our evidence on the second question indicates that estimated returns to in-school work experience also vary with type of schooling. We find that work experience acquired while attending a community college has a relatively large effect, suggesting that schooling and work are more complementary for two-year than four-year colleges.

JEL classification: 121

Keywords: Educational economics; Rate of return

1. Introduction

Since Mincer's (1974) path-breaking contribution, labor economists have conscientiously included a measure of post-school work experience in estimating the returns to education using a human capital earnings function. The human capital earnings function, as is well known, is based on the assumption that individuals complete their schooling early in their lifetimes and only then enter the labor force, the state in which they remain until retirement. More recently, it has been recognized that many individuals hold jobs while in school and shift between spells of schooling and employment before completing their formal schooling. In fact, Michael and Tuma (1984) point out that high school students as young as ages 14 and 15 often acquire substantial work experience that affects subsequent school enrollment and employment. Other papers including Light (1999), Meyer and Wise (1982), and Ruhm (1995, 1997) document the extent of work experience acquired by high school students and assess its impact on post-school earnings. Focusing on male college students, Ehrenberg and Sherman (1987) examine the effect of in-school employment on academic performance,

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probability of dropping out of college, and post-college labor market success. Their results indicate, particularly for off-campus jobs, that in-school employment adversely affects probability of continuing in college and graduating on time, but has no effect on grade point average and post-college earnings.

In a recent contribution to this literature, Light (2001) estimates the effect of in-school work experience acquired in both high school and college on post-school earnings. Using male respondents from the National Longitudinal Survey of Youth (NLSY), she reports that in-school work experience has a substantial impact on post-school earnings. Light's main finding is that estimated schooling coefficients are 25–44% higher when in-school work experience is omitted from the earnings function than when it is included. In other words, conventional models that omit in-school work experience significantly overstate the wage effects of schooling. She also finds that returns to in-school work experience are positive, ranging between 1.8 and 4.2 percentage points per year of work experience, depending on model specification and estimation technique. These return estimates are about one-quarter to two-thirds of the size of corresponding estimates obtained for an additional year of post-school work experience. In a related paper, Hotz, Xu, Tienda, and Ahituv (2002) consider the possibility that post-school wages and in-school work experience are both determined by unobserved factors including ability and family background.

Also using NLSY data for males, we seek to extend the analysis of Light (2001) by investigating the effect of in-school work experience on the returns to education when education is disaggregated by level and type of educational institution attended. Categorizing education in this way is not critical for Light's analysis since she estimates the bias in returns to a continuous measure of educational attainment. Nevertheless, estimates of the returns to attending different types of educational institutions are of interest in and of themselves (see, for example, Kane & Rouse, 1995; Leigh & Gill, 1997), and the magnitude of omitted variable bias in the effect of education may differ across different types of schools. Of particular interest are returns estimated for two-year colleges since work and schooling may be more complementary for students attending a community college than for students attending a four-year college. Supporting this community college complementarity hypothesis are Kane and Rouse's (1999) observations that community colleges (1) make a special effort to accommodate classes offered to the work schedules of students, and (2) are increasingly offering "contract" courses specifically designed to meet the training needs of local employers.

In this paper, we ask two interrelated questions. First, how sensitive are estimated returns to two-year and four-year colleges to the inclusion of in-school work experience? Second, do estimated returns to in-school work experience vary by type of educational institution attended?

