Location Matters: Historical Racial Segregation and Intergenerational Mobility

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Abstract
This paper explores historical patterns of racial segregation and its relationship with the observed spatial variation in contemporaneous economic mobility established in Chetty et al. (2014). We combined data from the Equality of Opportunity Project with a novel measure of racial segregation developed in Logan and Parman (2017) and find that past racial segregation explains a significant portion of the spatial variation in intergenerational mobility. These findings are consistent with models showing that persistent institutional factors may drive long-term outcomes across areas. Racial segregation and the environment that fosters it may diminish upward economic mobility by reducing access to networks, labor and capital markets, and political institutions. If so, then reducing the impact of these persistent processes may be key to mitigating current-day gaps in wealth, income, and overall well-being.

1. Introduction

Recent research on inequality in upward economic mobility has spurred renewed interest in the role of "place" in economic outcomes.[1] Chetty et al. (2014; 2016), for example, present compelling evidence linking intergenerational income mobility and childhood location. This research program, by necessity, focuses on relatively contemporary contributing factors. These measures, however, potentially understate the contribution of long-run historical processes to this intergenerational inequality.[2] In particular, we focus on the role of persistent institutional features associated with historical racial segregation – attitudes, disinvestment, and other policy choices (Cook, Logan, and Parman 2017) – that continue to still affect economic upward mobility for blacks and other disadvantaged groups.

This paper provides evidence that these historical processes do matter. Specifically, we augment the regressions of Chetty et al. (2014) with novel measures of historical racial segregation developed in Logan and Parman (2017). These measures have an economically significant link with contemporary income mobility. As Chetty et al. (2014) note, clean identification here is admittedly unattainable without strong assumptions; notwithstanding this concern, the results are suggestive. Specifically, in our preferred specification, a 10 percent increase in the 1880-1940 change in segregation is associated with a roughly 0.4 percent increase in contemporary parent-child rank-rank mobility, implying that higher historical segregation is associated with reduced intergenerational income mobility. This relationship is robust to including historical measures of local income inequality, suggesting that institutional features reflected in higher historical levels of local racial stratification, which include regimes and policies that exclude or restrict the growth of blacks within the political-economy of a locality, are relevant to understanding persistent spatial differences in inequality. Moreover, this finding is consistent with socio-historical

[1] See the Equality of Opportunity Project data described in Chetty et al. (2014) and Chetty and Hendren (2015).
[2] Chetty et al. (2014) note the segregation measures they use, as they are from the last decade, may not fully capture the extreme nature of segregation that characterized areas where blacks lived historically.

accounts whereby localities that promoted racial segregation could simultaneously undermine the economic mobility of both blacks and working class whites (e.g. Tomaskovic-Devey & Roscigno 1996).

Our contribution is, therefore, situated within a framework arguing that persistent socio-political attitudes and institutions matter (Acemoglu et al., 2012; Dell, 2010; Acharya et al., 2016; Chetty et al., 2014; Mazumder, 2005; Solon, 1992). People have historically sorted geographically; first along racial/ethnic lines and, increasingly, by income and education (Rothbaum, 2016; Kremer, 1997).[3] This sorting is bundled with considerable variation in both access to and the quality of public goods, economic and social capital, and institutions contributing to economic success. This includes networks that facilitate educational attainment, entrepreneurial opportunity (Becker and Tomes 1979, 1986) and infrastructure development (Islam 2016; Islam et al. 2015). Spatial variation in past racial segregation may embody differences in attitudes, politics, and resource allocation that help explain spatial variation in inequality and income mobility observed today.

It is important to note that this is not a purely southern phenomenon. Variation in local segregation in the South partially reflects the institutions that developed post-Reconstruction and ultimately calcified into Jim Crow. While other regions did not suffer a *de jure* Jim Crow regime, the segregation that emerged from underlying racial animosity and competition is reflected today in inequality in income, wealth, and economic mobility.

