Data Shop

Data Shop, a department of Cityscape, *presents short articles or notes on the uses of data in housing and urban research. Through this department, the Office of Policy Development and Research introduces readers to new and overlooked data sources and to improved techniques in using well-known data. The emphasis is on sources and methods that analysts can use in their own work. Researchers often run into knotty data problems involving data interpretation or manipulation that must be solved before a project can proceed, but they seldom get to focus in detail on the solutions to such problems. If you have an idea for an applied, data-centric note of no more than 3,000 words, please send a one-paragraph abstract to david.a.vandenbroucke@hud.gov for consideration.*

Measuring Neighborhood Opportunity With AFFH Data

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Abstract

HUD's new Affirmatively Furthering Fair Housing (AFFH) database is designed to help U.S. Department of Housing and Urban Development (HUD) program participants affirmatively further the purposes of the Fair Housing Act. Along with the AFFH database, HUD is providing a geospatial tool to generate a series of maps of tables with the AFFH data. Both the tool and database provide a new means for HUD program participants, researchers, and the public to assess neighborhood opportunity on a national basis.

This article introduces readers to the new AFFH database and compares it with other sources of data on neighborhood opportunity.

As an example of the type of data analysis possible with AFFH data, I analyze the relationship among school proficiency, the minority population, and poverty for 23 census tracts in Roanoke, Virginia. Results indicate that school proficiency is negatively related with both the percent of the population that is non-White and the poverty rate. Eight geographically contiguous tracts with the highest percent non-White and highest poverty also tend to have the lowest school proficiency.

Introduction

The Fair Housing Act (Title VIII of the Civil Rights Act of 1968) prohibits housing discrimination based on race, color, national origin, religion, or sex.[1] Amendments to the Act in 1988 further banned discrimination against families with children and people with disabilities, and they greatly increased the U.S. Department of Housing and Urban Development's (HUD's) enforcement role.

Local governments and states receiving Community Development Block Grants (CDBGs); HOME Investment Partnerships, or HOME; Emergency Solutions Grants, or ESGs; and Housing Opportunities for Persons with AIDS, or HOPWA, are obligated to affirmatively further the purposes of the Fair Housing Act, as are public housing agencies (PHAs). To help program participants meet this obligation, HUD's Affirmatively Furthering Fair Housing (AFFH) initiative[2] provides guidance, data, and an assessment template from which the participants will complete an assessment of fair housing (the AFH).

The AFH focuses program participants' analysis on four primary goals—

1. Reduce segregation and build on the nation's increasing racial, geographic, and economic diversity.
2. Eliminate racially and ethnically concentrated areas of poverty.
3. Reduce disparities in access to opportunities such as high-quality schools, job centers, and transit through both mobility and neighborhood reinvestment.
4. Narrow gaps that leave families with children; people with disabilities; and people of different races, colors, and national origins with disproportionate housing needs.

HUD's AFFH database provides nationally available data on these four areas. After analyzing the HUD data and any supplemental information they choose to add, program participants identify the primary determinants influencing fair housing conditions, prioritize addressing these conditions, and set one or more goals to further fair housing.

This article introduces readers to the data HUD is providing to grantees and PHAs to help complete their AFHs. The following sections (1) describe the AFFH database in greater detail; (2) compare the AFFH data with alternative sources of data on neighborhood opportunity; (3) present a data analysis example, analyzing the relationship among school proficiency, the minority population, and poverty for census tracts in Roanoke, Virginia; and (4) present concluding remarks.

[1] For more information on the Fair Housing Act, see HUD (2015a).

[2] See HUD (2015b) for more information about the AFFH final rule.

AFFH Database

The AFFH database contains property-level, block group-level, and census tract-level information from numerous sources. HUD provides a geospatial tool[3] that enables program participants and the public to generate a series of tables and maps with the data required for an AFH.[4] The tool also enables users to download the data used to populate the tables and maps.

Socioeconomic and Demographic Data

The AFFH database includes demographic data from the 2010 decennial census (for example, block-group data on race and ethnicity). Demographic and socioeconomic data (for example, data on people with disabilities, people in poverty, and unemployment) are also taken from the 5-year American Community Survey (ACS) for various timeframes. To keep margins of error within reasonable bounds, ACS estimates are not reported below the census tract level. Longitudinal socioeconomic and demographic tract data for 1990 and 2000 are from Brown University's Longitudinal Tract Database (Brown University, 2015), based on decennial census and ACS data.

