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AUTHOR McCracken, J. David; Peasley, Donald D.
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ABSTRACT

Four studies examined financial and achievement issues in rural Ohio school districts. Based on both county population and location relative to a metropolitan statistical area, schools were assigned to five location categories: rural, semirural, rural/suburban, suburban, and urban. Study 1 examined financial characteristics of the 73 rural Ohio districts and found that per-pupil expenditures ranged from $2300 to $3500, with a median of $2665, and were a function of both financial effort and financial ability. Study 2, involving all 612 Ohio districts, found that rural/suburban schools had the highest level of student achievement; urban and suburban districts had a greater capacity to generate revenue and expended more financial effort to support schools than did the other three categories; and school location was unrelated to student achievement when financial ability and financial effort variables were controlled. Study 3 looked at standardized test scores for grades 4-9 and found that rural/suburban and urban schools had the highest scores and also the greatest variances. Rural/suburban and suburban schools had nearly equivalent levels of achievement, suggesting that proximity to an urban area may be more important than population density for student achievement. It is noted that rural/suburban schools do more with less than any other category. Study 4 was descriptive in nature and outlined differences between location categories for various measures of financial ability and financial effort. Contains 20 references and 11 data tables and figures. (SV)

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Rural Ohio School Expenditure and Student Achievement

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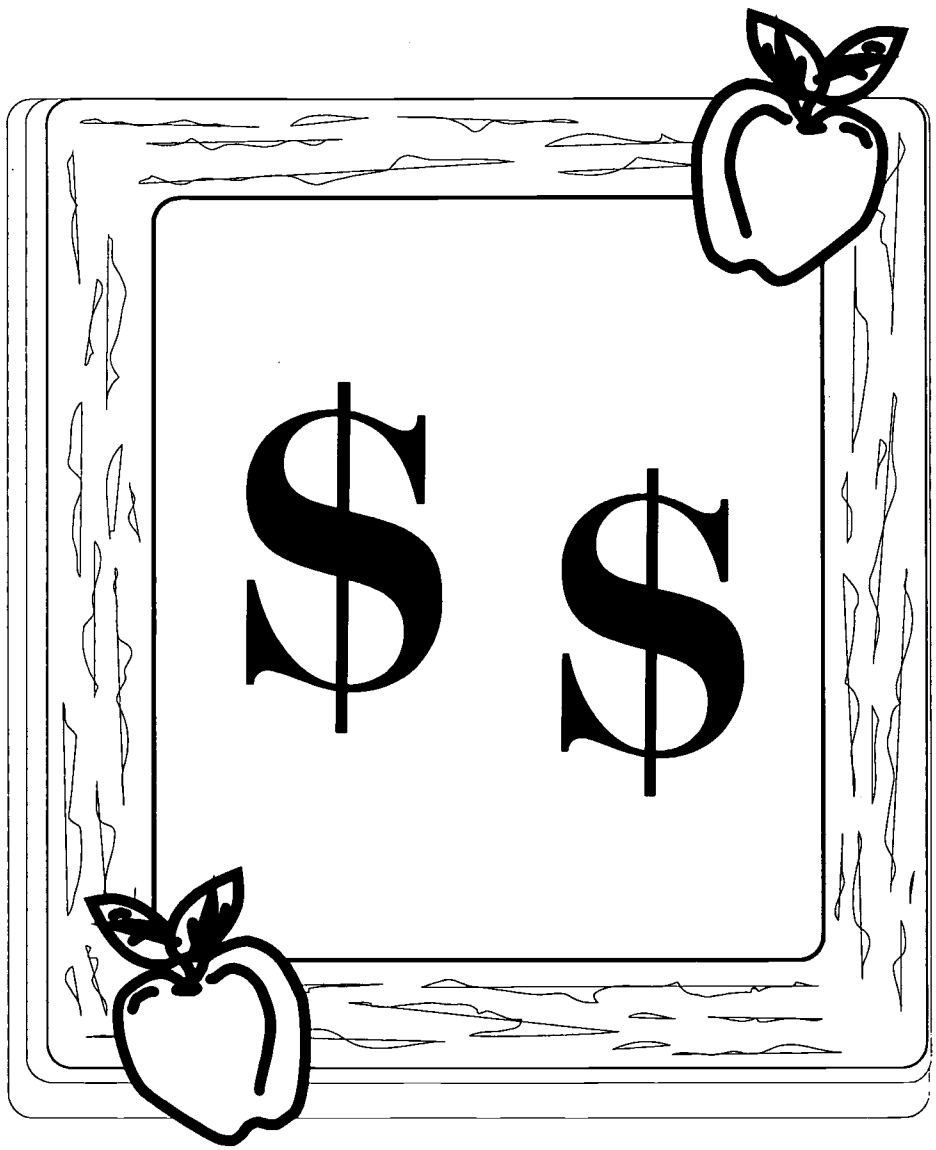

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J. David McCracken and Donald D. Peasley
Department of Agricultural Education
Ohio Agricultural Research and Development Center
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1994

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Contents

Rural Ohio School Expenditure and Student Achievement

Executive Summary 1

Introduction 3

Study 1. Factors Related to Per-Pupil Expenditures 3
- Procedures 5
- Results 5
- Discussion 6

Study 2. School Location and Student Achievement 7
- Procedures 7
- Results 8
- Discussion 9

Study 3. School Effectiveness and School Location 10
- Procedures 10
- Results 11
- Discussion 13

Study 4. Financial Effort and Ability By School Location 13
- Procedures 13
- Results 13
- Discussion 14

Implications 14

References 16

Tables

Table 1. Level of Per-Pupil Expenditure in Ohio Rural Schools (N=73) 6

Table 2. Selected Characteristics For Ohio Rural School Districts 6

Table 3. Semi-Partial Regression Analysis of Per-Pupil Expenditure on District Financial Ability, Financial Effort, and Student Achievement of Ohio Rural Schools (N=73) 7

Table 4. Means, Standard Deviations, and Medians of Selected Measures of Financial Effort, Financial Ability and Student Achievement of Ohio Public School Districts by School Location, 1990 (N=612) 9

Table 5. Intercorrelations of School District Characteristics Determined to Be Related to Both Student Achievement and School Location (N=612) 10

Table 6. Semi-Partial Regression Analysis of Student Achievement on District Financial Ability, Financial Effort and Location of Ohio Public Schools 1990 (N=612) 10

Table 7. Means and Standard Deviations of Selected Indicators of Student Achievement of Ohio Public School Districts By School Location, 1990 (N=612) 11

Table 8. Means, Standard Deviations, and Medians of Selected Measures of Financial Ability of Ohio Public School Districts By School Location, 1990 (N=612) 14

Table 9. Means, Standard Deviations, and Medians of Selected Measures of Financial Effort of Ohio Public School Districts By School Location, 1990 (N=612) 15

Figures

Figure 1. A Classification of Ohio Counties by Geographic Location and Population (Using 1990 U.S. Census Data) 4

Figure 2. Variance in Achievement Explained—Semi-Partial Regression Analysis 12

Rural Ohio School Expenditure and Student Achievement

J. David McCracken and Donald D. Peasley
Department of Agricultural Education
Ohio Agricultural Research and Development Center
The Ohio State University, Columbus
1994

Executive Summary

In recent years rural governments have had to bear more of the financial burden of maintaining their infrastructure. This has increased the competition faced by schools in seeking taxes to support education. Political power has been concentrating increasingly around metropolitan areas at the same time that the fiscal pressures on local rural governments have increased.

