Fall 2013

The Competitive Effect of Vouchers on the Performance of Traditional Public Schools in Hamilton County, Ohio

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By Nathan R. Lowe

Entitled
THE COMPETITIVE EFFECT OF VOUCHERS ON THE PERFORMANCE OF TRADITIONAL
PUBLIC SCHOOLS IN HAMILTON COUNTY, OHIO

For the degree of Doctor of Philosophy

Is approved by the final examining committee:
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THE COMPETITIVE EFFECT OF VOUCHERS ON THE PERFORMANCE OF TRADITIONAL PUBLIC SCHOOLS IN HAMILTON COUNTY, OHIO

A Dissertation

Submitted to the Faculty

of

Purdue University

by

Nathan R. Lowe

In Partial Fulfillment of the
Requirements for the Degree

of

Doctor of Philosophy

December 2013

Purdue University

West Lafayette, Indiana
I dedicate this study to my amazing wife, Anne, who has endured these past three years with me as a doctoral student. I could not have done this without her support, sacrifice, and encouragement. She carried the weight of the household responsibilities while I was gone on Saturdays at Purdue, attending evening classes during the week, and then working late into the night on this research. I owe Anne a trip to Europe when this is all over, but more importantly, I look forward to the extra time I will be able to spend with her and our children. Thank you for believing in me.
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ABSTRACT

Lowe, Nathan R. Ph.D., Purdue University, December 2013. The Competitive Effect of Vouchers on the Performance of Traditional Public Schools in Hamilton County, Ohio. Major Professor: Dr. Marilyn A. Hirth, Purdue University

The purpose of this quantitative study is to determine the effect that educational choice, in the form of vouchers, is having on the performance of traditional public schools in Hamilton County, Ohio. The threat of losing students to vouchers creates a sense of competition for students, and ultimately the dollars that are attached to them. This competition is relatively new to public education and is being promoted by state legislators as a catalyst for public school improvement. All data sets were obtained from publically available data on the Ohio Department of Education website between 2001 and 2012. Between 2001 and 2012, 107 Hamilton County schools had data points for each year. Twenty-five (25) of those schools were threatened by voucher eligibility in 2006 and eighty-two (82) were exempt from the threat of vouchers. The twenty-five schools threatened by vouchers increased an average of ten (10) Performance Index points between 2007 and 2012. The 82 non-threatened schools only increased an average of one (1) Performance Index point. The voucher-threatened schools closed the achievement gap 17 Performance Index points between 2001 and 2012. When the voucher effect was compared in a multiple regression to other factors that may contribute to change in performance, only the voucher variable was significant. Going from a non-voucher
eligible school to a voucher eligible school is associated with a 19% increase in PIS from 2007 to 2012. Schools that are eligible for vouchers are not closing at a significantly faster rate than non-voucher eligible schools in Hamilton County, Ohio based on a Chi-Square Test of Independence. The results of this study indicate that the traditional public schools in Hamilton County Ohio have responded positively to the threat of competition from vouchers. The EdChoice (voucher) program seems to be having a positive effect on the performance scores of previously failing public schools. Recommendations were made to educators and legislators who are debating this topic at the state level.
CHAPTER 1. INTRODUCTION

How do the following words apply to the traditional public education system: competition, capitalism, free market economy, supply and demand, marketing, and choice? In the past twenty years these words have begun to play a major role in the public education system in the United States of America. For the bulk of the twentieth century, public education was associated with words that fit more with a social welfare economic philosophy: words like free, equal, compulsory, state-controlled, and guaranteed. Most people, especially those without disposable income, had only one option when it came to education: the public school down the street. There were no other viable options. Private schools were reserved for middle or upper class citizens who could afford the cost of tuition.

All that changed on the national level on June 27, 2002, when the United States Supreme Court ruled in Zelman et al, v. Simmons-Harris et al, “that vouchers did not violate the Establishment Clause, thus leading the way for voucher programs throughout the United States” ("NCSL," 2012). Education vouchers are public monies, placed in the hands of parents and students, to be spent on private education at the school of their choice. The first city to adopt a school voucher plan was Milwaukee, Wisconsin. In 1990, when it started, only private schools with no religious affiliation could receive the vouchers, and consequently, only several hundred students took advantage of the
program. Within ten years, vouchers had been extended to parochial schools in Milwaukee and the number of students jumped to 10,000 (Peterson, Campbell, & Brookings Institution, 2001).

Since then, Louisiana, Ohio, Indiana, and the District of Columbia have passed legislation granting vouchers to low-income families. Several privately funded voucher programs have also been introduced in major metropolitan areas. Seven states: Florida, Georgia, Louisiana, Mississippi, Oklahoma, Ohio, and Utah, have endorsed legislation allowing voucher support for all special needs students who wish to attend non-public schools ("NCSL," 2012).

**The Voucher Debate**

The National Conference of State Legislators (2012) outlines the arguments on both sides of the voucher debate. Proponents of the vouchers suggest that the system provides more educational opportunities for low-income students. At the same time, vouchers should create an incentive for public schools to improve as a result of competition with parochial and private schools. Proponents also believe that vouchers will result in a better education for students because bureaucracy will be reduced and parents will gain more influence and control in educational decision making.

On the other side of the debate, opponents claim that vouchers serve to weaken public schools by siphoning much needed monies away from traditional public schools. Then states give those monies to private schools with little accountability attached for how they are spent. Some opponents argue that the amount of money provided through vouchers is insufficient to provide real equality in educational access when only a fraction of the tuition cost is covered. Because of the limited funds offered through
vouchers, low income students still do not have the opportunity to attend the most expensive private schools. Finally opponents assert that vouchers serve to lower the quality of public education by drawing away the most informed parents and students, thereby creating increased segregation along socioeconomic lines ("NCSL," 2012).

In spite of the arguments on both sides of the voucher debate, it is interesting to note that what started out as a movement to increase educational opportunities for parents has become a tool for the educational reform of traditional public schools (TPSs). This issue is the focus of the following research.

**Statement of the Problem**

As each state wrestles with the voucher question in the next few years, these are a few of the questions that legislators and education committees are asking: What is the effect when competition is introduced to the public education system? Do TPSs improve their program to attract or keep students? Do teachers work harder to produce engaging lessons and higher performing students? Do superintendents and principals provide more professional development for staff, better resources for quality learning, and marketing plans to promote their accomplishments? Are public schools really “weakened” by voucher programs as the opponents claim? Do the students who are “left behind” in the TPS suffer educational or social harm as a result of this new form of competition? What data could we study to find out the answers to these questions?

These questions and others have motivated the following research. The answers to these questions will determine the future of public education in the United States of America, and possibly the world. If the competitive effect of vouchers, charters, and expanded educational choice can be shown to drive the improvement of public education,
then it will be implemented as a tool in each state of the union. It will be embraced by both political parties as a legitimate method of educational improvement. It will gain momentum and be used by increasingly larger percentages of the population.

If, however, the competitive effect of school choice is not legitimized as a catalyst for public school reform, then it will most likely remain a tool used by a small segment (traditionally less than 1%) of our population to equalize educational choice. It will only be accepted in education circles as an alternative option for parents at lower socio-economic levels. In other words, vouchers will primarily be used as a means to equal the playing field for relatively few impoverished families, but will not be an accepted method of educational reform.

My own educational experience is split evenly between public and private education. I spent my elementary, secondary, and undergraduate work in private, parochial schools. Then I spent the next 15 years in public education as a teacher, coach, and administrator; and I am working on my second post-graduate degree from a public institution. Now I work for a private, faith-based alternative school which partners with public schools to provide drop-out prevention programming. Based on my diverse background and experience I am well positioned as a researcher to understand and explore both sides of this issue.

Although vouchers are relatively new to education, the concept of choice is not. The public charter school concept has enjoyed much wider acceptance as it moved from state to state in the past twenty-five years, and excellent data are available on charter schools to help researchers make claims about their effectiveness (Bohte, 2004; Booker, Gilpatric, Gronberg, & Jansen, 2008; Holmes, DeSimone, & Rupp, 2006; Lubienski &
Weitzel, 2010; Ni, 2009). We now know more about the competitive effect on the TPS in each state with charter school laws on the books. What we do not know is if that competitive effect works the same with vouchers as it does with charters. Matthew Carr (2009) and David Figlio (2010) are two researchers who have published research in this new area (Carr, 2009; Figlio, Hart, & Urban Institute, 2010), and in both cases, they had only a few years of data with which to work. This study will attempt to expand this research because of access to several more years of data.

**Purpose of the Study**

The purpose of this study is to investigate the competitive effect of vouchers on the traditional public school as measured by changes in the quality of education measured by performance indicators. This study focuses on the EdChoice “voucher” program in Hamilton County, Ohio. Hamilton County is home to Cincinnati Public Schools as well as several suburban districts. School performance as measured by the Performance Index Score (PIS) is compared before and after the EdChoice program was introduced in 2006. Carr (2009) was working with only two years of data, and now there are six years of data after vouchers were introduced available for evaluation. The long-term effects or trends of the voucher program on TPSs in Hamilton County are now observable. Hamilton County Ohio was chosen because it has a smaller data set that is fairly representative of the entire state. Cincinnati has a healthy mix of urban and suburban schools; high performing and low performing schools; poverty and wealth; small and large enrollments; and ethnic diversity. One final advantage is that vouchers are relatively new to Hamilton County, unlike the Cleveland Public Schools which introduced vouchers
in the mid 1990’s. Comparable data prior to 1990 are not readily available for Cleveland Public Schools, thereby eliminating Cleveland from the study.