Housing Data

The AFFH database includes property-level and census tract-level data on households receiving public housing and HUD multifamily rental assistance and tract-level data on households in the Housing Choice Voucher (HCV) program. Public housing and HCV data are from HUD's Inventory Management System, or IMS/Public and Indian Housing, or PIH, Information Center, or PIC (HUD, 2015f); multifamily data are from HUD's Tenant Rental Assistance Certification System, or TRACS (HUD, 2015g). Data on Low-Income Housing Tax Credit (LIHTC) Program properties are from HUD's LIHTC database (HUD, 2015h). Tract-level data on households with disproportionate housing needs are from HUD's Comprehensive Housing Affordability Strategy, or CHAS, database (HUD, 2015i).

Opportunity Indices

The AFFH database contains seven percentile indices to measure neighborhood opportunity.[5] Described in more detail in the data analysis section, the block-group school proficiency index is based on the percent of fourth grade students proficient on state math and reading exams. The low-poverty index is based on the census tract family poverty rate.

Also computed at the tract level, the labor market index is based on the unemployment rate, the labor force participation rate, and the percent of the older-than-25 population with at least a bachelor's degree.

[3] See HUD (2015c) for release 1 of the AFFH Tool.

[4] See HUD (2015d) for proposed tables and HUD (2015e) for proposed maps for the local jurisdictions, such as CDBG grantees. States, PHAs, and regional consortia will have separate templates with possibly different tables and maps.

[5] More information about the indices is available in the AFFH data documentation (HUD, 2015j).

The tract-level environmental health index is a linear combination of standardized estimates of air-quality carcinogenic, respiratory, and neurological hazards. Environmental hazard data are from the Environmental Protection Agency's (EPA's) National-Scale Air Toxics Assessment, or NATA, program (EPA, 2015a).

The jobs accessibility index for a given residential block group is measured as a function of its distance to all job locations within a Core Based Statistical Area (CBSA), with distances to larger employment centers weighted more heavily. Data on jobs and employment are from the Census Bureau's Longitudinal Employer-Household Dynamics, or LEHD, program (U.S. Census Bureau, 2015).

Two indices measure transportation opportunity for a household profile consisting of a single parent family of three, renting, with income equal to 50 percent of Area Median Income. The low transportation cost index is based on modeled transportation costs as a percent of household income. The transit trips index is based on modeled annual household transit trips. Tract data for both indices are from HUD's Location Affordability Index database (HUD, 2015k).

Other Sources of Neighborhood Opportunity Data

In this section, I discuss other sources of neighborhood opportunity data and compare them with the AFFH database.

Smart Location Database

The Smart Location Database (SLD) is EPA's geographic database for measuring location efficiency (EPA, 2015b). It includes more than 90 attributes summarizing characteristics such as housing density, diversity of land use, neighborhood design, destination accessibility, transit service, employment, and demographics. Most variables are available for all U.S. block groups.

The SLD contains measures of job accessibility via cars and mass transit compared with the AFFH jobs accessibility index, which is based on geodesic distance. The SLD transit measures are available only for participating General Transit Feed Specification, or GTFS, transit agencies compared with the AFFH transit index, which is available for all U.S. states and Washington, D.C.

EJSCREEN and C-FERST

EJSCREEN (EPA, 2015c), the EPA's environmental justice (EJ) screening and mapping tool, provides a nationally consistent dataset and methodology for calculating EJ indices at the block-group level. Each of the 12 EJ indices combines an environmental indicator (for example, a lead paint indicator) with demographic indicators (predictors of health status and of potential vulnerability to environment).

C-FERST, EPA's Community-Focused Exposure and Risk Screening Tool (EPA, 2015d), is being developed as a community mapping, information access, and assessment tool designed to help assess risk and assist in decision-making with communities. It will incorporate research estimating human exposures to toxic substances in the environment.

Compared with the AFFH environmental health index, EJSCREEN and C-FERST will contain a much richer set of data on environmental health risks.

The Kirwan Institute

The Kirwan Institute's opportunity mapping initiative (Kirwan Institute, 2015) includes projects for numerous metropolitan areas. For instance, they partnered with the Puget Sound Regional Council (PSRC, 2015) to develop a series of 20 indicators (for example, percent of an area that is within a food desert) that represent five major categories of opportunity: education, economic health, housing and neighborhood quality, transportation/mobility, and health and environment.

