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IMPACTS OF COMMUNITY CHARACTERISTICS ON THE ATTRIBUTES OF PUBLIC EDUCATION

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A public school student is a product of combined influences of the home and his peers, as well as the school [2, 3, 4, 5, 6 and 7]. Similarly, the school system within a community represents the combined impact of influence of taxpayers, teachers and administrators. Local elementary and secondary schools cannot operate independently of desires and wishes of residents in the community. This study presents an analysis of linkages between community characteristics and educational service provided by the public school.

MODEL FORMULATION

A school administrator is a manager of scarce resources. He is confronted with an economic problem similar to that which a business manager might face. A limited amount of tax dollars is available to school administration from federal, state and local sources. In most states, the primary source of operating revenue for school is a local property tax levied by the school district. The administrator does have some freedom in allocation of the tax dollars among alternatives within the school. He views perhaps as his objective maximization of a rather nebulous concept called "educational quality" within the budget constraint imposed by available tax revenue. Variables under the school administrator's control are also possible uses for tax dollars, but do not necessarily measure educational quality for a school district. Rather, they are proxy measures that may influence the kind of education a student receives. They are also the variables upon which teachers and taxpayers may exert an influence. Figure 1 illustrates relationships comprising the conceptual model. Attitudes of district residents toward

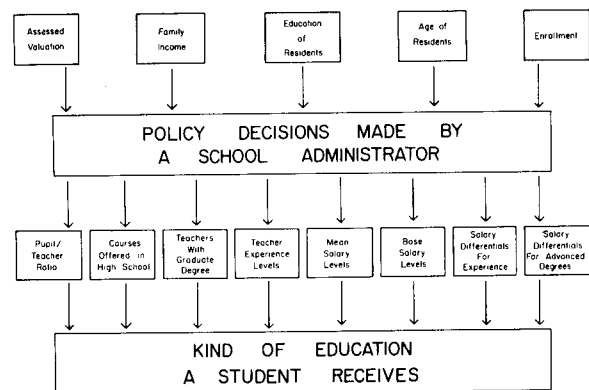


FIGURE 1. IMPACT OF COMMUNITY CHARACTERISTICS ON EDUCATIONAL POLICY

public education are influenced by community socio-economic characteristics. Residents influence policy decisions made by the school administrator. The school administrator has some control over pupil/teacher ratios, course offerings, degrees and experience of teachers, as well as salary levels. In turn, these variables have an impact on the kind of education a student receives.

VARIABLES UNDER ADMINISTRATIVE CONTROL

Variables under administrative control are used as dependent variables in the subsequent empirical analysis. These are:

Pupil/Teacher Ratios. The pupil/teacher ratio represents the key policy variable over which the school administrator exerts direct control. Reduc-

tions in the pupil/teacher ratio are extremely costly. The pupil/teacher ratio is closely linked to the level of per-pupil instructional expenditures within a school. Assuming non-salary instructional expenditures within a school district to be zero, the following algebraic equation holds true by identity:

$$\text{Per Pupil Expenditures for Instruction} = \frac{\text{Average Teachers Salary}}{\text{Pupil/Teacher Ratio}} \quad (1)$$

Figure 2 illustrates the relationship between per-pupil expenditures for instruction and the pupil/teacher ratio for a school district in which average salary is \$10,000. As is evident from Figure 2, substantial reductions in per-pupil expenditures can be achieved by slightly increasing the pupil/teacher ratio if the school district is operating at a very low pupil/teacher ratio. However, only modest reductions in per-pupil expenditures can be achieved by further increases in the pupil/teacher ratio if it is operating at a pupil/teacher ratio of 25:1 or greater.

The pupil/teacher ratio is perhaps the variable of greatest concern in all of educational finance. In most states, pupil/teacher ratios vary more widely across districts than do teacher's salaries, and hence have a greater effect on the level of per-pupil expenditures. Schools with small pupil/teacher ratios are extremely expensive to run. Moreover, no other administrative variable has been the subject of more emotionalism on the part of both parents and teachers. Parents are concerned that large pupil/teacher ratios imply big classes in which children do not get proper individual attention. Teachers are concerned about heavy work loads associated with large pupil/teacher ratios.

