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AN ANALYSIS OF FACTORS AFFECTING U.S. SCHOOLING EXPENDITURES, 1950-1968

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With the rapid growth in schooling expenditures, many issues arise including the effects of income, urbanization, race, federal aid, and geographic location on schooling expenditures. It is important to know if these factors tend to be associated with investment in schooling. This article examines these factors.

We begin by postulating some null hypotheses and then testing these hypotheses by multiple regression analysis. The hypotheses are:

Hypothesis A -- the level of per capita income (the ability to invest in schooling) is the most important determinate of the level of schooling expenditures.

Hypothesis B -- the ability to invest in schooling has no less effect on schooling expenditures in the South than in the non-South.

Hypothesis C -- the percentage of nonwhites has a negative influence on per pupil schooling expenditures.

Hypothesis D -- urbanization has no effect on schooling expenditures.

Hypothesis E -- since 1949-50, federal assistance to education has become regressive; that is, states with high incomes obtain more federal assistance per pupil than do state with low incomes.

These null hypotheses are tested with multiple regression analysis, using cross-sectional data for 1949-50, 1959-60 and 1967-68 from the 48 coterminous states. The regression coefficients for any of the three years illustrate what effect the respective explanatory variables have on the dependent variables across the 48 states for that year. Table 1 presents twelve multiple regression equations dealing with schooling expenditures for the three years. That is, each equation represents a static situation. However, by comparing any of the equations for a common dependent variable, some dynamic aspects can be seen.

The standardized regression coefficients (beta coefficients) are also shown in Table 1. Differences in the beta coefficients among the three equations also suggest changes in the effects of the independent variable on the dependent variable over time. A comparison of the beta coefficients gets away from problems resulting from differences in the variance of the estimate and the variance of each regression coefficient among the three equations. No attempt was made to test the difference in the regression coefficient for a given variable over the three equations. Instead, we observed the absolute level of the regression and beta coefficients over time and made some generalizations about the changes in the coefficients over time.

Current expenditures per pupil in average daily attendance in elementary and secondary schools are used as the level of the public's expenditures on schooling. Per capita personal income is used as the measure of the ability to finance schooling. The percent of personal income spent in financing schooling is used to reflect the public's propensity to invest in schooling. The regression analysis employs data on elementary and secondary schooling expenditures, personal income, percent nonwhite and percent urban from the *Statistical Abstract of the United States* for 1952, 1962, and 1968, and the *Digest of Educational Statistics* for 1952, 1962, and 1968.

TABLE 1. REGRESSION ANALYSIS OF PUBLIC ELEMENTARY AND SECONDARY SCHOOLING EXPENDITURES, UNITED STATES, 1950-1968

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Dependent Variable and Year	Equation Number	Standard Error of Estimate	Constant Term	Percent Non-white (X_1)	Percent Urban (X_2)	Per Capita Income Non-South (X_3)	Per Capita Income South (X_4)	New York and Louisiana Dummy (X_5)	R^2
Current Expenditures from State and Local Sources/Pupil									
1949-50	(1)	22.99	34.53						.83
Regression Coefficient				-.43	.32	.11	.08	2.29	
t Value				(.95)	(.98)	(5.91)**	(4.42)**	(.13)	
Beta Coefficient				-.0085	.0047	.000082	.000068	1.73	
1959-60	(2)	30.14	96.57						.87
Regression Coefficient				-.80	.52	.11	.08	116.82	
t Value				(1.32)	(1.11)	(5.53)**	(3.32)**	(5.09)**	
Beta Coefficient				-.016	.0080	.000071	.000069	89.02	
1967-68	(3)	55.37	92.47						.81
Regression Coefficient				-2.45	0.59	.15	.14	219.56	
t Value				(2.00)**	(.69)	(5.26)**	4.71)**	(5.18)**	
Beta Coefficient				-.054	.0092	.000075	.000075	167.97	
Current Expenditures from Federal Sources/Pupil									
1949-50	(4)	3.57	-5.13						.24
Regression Coefficient				-.14	.13	-.005	-.005	-.21	
t Value				(1.93)*	(2.54)**	(1.79)*	(1.70)*	(.08)	
Beta Coefficient				-.0027	.0019	-.0000039	-.0000041	-.16	
1959-60	(5)	13.28	21.19						.04
Regression Coefficient				.04	.25	-.009	-.010	-6.39	
t Value				(.16)	(1.21)	(.98)	(.93)	(.69)	
Beta Coefficient				.00090	.0038	-.0000055	-.0000084	-5.33	
1967-68	(6)	13.47	119.36						.53
Regression Coefficient				-.23	.44	-.032	-.028	-5.87	
t Value				(.78)	(2.11)**	(4.69)**	(3.85)**	(.57)	
Beta Coefficient				-.0051	.0022	-.000016	-.000015	-4.49	

