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Competition among Public Schools: An Analysis of Kentucky Public Elementary Schools

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An Analysis of Kentucky Public Elementary Schools

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EXECUTIVE SUMMARY

This study relied on data gathered on school identifiers and characteristics, student and teacher characteristics, and index scores of Kentucky public elementary schools, collected from 2001-2008 at the school level. An extensive literature review was completed in order to examine the effects of competition on public schools, both positive and negative.

This paper focused on the impact of public school competition on academic index scores in Kentucky school districts. Competition was measured in two ways: by the number of schools available per student in the district as well as the total district enrollment controlling for the total number of schools in a district. The data were analyzed using both a fixed-effects regression model and a between-effects regression model. The findings indicate that from year to year, increases in district enrollment have a positive effect on school index scores, but on average over the eight years, district enrollment actually has a negative impact. Overall, the findings suggest that public school competition does not appear to have a significant impact on school performance in Kentucky. Further analysis of competition among schools is recommended in order to provide policy makers with a better understanding of how competition, from both public and private institutions, can improve the quality of schooling in Kentucky.

INTRODUCTION

How best to go about increasing the quality of public schools is currently a controversial and highly debated issue in the United States. Federal, state, and local school boards across the nation have been faced with declining schools; prompting voters to rally for change, often in the form of school choice. Similarly, the demand by parents for high quality schools has led education reformers to look for new ways to improve the primary and secondary public school system. Many researchers have argued that increased competition can improve the quality of schools. This market-based reform, in the shape of expanded parental choice, has been debated in the past twenty years with no definitive answer as to whether this view can be substantiated. Proponents of school competition argue that increased choice for parents forces schools to work harder to be effective and, therefore, competitive in the education "market". Those opposed to school competition suggest that some parents may not be aware of their choice options, and that this lack of awareness will hurt the worst schools with the most disadvantaged students. Significant research has been done on school competition and choice in urban settings, but little research has looked at competition among public schools in rural settings. Most literature focuses on urban competition and choice options of private and charter schools often with the use of vouchers. This study sought to examine the public elementary schools in Kentucky, in geographic areas ranging from urban to rural including the Appalachian region. When treated as a private market good, school competition might be an aspect in determining school performance.

This paper examined competition among public schools and its impact on school performance, as measured by academic index scores. The hypothesis was that school

competition would have a positive impact on school index scores, assuming increased competition within districts requires public schools to work that much harder to keep high-achieving students in their schools. In theory, school districts with fewer schools do not have as much competition and therefore do not have the incentive to work to keep students; their students have no alternative public school options and so school scores in districts with fewer schools would be lower. Similarly, in rural areas there are often fewer private school alternatives which provides even less incentive for the public schools to remain competitive.

In the context of this paper, competition is measured in two ways. One measure examines the number of schools in a district, controlling for the total student enrollment of the district. The other is the ratio of the number of schools in a district to the number of students in the district. Both methods are used to examine the effects of competition on academic index scores.

TIEBOUT CHOICE

Charles Tiebout discussed his model regarding public choice in a 1956 paper entitled *A Pure Theory of Local Expenditures*. The Tiebout model states that the choice process allows individuals to determine an equilibrium of the provision of local public goods that are in harmony with the tastes and desires of the residents. In turn, the population sorts into their optimum and best matching communities (Tiebout, 1956). An analysis of Tiebout choice is important because it can provide quicker changes to American schools than certain reforms because it allows families to locate where they choose and lets them continue to move until they find a location that maximizes their utility i.e. voting with

their feet (Hoxby, 2002). The effects of education reform can take years to been seen, if they are seen at all; however Tiebout choice allows the equilibrium effects of choice to be seen in a much shorter time frame. In the absence of barriers to moving, housing and job markets can affect the degree of Tiebout choice. In a metropolitan area where many of the jobs and housing are located within one district, the cost of commuting to an adjacent district is high. Whereas, in an area where several school districts are clustered near many jobs, the cost of school choice is low. Tiebout choice is also important to understand when examining school competition because reform is often introduced to extend school choice options, not create them. Tiebout choice already accounts for some of the reasons families choose to live and send their children to school where they do. The effects of new school choice reforms may not be entirely attributed to those reforms.