In Ohio, as in many other states, discrepancies exist in wealth and the quality of schooling in urban, suburban, and rural school districts. Many states, including Ohio, are facing litigation because school funding formulas are viewed as unequitable. Case law has generally upheld the elimination of local wealth as a determinant of access. Research on school location (rural vs. urban), funding, size, and effectiveness is needed to inform the debate about resource allocation and outcomes.

Per-pupil expenditure in Ohio rural schools has been a function of financial effort and financial ability. Districts that have been better able to support their schools financially have done so with less effort than districts that have been less able. This condition may have resulted in an unfair tax burden on poor rural school districts. However, financial effort has contributed independently to expenditure. The fact that some school districts have had taxpayers willing to put forth a strong effort to support their schools has resulted in an unequitable distribution of resources among rural schools in Ohio, since taxpayers in other districts have provided less funds to schools.

Differences were found in every measure of financial ability among school districts based upon school location in Ohio. Urban and suburban districts had a greater capacity to generate revenue for local schooling than did rural, semi-rural, and rural/suburban districts. Urban and suburban schools also expended more financial effort to support schools than did rural, semi-rural, and rural/suburban districts. Generally, urban and suburban schools in Ohio had more per-pupil wealth and spent more money on a per-pupil basis than did rural, semi-rural, and rural/suburban schools.

School location was unrelated to student achievement when the financial ability and financial effort variables were controlled. This may have been due to the differences among locations in financial ability and financial effort. Rural/suburban schools had the highest level of achievement among Ohio schools even though this classification did not rate at the highest in either financial ability or financial effort. Students in rural and semi-rural locations were not achieving as well as students in rural/suburban, suburban, and urban locations.

Rural/suburban and suburban schools had nearly equivalent levels of achievement. This finding generates an interesting question — why this similarity? Proximity to an urban area may be more important than size in reaching higher levels of student achievement. Rural/suburban schools appeared to have similarities with both rural schools and urban schools, depending upon which characteristic was examined. Considering the high achievement of rural/suburban schools, it could be argued that rural/suburban schools do more with less than any other class of schools in Ohio.

Rural Ohio School Expenditure and Student Achievement

J. David McCracken and Donald D. Peasley
Department of Agricultural Education

Introduction

A major political trend affecting rural schools in the United States (Stephens, 1992) is the reduction of federal revenue sharing for state and local governments. Rural governments have had to bear more of the financial burden of maintaining their infrastructure. This has increased the competition faced by schools in seeking taxes to support education. Political power has been concentrating increasingly around metropolitan areas at the same time that the fiscal pressures on local rural governments have increased.

As rural areas face increasing financial responsibility for roads, waste disposal, and other municipal services, less resources are available for public education. Bass and Verstagen (1992) conducted a national study of state educational funding policies and found vast differences in the way that states equalize for factors related to a school's geography and enrollment level. Many states, including Ohio, are facing litigation because school funding formulas are viewed as unequitable. Courts have upheld the elimination of local wealth as a determinant of access (Stephens, 1992). Research on school location (rural vs. urban), funding, size, and effectiveness is needed to inform the debate about resource allocation and outcomes.

In Ohio, as in many other states, discrepancies exist in wealth and the quality of schooling in urban, suburban, and rural school districts. Elder (1991) classified 40% of Ohio school districts as rural. However, Peasley and McCracken (1993), using a different classification system for Ohio school districts, listed 11.5% as rural, 16.8% as semi-rural, and 7.5% as rural/suburban. A total of 35.8% of the districts had some rural designation.

A West Virginia Department of Education (1989) study reported that children in rural areas were disadvantaged by the likelihood of: (1) beginning the day with a fairly long bus ride, (2) being from a poor family, (3) having parents who are unemployed, (4) needing special educational services, (5) having parents who were less likely to have graduated from high school, and (6) being more likely to become a high school dropout. However, research on school effectiveness has suggested that rural and smaller-sized schools may be some of the most effective ones (Howley, 1989; Goodlad, 1984). Howley (1989) synthesized achievement advantages of small scale schools as possibly due to small class size; good student effect; strong financial support relative to socioeconomic status; and productive cooperation of students, staff, and community.

