The Implications of School Lotteries for Neighborhood Crime

Andrew Bibler, University of Nevada, Las Vegas

Stephen Billings, University of Colorado

Stephen Ross, University of Connecticut

Abstract

School choice lotteries are an important tool for increasing access to high quality public schools. There is strong evidence that high quality public schools have large academic and behavioral benefits due in large part to their peer environment (Deming 2011, Cullen, Jacob, and Levitt 2006). One element of school lotteries that has not been considered is how neighborhood peer relationships change as individuals are admitted to non-neighborhood schools. We examine the effect of school choice lotteries on the criminal activity of non-lottery students, estimating whether students are more or less likely to face future arrest if their neighborhood peers are admitted via lottery to a different school. We examine three cohorts of rising middle school students in Charlotte-Mecklenburg school district, comparing the outcomes for non-lottery students who live near lottery applicants who win the lottery to attend a different school with non-lottery students who live near applicants who lost. We estimate the effects of peer displacement, i.e., an additional lottery winner from the same neighborhood and school attendance zone, conditional on the expected number of lottery winners from their neighborhood.

Project Description

Research Question: A substantial literature documents neighborhood spillovers in criminal activity. Youth criminal activity may have especially long-lasting effects because arrest can limit opportunities in the formal labor market and in turn reduce the incentives for investing in human capital. This proposal asks whether school choice programs reduce the effect of neighborhood peers on criminal activity by separating students in the same neighborhood during the school day. Specifically, we will test whether students whose neighborhood peers apply to attend a different middle school and win this lottery are less likely to be arrested in high school or later than students whose neighborhood peers applied to attend a different school, but lost the lottery. School choice systems have become common and appear to have positive effects on students in poorly performing school districts who take advantage of these opportunities. This study will provide insights into another impact of school choice systems, namely the dispersion of students in the same residential neighborhood into different schools and through this dispersion a possible reduction in the effects of concentrated poverty on crime. The insights provided might also help with the efficient targeting of the limited resources available for school choice programs.

Rationale and Literature: Schools and school segregation play an important role in the incidence of criminal activity among youth. Deming (2011) shows that peer effects within schools are especially important during middle school years for explaining later youth crime, and Bacher-Hicks, Billings and Deming (2019) find that school discipline contributes to future incarceration as an adult. Billings, Deming and Rockoff (2014) examine the redistricting of

schools in Charlotte, NC and find that African-American students who experienced large increases in segregation were much more likely to be arrested. Similarly, Weiner, Lutz and Ludwig (2009) show that both homicide arrest rates and homicide victimization rates fall in cities where schools faced a court order enforcing school desegregation.

One key mechanism through which schools may influence crime is by facilitating the social connections, as documented by a large literature on the role of social connections and relationships in propagating criminal activity. Glaeser, Sacerdote and Scheinkman (1996) argue that crime rates exhibit a social multiplier effect where the variance of rates across places is much higher than can be explained by the exogenous determinants of crime. Bayer, Hjalmarsson and Pozen (2009) examine the effects of incarceration in youth correctional facilities finding that being incarcerated with a youth who had committed a specific type of crime lead to higher rates of future arrest for that specific crime. Patacchini and Zenou (2009) examine detailed data on social networks and find that criminal activity is influenced by conformism to the behaviors of others that are nearby in one's social network. Ludwig, Duncan and Hirshfield (2001), Kling, Ludwig and Katz (2005), and Ludwig and Kling (2007) show that youth criminal activity is affected by the neighborhood where one resides, and in the case of Ludwig and Kling (2007) especially affected by the crime rates in that neighborhood.

If older student's social networks tend to focus on school mates, rather than students residing in the same neighborhood, then school choice might create barriers to the types of interactions between at-risk youth that might contribute to high rates of criminal activity among youth in poor and/or segregated neighborhoods. Recently, Billings, Deming, and Ross (2019) examined the effect of school redistricting in Charlotte, NC. They first document that two individuals in the same neighborhood are more likely to be arrested for committing crime together and rates of arrest increase quickly with the concentration of similar youth in small neighborhoods. These effects appear to operate primarily along racial, ethnic and grade lines consistent with the evidence of strong homophile in youth friendships. Critically, they find that these effects disappear completely when redistricting places students on opposite sides of an attendance zone boundary. They conclude that school plays an important role in facilitating social relationships that may later contribute to criminal activity within neighborhoods. The new attendance zone boundaries sent these students to different schools, and thereby reduced the relevant population of at-risk peers whose presence in the neighborhood might lead to additional crimes.

