**Estimating Parents’ Valuations of Class Size Reductions**

**Using Attrition in the Tennessee STAR Experiment**

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February 2011

Abstract

This study estimates parents’ valuations of small classes and teachers’ aides by examining the effects of the randomly assigned class type on the decision to remove one’s child from the Tennessee STAR experiment. A new hedonic estimation strategy is used that compares attrition rates to the take-up rates for private school vouchers. In 2010 dollars, we estimate that parents on the margin of sending their children to private schools would have spent roughly $2,000 per year of small class instruction; for less prepared students, we estimate similar valuations for a year of instruction with a teacher’s aide.

JEL Classifications: I22, I21, H75, D61, C35

Student-teacher ratios are a topic of considerable interest to economists, educators, and policymakers, and class size reductions in elementary school have been shown to increase standardized test scores, college attendance, and later earnings (Angrist and Lavy, 1999; Chetty, et al, 2010; Krueger, 1999, 2003; Krueger and Whitmore, 2001).  To determine whether the gains from these policies are worth the costs, it is desirable to have a dollar-denominated measure of the policy’s full economic benefits, as expressed in terms of willingness to pay. The current study contributes to the literature on class size by applying new hedonic methods to parents’ attrition decisions in the Tennessee Student Teacher Achievement Ratio (STAR) class size experiment to measure the economic value that parents place on class size reductions.

Previous estimates of parental valuations of class size reductions rely upon regression-based comparisons of housing prices across school attendance areas with varying student-teacher ratios (Brasington, 1999; Brasington and Haurin, 1996, 2005). Such approaches are likely to produce biased results, as student-teacher ratios are correlated with key determinants of home value that are difficult to measure, such as neighbor attributes, crime, prices of local goods, and other determinants of school quality such as parental investments, peer characteristics, and student need. Due to similar biases, regression-based estimates of the effects of class size on test scores differ considerably from estimates from the Tennessee STAR class size experiment (Hanushek, 1986; Krueger, 1999). Some quasi-experimental studies avoid these neighborhood-level biases by examining discontinuities in housing demand across school district boundaries (Bayer, Ferreira, and McMillan, 2007; Black, 1999). These studies estimate parental demand for living in a district with higher average test scores; however, district-level differences in test scores are mainly driven by parental inputs, and these studies do not provide information about the values of specific school policies (Brasington and Haurin, 2009).

The estimation strategy used in this study builds upon the idea of Philipson and Hedges (1998) to use sample attrition to measure the degree to which experimental subjects regard a treatment as desirable. To illustrate this approach, Figure 1 plots hypothetical demand curves for private school among parents whose children were assigned to small and regular sized classes. Transferring to a private school is predicted to be less desirable for those assigned to small classes in the public school. The effect of class size on the fraction leaving the school system is shown along the horizontal axis. The vertical difference between the two curves identifies the value of a class size reduction for families on the margin of sending their children to private school. This value is measured as the quantity difference divided by the slope of the demand curve and can be viewed as the voucher amount that would generate the same difference in attrition rates as was caused by the class size experiment. The slope of the demand curve is estimated from application rates for private school voucher programs in various cities. In order for this approach to be valid, we require that the slope of the demand for private school is similar between the families in the class size and voucher studies. This approach for measuring a demand shift is described in detail in Rohlfs (2010a), and is applied in Rohlfs (2010b) to measure the economic cost of the Vietnam draft.