The Brandeis University site http://www.diversitydatakids.org includes information about a research project designed to provide national, integrated information about demographics, outcomes, and factors driving outcomes for children. Its child opportunity index (developed in conjunction with the Kirwan Institute) is calculated using 19 indicators (for example, proximity to parks and open spaces) in three defined opportunity domains: (1) educational opportunity, (2) health and environmental opportunity, and (3) social and economic opportunity. Its child opportunity maps visualize the geographic distribution of the index in the 100 largest U.S. metropolitan areas.

Although the Kirwan Institute and their partners have developed many more indicators of neighborhood opportunity than are contained in the AFFH database, the indicators are available for only select metropolitan areas.

National Neighborhood Indicators Partnership

The National Neighborhood Indicators Partnership (NNIP) is a collaboration of the Urban Institute and more than 30 city local partners to further the development and use of neighborhood-level data (NNIP, 2015). The NNIP data inventory contains a wealth of information on neighborhood characteristics such as demographics, education, health, public assistance, and business/economy data. The NNIP data inventory also includes data on crime for participating partners. The AFFH database does not include crime indicators, because neighborhood-level crime data are not nationally available.

Data Analysis

In this section, I analyze the relationship among school proficiency, the minority population, and poverty for 23 census tracts in Roanoke, Virginia.

The school proficiency index is based on the percent of fourth grade students proficient on state math and reading exams in up to three schools closest to the block-group centroid.[6]

$$Proficiency_i = \sum_{j=1}^{3} \frac{e_j}{E} * \left[\frac{r_{j+} m_j}{2}\right], \quad (1)$$

where i denotes a block group; e denotes fourth grade enrollment in the jth school; E denotes total fourth grade enrollment in the j schools; and r and m are percentages of fourth grade students proficient in reading and math, respectively, standardized by state. Proficiency data are from Great Schools for school year 2011–2012, and school location and enrollment data are from the U.S. Department of Education's Common Core of Data (ED/NCES, 2015).

[6] Elementary schools are linked with block groups based on a geographic mapping of attendance area zones from the School Attendance Boundary Information System, where available, or within-district proximity matches within 1.5 miles.

The school proficiency index is a within-state percentile of the variable defined above. While the index is measured at the block-group level, for this analysis I created a tract index by computing a tract mean of the block-group indices, weighting by fourth grade enrollment.

Exhibit 1 reports a linked micromap[7] of Roanoke tracts with data on the school index, percent of the population that is non-White (hereafter referred to as percent non-White), and the poverty rate. Data on percent non-White are from the 2010 decennial census, and poverty data are from the 2006–2010 ACS. Data in exhibit 1 are reported by ascending values of the school index; the data indicate that school proficiency is negatively related with both percent non-White and the poverty rate.

For further analysis, it might be helpful to classify tracts according their percent non-White and poverty rate. The AFFH data include an indicator for tracts classified as racially/ethnically concentrated areas of poverty (R/ECAPs). In CBSAs, R/ECAPs are defined as having percent non-White of at least 50 percent and a poverty rate that is at least 40 percent or three times the average tract poverty rate for the CBSA.

Because Roanoke has only three R/ECAP tracts, I employ an alternate approach categorizing tracts into two percent non-White categories (less than 37.9 percent and greater than or equal to 37.9 percent) and two poverty rate categories (less than 10.9 percent and greater than or equal 10.9 percent). I will refer to the lower categories for both variables as "low," and the higher categories as "high." I chose cut points with a regression tree.[8] In a least squares regression, the two categorical variables explain 65.7 percent of the variation in the school index.

Exhibit 2 reports school proficiency index summary statistics grouped by the two categorical variables; exhibit 3 reports a conditioned choropleth map[9] with the school proficiency index mapped conditioned on the two categorical variables. No tracts have a high percent non-White category and low-poverty category, seven tracts have low percent non-White and low-poverty categories, eight tracts have low percent non-White and high poverty categories, and eight geographically contiguous tracts have high percent non-White and high poverty categories.

Tracts with the low percent non-White and low-poverty categories tend to have the highest school proficiency (mean of 74.7), while the tracts with high percent non-White and high poverty categories tend to have the lowest school proficiency (mean of 45.8). Tracts with low percent non-White and high poverty categories have a mean school index of 66.3.

