Rosenwald Schools and the Intergenerational Mobility of Blacks and Whites: Evidence from North Carolina

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Research Question

In the early 20th century, Chicago philanthropist Julius Rosenwald established the Rosenwald Fund, a school construction program aimed at improving educational opportunities for black children in the rural South. Between 1913 and 1932, over 5,000 schools were built across 15 Southern states. By the end of the program in 1932, the total capacity of Rosenwald schools exceeded a third of the black school-age population in the rural South, making it the largest educational initiative of its kind at the time.[1] An important objective of the Rosenwald Fund was to not only expand access to education, but also provide high-quality education to black children. As such, Rosenwald schools were modernly-designed and had all the necessary amenities conducive to a good learning environment.

Aaronson and Mazumder (2011) have shown that Rosenwald schools had a positive impact on educational outcomes of rural black children, contributing to the narrowing racial gap in educational attainment over the first half of the 20th century. In this paper, we explore two related questions using a new longitudinal dataset of birth records linked to Census records. First, we will evaluate whether the impact of Rosenwald schools extended beyond educational attainment and ultimately translated into better labor market outcomes in adulthood for black boys, including labor force participation, occupational quality, and earnings. In addition, we will test whether greater exposure to Rosenwald schools led to higher intergenerational mobility, by comparing sons' occupational and educational attainment to that of their fathers. The availability of information on parents and siblings will also allow us to investigate the role of family characteristics, including parental background and family composition, in mediating the impact of Rosenwald schools.

The second component of our research question is assessing the impact of Rosenwald schools on long-run outcomes of whites. While white children were not directly affected by Rosenwald schools, Carruthers and Wanamaker (2013) provide evidence of spillovers in educational funding via greater expenditures on white schools in counties where Rosenwald schools were built. They argue that this reflects a reallocation of funds that would otherwise have been spent on black schools, perhaps as a way to preserve racial inequalities in place and appease the local white

[1] Estimate comes from Aaronson and Mazumder (2011).

population in the backdrop of a segregated South. This motivates our interest in both absolute and relative long-run outcomes of blacks and whites.

We study the impact of Rosenwald schools in the context of North Carolina. While this decision is driven by the fact that North Carolina is one of the two states covered in our dataset, it is actually an ideal setting for two reasons. First, with the construction of over 800 schools, North Carolina was the largest recipient of Rosenwald schools among all Southern states. Similar to existing studies, variation in the timing, location and size of Rosenwald schools will form the basis of our empirical strategy. Second, state and local officials in North Carolina produced a rich collection of educational statistics and reports from the early 20th century, which will help us revisit the findings of Carruthers and Wanamaker (2013) in the context of North Carolina. Moreover, while previous studies have mainly relied on cross-county (and temporal) variation in the construction of Rosenwald schools, detailed reports on the precise location of all schools in North Carolina will allow us to exploit within-county cross-town variation to identify parameters of interest.

Methodological Approach

This project is made possible by a new dataset, which we are currently involved in developing: the Longitudinal, Intergenerational Family Electronic Micro-Database Project (LIFE-M). LIFE-M combines vital records (birth, marriage and death certificates) and Census records to reconstruct families and link individuals over time. LIFE-M currently covers two states, Ohio and North Carolina, and spans the period from the late 19th century until 1940. This will allow us to study individuals who were of school-going age during the Rosenwald era and which we can observe in the 1940 Census as (young) adults. Thanks to father-son linkages via birth certificate information (which contain parent names), we will be able to compare outcomes of sons in 1940 to that of their fathers in 1900, 1910, 1920 or 1940 and study intergenerational mobility. Crucially for our purposes, birth certificates also enable us to determine which children were likely to have been exposed to Rosenwald schools as they list the county of birth.