This paper assumed that each student in the data set resided in the same county in which they attend school. In other words, a student only considers public schools in their county of residence. While this assumption does limit a student's possible choice of schools, it was necessary because the exact location of the school was known but not the location of the residence of the student.

OVERVIEW OF CHOICE IN KENTUCKY

Kentucky's public educational system is comprised of 120 county-based school districts and 55 independent school districts. Kentucky's geographic make up consists of many large rural areas with very few urban areas. This landscape makes school choice and competition unique and varied throughout the state. The restrictive somewhat language of Kentucky's Constitution with respect to education funding and the more restrictive

interpretation of Kentucky's state religion clauses make instituting a general voucher program difficult (Friedman Foundation for Educational Choice). Kentucky does not have a private school choice program in place and is one of only ten states that have not passed legislation regarding charter schools[1]. However, this may change as a result of the failure to receive money from the Race to the Top Fund; the federal program designed to spur reforms in state and local district K-12 education. Competitive grants to states were awarded to encourage education innovation and reform based on four areas. Kentucky received lower marks, due in part by the lack of charter schools in Kentucky. Kentucky school districts also are held to the requirements of Adequate Yearly Progress (AYP) under No Child Left Behind.[2] With a five-tier structure, consequences for the tiers increase each consecutive year that a school does not make AYP. After two years of not making AYP (Tier 1), school choice must be provided as an option to children at the underperforming schools.

A 2009 phone survey of 1,200 Kentucky residents conducted by The Friedman Foundation for Educational Choice found that fifty percent of K-12 parents would like to send their child to a private school, while in reality only nine percent of students attend private schools. Twelve percent of parents said they would send their children to charter schools if they were an option in Kentucky. Only thirteen percent of parents said they would choose traditional public schools, when in actuality ninety one percent of K-12 students attend traditional public schools. Based on the results of the survey, it appears that Kentucky may be lacking a school choice system that is able to sufficiently match

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[1] Charter schools in the U.S. are schools that receive public money but are not subject to some of the rules, regulations, and statutes that apply to other public schools. Charter schools are opened and attended by choice, but are not allowed to charge tuition.
[2] AYP results are based on the Kentucky Core Content Tests in reading and mathematics. Schools are required to have specific percentages of students reaching proficiency or above in reading and mathematics each year and to meet other criteria in order to make AYP.

parents' schooling preferences (Friedman Foundation for Educational Choice , School Choice Survey).

LITERATURE REVIEW

There is mixed opinion among education researchers regarding school competition and its impact on school performance. Overall, the scope of the research on school choice reveals a mixed picture, with some studies suggesting positive impacts, and others indicating negative impacts. Great differences exist among school choice literature; in the overall quality of the research as well as the conclusions the research supports.

Proponents of School Competition

As one of the earliest proponents of school choice, Milton Friedman argued that vouchers for primary and secondary education would widen the options to parents and provide positive outcomes for students. Friedman's paper opines that, "Government, preferably local governmental units, would give each child, through his parents, a specified sum to be used solely in paying for his general education; the parents would be free to spend this sum at a school of their own choice, provided it met certain minimum standards laid down by the appropriate governmental unit. Such schools would be conducted under a variety of auspices: by private enterprises operated for profit, nonprofit institutions established by private endowment, religious bodies, and some even by governmental units" (Friedman, 1955). Since the proposal by Friedman in the 1950's, vouchers have been discussed and widely debated.

In her paper, Hoxby (2002) found that Tiebout choice increases productivity in schools and also improves achievement while lowering spending per student. Hoxby's

research results have been seen as controversial, but she provided a starting point for innovative ways to measure school competition. Additional research about the impact of private schools on competition suggests the competition improves the quality of the public schools (Dee, 1998). Dee's research concluded that competition, even from private schools, provides education benefits not just to those students who are able to choose their school; the increase in competition has positive effects on student outcomes at all competing schools.

Several researchers argue that the higher the level of competition among school districts, the more pressure there is for the individual districts to perform in order to maintain their student base. Chubb and Mo hypothesize that public schools struggle more than private schools because they have less autonomy and are a product of the democratic institution (1988). Their work has helped develop a framework for school choice in public schools. Blair and Staley (1995) examined evidence from Borland and Howsen (1992) which proposed that standardized test scores would be higher in areas with more competition among schools and districts. Blair and Staley found that metropolitan areas with less public school competition have lower school quality. They also found that competition from neighboring schools has a positive effect on student performance.