School choice systems move students from their neighborhood school, assigned based on where they live, to another school altogether. Such systems are increasingly common in U.S. central cities that tend to have higher rates of poverty and contain heavily segregated neighborhoods. Our work will also contribute to a growing literature on the broad impacts of school choice systems. Many studies have examined the choices parents make (e.g. Hastings, Kane, and Staiger 2008; Chakrabarti 2013; Billings, Brunner and Ross 2018) and the impact of winning access to a choice school on student outcomes (e.g. Cullen, Jacob, and Steven Levitt 2006; Angrist, Pathak, and Walters 2013). To our knowledge, there has been less study of the effect on the peers who were left behind when a student wins a school choice lottery, which is the focus of this study.

If lottery assignments reduce the social connection between neighboring at-risk youth, perhaps the growth of school choice programs has provided broader societal benefits by reducing the amount of youth criminal activity, especially when the choice programs favor students who face greater disadvantages, such as those attending failing schools. Such reductions in arrests are likely concentrated among minority youth and youth in lower income neighborhoods, and may substantially improve these students' likelihood of long-run success in formal labor markets. Given the high levels of racial segregation observed within U.S. cities, this potential benefit may be much more important in central cities where many successful choice programs are concentrated. To our knowledge, no existing research has examined the effect that winning a school lottery has on the criminal activity of a student's neighborhood peers. Further, these findings may help guide the efficient allocation of limited school choice resources by focusing on students living in high poverty or heavily segregated neighborhoods.

Analytical Methods and Hypothesis Tests: This study will examine the effect of middle school lotteries that move students out of their assigned middle school, which typically leads to attending a different school than the youth residing in same neighborhood. Specifically, we will test whether residing near lottery winners can explain the likelihood of a student being arrested over and above any correlation that arises between living near equivalent lottery applicants and the likelihood of arrest.

Similar to Billings, Deming and Ross (2019), we will begin with a simple cross-sectional model that examines the conditional correlation between student arrests (y_{ibst}) in a small neighborhood and the number of students, or of similar students on key demographics, that reside in the neighborhood (X_{bst}). Specifically,

$$y_{ibst} = \beta_1 X_{bst} + \delta_{bs} + \gamma_{st} + \varepsilon_{ibst} \quad (1)$$

where δ_{bs} represents a neighborhood *b* within school attendance zone *s* fixed effect, γ_{st} represents a school by cohort *t* fixed effect. The model is identified because students in different cohorts have different numbers of same grade peers residing in their neighborhood. This model can be extended to count the number of peers who are the same gender and/or the same race and ethnicity. If variation across cohorts is quasi-random, then one can identify β_1 as the effect of the concentration of neighborhood peers on arrests. β_1 in equation (1) represents a test of our first hypothesis: does the likelihood of later life arrests depend upon the number and type of same grade/age students who reside in a student's neighborhood?

However, the cross cohort estimate of peer effects based on equation (1) does not directly address the policy question of whether moving an individual in this neighborhood out of the school reduces the criminal activity of other students residing in the neighborhood. We extend equation (1) to ask whether having more lottery winners (Z_{bst}) among neighborhood residents in the same cohort leads to reductions in crime among students who did not apply for the lottery, after conditioning on the number of peers living in the neighborhood. Since the decision to apply for the lottery and the conditions that affect the likelihood of lottery success both may correlate

with unobservables associated with this cohort of students, we also include a control for the expected number of winners (W_{bst}) in the same small neighborhood in equation (1).

$$y_{ibst} = \beta_1 X_{bst} + \beta_2 Z_{bst} + \beta_3 W_{bst} + \delta_{bs} + \gamma_{st} + \varepsilon_{ibst} \quad (2)$$

This specification in equation (2) represents the primary focus of our project. Specifically, β_2 asks the question: does the impact of a neighborhood student fall when this student attends a different school due to success in a school choice lottery?

As an extension, we will consider how residential movement of lottery losers influences outcomes as some lottery losers relocate in response to the lottery, changing both their school attendance zone and residence. Specifically, we will exploit school specific data on the fraction of losers who move (μ_s), and fraction of winners who actually attend their lottery school (π_s) to estimate

$$y_{ibst} = \beta_1 X_{bst} + \beta_{21} Z_{bst}\pi_s + \beta_{22}(N_{bst} - Z_{bst})\mu_s + \beta_{31} W_{bst}\pi_s + \beta_{32}(N_{bst} - W_{bst})\mu_s + \delta_{bs} + \gamma_{st} + \varepsilon_{ibst} \quad (3)$$

where N_{bst} is the number of applicants. We interact both variables of interest, actual winners (Z_{bst}) and expected winners (W_{bst}), with the measures of take-up frequency for winners and/or opt-out frequency for losers. Now, β_{21} tests whether the impact of a neighborhood student falls when this student attends a different school due to success in a school choice lottery, and β_{22} tests whether the impact of a neighborhood student falls when a student who loses a school lottery moves out of the neighborhood to attend a different school.

