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EXPENDITURE STREAMS AND SCHOOL IMPROVEMENT IN KENTUCKY: DOES MONEY MATTER?

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by

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EXPENDITURE STREAMS AND SCHOOL IMPROVEMENT IN KENTUCKY:

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Abstract

EXPENDITURE STREAMS AND SCHOOL IMPROVEMENT IN KENTUCKY: DOES MONEY MATTER?

Every Kentucky public school is expected to achieve the goal of proficiency on the State's Accountability Index by the year 2014. Many schools may not reach the proficiency goal in time without a broad, multifaceted approach to enhance educational outcomes. A strategy to optimize the allocation of school district funds may contribute to this goal. Previous studies have attempted to answer the question "does money matter?" for raising school performance, but to date the findings have proven inconsistent. One reason for this might be that most of these studies have used a global measure of monetary resources, such as total per pupil expenditure. The present study explores the possibility that expenditures earmarked for different purposes—termed 'expenditure streams'—may reveal that financial allocations can make a difference.

Unfortunately, the present study fails to find a single expenditure stream that is directly associated with the mean annual gain in school accountability scores. Three expenditure streams are shown to have indirect effects when mediated by pupil-teacher ratio. Expenditures for instruction and instructional staff support show positive indirect effects, whereas central office support reveals a negative indirect effect. Although these indirect effects are statistically significant, none are large enough to warrant policy recommendations.

The findings indicate that school districts are unlikely to stimulate school improvement by shifting financial resources between the currently used expenditure

categories. A possible explanation for this disappointing conclusion is that the linkage between personnel costs, which comprise 75-80 percent of all expenditures, and personnel quality is very weakly established at the present time. Efforts to more effectively measure personnel quality and to establish salary rates commensurate with quality might possibly lead to more robust associations between spending and school performance. Yet, one cannot place confidence in this solution at the present time since it has not been established by research that endogenous resources, such as high quality personnel, are the primary requisites for school improvement. Exogenous circumstances, such as the characteristics of the local community in which the school is embedded and the families whose children attend the school, along with school-community and school-family relations, may greatly influence how rapidly schools improve.

The answer to the "does money matter?" question remains moot for Kentucky as it does for the nation at large. The collection of school-level, rather than district-level, expenditure data might allow greater specificity in the definition of expenditure streams. More research to discover robust links between specific expenditure streams and school improvement could then bring about policy recommendations in the future.

EXPENDITURE STREAMS AND SCHOOL IMPROVEMENT IN KENTUCKY: DOES MONEY MATTER?[1]

Since the passage of the Kentucky Educational Reform Act of 1990 (KERA), Kentucky public schools have been under intense scrutiny. All public schools are enjoined to reach "proficiency" (100 out of 140 possible points) on the state's Accountability Index by the year 2014. The Accountability Index score of each school is calculated annually from a battery of academic tests and non-cognitive measures that denote student and school performance. At this point, thirteen years into the reform era, only six of the state's more than 1,200 schools have reached the goal. With eleven more years to go, it is apparent that many schools will not reach the proficiency standard without a broad, multifaceted approach for enhancing educational outcomes (Reeves, 2003; Roeder, 2001). Kentucky educators and policymakers face a daunting task.

Most educators and many policymakers assume a link exists between educational spending and educational excellence, but empirical research backing up this assumption has been inconclusive. How expenditures affect student learning and the excellence of schools is a hoary, unresolved problem in educational research. The present study plunges into the fray, asking how expenditures may influence school accountability scores in Kentucky. Confirming a linkage between finance and school

[1]The research results contained in this study were first presented as a Power Point slide show at a November 2001 meeting of the Educational Research Roundtable, Office of Educational Accountability, in Frankfort, KY. Subsequently, different versions of this paper were presented at the annual meeting of the Mid-South Educational Research Association held in Chattanooga, TN in November 2002 and at the Sociology of Education Roundtable Session during the annual meeting of the American Sociological Association held in Atlanta, GA in August 2003. The present version of the paper has benefited from the feedback received at each of these venues. Debbie Abell and Dave Rudy also contributed by reading and commenting on the manuscript. Kathryn Miller and Louise Cooper are thanked for copyediting.

improvement would be of great value to Kentucky policymakers, as it would suggest a way to harness the education finance system to the purposes of KERA (cf. Ladd & Hansen, 1999).