2. The data

The NLSY began in 1979 with a sample of over 12,000 men and women born between 1957 and 1964. Respondents were interviewed annually from 1979 to 1994 and biannually thereafter. Light (2001) calculates in-school work experience from each respondent's 16th birthday to his date of school exit using NLSY's week-by-week event history of employment experience measured from the first week of 1978 onward. This approach to measuring in-school work experience requires her to impose the data restriction that male respondents must be born between 1962 and 1964 (i.e., they should not be older than age 16 in 1978). Of the 6403 men in the NLSY, this restriction reduces the number of respondents in her sample to 2077. Light then defines the date of school exit as the first month that a respondent leaves school for a period of 12 months or longer. Having determined when school exit occurs, her definition of in-school work experience is the cumulative number of hours worked from the week of the 16th birthday to the midpoint of the month corresponding to school exit. Similarly, she defines schooling attainment as the highest grade completed at the time of school exit. In her earnings regressions, sample respondents are allowed to contribute one observation for every wage reported between the date of school exit and the 1994 interview. Multiple job-holders, of course, contribute more than one wage at each interview. Repeated annual interviews and the possibility of multiple jobs in any particular year result in Light's sample of 20,788 wage observations for her 2077 respondents.

In constructing our NLSY data set, we continue Light's emphasis on males.[1] In addition, we retain her restriction that individuals must be 16 years of age or younger in 1978 so that we can observe in-school work experience while they are still in high school. Thus, our sample of 2149 respondents is close to her sample of 2077 respondents.[2] We differ from Light, however, in where we "draw the line" in distinguishing when

[1] Females as well as males are examined in Molitor (2001).

[2] To the extent possible, we attempted to impose the same restrictions in constructing our data set as those imposed by Light (2001). The reason our data set is larger than hers by 72 respondents is that we allow a somewhat longer time period during which an employment spell must have taken place. Respondents who did not have a spell of paid employment by 1994 are excluded from her sample, whereas our requirement is a spell of paid employment by 1998.

in-school activities end and post-school activities begin. Her definition that a respondent has completed his schooling once he leaves school for 12 months or longer, while potentially a reasonable first approximation for four-year college students, is not as reasonable for two-year college students. The reason is that a much larger fraction of community college students are returning adults (see Leigh & Gill, 1997). For returning adults who have been out of school longer than 1 year, Light would misclassify as post-school work experience what we argue should properly be classified as in-school work experience.

Rather than attempting to set a date beyond which post-school activities begin, we allow the data to determine whether the respondent was in school or not. That is, for each interview starting with 1979, we check the respondent's answer to a question asking whether he was enrolled in school since his last interview. If enrolled, we record the available information on highest grade completed, highest degree received, type of college attended (two-year or four-year college), and hours worked since the last interview. Hours worked since the last interview, in this case, are defined as in-school work experience. If not enrolled, we record the wage on his primary job and hours worked since the last interview. Now hours worked since the last interview are defined as post-school work experience. This classification method differs from Light's (2001) in that it observes post-school work experience during periods in which a respondent is between spells of schooling and after he has finished schooling altogether. Over the 1979–1998 period, we have a total of 20,931 wage observations.

While Light's approach would misclassify as post-school work experience the work experience of returning adults for whom school is their primary activity, our approach also has a downside. The downside is that we would misclassify as in-school work experience, rather than post-school work experience, the work experience of "casual" students who are enrolled in only a course or two while devoting the bulk of their time to career jobs. Despite these differences in approaches, it is interesting to note that mean length of in-school work experience calculated over all of our respondents (1.184 years) is very close to Light's 1.126 years for her respondent sample. Similarly, mean in-school work experience calculated over all our wage observations (0.944 of a year) is very close to Light's 1.010 years for her sample of wage observations. Clearly, students obtain substantial work experience while attending school.

Table 1 provides variable definitions and descriptive statistics for our 2149 respondents and 20,931 wage observations.[3] The post-school hourly wage is measured for respondents in 1998 and for wage observations in those interviews at which respondents are not enrolled in school. Expressed in 1986 dollars, average hourly wage rates for males in our sample are $8.73 and $6.73, respectively, for individual respondents and wage observations. The two means differ because the mean in the first column is observed in 1998 when respondents have had more time to accumulate work experience and invest in education as compared to the mean in the second column that is calculated for wage observations measured over time as individuals build their human capital.

