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Second Year Evaluation of the Systemic Effects of the DC Voucher Program

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Introduction

While publicly sponsored school voucher programs are primarily intended to impact the lives of those who take advantage of the service, they may also have consequences for the larger community. In particular, voucher programs could affect the performance of public schools by altering their resources and incentives; they could alter the demographics of both public and private schools; they could provide new opportunities for students to attend private schools or simply supplement the behavior of students who would have attended private schools regardless of the program. Regardless of the impact of such programs on the few students who are able to use vouchers, it is important to understand the impact of such programs on the larger community before we can judge the overall wisdom of school choice policies.

In this paper we evaluate the impact of the federally sponsored voucher program in Washington D.C. on the academic performance of public schools, the access students have to private schooling, and the ability of students to attend racially integrated public schools. This paper is a second year follow-up to our previous work on these issues after one year (Greene and Winters 2006A; Greene and Winters 2006B). The main contribution of this paper is to follow the impact of this program in these three areas over time. We intend to continue to evaluate the impact of the DC voucher program on these community aspects over time and where possible using a variety of methods.

In what follows we will present our research on the impact of the DC voucher program on each of these issues in individual sections. We will then summarize the results and conclude with a general discussion.

The Impact of Vouchers on Public School Academic Performance

A wide body of existing research suggests that school choice is positively related to the academic outcomes of public schools. Researchers have evaluated the impact on the academic performance of public schools resulting from competition from private schools (Greene and Winters 2004; Chakrabarti 2004; West and Peterson 2005; and Figlio and Rouse 2005; Hoxby 2001; Greene and Forster 2002; Hammons 2001; Jepson 1999; Sander 1999; Hoxby 1994; Dee 1998). Other researchers have focused on the impact of school choice from the ease at which parents can move to another school system, or Tiebout choice (Borland and Howson 1993; Zanzig 1997; Hanushek and Rivkin 2002; Blair and Staley 1995; Greene 2002, Marlow 1997; Hoxby 2000; Walberg 1993; Borland and Howson 1992; 1995; Marlow 1999).

In a survey of the existing research, Columbia University's Belfield and Levin (2002) concluded that the culmination of the research suggests that school choice likely has a modestly positive effect on the educational outcomes of public schools. While there is certainly room for more research on the effects of vouchers on public schools, so far the evidence tends to support the theory that public schools improve their performance in response to expanded choice and competition.

In the first year analysis of the impact of the DC voucher program on public school academic performance Greene and Winters (2006A) utilized different measures of geographic distance between public and voucher accepting private schools as a proxy for competition from the program. That analysis failed to find statistically significant results, leading to the conclusion that after one year the voucher program had not impacted the academic performance of the DC public school system.

As discussed in the first year analysis, there are several reasons we might expect that the DC voucher program would have a more limited impact on public school performance than previous programs. First, only a limited number of children in the District are able to use the vouchers to leave their public school and attend a private school. The limited size of the program should reduce our expectations about the systemic effects of the DC voucher program, for good or for ill.

More significantly, the DC choice program was specifically designed to hold public schools financially harmless for the loss students to the voucher program. Congress explicitly declared their intention that the choice program ought to have no negative financial impact on DC public schools, writing into the text of the law that, “This title provides additional money for the District of Columbia public schools and therefore money for scholarships is not being taken out of money that would otherwise go to the District of Columbia public schools.”ⁱ Also, according to a Memorandum of Understanding between the Office of the DC Mayor and the District of Columbia Public Schools, individual public schools that lose students to the voucher program will receive reimbursements for any lost revenue.ⁱⁱ

Theoretically, holding public schools financially harmless under the voucher program could severally limit any systemic effects of the policy, positive or negative. The theoretical benefit of school choice policies on public schools comes directly from the increased financial incentive that potentially losing enrollment funds provides. On the other hand, theoretical concerns about how losing revenue would hinder school improvement would also be largely rendered moot if schools faced no loss of revenue from the program.