A review of school choice options in Chicago Public Schools found that students who chose to attend a public school other than the one they were zoned for, were more likely to graduate than those students who stayed at their zone school (Cullen, Jacob, Levitt, 2005). Cullen et al also found that students are more likely to graduate if they opt out of their zone school, but that they do so for reasons other than peers, resources, teachers or curricula. They hypothesize that students may leave their local schools to attend schools with higher

levels of outputs such as higher average test scores and graduation rates. While Cullen et al do not have an exact explanation for the decision of students to opt out of their assigned school, their research does support the concept that competition increases productivity.

Selection bias can be a concern when examining school choice both in public and private schools and is something that should be carefully examined. For example, it is possible that students who are seeking better educational institutes are doing so because they (or their parents) have higher education aspirations. This could make the receiving school appear better and the losing school appear worse even if they are both similarly "productive" in delivering student performance. Schneider, Teske, Marschall, Mintrom, and Roch (1997) acknowledge that parents who are actively choosing alternative schools may bias research results because they are not a random selection of parents in the district. Schneider et al, like many others, attempt to put in place controls in an effort to control for bias. It can only be assumed that these controls allow for an accurate portrayal of school choice.

Opponents of School Competition

In opposition to the arguments for the benefits of school competition, there is literature which poses the idea that competition has negative effects on productivity and performance. McMillan (2000) argues that the effect of school competition is close to zero and can sometimes have a negative impact on certain communities by lowering the quality of education offered. McMillan goes on to suggest that targeted vouchers, given to poor households to pay tuition and fees for their children's schooling at participating non-public schools, would be a better instrument to increase productivity. In a 2006 paper, Rothstein

looked for evidence of parental demand by examining the distribution of student outcomes across schools. After researching the incentive effects of competition among districts he found, contradictory to his initial hypothesis, that school choice did not have a significant impact on increased school effectiveness. He discussed the idea that "effectiveness sorting" only disappears if parents do not attach any value to effectiveness or peer groups. Rothstein holds that this is unlikely to happen because parents typically realize the importance of a child's peer group. He does, however, caution against generalizing the paper's results to choice markets that break up school assignment from residential location. He does so on the basis that school choice may be sensitive to other factors such as nonschool neighborhood amenities that were not considered in the paper. In another paper, titled *Does Competition Among Public Schools Benefit Students and Taxpayers? A Comment on Hoxby*, Rothstein replicated Hoxby's research methods with a corrected data set she supplied. When Rothstein ran the data, he found that the model was highly sensitive to alterations. He also found that, conversely to Hoxby's results, the effect of choice on achievement was not significant. While Hoxby's decision to count the number of rivers and streams in a geographical area to determine a school district's "market share" and boundaries was creative, according to Rothstein the data and methodology had several errors which, when corrected, yielded results that were not significant. In a recent paper, Loeb, Valant, and Kasman (2011) looked at current choice reforms and their effects on student achievement. Their paper discussed arguments as to why one might expect choice and competition to improve student achievement based on demand side forces, the school choosers such as parents, and supply side forces, the schools. They worked with the Milwaukee Public Schools in 2010 to survey principals about how they felt their school

competed for students. Their results found that when the school leaders felt any competition for students, they responded by trying to influence the information received by the parents rather than actually improving the school to better meet the student's needs. Their conclusion suggested that given the interest surrounding school choice, much of the results have been underwhelming and show only modest benefits. They do however acknowledge that although some research has shown that school choice efforts do not always have the desired results, it is important to continue to study them because we still have much to learn about choice options.