Research Questions

1. Is the introduction of EdChoice consistent with a statistically significant difference in the quality of public education in Hamilton County as measured by the PIS?

2. How well does time explain the variation in mean PIS scores for voucher eligible and non-voucher schools?

3. When holding other variables constant, is the threat of vouchers found to be a statistically significant predictor of PIS variation for voucher eligible schools?

4. Do we see an increased incidence of school closings with voucher eligible schools in Hamilton County?

Chapter two reviews the literature available on the competitive effects of school choice, charters, and vouchers. The smallest area of research is on the topic of vouchers, and this study will add to this research by studying a well-established voucher system in Hamilton County Ohio. The implications for other states debating this type of legislation for educational reform are deep and far-reaching. Before the education system continues down the road of competition and educational choice, educators must take a critical look at those states who are marching out in front. This leads directly to the literature review.
CHAPTER 2. REVIEW OF RELATED LITERATURE

Introduction

This review of the literature begins with a broad view of school choice and narrows toward the more recent voucher phenomenon that is sweeping the nation. School choice includes homeschooling, open enrollment, magnet and charter schools, alternative and online schools, and vouchers to attend private schools. Each state is moving through this polarizing repertoire of options at different rates and with differing levels of success.

The second major area in this literature review deals with the idea of competition as a catalyst for school improvement. This concept has been debated philosophically for years. Now that we have more than twenty years of school choice experimentation nationwide, researchers and legislators are able to back up their positions with data. Many educators believe the competitive effect of charters and vouchers on public schools is very similar, so this review of the literature will begin with the largest body of research (charters) and narrow toward the research area with the least amount (vouchers).

The third section focuses specifically on the competitive effect that charter schools are having on traditional public schools. A charter is typically a smaller, retooled public school that is exempt from much of the regulation that governs traditional public schools. Charter schools were chosen because most states have had them for many years,
and there is a growing body of peer-reviewed research on these schools. And, unlike private school data or homeschool data, the data on charters are publically available, making empirical research much easier to accomplish. This educational concept (the charter school) has also been embraced by the educational community more widely than other choice options.

Between the third and fourth sections of the literature review is a sub-section on creaming and reverse-creaming. Much of the research on the competitive effect of charter schools narrows in on the issue of creaming or sorting of students. This question is raised by opponents of charters and vouchers who claim that only the best students, those who have the most parental support, will take advantage of the voucher or charter option and consequently leave the traditional public school. Then the scores in the traditional public schools will go down and the achievement gap will widen.

The fourth major area narrows even further to the voucher question: Does the threat of the voucher motivate public schools to improve? Vouchers are public funds that are used by students to pay the tuition at private schools, including religious institutions. Vouchers are usually the last stop on the school choice bus because of the litigation that surrounds church-state separation. Because the voucher concept is relatively new to the education world, research on the competitive effect of vouchers is limited.

School Choice Trends in the USA

In the American School and University Journal, Kennedy (2007) gives a concise description of the changes taking place in public education as states and schools respond to the demand for more options. He uses data from the National Center for Education Statistics 2006 survey, "Trends in the Use of School Choice,” to support his premise.
Before open enrollment became the norm, parents had little choice but to attend the school in whatever district they lived. Unless they could afford private school tuition and transportation, the public school was the only option. In fact, that is how many families shopped for housing. They chose to live in a school district based on the quality of the local public school. In the past 20 years, that has begun to change. “80 percent of school-age children in 1993 attended the school to which they were assigned; by 2003 only 74 percent were attending their assigned school” (Kennedy, 2007, p. 20). With open enrollment the norm now in most states, that number will continue to plummet.

As dissatisfaction with public schools increases, more options become available. The survey found that the parents of students enrolled in assigned public schools were in general less satisfied with their children's schools than parents of students in chosen public schools or private schools. (Kennedy, 2007, p. 22)

Kennedy (2007) also points out that school choice availability to parents varies across the country. More than 61 percent of parents report public school choice options in the West, compared to 39 percent in the Northeast, 47 percent in the South, and 58 percent in the Midwest. These choice options include charter schools and voucher schools, and suddenly Traditional Public Schools (TPSs) are facing a competitive market for the first time in United States history. Schools must now compete for students and the state dollars that follow those students.

Proponents of school choice argue that the entire educational system benefits from the competition to attract and/or keep students. Belfield and Levin (2002) find that “increased competition and higher educational quality are positively correlated” (p. 297).
This conclusion makes perfect sense to economists, and if it were that simple we could adopt it as policy and be done with it. Opponents of school choice are quick to point out however, that it is not that simple when dealing with the complexities of educational choice. Belfield and Levin (2002) recognize this and clarify this finding in the next sentence. “However, the effects of competition on education outcomes appear to be substantively modest. Between one-third and two-thirds of the estimates lack statistical significance, and the methods applied are often multivariate regressions (Belfield & Levin, 2002, p. 297).

Yongmei Ni and David Arsen (2011) have done extensive research on this debate. They have been researching school choice and competition in Michigan for several years. They explain that those in favor of school choice believe that if funding is tied to enrollment, TPSs will have “incentive to compete and increase their effectiveness and efficiency by working harder and implementing educational improvements” (Ni & Arsen, 2011, p. 3). They go on to explain that critics of school choice believe that competition will only widen the gap between those with access to quality education and those without it. School choice policies will “create winners and losers relative to the status quo, increasing academic, racial, and social class stratification while further concentrating many of the most disadvantaged students in schools depleted of the personnel and resources needed for improvement” (Ni & Arsen, 2011, p. 3).

As Ni and Arsen (2011) delve deeper into the reasons that families choose one school over another, they find that socioeconomic factors may play a larger role than the quality of education in the decision to select another school. Parents who exercise choice options tend to move away from schools with high populations of poverty or minority
students. This finding plays a major role in the competitive effects of school choice. “In
short, our results indicate that in Michigan….the market signals these policies provide to
school personnel have very little to do with the student academic outcomes they strive to
improve” (Ni & Arsen, 2011, pp. 20-21). Opponents claim it causes a form of de facto
segregation, and no educational improvements.

Public school choice typically begins with open enrollment, a system that drops
the traditional boundary markers between school districts. Students can attend any
school for which they have transportation. David Welsch and David Zimmer (2010)
studied Wisconsin’s open enrollment program that was introduced in 1990 and was
considered by school choice advocates to be a pioneer state in this realm. These two
authors were looking at student migration in general. When a student has the option to
move out of a district, how does that district respond? They conclude that when students
begin moving out of a district, standardized test scores improve slightly in the following
year. “In particular, districts that experience a 5 percentage point increase in out-
migration subsequently witness increases of about 4–7 percentage points in the
percentage of students scoring advanced or proficient” (Welsch & Zimmer, 2012, p. 206).
They also conclude that schools typically focus more on preventing out-migration than
attracting in-migration of students. This shows that, at least in Wisconsin, TPSs are
affected by student migration. What it does not show, is whether the overall educational
quality increased. Further study is required to show the cause of the test score increases.
Open enrollment is now mandated by NCLB 2002 for schools that are failing to make
Adequate Yearly Progress (AYP) for two consecutive years, and many states have
adopted legislation allowing this basic level of choice for all schools.
At the other end of the public school choice spectrum is the voucher option, where public dollars can be directed to private, often religious schools. Although this concept is still hotly contested at the state level, in 2002 the United States Supreme Court ruled in *Zelman, Superintendent of Public Instruction of Ohio, et al, v. Simmons-Harris et al.*, “that vouchers did not violate the Establishment Clause, thus leading the way for voucher programs throughout the United States” ("NCSL," 2012).

Ironically, both political parties have embraced the school choice movement to varying degrees, although the implementation and regulation is still debated. The major difference in the current voucher discussion is, in speculation, that successful parties will embrace the winds of political change ushered in by a historical presidential election and an ecumenical coalition calling for comprehensive school reform. Just as Senator Blaine embraced nationalism in lieu of political and religious conflict, both former Speaker of the House Newt Gingrich and the Rev. Al Sharpton have united to embrace President Obama's vision for school reform. This phenomenon signals a bipartisan platform for school reform that may recast the school choice debate. (Sutton & King, 2011, p. 265)

Literature in the area of school choice trends in the United States suggest that the current political climate nationwide has swung the pendulum in favor of vouchers, charters, and choice. Percentages of students attending charters and private schools are up. Homeschooling is continuing to rise nationally. Movement is trending away from the TPS which is no longer the only game in town. Vouchers aimed at low income families are allowing this segment of the population into the educational choice arena for
the first time. Wherever these publicly-funded choices have been challenged, even on the grounds of separation of church and state, courts have decided in favor of expanded choice, thereby taking students, money, and resources from the public schools. The reason for this shift is not so much that charters or vouchers have been proven effective, but a general and growing dissatisfaction with the public school system in America.

