DOES PRIVATE EDUCATION INCREASE EARNINGS?

Jonathan Sandy
University of San Diego

and

Kevin Duncan
University of Southern Colorado

INTRODUCTION

A considerable debate exists regarding the relative effectiveness of public and private schools in the provision of education. Proponents of private education argue that students receive a higher quality education at lower cost in the private sector than in the public sector [West, 1991]. Others contend that public schools are best suited to meet the educational demands of society [Levin, 1991]. Coleman, Hoffer, and Kilgore [1982] provide some empirical support of the relative efficiency of private schools by finding that on standardized tests students attending Catholic schools outperform public school students. Others argue that the findings of Coleman et al. result from specification errors. Witte [1992], for example, provides a detailed examination of followup studies on Coleman et al., and concludes that any sector effects on achievement are "very small when controls for prior achievement, student background, tracking and course taking are included" [Witte, 1992, 387]. The inability to identify a substantial private sector advantage, and difficulties associated with education production functions, make it difficult to recommend policy based on standardized test results [Hanushek, 1986].

This paper proposes an indirect test of the relative effectiveness of public and private education that is consistent with the human capital theory of wage determination. While recognizing that the benefits to more and better schooling are numerous, human capital theorists focus on the role of education in the determination of earnings [Schultz, 1961]. Education affects earnings by increasing the skills used at work [Becker, 1975]. Human capital theory implies that those who receive better training while in school will earn more upon entering the labor market. If private schools are more effective in developing the cognitive abilities of students, the earnings of workers who attended private schools should exceed those of workers who attended public schools.

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A rich literature has established a positive relationship between years of schooling and wages. The quality of education, of course, also plays a role in wage determination. Linking the quality of the education to earnings, however, is somewhat problematic because educational quality is not easily defined. Although the link between educational inputs and outputs is elusive, wage studies have used inputs (pupil-teacher ratios, expenditures, teacher education and salaries) and outputs (standardized tests) as measures of educational quality [Hanushek, 1986; Card and Krueger, 1992; Ganderton and Griffin, 1993).

Sexton and Nickel [1992] propose school location as an alternate measure of school quality. They argue that inner-city schools are reputedly of lower quality than suburban schools. If there is a significant quality difference, wages would be expected to differ for students who attended inner-city and suburban schools, holding everything else constant. Their results, which are based on 1980 Census Data, indicate that attending an inner-city school significantly lowers the earnings of both black and white youth.

This paper employs an approach similar to Sexton and Nickel [1992], except for our use of private education as a proxy for quality (as opposed to location).[1] We find that those who attended private schools earn more; this result, however, has several interpretations. For example, one possible interpretation is that those who attend private schools receive superior academic training and higher wages as a consequence. This explanation dovetails with human capital theory and the studies suggesting that private schools are more effective in developing the skills of students. However, there are aspects of private education, other than traditional educational skills, that are associated with higher earnings. Certainly, the most obvious is family background. The families of those who attend private schools may differ in income, employment connections, emphasis on the importance of education, and even in motivation and discipline. These factors are associated with higher earnings regardless of the type of education received. In addition, the value systems that private schools impart may be associated with higher earnings. For example, parochial schools that emphasize traditional roles for men and women may impress male students with the importance of providing for a family. Therefore, the young men in our sample who attended such schools may have stronger attachments to the labor market, and higher earnings. Finally, private education may signal potential worker productivity to employers. For example, our data indicates that the privately educated are more likely to complete college. Therefore, these individuals may be more motivated or self-disciplined and possess traits other than private education that indicate high productivity. These signals of potential worker productivity may be as important to an employer as the skills the worker learned in school.

The varied interpretations of our empirical finding makes policy recommendations difficult. However, this difficulty is encountered by other studies. As mentioned above, Sexton and Nickel [1992] find that those who attend schools in the inner city earn less than those who attend schools in the suburbs. One interpretation of this result is that inner-city schools have inferior educational resources resulting in a lower quality education and, finally, in graduates who are not as prepared for labor market success. Other explanations are less dependent on the quality of education received. For example, schools in the suburbs may serve as a signal to employers of "better" workers. Also, since Sexton and Nickel do not control for family background, the differences in school location may be picking up differences in background characteristics that contribute positively to earnings. With so many interpretations of the empirical findings, it is difficult to recommend appropriate educational policy in this case.

