Does school type matter for future earnings? Evidence from public and private school attendance

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Abstract
The present research examined the return to schooling (Public and Private schools) in the census region of the East South-Central Division of the United States. The demographic diversity of this region is the primary reason for its selection. The functional form has specified wage as the log-linear function of school attendance, controlling for gender, race, work experience, occupation status, and educational attainment. We followed the extant literature to include a few socioeconomic variables. The article has used 2020 sample data from the Integrated Public Use Microdata Series to estimate the parameter coefficients. The results show that private schools yield a higher return regarding subsequent wage earnings. Further, the wage differential between private school & public school is higher for African Americans than for Caucasian Americans; similarly, the same differential is higher among females and males. We differed from the earlier studies in choosing a simplistic qualitative variable of schooling choice. Rather than looking into more school-specific details like the student-teacher ratio, the relative salary of teachers, and the length of school terms on the estimates of the return to education, we have considered the choice of schooling (public school versus private school) as the critical quality parameter

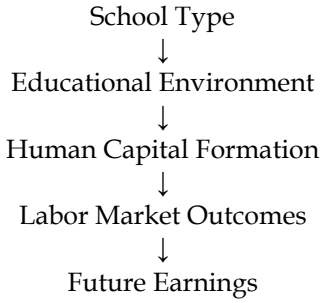
Introduction

Education is often the most crucial factor determining economic and social achievement. It benefits the individual who receives the education and society in general. A relatively sizeable extant literature focuses on the interrelationship of potential human capital with productivity, technology, and growth. The knowledge and skills children and youth acquire during school attendance will drive their employability, productivity, health, and well-being in the decades to come, which will help ensure that their communities and nations thrive (Education for Global Development, The World Bank Group, 2011). In this context, return to education from public school and private school becomes immensely important as the schooling choice might determine the potential human capital accumulated by the nation. In the context of schooling in the United States of America, Public schools are generally the schools that are provided by state and federal funding. According to a report by the National Center for Education Statistics (United States Department of Education, 2022), 53.9 million K -12 students were enrolled in public and private schools in the Fall of 2019. Of these students, 9 % were enrolled in private schools, and the remaining 91% were in public schools. Furthermore, 77 % of all private school students were white, compared to 63 % of all public school students who were white. The private school sector had fewer Hispanic students than the public school sector.

A burgeoning body of literature addresses questions related to the quality of the educational institution that might affect subsequent earnings. An excellent review is provided by McEwan (2000), who argues that, with a few exceptions, there needs to be more evidence to reach firm conclusions regarding such comparisons. Methodological difficulties found in this literature include the size and nature of the available samples of schools and students (e.g., small sample sizes, self-selection into public or private schools), as well as family, school, and community variables that remain unmeasured but may be associated with both public versus private school attendance and student achievement.

Lack of academic scrutiny provided us with the impetus to investigate the effect of attending public and private schools (i.e., the decision of school choices) on future wage earnings. We differed from the earlier studies in our choice of school quality as a variable. Rather than looking into more school-specific details like the student-teacher ratio, the relative salary of teachers, and the length of school terms on the estimates of the return to education (Card and Kreuger, 1992), we have considered a more simplistic qualitative indicator by considering the choice of schooling (public school versus private school) as the parameter. Rather than focusing exclusively on traditional measures of school quality such as student–teacher ratios, teacher salaries, or school expenditure, this study uses school type (public versus private) as an institutional proxy reflecting broader educational environments. School type may capture differences in organizational structure, peer composition, resource allocation, selectivity, and educational experiences. While imperfect, institutional characteristics have frequently been used in prior educational and labor market research where direct measures of school quality are unavailable. We recognize that school type does not fully represent educational quality and should therefore be interpreted as a proxy measure rather than a direct measure of school effectiveness.

Figure 1. Conceptual Model (School Type, an indirect measure of school effectiveness)



Accurate estimates of payoff from these two types of schools would be necessary for the students and their parents and general societal welfare. The literature review is closely connected to the theoretical and empirical findings of college quality on earnings in the later years. The U.S. Central Division of East South Central is our chosen geographic region (TN, Al, MS, and K.Y.) for the data sample. The objective behind the selection of this division is twofold: (1) we wanted to capture the returns to the schooling choices for relatively poorer states where income inequality is much higher than the states of other divisions, (2) diversified demographic composition, especially the significant presence of African American in this region motivated the selection. We admit in priority that the study typically relies on a single proxy variable for school quality. The wisdom of following such a path can be questioned, given that a single proxy likely measures school quality with substantial error. The remainder of the paper is organized as follows: The next section briefly describes the relevant literature on this subject, followed by the data and methodology. After that, we discuss the empirical results and inferences, delineating future research avenues. An appendix containing variable descriptions is also included.