Method

We utilize the same strategy to evaluate the impact of vouchers on the DC public schools as the previous first-year evaluation. Our strategy is to use different measures of geographic proximity to private schools to as a proxy for the competition that a public school faced due to the voucher program. The idea is that where private schools are closer to a public school, or where there are several private schools within a small radius of a public school, students have a better opportunity to utilize a voucher and thus public schools are faced with greater competition under the program. Some studies of other voucher programs have also utilized a similar approach based on geographic proximity to private schools (Greene and Forster 2002; Hoxby 2001).

We use OLS regression with heteroskedastic robust standard errors to estimate equations taking the form:

$$(1) \quad Y_{s,a,t} = \beta_0 + \beta_1 School_{s,t} + \beta_2 Y_{s,a,t-j} + \beta_3 GradeLevel_s + \beta_4 Distance_{s,t}^{charter} + \beta_5 Distance_{s,t}^{voucher} + \varepsilon$$

$$(2) \quad Y_{s,a,t} = \phi_0 + \phi_1 School_{s,t} + \phi_2 Y_{s,a,t-j} + \phi_3 GradeLevel_s + \phi_4 NumWithin_{s,t}^{charter} + \phi_5 NumWithin_{s,t}^{voucher} + \mu$$

$j = 1, 2$

Where Y is the average performance of school s in subject a during year t (year t-2 is the baseline year before the program was implemented), School is a vector of school demographic characteristics, GradeLevel is a vector of binary variables indicating that the school is an elementary, middle, or high school, Distance is the distance in miles between the public school and the nearest private school accepting vouchers under the program, NumWithin is the number of private schools within a five mile radius of the public school, and ε and μ are normally distributed stochastic error terms.

Unfortunately, we were unable to acquire school aggregate scaled scores on the DC math and reading exams reported in scale scores for the 2005-06 school year in time for this analysis. Instead, the dependent variable is the percentage of students in the school who scored at or below the Basic proficiency level as defined by the District.ⁱⁱⁱ We are, however, able to utilize the more precise mean scale scores for the prior years at times t-1 and t-2 for controls in the right hand side of the equation. We intend to re-run the analyses with mean scaled scores once data can be obtained.

Results

The results of estimating equations (1) and (2) are reported in Table 1. As in the first year analysis, we continue to find that competition from the DC voucher program as measured by geographic proximity has had no significant impact on the test scores of the DC public schools. The coefficient on the distance measure used as a proxy for competition (distance to nearest voucher school or number of voucher schools within a 5 mile radius) is statistically insignificant at the 5% level in all estimations and only reaches the 10% significance level in one model.

[Table 1 About Here]

The Impact of Vouchers on Private School Capacity

The main objective of school voucher programs is to provide the opportunity to attend a private school to students who otherwise would have had no other option than the public school system. However, the ability of a voucher program to meet this goal is limited by the availability of seats in private schools and the willingness of such schools to accept voucher students.

Some are concerned that voucher programs will only serve to supplement the tuitions of students who were going to attend private school regardless of the subsidy. Though in D.C. vouchers are only available to students who are not currently attending private schools, it is possible that students who use a voucher would have chosen to attend a private school regardless of the subsidy.

In the first year analysis, we utilized enrollment figures to determine the extent to which the DC voucher program increased private school enrollments or simply supplemented the tuitions for students who would have chosen to attend private school regardless of the program. Our results suggested that the overall impact of the voucher program after one year was to supplement the tuition of students who would have attended private school in absence of the policy, but that the policy did increase the enrollments of schools that charged an above average tuition (Greene and Winters 2006B). In this paper we utilize the same strategy as that previous paper to update the analysis of the impact of the program on private school enrollments two years after adoption of the policy.

Data and Method

To evaluate the impact of the D.C. voucher program on private school capacity we require enrollment information for participating private schools before and after implementation of the policy. The voucher program was first implemented in the 2004-05 school year. We developed a panel dataset of enrollments in private schools that eventually participated in the voucher program for each school year from the 2000-01 to 2005-06. We obtained this information from multiple years of the Private School

Universe Survey and a proprietary dataset collected by the School Choice Demonstration Project.^{iv}

The Private School Universe Survey is a survey of all private schools across the nation administered by the National Center for Education Statistics. The biannual survey collects basic information on all registered private schools, including school enrollment. We acquired data on enrollment in all D.C. private schools from the 1999-2000, 2001-02, and 2003-04 administrations of the universe survey. We then estimated school enrollments in the non-surveyed years by making a linear transformation.