In the remaining sections of the paper we present the empirical results from both a simple wage estimate and one that controls for the factors (discussed above) that may explain the private school earnings effect. Finally, we conclude with recommendations for further research.

DATA AND EMPIRICAL RESULTS

This paper uses the National Longitudinal Study of Labor Market Experience of Youth (NLSY) to estimate the wage advantage implicit in private education. The survey contains human capital, earnings, and demographic information for approximately 12,000 males and females between the ages of 14 and 22 in 1979. The survey also identifies which respondents attended non-public schools. Specifically, respondents were asked to identify the sector of their current or past school (grades 1-12) during the first interview in 1979. Given the age of respondents at the time, the question effectively identifies the respondent's high school education as private or public. The survey also contains information on selected school characteristics indicating educational quality (pupil-teacher ratios and teacher pay) for both public and private schools.

Using the retrospective question regarding the respondent's school, we estimate the earnings of black and white men who were employed in 1991. The results reported below have not been corrected for selectivity bias. Heckman [1979] argues that the estimation of a wage equation using a sample of employed individuals will be biased unless information on the process of being selected into the sample (the probability of working in this case) is included in the estimation. This is particularly a problem when estimating the wages of women, as systematic factors influence their work decisions, but less of a problem for males. Given that 90 percent of the sample of black and white males were employed in 1991, we have little concern over sample selectivity.[2]

The empirical model involved is straight forward. A standard wage equation is estimated that includes the dummy variable, *Private*, equalling 1 if the repondent attended a parochial or private school, and zero otherwise:

$$\mathrm{Ln}(W_i) = B_0 + B_1{*}Experience_i + B_2{*}Education_i + B_3{*}AFQT_i + B_4{*}Private_i + B_5{*}Z_i + E_i$$

The dependent variable, $\mathrm{Ln}(W_i)$ is the log of the ith individual's hourly wage, *Experience* measures the respondent's work experience. This variable is defined as the total number of weeks worked between 1979 and 1991. *Education* is the highest grade completed by the ith individual. *AFQT* is the respondent's score on the Armed Forces Qualifications Test. This variable serves primarily as a measure of a

TABLE 1
Variable Names and Means

Variable	Description	Total	Public	Private
Wage	Hourly wage at current occupation, 1991	12.023 (20.392)	11.782 (19.582)	16.485 (31.654)
Log Wage	Log of wage	2.285 (0.582)	2.272 (0.578)	2.534 (0.589)
Independent	**Variables for Model 1**			
AFQT	Performance on the Armed Services Qualification exam (percentile, 1980)	43.137 (30.052)	42.261 (29.971)	59.364 (26.864)
Education	Highest grade completed by 1991	13.077 (2.327)	12.998 (2.296)	14.535 (2.414)
Experience	Total weeks worked since first interview (1979 -1991)	473.873 (140.550)	472.898 (141.233)	491.946 (126.374)
Married	Dummy variable indicating married, spouse present, 1991	0.530 (0.010)	0.528 (0.010)	0.566 (0.044)
SMSA	Dummy variable indicating residence in a central city of an SMSA, 1991	0.141 (0.007)	0.142 (0.007)	0.124 (0.029)
South	Dummy variable indicating residence in a southern state, 1991	0.409 (0.010)	0.411 (0.010)	0.372 (0.043)
White	Dummy variable indicating respondent's race (1 for white, 0 for black)	0.660 (0.009)	0.652 (0.010)	0.806 (0.035)
Private	Dummy variable indicating respondent attended non-public or parochial school	0.051 (0.004)	-	-
Number of Observations		[2520]	[2391]	[129]

Source: NLSY 1991 Black and White Males. Parenthesis contain standard errors.

respondent's ability. The *AFQT* variable may also proxy other factors including family background and the educational inputs at the respondent's school. O'Neill, for example, states that the *AFQT* "... is an achievement test of verbal and mathematical skills and reflects the quality of schooling received as well as the effects of parental background" [O'Neill, 1990, 32]. Including AFQT in the earnings equation, therefore, helps control for several factors. *Private* is a dummy variable, indicating whether the respondent attended a private school. Z_i is a vector of family background, school quality and individual motivation variables. E_i is a random error term. These variables were used in two specifications. Model 1 omits the Z_i vector of variables.