While "automated" methods for linking individuals across Census waves have been around since the early work of Ferrie (1996) and spawned a vast literature, a key methodological advantage of LIFE-M—in addition to the extra information contained in vital records—is the combination of training data and machine learning methods for large-scale probabilistic record linking. A drawback of "unsupervised" linking methods is the prevalence of false matches (Bailey et al., 2018). To address this issue, LIFE-M has generated large amounts of training data over several years: data where human trainers observe potential candidates for a particular individual and make corresponding match/non-match decisions. In order to minimize false matches, the same records are shown to multiple trainers and candidates are only labeled as matches when there is a consensus among all the trainers.[2] Using the training data as an input, we can then train machine learning algorithms to reproduce these complex human decisions and scale linking to millions of records, and control for the accuracy of matches while maximizing match rates. Training data also

[2] In validation exercises, LIFE-M trainers achieved an accuracy rate of over 96% (Bailey et al., 2018).

allows us to better link minority groups, including blacks, which tend to be harder to link for a variety of reasons and have often been excluded from past datasets. The end product will be a large longitudinal sample of reconstructed families.[3]

To identify the impact of Rosenwald schools, we will exploit variation in the timing, location and size of Rosenwald schools. As mentioned earlier, over 800 schools were built all across North Carolina over a 17-year span (1914-1931), and ranged from small 1-teacher schools to large 20-teacher schools. Our empirical analysis will be divided into two parts. In the first part we will explore the impact of Rosenwald schools on the allocation of educational resources for blacks and whites, in terms of number of teachers, total expenditures on teachers, and number of schools. Using preliminary data we have digitized, Figure 1 provides some motivating evidence on the impact of Rosenwald schools. It plots total expenditures on teachers by race in North Carolina between 1904 and 1932, separately for the 7 counties that never received a Rosenwald school and the remaining 93 counties, as well as the total number of Rosenwald schools over time. Panel A shows that expenditures on black teachers grew more rapidly in Rosenwald counties starting in the mid-1910s, mirroring the emergence of Rosenwald schools. This relationship is not so surprising, given that local and state authorities were implicitly responsible for teacher salaries after schools were built (Ascoli, 2006). Panel B plots the corresponding series for white teachers. The pattern is similar to Panel A, but in this case the relationship is no longer mechanical since Rosenwald teachers were mostly black. While these graphs are merely suggestive, they are nonetheless consistent with spillovers in educational funding.

More formally, Table 1 estimates the relationship between total expenditures on teachers and total expenditures on Rosenwald teachers, defined as the cumulative number of Rosenwald teachers multiplied by average salaries for black teachers by county (in 1918). In columns (1)-(4), we estimate this relationship using the panel of counties in North Carolina over the period 1904-1932. Column (1) controls for county and year fixed effects, column (2) adds year fixed effects interacted with an indicator for never-Rosenwald counties, column (3) alternatively includes county-specific linear time trends, and column (4) allows the time trends to vary before and after 1918, when the Rosenwald initiative started to expand rapidly. The preferred estimates in column (4) imply that for every dollar spent on Rosenwald teachers, an *additional* 0.6 dollars were spent on black teachers, but also that 3.2 dollars were spent on white teachers in response.

One concern is that counties do not constitute good counterfactuals for one another, even after allowing for differential time trends. In columns (5)-(6), we estimate this relationship using within-county cross-town variation. The sample underlying these two columns is an unbalanced panel of towns in North Carolina for which data on educational expenditures was available, which we then merged with town-level information on Rosenwald schools. This additional layer of variation allows us to make finer comparisons and flexibly control for county-specific time trends by including county-year fixed effects. The estimates in column (6), which also includes town fixed effects and town-specific time trends, imply that total expenditures on black teachers increased

[3]See https://sites.lsa.umich.edu/life-m/ for additional details on LIFE-M.

one-for-one with expenditures on Rosenwald teachers (no crowding in, but no crowding out either), while expenditures on white teachers increased by a statistically insignificant 2.2 dollars. Although extremely preliminary, these results are consistent with the notion that Rosenwald schools led to greater funding for white schools. We plan on exploring this further once we digitize data on the number of teachers, average teacher salaries and the number of schools.