Background

The presumed linkage between school finance and student achievement received its first major empirical challenge in mid-1960. Equality of Educational Opportunity (Coleman et al., 1966), also known as the Coleman Report, found that school resources (expenditures and facilities) explained less than five percent of the variance in student achievement. Numerous studies followed attempting to confirm or to refute this finding. Hanushek (1989) gathered together school finance studies from 1967 to 1986, performed a meta analysis, and concluded that the preponderance of the evidence did not support the linkage between educational spending and performance. Hedges, Laine, and Greenwald (1994) followed with a fresh meta analysis that disputed Hanushek's conclusion. They found that school resources are systematically related to student achievement and these relations are large enough to be educationally important. Hanushek (1997) responded with an update and expansion of his original meta analysis. Once again he found little relation between achievement and expenditure.

To date, attempts to resolve the issue of "does money matter?" have not reached a satisfactory conclusion. All of the studies on which the various meta analyses were performed used a global measure of expenditure, such as total per pupil expenditure, and a production function methodology that sought a direct relationship between expenditure and achievement. Recent studies depart from this pattern. For instance, Wenglinsky (1997) hypothesized the effects of expenditures were largely indirect. One of his

conclusions finds that expenditures influence achievement because they increase or reduce the pupil-teacher ratio. A RAND study (Grissmer et al., 2000), examining state-to-state improvement in NAEP test scores, finds additional support for this perspective. Lowering the pupil-teacher ratio significantly increases achievement, while raising teacher salaries did not, according to this study. A third study, conducted by the Southwest Educational Development Laboratory (Pan et al., 2003), observes that high performing school districts employ more teachers and spend more on instruction than low performing districts. High performing districts also tend to spend less on general administration and non-instructional services.

Despite the inconclusiveness of the research findings, state policymakers and citizens have taken inequities in school funding very seriously. The constitutionality of unequal funding has been challenged in one state after another, across the nation. In Kentucky, the impetus for KERA was a class action suit that sought redress for school finance inequities. A recent study by independent consultants (Picus, Odden, & Fermanich, 2001) has shown that substantial progress has been made since the advent of KERA to equalize per pupil funding across the state. But equal funding may not contribute to raising the performance of all students and schools for two primary reasons: First, as many educational researchers have concluded, school finance may not be the real issue. Gamoran (2001), for example, commenting on the trend in many states to equalize school funding, asserts:

> This trend…will do little to reduce the major advantages held by those [students] from families with more economic resources over those with less. The most important resources tend to operate at the individual level, so they are unaffected by changes in the redistribution of collective funds for education (p. 143).

The second reason why the equalization of funding may not elevate school performance is that the allocation of funds for different purposes may be more important than the total funds available. In other words, enhancing school performance may depend on how wisely school districts distribute the financial resources that they control. The present study engages this issue by investigating the effects of expenditure streams (funds allocated for different purposes) on school accountability score gains in Kentucky.

The Present Study

This study seeks answers for the following questions:

1. What are the effects of various expenditures streams on the mean annual gain in Kentucky Accountability Index scores?
2. Are these effects direct, indirect, or both?
3. What are the policy implications of the findings?

Method

The statistical procedure chosen for this study was repeated-observations hierarchical linear modeling (HLM) (Raudenbush and Bryk, 2002, pp. 162-3). This procedure analyzes the effects of expenditure streams on within-school accountability score gains, controlling for school and district characteristics. A three-level model to estimate the Accountability Index score (Y) was specified with the following equations:

Level 1 (within-school)

$$Y = \pi_0 + \pi_1(\text{year index}) + e$$

Level 2 (between-school)

$$\pi_0 = \beta_{00} + \beta_{01}(\text{school membership}) + \beta_{02}(\text{middle school}) + \beta_{03}(\text{high school}) + \beta_{04}(\text{combined school}) + \beta_{05}(\text{pupil-teacher ratio}) + \beta_{06}(\%\ \text{Black students}) + \beta_{07}(\%\ \text{subsidized lunch}) + r_0$$

$$\pi_1 = \beta_{10} + \beta_{11}(\text{school membership}) + \beta_{12}(\text{middle school}) + \beta_{13}(\text{high school}) + \beta_{14}(\text{combined school}) + \beta_{15}(\text{pupil-teacher ratio}) + \beta_{16}(\%\ \text{Black students}) + \beta_{17}(\%\ \text{subsidized lunch}) + r_1$$