**Competition as a Catalyst for School Improvement**

School choice as a movement was started on the premise that parents should have, as the name implies, choice in the education of their children. Somewhere along the way, another purpose was added by education reformers. They looked at traditional public schooling and asked these questions: What if school choice could be a motivator for schools to improve? Would schools work harder to keep or attract students and the money attached to them by the state? Would TPS students ultimately perform better on achievement tests as a result of this increased competition?

George Holmes and others (2006) compared test scores in schools before and after competition was introduced in North Carolina and found that charter school competition serves to increase the overall academic performance of traditional public schools. Using seven measures of the impact of charter-school competition, Holmes et al. found that four of the seven measures were statistically significant while the other three measures were just short of statistical significance. The authors concluded that:

All else being equal (including the school's score on the performance composite the previous year) the presence of charter-school competition increases traditional school performance by about 1 percent. This represents more than one-half of the average achievement gain of 1.7
percent made by public schools statewide between 1998-99 and 1999-2000 and is, from a policy perspective, nontrivial. (Holmes et al., 2006, pp. 69-70)

Holmes et al. (2006) begins his concluding sentence (above) with the phrase, “All else being equal…” and the fact is that not all else is equal. The temptation is to compare the performance of the public school before and after competition is introduced, and if scores improve, assume it was a result of the competition. After studying traditional public schools in Michigan, Ni and Arsen (2009) are cautious about that conclusion. They suggest that the benefits of choice policies on educational outcomes in traditional public schools have not yet been established. “While it is appropriate to be cautious about drawing strong policy implications from extant research, the results thus far are hardly compelling” (Ni, 2009, p. 24). Correlation does not equal causation.

That is not to say that there are no TPS benefits associated with choice competition. Public schools are forced to think creatively when enrollment is dropping and funding is disappearing. In Kansas City Missouri, almost twenty percent of the students are now enrolled in charter schools (Kennedy, 2007). The district superintendent, Anthony Amato, took this “opportunity” to realign the buildings and programs that were left and eliminate the middle schools altogether. It was found that the new preK-8 configuration resulted in “more efficient use of facilities; fewer transitions between schools; improved attendance and achievement; fewer discipline problems; better curriculum articulation; increased parental involvement; longer-term relationships with teachers; and students having the same school schedule as younger siblings”
(Kennedy, 2007, p. 23). These benefits cannot be discounted and are a direct result of students leaving the TPS for local charter schools.

The findings regarding the impact of school choice on motivation for school improvements are mixed. Much depends on the location that is being studied and the methodology used by each researcher. Ni (2009) studied Michigan and found no positive effect of competition on the traditional public schools. She states that after a dozen years, the Michigan schools are just as bad as they have ever been. Holmes (2006) seems to find reason for a more positive outlook in North Carolina, where charter school competition has helped raise the traditional school performance by 1 percent. This is significant because it represents more than half of the achievement gain for public schools in a 3 year period. Kennedy (2007) uses data from the National Center for Education Statistics to show the shift away from public schools and toward educational choice alternatives. His statistics are 6 years old, but a quick check of the current numbers show that this trend has not slowed.

One limitation in these studies on competition and school performance is that it is not merely economics being studied. Schools, human behavior, and learning are being evaluated; and these are not strictly supply and demand; input and output issues. The following questions must be asked: Was the increase in test scores a result of the new teaching techniques and engaging curriculum, or was it a result of the natural sorting that took place as a result of competition? The difference here is critical. If one goal of educational choice is to prompt schools to approach learning differently and improve their craft, it will be a failure if students are only sorted and rearranged. This point is
The Competitive Effect of Charters on Public School Performance

Marcus Winters (2012) conducted a study on the effect of charters on public schools in New York. He recognized that most of the attention and research surrounding charters is focused on the performance of the students who left for the charter schools. Winters studied the effect on the students who were “left behind” in the public schools and found small but positive effects on educational achievement for students who stayed in public schools when given the choice to move to charter schools. Winters suggests that the competition created by the charter school movement has not harmed student achievement. He finds that these results are consistent with the results of previous studies which looked at the effect of school choice on academic outcomes of students at public schools (Winters, 2012).

The most important contribution of this paper is its focus on measuring the influence of school choice in a large urban setting. The finding that public school students benefit, though slightly, from competition from charter schools provides some encouragement for those who would continue to expand the charter school sector in American cities. (Winters, 2012, p. 301)

Kevin Booker et al. (2008) studied charter schools in Texas and found that the presence of charter schools had a positive effect on student test performance for the students who remained in public schools. The authors further found this effect in both reading and math as well as in “both district and campus level penetration measures, and
across a variety of specifications” (p. 143). It was concluded that the presence of school choice, in the form of charters, may result in systemic gains. It was not clear from this study whether the same gains would be achieved from the institution of broader choice systems such as vouchers.

Future research on the charter experiment which focused upon identifying the sources of gains from competition would help inform the general relevance of our findings. The relevance of school choice policies within the current policy environment rests upon the accumulation of evidence, such as ours, that children who stay behind are not necessarily left behind. (Booker et al., 2008, p. 143)

John Bohte (2004) conducted a similar study in Texas which looked at how the presence of charter schools impacts the achievement trends of high school students enrolled in traditional public schools across the state of Texas. He compared the overall pass rate on the Texas Assessment of Academic Skills (TAAS) prior to and after charter school competition was introduced. His interpretation of what he finds is interesting.

A 1 percentage point increase in countywide charter school enrollments (as a proportion of total enrollments) is associated with a 0.10 percentage point increase in district pass rates on TAAS exams the following year. There is clear evidence that charter schools are having an impact on the performance of students in traditional public schools. (Bohte, 2004, p. 511)

This seems like a very small percentage point increase after one year of data to be claiming “clear evidence” of an impact on TPS student performance.
To his credit, Bohte (2004) does use the results of a Texas Center for Educational Research survey completed by more than 300 superintendents to obtain some qualitative data. “At least a small part of the performance gains among students in traditional public schools are likely the result of policy changes initiated by administrators concerned about the impact of funding losses that result charter competition” (Bohte, 2004, p. 515).

As Bohte (2004) searches for the reasons for his “clear evidence” he finds “a much greater percentage of the performance gains among students enrolled in traditional public schools likely result from the movement of at-risk students to charter schools” (p.515). One interesting piece of information about Texas charters is brought out by Yongmei Ni and David Anderson in The Charter School Experiment (2010) edited by Lubienski and Weitzel. They note that roughly one half of the Texas charters were designed for at-risk students. As these students pull out of TPSs, the scores will naturally rise.

**Creaming & Reverse-Creaming**

John Bohte (2004) is getting down to the issue of how charter competition may naturally produce higher test scores, depending on the design or purpose of the charter. Critics of charter schools and school choice in general argue that competition will lead to creaming, in which the best students transfer to choice schools and, leaving traditional public schools with the burden of teaching weaker students. An equally valid concern is whether choice creates an avenue for “reverse creaming,” where administrators in public schools purposely encourage the transfer of weaker students to charter
schools in order to focus on less resource-intensive student populations.

(Bohte, 2004, p. 516)

Patrick McEwan in his 2004 study of Cleveland, Milwaukee, and Chile calls the phenomenon “cream-skinning” when higher level students are removed from the public school to participate in some level of school choice.

The mounting evidence on sorting suggests that cream-skinning could lower the achievement of remaining public school students. This is not necessarily a concern if the achievement declines from sorting are outweighed by gains from competition. However, most of the literature on private school competition does not suggest that gains would be large. More alarmingly, it is not at all clear that research succeeds in identifying the causal effect of competition. (McEwan, 2004, p. 76)

The flaw in his evaluation of this possible explanation is that the ends justify the means. If the goal of competition is really school improvement, one should not be satisfied with creaming or sorting of students to improve the data. And, as he points out, the gains from competition are not significant enough in the research to outweigh any achievement losses.

Ni and Arsen in Lubienski’s (2010) book, The Charter School Experiment, identify and neatly summarize eleven studies on the competitive effects of charter schools. Large urban district data or statewide data from Michigan, Arizona, Ohio, Texas, North Carolina, and Florida have all been studied since 2000. What they find is the results are “…mixed, with three studies finding negative competitive effects, three no effects, and five positive effects. Where positive effects have been found, they are
generally quite small” (Lubienski & Weitzel, 2010, p. 115). The authors identify the problem of mixed results as the inability of researchers to remove the self-selection bias of the students.

The preceding studies looked at the effect of charter schools on the public school students that were left behind when their classmates enrolled in charters. Winters (2012) found that public schools who actually lost students to charter schools were unaffected by the competition, or showed mild benefits in English and math scores. Bohte (2004) adds to the research by zeroing in on which student demographic remaining in the public schools benefits most from the presence of a charter. The strongest performance gains are found in the low-income students. Bohte (2004) goes on to define “creaming” and “reverse creaming” as two likely results of charters that may have more to do with school performance than the competitive effect of charters. Booker (2008) finds “robust evidence” that students who are “left behind” in public schools when some students choose to attend a nearby charter school are not really being left behind. In fact, their achievement scores in math and reading improve. Ni and Arsen in Lubienski (2010) summarize the charter school competitive effects as early and inconclusive. “Charter school competition is a very blunt policy tool for bringing about needed reforms in urban schools” (p. 118).

