PROPERTY TAX ASSESSMENT PROCEDURE CHANGES EFFECT ON SCHOOL RESOURCES AND STUDENT PERFORMANCE*

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INTRODUCTION

IN 1990, THE WEST VIRGINIA PROPERTY TAX SYSTEM was substantially modified in order to create equality among the state's 55 counties. This major modification, dubbed the Appraisal Act, fixed the differentials in property tax assessments among counties by mandating uniform property assessment practices. In 1982, the West Virginia circuit court under Judge Arthur Recht ruled that the state's wide variation in funding for public schools from county to county deprived children in poorer (or inadequately assessed) counties of their state constitutional right to a "thorough and efficient" free public education. Judge Recht declared that the reliance on property taxes contributed to the significant county-by-county funding inequities because property tax assessment practices varied significantly and mandated that the assessment practices be uniform. With the passage of the 1990 Appraisal Act, West Virginia county assessors were required to assess each individual parcel of property at 60 percent of fair market value in 3-year cycles with annual adjustments. In addition, a property valuation training and procedure commission was appointed to help with the process. This in turn met the mandate set forth by the Recht decision.

The Appraisal Act accompanied by the Recht decision thus changed the way public schools were financed in West Virginia after 1990 by promoting equalized resources in order to develop high-quality levels of education in all counties in the state. These changes enabled the public school support system in the state to allocate property tax revenue in an equitable manner by basing funding for variable expenses such as teacher salaries and transportation on student enrollment and percentage-of-total support for fixed expenses. This public education funding system has been assumed to have equalized student performance across the state; however, previous literature would disagree.

The goal of this paper is to examine, over time, how the public school revenue base was expanded through uniform property tax procedures, which coupled with court mandates, produced equalization of funding of public education and the affect this has had on student performance at different grade levels within West Virginia. Analysis shows that increased school revenues in West Virginia had insignificant effects on student achievement at the elementary school grade level. However, contrary to previous literature, school revenues resulted in slightly higher student achievement in junior high and high school students. Also, the accumulation of school revenues over time was shown to have a statistically significant effect on student performance at the elementary school level.

The next section of the paper reviews the existing literature on the effect of school resources and school finance reforms on student achievement. The third section will begin by showing how property tax revenue levels were affected by the passing of the 1990 Appraisal Act across all 55 counties in the state and how those changes affected the amount of resources available to each school district. Then the paper will show that school revenues significantly increased for all counties especially during the years the Appraisal Act was being implemented. The final section of the paper includes analysis of a panel of county-level student achievement scores from 1989 to 2002, which assesses that changes in spending levels had varying effects on student achievement at different grade levels.

PREVIOUS LITERATURE

The effect of school resources on student performance and the effect of school finance equalization reforms on student achievement have been major topics in the economics and education literature. Research assessing the connection between school resources and student achievement began with the Coleman report in 1966. This report, which was created on the heels of the Civil Rights Act of 1964, was mandated to explore the inequity in the provision of education. Coleman found that raising the level of school resources, which

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includes the lowering of class sizes, has no effect on student test scores. This study concluded that school characteristics, including financing, are relatively unimportant to student performance levels while families and peers are key elements to student success (Hanushek, 1986).

Hanushek (1996) continued the examination of what affects student performance by analyzing three decades of research on the topic. Hanushek found that all empirical research backed up the conclusions of the Coleman report. The research showed that resources that are devoted to schooling are not the primary factor in determining student performance. Hanushek concluded that while it may be necessary to increase spending on schools, restructuring of current resources in accordance with making teachers and schools better must be first accomplished.

Hanushek (2006) expanded his research on this topic by investigating how school resources and other factors relate to student performance through an education production function analysis. This production function allows the performance of a student at a particular time to be a function of family inputs, peer inputs, school inputs, innate ability, and a stochastic term. Due to the cumulative nature of student achievement, Hanushek considered a modification production function that takes into account the time path of inputs (including family, peer and school inputs).