Level 3 (between-district)

$$\beta_{00} = \gamma_{000} + \gamma_{001}(\text{district membership}) + \gamma_{002}(\text{located inside an MSA}) + \gamma_{003}(\text{per capita income}) + \gamma_{004}(\text{instruction}) + \gamma_{005}(\text{instructional support}) + \gamma_{006}(\text{instructional staff support}) + \gamma_{007}(\text{district administration}) + \gamma_{008}(\text{school administration}) + \gamma_{009}(\text{central office support}) + u_{00}$$

$$\beta_{10} = \gamma_{100} + \gamma_{101}(\text{district membership}) + \gamma_{102}(\text{located inside an MSA}) + \gamma_{103}(\text{per capita income}) + \gamma_{104}(\text{instruction}) + \gamma_{105}(\text{instructional support}) + \gamma_{106}(\text{instructional staff support}) + \gamma_{107}(\text{district administration}) + \gamma_{108}(\text{school administration}) + \gamma_{109}(\text{central office support}) + u_{10}$$

Level 1 comprises four years (1999–2002) of Kentucky Accountability Index (AI) scores for each school in the sample. In the equation above, π_0 represents the baseline (1999) AI score, and π_1 represents the mean annual gain achieved between 1999 and 2002. The Level-2 data consist of features that differentiate the sample of 1,111 of Kentucky's more than 1,200 public schools. Level 3, comprising 170 of Kentucky's 176 school districts, encompasses features that differentiate the school districts, including the expenditure streams for instruction, instructional support, instructional staff support, district administration, school administration, and central office support.

Variables

Table 1 presents the descriptive statistics of the variables. Each year of Accountability Index data has been entered as a separate record. Consequently, in the Level-1 equation there are 4,444 cases—four observations for each of the 1,111 schools. The record of each case is denoted by a year index (0, representing 1999, through 3, representing 2002). The range of AI scores is substantial (more than 70 points). More importantly, the mean is more than 30 points from the proficiency goal of 100 points. To

Table 1. Descriptive Statistics.

Variable	Mean	Std. Dev.	Min.	Max.
Level 1 (Within-school, N_1 = 4444)				
Accountability Index (AI score)	67.90	10.30	35.90	108.60
Year (index)	1.50	1.12	0	3
Level 2 (Between-school, N_2 = 1111):				
% students eligible for subsidized lunch	51.26	21.59	0.67	99.06
% Black students	8.88	13.83	0.00	72.99
School membership	515.02	294.35	65.00	2052.00
Pupil/teacher ratio	20.43	5.20	9.40	42.10
School type:				
Elementary (reference category)	0.56	0.50	0	1
Middle	0.17	0.38	0	1
High	0.17	0.38	0	1
Combined	0.10	0.29	0	1
Level 3 (Between-district, N_3 = 170):				
District membership	3763.31	7865.90	195.00	95815.00
Located inside an MSA	0.25	0.44	0	1
Per capita income ($)	16253.22	5054.15	9716.00	63375.00
Per pupil expenditure streams ($):				
Instruction	3182.27	359.33	2271.57	4635.24
Instructional support	180.56	57.17	49.61	388.39
Instructional staff support	237.37	101.51	28.48	923.82
District administration	272.95	159.58	39.14	933.96
School administration	278.32	66.30	128.93	511.84
Central office support	42.97	52.12	0.00	458.91

reach proficiency by 2014, an average elementary school will have to increase its accountability score by as much as three standard deviations. In other words, in eleven years the average school will be expected to perform at a level currently achieved by less than one percent of Kentucky schools. It is very unlikely that such dramatic progress can be accomplished without equally dramatic changes in how educational resources are allocated and used.