Literature Review

Recent research on the impact of school choice on future family wealth reveals a nuanced interplay between educational decisions and economic outcomes, and is interdisciplinary in its approach. It is hereby categorized into themes as follows.

Human Capital and Returns ot education

Morgan and Sirageldin (1968) and Link and Ratledge (1975) are the early studies that examined the relationship between return to schooling and wage earnings. But it was Jacob Mincer who brought the issue into the spotlight. In 1974, he published his seminal book Schooling, Experience, and Earnings, which profoundly influenced labor economics. The Mincer earnings function is the foundation of a voluminous literature in empirical labor economics. In the general version of Mincer's "human capital earnings function," log earnings are modeled as the sum of a linear function of years of education and a quadratic function of years of potential experience. The earning equation was specified as,

$$\text{lnwage} = c + \text{years of schooling} + \text{potential experience} + \text{potential experience}^{2}$$

Mincer's equation is famous because it is based on a formal human capital investment model, and the specification is parsimonious and fits well with the data. In this regard, it might be argued that the critical contribution of Mincer's earning specification was the introduction of potential experience (Age-Years of Schooling-6) as a standard regressor on the earnings regression specification. It was known before Mincer's work that earnings grew as a (concave) function of age. In his early work, Mincer (1958) also pointed out that the resulting "age-earnings profile" was steeper for more educated than less educated workers. Therefore, log earnings are not a strictly separable function of education and age. Nevertheless, introducing potential experience as opposed to age in the earnings equation is thus, it is a parsimonious way of capturing the shape and differential slope of the age-earnings profile across education groups. In addition, such a model asserts that it is conditional on years of potential experience, and there is a single rate of return to education in the labor market. This line of thinking provides the basis for the growing literature that attempts to estimate the causal effect of education on earnings.

School Quality and Earnings

Chetty, Friedman, and Rockoff's (2014) influential study in the United States highlights a significant correlation between attending high-quality schools during critical developmental stages and subsequent rises in income levels and college attendance. Similarly, the work of Lefgren and Sims (2015) underscores the enduring financial implications of school quality, illustrating a positive relationship between enrollment in higher-quality schools and enhanced labor market outcomes. Dale and Kreuger (2002) provide an excellent empirical analysis that utilizes information on the set of colleges to determine the effect of college quality on subsequent earnings. Contemporary research has supported the importance of school quality on future earnings. Bils and Klenow (2000) discussed the value of schooling to be affected by the human capital of previous generations. They followed the mechanism that essentially measures the school quality in terms of the school's teacher quality. Manuelli and Seshadri (2005) and Erosa, Koreshkova, and Restuccia (2006) describe various mechanisms of school quality and how those mechanisms affect the measured role of schooling. However, empirical research on the determinants of school quality remains skeptical until now (Hanushek 1995, Hanushek 2002). Oreopoulos and Stevens (2006) highlight the long-term impact of education in their study. The paper showed that education has a lasting impact on earnings throughout an individual's career, reflecting the enduring effects of the investment in human capital. In a similar vein, Heckman (2007) uses the human capital theory to support the concept of life-cycle earnings, where they show that the benefits of education manifest over an individual's career. Acemoglu and Autor (2011) demonstrate that education enhances an individual's

adaptability to technological change, contributing to increased productivity and earnings, and thus the return on education has a long-term impact.

Family Background and Educational Selection

The effect of family background on education by influencing the level of education individuals obtain is well documented and analyzed in the literature (Krishnan, 1996; Altonji & Dunn, 1996). However, the literature also recognizes the influence of socioeconomic factors in shaping school choices, potentially contributing to disparities in educational opportunities. The research by Reardon and Portilla (2016) sheds light on persistent inequalities in accessing high-quality schools based on family income. These findings underscore the intricate relationship between school choice, socioeconomic influences, and future family wealth. It, therefore, calls for a longitudinal literature review of our hypothesized question. Altonji & Dunn (1996) investigated the conjecture that the education slopes of wage equations are influenced by family background as measured by the father's and mother's education. In a nutshell, the article investigated the effects of parents' education on their sons' educational attainment, which thus increases the importance of the indirect and total effects of the family background variables on earnings. Lam & Schoeni (1993) have shown that the relationship between having a father with a university education and getting a 20% wage advantage when compared with an illiterate father and a 9% wage advantage when compared to a father with four years of schooling, controlling the workers' schooling and the schooling of other relatives respectively. Furthermore, Sahn & Alderman (1988) have pointed out that the wage offered in developing countries is influenced by other genetic and environmental influences captured in the wage of one's father. Thus, the significant impact of family background on earnings could mean that family background determines the quality of education and learning environment at home (as educated parents can improve the educational opportunities of their children through their absorption of attitudes and acquisition of human capital) or would indicate that individuals from a better family background can get better jobs through family connections and influences.