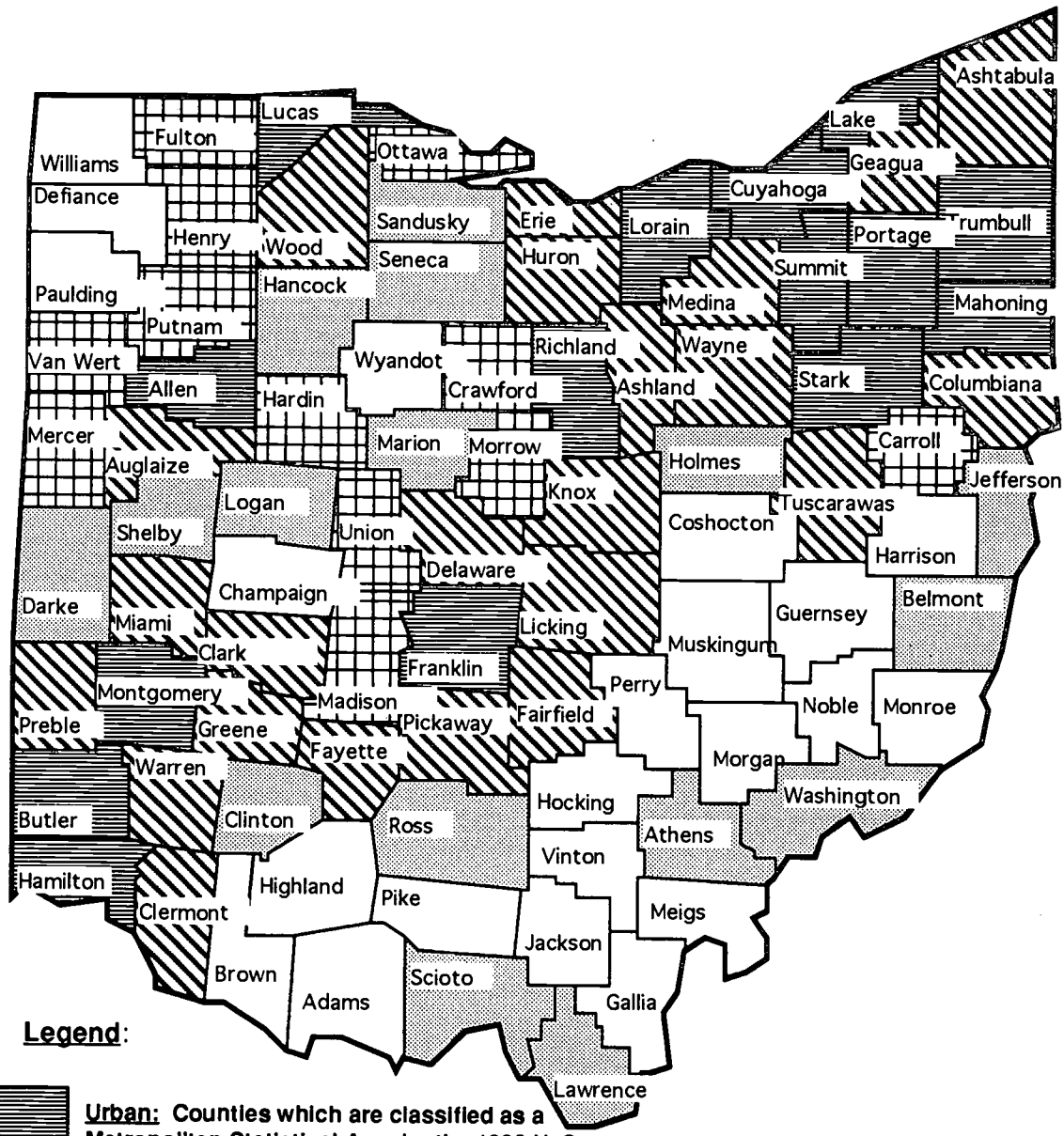
Researchers in Ohio (Peasley & McCracken, 1992) have established criteria for classification of school districts based upon both population density and distance from metropolitan services of the county in which the school is located. Schools were codified into one of five location categories based upon 1990 U.S. Census data (Figure 1) as follows: **rural** schools (N=69) were those schools located in counties that had a population less than 40,000 and were not contiguous to a Metropolitan Statistical Area (MSA); **semi-rural** (N=101) schools were located in counties with a population greater than 40,000 and were not contiguous to a MSA; **rural/suburban** schools (N=45) were located in counties with a population less than 40,000 and were contiguous to a MSA; **suburban** (N=185) schools were located in counties with a population greater than 40,000 and were contiguous to a MSA; and **urban** schools (N=202) were located in counties classified as a MSA.

Four studies were conducted dealing with financial and achievement issues in rural school districts in Ohio. The first examines factors related to per-pupil expenditures. The second investigates relationships between school location and student achievement. The third reports the association between school effectiveness and school location. The fourth inquires into financial effort and ability by school location.

Study No. 1 Factors Related to Per-Pupil Expenditures

Research of voter behavior in Ohio rural school tax elections (Baker, 1990) has shown that residents in Ohio rural schools are different from Ohio residents as a whole. Ohio rural residents pass more school tax issues, have lower personal income, have a lower education level, and fewer children receiving Aid to Dependent

Figure 1 A Classification of Ohio Counties by Geographic Location and Population (Using 1990 Census Data)



Legend:

Urban: Counties which are classified as a Metropolitan Statistical Area by the 1990 U. S. Census

Suburban: Counties which have a population greater than 40,000 and are contiguous to a Metropolitan Statistical Area

Rural/Suburban: Counties which have a population less than 40,000 and are contiguous to a Metropolitan Statistical Area

Semi-Rural: Counties which have a population greater than 40,000 and are not contiguous to a Metropolitan Statistical Area

Rural: Counties which have a population less than 40,000 and are not contiguous to a Metropolitan Statistical Area

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Children (ADC) support. In addition, a great deal of variability was found within rural school districts related to district financial ability and financial effort. Baker (1990) recommended further research to investigate relationships among school district expenditure, district financial ability, district financial effort, and district student achievement.

Several factors relate to the financial support that a school district provides for educating its students. The first is financial ability. School district financial ability relates to the relative wealth of a school district. Components of school district financial ability are property values and type of property, such as per-pupil property valuation and percentage of agricultural and residential property. Other components include socioeconomic status of a district. A negative indicator of socioeconomic status is the percentage of students receiving free and reduced lunch (Jones, 1985). The second factor, financial effort, relates to the degree that a school district supports its schools through the raising of local revenue. Components of financial effort include agricultural and residential tax rates, and the authorized tax rate of a district (Jones, 1985).

Lack of funding is often one of the greatest hindrances to providing instruction of high quality (Miller & McCracken, 1988). Howley (1989) found that per-pupil cost was related to pupil learning when socioeconomic status was controlled. Research was recommended to identify factors that differentiate levels of spending in school districts. Baker (1990) advocated exploring relationships among the factors of financial effort, financial ability, and student achievement.

The purpose of this study was to identify characteristics of Ohio rural school districts related to the level of per-pupil expenditure. Specific objectives were to:

1. Report the expenditure per pupil of rural Ohio school districts.
2. Describe rural Ohio school districts in terms of financial ability, financial effect, and size.
3. Determine the unique amount of variance in per-pupil expenditure explained and predicted by selected sets of Ohio rural school characteristics.

Procedures

The study was descriptive-correlational in nature. The population consisted of rural school districts in Ohio (N=73). Rural school districts were defined as being located in a county with a total population of less than 40,000; being located outside a Standard Metropolitan Statistical Area (1980 Census); and having a Grade 9-12 enrollment of 500 or less. Descriptive statistics were used to summarize and analyze the data. Correlation and regression analyses were used to identify individual school characteristics which best predicted per-pupil expenditure. Only independent variables that correlated with per-pupil expenditure at $\rho \geq .20$ and were inter-correlated with other independent variables at $\rho \leq .70$ were included in the regression analysis. Semi-partial multiple regression of the selected sets of variables was used to explain unique variance in per-pupil operation expenditure. Since data collected for this study were from a census, there was no need to establish alpha levels *a priori*. Results from the analysis were true for the population studied. Procedures used to analyze the data were those suggested by Hair, Anderson, and Tatham (1987).