Education is broken down by the mutually exclusive two-year and four-year college categories used by Kane and Rouse (1995). We also impose their hierarchy of educational attainment in which college degrees take precedence over college attendance. For example, a respondent with an A.A. degree who attended a four-year college without earning a B.A. degree would be classified as an A.A. degree recipient. Nearly 17% of respondents in our sample either attended a community college or earned an A.A. degree but did not attend a four-year college. Means for the education variables differ because the first column mean captures the final outcome of individuals' education investment while the second column mean reflects shifts between schooling and work before schooling is finally completed. For example, suppose that an individual graduates from high school and then works for 2 years before enrolling in a community college. If he graduates with an A.A. degree, he appears in the first column as an A.A. degree holder. In contrast, the same individual's contribution to the second column includes two wage observations while his level of education is only a high school degree.

The in-school work experience variable is measured by the total number of hours worked (divided by 2000 to convert to full-time equivalent years) in years in which the respondent is enrolled in school. Post-school work experience is measured in the same manner except that it is observed for years in which the respondent is not enrolled. The difference in means shown for post-school work experience (11.2 years vs. 6.2 years) is due, as in the case of average wages, to the measurement of accumulated post-school work experience in the first column as opposed to measuring post-school work experience over time in the second.

There would be little difference between means shown for in-school work experience in Table 1 if schooling were uninterrupted by periods of employment. Since it is not, just as in the case of education, it is the prevalence of returning adult students that drives a wedge between corresponding estimates. One more example may be useful in driving home this point. Consider a respondent who graduates from high school in 1983, works full time the next two years, enrolls at a four-year college in 1986 and graduates with a B.A. degree in 1989, and then

[3]In this and following tables, we follow Light (2001) in denoting post-school work experience by X and in-school work experience by SX.

Table 1
Definitions and summary statistics for wage rates, schooling, and in-school and post-school work experience (standard deviations in parentheses)

Variable name	Definition	Individuals[a]	Wage observations
Post-school wage	Log of hourly wage (1986 dollars).	2.167[b] (0.673)	1.906 (0.517)
Schooling			
High school dropout	1 if never graduated from high school.	0.181	0.239
High school degree	1 if high school degree is highest schooling level.	0.341	0.377
Two-year college	1 if attended a two-year college but did not attend a four-year college or receive a college degree.	0.112	0.106
Four-year college	1 if attended a four-year college but did not attend a two-year college or receive a college degree.	0.081	0.073
Two- and four-year college	1 if attended a two-year college and attended a four-year college but did not receive a college degree.	0.058	0.043
A.A. degree	1 if A.A. or A.S. is highest degree.	0.055	0.039
B.A. degree	1 if B.A. or B.S. is highest degree.	0.133	0.104
Advanced degree	1 if respondent earned an advanced college degree.	0.038	0.02
In-school work experience			
SX	Years of in-school work experience (hours/2000).	1.184 (1.466)	0.944 (1.132)
$SX^2/100$	In-school work experience squared/100.	0.036 (0.087)	0.022 (0.052)
Post-school work experience			
X	Years of post-school work experience (hours/2000).	11.202 (5.490)	6.221 (4.571)
$X^2/100$	Post-school work experience squared/ 100.	1.556 (1.231)	0.596 (0.775)
Number of individuals and observations		2149	20,931

[a]All means for individuals are estimated for 1998.
[b]A total of 1454 individuals reported wage rates in 1998.

works full time until 1998. Suppose also that he works half time during his junior and senior years of high school and during each year of his four years of college. The total number of post-school wage observations for this individual is 9, 2 observations while between spells of schooling (1984 and 1985) and 7 observations after college (1990–1994, 1996, and 1998). For the 1984 and 1985 wage observations, his in-school work experience is 1 year. For the other 7 wage observations, his in-school work experience is 3 years. Hence, the individual would contribute 3 years to the calculation shown in the first column, but 2.56 years ($= 2/9*1 + 7/9*3$) to the second.