We supplemented these data with information from a proprietary dataset collected by the School Choice Demonstration Project. This dataset contained overall enrollments and the number of students using a voucher to pay the school tuition for private schools participating in the program during the first and second year of its implementation, 2004-05.

We pooled these data into a panel format so that each observation represented a private school in a year. Since we only have enrollments in 2004-05 and 2005-06 in private schools that participated in the voucher program during these years, we are only able to include schools that participated in the program during both years.

As in our previous analysis after one year, we estimate two equations to evaluate the impact of accepting vouchers on private school enrollments using a school fixed-effects model. The first equation estimates enrollment of school s in year t , $Enroll_t$ as a function of the previous year's enrollment, a school fixed-effect γ_s , a binary variable indicating that the school was treated in that year $Treat_t$, and a stochastic error term η .

$$(3) \text{ } Enroll_{s,t} = \beta_0 + \beta_1 Enroll_{s,t-1} + \beta_2 Treat_t + \gamma_s + \eta_{s,t}$$

Since data restrictions leave us only able to include those schools that were treated in both 2004-05 and 2005-06, estimation of equation (1) with the school fixed effect only measures the impact of the 2004-05 change in treatment. This is because the treatment is necessarily time-invariant after that point and the fixed effect estimator will only consider the switch from being untreated to being treated. Thus, the results of estimating this equation are bound to be quite similar to those found in the previous year's analysis and will only differ due to schools dropping out of the program in the second year or not having reported enrollment data. In order to incorporate the second year figures we also estimated equation (1) using data every two years beginning in 2001-02 and ending in 2005-06.^v Results are similar to those of estimating equation (1) directly.

Estimating equation (1) allows us to evaluate the impact of the voucher program on the overall enrollments of private schools through β_2 . We can also evaluate the extent to which each voucher student represents an additional student enrolled in the private school by estimating an equation taking the form:

$$(4) \text{Enroll}_{s,t} = \phi_0 + \phi_1 \text{Enroll}_{s,t-1} + \phi_2 \text{Admit}_{s,t} + \gamma_s + \tau_{s,t}$$

Where Admit is the number of voucher students that were actually admitted by the school in year t and τ is a stochastic error term. We can interpret ϕ_2 as the percentage of an additional student enrolled represented by each student who used a voucher to attend the private school.

As in the first year analysis, we also estimated equation (4) independently for schools whose tuition was above or below the median tuition for voucher accepting schools, \$6,369 per year.^{vi} Since students are not allowed to supplement the voucher in

the D.C. program, we might expect that the impact of the voucher program on enrollments could differ in schools by their tuition cost. In particular, we might expect that the voucher program could have a smaller impact on the enrollments of schools with higher overall tuitions, since the voucher, which is capped at \$7,500 per year, covers less of the tuition that would be otherwise collected by the school. However, since voucher recipients are required to have incomes that are no higher than 200% above the poverty line, we might expect that each additional voucher student could have a larger impact on the enrollment of higher tuition schools. The results of our first year evaluation suggested that the program increased the enrollments of schools above the median tuition but had no impact on the enrollments of those schools with below median tuitions.

Results

The results from estimating equations (3) and (4) for all students are reported in Table 2. Unsurprisingly, the impact of the treatment variable is statistically significant and quite similar to that found in the previous year's analysis. As discussed above, this evaluation is nearly identical to that reported in the first year because we are only able to include those schools that participated in the program.

[Table 2 About Here]

The results for estimating equation (4), however, are somewhat different than in the first year analysis. Here we find a statistically significant relationship between the addition of a voucher student and private school enrollment. In particular, the coefficient on Admit suggests that each student that enters a school using a voucher represented a new enrollment of about 0.14 students. Thus, while the largest effect of the program still appears to be to supplement the tuition of those who would have gone to private school

regardless of the policy, the second year results suggest that the program has provided additional access to private schools for some students.