Data were collected primarily from data tapes provided by the Ohio Department of Education for the five years between 1984 and 1988. Data included:

A. Measures of school district financial ability: average and median family income, the percentage of families receiving Aid to Dependent Children (ADC), the number of students receiving free and reduced lunch, total property valuation/pupil, and agricultural and residential property valuation/pupil.
B. Measures of school district financial effort: agricultural and residential property tax rate, current school operating expenditures tax rate, total property taxes/pupil, percent of total district funding from local revenues, total expenditure/pupil, average teacher salary, instructional expenditure/pupil, and non-instructional expenditure/pupil.
C. Student achievement as measured by ACT composite score for the school district.
D. Size as measured by total average daily membership of students enrolled in a school district.

Results

The level of per-pupil expenditure ranged from just above $2,300 to nearly $3,500 (Table 1). The mean was $2,721.86, the standard deviation was $246.77, and the median was $2,665. Most rural schools were clustered in the $2,500 to $2,800 range. Eleven schools (15%) were below and 21 schools (29%) were above the schools in the cluster in per-pupil expenditure. Only five schools (7%) spent more than $3,200 per pupil.

Ohio rural school district characteristics are reported in Table 2. Indicators of socioeconomic status were the percentage of students receiving free and

reduced-price lunch (Mean=18.07%) and the percentage of students from Aid to Dependent Children (ADC) families (Mean=8.72%). Schools ranged in size from 130 students to 5,855 students (Mean=1,162.21).

Table 1. Level of Per-Pupil Expenditure in Ohio Rural Schools (N=73)

Range of per-pupil expenditure ($)	n	%
$2300-2399	5	6.9
$2400-2499	6	8.3
$2500-2599	12	16.4
$2600-2699	18	24.7
$2700-2799	11	15.0
$2800-2899	5	6.9
$2900-2999	7	9.6
$3000-3099	4	5.5
$3100-3199	0	0.0
$3200-3299	2	2.8
$3300-3399	1	1.4
$3400-3499	2	2.8
Total	73	100.0

μ=$2721.86, σ=$246.77, Median=$2665

Per-pupil property valuation ranged from $14,465 to $103,919, which would indicate that the property wealth per pupil in the most disadvantaged district was only 14% of that in the most advantaged district. Percent local funding ranged from 11.73% to 70.24%. Percent state funding ranged from 25.59% to 78.91%. Family income in these school districts averaged $20,493. Revenue raised locally varied considerably by school district.

A correlational analysis was used to select school characteristics for inclusion in the regression analysis. Characteristics were selected on the basis of being independently related to school expenditure per pupil. Variables meeting these criteria were: (1) per-pupil property valuation, (2) average family income, (3) percent of students receiving free lunch, (4) agricultural and residential tax rates in mills, (5) commercial, industrial, and mining tax rates in mills, (6) local authorized tax rates in mills, (7) percent of total district budget funded locally, and (8) ACT composite score. The first three variables were grouped into a set of variables labeled "financial ability." Variables numbered four through seven were grouped into a variable set labeled "financial effort." A simultaneous semi-partial multiple regression analysis was performed, using the variable sets of financial ability, financial effort, and achievement (ACT composite score). This analysis enabled the researcher to evaluate the unique contribution of each variable set after controlling for the other two variable sets.

As can be seen in Table 3, financial ability uniquely explained 47% of the variance in per-pupil expenditures for the rural school districts in the study. Financial effort uniquely explained 27% of the variance in per-pupil expenditures. The semi-partial relationship of achievement with expenditure was negligible. The overall variance explained in per-pupil expenditure by the eight factors was R^2=.77.

Table 2. Selected Characteristics For Ohio Rural School Districts

Variable	μ	σ	Min	Max
Free and reduced lunch	18.07	12.70	.0	61.1
Average daily member	1,162.21	838.25	130.0	5,855.0
Per-pupil prop value	42,158.32	15,945.62	14,465.0	103,919.0
Percent state funding	57.52	10.34	25.59	78.91
Percent local funding	38.42	10.94	11.73	70.24
Percent federal funding	4.06	1.73	1.35	9.93
Average income	20,492.84	1,915.82	14,621.0	26,056.0
Class one tax rate	23.19	2.99	19.58	30.39
Class two tax rate	23.20	3.21	19.72	33.30
Authorized tax rate	31.22	5.58	20.00	46.25
Ag/residential prop.	63.69	16.60	17.3	90.2
Other real prop.	7.40	4.45	1.4	26.1
Personal tangible prop.	28.92	14.01	6.3	70.7
Per-pupil revenue	1,037.23	366.11	322.0	2,117.0
Percent ADC	8.72	7.07	.00	32.21

N=73

Discussion

The β-value for the prediction of student achievement from the percent free lunch variable was positive. Therefore, percent free lunch, when moderated by per-pupil property valuation and average family income, had a positive relationship with student achievement. This would be the opposite of what might be hypothesized. It might be that poorer and lower achieving districts are less likely than other districts to utilize fully the free and reduced-price lunch program.

One could conclude that per-pupil expenditure in Ohio rural schools has been a function of financial effort and financial ability. Districts that have been better able to support their schools financially have done so with less effort than districts that have been less

able. This condition may have resulted in an unfair tax burden on poor rural school districts. However, it should be noted that financial effort has contributed independently to expenditure. Some school districts have had taxpayers willing to put forth a strong effort to support their schools. Others have supported schools less well. Therefore, an unequitable distribution of resources exists among rural schools in Ohio.

Study No. 2
School Location and Student Achievement

Research on school effectiveness has suggested that rural and smaller-sized schools often are some of the most effective ones (Walberg & Fowler, 1987; Howley, 1989; Goodlad, 1984). The literature also suggests that rural and smaller school districts extend more financial effort relative to financial ability than do larger school districts (Howley, 1989). Currently, there is an emphasis on outcomes and accountability regarding public school policy (U.S. Department of Labor, 1991). The national rhetoric related to public schools emphasizes increasingly the notion of "doing more with less." In order for policy makers to make informed decisions about public school resources and outcomes, there should be a systematic attempt to examine specific relationships and consequences of school size and location upon schooling outcomes. Peasley, Baker, and McCracken (1991) found expenditure was unrelated to student achievement when controlling for socioeconomic factors. Subsequently, they recommended that further research should be conducted in order to examine the relationship of school location and achievement.

