PPOL 503-03, PPOL 503-04, Fall 2016
Course Notes #19: Gormley and Gayer "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program"

A. Introduction

1. Universal Pre-K programs: designed to enhance school readiness, but is this premise correct? Well-designed and well-staffed early intervention programs can improve the academic achievement of disadvantaged children. But can we extrapolate from early intervention programs to less intensive ones? Can we generalize from selective programs to universal programs, in light of the larger staffing programs faced by universal programs?

2. Primary difficulty in assessing a voluntary pre-k program is that certain parents are more likely to select the pre-k program for their children and these parents might also have unobservable characteristics that influence test outcomes

B. Study Objectives

1. To assess Oklahoma's pre-k program by focusing on data from the Tulsa Public Schools (TPS).

2. Why study Tulsa? A) TPS administered the same test to 4-year olds beginning Tulsa's pre-K and 5-year olds beginning TPS kindergarten in Sept 2001.
b) TPS used a strict cut-off birthday requirement for enrollment in TPS pre-k. This strict cut-off birthday requirement creates a discontinuous relationship between age and whether the child attended TPS pre-k in the 2000 or 2001 academic year.
c) Can compare children who made the cutoff to children who just missed it. If other characteristics of the children are sufficiently smooth at this cut-off date, then this regression discontinuity

design can identify the effect of the TPS pre-K program on test scores.

C. Literature Review

1. We know little about the effects of pre-k program, we know even less about the effects of universal pre-k programs.

2. Georgia study found that 82% of former pre-k students rated average or better on 3rd grade readiness but it lacked and appropriate comparison group.

3. Latest Georgia study compared Georgia pre-k, head Start and other preschool children but did not include children who attended no preschool.

D. Oklahoma's Universal Preschool Program

1. 1998-Oklahoma legislature established universal pre-k. Each of the state's 543 public school districts can choose to participate and the state provides full funding. In 2002-2003, 91% of school districts were participating. 65% of all four-year old children were participating in 2002-2003.

2. All teachers must have a college degree and a certificate in early education. Pre-k teachers receive same compensation as teachers in public schools. Group sizes are set at 20 and child/staff ratios at 10/1.

3. Reasons to focus on Tulsa: a) largest school district; b) ethnically diverse; c) the TPS administered an annual Early Childhood Skills Inventory to students entering TPS pre-k and to student entering TPS kindergarten.

4. This testing in conjunction with the strict birthday cutoff allows one to estimate the effects of a universal pre-k using a RD approach that contrasts the performance of children born just

before the cut-off date (treatment group) to the performance of children born just after the cut-off date(control date).

E. Tulsa's Database

1. August 2001—TPS administered a 26 item test to students about to enter pre-k and kindergarten.

2. 76% of 1,690 pre-K (N=1,284) and 66% of 3,441 kindergarten students (N = 2,276)

3. Test-takers were similar to the population with few exceptions. Hispanic are under-represented in the TPS pre-K sample while blacks are under-represented in the TPS kindergarten sample

F. Empirical Strategy

1. Estimates the treatment on the treated effect, that is the effect on test scores of attending TPS pre-k.

Model

$$Y_i = \gamma X_i + \theta T_i + u_i$$

$$T_i = \beta X_i + v_i$$

Where Y is the child's test score, X is vector of child characteristics, T is an indicator variable if the child attended the TPS pre-k program, u_i captures the unobservable determinants of whether the child attended TPS pre-k; v_i capture the unobservable determinants of whether the child attended the TPS pre-k.

2. Treatment group is the TPS pre-K. The treatment of TPS pre-K includes an income effect since parents who would have paid for pre-k have more income to spend on the child.

3. Counterfactual to treatment is either the child gets no pre-K or the child gets another (perhaps private) day care or pre-k program or Head Start.

4. If the unobservable determinants of whether a child attends pre-K are correlated with unobservable determinants of test scores, the coefficient on the treatment or program participation variable will be biased.

5. Best way to estimate causal impact is randomization.

6. In the absence of randomization, the researchers used the structure of Tulsa's child testing program and the strict age qualifications to identify the causal impact of TPS pre-k on test scores.