Model 2 includes this vector and allows us to observe changes in the private earnings effect as background and school quality variables are included.

Experience, *Education* and *AFQT* are expected to increase wages. A positive and significant coefficient on the *Private* dummy variable would indicate a "shift" effect in wages, similar to the location effect identified by Sexton and Nickel [1992]. An insignificant coefficient, on the other hand, would indicate that private education offers the respondent no earnings advantage.

Table 1 presents the dependent and independent variable names and summary statistics for the aggregate sample, and for respondents who attended public and private schools. The variables are also divided (see Table 3) to correspond with the two regression models presented in Table 2. According to Table 1, approximately 5 percent of the sample attended private schools. Since we are able to identify only those that attended private high schools, our sample will not reflect the national average of 10 percent that is enrolled in private elementary and high schools. Respondents who attended private schools earn substantially higher wages, on average, than those who attended public schools. The wage equations will clarify whether this difference is due to private education *per se*, or due to differences in other factors that affect wages. For example, respondents who attended private schools, on average, scored considerably higher on standardized tests (*AFQT*), completed a higher grade (*Education*), are much more likely to be white (*White*), and despite the extra time spent in school, have more work experience (*Experience*) than respondents who attended public schools. All of these variables are associated with higher earnings. Private school respondents are more likely to be married and less likely to live in the South than public school respondents. The averages of the measures of family background, school quality and individual motivation that are used in the regression analysis are discussed below in Table 3.

Table 2 presents two wage equations. Model 1 is a standard wage equation that includes the variables described in Table 1. The R^2 indicates that the model explains 22 percent of the sample variance in the log of hourly wages.[3] The model is significant overall according to the F statistic. The slope coefficients exhibit the expected signs and are generally significant. Specifically, the *AFQT* coefficient indicates that increases in the performance on standardized exams significantly increase wages. O'Neill [1990] also finds that increases in *AFQT* scores increase earnings for NLSY black and white men. The *Education* coefficient indicates positive returns to another year of education. This result is consistent with the theory and prior studies. For example, Sexton and Nickel [1992] and Ganderton and Griffin [1993] report education coefficients of similar magnitude. According to the *Experience* coefficient, an additional week of work experience significantly increases earnings. Considered with the *Education* coefficient, this result confirms that human capital is acquired through both formal education and experience. The remaining results indicate that married respondents earn significantly higher wages than other respondents. Respondents who live in the center city of an SMSA do not earn significantly different wages from other respondents. Wages in the South are significantly below wages in other regions. Whites do not appear to earn significantly more than blacks. O'Neill [1990]

TABLE 2
Wage Equations
Dependent Variable = Log of hourly wage

Variable	Model 1	Model 2
Constant	1.096	1.062
	(12.953)	(4.513)
AFQT	0.003	0.004
	(6.173)	(5.505)
Education	0.052	0.022
	(9.000)	(1.724)
Experience	0.642 E-3	0.633 E-3
	(8.157)	(5.520)
Married	0.146	0.079
	(6.642)	(2.585)
SMSA	0.048	-0.017
	(1.560)	(-0.372)
South	-0.111	-0.077
	(-5.013)	(-2.391)
White	0.033	0.016
	(1.215)	(0.389)
Private	0.102	0.138
	(2.171)	(2.020)
Mother's Education		-0.842E-3
		(-0.010)
Father's Education		-0.003
		(-0.351)
Father's Profession		0.097
		(2.619)
Pupil-Teacher Ratio		0.003
		(1.027)
Average Teacher Pay		0.303E-4
		(2.366)
College		0.035
		(0.567)
Professional		0.121
		(3.344)
Positive Attitude		0.032
		(0.523)
Library Card		-0.028
		(-0.818)
F	88.550	21.175
R^2	0.220	0.237
Sample Size	2520	1176

Source: NLSY 1991 Black and White Males. Parentheses contain *t*-statistics.