Hanushek (2006) examined 376 production function estimates that were published in 89 articles prior to 1995 which included a variation of the previously mentioned production functions, used school and family inputs, and provided the sign and significance of the resource relationship with a measurable school outcome. Of these production function estimates, Hanushek concluded that, after examining teacher-pupil ratios, teacher education, and teacher experience, estimates that adding more of these resources may not boost student achievement. The estimates also showed weak support for the idea that providing higher teacher salaries or higher levels of overall spending will lead to improved student performance.

The most recent studies of student finance reform have delved into the effect of reform on the equalization of spending and the effect of that spending on student performance. Murray, Evans, and Schwab (1998) investigated school finance reform in 16 states and found that court-ordered finance reform reduced within-state inequity in spending by 19 to 34 percent. Downes and Figlio (1997) also looked at court-mandated school finance reforms that occurred during the 1980s and found that these reforms did not result in significant changes in either the mean level of the distribution of student performance on standardized tests of reading and mathematics for high school seniors. Downes and Figlio (1997) also examined substantial education finance reforms that were not responses to court mandates and found increases in mean student performance. An examination of the effect of school finance reform on the distribution of school spending across rich and poor school districts and the consequences of spending equalization of student achievement was completed by Card and Payne in 2002. Their analysis looked at SAT score distributions before and after spending gaps between richer and poorer districts were narrowed through school finance reform in the 1980s. Card and Payne found evidence that equalization of spending actually lead to a narrowing of test score outcomes across family background groups. Their analysis included the examination of school aid formulas found in each state, school district expenditures, and SAT scores from 1978-1992; and concluded that spending equalizations that followed unconstitutional court rulings in 12 states closed the gap in average SAT scores between children with highly educated and poorly educated parents by approximately 5 percent.

PROPERTY TAX AND PUBLIC EDUCATION SPENDING

Property tax assessment practice modifications made in 1990 by the Appraisal Act were intended to make the property tax system more uniform across the state of West Virginia. All property was required to be assessed at 60 percent of fair market value by 1994. Assessors were also required to assess each county's property in 3-year cycles with annual adjustments. With many of the counties assessing a percentage well below 60, this act not only was expected to make the system uniform across counties but also increase the amount of taxes levied in the state. However no property tax revenue spikes were experienced. The state instead experienced average annual growth of 8.6 percent from 1990 till full implementation of the act in 1994. The nonexistent spike in revenue growth can be attributed to legislation passed in 1991, which limited the amount of property tax revenue collected within the state.

While the state did not experience a dramatic spike in property tax revenue, it did maintain an increase each year after the 1990 Appraisal Act. This rise expanded the public school support base and led to an upsurge in public education revenue for all 55 school districts (i.e., counties). Public education revenues from the passage of the Appraisal Act onward rose at an average annual rate of 5.5 percent. However, from the Act's passage till its full implementation (1990-1994), public education revenue increased at annual rates of 10 to 15 percent.

For West Virginia, uniform property tax assessment regulation in 1990 coupled with tax revenue limitations in 1991, allowed for steady increases in property taxes. During the same time period, total public education revenue increased with higher levels of growth from the passage of the Appraisal Act to its full implementation. Regression analysis showed the link between property taxes and school revenue also increased after the passage of the Appraisal Act. The next step is to investigate if these changes in school revenues had an impact on student achievement in the state.

EFFECT ON STUDENT ACHIEVEMENT

Methodology

Consistent with the previous literature, production function analysis in conjunction with time and county fixed effects was used to determine if school revenues affect student performance in West Virginia from 1989 to 2002. For each of the four grade levels, school, peer, family, and county inputs were factored into the OLS regression analysis. Dummy variables were included for each year of the data set, as well as for each of the 55 counties within the state. Student mean percentile scores were the dependent variables in this fixed effects model, as shown in equation (1).

$$\textbf{(1)} \quad Score_{it} = f(Score_{it-1}, Revenue_t, School_t, Peer_t, Family_t, County_t) + \varepsilon_{it}$$

Data

Previous literature that analyzed the effect of resources on student achievement used two basic forms of data to measure student performance: SAT scores and mean percentile standardized test scores. To see the effect on West Virginia students, mean standardized test scores were used. The data for this analysis was drawn from West Virginia school districts[1] from 1989 to 2002 for four grade levels. Student achievement was measured by mean percentile standardized test scores for total basic skills in grades 3, 6, 9, and 11 for all 55 counties in the state. These scores are the result of a statewide student achievement testing program, which is mandated for public schools within the state.