Table 3 reports the results of estimating equation (4) independently for those schools that are above or below the median tuition level for schools in our dataset. As in the first year analysis, we continue to find no statistically significant relationship between adding a voucher student and the enrollment level for schools with tuitions below the median level. This result suggests that vouchers have been used entirely to supplement the tuitions for students who would have attended these lower tuition schools regardless of the policy.

The coefficient on the Admit variable in the analysis for schools with above median tuitions is barely insignificant at the 5% level and significant at the 10% level (p -value = .055). If considered significant under the looser standard, the result indicates that in these above median tuition schools each voucher student accepted represents an increase of about 0.42 students. This coefficient is smaller than that found in the first year analysis, where we found that each voucher student represented one entire new student enrolled.

The Impact of Vouchers on Public School Racial Integration

Public schools are expected to do more than convey academic skills. We also look to them to help in the development of future generations of citizens. The positive experience with people from different backgrounds resulting from racial integration is another important aspect of whether schools are serving public purposes.

One concern about voucher programs is that students could choose to attend schools based on their racial composition rather than their academic benefits. Such an

effect could lead students to attend more racially segregated schools. That such segregation would occur due to individual choice rather than government fiat provides little relief for those concerned with the civic purposes of public education.

There have been several studies comparing rates of racial segregation in public and private schools, much of which purports to find that private schools are more racially segregated than public schools. However, most of this research fails to properly define racial integration, leading to improper conclusions. (Greene, 2005)

Some studies define greater integration as schools with larger numbers of minority students, others as evenness in the distribution of students among schools within already segregated school districts. Some researchers have used levels of racial integration of public schools as the benchmark to measure the racial integration in schools of choice. Finally, researchers studying the effect of school choice programs, such as vouchers, have sometimes wrongly compared the demographic characteristics of those who participate in the programs with those who choose not to participate as an indication of the effects of the programs on school integration.

Each of the methods to measure racial integration described above fails to square with the common understanding of racial integration. If larger numbers of minority students were a proper indicator of greater racial integration, then African-American schools of the Jim Crow era were perfectly integrated. Evenly distributing racial populations among schools in a district is no achievement for racial integration if an all black school district is geographically adjacent to an all white school district. Each district could perfectly distribute its racially homogenous student population across the schools within its district and still fail utterly to offer an integrated school environment.

Using public schools as a benchmark for perfect integration is also a flawed method, considering that it means by definition that there is no possibility for choice schools to be more racially integrated than the public schools against which they are being compared. And comparing the characteristics of those who choose to participate in school choice programs to those who choose to remain in their public school confuses differences in who participates with effects on integration. A magnet program that largely draws white students to attend predominantly African-American schools could enhance integration even if – or maybe precisely because – it differentially attracted white students.

A more reasonable approach to measuring racial integration involves comparing the demographic characteristics of schools to that of their surrounding metro-area. To the extent that schools contain a racial mix of students that more closely resembles the racial mix of students in the broader community from which they could reasonably draw students given transportation constraints but ignoring political boundaries, such as city or school district line, the better integrated they are.

Another reasonable approach to measuring integration (or the lack of it – segregation) is to see how many schools are racially homogenous. For instance, a school with a population that is more than 90% minority cannot be considered to be racially integrated under any reasonable standard. If a large percentage of an area's schools are more than 90% homogeneous then we could reasonably consider those schools to be racially segregated.

Greene (1998) examined data from nationally representative samples of public and private school students collected by the US Department of Education's National Educational Longitudinal Study. Greene found that twelfth-grade students in private

school classrooms had racial compositions that were on average closer to national racial demographic characteristics than students in public school 12th grade classrooms. He also found that private school students were significantly less likely to be in classrooms that were more than 90% racially homogeneous than were their public school counterparts.

Ritter, Rush, and Rush (2002) replicated Greene's method but looked at racial segregation among kindergarten students, rather than twelfth-graders. They found that private school kindergartens are more racially segregated than public school kindergartens. However, it is likely that twelfth-grade enrollments tell us more about racial segregation than information on kindergarten students. Unlike high school, full day kindergarten is not offered in all communities, causing a significant number of wealthier, white students to enroll for kindergarten and then switch to public school for 1st grade. This "bubble" in kindergarten enrollment could make an analysis of that grade unrepresentative of public and private schools more generally.