**Examples of Competitive Effects of Vouchers on Public School Performance**

The final area to be explored in this literature review is the competitive effect of vouchers on public school performance. Vouchers that pay for private school tuition seem to be the last battle that school choice advocates fight in each state. Because
vouchers cross the church-state divide, states have been slow to pass this legislation. However, several states have led the way into this final frontier. Florida is one of them.

David Figlio & Cassandra Hart studied the competitive effect of Florida vouchers in 2010 and found that “…all four measures of competition are positively and significantly related to student performance (p.23). This study looked at the distance between the TPS and the closest private school accepting vouchers. The authors find that every mile closer to the private school increases TPS performance in math and reading by at least 0.014 of a standard deviation. Likewise, an increase in the number of private schools available nearby correlates to an increase in test scores. “While these estimated effects are modest in magnitude, they are very precisely estimated and indicate a positive relationship between private school competition and student performance in the public schools” (Figlio et al., 2010, pp. 23-24). At first glance, it seems that TPSs are responding positively to the threat of vouchers in Florida. More research is needed to determine the cause of these test score increases.

Matthew Carr’s 2009 dissertation on the Ohio EdChoice program and the effect it is having on public schools is the study that most closely resembles the research questions and methodology in this study. It is here that the review of literature is focused to its narrowest point. Carr’s findings and how he achieved them will be explained, the flaws will be critiqued, and the new questions, methodology, and findings will be added to the growing body of knowledge on this topic.
Carr’s research questions include the following:

(1) Will traditional public school buildings where students are eligible to use a voucher see significant changes on indicators of overall proficiency in math and reading than buildings not so threatened?

(2) Will traditional public school buildings where students are eligible to use a voucher see significant changes on indicators of advanced or limited proficiency in math and reading than buildings not so threatened?

(3) Will traditional public school buildings where students are eligible to use a voucher see significant changes on indicators of administrative and personnel policies (proximal effects) than buildings not so threatened?

(Carr, 2009, p. 139)

Carr addressed his research questions by evaluating data from 2003 to 2008 using a fixed-effects regression design. The study focused closely on the outcome data from 2006, the year that vouchers were introduced in Ohio. While few effects were observed on overall proficiency passage rates following the introduction of vouchers, voucher-threatened schools did show significant gains in the percentage of students moving out of the lowest performance category and in the percentage of students moving into the highest performance category. (Carr, 2009, p. 139)

Through his proximal effects models (addressing research question 3), Carr also found that “voucher threatened schools increased resources for staff support, reduced student truancy, and increased their focus on discipline” (Carr, 2009, p. 139). This third research question is probably the most important because it gets to the heart of the improvement question. Did public school administrators make a concerted attempt at
change or did they just ride out the voucher competition and hope the less successful students take the voucher option – reverse creaming?

Carr (2009) did his research on the EdChoice program only three years into the program. He saw that schools faced with the threat of vouchers focused their efforts on the highest and lowest performers. These students were identified as the ones most likely to take advantage of the voucher and leave the TPS. He found little overall change in the passage rates on state testing. The competitive effect of vouchers in Ohio was negligible.

Review of research related to the competitive effects of vouchers on public school performance suggests that voucher-threatened schools are not harmed by the threat of voucher schools in the neighborhood. Some TPSs even show slight improvement and the greater or closer the competition is to the public school, the greater the growth associated with it. However, we must be careful with these findings. Some research indicates that the effect is caused by sorting of students, not the positive response to competition that choice advocates may claim. Many are interested to know if the effect has changed over time. Now that the Ohio EdChoice program has six years of data, the results of this study may be entirely different. This leads to the current research.
CHAPTER 3. METHODOLOGY

Introduction

The methodology for this study was driven by the research questions which are listed again in the next section. The goal was to isolate the voucher effect on the performance of the traditional public school as measured by the Performance Index Score (PIS). Carr used individual student scores from a few specific, grade-level tests to attempt to isolate the voucher effect on the PIS scores for that school. The methodology for this study looks at the relationship between voucher-threatened schools and schools not threatened by vouchers. It also compares the annual growth in PIS before and after the voucher threat was introduced. A multiple regression is used to compare the effect of other common predictors of performance with the voucher effect. Finally, a chi-square test of independence is used to determine if voucher-threatened schools are closing at a faster rate than their non-threatened neighbors. These four tests should give reliable answers to the questions below:

Research Questions

1. Is the introduction of EdChoice consistent with a statistically significant difference in the quality of public education in Hamilton County as measured by the PIS?

2. How well does time explain the variation in mean PIS scores for voucher eligible and non-voucher schools?
3. When holding other variables constant, is the threat of vouchers found to be a statistically significant predictor of PIS variation for voucher eligible schools?

4. Do we see an increased incidence of school closings with voucher eligible schools in Hamilton County?

Ohio was chosen as the focus of this study for two reasons: (1) Ohio has a relatively long and established history with educational choice, charter schools, and vouchers. The Ohio EdChoice program has stood the tests of time, scrutiny, legislation and litigation. (2) Ohio has an excellent department of education website that has made the raw data available to the general public: http://ilrc.ode.state.oh.us/Downloads.asp. On this particular page one can find disaggregated, downloadable, reports going back to the 2000-2001 school year. These reports can then be exported as Excel files for further sorting and statistical analysis. Another very useful page on the website is the Power User Reports (http://ilrc.ode.state.oh.us/Power_Users.asp) which can be used to create custom reports with the specific information needed. A researcher can identify by county, school district, or individual school building, and then disaggregate the data for socio-economic status, disability, race, or any other subgroup. Each of the statistical models will still require cleaning and sorting, but starting with good, solid, readily-available, raw data is crucial to further study and peer review.

As was explained near the end of Chapter One, Hamilton County has one of the best representations of school districts across the state of Ohio. Three other large, metropolitan school districts in the state were considered for this study, but were eliminated for separate reasons. Cleveland was eliminated because that particular voucher program was started in 1995 and data prior to the introduction of vouchers are
not readily available. This fact alone makes it more difficult to study the competitive effect of the voucher program in Cleveland over time, which is a focal point of this study.

Columbus was eliminated for the opposite situation. Columbus has several very affluent neighborhoods with excellent schools. Very few inner-city schools were threatened by the voucher option, and therefore the EdChoice program would most likely have had very little competitive effect. Akron was the final option considered, and although it has a fairly good representation, it is substantially smaller in size and number of schools compared to Cincinnati.

**Instrumentation**

The Performance Index Score (PIS) is another unique feature that Ohio introduced in 2000. This score is derived from a formula that takes into account all of the Ohio Achievement Assessment (OAA) results of students from third through eighth grades and the Ohio Graduation Test (OGT) results from grade ten. Higher proficiency scores receive more weight than lower proficiency scores and then each school is given a PIS from zero to 120. The PIS is helpful in that it collapses all the test data for each school into a single score. This score and formula have remained unchanged since it was introduced in 2000. For research purposes, especially when comparing overall school improvement over time, this is a very useful data point. Since the researcher is looking for the competitive effect of vouchers on the overall performance of the TPS, the bulk of the statistical research will focus on this score.

The reliability and validity of the PIS are directly related to the reliability and validity of the OAA and OGT. Because the weights are pre-determined, and based on the level of achievement on these assessments, which are also reliable, each these scores are
calculated, researchers will achieve the same results. These scores are standardized. Because the PIS is tied directly to the performance scores on the achievement exams, which are also standardized, the researcher is testing what he intends to test, making the PIS valid by definition. Higher scores on the assessments will result in a higher Performance Index Score for the school.

**Variables**

The dependent variable in the first few tests of this statistical research is the percent change in the PIS. The independent variables are (a) Voucher or Non-Voucher schools based on Adequate Yearly Progress (AYP) designation and represented by a dummy variable, one or zero, and (b) Time. The schools in the voucher threatened category received a rating of “D” or “F” for three years in a row and are designated by the dummy variable “one”. The other schools, not immediately threatened by losing students to vouchers, are represented by a “zero”.

For research question three, a set of control variables are included that are commonly attributed to the performance indicators of a school: discipline referrals, minority population, expenditures per pupil, highly qualified teachers, and socio-economic status. These are independent variables that, when changed over time, often have an effect on school performance. They are analyzed along with the independent variable of voucher eligibility or not, again represented by a “one” or a “zero”. The dependent variable remains the PIS.

The final test uses a discrete variable based on whether or not a school survived all six years after the introduction of vouchers. For this particular test, the independent variable remains as “voucher eligibility” and the dependent variable is "school closing".
However, the nature of these variables is different than that of the continuous variables utilized in the other tests. That is to say, they are binary, discrete variables (yes or no). Either the school was voucher eligible, or it was not. Either the school closed, or it did not. Thus, a special test was used to accommodate these variables—a Chi-Square Test of Independence.