Table 2 displays average levels of in-school work experience broken down by categories of education using our sample of 20,931 wage observations. Beginning with the first row, the mean of 1.779 years shown in column (6), for example, is interpreted as saying that A.A. degree holders who did not receive a B.A. degree acquired, on average, a total of 1.779 years of in-school work experience. This mean is calculated over all the years during which respondents attended school (both high school and college). The next row shows the fraction of respondents with no in-school work experience. This fraction is small for A.A. degree holders at about 3%.

The remaining rows of Table 2 break down average in-school work experience by the type of school attended when the work experience was acquired. Continuing to look at A.A. degree holders in column (6), the mean of 1.779 years is the sum of 0.592 of a year of high school work experience, 0.438 of a year of two-year college work experience, 0.248 of a year of four-year college work experience, and 0.501 of a year of work experience acquired while attending a postsecondary educational institution that we cannot identify by college type. An entry appears for four-year college because in our hierarchy of education categories, college degrees take precedence over college attendance. This means that an individual who earns an A.A. degree and transfers to a four-year institution but does not graduate is counted as an A.A. degree holder, and his four-year college work experience appears in column (6). In column (3), on the other hand, our hierarchy means that an individual who attends a community college but does not earn a degree or transfer has no four-year college in-school work experience. The unclassified college work experience category arises because 544 respondents in our sample reported, in at least one interview over the 1979–1998 interval, that they attended school and that their highest grade completed

Table 2
In-school work experience, by schooling level (standard deviations in parentheses)

	High school dropout (1)	High school degree (2)	Two-year college (3)	Four-year college (4)	Two- and four-year college (5)	A.A. degree (6)	B.A. degree (7)	Advanced degree (8)
Total in-school work experience								
Mean	0.296 (0.424)	0.528 (0.520)	1.199 (0.968)	1.227 (1.023)	1.641 (1.140)	1.779 (1.442)	2.486 (1.452)	3.006 (1.553)
Fraction equal to zero	0.442	0.175	0.046	0.047	0.013	0.033	0.009	0.000
In-school work experience obtained while attending								
High school	0.296 (0.424)	0.528 (0.520)	0.694 (0.600)	0.528 (0.481)	0.592 (0.493)	0.592 (0.517)	0.572 (0.454)	0.483 (0.439)
Two-year college			0.399 (0.514)		0.385 (0.454)	0.438 (0.591)	0.148 (0.350)	0.139 (0.361)
Four-year college				0.419 (0.518)	0.367 (0.465)	0.248 (0.464)	0.756 (0.601)	1.055 (0.917)
Unclassified college			0.106 (0.322)	0.279 (0.557)	0.297 (0.530)	0.501 (0.725)	1.010 (0.890)	1.329 (1.019)
Number of observations	4996	7887	2219	1518	898	822	2177	414

exceeded 12, but then they failed to answer the two-year/four-year college question.[4]

3. Results

3.1. Returns to schooling

The first question posed in the Introduction raises the issue of the sensitivity of the labor market returns to attending two-year and four-year colleges to the inclusion of in-school work experience. We address this question in Table 3. For each pair of equations appearing in the table, return estimates calculated excluding a measure of in-school work experience appear first in odd-numbered columns, while in-school work experience is added in even-numbered columns. Our empirical strategy is patterned closely after that in Light (2001). Standard errors are calculated using the Huber–White procedure to correct for multiple wage observations for the same individual.

In columns (1) and (2), the first pair of ordinary least-squares (OLS) regressions with corrected standard errors control for a variety of personal and labor market characteristics, but not for variables measuring respondents' ability and family background.[5] For this specification, Light (2001) reports that the coefficient on her continuous measure of schooling falls by approximately 22% (from 0.096 to 0.075) with the addition of in-school work experience. Similarly, our results show that estimated returns for all educational categories are sensitive to the inclusion of in-school work experience (high school dropout is the reference category). For example, with the addition of in-school work experience the estimated coefficient on two-year college falls by about 32% (from 0.173 to 0.117) and the estimated coefficient on an A.A. degree falls by about 25% (from 0.328 to 0.247). Estimated linear and quadratic effects of post-school work experience are essentially unchanged between columns (1) and (2). Evaluated at the mean