The second part of our analysis will explore the impact of Rosenwald schools on long-run outcomes of black and white children, including intergenerational mobility. The analysis will be based on two LIFE-M samples: (1) the universe of boys born in North Carolina in the early 20th century linked to themselves in the 1940 Census, and (2) the subsample of boys whose fathers were linked to the 1900, 1910, 1920, or 1940 Census. Similarly to Aaronson and Mazumder (2011), we will compare children who were more or less exposed to Rosenwald schools as measured by the number of Rosenwald teachers adjusted for population during the years they were of school-going age, in their place of birth. As such, we will essentially compare children born in the same place but from different birth cohorts, as well as children from the same birth cohort but born in different places. We will employ two additional identification strategies to address potential confounding factors: (1) a town design comparing children from the same county and year of birth but born in different towns, and (2) a sibling design comparing siblings who grew up in the same town but born in different years.[4]

Anticipated Contribution to the Literature

Numerous studies have explored the legacy of Rosenwald schools. Notably, Aaronson and Mazumder (2011) find that Rosenwald schools had a positive impact on school attendance, literacy rates and years of schooling among rural black children. Aaronson et al. (2014) study the impact of Rosenwald schools on the fertility decisions of black women, while other work has shown that Rosenwald schools had a positive impact on health outcomes, life expectancy and incarceration rates (Frisvold and Golberstein, 2013; Aaronson et al., 2017b; Eriksson, forthcoming). More recently, Aaronson et al. (2017a) investigate potential benefits for children of parents who were exposed to Rosenwald schools, with preliminary evidence suggesting positive effects on educational attainment.

The paper will directly contribute to this literature by examining new important outcomes of interest: long-run labor market outcomes and intergenerational mobility. Given that education is generally thought to have a positive effect on economic outcomes, we might expect to find positive effects for blacks. However, determining the magnitude of any long-term gains is crucial in assessing the effectiveness of the program. Our project will also contribute to the literature on socio-economic differences between blacks and whites. In addition to documenting large and persistent gaps in black-white outcomes, many studies have found that racial gaps have been

[4]Note that we will estimate separate models for white and black children since the first part of the analysis implies that white children were also likely affected by Rosenwald schools via spillovers in educational funding. We will proxy for town of birth using fathers' town of residence in the Census(es) preceding the child's birth.

persistent across generations, often attributing a central role to differences in human capital accumulation (Mazumder, 2014; Carruthers and Wanamaker, 2017; Collins and Wanamaker, 2017). By studying the impact of Rosenwald schools on long-run outcomes of both blacks and whites, we hope to shed further light on the determinants of racial gaps in the first half of the 20th century.

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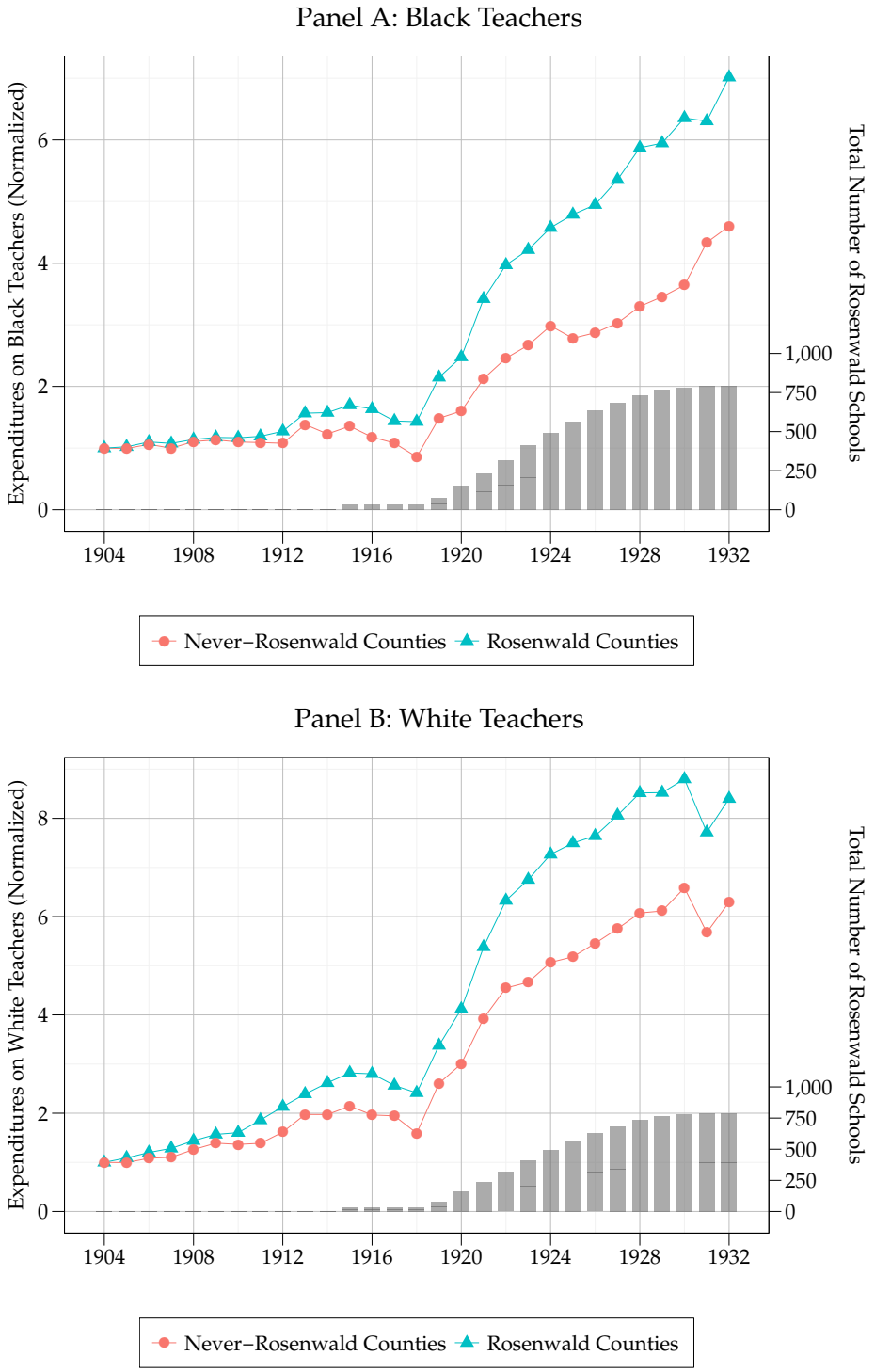
Figure 1: Expenditures on Teachers by Race in Rosenwald vs. Never-Rosenwald Counties in North Carolina, 1904-1932