Work sector and wages

The partial cause of earnings differentials may also be a sector of employment. Mann & Kapoor (1988) have explained that, on average, public-sector workers are paid much higher wages than private and joint-sector key workers. Rees & Shah (1995) have reasoned that the private sector wage determination is subject to profit constraint, whereas the public sector wage determination is subject to ultimate political control. Thus, wages in the public sector are higher than in the private sector. Pritchett and Filmer (1999) highlighted the situation in which governments are taking resources away from nongovernmental activity in the form of taxes to pay additional workers whose marginal product in the public sector is very low but are paid much higher wages than workers in the private sector.

In summary, a corpus of literature highlights the returns on education that manifest as higher earnings throughout one's career. As individuals acquire education, they gain specific expertise and develop the capacity to adapt to evolving workplace demands. Higher levels of education are associated with increased productivity, making individuals more valuable contributors to the workforce. Consequently, the market rewards this enhanced human capital with elevated earnings, reflecting the correlation between educational attainment and economic success. This relationship is dynamic, evolving over an individual's life cycle, and underscores the role of education as a driver of economic mobility and reduced income inequality. However, it is unacceptable to understate the effects of other influential factors on earnings. This implies that the basic Mincerian approach to estimating the return to education is applicable but should be extended further to control for other latent variations. Existing studies largely focus on specific quality indicators or postsecondary institutions. Less attention has been devoted to

whether broad institutional schooling choices are associated with later labor market outcomes. The present attempt has tried to control other variables, though typically constrained by the limited data availability.

Data and Methodology

We have used the U.S. Census Bureau data for the year 2020. The data are collected from Integrated Public Use Microdata Series: Minneapolis, MN: Minnesota Population Center http://usa.ipums.org/usa/. There are two distinct advantages of using IPUMS data for our analysis. First, the convenience of this data is that it provides codes and names for all samples in an easy-to-use format. Samples include demographic measures, educational, occupational, and all work indicators. We tailored our data filter to answer the questions using the desired set of variables. Second, the 5% sample of this database provides a large sample base crucial to capturing the differential effects of certain variables on the outcome variable. However, there is a notable disadvantage. Using IPUMS data implies that we are restricted only to the cross-sectional dimensions of the data. In our sample, we extracted approximately 100,000 observations and further cleaned the data to maintain our sample size of 47,268 observations.

We have constructed the dummy variables (to obtain a binary specification) for the independent variables. However, a couple of such variables need special attention from the readers. From the data, we have divided the observations' educational attainment records into four categories: observations with less than a high school diploma, with a high school diploma, with some associate degree, and with a baccalaureate or higher degree. We have chosen the less-than-high-school diploma category as the reference category. Specifically, we have constructed three dummies in the other three categories.

Similarly, we have categorized the race variable into three parts: White Americans, Black Americans, and other races, and have used the' other races' category as the reference to construct the respective dummies for the remaining two categories. We have constructed two race dummies, namely racew and raceb: Racew = 1 for whites
= 0 otherwise. Raceb
= 1 for blacks
= 0 otherwise.

To capture the effect of family backgrounds for different observations, we have used two of the constructed variables from the IPUMS data, namely the variable 'mother's location in the household and the 'father's location in the household' variable. Such variables are specified as,

0 = Absence of parents in the same household when the observation was a child.

1 = Presence of parents in the same household when the observation was a child.

We specified the model as,

$$\text{lnwage} = c + \alpha D_0 + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \gamma_1 pot\exp + \gamma_2 pot\exp^2 + \sum_{j=1} \delta_j x_j + \varepsilon \qquad (1)$$

where D_0 = 0 for Public School
= 1 for private school
D1 = 0 for a high school diploma
= 1 otherwise
D2 = 0 for some college degree (e.g., associate degree)
= 1 otherwise
D3 = 0 for a bachelor's degree or higher
= 1 otherwise

x_js represents the demographic variables we have controlled for (namely race, sex, and family background variables) and is a white noise error term.