[4]This unclassified category of in-school work experience might have been acquired while respondents attended some other type of postsecondary institution including a vocational or technical institute, area vocational school, or proprietary college. But we suspect that most was acquired while respondents attended a community college or four-year college but failed to answer the two-year/four-year college question. The reason for our suspicion is that mean unclassified in-school work experience rises with educational attainment peaking in column (8) at over 1.3 years. It is difficult to imagine that many graduate degree holders obtained in-school work experience while attending postsecondary educational institutions other than two-year or four-year colleges.

[5]Control variables included in the regressions are race/ethnicity, part-time employment, local unemployment rate, urban/rural residence, and region of residence.

Table 3
OLS estimates of selected coefficients in wage models excluding and including in-school work experience (corrected standard errors in parentheses)[a]

Explanatory variables	Controls only		Family background		Ability		Family background and ability	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Highest level of schooling:								
High school degree	0.068 (0.016)	0.053 (0.016)	0.043 (0.016)	0.033 (0.016)	0.014 (0.015)	0.005 (0.015)	0.005 (0.015)	−0.002 (0.015)
Two-year college	0.173 (0.025)	0.117 (0.025)	0.129 (0.025)	0.085 (0.025)	0.084 (0.025)	0.044 (0.025)	0.066 (0.025)	0.032 (0.025)
Four-year college	0.232 (0.026)	0.173 (0.026)	0.182 (0.026)	0.136 (0.027)	0.112 (0.027)	0.071 (0.027)	0.093 (0.027)	0.058 (0.027)
Two- and four-year college	0.217 (0.037)	0.136 (0.037)	0.161 (0.037)	0.095 (0.037)	0.110 (0.038)	0.050 (0.038)	0.083 (0.038)	0.030 (0.038)
A.A. degree	0.328 (0.031)	0.247 (0.032)	0.277 (0.032)	0.209 (0.033)	0.218 (0.033)	0.157 (0.034)	0.194 (0.033)	0.140 (0.033)
B.A. degree	0.537 (0.025)	0.420 (0.031)	0.455 (0.027)	0.358 (0.032)	0.386 (0.028)	0.298 (0.032)	0.351 (0.029)	0.271 (0.032)
Advanced degree	0.724 (0.051)	0.587 (0.057)	0.611 (0.051)	0.497 (0.055)	0.540 (0.053)	0.436 (0.058)	0.486 (0.052)	0.391 (0.056)
Post-school work experience:								
X	0.058 (0.003)	0.057 (0.003)	0.059 (0.003)	0.058 (0.003)	0.060 (0.003)	0.059 (0.003)	0.060 (0.003)	0.059 (0.003)
$X^2/100$	−0.140 (0.015)	−0.138 (0.015)	−0.145 (0.015)	−0.143 (0.015)	−0.152 (0.015)	−0.149 (0.015)	−0.154 (0.015)	−0.151 (0.015)
In-school work experience:								
SX		0.083 (0.015)		0.069 (0.015)		0.064 (0.015)		0.056 (0.014)
$SX^2/100$		−0.738 (0.262)		−0.514 (0.261)		−0.492 (0.258)		−0.349 (0.257)
Ability variables:								
School ability					0.115 (0.049)	0.116 (0.048)	0.085 (0.049)	0.089 (0.049)
Work ability					0.207 (0.036)	0.189 (0.036)	0.202 (0.036)	0.186 (0.036)
Family background included	No	No	Yes	Yes	No	No	Yes	Yes

[a]Control variables include race/ethnicity, part-time employment, local unemployment rate, urban/rural residence, and region.

(6.221 years), the effect of post-school work experience is 4.1 percentage points per year [= .058−(2/100)(.140)(6.221)] using the estimates in column (1). In column (2), the effect of in-school work experience, evaluated at the mean of 0.994 of a year, is 6.9 percentage points.