**Procedures**

The research began by separating the voucher eligible schools from the non-voucher eligible schools and running a simple t-test: paired two-sample for means. This test helped to determine if each group had statistically significant change between 2007 when vouchers were introduced, and 2012, the most recent year for which data are available. To begin to isolate the voucher effect, the PIS was compared for schools before and after 2007, when vouchers were introduced. Did performance change at the same rate before and after vouchers, or did we see a difference in rate of growth? The compound annual growth rate (CAGR) was calculated to identify if the change in growth was significant before and after the introduction of vouchers. The graph of those trend lines demonstrates both similarities and differences. This was followed by a cubic time-series regression on the voucher group to see if that better represented the trend than a linear trend line.

A time series, multiple regression was implemented to test the categorical independent variables. This tested the variance between the mean PIS for each category of school before and after the introduction of vouchers. Finally, to answer question number four, the research called for a Chi-Square Test of Independence to see if the voucher-threatened schools closed at a greater rate than non-voucher schools.
Threats to Validity

The threat to validity in this research, as identified by Carr (2009) is regression to the mean. The best control for this threat is to compare the trend before and after the treatment in both voucher and non-voucher schools. To combat this threat, the research began with t-tests on the PIS trends before and after vouchers were introduced. This allowed the researcher to compare the rate of growth and possible trend toward the mean for both groups, before and after vouchers. The advantage this 2013 study had that Carr (2009) did not have was four more years of trend data after the introduction of EdChoice. With the abundance of data available on the ODOE website, this study had as many years of data before vouchers as after, which helped increase the validity of the trend lines over time.

The second threat to validity that often comes up in studies on voucher effect is endogeneity, which can be caused by self-selection bias. This study, like Carr’s (2009) study, avoided this issue altogether. The focus of this research was only on the threat of vouchers as determined by a school’s A-F classification. Regardless if any students actually chose to take the voucher and leave the public school, the researcher wants to know that school responded to the threat of competition from vouchers? The self-selection bias was eliminated from this study by design.

The third threat to validity had to do with explanation of the results. In this review of the literature, it was referred to as the “creaming effect” or “reverse creaming”. What if the PIS trends up or down, not because schools are responding to the competition, but because students are being sorted into schools that better fit their peer group, behavior, or socio-economic status? Those variables were included in the study
and were controlled for by studying the change in each variable after vouchers were introduced. Those changes were included in the multiple regression and effectively eliminated as factors in the results of this study, especially when compared with the voucher effect.

The final threat to validity is the number of school closings between 2007 and 2012. If the voucher-eligible schools closed at a higher rate than the non-voucher eligible schools, that would affect the validity of this study. It would seem to indicate, not that voucher threatened schools improved, but that they were forced to close. Eliminating a higher percentage of lower performing schools from one of the groups being compared could skew the data upward, giving the impression of improvement, when actually they are failing at a higher rate. The final test of independence sufficiently dealt with this threat head on.
CHAPTER 4. RESULTS

Research Question One

Is the introduction of EdChoice consistent with a statistically significant difference in the quality of public education in Hamilton County as measured by the PIS? The null and alternative hypothesis for this test is stated as follows for voucher eligible schools:

Ho: $\mu_{2007} - \mu_{2012} \geq 0$

Ha: $\mu_{2007} - \mu_{2012} < 0$

When we compare PIS scores for voucher eligible and non-voucher eligible schools 5 years after eligibility began, were those scores higher at a statistically significant level? Therefore, two paired sample t-tests were run: the first for voucher eligible schools and the second for non-voucher eligible schools in the year 2007. These tests compared the mean PIS score for 107 Hamilton County schools with data in 2007 and 2012. The first t-test is 25 schools under the threat of losing students to vouchers.
Table 1. *t*-Test: Paired Two Sample for Means for Voucher Eligible Schools

<table>
<thead>
<tr>
<th>Descriptive Data</th>
<th>2007</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>69.036</td>
<td>78.944</td>
</tr>
<tr>
<td>Variance</td>
<td>57.459</td>
<td>70.828</td>
</tr>
<tr>
<td>Observations</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.346</td>
<td></td>
</tr>
<tr>
<td><em>P(T&lt;=t)</em> one-tail</td>
<td>7.52466E-06</td>
<td></td>
</tr>
</tbody>
</table>

The mean PIS jumped from 69.036 to 78.944 during the experimental period when the EdChoice voucher program was in full effect. This is significant at p<.01.

For comparison purposes, the next *t*-test involves the other 82 schools in Hamilton County that were not in danger in 2007 of losing students to the voucher program.

Table 2. *t*-Test: Paired Two Sample for Means for Non-Voucher Schools

<table>
<thead>
<tr>
<th>Descriptive Data</th>
<th>2007</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>97.562</td>
<td>98.803</td>
</tr>
<tr>
<td>Variance</td>
<td>76.292</td>
<td>92.241</td>
</tr>
<tr>
<td>Observations</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.849</td>
<td></td>
</tr>
<tr>
<td><em>P(T&lt;=t)</em> one-tail</td>
<td>0.0151</td>
<td></td>
</tr>
</tbody>
</table>

The mean PIS for these schools went from 97.56 to 98.80 during the same period, which is significant at p<.05. To summarize, 2007 Voucher eligible schools saw an increase in their mean PIS of approximately 10 points. For non-voucher schools, the
increase was just over 1 point. Both findings were statistically significant, although non-voucher schools was significant at \( p<.05 \) compared to \( p<.01 \) for voucher eligible schools. We reject the null hypothesis that there is no significant change in the PIS after the introductions of vouchers, and accept the alternative hypothesis which suggests there was a statistically significant jump in mean PIS for voucher eligible schools. This suggests that there is a relationship between the introduction of vouchers and the PIS in Hamilton County, Ohio.

**Research Question Two**

What if the Hamilton County schools were already growing at a similar rate prior to the introduction of vouchers? This brings us to research question two. How well does time explain the variation in mean PIS scores for voucher eligible and non-voucher schools? Here, the predictor variable is time, and we can compare the results across voucher eligible and non-voucher eligible schools. Prior to utilizing time as a variable to predict the variation in PIS scores, it is helpful to explore the rate of growth occurring across both school categories (before and after vouchers were introduced). Specifically, the null and alternative hypotheses for this test are stated as follows (both voucher eligible and non-voucher eligible):

\[
    H_0: \mu_{\text{CAGR01-06}} - \mu_{\text{CAGR07-12}} \leq 0
\]

\[
    H_a: \mu_{\text{CAGR01-06}} - \mu_{\text{CAGR07-12}} > 0
\]

As mentioned, the Compound Annual Growth Rate (CAGR) allows us to compare—not just a change in scores—but the rate of growth across voucher and non-voucher eligible schools. This is important in order to tease out the velocity of growth between school categories and make a distinction between them.
A t-test (assuming unequal variances) will tell if the difference in the growth rate is significant. Table 3 shows the results of the CAGR for all schools in Hamilton County, which can be used to compare each subset to the group norm.

**Table 3. t-Test: Assuming Unequal Variances for All Hamilton County Schools**

<table>
<thead>
<tr>
<th>Descriptive Data</th>
<th>CAGR 2001-2006</th>
<th>CAGR 2007-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6.03</td>
<td>0.827</td>
</tr>
<tr>
<td>Variance</td>
<td>228.88</td>
<td>3.75</td>
</tr>
<tr>
<td>Observations</td>
<td>107</td>
<td>107</td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.000306221</td>
<td></td>
</tr>
</tbody>
</table>

The mean growth for all Hamilton County schools went from 6.03 PIS points per year, to .827 PIS points per year. This is a drastic decrease in the rate of growth which could be attributable to two major variables: the introduction of vouchers or the change in the state tests, both of which came in the same school year. The state test scores are the primary determinates of the PIS for each school. Either way, we notice a major slowing in the rate of growth since 2006.

Here is what we see with schools that are eligible for vouchers in 2007:

**Table 4. t-Test: Assuming Unequal Variances for Voucher Eligible Schools**

<table>
<thead>
<tr>
<th>Descriptive Data</th>
<th>CAGR 2001-2006</th>
<th>CAGR 2007-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>14.48</td>
<td>2.75</td>
</tr>
<tr>
<td>Variance</td>
<td>890.79</td>
<td>7.21</td>
</tr>
<tr>
<td>Observations</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.030965148</td>
<td></td>
</tr>
</tbody>
</table>
This test shows significance at p<.05. Compound Annual Growth before vouchers was a little more than twice the rate of the county. After 2006, the CAGR for voucher eligible schools is more than three times the rate of the rest of Hamilton County. Below are the results of the non-voucher schools:

<table>
<thead>
<tr>
<th>Descriptive Data</th>
<th>CAGR 2001-2006</th>
<th>CAGR 2007-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.45</td>
<td>0.242</td>
</tr>
<tr>
<td>Variance</td>
<td>6.814</td>
<td>1.29</td>
</tr>
<tr>
<td>Observations</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.0000</td>
<td></td>
</tr>
</tbody>
</table>

This t-test indicates that growth also slowed for the non-voucher schools. Prior to vouchers, the compound annual growth was half the rate of Hamilton County. After vouchers, the growth rate slowed to less than one third that of the rest of the county. All three tests were significant at p<.05 for a one-tail test.

The Compound Annual Growth Rate (CAGR) comparisons between voucher and non-voucher eligible schools reveal that voucher eligible schools demonstrate a more robust rate of growth than the county average or non-voucher eligible schools over a similar period.