2. Data and Empirical Strategy

We use data drawn from two sources: (1) commuting zone-level estimates of rank–rank child-parent income mobility parameters and contemporary measures of segregation and racial isolation made available by the Equality of Opportunity Project (Chetty et al. 2014; Dahl and DeLeire, 2008), and (2) a novel measure of local segregation from 1880 and 1940 described in Logan and Parman (2017). The latter

[3] A number of recent books have outlined and discussed the ramifications of this growing feature of US society (e.g. Bishop, 2008; Putnam, 2015).

draws upon US Census enumerator data from the Minnesota Population Center's Integrated Public Use Microdata Series (IPUMS). Enumerators, going door–to–door, recorded household race, allowing for neighbor-based measures of segregation.

Logan and Parman (2017) use the Census Enumerator data to create a localized measure of segregation based on a thought experiment: more "integrated" areas should have a relatively higher rate of different race persons living adjacent to each other. They first use the census information to identify and assign race to neighbors. Next, using county–level black and white population, they predict the number of black households with white neighbors: (1) assuming that households are distributed randomly across space; (2) assuming perfect segregation; and (3) then determine the extent to which the true distribution differs from these two extremes.[4] The final measure takes on values between zero and one; zero corresponds to an essentially random local racial distribution of households while one implies perfect segregation.

Two traditional measures of segregation—the dissimilarity index and isolation index—require population shares by race at higher levels of geographical aggregation while the Logan and Parman measure uses household level information on neighbors. Logan and Parman (2017), in an online appendix, provide the results of simulation analyses comparing the performance of their measure to the performance of dissimilarity and isolation indices under different scenarios. They find that the Logan and Parman measure more reliably identifies segregation and integration in communities, even with very low numbers of black households and in the presence of missing data. In contrast, the dissimilarity index can overstate segregation with small numbers of black households, and both the dissimilarity and isolation indices depend on how geographical boundaries are drawn and the number of geographical subunits. This leads to widely varying estimates of the level of segregation even for simulated areas with completely

[4] It is important to note that during the time period Logan and Parman (2017) consider, less than 0.5% of the population was neither black nor white. Further, interracial marriages, by virtue of law and/or custom, were extremely rare.

segregated or completely integrated black populations. Thus, for larger geographical units, the Logan and Parman measure reveals patterns of segregation that these traditional measures may not and represents an innovation in the measurement of segregation at finer levels of geographical aggregation. Though less common in the segregation literature, the Theil index captures the relative "evenness" of the racial distribution within a local area relative to city/metro or county. Logan and Parman's approach adds another dimension by comparing each local area to its own two extreme counterfactual distributions—complete segregation versus integration.[5]

Given these properties, Logan and Parman's measure has several advantages. First, it mitigates ecological problems inherent in using tract or municipal level boundaries as the geographic unit. Racial counts are assigned based on the race of the household head, rather than using total population, reducing concerns that systematic differences in household sizes across race may distort measurement. Second, their measure captures meaningful segregation in rural areas. Third, and most importantly, their measure may more directly capture social interactions. Intuitively, cross-racial interactions are more likely in locally integrated contexts. Stronger racial sorting, however, may reflect little cross-racial interaction or, more important, social attitudes and institutions that discouraged contact.

We use a commuting zone-to-county crosswalk to create a unique dataset of 1993 commuting zone level observations that combine historical and contemporaneous information.[6] Table 1 presents summary statistics describing these data. The commuting zones in our data have a mean 1996-2000 parental income of approximately $65,000. The pooled sample of parents from the core Equality of Opportunity (2014) data yield a Gini coefficient of 0.391 (the nationwide Gini coefficient in 2015 was 0.482), and the top 1 percent of our sample holds roughly 10 percent of income. Finally, turning to 1880, these commuting zones were roughly 15 percent black and had substantial variation in local racial

[5] Reardon and Fishbaugh (2002) discuss the Theil index and its properties relative to the dissimilarity and isolation indices.

[6] This crosswalk was developed by David Dorn. Detailed information on these crosswalks are available via Dorn (2009) and Autor and Dorn (2013).

segregation: a mean of roughly 0.2 with a standard deviation of 0.153, suggesting that most places were moderately segregated.