School resources in West Virginia from 1989 to 2002 were measured by the total public education revenue per student. Revenue was measured as the amount allocated to each county for K-12 public education through the state's Public School Support Program (PSSP). West Virginia's PSSP is the total basic foundation program for public education within the state. This program determines the distribution of funds to each county by summing the computed costs for the following allowances: professional educators, service personnel, fixed charges, transportation costs, administrative costs, other current expenses, and allowances to improve instructional programs. The total amount allocated was then divided by the total net enrollment[2] in each county for each school year.

To account for the effects other school resources may have on student achievement, data on pupil teacher ratios and number of schools in each county were collected. Pupil teacher ratios measure the average number of students for each full-time equivalent (FTE) teacher. This ratio is derived by dividing public school net enrollment by the number of FTE teachers in each county for each school year. Some of the aforementioned literature found that pupil teacher ratios may have a positive and significant effect on student performance (Hanushek, 1996). The total number of schools in each county was also considered in this analysis. Public schools in West Virginia that were summed in each county included all elementary, middle, junior high, and senior high schools.

To get a full understanding of all variables that may be affecting student achievement in West Virginia from 1989 to 2002, production function analysis was used. This type of analysis included the aforementioned school inputs as well as peer inputs, family inputs, and county inputs. Peer inputs used in the analysis were previous year scores, density rates, and retention rates by grade level. Scores from the previous year (or lagged scores) show how students in similar environments had faired taking the same standardized test only a

year prior. Density rates, which can be used to show how rural each school district was for each school year, were calculated to be the number of students enrolled in grades 3, 6, 9, and 11 per square mile of the county for which they were enrolled. The number of students held back a year or retained was also considered in this analysis.[3]

The number of students in each county that qualified for free or reduced lunch from 1989 to 2002 was the variable used to show family inputs on student performance. To qualify for free or reduced price lunch, family characteristic qualifications for each child must be met. These qualifications, which include family size and income levels, are adjusted annually and all school children whose family meets these qualifications must be offered free or reduced price lunches by the school in which they are enrolled.

The type of environment in which students live may also have an effect on student achievement. To account for this affect, county characteristics were included in the analysis. Population and per capita personal income levels were both examined, however, in final tabulations only population of each county from 1989 to 2002 was found to have an effect on student achievement.

Results

Student achievement at elementary grade levels, grades 3 and 6, are presented in Table 1. As found in previous literature, school revenue does not significantly affect student achievement at these grade levels. In fact, school revenue per student is shown to have a small, negative but statistically insignificant effect on student achievement in West Virginia from 1989 to 2002. Other school inputs

Table 1
Determinants of Student Achievement in West Virginia: 1989-2002
Time and County Fixed-Effects Model
Grades 3 and 6
(Dependant Variable: Grade-Level Mean Percentile Standardized Score)

	Grade 3	*Grade 6*
Lagged test score	0.2085***	0.1914***
	(0.05)	(0.04)
School revenue per student ($1,000)	-0.0573	-0.1115
	(0.11)	0.09
% Retained	-12.1755	-1.6499
	(9.28)	(2.18)
Pupil-teacher ratio	0.0248	-0.1259
	(0.31)	(0.32)
Elementary schools	-0.0919	-0.0704
	(0.06)	(0.07)
% Free Lunch	-5.8202	-4.4031
	(3.75)	(4.95)
Student density	-4.479***	-2.9861***
	(1.22)	(0.99)
Population	0.0001**	0.0001*
	(0.00)	(0.00)
Const.	52.6498***	53.9125***
	(8.60)	(8.41)
R squared	0.69	0.63
Observations	770	770

Note: Robust standard errors are shown in parentheses.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

also had notably weak explanatory power. The peer inputs, however, had considerable explanatory power. In fact, two of the three peer inputs are shown to have significant but opposite effects on student achievement. Family inputs had the highest explanatory power, however, the null of no effect cannot be rejected. The percentage of students that qualified for the free- and reduced-lunch program had a negative effect on student achievement consistent with the notion that children from lower income households will have lower levels of student performance; however, this explanatory variable was not statistically significant.