At Level 2, the variables that distinguish between schools are: the percentage of students eligible for subsidized lunch,[2] the percentage of Black students,[3] school membership, the pupil-teacher ratio, and a series of dummy variables denoting school type. Each of these variables describes the school during the 1999-2000 school year. Before performing the HLM analysis, two variables—percent Black students and school membership—were log transformed to achieve better approximation to a normal distribution. With regard to the multinomial variable of school type, elementary school is the reference category. 'Combined school' refers to schools with grades that span either the elementary and middle school grade levels or the middle and high school grade levels.

At Level 3, the variables differentiating the school districts include a log-transformed measure of district membership and a dummy variable indicating that the school district is located inside a Metropolitan Statistical Area (MSA).[4] Also at Level 3,

[2] To achieve a better fit in the HLM analysis, % subsidized lunch was estimated with random as well as fixed effects. The inclusion of a random effect was needed because the effect of % subsidized lunch on the baseline AI score is not only significant across all schools in the sample, but more specifically the effect varies significantly among the schools within each district.
[3] Blacks are the only sizeable minority in Kentucky's public schools. Because of very small counts, other racial and ethnic categories are not systematically counted by the Kentucky Department of Education.
[4] The control variables were chosen because they were previously shown to influence Kentucky school performance and improvement (Reeves, 2000, 2003; Price and Reeves, 2003).

the different expenditure streams are captured by the per pupil expenditures for instruction, instructional support, instructional staff support, district administration, school administration, and central office support. The expenditure stream variables are shown in Table 1 as the dollar amounts expended in each category in 1999. Table 2 provides details of the major components of each expenditure stream category.

A final Level-3 variable is a control for the between-district variation in the cost of providing educational services. Following McMahon (1996), a cost of living proxy is used for the district-level cost of education. Initially, two variables that McMahon cited as key indicators of intrastate cost of living estimates—per capita income and the median value of housing—were considered. For each Kentucky school district in the sample, the per capita income in 1999 and the median value of owner-occupied housing in 2000 were acquired from the Census 2000 School District Profiles (National Center for Educational Statistics). In initial testing of the suitability of using both indicators it was discovered that median housing value showed strong collinearity with per capita income. Therefore, per capita income alone was chosen as a proxy for the cost of living. McMahon suggests a rationale for this:

> Property is a very narrow and inadequate measure of total family income or wealth…Per capita personal income is a much better measure of true ability to pay, since it reflects the earnings from human capital and interests and profits from financial assets, as well as real estate (McMahon, 1996, p. 112).

In Kentucky, per capita income departs strongly from a normal distribution, so this variable was also log-transformed before inclusion in the HLM analysis.[5]

[5] McMahon (1996) counseled using a county-level cost of living estimate in preference to a school district-level estimate. He did this because his goal was to advise policymakers how best to determine the fair allocation of educational funds using intrastate cost adjustments in a funding formula. His foremost concern was to avoid cost endogeneity within districts that would set up incentives for spending

Table 2. Expenditure Streams.

Expenditure stream	*Components*
Instruction	Teachers salaries & benefits
Instructional support services	Pupil attendance Social work Guidance Health Psychological testing & counseling Speech pathology & audiology Special education related services Visually handicapped services
Instructional staff support services	Curriculum development Instructional staff development School library Audio-visual media Educational television Computer assisted instruction
District administrative support services	Board of Education Office of Superintendent
School administrative support services	Office of the Principal School Council activities
Central office support services	Planning, research, development & evaluation Information services Personnel services Data processing/computer/network services

inefficiency and manipulation of the funding formula. The present study was interested in the more general research goal of adjusting the value of expenditure streams across school districts.

Findings

The results of the repeated-observations HLM analysis are shown in Table 3. The first column of regression coefficients contains the fixed effects of the exogenous variables on the baseline (1999) Accountability Index score. These results are not the primary concern, although brief mention will be made of them. The primary concern is with the regression coefficients shown in the second column, the fixed effects that influence the mean annual change in the AI score. These are the effects that may promote or retard a school's progress toward achieving the 2014 proficiency goal.