The purpose of this study was to determine the relationship of school location and student achievement in Ohio public school districts. The following research objectives were developed to guide the study:

1. To describe Ohio school districts in terms of financial ability, financial effort, and student achievement according to school location (rural, semi-rural, rural/suburban, suburban, and urban).
2. To determine the relationship of school location and student achievement in Ohio school districts after controlling for other important independent variables.

Procedures

The study was ex-post facto/correlational. A census of all school districts in Ohio (N=612) was conducted using data from the years 1988-90. Data were collected from records compiled by the Ohio Departments of Education and Taxation in April, 1991. The independent variable for this study was school location (rural, semi-rural, rural/suburban, suburban, and urban). Other possible independent variables identified through a review of the relevant literature included:

A. Measures of school district financial ability—average and median family income, the percentage of

Table 3. Semi-Partial Regression Analysis of Per-Pupil Expenditure on District Financial Ability, Financial Effort, and Student Achievement of Ohio Rural Schools (N=73)

Variable Set	K_a	K_b	sR^2	β
Ability	3	5	.47	
PPropEval				.86
AveIncome				−.03
%FreeLun				.51
Effort	4	4	.27	
Ag&ResMill				.39
Comm,IndMill				.06
Auth.Mill				.31
%LocalFunding				−.36
Achievement	1	7	.01	
(ACT Composite Score				−.08

K_a = Number of variables in set
K_b = Number of variables controlled
R^2 for model = .77
PPropEval = Per-Pupil Property Valuation
AveIncome = Average Family Income
%Free Lunch = % of Students receiving free lunch
Ag&ResMill = Agricultural and Residential Tax Rates in Mills
Comm, IndMill = Commercial, Industrial, and Mining Tax Rates in Mills
Auth.Mill = Local Authorized Tax Rates in Mills
%LocalFunding = % of total district budget funded locally
Achievement = ACT Composite Score

families receiving Aid to Dependent Children (ADC), the number of students receiving free and reduced lunch, total property valuation/pupil, and agricultural and residential property valuation/pupil.

B. Measures of school district financial effort—agricultural and residential property tax rate, current school operating expenditures tax rate, total property taxes/pupil, percent of total district funding from local revenues, total expenditure/pupil, average teacher salary, instructional expenditure/pupil, and noninstructional expenditure/pupil.

C. School size as measured by total average daily membership of students enrolled in a district.

The criterion variable for this study was a measure of student achievement, the Ohio proficiency examination. High school students in Ohio are required to pass a proficiency examination on basic reading, writing, mathematics, and citizenship skills in order to receive a diploma. This criterion-referenced test went through an extensive validation and field-testing procedure by Department of Education testing consultants. Pilot test reliability estimates ranged from .85-.89 on the four scales (Ohio Dept. of Education, 1991). The percentage of high school students in each district who passed the test in the fall of 1990 was used as the indicator of student achievement.

School districts served as the unit of analysis for this study. Descriptive statistics were used to analyze data relative to the first objective. Correlational and regression analyses were used to analyze data in order to address the second objective. Originally, a total of 16 measures were collected and identified as potential extraneous variables. Of these, seven were found to be correlated with both the criterion variable and the main independent variable (location). These seven measures were included in the regression analysis. Since a census of all Ohio school districts was taken, the study was descriptive rather than inferential; therefore, the statement of an alpha level was not necessary. Results of the analyses performed are true for the population of Ohio public school districts.

Results

Differences existed among the school locations on several descriptive variables. Data on financial ability, financial effort, and student achievement are summarized in Table 4. In terms of financial ability, average median family income ranged from \$19,839 (σ=\$2,405) for rural districts to \$24,259 (σ=\$2,980) for urban districts. The median percentage of families receiving ADC in rural and semi-rural school districts was more than double that of rural/suburban districts and considerably larger than in suburban and urban districts. It appears that rural and semi-rural schools have considerably lower financial ability than do suburban and urban districts.

School districts differed widely in financial effort. Urban districts raised nearly twice the amount of property taxes on a per-pupil basis (median= \$2,075) than did rural districts (median=\$1,067). There were also large differences between school districts in terms of operating expenditure tax rates, teacher salary, and the percentage of total expenditure raised from local revenue sources (median percentages were below 40% for rural, semi-rural, and rural/suburban districts versus 51% for urban districts). Urban and suburban districts appeared to have greater financial ability and also expend more financial effort in raising funds for public schools.

Rural/suburban schools had the highest student achievement, followed by urban, suburban, semi-rural, and finally rural schools. It is important to note that rural/suburban schools and urban schools also had the highest variances (σ=16.0 and 15.9, respectively) in student achievement. Student achievement in Ohio schools did not follow the same trend that financial ability and effort did (*i.e.*, that financial ability and effort appeared to increase as population density increased).

Bivariate relationships of financial ability and effort to both school location and student achievement are presented in Table 5. The two measures of financial ability and five measures of financial effort were selected from the original list of 16 measures. All measures selected had minimum correlation coefficients of ρ=.20 with both student achievement and location.

It was interesting to note that the socioeconomic (financial ability) measures of percent ADC (ρ=−.61) and median family income (ρ=.59) were the two independent variables most highly related to student achievement (PPass). Percent local funding (ρ=.47) and non-instructional expenses per pupil (ρ=.41) were the financial effort factors which were related most highly with achievement.

A semi-partial regression analysis was used to calculate the unique relationships among the school location, financial ability, and financial effort variable sets (Table 6). School district financial ability explained the greatest amount of unique variance in student achievement (sP^2=.205), followed by

district financial effort (sP^2=.043). School location accounted for a minimal (sP^2=.011) amount of the unique variance in student achievement. The percentage of families receiving ADC (β=−.41) and median family income (β=.22) were the strongest individual predictors of student achievement.

Discussion

There were differences in every measure of financial ability among school districts based upon school location in Ohio. Urban and suburban districts had a greater capacity to generate revenue for local schooling than did rural, semi-rural, and rural/suburban districts. Urban and suburban schools also expended more financial effort to support schools than did rural, semi-rural, and rural/suburban districts. Generally, urban and suburban schools in Ohio had more per-pupil wealth and spent more money on a per-pupil basis than did rural, semi-rural, and rural/suburban schools. These findings support the contention of Stephens that rural schools are at a distinct fiscal disadvantage. As long as significant differences exist in economic wealth between school districts, fiscally poor communities will continue to be hard pressed to fund schooling as well as those districts which are wealthier.

Rural/suburban schools had the highest level of achievement among Ohio schools even though this classification did not rate at the highest in either financial ability or financial effort. Rural schools and semi-rural schools lag behind rural/suburban, suburban, and urban schools in student achievement. The meaning of this finding is unclear, but may be better understood as more data on student achievement are generated.