Regression results were considerably different for the higher grade levels in West Virginia. Unlike grades 3 and 6, as well as previous literature, school resources added significant explanatory power to the analysis. In fact, for every $1,000 increase in school revenue per student, mean percentile scores increased by 0.28 in the ninth grade and 0.17 in the eleventh grade. The results in Table 2 show that school revenue, which during this time period may have been a result of increased technology, positively and significantly affected student achievement in West Virginia. Peer inputs were the only other variables with significant explanatory power for the higher grade levels.

With the basic concept that knowledge is cumulative and thus builds over time, the examination of growth of student achievement was the next step in the analysis. Using a general value-added formulation similar to the example shown in equation (1), the change in each grade level's mean percentile standardized test score was evaluated. The change from one year to the next of school, peer, family, and county inputs were examined to see if relationships exist with growth of student achievement. Analysis resulted in no significant effect of growth

Table 2
Determinants of Student Achievement in West Virginia: 1989-2002
Time and County Fixed-Effects Model
Grades 9 and 11
(Dependant Variable: Grade-Level Mean Percentile Standardized Score)

	Grade 9	*Grade 11*
Lagged test score	0.3491***	0.2151***
	(0.04)	(0.05)
School revenue per student ($1,000)	0.2833***	0.1670*
	(0.09)	(0.09)
Pupil-teacher ratio	-0.2258	-0.0288
	(0.28)	(0.32)
Total schools	-0.0687	-0.0883
	(0.07)	(0.08)
% Free Lunch	-2.5332	-3.2127
	(4.41)	(3.89)
Student density	-2.1704***	-2.2571***
	(0.69)	(1.05)
Population	0.0000	0.0000
	(0.00)	(0.00)
Const.	63.3647***	60.5551***
	(8.43)	(9.24)
R squared	0.68	0.61
Observations	770	770

Note: Robust standard errors are shown in parentheses.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

of school revenues on growth in student achievement. Other school inputs as well as peer, family, and county inputs affected each grade level very differently. The only common input effect involved the growth of student density in grades 6 and 9. For these grade levels, the change in student density from one year to the next had a small, negative, and significant effect on mean percentile test score changes during the same time period.

While the growth in inputs did not exhibit consistent or significant results on growth in student performance, analysis on the accumulation of resources was completed. Student achievement at each grade level can be thought of as the result of the accumulation of resources and inputs up to that grade level. Using grades 3 and 6 student mean percentile standardized test scores[4] from 1989 to 2002 for all 55 counties in West Virginia and cumulative revenues from kindergarten to third or sixth grade, this theory can be supported. Table 3 shows that cumulative public school revenues had a small, positive, and statistically significant effect on student achievement for both grades while lagged mean percentile scores and student density levels continued to have highly

Table 3
Determinants of Student Achievement in West Virginia: 1989-2002
Time and County Fixed-Effects Model with Cumulative Revenues
Grade 3 & 6
(Dependant Variable: Grade-Level Mean Percentile Standardized Score)

	Grade 3	*Grade 6*
Lagged test score	0.2148***	0.1947***
	(0.05)	(0.44)
School revenue per student ($1,000)	-0.0544	-0.1048
	(0.11)	(0.09)
Cummulative school revenue ($100,000)	0.0002**	0.0003**
	(0.00)	(0.00)
% Retained	-12.2382	-1.5368
	(9.40)	(2.14)
Pupil-teacher ratio	0.0321	-0.1192
	(0.31)	(0.32)
Elementary schools	-0.0948	-0.0747
	(0.06)	(0.07)
% Free Lunch	-6.3973*	-5.4959
	(3.75)	(4.88)
Student density	-4.3749***	-2.8930***
	(1.22)	(0.99)
Population	0.0001*	0.0000*
	(0.00)	(0.00)
Const.	52.5838***	54.6797***
	(8.58)	(8.36)
R squared	0.69	0.64
Observations	770	770

Note: Robust standard errors are shown in parentheses.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Correlation between school revenue per student and cumulative school revenue was found to be very low so both variables were included in the analysis.

significant effects. This result supports the argument that increasing school resources increases student performance at the lower or elementary levels. While school funding for one year did not show significant explanatory power, the accumulation of funding over the academic career was significant.