In the first column of coefficients in Table 3, the intercept reveals that elementary schools achieved an average baseline AI score of 65.9, while middle schools, high schools, and combined schools achieved significantly less. Schools in larger districts and schools located inside an MSA also performed at significantly lower levels. Per capita income shows a strong positive effect, suggesting that in high-income school districts one should expect schools to perform at a very significantly greater level than in low-income school districts. This effect is independent of student poverty in the school per se. Student poverty, which is estimated by the percentage of students eligible for subsidized lunch, is very significant in the negative direction. The significantly positive influence of the pupil-teacher ratio on the baseline performance is puzzling, but another study (Reeves and Bylund, 2003) suggests that it could be the result of an unexamined three-way interaction between MSA location, the pupil-teacher ratio, and elementary school. Elementary schools are disproportionately found inside MSAs, attain the highest baseline performance, and are also the type of school with the largest pupil-teacher ratio (because of the unspecialized nature of primary school teaching).

Table 3. Results of the Repeated-Observations HLM Analysis: The Effects of Expenditure Streams and Other Variables on the Baseline Accountability Index Score and the Mean Annual Gain.

Fixed Effect	**Baseline AI Score**		**Mean Annual Gain**	
	Coefficient	***SE***	***Coefficient***	***SE***
Intercept	65.937***	(0.504)	1.888***	(0.095)
District membership (ln)	-0.871**	(0.667)	0.509***	(0.136)
Located inside an MSA	-2.146*	(1.091)	-0.114	(0.181)
Per capita income (ln)	22.525***	(2.298)	-1.200**	(0.446)
School membership (ln)	-0.874	(0.560)	-0.371*	(0.169)
Middle school	-3.774***	(0.959)	-0.844***	(0.225)
High school	-7.974***	(1.070)	-0.746**	(0.275)
Combined school	-2.931**	(0.813)	-0.389	(0.253)
Pupil-teacher ratio	0.196**	(0.060)	-0.058**	(0.019)
% Black students (ln)	-0.072	(0.109)	0.025	(0.038)
% subsidized lunch	-0.253***	(0.030)	0.003	(0.008)
Per pupil expenditures (in $100s):				
Instruction	-0.115	(0.117)	-0.005	(0.026)
Instructional support	0.050	(0.812)	-0.160	(0.132)
Instructional staff support	-0.027	(0.433)	0.046	(0.113)
District administration	-0.519	(0.406)	0.116	(0.074)
School administration	-0.402	(0.763)	0.014	(0.142)
Central office support	-0.504	(0.906)	-0.161	(0.132)

*p < .05; **p < .01; ***p < .001 (two-tailed tests with robust standard errors)

The main thing to be gleaned from the first column of coefficients is that none of the expenditure streams is significantly associated with the baseline AI score. These results bolster many previous studies that found little association between spending levels and the level of educational achievement between schools. In this regard, one contribution of the present study is to show that even when expenditures are broken down into different categories, there is no support for the contention that "money matters."

A shortcoming of many previous studies has been that their examination of the association between expenditure and educational achievement was static; they did not examine gains over time. The second column of coefficients in Table 3, then, presents the effects of expenditure streams and the other factors on the mean annual gain in school performance. The intercept in the second column (i.e., the slope of the annual change) estimates a mean annual rate of improvement of 1.89 for elementary schools. Middle schools and high schools improve at significantly lesser rates, whereas combined schools' annual gain is statistically indistinguishable from the elementary school rate. Schools located in larger districts were found to have significantly greater gains, but location inside an MSA does not significantly affect annual gain. Per capita income exerts a statistically significant negative effect. This suggests that when school districts face higher costs of providing educational services, schools may be negatively impacted by having fewer resources with which to improve.[6] Large schools show a significant tendency to gain at a lesser rate than small schools. Of the remaining non-expenditure factors, only the pupil-teacher ratio registers a significant association with the mean

[6] Regression to the mean could also explain this negative association between the per capita income and the mean annual gain.

annual gain, and the effect is negative. An increase in the pupil-teacher ratio of one predicts a 0.06 decline in the mean annual gain.

None of the expenditure streams registers even a marginally significant direct effect on the mean annual gain. In fact, taken altogether, the expenditures streams explain only 3.2 percent of the gain variance. Clearly, the direct effect of all expenditures on school improvement is quite small. These results are disappointing to say the least. Schools districts have little ability to influence the improvement of schools by shifting financial resources among the different expenditure categories used for this analysis.