RESEARCH DESIGN

Data

There are nearly 645,000 students enrolled in the Kentucky public school system in grades K-12. The school level data used in this paper were collected from the Kentucky Department of Education from the 2001-2008 school years. Missing data were filled in from the National Center for Education Statistics' Common Core of Data (CCD).[3] The dataset included information on school identifiers and characteristics, student characteristics, teacher characteristics, and index scores, all collected at the school level. Information on the geographic land area of the school districts was collected from the Census Bureau TIGER files for school districts. The data were collected from all 120 county-based school districts in Kentucky, as well as the 55 independent school districts. The dataset consisted of 10,250 observations from 1,279 schools over the eight year period. Middle schools and

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[3] The data was originally collected by Dr. Eugenia Toma and her staff. It includes data from the Appalachian Math Science Partnership and Non-Appalachian Math Science Partnership school districts in Kentucky from 2001-2008.

high schools were dropped from the data set because of the limited number of schools available in each district. Data from elementary schools were used in an attempt to achieve a more accurate measure of competition for the schools.

Table 1: Variable Descriptions

Variable	Description
Attendance	average daily student attendance
Student:Teacher	student to teacher ratio
Enrollment	total school enrollment
Spending	spending per student in dollars
Ethnicity White	percent of white students in school
Free/Reduced Lunch	percent of students in school on free/reduced price lunch (poverty)
Experience	average years experience of all teachers in school
Lagged Index Score	lagged student academic index score
Index Score	student academic index score
Schools Per Student	number of schools per student
District Enrollment	log of total district enrollment
Total Schools	log of total schools in district
Master's	percent of teachers in school with a Master's degree
Area	land area of school district

School achievement was measured as a function of the student academic index, standardized across time and school level. The Kentucky Department of Education defines the academic index as a number on a 0-140 scale that calculates how all students

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performed on all of the seven Core Content subjects (reading, math, science, social studies, on-demand writing, arts & humanities, practical living/vocational studies, writing, and non-academic). An index of 100 is equivalent to average student performance, being measured as proficient, but may include some students at the distinguished level and some at the novice and apprentice levels. An index of 140 would mean students performed at the distinguished level in all subjects.

The academic index provided the best single number for comparing the performance of different student groups and getting an overview of achievement gap issues (2003 CATS Interpretive Guide). A student academic index score variable was also generated with a one-year lag to attempt to capture prior impacts on student achievement. The lagged academic index score separates any influences on the index score from year to year, allowing for achievement to be accurately credited to the school or teacher for that year alone.

In this paper, competition was measured in two ways: by the number of schools per student in the district as well as the district enrollment controlling for the total number of schools in a district.

Research Model

The aim for this paper was to determine the effects of school competition on student achievement by holding constant the effects from other variables. Possible random error was reduced by accounting for all the variables related to the schools, students, and teachers. Variables used to represent school inputs in the model were student teacher ratio, spending per student, average years of teacher experience, and percent of teachers

with a Master's degree. The variables used to represent the family and socioeconomic status were the percent average daily attendance, percent white students, and percent free and reduced lunch, which is used to measure the poverty level.

As discussed previously, two measures of competition were used to determine the impact of competition on school performance, as measured by academic index scores. Because of the highly skewed nature of the data due to some outlying school districts, the district enrollment and total schools variables were converted to logarithms to show the logarithmic effect rather than the linear effect of the two variables. The logarithm of a number to a given base is the exponent to which the base must be raised to produce that number. Logarithmic scales reduce wide-ranging quantities to smaller scopes. In this case, a logarithm was utilized to diminished some of the variance in the district enrollment and total schools variables, providing a more normal distribution of the variables.

Two methods of estimation were used to determine the effect of public school competition on school performance. A fixed-effects model was used to estimate the effects of changes in the explanatory variables, such as ratio of students to teachers or poverty level, on changes in the school academic index scores. A fixed-effects model controls for characteristics of the schools that are constant over time but that do vary considerably between schools and could impair the ability to isolate the effects of the variables of interest. By focusing on the changes over time for each school, the effect the changes have on school performance can be determined. By examining the characteristics within a school it was possible to determine whether a change within a school was associated with changes in school test scores over time.

A between-effects model was also used to estimate what how differences between schools affected school index scores. Comparing the differences in characteristics between schools identified what average school characteristics are associated with higher or lower school scores.