TABLE 3
Variable Names and Means

Variable	Description	Total	Public	Private
Additional Independent Variables for Model 2				
Mother's Education	Highest grade completed by respondent's mother	11.997 (2.188)	11.949 (2.195)	12.883 (1.851)
Father's Education	Highest grade completed by respondent's father	12.168 (3.216)	12.078 (3.194)	13.833 (3.200)
Father's Profession	Dummy Variable indicating professional father.	0.338 (0.014)	0.325 (0.014)	0.567 (0.064)
Library Card	Dummy Variable indicating a library card at age 14	0.732 (0.013)	0.724 (0.014)	0.883 (0.041)
Pupil-Teacher Ratio	Ratio of total enrollment to total teachers at respondent's school	19.117 (4.465)	19.156 (4.304)	18.392 (6.815)
Average Pay	Average starting salary for new teachers at respondent's school	10,805.467 (1185.538)	10,877.347 (1137.152)	9,468.500 (1279.721)
College	Dummy variable indicating respondent completed at least the fourth year of college	0.274 (0.013)	0.259 (0.013)	0.550 (0.064)
Professional	Dummy variable indicating respondent's occupation is professional/technical/managerial according to three digit census code, 1991	0.390 (0.014)	0.374 (0.014)	0.700 (0.059)
Positive Attitude	Dummy Variable indicating respondent "takes a positive attitude toward myself" in 1980	0.941 (0.007)	0.942 (0.007)	0.933 (0.032)
Number of Observations		[1176]	[1116]	[60]

Source: NLSY 1991 Black and White Males. Parentheses contain standard errors.

also finds no significant wage gap between NLSY black and white men when controlling for *AFQT*.

Respondents who attended private schools have significantly higher wages than those who attended public schools. This result supports the view that private education is of higher quality than public education. Furthermore, the result supports the productivity of schooling, or child quality hypothesis, which argues that children differ in ability to convert learning into earnings. Children with better family circumstances and higher quality education are expected to do better in the labor market than other children. [4]

The positive *Private* coefficient may confirm the conventional wisdom that private schools, in general, place more emphasis on basic skills in reading, mathematics, and writing, which are useful in the labor market. The results in Table 2, however, are not sufficient to establish a definitive private school effect because it is also possible that the private variable is correlated with unobserved factors that influence wages. Specifically, the private school variable could be correlated with a student's ability, a student's effort, family background, or other school characteristics, which contribute to differences in wages. The *AFQT* variable controls for this somewhat because it is correlated with ability, effort, family background, and school quality. However, to further control for these factors we can introduce additional variables including family background, school characteristics and motivation in the wage equation.[5]

Table 3 presents additional variables measuring family background, school characteristics, college education, professional occupation and motivation. Table 3 indicates that public and private school respondents differ in ways that could explain wage differences according to the productivity of schooling hypothesis. For example, the parents of private school students are more educated, their fathers are more likely to hold professional occupations and privately educated respondents are more likely to have access to a library card at age 14 than those who attended public school. Private schools, further, have lower pupil-teacher ratios, on average, than public schools. The private school respondents are also much more likely to complete at least a fourth year of college, and to have professional careers. Public schools, on the other hand, pay teachers higher starting salaries than private schools. The measures of positive attitude are approximately equal for the two groups. This variable is included as a proxy for motivation. It is assumed that those who have a positive attitude about themselves will be more motivated at work.

Establishing that private school students do better in the labor market could lend support to policies that would increase the role of private schools in the provision of education. If, however, the observed wage differential between public and private school respondents is due to differences in family background, innate abilities or school quality, there would likely be no social gain from increasing the role of private education.