This study confirmed the findings of Coleman (1966) that socioeconomic status is the strongest predictor of student achievement. In Ohio, school location was unrelated to student achievement when the financial ability and financial effort variables were controlled. This may have been due to the differences among locations in financial ability and financial effort. Further

Table 4. *Means, Standard Deviations, and Medians of Selected Measures of Financial Effort, Financial Ability, and Student Achievement of Ohio Public School Districts By School Location, 1990 (N=612)

Measure	Rural N=69	Semi-Rural N=101	Rural/Suburban N=45	Suburban N=185	Urban N=202
Finan. Ability					
Income μ	$19,839	$20,569	$21,459	$22,323	$24,259
σ	$2,405	$2,519	$1,982	$3,373	$4,980
Median	$19,327	$20,337	$21,419	$21,697	$23,405
%ADC μ	12.96	13.84	5.08	7.21	8.75
σ	8.59	9.92	3.47	5.48	10.49
Median	10.00	12.00	5.00	5.00	4.00
Finan.Effort					
COpMil μ	31.71	33.36	34.07	40.52	44.83
σ	7.54	5.60	6.71	8.61	11.21
Median	30	33	32	39	42
TaxPup μ	$1,168	$1,342	$1,376	$1,975	$2,584
σ	$454	$587	$462	$2,727	$1,513
Median	$1,067	$1,270	$1,269	$1,527	$2,075
% local μ	35.11	38.96	41.25	45.32	54.71
σ	11.27	14.92	10.42	14.45	17.83
Median	33	37	39	43	51
TeSal μ	$26,031	$26,939	$26,266	$28,181	$31,510
σ	$1,755	$2,029	$2,259	$2,924	$3,366
Median	$26,214	$27,021	$25,799	$27,985	$31,448
NIExPu μ	$59	$59	$70	$68	$82
σ	$34	$33	$48	$43	$59
Median	$56	$55	$64	$62	$66
Student Achievement					
PPass μ	29.2	31.9	42.0	36.7	40.4
σ	10.3	11.0	16.0	11.8	15.9
Median	29	32	45	35	40.5

*Note: Income = median family income
%ADC = percentage of families in district receiving ADC
COpMil = current operating millage rate
TaxPup = per-pupil property taxes
%Local = percentage of total school district budget funded from local sources
TeSal = average teacher salary
NIExPu = per-pupil non-instructional expenditure
PPass = percentage of students in district passing the state proficiency examination

research is needed to discover how funds might be more effectively employed to improve student achievement.

Study No. 3 School Effectiveness and School Location

Research in Ohio has studied rural schools in terms of student aspirations (McCracken, Wims & Barcinas, 1991; McCracken & Odell, 1989), voter behavior (Baker, 1990), curriculum (Elliot & McCracken, 1989), achievement (Peasley, Baker & McCracken, 1991; Baker, 1990), school expenditure patterns (Peasley, Baker & McCracken, 1991), and school location as a predictor of student achievement (Peasley & McCracken, 1992). Peasley and McCracken (1992) found that location was unrelated to student achievement after controlling for socioeconomic factors; however, they used only one measure of student achievement in their analysis. Subsequently, they recommend that research should be conducted to examine multiple indicators of school effectiveness among classes of school location.

The purpose of this study was to examine indicators of effectiveness among classes of school location in Ohio public schools. The following objectives guided the study:

1. To describe the effectiveness of Ohio public schools in terms of student achievement on standardized measures of language, mathematics, and reading in the fourth, sixth, and eighth grades; and the percentage of ninth-grade students who passed a statewide proficiency test.
2. To compare the effectiveness of Ohio public schools among the five classes of school location (rural, semi-rural, rural/suburban, suburban, and urban).

Table 5. Intercorrelations of School District Characteristics Determined to Be Related to Both Student Achievement and School Location (N=612)

Characteristic	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.PPass	—	.30[a]	.59	−.61	.30	.32	.47	.31	.41
2.Location		—	.39[a]	.31[a]	.29[a]	.60[a]	.42[a]	.49[a]	.21[a]
3.Income			—	.58	.34	.48	.55	.49	.37
4.%ADC				—	−.22	−.07	−.42	−.21	−.29
5.TaxPup					—	.48	.66	.31	.39
6.TSal						—	.61	.54	.39
7.%Local							—	.43	.44
8.COpMil								—	.31
9.NIExpPu									—

*[a] -denotes Multiple Correlation Coefficient calculated by dummy-coding of school location

Table 6. Semi-Partial Regression Analysis of Student Achievement on District Financial Ability, Financial Effort, and Location of Ohio Public Schools, 1990 (N=612)

Variable Set	K_a	K_b	sR^2	β
Ability	2	9	.205	
Income				.22
%ADC				−.41
Effort	5	6	.043	
TaxPu				−.02
TSal				.16
%Local				.03
COpMil				−.00
NIExPu				.16
Location[a]	4	7	.011	.00−.12[b]

K_a = Number of variables in set
K_b = Number of variables controlled
R^2 for Model = .508
[a] - Location is dummy coded into a four variable set for this analysis
v - Represents the range of Beta values for the four dummy-coded variables

Procedures

The study was descriptive in nature. A census of all school districts in Ohio (N=612) was conducted using data from the years 1988-90. Data were collected from records compiled by the Ohio Department of Education in April, 1991.

Indicators of school effectiveness included standardized measures of math, reading, and language achievement in the fourth, sixth, and eighth grades and the performance of high school students on a statewide proficiency examination required for graduation in Ohio.

The specific measures of fourth-, sixth-, and eighth-grade achievement were expressed in terms of the per-

centage of scores in a district which were above the fiftieth normal curve equivalent (NCE) for the standardized test.

Performance on the proficiency exam was expressed as the percentage of ninth-grade students in each district who passed this criterion referenced test. Measurement of student achievement on these bases allowed for direct comparison between schools at the district level (Linn, 1991). School districts served as the unit of analysis for this study. Descriptive statistics were used to analyze data relative to the objectives.

Results

The means and standard deviations of the measures of student achievement are summarized in Table 7.

At the fourth-grade level, student achievement for urban schools was higher than for all other classes of school location. Rural and semi-rural schools appeared to have the lowest overall levels of achievement, especially in terms of mathematics and language skills. Rural/suburban and suburban schools appeared to have somewhat similar levels of achievement at the fourth-grade level.

At the sixth-grade level, urban schools again had the highest levels of achievement for all three academic measures. Semi-rural schools had the lowest levels of achievement, followed by the rural class of schools. Rural/suburban and suburban schools again had very comparable levels of student achievement.