The dependent variable wage earnings in our model are in the log form, like the standard Mincer earnings equation, as opposed to the level of earnings. While logs are typically used in econometric models for a better fit, there is a robust theoretical foundation for using log earnings in an education-earning regression. As Mincer (1958) pointed out, education should have a multiplicative effect on earnings in a trivial model where identical individuals maximize the present value of future income, which is equalized for all education levels in equilibrium. The reason is that human capital investments are only undertaken if the rate of return (not the absolute return) on the investment exceeds the discount rate. It is conceived that the log-linearity of earnings as a function of years of schooling is, in fact, a critical empirical implication of the human capital model with identical individuals proposed by Mincer (1958). Moreover, the existing evidence generally supports the log-earnings specification. For example, James Heckman and Polachek (1974) estimated a Box-Cox model and could not reject the log specification.

Results

This section consists of distinct but related forms of analysis. First, we report the descriptive statistics for the model specified in equation (1). Second, we present the estimated coefficients of the relevant parameters using OLS regression as baseline specifications. Third, we show the estimated relationships of the explanatory variables on the outcome variable to counter any potential endogeneity. Such analyses serve as the best alternative in the absence of any valid instrument.

Descriptives

Table 1 summarizes the mean per-head wage income for Caucasians and African Americans. While the mean wage income is higher for private school attendees than for public school attendees, the wage differential in terms of return to education in these two schools is higher for Caucasian Americans than for African Americans. The descriptive statistics for the relevant parameters are given in Tables 1 and 2.

Table 1. Mean Earnings by School Types for Two Dominant Races

Race	Number of Observations	Mean Income (Public School)	Mean Income (Private School)	Mean Income
White	35469	12126.86	13983.64	12450.64
Black	10043	11744.29	15645.16	12253.12

Table 2. Descriptive Statistics for the Relevant Parameters

Variable	Mean	Standard Deviation
Log of Wage	8.646	1.367
School type	0.834	0.371
Potential experience	11.257	9.037
Less than High School	0.236	0.257
High school diploma	0.130	0.337
Some college	0.485	0.499
College degree and higher	0.146	0.353
Mom location	0.620	0.782
Pop location	0.270	0.519
Marital Status	0.250	0.433
Sex	1.540	0.499
Number of Siblings	0.102	0.303
Language	0.069	0.253

Estimated coefficients of relevant parameters

Initially, regression was conducted for the entire sample presented in Table 3. Table 4 and Table 5 summarize the regression estimates for Caucasian Americans and African Americans, respectively. In contrast, in Tables 6 and 7, we ran separate regressions gender-wise: i.e., for the male and female observations separately. For all the specifications, the adjusted R^2 is reasonably high. Standardized coefficients or beta coefficients are reported for each variable. It represents the wage earnings log change resulting from a one-standard-deviation change in one of the independent variables. The standardized coefficient helps us determine the relative weights of each independent variable on the outcome variable. We have conducted the multicollinearity test for all the variables in each specification and reported the respective variance Inflation factor (from here on referred to as VIF). For all the variables, the reported VIF measures indicate no multicollinearity except for the potential experience variable and its quadratic function. However, the findings suggest that VIF for them is much below 30 (potential threat level), i.e., the collinearity is very moderate and can safely be ignored.

Table 3. Standardized Regression Estimates

Variable	Standardized Coefficients Beta	Sig. level (P values)	Variance Inflation Factor
(Constant)	6.902	.000	
School type	0.123	.000	1.015
Potential experience	0.156	.000	13.969
Potential experience ^{2}	-0.02	.000	12.106
High school diploma	0.156	.000	1.028
Some college	0.304	.000	1.026
College degree and higher	0.325	.000	1.409
Mom location	0.003	0.418	1.831
Pop location	0.004	0.215	1.865
Marital Status	0.044	.000	1.411
Sex	-0.083	.000	1.014
Racew (Controlling for white)	0.021	0.015	5.992
Raceb (Controlling for Black)	-0.004	0.507	5.891
Number of Siblings	-0.001	0.687	1.133
Language	-0.008	.015	1.108
Number of Observation	47265		
Adjusted R^2	0.436		

In Table 3, the estimated coefficients of the parameters have their expected signs. The parameters school type, potential experience, and different educational attainment categories are statistically significant. As expected for the race variable (controlling for whites and blacks), racew is positive, raceb is negative, and both are statistically significant. Intuitively, the differential effect of being black on the outcome variable is negative with respect to the reference category. Two indicator variables, namely the number of siblings and the household language, have their expected signs. The increase in several siblings is negatively associated with the earnings; similarly, the variable 'language spoken at the household' is negative, indicating that for the households whose native language is not English, the differential effect of it on the log earnings is negative for the English-speaking households on log earnings.

