Segregated Neighborhoods, Segregated Schools?

Methodology

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Data for the chart presented in this article come from three sources: (1) the National Center of Education Statistics (NCES) Common Core of Data, (2) the NCES Private School Survey (PSS), and (3) the Census Bureau's American Community Survey (ACS) five-year estimates of census-tract population by race and age, as provided by the National Historical Geographic Information System. School data correspond to all K–12 students attending public schools in a US state for the school year 2015–16. I supplement the public school data with the available data on private schools, which includes most private schools in the country (75.7 percent, as reported in the PSS documentation). I restrict the school data to regular schools that were open in 2015. I throw out schools for which kindergarten is the highest grade offered and those that only offer adult education. ACS data are for the period 2011–15, focusing on individuals 5 to 17 years old in each census tract (a proxy for residential neighborhoods) in a US state. Census tracts with no residents in this age range are thrown out of the analysis dataset.

The following describes the procedure used to construct the segregation indices presented in the chart. Segregation indices summarize the distribution of racial groups among units (i.e., schools and tracts) within a system. Systems are defined as metropolitan statistical areas (MSAs). I match school and census-tract data to MSAs using the US county-MSA crosswalks provided by the National Bureau of Economic Research.[1] Then, I compute the total population and fraction of students/residents who are underrepresented minorities (defined as black or Hispanic, for historical reasons). For each MSA's schools/tracts, I compute the variance-ratio index of segregation (also known as the eta-squared index), defined as

$$Segregation = \frac{Isolation - Q}{1 - Q},$$

where Q is the MSA fraction of residents/students who are underrepresented minorities.

The isolation index is

$$Isolation = \sum_i \frac{m_i q_i}{M},$$

with m_i being the number of underrepresented minority students/residents in school/tract, i, q_i being the fraction of students/residents in school/tract i who are minorities, and M as the total number of students/residents in the MSA who are minorities. Intuitively, the isolation index measures the average fraction of peers who are minorities for a randomly chosen minority student/resident in the MSA. High values of isolation mean that minority individuals tend to interact with individuals who are also minorities. In a perfectly integrated environment, the isolation index would be equal to Q, the fraction minority of the MSA's population. Therefore, the numerator in the segregation index measures excess isolation, $Isolation - Q$, defined relative to a perfectly integrated city. On the other hand, a perfectly segregated city would have isolation equal to 1, such that minorities have 100 percent minority peers/neighbors, in which case excess isolation would equal $1 - Q$. The variance-ratio segregation index is therefore the ratio of existing excess isolation to excess isolation under perfect segregation. The index is bounded between 0 and 1, and it is interpreted in proportional terms. For instance, segregation equal to 0.30 means that the city's schools/neighborhoods are 30 percent as segregated as they could possibly be given the overall racial composition of the city. Thus, this index takes into account differences in the racial composition of cities, making comparisons between cities meaningful.

I compute school and neighborhood segregation for all 316 MSAs in the data. Average MSA neighborhood segregation is 0.23 (standard deviation = 0.12). Average MSA school segregation is 0.24 (standard deviation = 0.14). The correlation between school and neighborhood segregation is 0.87. Moreover, a univariate OLS (ordinary least squares) regression of school on residential segregation (unweighted) generates the following estimates:

$$School\ Segregation = 0.002 + 1.04 * Neighborhood\ Segregation + \epsilon.$$

The slope coefficient is statistically significant at the 1 percent confidence level. Therefore, the 45-degree line in the chart is almost equal to the regression line using unweighted observations. The R^2 of this model is 0.76, suggesting that neighborhood segregation explains about three-quarters of the observed variance in school segregation. The remaining variation, one-quarter of the total, is driven by student sorting into schools—both because of parental preferences and student assignment policy—and to measurement error.

One caveat with the estimates of residential segregation using the five-year ACS is that, unlike the school data, the ACS data constitute a sample of individuals for each census tract, not the whole population. Reardon and colleagues study the properties sampling bias of segregation indices. They show that sample data may lead to overestimates of actual segregation levels.[2] Therefore, the estimates of neighborhood segregation presented in our charts may constitute an upper bound for actual segregation levels in 2015. To the extent that the ACS sampling rates are similar across MSAs, this should not affect the results of our comparative analysis.

Notes

1 "CMS's SSA to FIPS CBSA and MSA County Crosswalk," National Bureau of Economic Research, last updated April 17, 2017, http://www.nber.org/data/cbsa-msa-fips-ssa-county-crosswalk.html.

2 Sean F. Reardon, Kendra Bischoff, Ann Owens, and Joseph B. Townsend, *Has Income Segregation Really Increased? Bias and Bias Correction in Sample-Based Segregation Estimates*, working paper no. 18-02 (Stanford University: May 2018).

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