Model 2 in Table 2 includes all the variables described in Tables 1 and 3. The results in Model 2 are generally consistent with those in Model 1. However, the magnitude of the *Education* coefficient declines from Model 1 to Model 2. This indicates that standard wage equations which omit educational quality and family background measures tend to overstate the returns to education. Among the new independent variables, the effects of parental education and occupation are mixed. If the father is a professional, the respondent's earnings are significantly increased. This is consistent with the productivity of schooling hypothesis. The parent's education, however, does not have a significant impact on wages. The results of the school quality variables are also mixed. Hanushek [1986] mentions both pupil-teacher ratios and teacher salaries as common measures of school quality because they are important components of instructional expenditures. According to Model 2, increases in the average starting teacher salary have the expected sign and are significant, but the pupil-teacher ratio coefficient has an unexpected sign and is insignificant. This result is inconsistent with Card and Krueger [1992] who find that pupil-teacher ratios significantly impact the returns to education. Such inconsistencies across studies are common in models of educational production functions.[6] Within the NLSY survey, teacher salaries appear to be a better proxy for school quality than the pupil-teacher ratio. Respondents who are professionals earn significantly more than other respondents. Completing at least a fourth year of college, on the other hand, does not impact earnings. The *Private* coefficient remains positive and significant in Model 2. These results tell us that even with measures of child quality and family background held constant, those who attend private schools earn more. This indicates that private education adds something to the earnings ability of students regardless of their qualities upon entering school.

CONCLUSION

This paper asks whether students who attend private schools earn more than those who attend public schools. Within the context of a standard wage equation, our results indicate they do. The finding of a significant and positive private school earnings advantage among NLSY respondents is unique and contrary to the results of other researchers.[7] At a minimum, we can conclude that respondents in the NLSY survey who attended private schools have better labor market experiences than those who attended public schools, even when reasonable measures of school quality, family background, educational achievement, occupation and motivation are included. This result is consistent with the hypothesis that private schools are of a higher quality than public schools and supports the human capital theory relating educational quality to earnings. However, as mentioned above, there are unmeasured characteristics of private schools (such as values that encourage labor market attachment) that suggest the earnings advantage may not be attributed to the academic quality of private education. While we have attempted to control for family background and motivation, we have not been able to measure differences in the family's attitudes toward school, or the respondent's level of motivation directly. If these factors vary between those who attend private and public schools, and if they have not been adequately controlled for, the pro-private school results will be strengthened regardless of academic quality differences between the two types of schools. So, while we find that those who attend private schools earn more, the policy implications of this wage differential are less obvious. Additional research will hopefully better identify how the process of education, and different types of education impact earnings. For now, this paper suggests that comparisons of the performance of public and private school students should be extended past standardized tests to include labor market performance.

NOTES

The paper has benefited from the helpful comments on an earlier draft by Sally Duncan, two anonymous referees and the editor.

1. Card and Krueger [1992] also address this issue. Their data proxies private school effects with the percent of students enrolled in private schools by state and pupil-teacher ratios for public and private schools. Their results indicate a positive but insignificant relationship between the percent private variable and the returns to education. They conclude that any sectoral effects on the returns to education are explained by pupil teacher ratios, and term length.
2. We estimate the models with the selectivity correction. These results, available from the authors upon request, are consistent with those reported below.
3. The use of the natural log of wages is the standard in the estimation of hourly wages. Hence, the coefficients are interpreted as the percent change in wages given a unit change in the independent variable.
4. Ganderton and Griffin [1993] mention private education as one of several measures of child quality, but they do not include it in their empirical analysis. The results in Table 2 indicate that private education is a relevant factor in determining wages.
5. Ganderton and Griffin [1993] use this approach to test a productivity of schooling or child quality theory. They include several family background, student performance (high school GPA and standardized test results), and school characteristics in the earnings equations. Many of these factors have a significant effect on earnings in a pooled model, but most are not significant when the data is stratified by race. Their primary finding is that the returns to education coefficients decline when controlling for family background, student performance, and school characteristics, which is consistent with the child quality, or productivity of schooling hypothesis.
6. Hanushek [1986] reports that pupil teacher ratios have inconsistent impacts of the performance of students on standardized tests.
7. For example, Card and Krueger [1992] find no private sector effect on the returns to education when controlling for pupil-teacher ratios and term length. The difference in findings may be due to the time periods of the studies. Card and Krueger use cohorts born between 1920 and 1939. These groups would have finished high school from approximately 1938 to 1957. This paper uses respondents who would have been in high school in the 1970s and 1980s. The relative quality of public and private schools could have changed substantially between these periods.

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