Research directly on the racial integration impact of vouchers in Milwaukee and Cleveland suggests that those programs contributed to greater opportunities for racial integration. Fuller and Greiveldinger (2002) found that Milwaukee's voucher program allowed participating students to attend more racially integrated private schools than could be found in their previous Milwaukee public schools. Greene (1999) found that 19% of students using a voucher to attend a private school in Cleveland went to a racially integrated school, compared to only 5% of students in Cleveland's public schools.

In our first year analysis (Greene and Winters 2006A) we found that private schools in DC were less racially segregated than public schools in the District and thus that the voucher program allowed for students to attend better integrated schools. That is,

we found that private schools had percent minority enrollments that were more closely related to the percent minority in the DC metro area and were less likely to have enrollments that were 90% or 95% homogenous in race.

Data and Method

Our goal is to update our previous analyses of the impact of the DC voucher program on racial integration after two years. Unfortunately, the voucher granting organization did not collect information on the percent of private schools enrollments that were minority in 2005-06. Thus, we are unable to evaluate any changes in racial composition of these schools until such data would become from another source for the 2005-06 school year or until the third year study.

However, though we would have preferred to have been able to evaluate the racial composition of private schools, we are able to use publicly available data to evaluate the racial composition of DC public schools in the second year of the voucher program.

This paper evaluates racial segregation in two ways. We first measure the extent to which each public school's racial composition differs from the racial composition of the school-aged population in the surrounding metropolitan population, as defined by the United States Census. The greater absolute value of the difference between a school's demographic characteristics and the demographic characteristics of the surrounding metro-area, the more racially segregated the school. We then computed the weighted average difference for DC public schools.

Our second approach to analyzing racial segregation was to evaluate the percentage of public schools with enrollments that are greater than 90% or 95% racially homogeneous. This evaluation sheds light on the percentage of schools that have student

populations that simply cannot be considered to be racially integrated under any reasonable standard, regardless of the surrounding population.

To evaluate the impact of the D.C. voucher program on opportunities for racial integration we collected information on the racial composition each public school and each private school participating in the voucher program. For public schools we acquired data using the Core of Common Data, made available by the U.S. Department of Education.^{vii} These datasets provided information on the number of students who were non-white in each school, which we converted into percentages.^{viii} Thus, all of our analyses focus on integration between white (defined as non-Hispanic white) and minority students and do not offer information about integration between different minority groups.

To compare public schools and the surrounding metro-population we utilized data from the U.C. Census. We downloaded information on the racial characteristics of the school-age population (ages 5-18) in the Washington D.C./VA/MD Urbanized Area as defined by the Census. This is the population from which area schools could reasonably draw students.^{ix}

For each public and private school we then calculated the absolute value of the difference between its non-white population and the surrounding metro-area's non-white population. Next, we took the average difference between the non-white school and area populations in the District, weighted for each school's enrollment. Failing to account for each school's enrollment size would give unnecessary weight to the percentage of students who are non-white in schools with particularly small enrollment populations.

We also created two sets of dummy-variables for each school, one indicating whether 90% of its student population was either white or non-white, and another indicating whether 95% of its student population was either white or non-white. We then calculated the percentage of schools that had enrollments that were racially homogeneous by these definitions. We again weighted the analysis to account for the size of each school's enrollment.

Results

The results of our evaluation of the racial composition of DC public schools two years after adoption of the voucher policy are similar to those of the first year analysis. Table 3 reports the findings. The table shows that the weighted absolute value of the difference between the percent minority of public schools and the DC metro area was 40.0% in the 2005-06 school year. In our previous analysis we found this difference for public schools to be 39.5%.

The results are also similar for the percent of public school students who attend schools that are 90% or 95% racially homogenous. We find that in 2005-06 86.9% of DC public school students attended schools that were at least 90% racially homogenous and 85.4% of public school students attended schools that were at least 95% racially homogenous. These figures were 85.4% and 84.4% for public schools in the evaluation of 2004-05 school year.