When considering eighth-grade indicators, urban schools again had the highest levels of student achievement. Rural schools had the lowest levels of achievement in all three areas. Rural/suburban and suburban schools again appeared to have nearly identical levels of student achievement.

There were also differences in student achievement among the rates of successful completion of the proficiency examination. There was a 10-point gap in success rates between rural schools and urban schools. There was also a large difference between rural/suburban schools and rural and semi-rural schools.

Semi-partial regression analysis revealed that financial ability appeared to be the most powerful predictor of student achievement. School location made only a negligible contribution to student achievement (Figure 2).

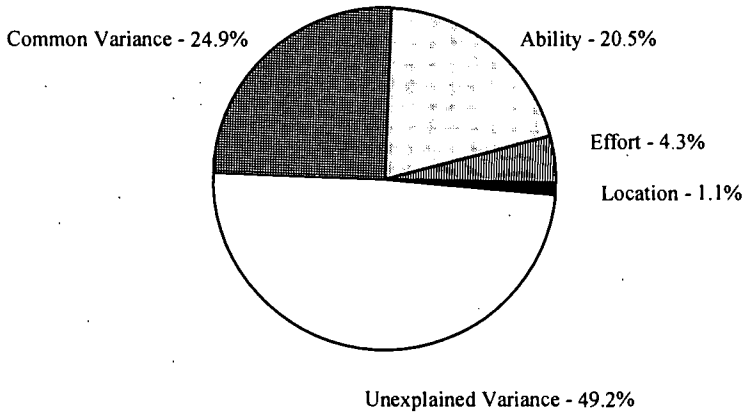
Table 7. Means and Standard Deviations of Selected Indicators of Student Achievement of Ohio Public School Districts By School Location, 1990 (N=612)

Measure	Rural N=69	Semi-Rural N=101	Rural/Suburban N=45	Suburban N=185	Urban N=202
Fourth Grade					
Reading μ	55.0	56.0	58.2	61.2	63.9
σ	11.6	11.7	10.8	11.0	12.8
Math μ	49.8	49.5	54.9	54.6	59.4
σ	13.2	15.8	13.2	13.1	14.5
Lang. μ	50.5	53.2	55.8	57.8	62.1
σ	12.8	12.5	13.2	12.4	14.2
Sixth Grade					
Reading μ	56.0	53.7	58.8	58.7	62.6
σ	12.7	12.0	10.4	10.9	13.7
Math μ	54.2	52.7	59.0	56.9	60.5
σ	15.5	15.1	13.3	13.1	15.0
Lang μ	53.7	51.7	55.4	55.8	60.6
σ	13.9	12.6	12.3	11.9	14.1
Eighth Grade					
Reading μ	54.5	57.8	60.5	60.3	64.1
σ	12.2	9.7	10.6	10.5	13.5
Math μ	49.8	52.5	57.5	55.5	60.5
σ	14.0	14.8	15.0	13.3	15.4
Lang. μ	52.4	53.8	59.6	57.3	61.3
σ	13.4	10.8	14.6	11.9	13.9
Ninth Grade Proficiency					
μ	29.2	31.9	42.0	36.7	40.4
σ	10.3	11.0	16.0	11.8	15.9

*Note: Fourth-, sixth-, and eighth-grade scores expressed in percent of students in district above the fiftieth NCE on the standardized test. Ninth-grade scores expressed in terms of percentage of students in district who passed the criterion referenced proficiency examination.

Figure 2 Variance in Achievement Explained

Semi-Partial Regression Analysis



Total Variance Explained = 50.8%

Discussion

Examination of the measures of variation on these indicators revealed that variances for each academic measure were relatively consistent within and across classes of school location at the fourth, sixth, and eighth grades. The measure of high school proficiency, however, showed that the classes of school location with the highest levels (rural/suburban and urban) also had the highest variances within the location classification. One should note this phenomenon as a caveat when interpreting these results.

Other caveats of note were the size of some of the differences that existed. In some cases, the difference in percentages from the highest to the lowest score was less than eight points; and in other cases this difference was 13 points. The authors acknowledge that the practical meaning of these differences may be open to interpretation. One should also note that the measures of fourth-, sixth-, and eighth-grade achievement were expressed as the percentage of students scoring above the 50th percentile of the norm group. When one considers this, it can be concluded that all classes of school location were performing at or above "average" (or the norm) in terms of these indicators.

Students in rural and semi-rural locations were not achieving as well as students in rural/suburban, suburban, and urban locations. Comparisons within and among rural and semi-rural schools may be more enlightening as a way to change educational practice than comparisons with the more urban districts.

Rural/suburban and suburban schools had nearly equivalent levels of achievement. This finding generates an interesting question — why this similarity? It may be that proximity to an urban area is more important than size in reaching higher levels of student achievement.

Study No. 4 Financial Effort and Ability By School Location

Research (Peasley & McCracken, 1992) has shown that school district financial ability, as measured by family socioeconomic status, is the best predictor of student achievement. Peasley and McCracken (1992) have further shown that school district financial effort, as measured by rates of taxation and per-pupil expenditure, is the second ranking predictor of student achievement in Ohio public schools. It is important to further examine district financial effort and ability among classes of school location so that policy makers can make informed decisions about resource allocation.

Peasley and McCracken (1992) recommended further research that would compare the financial ability and effort among classes of school location (rural, suburban, urban) in Ohio. The purpose of this study was therefore to examine financial ability and financial effort among classes of school location in Ohio public schools. The following objective guided the study: Describe Ohio school districts in terms of school district financial ability and financial effort by school location.

Procedures

The study was descriptive in nature. A census of all school districts in Ohio (N=612) was conducted using data from the years 1988-90. Data were col-

lected from records compiled by the Ohio Departments of Education and Taxation in April, 1991. Measures of school district financial ability included average and median family income, the percentage of families receiving Aid to Dependent Children (ADC), the number of students receiving free and reduced lunch, total property valuation/pupil, and agricultural and residential property valuation/pupil.

Measures of school district financial effort included agricultural and residential property tax rate, current school operating expenditures tax rate, total property taxes/pupil, percent of total district funding from local revenues, total expenditure/pupil, average teacher salary, instructional expenditure/pupil, and non-instructional expenditure/pupil. School districts served as the unit of analysis for this study. Descriptive statistics were used to analyze data relative to the objective.

Results

Classes of school location were described on financial ability and financial effort. There were large differences among school locations on every measure of financial ability (Table 8). Urban schools in Ohio had the highest level of median family income, while rural districts had the lowest. Semi-rural and rural communities had the highest percentage of students receiving ADC. Rural and semi-rural districts also had the highest percentage of students receiving free lunch. The rural/suburban and suburban class of schools had similar levels of income, ADC percentage, and free lunch percentage. The rates of students receiving reduced lunch were fairly equivalent across all classes of schools.