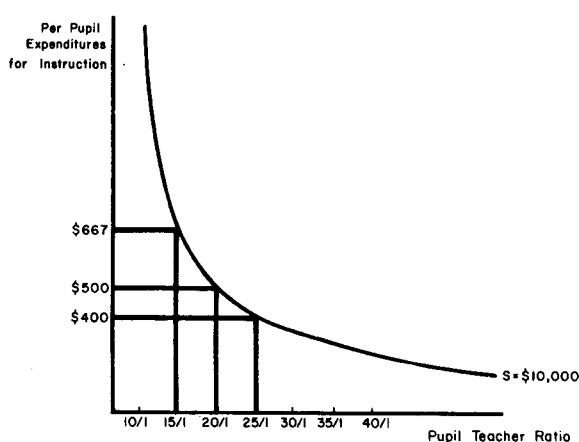


FIGURE 2. GRAPHIC RELATIONSHIP BETWEEN THE PUPIL/TEACHER RATIO AND PER-PUPIL EXPENDITURES FOR INSTRUCTION

Whether the pupil/teacher ratio does influence education to the extent both parents and teachers believe is debatable [5], but the emotionalism associated with the variable is very real.

Number of Course Offerings. A school system designed to meet students' needs provides a wide variety of courses at the secondary level. For high schools with large enrollments, the cost of adding a course may be minimal. Sections of existing courses need merely be combined and teachers reassigned to new courses without operating at an extremely low (and therefore costly) pupil/teacher ratio.

Salary Levels and Increments. Base salaries, salary differentials for training and experience, average training and experience levels for teachers are linked through a school district's salary schedule. Residents in a community are no doubt concerned that average salaries of teachers be comparable to incomes of other comparatively trained and experienced people in the community. It is widely believed that high average salaries attract competent teachers. By raising salary increments for experience, the administrator may be better able to retain teachers. Increases in salary increments for an advanced degree over the long run may increase the proportion of teachers with graduate degrees.

Alteration of Experience and Educational Levels. The public believes experienced teachers are better teachers than inexperienced ones. At least with respect to the impact of teacher experience on standardized achievement scores, empirical evidence has not provided strong support for this widespread belief [3, 4, 5 and 6]. Some believe it desirable for teachers to hold graduate degrees. Substantial variation exists among Indiana school districts in the proportion of teachers holding graduate degrees. Both administrators and the public vary across school districts in their willingness to hire replacement teachers holding advanced degrees.

COMMUNITY CHARACTERISTICS

Community characteristics act as proxies for residents' ability and desire to support public education. Community characteristics are used as independent variables in the subsequent analysis. Data on these characteristics consist of information for individual school districts, not city or county averages. Township data from the 1970 census were aggregated for school districts. These characteristics are:

Assessed Valuation. In Indiana, as in a number of other states, the bulk of tax revenue for local schools continues to be raised from local property tax. It is appropriate that the basic budget constraint imposed on local school administration be represented by the

amount of taxable wealth (assessed valuation) backing each pupil in the district. Data on per-pupil assessed valuation and enrollment levels were obtained from the Indiana Department of Public Instruction for 1970-71.

Family Income. Schools in high income areas should tend to operate at low pupil/teacher ratios, offer a wide variety of courses, have highly trained and experienced teachers, pay large base salaries and salary differentials for training and experience, and have relatively large average salary levels.

Percent of Persons Over 25 that Graduated from College. Parents who are college graduates may be particularly concerned that their children are taught by teachers who hold graduate degrees.

Percent of Persons Over 65. Schools in communities where a high proportion of the population is over 65 might be expected to operate at relatively high pupil/teacher ratios, have few teachers holding graduate degrees and have relatively low salaries. Economic factors may compel elderly persons to keep taxes low and, therefore, provide only minimum funding for education.

Enrollment. School district enrollment is not usually thought of as a socioeconomic characteristic

of a community. However, enrollment is expected to be a major determinant of pupil/teacher ratios and availability of course offerings. Almost without exception, districts with large enrollments are found in urban areas.

EMPIRICAL FINDINGS

Following the conceptual model outlined in Figure 1, each administrative policy variable was viewed as a function of assessed valuation, enrollment and other community characteristics. All Indiana districts were included for which data were complete. There are approximately 315 districts in Indiana. Equations for estimating pupil/teacher ratios and course offerings used enrollment data for individual plants (buildings): remaining equations used enrollment for the entire district. Each equation was estimated using least squares regression procedures with results presented in Table 1.