2.1 Empirical Strategy

The empirical strategy estimates variations of the following regression:

$$y_i = \alpha s_i + x_i'\beta + \epsilon_i \quad (1)$$

where y_i is a contemporaneous measure of income mobility, the average rank-rank coefficient for commuting zone i (Chetty et al. 2014). The vector x_i denotes observable characteristics of location i including contemporary measures of racial isolation and segregation. The coefficient of interest, α, captures the conditional reduced-form relationship between historical segregation, denoted by s_i, and contemporary income mobility. We also estimate specifications that include state and region fixed effects, as well as versions of (1) that include the change in segregation between 1880 and 1940 and measures of historical income inequality at the state, local, and national levels.

While we do not claim to isolate the causal effect of segregation, it is instructive to briefly discuss what we believe is reflected within our empirical model. There are a broad set of unobserved factors embedded in ϵ that affect contemporary intergenerational mobility including predetermined factors associated with local attitudes, opportunities, networks, and investments in public goods – institutional features that are potentially persistent over time and whose level was affected by the local racial environment. The variation in historical segregation across location, therefore, captures the reduced form effect of these historical factors on contemporary outcomes, but this variation is plausibly unrelated to the unobserved modern-day location, consumption, and schooling choices made by the parents and children reflected in the rank – rank coefficients.

3. Main Results

Panel A of Table 2 presents baseline estimates of equation (1). The dependent variable, drawn from data provided by Chetty et al. (2014), is a rank-rank coefficient that summarizes the relationship between child and parent location in the national income distribution. These rank-rank coefficients (see Chetty et al. 2014 for a lengthier description of their data) represent the relationship between an adult child's placement in the income distribution and their parents' rank when they were children. These measures are estimated for adult children from the 1980-1982 birth cohort and their parent's mean income between 1996-2000. Column 1 of Panel A reports results conditioning only on the 1880 black population share in location *i*; Column 2 includes state fixed effects and Column 3 includes region fixed effects based on Census divisions. The dependent variable is the slope of the regression of child income rank on parental income rank, with higher values implying lower intergenerational mobility. Depending on specification, we cluster our results at the state or region level to account for within–state/regional level correlation in the unobservables.

We estimate a positive and statistically significant relationship between segregation and intergenerational mobility, which suggests that in areas where our localized 1880 segregation measure was higher, contemporaneous intergenerational inequality is higher. Intuitively, larger mobility coefficients and positive associations with them imply a less mobile society, insofar as parental income is highly predictive of subsequent adult child outcomes. Thus, our results show that historical segregation contributes meaningfully to a less mobile society. Specifically, a 1 percent increase in 1880 segregation is associated with a 0.06 increase in relative contemporary mobility inequality. Including region fixed effects slightly reduces the magnitude of the coefficient. Panel B of Table 2 includes racial dissimilarity and isolation indices, commonly used measures of contemporary racial segregation. Our primary result is robust to the inclusion of these additional measures. Historical segregation measures remain positive and statistically significantly related to intergenerational inequality, even after controlling for current-day segregation and isolation, much of which developed later in the 20th century.

It is important to note that the time period between the late 1800s and early 1900s marked a dramatic turning point in the sociopolitical outlook for black Americans. Specifically, this period includes the end of Reconstruction, which allowed the south to effectively roll back much of the post-bellum political and social progress made by blacks. This progress was fostered in part by legislation that included the Civil Rights Acts of 1866 and 1875, as well as laws that continued funding for the Freedman's Bureau and the first Reconstruction act (Cox and Cox 1973). By the early 1900s, pushback among policymakers resulted in erosion of black political representation and an increase in racial segregation.