Another way of illustrating this effect is through a time-series regression model. In a time-series regression, “time” is the independent variable used to explain the dependent variable, which in this case is mean PIS for the period 2001-2012. The Null and Alternative Hypothesis are stated as follows:
Ho: $\beta_1 + \beta_2 + \beta_3 = 0$

Ha: $\beta_1 + \beta_2 + \beta_3 \neq 0$

Note: The beta coefficients are time variables ($x$, $x^2$, and $x^3$). In other words, by rejecting the null hypothesis, we are concluding that time—whether expressed as linear ($x$), quadratic ($x^2$), or cubic ($x^3$)—is a good predictor of the dependent variable, which in this case reflects mean PIS scores.

The results are as follows:

Table 6. Time-Series Regression for Non-Voucher-Schools

<table>
<thead>
<tr>
<th>Regression Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>R Square</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>df</td>
</tr>
<tr>
<td>Regression</td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Standard Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>78.4581</td>
<td>1.78</td>
</tr>
<tr>
<td>Period</td>
<td>5.1843</td>
<td>1.14</td>
</tr>
<tr>
<td>Period$^2$</td>
<td>-0.4646</td>
<td>0.20</td>
</tr>
<tr>
<td>Period$^3$</td>
<td>0.0142</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Before describing the output, it is important to recognize what is taking place in a time series regression. As mentioned, time is the explanatory variable with mean PIS scores by year being the dependent variable. In a regression model, two primary questions need to be addressed. First, is there a relationship between the predictor variable(s) and the dependent variable? Second, what line best approximates this
relationship? In this particular model, there is a strong relationship, but a straight line (linear) was not the best line to approximate the relationship. Thus, a cubic (polynomial) line of best fit was used to describe the variation in the dependent variable. Consequently, this line provided the highest r-squared values for both voucher and non-voucher schools (meaning that it could explain more of the variation in the dependent variable: mean PIS).

From a model perspective, we notice two things. First, the r-square is .966. This means that time explains nearly 97% of the variation in PIS scores for non-voucher eligible schools. Second, the F-statistic is significant at p<.01. This means that the model is found to be a statistically significant predictor of the dependent variable.

While r-squared values were high for both time-series models (voucher and non-voucher eligible schools)—the coefficients tell us something important about the trend lines for PIS growth. For the non-voucher schools, the coefficient on the cubic variable \(x^3\) was positive, implying that we might expect the third “period” of this model to have a positive increasing trendline. Although the coefficient value was positive, it was not found to be statistically significant. In other words, where the \(x\) and \(x^2\) values fit the line well, the \(x^3\) value did not. This implies more of a dome shape than the S-shaped curve typical of a cubic model where coefficient values for \(x\), \(x^2\), and \(x^3\) are positive, negative, and positive accordingly. This is illustrated in table (7) below.

It is interesting to contrast this model with the voucher eligible time-series regression. Similar to the non-voucher model, this model (Table 7 below) has a high r-squared value (95.5%) and a statistically significant F-value (implying that the model is good for prediction purposes). Moreover, we see that the values for \(x\), \(x^2\) and \(x^3\) have
coefficient values of positive, negative, and positive (similar to the non-voucher time
series model). However, we see that $x^3$ is statistically significant in this model,
implying that the third period in the line of best fit does, indeed, trend upward. This is
also illustrated below in Table 7.

Table 7. Time-Series Regression for Voucher Eligible Schools

<table>
<thead>
<tr>
<th>Regression Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>R Square</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>df</td>
</tr>
<tr>
<td>----</td>
</tr>
<tr>
<td>Regression</td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Standard Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>35.3765</td>
<td>3.51</td>
</tr>
<tr>
<td>Period</td>
<td>13.8048</td>
<td>2.25</td>
</tr>
<tr>
<td>Period$^2$</td>
<td>-1.9125</td>
<td>0.39</td>
</tr>
<tr>
<td>Period$^3$</td>
<td>0.0892</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Based on this information, we reject the null hypothesis for the time series
regression model and accept the alternative (time does explain the variation in mean PIS).
The null for the time series regression is that there is no relationship between time and
PIS scores. There is a relationship between time and PIS scores, and it is a cubic
-polynomial) relationship, which may be easier to visualize with the illustrative graph
(Figure 1).
This graph reveals that all schools are showing growth in PIS between 2001 and 2006. Then, something is introduced that causes all schools to show a decline in the performance index. Most researchers presume that this dip is caused by the new state assessments that were introduced in 2007 to several million students, not the threat of several thousand students taking vouchers. This dip will be discussed further in the final chapter of this study.

The line of best fit for voucher eligible schools is a polynomial line from a cubic regression. After 2006 is where we see the greatest difference in growth for the voucher eligible schools. When we evaluate the formulas for the cubic regression we can see a significant difference in the values that are multiplied by x: In the first sequence 13.805 for the voucher schools, and 5.183 for the non-voucher schools. It is also apparent that
the polynomial line for non-voucher schools seems to plateau at the end, while the line for voucher schools is arcing sharply upward. The voucher-threatened schools make up a lot of ground as they head toward 2012. The achievement gap is closing between the voucher-threatened schools and the non-threatened schools. It went from a 37 point gap in 2001 to a 20 point gap in 2012.

Closing the achievement gap between the between failing schools and exemplary schools cannot be overstated. This is an issue that everyone involved in education is trying to address. Legislators, superintendents, teachers, reformers, and researchers are all working to close this gap. It appears that one solution to closing this achievement gap in Hamilton County involves the competitive effect of EdChoice on the public education system.

**Research Question Three**

To validate this claim, however, it is necessary to control for other variables that might play a role in PIS variation—thus, the third research question: When holding other variables constant, is the threat of vouchers found to be a statistically significant predictor of PIS variation for voucher eligible schools?

$H_0$: Vouchers do not have an influence on the variation of the PIS (when adding control variables to the regression model).

$H_0: \beta_1 + \beta_2 + \ldots + \beta_n = 0$

$H_a: \beta_1 + \beta_2 + \ldots + \beta_n \neq 0$

This is where it can get tricky. Is it possible to isolate the voucher effect when there are so many variables that impact the performance of a school? To do this one must isolate the 135 schools in Hamilton County that had data in both 2007 and 2012. This is
a different set than was studied in the first part of this research because that previous analysis could only include schools that had performance scores every year from 2001 to 2012. Now that we are looking at demographic data and a shorter span of years, more schools can be included in the study.

A snapshot of school data in 2007 and in 2012 included each control variable, and using a multiple regression, identified significant factors in the determination of the PIS. The dependent variable is the percent change in the PIS between 2007 and 2012. The independent variables are as follows: 1. Voucher eligible in 2007; 2. Percent change in discipline infractions; 3. Average percent minority students; 4. Percent change in expenditure per pupil; 5. Average percent highly qualified teachers; 6. Average percent of economically disadvantaged students. The multiple regression will indicate which of these independent variables has the greatest effect on the PIS scores between these two years.
None of the p-values are significant EXCEPT the p-value for whether or not the school was eligible for vouchers in 2007. This is a “Dummy Variable” where if the school was eligible they get a 1 and if they weren’t eligible they get a 0. Thus, we say that going from a 0 to a 1 (non-voucher eligible to voucher eligible) is like adding an additional 19.76% to a school’s % change in PIS Scores (the coefficient associated with this variable).

With an F-value for significance well below .01 we see that this model has predictive power at a statistically significant level. However, when we look at the p-values for each individual predictor variable, the only variable for the 135 included schools that has significance is the voucher eligible variable at p<.01. And with a
coefficient value near 20%, we see that vouchers have a significant positive relationship with the percent change in PIS. Going from a non-voucher eligible school to a voucher eligible school is associated with a .19 or a 19% increase in PIS from 2007 to 2012. This provides evidence that voucher eligibility is a good predictor of the variation in PIS. We can safely reject the null hypothesis that vouchers do not have an effect on the PIS when other variables are held constant. No other variable in this model accounts for as much of the Performance Index Score variation as does the voucher variable.

Some may point out that the R-squared (or the coefficient of determination) only accounts for about one-third of the variation in PIS (.323 or 32.3%). However, this value is acceptable when studying human behavior. The variables included in this study are the same variables that educators often use to explain why a school improvement initiative will or will not work. These demographic indicators are some of the best available to predict individual student performance. However, when applied to a whole school growth model or predictor of school performance, they just do not hold up. Other variables that may have an influence on test scores like curriculum implementation, instructional strategies, or teacher motivation have not been included in this study, even though these variables would most likely play a role in explaining the variation in the dependent variable (% change PIS). However, most of them cannot be “modeled” or captured in a regression model. For example, motivated teachers would likely influence student performance, but one cannot simply put “motivation” into a regression model.