As stated previously, the pupil-teacher ratio is observed to have a small, yet significant, negative influence on the mean annual gain. This finding creates the opportunity to explore the potential indirect effects of expenditure streams on the annual gain when the pupil-teacher ratio is the intermediate factor. The rationale for exploring these indirect effects rests upon earlier studies that were described previously (Wenglinsky, 1997; Grissmer et al., 2000; Pan et al., 2003). Therefore, a second HLM analysis was devised—a two-level model this time. Level 1 is this analysis consists of the dependent variable, the pupil-teacher ratio, and the school type dummies as control variables. Level 2 is comprised of the expenditure stream variables plus per capita income, another control variable (see Table 4).

The intercept estimates the average pupil-teacher ratio for elementary schools to be 22.5. Middle schools, high schools, and combined schools have substantially lower pupil-teacher ratios, despite the fact that elementary schools by law must have smaller class sizes. The explanation of this seeming anomaly is that secondary schools have many more specialized teachers on their faculties than do elementary schools. The

Table 4. Results of the Two-Level HLM Analysis: The Effects of Per Pupil Expenditure Streams on the Pupil-Teacher Ratio, Controlling for Per Capita Income and School Type.

Fixed Effect	**Pupil-Teacher Ratio**	
	Coefficient	***SE***
Intercept	22.513***	(0.282)
Per capita income (ln)	1.839*	(0.867)
Middle school	-7.102***	(0.304)
High school	-6.474***	(0.362)
Combined school	-4.867***	(0.375)
Per pupil expenditures (in $100s): Instruction	-0.177***	(0.047)
Instructional support	-0.283	(0.308)
Instructional staff support	-0.472*	(0.182)
District administration	0.037	(0.133)
School administration	-0.363	(0.359)
Central office support	1.011**	(0.349)

*p < .05; **p < .01; ***p< .001 (two-tailed tests with robust standard errors)

analysis also reveals that high-income school districts have higher pupil-teacher ratios in their schools than low-income districts, as the economic theory of human capital markets predicts. When the cost of human capital (i.e., per capita income) is high, the school district has a difficult time competing with other employers for qualified personnel (McMahon, 1996).

Three expenditure streams were discovered to be significantly associated with the pupil-teacher ratio. A one standard deviation increase in the expenditure for instruction reduces the ratio 0.65. When instructional staff support is increased by one standard deviation, the pupil-teacher ratio is reduced 0.48. Central office support expenditure, unlike the previous expenditure streams, has a positive effect on the pupil-teacher ratio. A one standard deviation increase in the central office support expenditure is estimated to increase the pupil-teacher ratio 0.53.

Coupling these findings with the effect of the pupil-teacher ratio on the mean annual gain (Table 3) yields the indirect effects listed below:[7]

Instruction —(-0.177)→ Pupil-teacher ratio —(-0.058)→ Mean annual gain

Instructional staff support —(-0.472)→ Pupil-teacher ratio —(-0.058)→ Mean annual gain

Central office support —(+1.011)→ Pupil-teacher ratio —(-0.058)→ Mean annual gain

The expenditures for instruction and instructional staff support exercise a positive indirect influence. For example, if instruction expenditure were raised one standard deviation (i.e., $359 per pupil), the indirect effect would be to increase the mean annual

gain 0.04. By comparison, if instructional staff support expenditure were increased by one standard deviation (i.e., $102 per pupil), the annual gain would increase 0.03. Finally, if the expenditure for central office support were decreased by one standard deviation (i.e., $52), the indirect effect on the annual gain would be reduced 0.03. Since the effect of expenditure on central office support is negative, one can easily envision a tradeoff where the savings from restricting central office expenditure could be allocated to enhance instruction and instructional staff support. If reallocating these financial resources were devoted to reducing the pupil-teacher ratio, an increase in the rate of improvement of schools' accountability scores would be expected. However, even in combination, the effects on the mean annual gain are very small. The total effect of making the hypothetical changes that were sketched above in the three expenditure streams would raise AI scores 0.04 per year, or a total of 0.44 by 2014!