TABLE 1. REGRESSION ANALYSIS OF PUBLIC ELEMENTARY AND SECONDARY SCHOOLING EXPENDITURES, UNITED STATES, 1950-1968
(Continued)

Dependent Variable and Year	Equation Number	Standard Error of Estimate	Constant Term	Percent Non-white (X_1)	Percent Urban (X_2)	Per Capita Income Non-South (X_3)	Per Capita Income South (X_4)	New York and Louisiana Dummy (X_5)	R^2
Current Expenditures from All Sources/Pupil									
1949-50	(7)	22.56	39.66						.83
Regression Coefficient				-.30	.19	.11	.09	2.50	
t Value				(.67)	(.60)	(6.30)**	(4.78)**	(.15)	
Beta Coefficient				-.0058	.0028	.000086	.000072	1.89	
1959-60	(8)	31.28	117.76						.86
Regression Coefficient				-.76	.77	.10	.07	109.82	
t Value				(1.20)	(1.58)	(4.92)**	(2.81)**	(4.61)**	
Beta Coefficient				-.015	.012	.000065	.000060	83.69	
1967-68	(9)	58.41	211.82						.76
Regression Coefficient				-2.68	1.03	.12	.11	213.67	
t Value				(2.08)**	(1.14)	(3.90)**	(3.58)**	(4.78)**	
Beta Coefficient				-.0592	.0160	.000059	.000060	163.47	
Propensity to Invest in Schooling									
1949-50	(10)	.555	3.69						.18
Regression Coefficient				-.003	.0006	.0008	.0010	.27	
t Value				(.25)	(.08)	(1.92)*	(2.26)**	(.65)	
Beta Coefficient				-.000054	.000009	-.0000006	-.0000008	.21	
1959-60	(11)	.451	5.42						.37
Regression Coefficient				-.002	-.0005	-.0010	-.0012	.642	
t Value				(.24)	(.07)	(3.26)**	(3.32)**	(1.87)*	
Beta Coefficient				-.000044	-.000007	-.0000006	-.0000010	.49	
1967-68	(12)	.774	8.09						.21
Regression Coefficient				-.021	.008	-.001	-.001	.84	
t Value				(1.23)	(.64)	(2.61)**	(2.59)**	(1.42)	
Beta Coefficient				-.0005	.0001	-.0000005	-.0000006	.64	

MEASURING THE LEVEL OF SCHOOLING EXPENDITURES

Table 1 presents the results of multiple regression analysis, with the dependent variable the level of schooling expenditures from state and local sources, federal sources and from all three sources. Individual regressions were estimated with data from 1949-50, 1959-60 and 1967-68. The explanatory variables are percent nonwhite (X_1), percent urban (X_2), per capita income in the non-South (X_3) per capita income in the South (X_4) and a dummy variable for New York and Louisiana (X_5).[1] The dummy variable was included for New York and Louisiana because those states appeared to invest substantially more in schooling than other states, other things being equal. That is, given the level of per capita income, percent nonwhite and percent urban, substantially more in schooling than other states, other things being equal. That is, given the level of per capita income, percent nonwhite and percent urban, New York and Louisiana's schooling expenditures are considerably higher than the national average. Computed t values are shown in parentheses below the regression coefficients. The double asterisk denotes significance at the .01 level; a single asterisk denotes significance at the .05 level.

Equations (1), (2) and (3) of Table 1 show that the level of per capita income is the prime variable determining the level of state and local schooling expenditures. The t values are significant at the .01 level for both the non-South and South per capita income variables for all three years. The similarity in size of the t values and beta coefficients of the income variables for the three equations suggests that per capita income has had a somewhat stable influence on state and local schooling expenditures over time. Equation (1), (2) and (3) also show that the effects of per capita income on schooling investment is not significantly different in the South and non-South. By comparing the regression coefficients and respective t values for the percent nonwhite variable (X_1) for the three equations, it can be seen that the negative effect of nonwhites on state and local schooling expenditures has increased over time. Further, the coefficients for the percent urban variable (X_2) in equations (1) to (3) suggest that since 1949-50 the effect of urbanization has trended toward a slight positive influence on state and local schooling expenditures, other things being equal.

Federal assistance to education was significantly progressive with respect to per capita income in 1967-68 as can be seen by the significant negative coefficients of (X_3) and (X_4) of equation (6). However, in 1949-50, the negative income coefficient was significant only at the .05 level whereas in 1959-60 the income coefficient was not significant at either the .05 or .01 level.