The first three research questions have helped to substantiate the use of vouchers as a means to improve public school performance. In other words, voucher eligible schools that were still around from 2007 to 2012 do better. That is the good news. Is
there another side to that coin? A common charge against vouchers is that they accelerate school closings. So, criticism might be that voucher eligible schools do better, if they survive, but if vouchers cause a lot of public schools to close they are not really a catalyst for improvement. As the data were being collected for these tests it was difficult to find enough schools in Hamilton County that had data for the entire twelve year period. Some schools began well and then the data ends at 2009, so that school was eliminated from the study. It can be assumed, based on the state and federal sanctions for school improvement that these schools had failed to make Adequate Yearly Progress (AYP) and were summarily closed or reorganized. Other schools only have data from 2007 on and it seems that these were the reorganized schools that were born out of the death of a failing school. The data seemed to indicate that schools either made significant improvement and stayed open, or did not make improvement and were forced to close or reorganize. It is only fair to investigate this claim, even if it derails the entire study.

**Research Question Four**

The final research question is this: Do we see an increased incidence of school closings with voucher eligible schools in Hamilton County?

To answer this question, a Chi-Square “test of independence” was run to help determine whether a relationship existed between voucher eligibility and school closings. A Chi-Square test explores relationships between discrete, or categorical, variables—making it a natural fit for the two variables of interest (voucher eligible=yes/no; school closed between 2007 and 2012=yes/no). The null and alternative hypotheses are stated as follows:
Ho: Voucher eligibility and School Closings are independent; no relationship

Ha: Voucher eligibility and School Closings are not independent; related

In 2012, 280 Hamilton County Schools were in existence, but 63 of those schools did not exist in 2007 and were removed from this test. We are only interested in schools that were open in 2007 and whether or not they were still open in 2012. That leaves 217 schools with data and this group of schools comprises the final data set. Of these 217 schools, 43 closed between 2007 and 2012. This left 174 schools that survived this 6 year period. Figure 2 illustrates the data.

**Figure 2. Chart Comparing School Closings from 2007-2012**
Most educators understand that if a school does not show Adequate Yearly Progress, it will eventually be taken over by the state, reorganized, or shut down. It seems to reason that if a school is eligible for vouchers, it is not only in danger of losing students and money, but it is also in danger of being closed. It appears that the proportions are in line with what we would expect.

As we can see from the graph, Hamilton County had 43 schools close between 2007 and 2012 and 174 schools that did not close during this period. This means that nearly 20% or one out of five schools, voucher or not, closed or reorganized. On the left set of columns there is a higher than average ratio of voucher-eligible schools that closed (12/43=27%). On the right side we see only 23% (50/217 = 23%) of all Hamilton County schools are eligible for vouchers. Another way to look at it is that 24% (12/50=24%) of all voucher-eligible schools closed their doors between 2007 and 2012. This is higher than the average of 20%.

The fact remains that a greater percentage of voucher eligible schools did close in Hamilton County. The question remains, is it different enough to be statistically significant? To find out, it was put to a statistical test: a Chi-Square test of independence. Table 9 has the results.
Table 9. Chi-Square Test of Independence for School Closings in Hamilton County


<table>
<thead>
<tr>
<th>N=217 Schools in Hamilton County</th>
<th>Did the School Close Between 2007 and 2012?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Total</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-------</td>
</tr>
<tr>
<td>Was the School Voucher Eligible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in 2007?</td>
<td>31</td>
<td>136</td>
<td>167</td>
</tr>
<tr>
<td>No</td>
<td>18.6%</td>
<td>81.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Expected Count</td>
<td>33.1</td>
<td>133.9</td>
<td>167.0</td>
</tr>
<tr>
<td>% within Was the School Voucher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eligible in 2007?</td>
<td>12</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Yes</td>
<td>6.3%</td>
<td>33.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Expected Count</td>
<td>9.9</td>
<td>40.1</td>
<td>50.0</td>
</tr>
<tr>
<td>% within Was the School Voucher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eligible in 2007?</td>
<td>76.0%</td>
<td>24.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>174</td>
<td>217</td>
</tr>
<tr>
<td>Count</td>
<td>19.8%</td>
<td>80.2%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Expected Count</td>
<td>43.0</td>
<td>174.0</td>
<td>217.0</td>
</tr>
<tr>
<td>% within Was the School Voucher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eligible in 2007?</td>
<td>100.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>217</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi-Square Test

<table>
<thead>
<tr>
<th>Chi-Square Test</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.716</td>
<td>1</td>
<td>.397</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>217</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table restates that nearly 20% (19.8) of all schools in Hamilton County closed their doors or reorganized between 2007 and 2012. Twenty-four (24%) of the voucher-eligible schools closed their doors during the same period compared with 18.6% of non-voucher schools. If these percentages are different enough, the Pearson Chi-Square value will be less than .05. In this analysis, the Pearson Chi-Square is .397, which is not statistically significant because the P-value is > .05. Is there a relationship between voucher eligibility and school-closings? According to the chi-square output, there is not.
Therefore, we fail to reject the null hypothesis which states that there is no relationship between school closings and vouchers in Hamilton County. According to this test, we have enough evidence to say that the two are independent of each other. Therefore, this would not fit with a narrative claiming that voucher eligibility exacerbates school closings—at least in Hamilton County.

**Summary of Results**

The four research questions that drove this study were answered by the data returned. The first question asked if there was a significant difference in the PIS for voucher and non-voucher schools, before and after vouchers were introduced. The model found that there is significance at $p<.05$ for non-voucher; $p<.01$ for voucher. In Hamilton County Ohio there is a significant change in the PIS after the introduction of vouchers for both types of school. The second question attempted to isolate time as a variable and identify the shape of the trend line before and after vouchers were introduced. Using the Compound Annual Growth Rate and a time-series regression, time was found to be a significant variable in the change in PIS for all schools. Once again, however, voucher eligible schools grew at a faster rate than the non-voucher schools, and closed the achievement gap by 17 PIS points.

The next step was to use a multiple regression to isolate the voucher effect from five other variables that could have played a role in changes in the PIS for each school after the introduction of vouchers. The voucher variable was the only one that had a statistically significant effect on the PIS. And the final step was to determine if voucher eligible schools were closing or reorganizing at a higher rate than non-voucher schools. The finding of the chi-square test of independence was that schools threatened by
vouchers are not closing at a higher rate, statistically, than schools not threatened by vouchers. Chapter five will discuss what this means for the traditional public schools in Hamilton County, Ohio.
CHAPTER 5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The question of competition in education has been debated and tested for generations, and it will continue to be debated for generations to come, especially when it includes vouchers. This study adds only a trifle to that conversation, and is by no means conclusive. However, some interesting conclusions can be drawn from the data coming out of Hamilton County, Ohio in the wake of the EdChoice program introduced in 2006.

This chapter is divided into three sections. The first section presents the purpose and methodology of this study. In the second section, the conclusions reached for each of the four research questions and the null hypotheses are discussed. The final section presents recommendations for further research on the competitive effect of vouchers. In addition, the final section offers implications from the research for state legislators who are currently debating this issue.

**Purpose and Methodology**

The purpose of this study was to investigate the competitive effect of vouchers on the traditional public school as measured by changes in the quality of education measured by a Performance Index Score for each school. Initially, the concept of a voucher was primarily promoted as a tool to equalize educational opportunities for parents. Now that vouchers are being touted by legislators as a catalyst for public school improvement, educators want to know if it is working as claimed.
This study focused on the EdChoice “voucher” program in Hamilton County, Ohio, which is home to Cincinnati Public Schools as well as several suburban districts surrounding the inner-city. School performance was measured by the Performance Index Score (PIS) which is a comprehensive rating for each school building based on test scores and other education data benchmarks. The purpose of this study was to attempt to isolate the voucher effect from the other major effects on the PIS, and determine the significance of that effect.

The methodology for isolating the voucher effect began with a comparison of the mean trendline for voucher-threatened schools prior to the introductions of vouchers, and the mean trendline for schools not threatened by vouchers. Is there a relationship between the mean Performance Index Scores and the introduction of vouchers? It also compared the compound annual growth rates in performance scores before and after the voucher threat was introduced. A time-series regression was employed to determine the relationship that time had as an explanatory variable and the line of best fit. A multiple regression was used to compare the effect of other common predictors of performance with the voucher effect. Finally, a chi-square was used to determine if voucher-threatened schools closed at a faster rate than their non-threatened neighbors. These tests gave reliable answers to the research questions posed, answered, and analyzed in the next section.

Conclusions

Research Question number 1: Is the introduction of EdChoice consistent with a statistically significant difference in the quality of public education in Hamilton County as measured by the PIS? We rejected the null hypothesis that there is no significant
change in the PIS after the introductions of vouchers. There is a positive relationship between the introduction of vouchers and the PIS in Hamilton County, Ohio at p<.05 for all public schools. In fact, if a school is threatened by a voucher, the mean increase in the PIS is almost 10 points, and the significance increases to p<.01. Whereas the mean increase for public schools not threatened by vouchers is just over 1 point and is significant a p<.05. Although the research might have stopped here, this statistic does not convince the reader or the researcher. How do we know that vouchers were responsible for the increase in the mean PIS? What if the mean PIS for both groups was already growing at a similar rate before the introduction of vouchers? There are still too many unanswered questions. So we press on to the second question.