Among students who entered Project STAR in kindergarten, we find, as previous authors do, that those assigned to small classes were two to six percentage points more likely to remain in their original schools than those assigned to regular-sized classes or regular classes with teachers’ aides (Hanushek, 1999; Krueger, 1999; Nye, *et al*., 1999; Schanzenbach, 2006), with much of this attrition due to students leaving the public school system. Kindergarten was not mandatory in Tennessee at the time of the study, and students entering program schools in first grade were randomly assigned into existing classes. Among these students, we find, as previous authors do, that attrition was lowest among those assigned to classes with teachers’ aides. Our results are consistent with the view that the extra attention offered by the aides was particularly useful for the relatively unprepared students who entered in first grade. While imprecise, our estimates indicate that the parents of kindergarten students valued spending first grade in a small rather than a regular class at roughly $2,000 in 2010 dollars. For children entering the program in first grade, we find similarly-sized valuations of spending second grade in a class with an aide rather than a regular class

The remainder of this paper proceeds as follows: Section II reviews the relevant institutional features of the Tennessee STAR experiment and the voucher experiments. Section III provides descriptive results. Section IV discusses the econometric framework. Section V presents our formal estimates, and Section VI concludes.

**II. Key Institutional Details**

A. Attrition in the Tennessee STAR Experiment

Through the Tennessee STAR experiment, each student in the 1985 kindergarten cohort in participating schools was randomly assigned to a small class of 13-17 students, a regular sized class of 22-25 students, or a regular sized class with a teacher’s aide. The experiment lasted through third grade.

Students’ assigned class types were meant to remain constant over these years; however, parental pressure led the researchers to a re-randomization of class types for the students in the regular and regular with aide classes after the first year. Additionally, many students assigned to regular classes in later years were able to obtain access to the small and regular with aide classes. Of the 79 schools that initially participated in the experiment, four left due to the cost and parental pressure associated with the program.

B. Application Rates and the Demand for School Vouchers

DC (wolf Peterson west)

The Washington Scholarship Fund, a privately funded school voucher program, offered more than 1,000 scholarships to public and private school students from the Washington, DC metropolitan area in the 1998-9 school year, representing a large expansion of the program. The program was publicized in news and advertisements, and was open to all families with incomes less than 275% of the federal poverty line. Students had to be entering kindergarten up to grade 8 in the fall of 1998, and were eligible for up to $1,700 in assistance for elementary school and $2,200 for high school. Funding was guaranteed for at least three years. More than 7,500 students applied by telephone, and more than 3,000 attended the follow up eligibility verification sessions. Preference in selection was given to public school students, and 811 were selected for the voucher, of whom 341 used it to attend a private school. Almost 6,000 of the applications came from students previously attending private school, and 189 were selected to receive a voucher.

NYC (mayer Peterson Meyers)

The School Choice Scholarships Foundation (SCSF) program was designed to serve students attending NYC public schools. To be eligible for one of the 1,300 scholarships on offer, children had to be entering grades one through five in the 1997-8 school year, living in NYC, attending a public school at the time of application, and qualify for the federal School Lunch Program (below 185% of poverty line). More than 20,000 students applied for the program, and SCSF had to begin the randomization of applicants during the income verification sessions because the number could not be accommodated. Of the 1,300 students selected, 988 used the voucher to attend a public school.

Dayton (howell & Peterson)

The Parents Advancing Choice in Education (PACE) program awarded 765 scholarships to public and private school students in its first year, the 1998-9 school year. Scholarships were open to students entering kindergarten through grade 12 whose family income was less than 200% of the federal poverty line. About 3,000 initial applications were received, and about 1,500 families attended income verification sessions. The majority of recipients (515) were families whose students had previously been attending public school, and the scholarships were awarded by separate lotteries. Of those (775 total) receiving scholarships, 542 attended a private school.

**III. Descriptive Results**

**IV. Conceptual Framework**

**V. Results**

**VI. Conclusion**

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Figure 1: Demand for Private School for Parents in the Tennessee STAR Experiment

Demand for private school if child is in small class

Demand for private school if child is in regular-sized class

Tuition

Private school attendance

Observed difference in quantity demanded

Marginal surplus (MS) for parents on the margin of sending child to private school

Figure 2: Illustration of Payoffs Associated with Voucher Experiment

Apply?

Private School?

No

No

Yes

Yes

Offered Voucher?

Private School?

Private School?

No

Yes

Yes

Private School?

Private School?

Yes

No

Yes

Yes

No

No

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