A comparison of the coefficients of percent nonwhite (X_1) and percent urban (X_2) in equations (4), (5) and (6) indicates that each of the variables has exhibited shifting influences on federal educational assistance since 1949-50. Whereas percent nonwhite has a significant negative effect on federal assistance in 1949-50, its effects on the level of federal funds in 1959-60 and 1967-68 were not significant. On the other hand, urbanization had a significantly positive effect on federal assistance in 1949-50 and again in 1967-68, other things being equal. These effects of urbanization on federal assistance in 1949-50 and 1967-68 were of similar magnitudes as denoted by the beta coeffients.

Equations (7), (8) and (9), taken individually, show the effects of each of the explanatory variables on current schooling expenditures from all sources for the respective three school years. By again comparing the regression and beta coefficients for a given variable over the three equations, one is able to gain some insight into the changing influences of the variable on schooling expenditures over time. Per capita income, both in the non-South and South, was highly significant in explaining schooling expenditures from all sources. The effects of per capita income on schooling expenditures from all sources has diminished slightly as indicated by the decline in the beta coefficients of the income variables of equations (7), (8), and (9). This is largely the result of the increasing negative influence of per capita income on federal assistance.

According to equations (7), (8) and (9), increases in the proportion of nonwhites has had a negative effect on total schooling expenditures in all three years. The greatest negative influence of racial composition on schooling expenditures was in the 1967-68 school year. On the other hand, the degree of urbanization has had a positive effect on current schooling expenditures from all sources in all three years.

However, the effects of urbanization are not statistically significant in any one year at the .01 or .05 level.

MEASURING THE PUBLIC'S PROPENSITY TO INVEST IN SCHOOLING

The propensity to invest in schooling, an expression of public support, is measured by the proportion of a state's personal income spent in financing schooling.[2] Equations (10), (11) and (12) relate the propensity to invest in schooling to the four explanatory variables in 1949-50, 1959-60 and 1967-68, respectively. Equation (10) for 1949-50 indicates that states with higher per capita income exhibited a higher propensity to invest in schooling than did states with lower per capita incomes. This was not the case in 1967-68 when a greater per capita income had a detrimental effect on a state's propensity to invest in schooling (equation 12).

The percent nonwhite and percent urban variables have grown in their influence on the propensity to invest in schooling since 1949-50 as indicated by the increase in the beta coefficients of the two variables from 1949-50 to 1967-68. However, the effects of urbanization and racial composition on the propensity to invest in schooling were not significant in any one year.

SUMMARY

Results of the multiple regression analysis give some statistical basis for accepting Hypotheses A, B and C, no statistical basis for either accepting or rejecting Hypothesis D, and some statistical basis for rejecting Hypothesis E. Hypothesis A, stating that per capita income (the ability to invest) is the most important determinate of a state's level of schooling expenditures, is accepted on the basis of equations (7), (8) and (9). Hypothesis B, stating that the ability to invest in schooling has no less effect on schooling expenditures in the South than the non-South, is accepted on the basis of the lack of any significant difference between the coefficients of the South and non-South per capita income variables of equations (1), (2) and (3) and (7), (8) and (9). These results suggest that underinvestment in schooling in the South is the result of low income rather than the result of a low propensity to invest in schooling out of a given income.

Equations (1), (2) and (3) suggest that there is a growing tendency for the percent of nonwhites to have a negative effect on state and local schooling expenditures. Although the percentage of nonwhites has a positive effect on federal assistance in 1959-60 (equation 5), equations (4) and (6) show that there is a tendency for federal expenditures to be negatively affected by a larger percentage of nonwhites. Since the negative effects of racial composition on state and local schooling expenditures and on federal assistance were statistically significant for 1967-68, they provide some basis for accepting Hypothesis C.

Hypothesis D which states that urbanization has no effect on schooling expenditures cannot be accepted or rejected since the percent urban coefficients are not statistically significant in equations (7), (8) and (9). However, urbanization did have a significant positive effect for both 1949-50 and 1967-68 on federal expenditures alone. Equations (4), (5) and (6) clearly show that federal assistance in financing schooling has been greatest for states with low per capita income. Thus, we reject Hypothesis E stating that federal schooling aid is regressively distributed among states.

FOOTNOTES

1. The percent nonwhite and percent urban variables are not readily available for 1968. Therefore, the equations for 1967-68 employed 1960 percent nonwhite and percent urban data. Per capita income data are available for all three years.

2. The propensity to invest in schooling represents schooling expenditures from state and local sources as well as from federal sources; it is expressed as a percent of the state's personal income. The equations remain essentially unchanged when federal funds are excluded in computing the propensity to invest in schooling.

REFERENCES

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