Table 4. Regression Estimates for Sub-Sample (Caucasian)

Variable	Standardized Coefficients Beta	Sig. level (p values)	Variance Inflation factor
(Constant)	7.048	.000	
School type	0.115	.000	1.014
Potential experience	0.157	.000	15.088
Potential experience ^{2}	-0.002	.000	12.681
High school diploma	.163	.000	1.392
Some college	0.320	.000	2.098
College degree and higher	0.339	.000	2.068
Mom location	0.018	0.011	3.293
Pop location	0.005	0.459	2.885
Marital Status	0.061	.000	1.584
Sex	-0.095	.000	1.012
Racew (Controlling for white)	-	-	-
Raceb (Controlling for Black)	-	-	-
Number of Siblings	0.001	0.848	1.001
Language	-	-	-
Number of Observation	35,457		
Adjusted R^2	0.454		

Table 5. Regression Estimates for African Americans

Variable	Standardized Coefficients Beta	Sig. level (p values)	Variance Inflation factor
(Constant)	6.762	.000	
School type	0.137	.000	1.033
Potential experience	0.170	.000	12.333
Potential experience ^{2}	-0.003	.000	11.301
High school diploma	.135	.000	1.623
Some college	0.258	.000	2.105
College degree and higher	0.249	.000	1.773
Mom location	0.006	0.451	1.002
Pop location	0.006	0.412	1.002
Marital Status	0.021	.000	1.209
Sex	-0.035	.000	1.030
Racew (Controlling for white)	-	-	-
Raceb (Controlling for Black)	-	-	-
Number of Siblings	-0.011	0.153	1.027
Language	-	-	-
Number of Observations	10,042		
Adjusted R^2	0.384		

Tables 4 and 5 summarize the regression results when the same regressions are run for the Caucasians and the African Americans separately. All the coefficients have their expected sign, and the adjusted R^2 is reasonably high. The wage differential between private and public school goers among blacks is higher than for whites. The larger private-school wage premium among African American respondents may indicate that institutional schooling environments produce heterogeneous labor market returns across demographic groups. One possible interpretation is that private schooling may provide differential access

to social capital, networks, or educational resources that are particularly consequential for historically disadvantaged groups. However, causal interpretation should be approached cautiously due to possible selection effects. Family background variables that determine whether the parents were in the same household during the schooling years also have their expected effects.

Table 6. Regression Estimates for Males

Variable	Standardized Coefficients Beta	Sig. level (p values)	Variance Inflation Factor
(Constant)	6.472	.000	
School type	0.123	.000	1.021
Potential experience	0.172	.000	14.282
Potential experience^2	-0.003	.000	12.021
High school diploma	.165	.000	1.337
Some college	0.304	.000	1.681
College degree and higher	0.287	.000	1.805
Mom location	0.002	0.645	1.015
Pop location	0.007	0.138	1.012
Marital Status	0.080	.000	1.550
Sex	-	-	-
Racew (Controlling for white)	0.031	0.015	5.098
Raceb (Controlling for Black)	-0.019	0.770	4.964
Number of Siblings	0.005	0.376	1.099
Language	-.013	0.014	1.167
Number of Observations	21861		
Adjusted R^2	0.484		

Table 7. Regression Estimates for Females.

Variable	Standardized Coefficients Beta	Sig. level (p values)	Variance Inflation Factor
(Constant)	6.563	.000	
School type	0.127	.000	1.019
Potential experience	0.147	.000	14.141
Potential experience^2	-0.002	.000	12.326
High school diploma	0.150	.000	1.538
Some college	0.311	.000	2.273
College degree and higher	0.362	.000	2.101
Mom location	0.013	0.645	0.104
Pop location	0.017	0.138	0.020
Marital Status	-0.051	.004	1.407
Sex	-	-	-
Racew (Controlling for white)	0.009	0.486	6.905
Raceb (Controlling for Black)	0.019	0.634	6.823
Number of Siblings	-0.050	0.380	1.212
Language	-0.006	0.270	1.167
Number of Observations	25405		
Adjusted R^2	0.398		

Table 6 and Table 7 summarize the regression results when the same set of regressions is run separately by sex, i.e., for males and females. The wage differential between attending private and public schools is marginally higher for females (0.4 points) than for males. Notably, for females, married women earn less than unmarried women, and the estimated coefficient for the relevant variable has a negative sign. Although the estimated difference is statistically significant, the magnitude remains relatively modest. Therefore, practical implications should be interpreted cautiously.