Summary and Conclusion

This paper has served as a second year follow up to our previous evaluations of the impact of the DC voucher program on public school achievement, access to private schooling, and school segregation. We intend to continue to evaluate these aspects of the

policy over time using these and other methods in order to discover the overall impact of the federally sponsored voucher programs on the larger community.

In each of our analyses, the results after two years are relatively similar to those of a year ago. First, we continue to find that the voucher program has had no systematic impact on the academic performance of public schools. This result is somewhat disheartening since many have hoped that competition from the voucher program could help to finally turn around the struggling DC public school system. However, our null results could reflect the fact that the design of the DC program is not particularly well suited for creating a public school academic effect. Further, in the next year analysis we intend to consider alternative approaches to studying the academic effect on public schools in case the geographic approach is a cause for the null finding. If we continue to find similar null results over time and using various methods we would have more reason to believe that the DC program has had no overall academic on public school academic performance.

The results of our evaluation of the impact of the DC voucher program on private school enrollments differ slightly than the previous year's analysis. After two years we find that the program has increased access to private schooling. Though statistically significant, however, our result is limited in size, indicating that each student using a voucher to attend a private school represents an increase of about 0.14 students enrolled in the school.

As in the first year analysis, we again find that the voucher program has had more of a supplemental effect in schools with lower tuitions than those with higher tuitions. This result likely reflects the fact that low income parents are able to send their children

to lower tuition schools in absence of the program, though likely with some hardship, while higher tuition schools are simply beyond their reach in absence of the subsidy. To be certain, policymakers could consider subsidizing the incomes of low income parents who choose private schooling for their children as a benefit of the program. However, this result suggests that in order to have an impact on private school enrollments a program must offer vouchers of substantial size, or else the impact will likely be to supplement the tuitions of those who would have attended private school regardless of the program.

Finally, we find that public schools in DC continue to be largely racially segregated in the second year after adoption of the voucher policy. Unfortunately, we were unable to also evaluate the extent of racial integration in private schools because of data limitations. We hope to have access to the data necessary to evaluate the racial composition of both sectors in future years in order to discover whether students attending private schools have access to a more racially integrated academic experience.

References

- Belfield, C.R., & Levin, H.H. (2002). *The Effects of Competition on Educational Outcomes: A Review of the Evidence*. National Center for the Study of Privatization in Education.
- Blair, J.P. & Staley, S. (1995). Quality Competition and Public Schools: further Evidence. *Economics of Education Review*, 14(2).
- Borland, M. V., & Howson R. M. (1992). Students' Academic Achievement and the Degree of Market Concentration in Education. *Economics of Education Review*, 11.
- Borland, M. V., & Howson R. M. (1993). On The Determination of the Critical Level of Market Concentration in Education. *Economics of Education Review*, 12.
- Borland, M. V., & Howson R. M. (1995). Competition, Expenditures, and Student Performance in Mathematics: A Comment on Crouch et al. *Public Choice*, 87.
- Chakrabarti, Rajashri, (2005). Impact of Voucher Design on Public School Performance: Evidence from Florida and Milwaukee. Harvard University.
- Dee, T.S., (1998). Competition and the Quality of Public Schools. *Economics of Education Review*, 17(4).
- Figlio, David N. and Ceceilia E. Rouse, (2005) Can Accountability and Voucher Threats Improve Low-Performing Schools? University of Florida, Princeton University, and NBER.
- Fuller, H.L., & Greiveldinger, D. (2002). The Impact of School Choice on Racial Integration in Milwaukee Private Schools. *American Education Reform Council* manuscript.
- Greene, J.P. (1998). Civic Values in Public and Private Schools. In *Learning from School choice*, Paul Peterson and Bryan Hassel, eds., Brookings Institution.
- Greene, J.P. (1999). The Racial, Economic, and Religious Context of Parental Choice in Cleveland. Paper presented at the Association for Public Policy Analysis and Management meeting.
- Greene, J.P. (2002). *2001 Education Freedom Index*. Manhattan Institute Civic Report 24.
- Greene, J.P. (2005). *Choosing Integration*. In "School Choice and Diversity: What the Evidence Says," Janelle t. Scott, ed., Teachers College Press.