CONCLUSION

The 1990 Appraisal Act in West Virginia created a more uniform property tax appraisal system within the state. Uniform practices coupled with revenue restricting legislation allowed for property tax revenue to rise at a consistent, but not radical rate. Rising property tax revenue led to an increase in the revenue base for funding public education. Equitable distribution practices of public education revenue, which included basing a majority of revenue on enrollment instead of actual costs, was promoted with the uniform property tax assessment practices. The increased funding for education had fundamentally different affects on different grade levels. Previous research showed that increasing school resources had no effect on achievement and analysis of elementary school performance supported that theory. This analysis suggests that the increased school revenue support had insignificant effects on the level of student achievement at the elementary school levels (i.e., grades 3 and 6). Junior high and high school level student achievement, however, was affected quite differently. Increased school revenue per student had a positive and statistically significant influence on student achievement. While these effects were calculated to be rather small, there was clear evidence of their existence. These effects may be attributed to increased funding for new technologies, advanced courses, and better classroom resources. The argument that accumulative school resources have an effect on student performance was also supported. Analysis of the relationship between grade 3 and 6 student achievement and cumulative school revenues showed that student performance is significantly influenced by the accumulation of school resources over time.

With a clear difference in how school resources affect achievement at different grade levels, further research should be completed on the effects the increased resources had on rural school districts versus more urban areas. For instance, it seems plausible that effects might be larger for counties that started with below-average spending levels. Also the effects cumulative school resources have on higher grade levels should also be explored. These grade levels, which were shown to be affected by annual revenues, may be affected even more by increases in school revenues over time.

Notes

[1] West Virginia school districts are constructed at the county level. Thus, all data used in this analysis is for the county.

[2] Net enrollment includes the number of pupils enrolled in special education programs, kindergarten programs, and grades 1 to 12 of the public schools in the county according to §18-9A-2 WV Code.

[3] Due to data availability, student retention rates were not available for grades 9 and 11. Dropout rates for these grades were considered but after further examination were not used due to a change in how rates were calculated during the 1995-96 school year.

[4] Due to the unavailability of historical school revenue by county, only student achievement for third and sixth graders in West Virginia was analyzed.

References

Card, David and Abigail Payne. School Finance Reform, the Distribution of School Spending, and the Distribution of Student Test Scores. *Journal of Public Economics* 83 (January 2002): 49-82.

Downes, Thomas A. and David N. Figlio. School Finance Reform, Tax Limits and Student Performance: Do Reforms Level-Up or Dumb Down. Madison: University of Wisconsin, 1997. Institute for Research on Poverty Discussion Paper 1142-97.

Hanushek, Eric

The Economics of Schooling: Production and Efficiency in Public Schools. *Journal of Economic Literature* 24 (September 1986): 1141-1177.

Measuring Investment in Education. *Journal of Economic Perspectives* 10 (Fall 1996): 9-30.

School Resources. In Eric Hanushek and Finish Welch, eds. *Handbook of the Economics of Education,* Vol. 2, 2006, Chapter 14.

Murray, Sheila E., William N. Evans, and Robert M. Schwab. Education-Finance Reform and the Distribution of Education Resources. *American Economic Review* 88 (September 1998): 789-812.

West Virginia Department of Education

West Virginia Educational Statistical Summary, 1985-2002. Charleston, WV, 2002.

West Virginia Report Card Educational Trends: 1985-86 thru 1989-90 State Data. Charleston, WV, 1990.

West Virginia Report Cards: County-by-County Trend Data 1998-1999 Through 2002-2003. Charleston, WV, 2003.

West Virginia Report Cards: State, County, and School Data, 1985-2002. Charleston, WV, 2002.

West Virginia Report Cards Trend Data: 1993-1994 through 1997-1998 State Data. Charleston, WV, 1999.

West Virginia Report Cards Trend Data: 1994-1995 through 1998-1999 State Data. Charleston, WV, 2000.