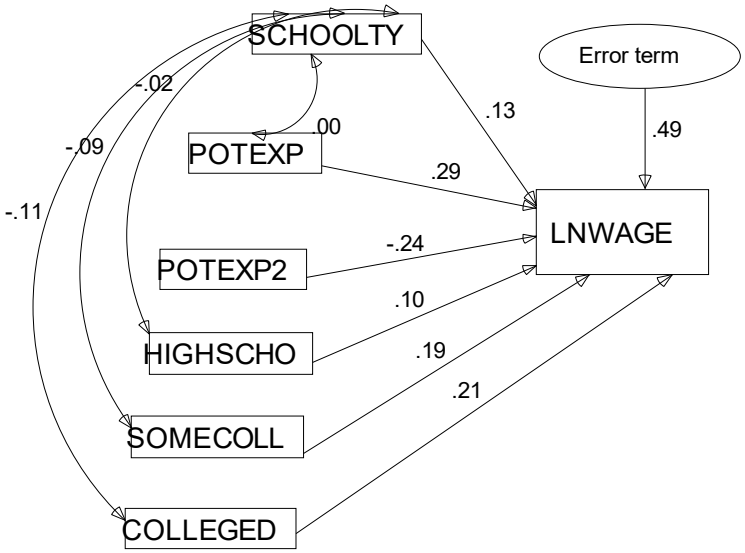
Path Analysis and Causal Relations

We incorporate the path analysis and the usual OLS regression methods to capture the causal relationship between explanatory variables and the outcome variable. Path analysis requires the standard assumptions of regression. Moreover, it is susceptible to model specification because failure to include relevant causal variables or the inclusion of extraneous variables often substantially affects the path coefficients, which are used to assess the relative importance of various direct and indirect causal paths to the dependent variable.

Table 8. Standardized Coefficients of the Exogenous Variable

Outcome Variable	Causal Relation	Exogenous variables	Estimated Coefficients	Standardized
Log wage	←	School Type	.13	
Log wage	←	Potential experience	.29	
Log wage	←	(Potential experience)^2	-.24	
Log wage	←	High school Diploma	.099	
Log wage	←	SOME College	.194	
Log wage	←	COLLEG Degree And Higher	.21	
Log wage	←	Unobserved Variable	.489	

Figure 2: Path Diagram: Structural Equation Modelling



Path estimates are calculated here by using MLE estimation. A path diagram gives the estimates. Single arrows indicate causation between exogenous or intermediary variables and the outcome variable. Arrows also connect the error terms with the endogenous variable. The residual error terms, also called disturbance terms, reflect unexplained variance (the effect of unmeasured variables) plus measurement error. Double arrows indicate a correlation between pairs of exogenous variables. The outcome variable, i.e., endogenous to the system, is denoted with incoming arrows. We have attached the path diagram for the specified model below. Correlation coefficients are calculated between the variable' school types' that capture the choice of schooling characteristics and the other exogenous variables. Further, the error term is attached to capture the latent/unobserved variations and the measurement error.

The path coefficient in the above analysis is a standardized regression coefficient (beta) showing the direct effect of an independent variable on a dependent variable in the path model. Thus, when the model has two or more causal variables, path coefficients are partial regression coefficients that measure the extent of the effect of one variable on another in the path model, controlling for other prior variables, using standardized data or a correlation matrix as input.

Policy Implications and Future Research Avenues

Gary Becker's pioneering research on human capital launched a large and active industry estimating causal effects and returns to schooling. However, the earlier results often do not report the causal effect. This study compares the estimated return to education from public schools vis-à-vis private schools using a path diagram, examining potential structural associations. The main result obtained with the help of the extended Mincerian earnings function indicates that people educated in a private school earn more than those educated in a public school. In addition, the study shows that the wage differential between private schoolgoers and public schoolgoers among African Americans is higher than the wage differential among White Americans. Findings suggest that schooling environments may be associated with later labor market outcomes; however, because school type is used as a proxy and the analysis relies on observational cross-sectional data, policy conclusions should be interpreted cautiously. The results suggest that educational contexts and institutional characteristics warrant further investigation as potential contributors to long-term economic outcomes. Future policies may benefit from focusing on equitable access to educational opportunities and school resources rather than assuming direct causal effects of school type itself. In addition, the gender issue of wage differential is higher for females, which might delineate possible research avenues in the literature on family or feminist economics and education.