Greene, J.P. and Forster, G. (2002). Rising to the Challenge: The Effect of School Choice on Public Schools in Milwaukee and San Antonio. Manhattan Institute Civic Bulletin 27.

Greene, J.P. and Forster, G. (2004). The Teachability Index: Can Disadvantaged Students Learn? Manhattan Institute Education Working Paper 6.

Greene, J.P. and Winters, M.A. (2004). Competition Passes the Test *Education Next*, Summer.

Greene, J.P. and Winters, M.A. (2006A). An Evaluation of the Effect of D.C.'s Voucher Program on Public School Achievement and Racial Integration After One Year. Manhattan Institute, Education Working Paper 10.

Greene, J.P. and Winters, M.A. (2006B). The Impact of the D.C. Voucher Program on Private School Capacity. Paper presented to the School Choice Demonstration Project Advisory Board.

Hammons, C.W. (2001). The Effects of Town Tuitioning in Vermont and Maine. Milton & Rose Friedman Foundation.

Hanushek, E.A. & Rivkin, S.G. (2002). Does Public School Competition Affect Teacher Quality? In Caroline Hoxby (Ed.) *The Economics of School Choice*. Chicago: University of Chicago Press.

Hoxby, C. (1994). Do Private Schools Provide Competition for Public Schools?" NBER Working Paper 4978).

Hoxby, C. (2000). Does Competition Benefit Students and Taxpayers? *The American Economic Review*, 90(5).

Hoxby, C. (2001). The Rising Tide. *Education Next*, 1(4).

Jepson, C. (1999) The Effects of Private School Competition on Student Achievement. Unpublished paper.

Marlow, M.L. (1997). Public Education Supply and Student Performance. *Applied Economics*, 29.

Marlow, M.L. (1999). Spending, School Structure, and Public Education Quality: Evidence from California. *Economics of Education Review* 19.

Ritter, G., & Rush, A., & Rush, J. (2002). How Might School Choice Affect Racial Integration in Schools? New Evidence from the ECLS-K. *Georgetown Public Policy Review*.

Sander, W. (1999). Private Schools and Public School Achievement. *The Journal of Human Resources*, 34.

Walberg, H.J. (1993). Losing Local Control of Education: Cost and Quality Implications. *Heartland Policy Study*, 59.

West, M.R. and Peterson, P.E. (2005). The Efficacy of Choice Threats Within School Accountability Systems: Results from Legislatively Induced Experiments. Paper presented before the Annual Conference of the Royal Economic Society, university of Nottingham.

Wolf, P., Gutmann, B., Eissa, N., & Puma, M. (2005). Evaluation of the DC Opportunity Scholarship Program: First Year Report on Participation. U.S. Department of Education, National Center for Education Evaluation and Regional Assistance. Washington, DC: U.S. Government Printing Office, 2005.

Zanzig, B.R. (1997). Measuring the Impact of Competition in Local Government Education Markets on the Cognitive Achievement of Students. *Economics of Education Review*, 16(4).

Endnotes

ⁱ Title III – DC Choice Incentive Act of 2003, Sec. 302, (6). Text available online at http://www.schoolchoiceinfo.org/data/facts/DC_Choice.pdf

ⁱⁱ Memorandum was reported in Wolf, Gutmann, Eissa, and Puma (2005).

ⁱⁱⁱ The use of proficiency levels could exacerbate the potential censoring problem, in that some schools may have either zero or 100% of their students which could affect any results. However, no schools in our dataset reached the censoring point. As a check, however, we did run the models using a tobit estimator that would account for such censoring and found similar results to those resulting from OLS.

^v In this model we control for the school's enrolment two years before, rather than the previous year.

^{vi} We choose not to independently estimate equation (3) for students in these types of schools because, for reasons discussed earlier, the results are bound to be nearly identical to those reported in the first year study.

^{vii} National Center for Education Statistics, *Core of Common Data*.

^{viii} For the purposes of this paper, "white" refers to non-Hispanic whites.

^{ix} United States Census, American Fact Finder.

http://factfinder.census.gov/servlet/CTTable?_lang=en&_ts=148569660902.