Table 2: Descriptive Statistics
Elementary Schools

Measure	n[a]	Mean	StDev[b]	Min	Max
Attendance	5766	82.62218	32.16563	0	98
Student:Teacher	5799	15.45144	2.831889	6	122.9
Enrollment	5800	406.1021	163.6612	69	1170
Spending	5767	5217.99	2485.58	0	14775
Ethnicity White	5462	74.76224	33.96492	0	100
Free/Reduced Lunch	5717	57.23551	22.05328	0	100
Experience	5768	11.8146	2.669018	1.255814	26
Lagged Index Score	5700	76.84394	13.65018	33.4	125.4
Index Score	5626	80.12947	13.81397	36.2	125.4
Schools Per Student	5800	0.0021529	0.0007977	0.001131	0.011583
District Enrollment	5800	15874.11	26702.65	139	90946
Total Schools	5800	25.95966	39.32704	1	135
Master's	5794	66.90099	28.7689	0	100
Area	5792	291.5675	154.299	0.8126298	685.6155

[A] n refers to the number of observations.
[B] StDev refers to the standard deviation.

For both estimation methods, the student academic index was regressed at the district level on demographic controls, teacher characteristics in the school, and the school competition measures of schools per student and the district enrollment controlling for the number of schools per district, leaving all other sources in Kentucky as the omitted base

category. Due to the panel form of the data, multiple observations of many variables over a period of time, a time trend regression was used.

Research Question 1: Does an increase in school competition improve school performance?

This first regression model used a fixed-effect estimator of competition[4]. The fixed-effects model made it possible to control for all stable aspects of the individual school characteristics, even if they vary over time and cannot be measured. The fixed-effects estimation also allowed for general heteroscedasticity (robust estimation) and correlations within schools (clustering). This model is represented by:

$$Y_{it} = A + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \alpha_i + \varepsilon_{it}$$

where Y signifies the academic index score of school i in year t, X represents the variables of interest, α denotes the unobserved individual school effect, and ε is the random error in the model.

Research Question 2: Is there a relationship between school competition and school performance?

A secondary between-effects model was used to recover any hidden effects of the variables that may have been pulled into the effect of the environments of the individual schools. This estimation allowed for the isolation of effects of the variables that remained

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[4] An indicator was used to represent all omitted variables

constant over time. The model used aggregated data to test effects between schools, assuming no school and time effect. The model is represented by:

$$Y_{it} = A + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon_{it}$$

where Y again signifies the academic index score of school i in year t, X represents the variables of interest, and ε is the random error in the model.

ANALYSIS AND FINDINGS

The results of the empirical analysis were unexpected and in contradiction with the original hypothesis of competition in Kentucky. As previously mentioned, the hypothesis assumed that school competition would have a positive impact on school index scores. When measuring competition by number of schools per student in the district, the effect of competition was not significant (Table 3, Model 1). This was in opposition to the original theory that the availability of more schools to a student would increase the school performance. The second model of competition looked at district enrollment and total schools in the district as separate variables (Table 3, Model 2). In this model, yearly increases in district enrollment positively impacted school achievement, while the change in total number of schools was not significant.

Table 3: Fixed-effects Regression Output
Elementary Schools

Independent Variables	Estimated Coefficients (t-statistics)			
	Model 1		Model 2	
Attendance	0.06	(3.20)*	0.06	(3.19)*
Student:Teacher	-0.23	(-2.32)*	-0.24	(-2.44)*
Spending	0.00	(18.59)*	0.00	(18.33)*
Ethnicity White	-0.01	(-1.14)	-0.01	(-0.96)
Free/Reduced Lunch	0.06	(5.42)*	0.06	(5.16)*
Experience	-0.04	(-0.46)	-0.01	(-0.11)
Lagged Index Score	0.20	(18.41)*	0.19	(18.18)*
Schools Per Student	-1072	(-1.01)	-	-
District Enrollment	-	-	8.51	(2.78)*
Total Schools	-	-	-3.93	(-1.39)
Master's	0.07	(5.98)*	0.07	(5.97)*

* significant at .05 confidence level
** significant at .1 confidence level

The positive effect of district enrollment on index scores could be attributed to the attraction of students to districts with higher test scores for a given year, or better teachers rather than a factor of competition itself. Attendance, spending per student, and teachers with a Master's degree were all significant with a positive coefficient. These results were not surprising, indicating that schools with higher attendance, higher spending per student, and teachers with Master's degrees had positive impacts on school performance. Interestingly, free & reduced lunch had a positive, albeit nominal, impact on school index scores. While this seems counter intuitive, a possible explanation may be that the schools in the most impoverished areas are typically the schools that have not been making adequate

yearly progress. These schools that were so far behind the state average only needed to make minimal changes to result in gains in scores, while the schools that were already doing fairly well had to work harder for smaller gains.