The remaining columns in Table 3 add measures of family background and ability to the earnings function.[6] Columns (3) and (4) include family background variables, columns (5) and (6) add measures of ability, and columns (7) and (8) include both family background and ability. Focusing first on odd-numbered columns, the addition of these variables sharply reduces estimated coefficients on the education variables. This is especially the case for the education categories that do not involve a degree. For example, estimated coefficients on two-year college fall from 0.173 percentage points in column (1) to 0.066 percentage points in column (7), a decrease of 62%. In comparison, estimated coefficients on an A.A. degree fall from 0.328 percentage points to 0.194 percentage points, or 41%, between the same two columns.

Now compare odd and even columns among pairs of columns included in columns (3)–(8). As is the case for the first two columns, estimated returns to all educational categories are sensitive to the inclusion of in-school work experience, regardless of control variables. Again, it is interesting to note that the non-degree educational categories appear to be especially sensitive. Controlling for both family background and ability, for example, the estimated coefficient on two-year college drops by almost 52% [from 0.066 in column (7) to just 0.032 in column (8)] with the addition of in-school work experience. The corresponding decrease in the coefficient on an A.A. degree is considerably less at 28%.

One last comparison involves the sensitivity of returns to two-year college categories versus four-year college categories when we take account of in-school work experience. Regardless of controls for family background and ability, returns to community college attendance and A.A. degree appear to be more sensitive to controlling for in-school work experience than are returns to four-year college and B.A. degree. In columns (7) and (8), for example, taking in-school work experience into account results in the estimated return to an A.A. degree falling by 28% (from 0.194 to 0.140), while the estimated return to a B.A. degree falls by 23% (from 0.351 to 0.271).

Turning to explanatory variables other than education, estimated coefficients on post-school work experience are seen in Table 3 to be essentially unchanged with the addition of controls for family background and ability and the inclusion of in-school work experience. Estimated effects of in-school work experience, in contrast, decrease as these controls are added. For the two ability measures, columns (5) and (6) and columns (7) and (8) indicate that the estimated effect of work ability but not school ability is slightly affected by the inclusion of in-school work experience.

3.2. Returns to in-school work experience

The second question posed in the Introduction is whether estimated returns to in-school work experience vary by type of educational institution attended. Table 4 addresses this question. Earnings functions specified in this table are identical to those shown in even-numbered columns of Table 3, except that in-school work experience is disaggregated by category of schooling.

The linear effects of in-school work experience shown in Table 4 clearly suggest that returns to in-school work experience vary by type of schooling. In column (1), for example, work experience gained while attending a community college appears to have the largest return, followed in decreasing order of magnitude by work experience gained while attending a four-year college, gained while attending high school, and gained while attending an unclassified postsecondary educational institution. It is also interesting to note that the linear effect of community college work experience is essentially unchanged as additional controls are added, while linear effects estimated for other educational categories decrease in size.

Of course, coefficients on the quadratic work experience terms need to be taken into account, and we do this in panel A of Table 5 for work experience acquired while in high school, two-year college, and four-year college. Predicted wage effects by schooling category are shown for in-school work experience of 0.5 and 1.0 years. These values seem reasonable in view of the means shown earlier in Table 2. As expected, column (1) indicates for each level of work experience that the estimated effect of two-year college work experience exceeds that of four-year college work experience, which, in turn, exceeds that of work experience gained while in high school. Moving from column (1) to column (4), the additional controls have the effect of making the advantage of two-year college work experience over work experience gained while attending other educational institutions even larger. We view this result as offering support for the hypothesis, suggested in the Introduction, that

[6] We follow Light (2001) in constructing the ability and family background variables. School and work ability are developed from the 10 components of the Armed Forces Vocational Aptitude Battery administered in 1980. Family background variables include family income, father and mother's education, number of siblings, religion, and whether any member of the respondent's household at age 14 regularly received magazines or newspapers or had a library card.