Limitations

The methodology has certain limitations. The estimations are strictly restricted to a cross-sectional design, self-selection into private schools, and missing household income controls. Additionally, school type is an imperfect proxy variable with unobserved parental motivation. Moreover, the regional limitation of the study data is with the South Central region only, and therefore, there is possible endogeneity of certain explanatory variables. However, the study can be an essential addition to the extant literature as it addresses a different proxy for school quality in terms of choice of schooling. In the future, the authors would like to construct balanced panel data and check for the robustness of the results. Because families self-select into private schools, estimated differences may partly reflect pre-existing family characteristics rather than schooling effects alone. Nevertheless, the results show considerable promise for describing the impact of educational attainment on future income. In addition, since IPUMS provides individual-level census records, we conducted multivariate analyses on the characteristics of households and how they differ depending on the level of education and other compounding factors.

Appendix

Variable Description

Wage and salary income (lnwage): Reports each respondent's total pre-tax wage and salary income - that is, money received as an employee - for the previous year. The censuses collected information on such income during the preceding calendar year; for the ACS and the PRCS, the reference period was the past 12 months. The log of wage is derived from taking the logarithm of this variable.

Mother's location in the household (Mom Location): this is a constructed variable that indicates whether the person's mother lived in the same household when the subject was a child.

Father's location in the household (Pop Location): this is a constructed variable that indicates whether the person's father lived in the same household when the subject was a child.

High School Diploma: classifies high school graduates according to their degree earned.

Some College: Occupational associate degree or Academic associate degree

College Degree and Higher: Bachelor's degree
Master's degree
Professional Degree
Doctorate

Marital Status (Marstatus): Marstatus gives each person's current marital status.

Two Categories: Married: 1) Spouse Present
2) Spouse Absent
Unmarried: 1) Widowed
2) Divorced
3) Separated
4) Single

References

Acemoglu, D., and Autor, D.H. (2011) "Skills, tasks, and technologies: Implications for employment and earnings." In Handbook of Labor Economics, vol. 4, pp. 1043-1171. Elsevier

Altonji, J., and Dunn, T. (1996). "The effects of family characteristics on the Return to Education" The Review of Economics and Statistics, Vol. 78, No.4, pp. 692-704. Available at: https://doi.org/10.2307/2109956 (Accessed: May 19, 2026)

Bils, M., and P. J. Klenow (2000): "Does Schooling Cause Growth?" The AmericanEconomic Review, Vol. 90, No. 5, pp. 1160–1183. DOI: 10.1257/aer.90.5.1160

Bryman, A. and D. Cramer (1990). Quantitative Data Analysis for Social Scientists, pp. 246-251. Routledge

Card, David (1999). "The Causal Effect of Education on Earnings" in Orley Ashenfelter and David Card, editors, Handbook of Labor Economics, North Holland: Amsterdam and New York.

Chetty, R., Friedman, J. N., & Rockoff, J. E. (2014). Measuring the Impacts of Teachers I: Evaluating Bias in Teacher Value-Added Estimates. American Economic Review, Vol. 104, No. 9, pp. 2593–2632. Available at: https://doi.org/10.1257/aer.104.9.2633 (Accessed: May 19, 2026)

Erosa, A., T. Koreshkova, and D. Restuccia (2006): "On the Aggregate and Distributional Implications of Productivity Differences across Countries," Available at: The Federal Reserve Bank Working Paper Series. (Accessed: May 19, 2026)

Griliches, Z. (1979). Sibling Models and Data in Economics: Beginnings of a Survey. Journal of Political Economy, Vol. 87, No. 5. Available at: https://doi.org/10.2307/1829908 (Accessed: May 19, 2026)

Hanushek, E. A. (1995). Interpreting Recent Research on Schooling in Developing Countries. The World Bank Research Observer, Vol. 10. No. 2, pp. 227-246. Available at: https://www.jstor.org/stable/3986584 (Accessed: May 19, 2026)

Hanushek, E. A. (2002): "Publicly Provided Education," in Handbook of Public Economics, ed. by A. J. Auerbach, and M. Feldstein, Vol. 4, Chap. 30, pp. 2045–2141. Elsevier Science, North-Holland Publishers. Available at: https://doi.org/10.1111/j.1468-0084.1996.mp58001008.x (Accessed: May 19, 2026)

Heckman, J. J. (2007). The economics, technology, and neuroscience of human capability formation. Proceedings of the National Academy of Sciences, Vol. 104, No.33, pp. 13250-13255. Available at: https://doi.org/10.1073/pnas.0701362104 (Accessed: May 19, 2026)

Heckman, J. and Polachek, S. (1974). "Empirical Evidence on the Functional Form of the Earnings-Schooling Relationship." Journal of the American Statistical Association, Vol. 69, No. 346, pp. 350-354. Available at: https://doi.org/10.1080/01621459.1974.10482952 (Accessed: May 19, 2026)

Krishnan, P. (1996). "Family background, education, and employment in urban Ethiopia" Oxford Bulletin of Economics and Statistics, Vol. 58, No. 1, pp. 167-183.