When the two measures of competition were run with a between-effects estimator, schools per student was still not significant (Table 4, Model 1). The between-effects model provided another unexpected result, showing that on average for the eight years, higher district enrollment had a negative impact on academic index scores while the total number of schools was not significant (Table 4, Model 2). One reason for this result could be that there is a certain capacity level for schools and when that capacity level is exceeded, it has negative implications for school performance. Teachers with a Master's degree, percentage of white students, and the total land area of the school district are significant and have a positive impact on school index scores. Free and reduced lunch, a measure of poverty, was significant and had a negative impact on school achievement. These results were expected given the normal assumptions of such variables on school performance as measured by the academic index score. If there is indeed a competitive effect among public schools in Kentucky, it is being overwhelmed by something else that the model was unable to capture.

Table 4: Between-effects Regression Output
Elementary Schools

Independent Variables	Estimated Coefficients (t-statistics)			
	Model 1		Model 2	
Attendance	0.00	(0.04)	0.00	(0.05)
Student:Teacher	-0.06	(-0.44)	0.01	(0.08)
Spending	-0.00	(-0.91)	-0.00	(-0.13)
Ethnicity White	0.10	(4.84)*	0.08	(3.36)*
Free/Reduced Lunch	-0.20	(-11.91)*	-0.21	(-11.89)*
Experience	0.09	(0.74)	0.07	(0.54)
Lagged Index Score	0.48	(13.74)*	0.48	(13.66)*
Schools Per Student	6.11	(1.55)	-	-
District Enrollment	-	-	-2.37	(-2.10)*
Total Schools	-	-	1.96	(1.55)
Master's	0.18	(4.67)*	0.19	(4.79)*
Area	0.00	(3.52)*	0.00	(3.74)*

* significant at .05 confidence level
** significant at .1 confidence level

DISCUSSION

Recommendations

A basic yet serious question for policy makers is whether public choice actually matters in Kentucky. Significant research has been done on private and charter school competition, with results suggesting that the competition from these options does have an impact on public schools. However, given the results of this research, it appears that public schools in Kentucky do not serve as competition to each other in regards to improving school performance.

The findings, showing little correlation between competition among public schools and improvement on academic index scores, have important policy implications. This study concluded that yearly increases in district enrollment had positive effects on school performance, but on average over the eight years examined, increased district enrollment had negative effects. Focusing greater attention on schools which saw an increase from year to year could improve the understanding of what attracts students to certain schools.

Limitations

There were several limitations to the model in this paper, partially due to the nature of the dataset. These data use provided information solely on public schools in Kentucky. Given the difficulty of accurately measuring public school competition in Kentucky, a more appropriate comparison might have been competition as measured against private schools.

In this paper, school performance was measured by standardized test results. While this is a common variable often used to measure school performance, it is possible that public schools are competing with one another but that the competition is not influencing school performance.

As previous literature has shown, students who opt out of their assigned school or school district may be self-selecting into new schools because of some type of perceived advantages. This transfer might increase the performance of the new school and decrease the performance of the old school without the student's performance actually changing. A more direct measure could be whether students who transfer have better outcomes than they would have if they had not transferred. Unfortunately, since the data set was collected

at a school level, it did not track students who switched into or out of their designated school.

Previously in the paper, it was mentioned that the assumption was made that students only attend public schools in their county of residence because the exact location of the school was known but not the location of the residence of the student. This study could have been improved if student level data were available and included the location of the student's residence, it might better determine a student's school choice set and in turn provide more relevant information regarding the competition in their catchment area.

For this paper, district enrollment and total schools were converted to logarithms to provide a more normal distribution of the variables. This in essence discarded Jefferson and Fayette County from the model as outliers due to their high number of elementary schools relative to other counties. While this was necessary to provide an accurate measure of competition, it might not accurately portray the public school options of students living in the counties surrounding Jefferson and Fayette.