To capture this equilibrium that emerged in the early 1900s, in Table 3 we augment our baseline regression with the change in racial segregation between 1880 and 1940. Here, we find that the 1880-1940 percent change in racial segregation is significantly related to intergenerational mobility. This correlation holds after controlling for the Duncan occupational score, which measures the fraction of people in the top quintile as a measure of income inequality at the national, state, and regional levels. These measures have small, statistically insignificant relationships with contemporary inequality in mobility in contrast to the strong relationship with segregation. Controlling for contemporary measures of dissimilarity and isolation, we again find that larger relative changes in local racial segregation between 1880 and 1940 are associated with lowered local-level mobility. Across all specifications in Table 3, a 1 percent increase in the 1880-1940 racial segregation change is associated with a roughly 0.04 percent increase in the contemporary parent-child rank-rank mobility measure.

4. Discussion and Conclusion

This paper combines estimates of measured intergenerational inequality with unique data on historical segregation to study whether historical institutions and attitudes typically ascribed to racial segregation have an independent relationship with contemporaneous economic mobility. We find evidence that higher local historical segregation from the late 1800s is positively correlated with relatively

decreased contemporary economic mobility—specifically for children born in the early 1980s. This relationship is robust to controlling for standard current-day measures of racial segregation and isolation, suggesting that the historical segregation measure captures important unobservable features across locations that matter for current day outcomes.

Having established this relationship, it is important to consider the implications. The historical features captured within the Logan and Parman measure of racial segregation, including public policies, disinvestment, as well as the underlying attitudes that helped foster it, could have important impacts on a broad range of economic and educational opportunities for black and other disadvantaged Americans. Our findings thus suggest a possible independent role for these factors as determinants of modern day economic mobility outcomes. Importantly, we control for current-day segregation, a well-documented correlate of socioeconomic inequality; omitting current-day segregation would likely impose a positive bias on our estimates of the historical segregation-mobility link. A number of studies—e.g. Yinger (1995) and Cutler and Glaeser (1997)—demonstrate the consequences of segregation on educational and labor outcomes within a generation. In addition, in results not reported here, we also find evidence that historical segregation is related to inequality in individual income mobility and the likelihood a child attends and completes college.[7]

Because such extreme segregation and associated attitudes have ostensibly declined in recent years, many scholars and policymakers argue that, even in the face of persistent wealth and income differences, many barriers to economic mobility for blacks and other disadvantaged groups have been mitigated or eliminated. Our results suggest that such pronouncements may be premature. The negative effects of institutions and attitudes manifested in segregation potentially have substantial long-run effects. As such, ameliorating such gaps may require more robust public policy responses to bring equality of

[7] These results are available in an appendix that is available from the authors upon request.

opportunity in places that historically have been less amenable to upward mobility for disadvantaged groups.

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Table 1: Commuting Zone Level Descriptive Statistics

Variables	Mean 1980-1982	Standard Deviation 1980-1982
1980-82 Child-Parent Income Rank	0.336	0.059
Expected Rank	42.969	4.493
Logan-Parman Racial Segregation Measure	0.202	0.153
1880 Percent Black	0.149	0.207
Racial Isolation Index	0.102	0.089
Racial Dissimilarity Index	0.408	0.198
Gini Coefficient	0.391	0.067
Mean Parent Income, 1996-2000	65084.36	16078.85
Income Share of Top 1%	0.097	0.030
Number of Commuting Zone Observations	1993	

Note: Data drawn from multiple sources. Variables Child - Parent Income Rank, Expected Rank Racial Isolation Index, Dissimilarity Index, Mean Parent Income, and Income Share of Top 1% are drawn from data made available by the Equality of Opportunity Project (Chetty et al. 2014). Parental income values are reported in 2012 dollars, deflated using the CPI-U. The Logan-Parman Racial Segregation Measure is a localized segregation measure in 1880 developed in Logan and Parman (2017). See text for more discussion.