Assessed Valuation

School districts with high assessed valuation operate at lower pupil/teacher ratios and higher average salary levels than do low assessed valuation

TABLE 1. FACTORS INFLUENCING THE AVAILABILITY OF SCHOOL INPUTS, INDIANA, 1970-71 SCHOOL YEAR^a

Dependent Variables	Assessed Valuation Per Pupil in District	Mean Family Income	Independent Variables		Enrollment ^b	Intercept	R ²	F	N
			Percent of Persons Over 25 That Graduated From College	Percent of Total Population Over 65					
1. Pupil/Teacher Ratio, Elementary Level	-.00016*** (3.20)	-.00037*** (2.85)	-.02266 (1.17)	.13370*** (2.02)	.00740*** (10.57)	27.12	.16	27.09	967
2. Pupil/Teacher Ratio, Secondary Level	-.00014*** (3.50)	-.00050*** (2.94)	-.01196 (0.48)	-.07620 (1.04)	.00183*** (6.78)	27.03	.12	12.56	325
3. No. of Courses Offered in the High School	.00017* (1.31)	.00195*** (3.36)	-.03789 (0.43)	-.45920** (1.78)	.01605*** (16.89)	30.21	.64	111.39	325
4. Proportion of Classroom Teachers With a Graduate Degree	.00030** (1.74)	.00180*** (2.41)	.5487*** (3.71)	1.0439*** (3.10)	.00036*** (2.23)	3.85	.21	13.88	269
5. Mean Experience Level of Classroom Teachers	.00002 (0.98)	-.00042*** (3.82)	.03363** (1.71)	.24588*** (5.01)	.00004*** (2.75)	11.20	.32	24.24	269
6. Mean Salary of Classroom Teachers	.04143*** (5.85)	.12008*** (3.93)	8.9458* (1.48)	21.039* (1.52)	.03422*** (8.09)	6608.26	.41	36.15	269
7. Base Salary (From Salary Schedule)	.01206* (1.34)	.08389*** (2.16)	-10.47* (1.37)	20.309 (1.16)	.00987** (1.84)	5820.06	.04	2.39	269
8. Salary Differential For Experience	.00211*** (3.05)	.01701*** (5.68)	.0691 (0.12)	-1.84* (1.37)	.00085 (2.07)	18.02	.34	27.37	269
9. Salary Differential for an Advanced Degree	.00175 (0.63)	-.00765 (0.64)	7.8459*** (3.34)	-10.468*** (1.95)	.00531*** (3.24)	638.81	.13	8.19	269

^aStudent's t ratios in parenthesis

***Statistically significant at the .05 level, two tailed test

**Statistically significant at the .10 level, two tailed test

*Statistically significant at the .20 level, two tailed test

^bEnrollment figures for equations 1, 2 and 3 were for the individual school plant. Enrollment in the remaining equations was the district total.

schools. Average per-pupil assessed valuation in Indiana is approximately \$10,000. An increase in assessed valuation of one thousand dollars results in a reduction of pupil/teacher ratios of .16 students at the elementary level and .14 students at the secondary level (Table 1).

A thousand dollar increase in assessed valuation per student, *ceteris paribus*, results in a 41 dollar increase in average salaries. The primary reason schools with high per-student assessed valuations have higher mean salary levels is because they pay large salary differentials for experience. However, the most experienced teachers are not found in high assessed valuation districts.

Weak evidence supports the belief that schools with high assessed valuations offer more courses, pay higher starting salaries and have a slightly greater proportion of teachers with graduate degrees than do other schools. These relationships are not strong, and need to be interpreted with caution.

Family Income

The simple correlation coefficient between family income and assessed valuation was estimated at .02 for the 269 school districts. Thus, evidence for Indiana does not support the contention by plaintiffs in Rodriguez [8] that funding of public schools with local property tax discriminates against the poor. From a statistical standpoint, the low degree of correlation between family income and assessed valuation means that variation in school input levels explained by family income could not also be attributed to assessed valuation. A one thousand dollar increase in average family income results in a decrease in the pupil/teacher ratio of .4 pupils at the elementary level and .5 pupils at the secondary level, with 2 additional courses offered in high school. Experienced teachers tend to be found in low, not high, income communities. A thousand dollar increase in family income would result in a decrease in average experience level of .42 years for teachers within the local public school. Other findings (equation 8) reveal that schools in high income areas pay higher salary differentials for experience than do other schools. One reason experienced teachers tend to be found in low, not high, income communities may be because low income communities tend to have net out-migration. Out-migration may mean that few new (and probably inexperienced) teachers need to be hired each year. The result is high average experience level for teachers in schools located in low income communities.

