

X_4 —number of public school pupils in average daily attendance per square mile,

X_5 —percent increase in public school pupils in average daily attendance, 1951–56,

X_6 —average assessed valuation of real property per pupil in average daily attendance, and

X_7 —quality index of public education in primary and secondary schools.

As was mentioned above, the quality index is composed of six subindexes—

A is equal to number of teachers per 100 pupils in average daily attendance,

B is equal to number of college hours of average teacher,

C is equal to average teacher's salary,

D is equal to percent of teachers with more than 10 years of experience,

E is equal to number of high school credit units, and

F is equal to percent of high school seniors entering college.

Since testing this hypothesis involves the loss of 8 degrees of freedom, a large loss when merely 27 observations are available, it was thought desirable to work with as large a sample as possible. For this reason, data for two different periods—that is, 1951–52 and 1954–55, with a 2-year interval between, were used. Since expenditures and their determinants increased overtime at somewhat different rates in the different school districts, the cross-section data pertaining to the 2 staggered years are devoid of major serial intercorrelation.

In order that a test as to the presence of economies of scale can be made, the following functional relationship was assumed:

$$X_1 = f(X_2, X_3, X_4, X_5, X_6, X_7).$$

The following results were obtained for total current expenditures plus debt service (X_{1a}) and total current expenditures without debt service (X_{1b}), respectively, per pupil in average daily attendance.

$$X'_{1a} = -240.966 - \frac{0.00347 X_2}{(0.0916)} + \frac{0.000000317 X_2^2}{(0.0696)} + \frac{4.090 X_3}{(0.363)} \\ - \frac{0.0293 X_4}{(0.0253)} - \frac{0.335 X_5}{(0.0253)} + \frac{0.0135 X_6}{(0.679)} + \frac{213.888 X_7^3}{(0.414)}.$$

The coefficient of multiple determination— R^2 —is 0.85 and this coefficient adjusted for degrees of freedom lost— R^{*2} —is 0.82. It is highly significant at an α of 0.05. Thus, about 82 percent of the variation in total current expenditures plus debt service per pupil in average daily attendance is explainable in terms of these six stated independent variables, of which financial ability, service level, and percentage of high school pupils are statistically significant.

$$X'_{1b} = -26.956 - \frac{0.00181 X_2}{(0.0584)} + \frac{0.0000000154 X_2^2}{(0.0412)} + \frac{2.999 X_3}{(0.329)} \\ - \frac{0.0198 X_4}{(0.148)} - \frac{0.143 X_5}{(0.131)} + \frac{0.0116 X_6}{(0.697)} + \frac{156.40 X_7^4}{(0.375)}.$$

$R^2=0.84$ and $R^{*2}=0.82$. They are highly significant at an α of 0.05.

Thus, the empirical correlation and regression analysis did not reveal significant economies of scale in the school districts of the St. Louis city-county area.

³ The figures in brackets are partial correlation coefficients. Since there are 54–8 or 46 degrees of freedom, the coefficient is statistically significant at an α of 0.05 in case it is larger than 0.28. Statistically significant regression coefficients are associated with X_3 , X_4 , and X_7 .

⁴ See footnote 3 above.