Table 4
OLS estimates of selected coefficients in wage models disaggregating in-school work experience (corrected standard errors in parentheses)[a]

Explanatory variables	Controls only (1)	Family background (2)	Ability (3)	Family background and ability (4)
Highest level of schooling:				
High school degree	0.055 (0.016)	0.035 (0.016)	0.008 (0.015)	0.001 (0.015)
Two-year college	0.111 (0.027)	0.076 (0.027)	0.031 (0.027)	0.018 (0.027)
Four-year college	0.174 (0.027)	0.136 (0.028)	0.073 (0.028)	0.057 (0.028)
Two- and four-year college	0.121 (0.038)	0.079 (0.039)	0.032 (0.040)	0.010 (0.040)
A.A. degree	0.239 (0.033)	0.200 (0.033)	0.148 (0.035)	0.128 (0.034)
B.A. degree	0.422 (0.036)	0.358 (0.036)	0.304 (0.037)	0.272 (0.037)
Advanced degree	0.594 (0.061)	0.498 (0.059)	0.445 (0.062)	0.393 (0.059)
Post-school work experience				
X	0.057 (0.003)	0.058 (0.003)	0.059 (0.003)	0.059 (0.003)
$X^2/100$	−0.137 (0.015)	−0.142 (0.015)	−0.149 (0.015)	−0.151 (0.015)
In-school work experience				
High school SX	0.083 (0.032)	0.057 (0.033)	0.032 (0.031)	0.020 (0.032)
High school $SX^2/100$	−1.694 (1.784)	−0.612 (1.839)	0.789 (1.724)	1.177 (1.770)
Two-year college SX	0.127 (0.068)	0.121 (0.064)	0.127 (0.068)	0.124 (0.064)
Two-year college $SX^2/100$	−2.538 (4.493)	−2.606 (4.068)	−2.462 (4.442)	−2.639 (4.110)
Four-year college SX	0.099 (0.039)	0.084 (0.041)	0.084 (0.040)	0.077 (0.041)
Four-year college $SX^2/100$	−1.020 (1.197)	−0.562 (1.258)	−0.629 (1.210)	−0.333 (1.256)
Unclassified SX	0.040 (0.030)	0.039 (0.030)	0.018 (0.030)	0.022 (0.030)
Unclassified $SX^2/100$	−0.987 (0.670)	−0.880 (0.668)	−0.575 (0.632)	−0.579 (0.633)
Ability variables				
School ability			0.120 (0.048)	0.092 (0.049)
Work ability			0.192 (0.036)	0.190 (0.036)
Family background included	No	Yes	No	Yes

[a]Control variables are the same as in Table 3.

schooling and work are more complementary for two-year colleges than four-year colleges.

Evidence suggesting greater complementarity between school and work for community college students raises the possibility that failing to take into account in-school work experience may differentially overstate the returns to attending a community college. That is, estimated effects of two-year college may be more likely, relative to other education categories, to be attributable to the acquisition of valuable work experience while in school rather than to the schooling itself.

We consider this possibility in panel B of Table 5, which shows predicted returns to alternative education categories for different levels of in-school work experience. Note that these calculations make use of estimated returns to education shown in Table 4 that are conditioned on in-school work experience disaggregated by schooling category. In column (1), for example, the estimated effect of attending a community college while working enough to acquire one-half year of work experience (0.168) is the two-year college effect (0.111) shown in Table 4 plus the effect of one-half year of work experience shown in panel A (0.057). A key result in panel B appears in column (4). Controlling for family background and ability, the return to attending a two-year college is seen to be negligible at 1.8 percentage points in the absence of in-school work experience but rises to 11.6 percentage points for a full year of work experience. In other words, these calculations suggest that in the absence of substantial work experience gained while in school, the effect of attending a two-year college is not distinguishable from that of obtaining a terminal high school degree.