7. Children were qualified to attend TPS pre-k in academic year 2000-2001 if an only if they were born before Sept 1, 1996 and after Sept 1, 1995. Children born later had to wait.

8. Sept 2001—TPS administered an aptitude test to all TPS pre-K and kindergarten students: identical test given to both groups of students.

Starting TPS Kindergarten in 2001: a) had TPS pre-k (treatment); b) did not have TPS pre-k (control 1)
Starting TPS pre-k in 2001 (not yet treated—control 2)

9. There are four different tests, measuring social/emotional skills, cognitive/knowledge skills, motor skills and language skills. Also include a total test score which is the sum of the four. Table 2 shows the problem that arises if one compares the treatment group to control group 1. Treatment group who had TPS pre-K

had significantly higher test scores than the children in control group1, they also differ in other ways. Pre-k children are more likely to be black and to have been on full free-lunch program. The differences in observable characteristics suggest that Control 1 is not a valid control group; they may differ in unobservable characteristics as well.

10. Better approach: compare the test scores of kindergarten students who attended TPS pre-K in the previous year (Treatment) to the scores of children just beginning TPS pre-K (Control 2). Advantage: both the treatment and control group selected into the treatment, with the latter not yet having been treated.

11. Even controlling for the effect of age on test scores, the two groups may have different characteristics. Total test score is 5.7 points higher for those who were previously enrolled in TPS pre-K compared to those currently enrolled in TPS pre-K. Treatment group (before 9/1) had a higher proportion of children in full free lunch, lower proportion of children with no or partial free lunch, and higher proportion of non-whites.

12. Use the strict birthday cut-off as the basis for using a regression discontinuity design.
a) Data points to the left of the cut-off date are “young” children, that is, those that missed the cut-off data and qualified for TPS pre-k in 2001. This is the control group; they selected into the program but as of the test time in August 2001, they did not experience the treatment.

b) Data points to the right of the cut-off are “old” children; those who qualified and enrolled in TPS pre-k in 2000 and are in TPS kindergarten in 2001. This is the treatment group because they received pre-K education in 2000.

13. Identifying assumption that must hold: unobservable characteristics of the children cannot vary discontinuously at the cut-off birthday.

G. Empirical Specification

1. Use a second-order (quadratic) polynomial specification because it offers a more flexible fit for the age/test score relationship. The quadratic regression-discontinuity estimates for test scores is estimated as a function of :
a) the difference in days between the birth date and the cut-off date, the square of this term, a dummy indicating if the child received the treatment and interactions. Other covariates include whether the child receives no free lunch, partial free lunch or full free lunch; gender; and race.

$$Y_i = \gamma_1 W_i + \gamma_2 W_i^2 + \gamma_3 (W_i \times T_i) + \gamma_4 (W_i^2 \times T_i) + \theta T_i + \gamma_5 X_i + u_i$$

W measures the number of days between the child's birthday and the cut-off date, T is an indicator variable of whether the child received the TPS pre-K (is born before the cut-off date). Coefficient estimates of θ gives the mean test score difference at the cut-off date between those who did and did not attend the TPS pre-K.

H. Results

1. Results in Table 4 show that the TPS pre-K had an impact on three of the four tests. The largest effects are on language skills (0.817 increase; .33 std. deviation) and on cognitive/knowledge scores (0.756 higher; .39 std. deviation); both significant at the 1% level. Effects on motor skills is 0.413 or .24 std. deviation ($p<.05$).

2. Absence of any effect on socio-emotional development may be due to having too few measures (only 3) to capture the effects of pre-K.

3. Further analysis shows that the full-day program in Tulsa is more effective than the half-day program for Hispanic children who enrolled. This also holds for black children.

I. Conclusions

1. Study uses observational data and the strict age cut-off age qualification for TPS pre-K in order to replicate randomization.

2. For three of four dimensions examined: cognition, language, and motor skills-the TPS pre-K program results in higher test scores.

3. Positive effects are greatest for Hispanic children followed by blacks. Results also show a positive impact of TPS pre-K on test scores for children who qualify for the full free-lunch program.

4. Costs of the program appear to be relatively low in comparison to Head Start or other early intervention programs.