Lam, D. and Schoeni, R. (1993), Effects of Family Background on Earnings and Returns to Schooling: Evidence from Brazil, Journal of Political Economy, Vol. 101, No. 4, pp.710-40

Lefgren, L., and Sims, D. P. (2015). The Relationship between Pupil Attainment and School Value-Added in a Cross-Section of English Primary Schools. Journal of the Royal Statistical Society: Series A (Statistics in Society), Vol. 178, No. 4, pp. 863–882.

Link, C. R., and Ratledge, E.C. (1975). "Social Returns to Quantity and Quality of Education: A Further Statement." Journal of Human Resources Vol. 10, No. 1, pp. 78-89. https://doi.org/10.2307/145120

Manuelli, R. E., and Seshadri, A. (2014). Human Capital and the Wealth of Nations. The American Economic Review, Vol. 104, No. 9, pp. 2736-2762. Available at: https://doi.org/10.2307/43495331 (Accessed: May 19, 2026)

Morgan, J., and I, Sirageldin. (1968). "A Note on the Quality Dimension in Education." The Journal of Political Economy, Vol. 76, No. 5, pp. 1069-1077

Mann, P., and Kapoor, B. (1988). "Earnings differentials between public, private and joint sector in Punjab (India)" The Journal of Development Studies, Vol. 25 No. 1, pp. 97-111.

McEwan, P.J. (2000). "The Potential Impact of Large-Scale Voucher Programs" Review of Educational Research, Vol. 70 No. 2, pp. 103–149. Available at: https://doi.org/10.2307/1170659 (Accessed: May 19, 2026)

Mincer, J. (1958). "Investment in human capital and personal income distribution" The Journal of Political Economy, Vol. 66 No. 4, pp. 281-302. Available at: https://www.jstor.org/stable/1827422 (Accessed: May 19, 2026)

Mincer, J. (1974). Schooling, experience, and earnings, National Bureau of Economic Research, New York, NY.

NCES (2020). "Racial Ethnic Enrollment in Public Schools." National Center for Education Statistics, Available at: https://nces.ed.gov/programs/coe/indicator/cge/racial-ethnic-enrollment (Accessed: 24th February 2026)

NCES (1997). "Findings from the condition of Education 1997 - National Center for Education Statistics", No. 12 - Public and Private Schools How do they differ? Available at: https://nces.ed.gov/pubs97/97983.pdf (Accessed: May 19, 2026)

Han, W.-J., Hetzner, N. P., & Brooks-Gunn, J. (2021). Employment and parenting. In M. H. Bornstein (Ed.), Psychological insights for understanding COVID-19 and families, parents, and children. Routledge/Taylor & Francis Group. pp. 157–183. Available at: https://doi.org/10.4324/9781003136811-5 (Accessed: May 19, 2026)

Pritchett, L. and Filmer, D. (1999), What education production functions show: a positive theory of education expenditures, Economics of Education Review, Vo. 18, No. 2, pp. 223-239.

Reardon, S. F., and Portilla, X. A. (2016). Recent Trends in Income, Racial, and Ethnic School Readiness Gaps at Kindergarten Entry. AERA Open, Vol. 2, No. 3. Available at: https://doi.org/10.1177/2332858416657343 (Accessed: May 19, 2026)

Rees, H. and Shah, A. (1995), Public-Private Sector Wage Differential in the U.K, The Manchester School of Economic & Social Studies, Vol. 63, No.1, pp. 52-68.

Sahn, D., and Alderman, H. (1988), The effects of human capital on wages, and the determinants of labor supply in a developing country, Journal of Development Economics, Vol. 29, No. 2, pp. 157-183.

Stacy Berg Dale, & Krueger, A. B. (2002). Estimating the Payoff to Attending a More Selective College: An Application of Selection on Observables and Unobservables. The Quarterly Journal of Economics, Vol. 117 No. 4, pp.1491–1527. Available at: http://www.jstor.org/stable/4132484 (Accessed 24th April 2022).