Notes: Never-Rosenwald counties are 7 counties which never received a Rosenwald school (Alleghany, Caldwell, Graham, Granville, Mitchell, Watauga, Yancey). Expenditures on teachers are normalized to 1 in 1904 by county type and race. Scale for total number of Rosenwald schools in North Carolina on the right-hand side y-axis.

Source: 1904-1932 Biennial Reports of the Superintendent of Public Instruction of North Carolina, Fisk University Rosenwald Fund Card File Database.

Table 1: Rosenwald Schools and Expenditures on Teachers by Race, 1904-1932: OLS Estimates

	Outcome: Expenditures on black/white teachers (1918$)					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Expenditures on black teachers						
Cumulative number of Rosenwald teachers ×	3.51***	3.46***	2.04***	1.61***	2.38***	0.99***
average salary for black teachers in county (1918$)	(0.53)	(0.55)	(0.35)	(0.31)	(0.80)	(0.31)
Panel B: Expenditures on white teachers						
Cumulative number of Rosenwald teachers ×	10.30***	10.11***	4.27**	3.21*	9.40**	2.21
average salary for black teachers in county (1918$)	(3.14)	(3.28)	(1.96)	(1.84)	(4.23)	(1.51)
County FEs	✓	✓	✓	✓		
Year FEs	✓	✓	✓	✓		
Year FEs × never-Rosenwald county		✓				
County FEs × linear trend			✓	✓		
County FEs × linear trend × Rosenwald era (1919-32)				✓		
County × year FEs					✓	✓
Town FEs					✓	✓
Town FEs × linear trend						✓
Unit of observations	County	County	County	County	Town	Town
Observations	2,882	2,882	2,882	2,882	2,134	2,134

Notes: The cumulative number of Rosenwald teachers is approximated by the total number of classrooms across all Rosenwald schools built up until a given year in a given county or town. Sample restricted to county × year combinations with at least two towns in columns (5)-(6). Robust SEs in parentheses, clustered at the county level in columns (1)-(4) and at the town level in columns (5)-(6). *** 1%, ** 5%, * 10% significance.

Source: 1904-1932 Biennial Reports of the Superintendent of Public Instruction of North Carolina, Fisk University Rosenwald Fund Card File Database, 1938-1940 Educational Directory of North Carolina.