4. Conclusion

In this paper, we build on the analysis of Light (2001) that examines the impact of education on earnings controlling for the impact of in-school work experience. Specifically, we ask the following interrelated questions: (1) how sensitive are estimated returns to two-year and four-year colleges to the inclusion on in-school work experience, and (2) do estimated returns to in-school work experience vary by type of college attended?

Table 5
Predicted wage effects of disaggregated in-school work experience and selected schooling categories

Schooling and in-school work experience	Controls only (1)	Family background (2)	ASVAB (3)	Family background and ASVAB (4)
A. Effect of in-school work experience				
High school				
$SX = 0.5$	0.037 (0.003)	0.027 (0.001)	0.018 (0.005)	0.013 (0.004)
$SX = 1.0$	0.066 (0.033)	0.051 (0.034)	0.040 (0.032)	0.032 (0.033)
Two-year college				
$SX = 0.5$	0.057 (0.023)	0.054 (0.020)	0.058 (0.023)	0.055 (0.020)
$SX = 1.0$	0.102 (0.078)	0.095 (0.072)	0.103 (0.077)	0.098 (0.072)
Four-year college				
$SX = 0.5$	0.047 (0.008)	0.040 (0.010)	0.041 (0.009)	0.038 (0.010)
$SX = 1.0$	0.089 (0.038)	0.078 (0.039)	0.078 (0.039)	0.074 (0.039)
B. Effect of in-school work experience and schooling				
High school degree				
$SX = 0$	0.055 (0.016)	0.035 (0.016)	0.008 (0.015)	0.001 (0.015)
$SX = 0$ .5	0.092 (0.021)	0.062 (0.022)	0.026 (0.021)	0.014 (0.021)
$SX = 1.0$	0.121 (0.037)	0.086 (0.037)	0.048 (0.035)	0.033 (0.036)
Two-year college				
$SX = 0$	0.111 (0.027)	0.076 (0.027)	0.031 (0.027)	0.018 (0.027)
$SX = 0.5$	0.168 (0.042)	0.130 (0.040)	0.089 (0.042)	0.073 (0.041)
$SX = 1.0$	0.213 (0.082)	0.171 (0.076)	0.134 (0.081)	0.116 (0.076)
A.A. degree				
$SX = 0$	0.239 (0.033)	0.200 (0.033)	0.148 (0.035)	0.128 (0.034)
$SX = 0$ .5	0.296 (0.047)	0.254 (0.045)	0.206 (0.047)	0.184 (0.046)
$SX = 1.0$	0.341 (0.084)	0.295 (0.079)	0.251 (0.084)	0.226 (0.079)
B.A. degree				
$SX = 0$	0.422 (0.036)	0.358 (0.036)	0.304 (0.037)	0.272 (0.037)
$SX = 0.5$	0.469 (0.039)	0.398 (0.040)	0.345 (0.040)	0.310 (0.040)
$SX = 1.0$	0.558 (0.050)	0.476 (0.052)	0.423 (0.051)	0.384 (0.052)

With respect to the first question, our findings are consistent with those of Light showing that estimated returns to schooling are highly sensitive to control for in-school work experience. In other words, failure to take in-school work experience into account is likely to result in returns to schooling that are upwardly biased. Our analysis suggests that this is especially likely to be the case for categories of education, such as attending a two-year college, that do not involve the awarding of a degree.

Turning to the second question, we find that estimated returns to in-school work experience do vary by type of schooling. Work experience acquired while attending a community college has the largest estimated effect, followed by four-year college work experience, and then by high school work experience. That is, the single in-school work experience coefficient estimated in previous studies is really a weighted average of different effects for alternative schooling categories. The relatively large effect of community college work experience supports the hypothesis that schooling and work are more complementary for community colleges than four-year colleges. This result raises the possibility that substantial estimates of the return to attending a community college shown in Kane and Rouse (1995) may, at least in part, be the result of productive work experience acquired while attending a two-year college.

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