Data and Analysis: We plan to use the school choice lottery data for the 2006-2007 to 2008-2009 cohorts of students entering 6th grade in CMS. We observe the school lottery choices for all students who applied to the lottery and whose applications were successfully matched to the NCERDC student level data. The linkage to NCERDC data allows us to observe students through the end of high school including information on standardized test scores, disciplinary actions, and student demographics. We plan to use the census block group assignments in the NCERDC data and school attendance zones in the CMS data to group students into small neighborhoods in which all students in a neighborhood live in the same block group and in the same middle school attendance zone.

Using the NCERDC data, we examine long run effects of peer outcomes in the lottery on disciplinary actions measured by the quantity and duration of suspensions. We estimate the effects of lottery placements based on the total number of peers with the same assigned grade, assigned neighborhood school, census block group, and gender, as well as for the number of students who match the subject student on economic disadvantage, race/ethnicity or both. We can extend this to analyze the effects of lottery outcomes on standardized test scores and high school graduation.

We use two additional data sources: Matched incarceration records from NC Department of Corrections, and Mecklenburg County arrest records during our relevant sample period on individuals arrested between the ages of 16 and 21. While this data allows us to observe the

future criminal behavior of CMS students, regardless of whether they transfer or drop out of school, they are limited to crimes committed in Mecklenburg County. Nonetheless, Mecklenburg County contains Charlotte and the surrounding, and most arrests are concentrated in and around the urban center. These two additional data sources allow us to extend our analysis to estimate the effects of peer lottery outcomes on future arrests and incarceration.

References:

Angrist, Joshua D., Parag A. Pathak, and Christopher R. Walters. 2013. Explaining the Effectiveness of Charter Schools? American Economic Journal: Applied Economics, American Economic Association, vol. 5(4), pages 1-27

Bacher-Hicks, Andrew, Stephen B. Billings, David J. Deming. 2019. The School to Prison Pipeline: Long-Run Impacts of School Suspensions on Adult Crime. NBER Working Paper #26257.

Bayer, Patrick, Randi Hjalmarsson, and David Pozen. 2009. "Building Criminal Capital behind Bars: Peer Effects in Juvenile Corrections," The Quarterly Journal of Economics, 124: 105-147.

Billings, Stephen, Eric Brunner, and Stephen L Ross. 2018"The Housing and Educational Consequences of the School Choice Provisions of NCLB: Evidence from Charlotte, NC". Review of Economics and Statistics 100, 65-77.

Billings, Stephen B., David J. Deming, and Jonah Rockoff. 2014. "School Segregation, Educational Attainment, and Crime: Evidence from the End of Busing in Charlotte-Mecklenburg." The Quarterly Journal of Economics 129 (1): 435-476.

Billings, Stephen B., David J. Deming, and Stephen L. Ross. 2019. "Partners in Crime". American Economic Journal: Applied Economics 11(1), 126-150.

Cullen, Julie Berry, Brian A. Jacob, and Steven Levitt. (2006). "The Effect of School Choice on Participants: Evidence from Randomized Lotteries." *Econometrica*. 74(5): 1191-1230.

Chakrabarti, R. (2013). Vouchers, Public School Response and the Role of Incentives: Evidence from Florida. Economic Inquiry, 51(1), 500-526.

Deming, David J. 2011. "Better Schools, Less Crime?" The Quarterly Journal of Economics 126 (4): 2063-2115.

Glaeser, Edward L., Bruce Sacerdote, and José A. Scheinkman. 1996. Crime and Social Interactions. *The Quarterly Journal of Economics* 111(2), 507–548.

Hastings, Justine S., Thomas J. Kane, and Douglas O. Staiger. 2008. "Preferences and Heterogeneous Treatment Effects in a Public School Choice Lottery," NBER Working Paper No. 12145, 2007.

Kling, Jeffrey R., Jens Ludwig and Lawrence F. Katz. 2005. "Neighborhood Effects on Crime for Female and Male Youth: Evidence from a Randomized Housing Voucher Experiment." The Quarterly Journal of Economic 120 (1): 87-130.

Ludwig, Jens; Duncan, Greg J.; and Hirschfield, Paul. 2001. "Urban Poverty and Juvenile Crime: Evidence from a Randomized Housing-Mobility Experiment." The Quarterly Journal of Economics 116: 655-80.

Ludwig, Jens, and Jeffrey R. Kling. 2007. "Is Crime Contagious?" Journal of Law and Economics 50: 491–518.

Patacchini, Eleanora and Yves Zenou. 2009. "Juvenile Delinquency and Conformism." Journal of Law, Economics, and Organization 28: 1-31.

Weiner, David A., Byron F. Lutz, and Jens Ludwig. 2009. The Effects of School Desegregation on Crime. NBER Working Paper #15380.