Persons Graduating from College

Teachers holding graduate degrees tend to be

found in communities where a high proportion of the population has graduated from college. A five percent increase in the number of persons in the community graduating from college results in an increase in the percentage of teachers holding graduate degrees of 2.74 percent.

Population Over 65

The key finding is the relationship between percent of population over 65 and experience of teachers. Experienced teachers tend to be found in communities where a high proportion of the population is over 65. Net out-migration may be the underlying cause. Salary differentials for both experience and an advanced degree are lower for schools in communities in which a high proportion of persons are over 65, even though teachers in these schools have more training and experience. Mean salaries are higher in these communities than in other areas because teachers are, on the average, relatively high on the salary schedule.

Enrollment

Each 100 students added to an elementary plant results in a decrease in the pupil/teacher ratio of .74 units; and at the secondary level, a similar decrease of .18 units. Enrollment is the major determinant of availability of courses at the secondary level. One hundred additional students allows a high school to offer 1.6 additional courses. Furthermore, teachers in large enrollment districts (a) hold more graduate degrees, (b) tend to be more experienced, (c) receive larger salary increments for an additional year of experience and an advanced degree and (d) are paid higher starting and average salaries.

IMPLICATIONS FOR COMMUNITY DEVELOPMENT DECISION-MAKERS

The fundamental finding of the analysis is that local public schools are indeed a product of the community. This is reflected in two ways: first, this is suggested by local residents' willingness to support public education by providing tax dollars for public schools. Second, once total tax dollar expenditure by residents for public schools has been decided upon, residents continue to exert their influence in the way tax dollars are allocated in local public schools.

Empirical findings dispute beliefs widely held by the public as well as school administrators. Even though Indiana schools are funded primarily through the property tax, a thousand dollar increase in mean family income levels will have a greater impact on teacher's salaries than will a thousand dollar increase in per-pupil assessed valuation in the district. An

increase in assessed valuation has much less impact on the proportion of teachers with a graduate degree than does an increase in family income and educational levels. Hence, changing the system of funding schools in Indiana to a system based on taxes other than property would not necessarily ensure that all school systems would operate at the same pupil/teacher ratios and teacher salary levels. Even if the same number of dollars were made available to support every public school pupil, funds would not be spent the same way in every school. Pupil/teacher ratios, course offerings and salary levels would continue to vary among districts. Local residents would continue to express preferences with regard to

how tax dollars are spent within the school.

How do community leaders know whether or not they have a "good" public school? Bottum, in a recent article [1] struggled with the issue of what constitutes a "good" community. He argued that a "good" community is what residents want after they have been exposed to possible available alternatives. Much the same may be true for local public schools: a good school is the kind of school local residents want after having been exposed to the alternatives. It is therefore enlightening to find a high degree of relationship between characteristics of local residents and allocation of tax dollars within public schools.

REFERENCES

- [1] Bottum, J. Carrol. "Policy Formation and the Economist," *American Journal of Agricultural Economics*, 57: 6, December 1975, p. 767.
- [2] Bowles, Samuel. "Toward an Educational Production Function," *Education Income and Human Capital*, W. Lee Hansen, Editor, Columbia University Press, 1970, pp. 1-61.
- [3] Coleman, James S., *et al.* "Equality of Educational Opportunity," U.S. Office of Education, 1966.
- [4] Debertin, D. L. "An Econometric Investigation of the Provision for Public Education in Indiana," Unpublished Ph.D. Dissertation, Department of Agricultural Economics, Purdue University, 1973.
- [5] Jencks, Christopher, *et al.* *Inequality: A Reassessment of the Effect of Family and Schooling in America*, New York: Basic Books, 1972.
- [6] Mosteller, Frederick and Daniel P. Moynihan, Editors. *On Equality of Educational Opportunity*, New York: Random House, 1972.
- [7] "Perspectives on Inequality," *Harvard Educational Review*, 43:1, February 1973.
- [8] *San Antonio School District v. Rodriguez*, U.S. Supreme Court No. 71-1332, 1973.