Discussion

The results of this study indicate that the allocations of expenditures for varying purposes can indirectly influence the rate of gain in school accountability scores, but probably not sufficiently to attract the interest of state policymakers and school districts. The multilevel models contained a substantial number of variables that measured characteristics of schools and school districts. The pupil-teacher ratio was one of the few variables to register a significant association with the annual gain, although the effect size was small. The model predicted that a reduction in the pupil-teacher ratio of one would bring about a 0.06 increase in the accountability score; a reduction of five would bring about a 0.30 increase. The costs of implementing a strategy of reducing the pupil-teacher

[7] Recall that each expenditure stream effect is predicated on increasing funding by $100 increments.

ratio across all low improving schools in the state would be huge since it would probably require an increase in salaries to attract many more teachers into the field.

The many non-significant expenditure stream effects found in this study could be due to the design of the multilevel analysis. Since expenditures were measured at the district level while the Accountability Index score and the mean annual gain were measured at the school level, the effects of the expenditure streams were averaged across the schools within each district. If data were available for school-level expenditures, it might be possible to identify a greater number of significant expenditure effects, and the estimations would almost certainly be more precise. But the collection of school-level data in Kentucky as in other states poses grave difficulties because of variation in budgeting practices both within districts and between districts. Still, assembling school-level data should be one way to better find out how expenditures affect school accountability scores.

A possible shortcoming of the present study is that it used single-year measures of expenditure streams but did not consider changes in expenditure over a period of years. Pan et al. (2003) examined five-year expenditure changes and related these to school district improvement during a subsequent three-year period. However, the results were nonsignificant in the large majority of the tests that were performed.

The present study used somewhat different data and a different methodology than a recent study by Roeder (2002), but the conclusions are similar. Roeder used multi-year data to explore if teaching and financial resources moderated the negative effects of poverty on school district accountability scores in Kentucky. He did not examine the change in accountability scores, but instead obtained year-by-year multiple regression

results. Thus, his results are comparable to the first column of regression coefficients in Table 2 above.[8] Roeder found poverty to be the largest and most consistent factor affecting district performance. Teacher quality (measured by years of experience and education level) had significant, positive effects in two out of five years; the effect was marginally significant in the remaining three years. Teacher salary was not significant in any year. Total per pupil revenue, his main measure of district financial resources, was not significant in any year. These and other findings led Roeder to conclude that Kentucky policymakers should exercise caution when considering presumed linkages between resources and school performance.

Taken together, the present investigation and Roeder's do not lend much support to the contention that "money matters." Although Roeder reveals that teacher quality can make a difference, and this study suggests that reducing the pupil-teacher ratio is money well spent, neither effect is strong enough to support a policy recommendation, especially during the current period of severe state budget deficits and curtailed financing.

Even more perplexing, neither Roeder's nor this study can provide an explanation for the extremely weak association between spending and improving educational quality. Do the results of these studies really mean that how Kentucky school districts allocate their financial resources does not matter very much, or do they mean that school systems do not use money wisely to purchase high-quality resources and the most appropriate resources? Perhaps the results only mean school systems are unable to assess the quality of the resources that they purchase. This is probably most true of human capital resources (since guidelines do exist for the purchase of equipment). For example, at the time of initial hiring, it may be very difficult to predict how well a teacher will perform

[8] It should be noted that Roeder did not attempt to control for the cost of providing educational services.

after five or ten years. Furthermore, teachers' salaries and promotions are tied to seniority, professional development, and degrees earned—not to the demonstrated ability to enhance student performance. Since 75-80 percent of public school expenditures are for human capital resources (David Barnett, personal communication; McMahon, 1996), it seems axiomatic that efficient school finance policy cannot be achieved absent a reliable means for recognizing and compensating the quality of school district and school personnel.[9]

Efforts to more effectively measure personnel quality and to establish salary rates commensurate with the degrees of quality could possibly lead to more robust associations between how money is spent and educational performance. Yet, one cannot place confidence in this solution at the present time since research has not established that endogenous resources, including personnel quality, are the primary requisites for school improvement. Exogenous circumstances, such as the characteristics of the local community in which the school is embedded and of the families whose children attend the school, along with school-community and school-family relations, may greatly influence how rapidly schools improve (Bryk and Schneider, 2002).