Finally, it may simply be that there was not enough variance in rural Kentucky school districts to see any effects of competition. The attributes of public schools in Kentucky do not dramatically vary from each other, and therefore any effects of competition on school performance are difficult to measure.

Future Research

Given the somewhat unexpected results of this study, it seems that a better understanding of the impact of competition could be gleaned from continued research in Kentucky, both in rural and urban school districts. The primary question of this study was

whether increased competition has an impact on school academic index scores. Based on the results, a definitive statement on public competition cannot be made through this research. However, the results presented here suggest that future evidence on how competition impacts public schools in Kentucky will have to acknowledge the impact of private schools and the attributes of neighboring public schools.

REFERENCES

Blair, John P. and Sam Staley. "Quality Competition and Public Schools: Further Evidence." *Economics of Education Review*, 1995, vol. 14 no. 2, pp. 193-198.

Borland, M.V. and R.M Howsen. "Student achievement and the degree of market concentration in education." *Economics of Education Review*, 1992, vol. 11 no. 1, pp. 31-39.

Chubb, John E. and Terry M. Moe. "Politics, Markets, and the Organization of Schools." *American Political Science Review*, 1988, vol. 82 no. 4, pp. 1065-1087.

Cullen, Julie Berry, Brian A. Jacob, and Steven D. Levitt. "The impact of school choice on student outcomes: an analysis of Chicago Public Schools." *Journal of Public Economics*, 2005, vol. 89, pp. 729-760.

Dee, Thomas S. "Competition and the Quality of Public Schools." *Economics of Education Review*, 1998, vol. 17 no. 4, pp. 419-427.

Friedman Foundation for Educational Choice. "School Choice in Kentucky." Accessed April 4, 2011. http://www.edchoice.org/School-Choice/State/KY.aspx.

Friedman Foundation for Educational Choice. "School Choice Survey in the State: Kentucky's Option on K-12 Education and School Choice." August 2009. Accessed April 4, 2011. http://www.edchoice.org/CMSModules/EdChoice/FileLibrary/379/KY%20-%20Kentucky's%20Opinion%20on%20K-12%20Education%20and%20School%20Choice.pdf.

Friedman, Milton. "The Role of Government in Education." In Solo, Robert A. (ed) *Economics and the Public Interest*, 1955, pp. 123-144. Rutgers University Press, New Brunswick, NJ.

Hoxby, Caroline. "Does Competition Among Public Schools Benefit Students and Taxpayers?" *The American Economic Review*, December 2002, vol. 90 no. 5, pp. 1209-1238.

Kentucky Department of Education. "2003 CATS Interpretive Guide," 2003, Frankfort, KY. Accessed March 31, 2011.http://www.education.ky.gov/nr/rdonlyres/58d35fb2-bcd0-4d17-8aa3-8470c6dcd6ea/0/2003catsinterpretiveguidev101.pdf.

Loeb, Susanna, Jon Valant, and Matt Kasman. "Increasing Choice in the Market for Schools: Recent Reforms and their Efforts on Student Achievement." *National Tax Journal*, March 2011, vol. 64 no. 1, pp. 141-164.

McMillan, Robert. "Competition, Parental Involvement, and Public School

Performance." *National Tax Association Proceedings*, 2002, 93rd Annual Conference on Taxation, pp. 150-155

Rothstein, Jesse M. "Does Competition Among Public Schools Benefit Students and Taxpayers? A Comment on Hoxby." Accessed March 5, 2011. http://gsppi.berkeley.edu/faculty/jrothstein/hoxby/hoxbycomment_firstsubmission.pdf.

Rothstein, Jesse M. "Good Principals or Good Peers? Parental Valuation of School Characteristics, Tiebout Equilibrium, and the Incentive Effects of Competition among Jurisdictions." *The American Economic Review*, September 2006, vol. 96 no. 4, pp. 1333-1350.

Schneider, Mark, Paul Teske, Melissa Marschall, Michael Mintrom, and Christine Roch. "Institutional Arrangements and the Creation of Social Capital: The Effects of Public School Choice." *American Political Science Review*, March 1997, vol. 91 no 1, pp. 82-93.

Tiebout, Charles M. "A Pure Theory of Local Expenditures." *The Journal of Political Economy*, October 1956, vol. 64 no. 5, pp. 416-424.