Table 2: Segregation Measure and County Level Measures of Inequality

Panel A. With Controls for 1880 Black Population Share			
Dependent Variables	Intergenerational Inequality Measure	Intergenerational Inequality Measure	Intergenerational Inequality Measure
Cohort	1980-1982	1980-1982	1980-1982
1880 Segregation Measure	0.066***	0.041***	0.054***
	[0.017]	[.013]	[0.012]
1880 Percent Black	0.106***	0.077***	0.098***
	[0.016]	[.015]	[0.011]
Constant	0.312***	0.322***	0.295***
	[0.006]	[.003]	[0.006]
State Fixed Effects		X	
Region Fixed Effects			X
Observations	1,993	1993	1,993
R-squared	0.236	0.382	0.328
Panel B. With Controls for 1880 Black Population Share and Contemporary Racial Segregation			
1880 Segregation Measure	0.071***	0.047***	0.056***
	[0.017]	[.012]	[0.018]
1880 Percent Black	0.094***	0.069***	0.090***
	[0.015]	[.013]	[0.016]
Isolation Measure	-0.072**	-0.041***	-0.0322**
	[0.028]	[0.013]	[0.016]
Dissimilarity Measure	-0.0121	-0.029**	-0.0360***
	[0.019]	[.014]	[0.012]
Constant	0.324***	0.338***	0.318***
	[0.006]	[.006]	[0.009]
State Fixed Effects		X	
Region Fixed Effects			X
Observations	1,993	1993	1,993
R-squared	0.253	0.394	0.342

Note: Cluster - robust standard errors in brackets are clustered at the state level in columns 1 and 2 and at the region level in column 3. The dependent variable is the slope of the regression of child income rank on parental income rank. Higher values imply greater income inequality. *** p<0.01, ** p<0.05.

Table 3: 1880-1940 Segregation Change Measure and County Level Measures of Inequality

Dependent Variables	Intergenerational Inequality Measure	Intergenerational Inequality Measure	Intergenerational Inequality Measure	Intergenerational Inequality Measure	Intergenerational Inequality Measure	Intergenerational Inequality Measure	Intergenerational Inequality Measure
Cohort	1980-1982	1980-1982	1980-1982	1980-1982	1980-1982	1980-1982	1980-1982
1880 Segregation Measure	0.084**	0.083**	0.084**	0.084**	0.083**	0.084**	0.067**
	[0.019]	[0.018]	[0.018]	[0.027]	[0.027]	[0.027]	[0.027]
1880 Percent Black	0.088***	0.087***	0.087***	0.088***	0.087***	0.087***	0.091***
	[0.015]	[0.015]	[0.015]	[0.014]	[0.015]	[0.014]	[0.013]
1880-1940 Segregation Change	0.043***	0.042***	0.042***	0.043***	0.042***	0.042***	0.032***
	[0.007]	[0.007]	[0.007]	[0.010]	[0.010]	[0.010]	[.009]
1880 National-level Duncan Occupation Score	0.011			0.011			
	[0.025]			[0.020]			
1880 Regional-level Duncan Occupation Score		0.021			0.021		
		[0.021]			[0.027]		
1880 State-level Duncan Occupation Score			0.013			0.013	0.002
			[0.022]			[0.028]	[0.019]
Dissimilarity Measure	0.003	0.001	0.001	0.003	0.001	0.001	-0.028**
	[0.020]	[0.020]	[0.017]	[0.024]	[0.024]	[0.024]	[0.012]
Isolation Measure	-0.080**	-0.081**	-0.081**	-0.080**	-0.081**	-0.081**	-0.038

	[0.025]	[0.025]	[0.025]	[0.029]	[0.028]	[0.028]	[0.025]
Constant	0.308***	0.305***	0.307***	0.308***	0.305***	0.307***	0.311***
	[0.013]	[0.013]	[0.014]	[0.016]	[0.016]	[0.017]	[0.010]
Region Fixed Effects							X
Observations	1,799	1,799	1,799	1,799	1,799	1,799	1,799
R-squared	0.239	0.240	0.239	0.251	0.251	0.251	0.364

Note: Columns 1-3 include standard errors clustered at the state level in brackets; Columns 4-7 include standard errors clustered at the region level in brackets. The dependent variable is the slope of the regression of child income rank on parental income rank. Higher values imply greater income inequality. Duncan Occupation Score is measure of income inequality defined by fraction of of Census respondents in the top quintile of income. Dissimilarity and Isolation Measure are contemporary segregation measures made available in Chetty et al. (2014). *** p<0.01, ** p<0.05, * p<0.1