Two other recent studies, while not conducted in Kentucky, are relevant to the general issue of monetary influences on school performance. Elliott (1998) evaluates the process through which financial resources affect opportunities to learn in U.S. public high schools. After adjusting for cost differences, she finds that per pupil expenditures indirectly increase achievement by giving students access to teachers with better

[9] Measuring teacher quality has always been a difficult and controversial issue. A recent methodology rates teachers by their students' performance in the next three years of school (Sanders and Horn, 1994, 1998). However, the validity of this methodology has come under attack (Kupermintz, 2003).

credentials and teachers who use more effective pedagogies. While these findings are a welcome contribution, the effect sizes are very small (one percent or less). Condron and Roscigno (2003) confine their study to elementary schools in a single urban public school district. Their main focus is to find out how variation in spending that is related to the racial and class composition of the schools affects academic achievement. They examine two categories of per pupil spending—instruction and operations/maintenance. They also consider the indirect effects these forms of expenditure have on academic achievement through several intermediate factors—physical condition of the school, order/consistency in the school, and teachers' education. The findings generally confirm their expectations. Spending levels are related to the racial and class composition of the schools in the district where their study was carried out, and both categories of spending have direct as well as indirect effects on school performance. The effect sizes obtained by Condron and Roscigno are larger than in other research. (Partly, this is an artifact of the small sample size—89 schools). For instance, they find a significant direct effect between instructional expenditure and school math performance as follows: one standard deviation increase in per pupil instructional expenditure excluding Title I allocation (i.e., $580) is associated with 0.3 standard deviation increase in the school's math score. And there are other direct effects for instructional expenditure of similar magnitude.[10] This study suggests that if school-level expenditure data were to become more systematically available, the ability to diagnose expenditure effects could improve.

[10] A factor that could have influenced Condron and Roscigno's results to an undetermined degree is the maldistribution of teachers, which Rothstein (2000) states is the most serious cause of inequality within urban school districts. Schools characterized by low-income students and racial minorities often are compelled by circumstances to hire the least experienced and least qualified teachers, while the more experienced and qualified teachers exercise seniority privileges to transfer from these less desirable low-income, high-minority schools to schools where the student body is middleclass and predominantly white.

Conclusions and Implications

The main contributions of this study to answering the "does money matter?" question are: (1) the measurement of various expenditure streams—in lieu of a global measure of educational expenditure—and (2) the examination of school improvement through time—in lieu of a static, cross-sectional analysis of school performance. Although the present study supports many earlier findings (Wenglinsky, 1977; Grissmer et al., 2000; and Pan et al., 2003), it also reveals that the direct and indirect effects of the expenditure streams are extremely weak—too weak, in fact, to advise school districts on how to improve schools by reallocating funds. Unless and until school-level spending data is systematically collected and potent linkages are established between purchasable inputs and student academic improvement, little guidance can be offered to school districts wanting to maximize the academic returns to their spending.

In conclusion, the implications of present study may be summarized in the following five points:

1. The answer to the "does money matter?" question remains moot for Kentucky as it does for the nation at large.
2. In the present study, the direct and indirect effects of expenditure streams on the mean annual gain in the Accountability Index are nil, or at most very small. School districts are not advised to use these results to inform a strategy for reallocating expenditures in order to increase school accountability scores.
3. The effects obtained in this study have been "averaged" because expenditures were measured at the district level, whereas the Accountability Index scores were measured at the school level. It is possible that larger effects could be obtained if

expenditures were also measured at the school level. Conceivably, school-level data would also permit greater specificity in the definition of types of expenditure. If this resulted in the discovery of robust links between school-level expenditures and school improvement, practical recommendations for spending strategies that optimize improvement could be forthcoming.

4. Future studies of expenditure streams in Kentucky school systems should examine changes in expenditure over time as well as single-year variation in expenditure levels across districts. The present study explored the latter option only.
5. One reason why money does not seem to matter very much could be that school districts cannot evaluate the quality of the resources and personnel that they purchase. Thus, a disconnect exists between expenditures, the quality of inputs that are purchased, and school performance, which shows up in studies like the present one as associations that can hardly be distinguished from randomness.

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