Rural districts had the lowest level of per-pupil property and agricultural-residential property valuation. Urban districts had the overall highest levels of per-pupil property and agricultural-residential property valuation. Rural/suburban schools were similar to rural and semi-rural schools in terms of property valuation, while suburban schools were more similar to urban schools with respect to these measures.

Measures of district financial effort revealed meaningful differences in nearly every measure of school district financial effort (Table 9). Urban, rural/suburban, and suburban schools had nearly equal rates of agricultural-residential millage. Rural and semi-rural districts had the lowest levels of agricultural-residential millage. Urban and suburban schools had the highest overall level of operating millage rates, while rural/suburban, semi-rural, and rural schools had similarly low operating millage rates.

Urban and suburban schools had the highest levels of tax dollars raised per pupil, total expenditure per pupil, teacher salary, and instructional expenditure per pupil; rural and semi-rural schools had the lowest levels of these measures. Urban districts had the highest level of local percentage of total educational expenditure. Urban and suburban schools had the ability to raise more funds for education and expend more effort to generate financial

Table 8. Means, Standard Deviations, and Medians of Selected Measures of Financial Ability of Ohio Public School Districts By School Location, 1990 (N=612)

Measure		Rural N=69	Semi-Rural/ N=101	Rural/ Suburban N=45	Suburban N=185	Urban N=202
Income	μ	$19,839	$20,569	$21,459	$22,323	$24,259
	σ	$2,405	$2,519	$1,982	$3,373	$4,980
Median		$19,327	$20,337	$21,419	$21,697	$23,405
%ADC	μ	12.96	13.84	5.08	7.21	8.75
	σ	8.59	9.92	3.47	5.48	10.49
Median		10.00	12.00	5.00	5.00	4.00
FLunch	μ	350.7	368.6	154.6	272.8	1,168.5
	σ	335.7	341.5	136.4	367	4,789.8
Median		241	295	121	173	191.5
RLunch	μ	64.8	72.3	51.1	71.2	184.4
	σ	42	64.3	42.5	60	520.56
Median		58	51.5	40	57	198
ProVal	μ	$43,445	$48,387	$46,770	$64,502	$78,892
	σ	$14,183	$19,594	$16,296	$89,682	$53,791
Median		$41,544	$44,502	$43,987	$48,467	$52,861
AgResV	μ	$24,197	$25,578	$30,141	$37,041	$43,364
	σ	$5,520	$7,502	$6,330	$43,431	$25,515
Median		$24,602	$24,958	$28,829	$30,017	$34,426

Note: Income = median family income
%ADC = percentage of families receiving ADC
FLunch = number of students receiving free lunch
RLunch = number of students receiving reduced lunch
ProVal = per-pupil property valuation
AgResV = per-pupil agricultural and residential property valuation

resources. Rural/suburban schools appeared to be more like rural and semi-rural schools in terms of financial effort.

Discussion

One interesting finding of this study was related to the rural/suburban class of school location. This class of schools appeared to have similarities with both rural schools and urban schools, depending upon which characteristic was examined. When this finding was put in the context of research on the high achievement of rural/suburban schools (Peasley & McCracken, 1992), it could be argued that rural/suburban schools do more with less than any other class of schools in Ohio.

Table 9. Means, Standard Deviations, and Medians of Selected Measures of Financial Effort of Ohio Public School Districts By School Location, 1990 (N=612)

Measure		Rural N=69	Semi-Rural N=101	Rural/Suburban N=45	Suburban N=185	Urban N=202
AgReMil	μ	24.74	24.91	28.77	27.75	30.37
	σ	4.34	3.84	5.30	4.36	5.22
Median		22	23	27	27	29
COpMil	μ	31.71	33.36	34.07	40.52	44.83
	σ	7.54	5.60	6.71	8.61	11.21
Median		30	33	32	39	42
TaxPup	μ	$1,168	$1,342	$1,376	$1,975	$2,584
	σ	$454	$587	$462	$2,727	$1,513
Median		$1,067	$1,270	$1,269	$1,527	$2,075
%Local	μ	35.11	38.96	41.25	45.32	54.71
	σ	11.27	14.92	10.42	14.45	17.83
Median		33	37	39	43	51
ExpPup	μ	$3,691	$3,745	$3,694	$4,242	$4,544
	σ	$314	$328	$378	$3,188	$1,043
Median		$3,664	$3,736	$3,586	$3,850	$4,261
TeSal	μ	$26,031	$26,939	$26,266	$28,181	$31,510
	σ	$1,755	$2,029	$2,259	$2,924	$3,366
Median		$26,214	$27,021	$25,799	$27,985	$31,448
InExPu	μ	$1,552	$1,629	$1,627	$1,877	$2,083
	σ	$175	$168	$178	$1,224	$487
Median		1,553	$1,604	$1,608	$1,690	$1,959
NIExPu	μ	$59	$59	$70	$68	$82
	σ	$34	$33	$48	$43	$59
Median		$56	$55	$64	$62	$66

Note: AgReMil = agricultural and residential property millage rate
COpMil = current operating millage rate
TaxPup = per-pupil property taxes
%Local = percentage of total school district budget funded from local sources
ExpPup = per-pupil total expenditure
TeSal = average teacher salary
InExPu = per-pupil instructional expenditure
NIExPu = per-pupil non-instructional expenditure

Implications

Examination of the data across the four studies reported allows one to reach conclusions which may have important implications for policies relating to educational financing in Ohio. Financial ability appears to be the strongest predictor of per-pupil expenditure in the state. Financial effort is another strong predictor of per-pupil expenditure, but does not contribute as much variance to per-pupil expenditure as does financial ability. The equalization of the ability to support schools across all of the school districts in Ohio may be a needed and important step to take as a way to provide equality of educational opportunity to the future generation of Ohio citizens.

The urban and suburban school districts of the state, in general, have greater ability to support schools financially than do rural/suburban, semi-rural, and rural school districts. These districts not only exhibit more financial ability but they also expend greater financial effort in the support of schools.

Semi-rural and rural school districts lag behind rural/suburban, suburban, and urban districts in most measures of educational achievement. Educational achievement was also related to socioeconomic status. In fact, socioeconomic status was the strongest predictor of educational achievement. Rural/suburban school districts (districts low in population but near urban centers) were lower in per-pupil expenditure but competed well in terms of educational achievement.

Nearness to an urban center seemed to be associated with most measures of educational success. Lack of such proximity seemed to be associated with lower socioeconomic status, lower ability to support schools, lower financial effort, and lower educational achievement.

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