Research question 2: How well does time explain the variation in mean PIS scores for voucher eligible and non-voucher schools? This question was answered in two parts. The null and alternative hypotheses for the first test are stated as follows (both voucher eligible and non-voucher eligible): There is no change in the Compound Annual Growth Rate (CAGR) for the six years prior to the introduction of vouchers, compared to the six years after the introduction of vouchers. We rejected the null hypothesis and found that there is a significant change in both voucher and non-voucher threatened schools at p<.05. For voucher eligible schools, the Compound Annual Growth before 2006 was a little more than twice the rate of the county. After 2006, the CAGR for voucher eligible schools was more than three times the rate of the rest of Hamilton County. And non-voucher threatened schools dropped to one third the growth rate of the rest of the county.
The null hypothesis for the second test involving time was stated as follows:
There is no change in the PIS over time for Hamilton county schools. We rejected the null after running the time-series regression because in fact there is a relationship between time and PIS scores, and it is a cubic (polynomial) relationship. For non-voucher threatened schools, the third iteration of time is not significant, \( p > .05 \), but for voucher-threatened schools, the third iteration of time is significant at \( p < .01 \). What this shows is that in 2008, two years after vouchers were introduced, the PIS for non-voucher schools leveled off. However, the PIS for voucher-threatened schools began to arc sharply upward again and continue to rise. This was the information that Carr (2009) did not have when he completed his research in 2009. This shows the influence that time has had on the PIS for voucher-threatened schools.

In chapter 4 it was noted that there is a significant dip in test scores that ultimately affect the PIS for each school. In 2006 the Ohio State Achievement Tests hit their peak, and then in 2007 we see a drop in scores across the state. The state tests were changed to include more stringent standards and subsequently scores went down. This follows the pattern of any new education initiative where schools see an implementation dip. Interestingly, the public schools not threatened by vouchers have essentially plateaued since 2008. They did not rebound like the voucher-threatened schools did. It could be concluded that the competitive effect of vouchers continues to help drive scores upward. But before we draw that conclusion, we must investigate the potential that other variables could have on the PIS, which leads to the next research question.

Research question three: When holding other variables constant, is the threat of vouchers found to be a statistically significant predictor of PIS variation for voucher
eligible schools? The null hypothesis states that vouchers do not have an influence on the variation of the PIS. A snapshot of school data in 2007 and in 2012 included each control variable, and then, with a multiple regression, identified significant factors in the determination of the PIS. The dependent variable was the percent change in the PIS between 2007 and 2012. The independent variables were voucher eligible in 2007, percent change in discipline infractions, average percent minority students, percent change in expenditure per pupil, average percent highly qualified teachers, and average percent of economically disadvantaged students.

The multiple regression indicated which of these independent variables had the greatest effect on the PIS scores between these two years. The only variable that had any significant effect on the PIS was the voucher variable at $p<.01$, and this effect accounted for 19% of the percent change in the PIS between 2007 and 2012. Voucher eligibility is a good predictor of PIS. We can safely reject the null hypothesis that vouchers do not have an effect on the PIS when other variables are held constant. No other variable in this model accounts for as much of the performance indicator score as does the voucher variable.

This test also indirectly addresses the “creaming” or “reverse creaming” debate that presented itself in the Review of Related Literature (Chapter 2). If creaming was actually taking place, then these other demographic variables would have a greater effect on the PIS than the data indicate. It seems that if some sort of creaming is taking place, and students are being sorted based on race or socio-economic status, it is having no measurable effect on the change in PIS of these schools.
The results of the first three research questions established the voucher-effect as a catalyst for traditional public school improvement. It seems that voucher-eligible schools are closing the achievement gap with non-voucher threatened schools and the PISs for these schools are headed in the right direction. The final research question was included to investigate the claim of voucher critics that while some schools improve to avoid losing students to vouchers, the rest are just being shut down. Perhaps that would account for some of the improvement. Because those underperforming schools are not included in the study, we really do not see the full picture.

Research question four: Do we see an increased incidence of school closings with voucher eligible schools in Hamilton County? The null hypothesis was “voucher eligibility” and “school closings are independent”; there is no relationship. What we found is that roughly one fifth of all schools, voucher or not, closed in Hamilton County between 2007 and 2012. Voucher-eligible schools did close at a slightly greater rate in Hamilton County. To find if this difference is statistically significant it was put into a statistical test: a Chi-Square test of independence. The results of the Chi-Square test found that there was no statistically significant difference in the rate of school closings between voucher and non-voucher threatened schools. Therefore, we fail to reject the null hypothesis. There is no relationship between voucher eligibility and school closings in Hamilton County, Ohio.

In conclusion, traditional public schools in Hamilton County, Ohio have little to fear when it comes to competition posed by voucher eligibility. It seems that schools are responding positively to that threat, performance is improving, and voucher-threatened schools are in no more danger of closing than those not threatened by vouchers. When it
comes to change in the PIS, minority populations, families in poverty, discipline infractions, per-pupil spending, and teacher certification have less to do with school performance than the competitive effect of EdChoice (voucher) legislation.

**Recommendations and Implications**

It is interesting to watch each state debate the pros and cons of educational choice. Charters, vouchers, and educational choice are moving across this country at varying rates, and these changes should be made cautiously and circumspectly. Ohio is one state that seems to be leading the way when it comes to educational choice, and the voucher program they have established applies specifically to schools that have been failing for three years out of five. This seems to intensify the competitive effect of the voucher program, because these schools would feel the financial loss of these students immediately and profoundly.

Some states, like Indiana, have implemented voucher programs that are much more comprehensive, but actually mitigate the competitive effect of the voucher. In Indiana, all students from any school district are eligible to apply for a voucher. And when those monies are applied to a private school, a little bit is taken out of the pot for all public schools. For education choice proponents, Indiana is preferred over Ohio. However, for those promoting vouchers as catalyst for school improvement, some of the competitive effect is lost in Indiana. Even if zero students from a given school take a voucher, that school will still lose revenue because the total pot of money for public education is reduced. Alternatively, if a significant number of students leave a particular school to take a voucher, the financial impact is spread over all the schools in the entire state. Of course the school that lost students to vouchers will also lose the funding it
would have received from those students. For the competitive effect of vouchers to produce results similar to what we found in Hamilton County, Ohio, the program must be similar.

Now, since this research was completed, legislators in Ohio voted in 2013 to expand the EdChoice Scholarship Program to include all low-income students from any school. Apparently the effect of vouchers on failing schools was significant enough to justify applying the rules to any school in the state. The changes will begin with the kindergarten class in the fall of 2014 when low-income students from A, B, and C rated schools can also apply for vouchers in Ohio. And the cap on EdChoice scholarships which was set at 14,000 for the past 6 years has been increased to 60,000 scholarships. It will be interesting to see if the exemplary schools who are now threatened by vouchers will see an increase in performance scores. If an exemplary school has plateaued performance, the competitive effect of vouchers may be able to prompt an increase.

Recommendations from this study are as follows:

1. Legislators who want to use vouchers as a catalyst for TPS improvement should follow an implementation model similar to the EdChoice program in Ohio. Do not assume that all voucher programs are the same. This one is unique and should be researched thoroughly, especially considering the recent changes.

2. Be sure the voucher program is comprehensive enough to provide real educational choice for parents in the lowest performing schools. This should always remain the primary purpose for vouchers.
3. The voucher program should not penalize schools that are showing continuous improvement and/or exemplary status. Although if an exemplary school has plateaued, vouchers may be a viable option to promote performance growth.

4. Be sure that the vouchers are taken directly from the funding from the school that is consistently failing, so that they feel the direct effect of the competition for those dollars.

If these recommendations are followed, a voucher program may have a similar, positive, competitive effect on the performance of the traditional public school. This is the beginning of the research on competitive effects of vouchers, and much more must be done.

Also, there were several questions raised during the research that are outside the scope of this study. These would be great questions for further research:

1. Why did the voucher-eligible schools show improvement in the PIS?

2. What professional development, staff training, curriculum, or program changes were made in response to the vouchers that may have affected the PIS?

3. When a voucher eligible school was forced to close, what happened to the students? Where did they go? Did they perform at a higher level after attending another school?

4. When a voucher eligible school reorganized, did the students show improvement in the new model? Currently, there is no easy way to follow the schools that reorganize to see the result. The Ohio State Department of
Education does not publish this information, but this would be a very interesting study.

5. What percentage of students in these schools actually takes a voucher, and do school administrators and staff really perceive this as a threat to the funding or viability of their school? Is this threat enough to prompt systemic changes?

6. As Ohio expands the EdChoice Scholarship Program to include all schools, will the exemplary schools with plateaued performance show increases in the PIS? Will the competitive effect of vouchers be able to push through the performance ceiling at the top of the scale?

**Summary**

The new face of education in the United States of America includes a measure of competition. And vouchers, which will probably claim a relatively small market share of that system, are here to stay. Educators can either fight these programs or embrace them, but they can no longer be ignored. The results of this study indicate that vouchers should not be feared. In Hamilton County, Ohio, vouchers are not causing the traditional public schools to close their doors disproportionately. In fact, the EdChoice (voucher) program seems to be having a positive effect on the performance scores of their previously failing schools. The achievement gap is closing as scores from these voucher-eligible schools continue to rise. The students in the traditional public schools in Hamilton County, Ohio are not being left behind.
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