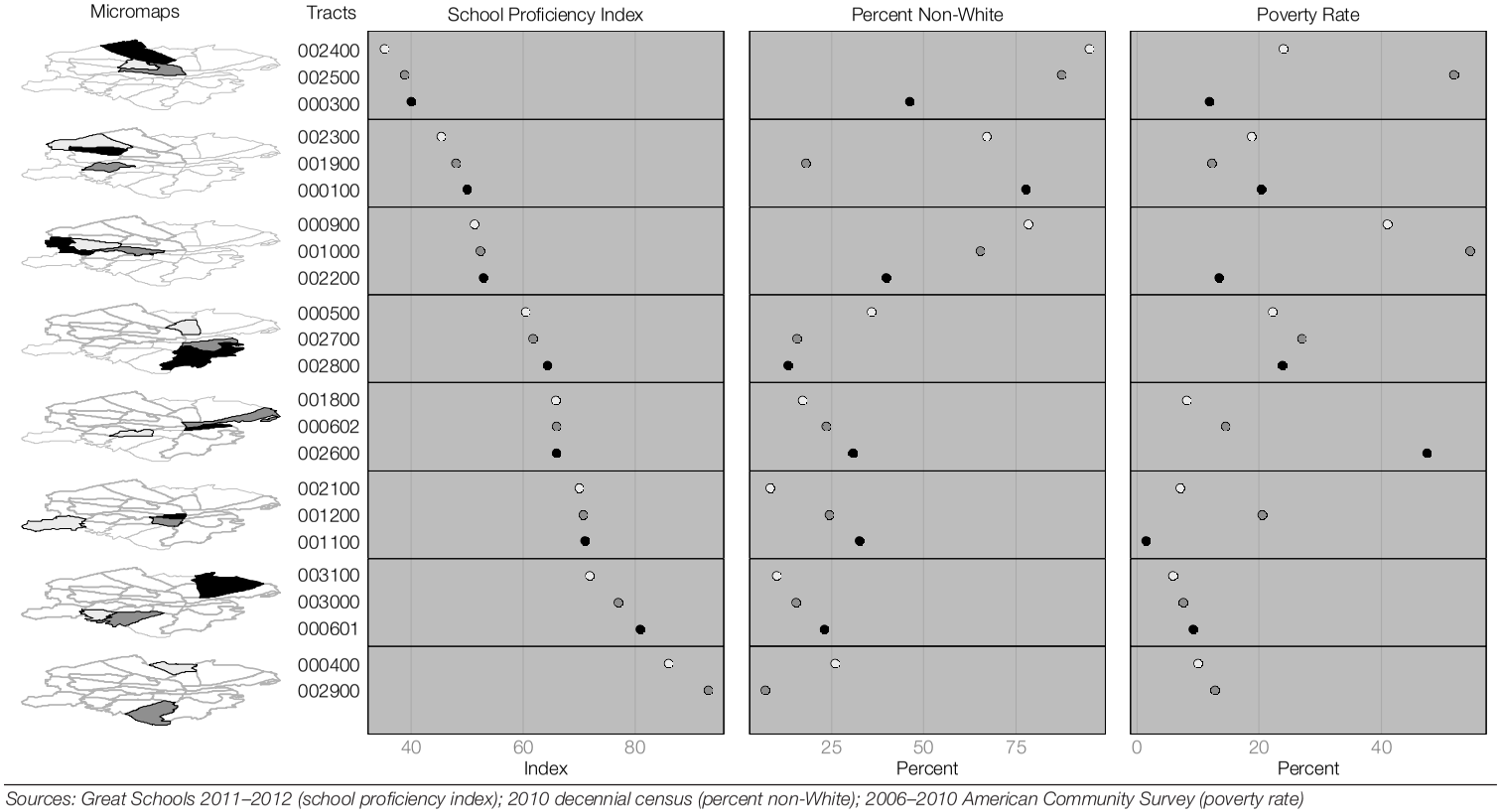
[7] The linked micromap in exhibit 1 was generated with the R "micromap" package (program available upon request).

[8] The regression tree was estimated with the R "rpart" package (estimates and program available upon request).

[9] The conditioned choropleth map in exhibit 3 was generated with the R "maptools" package (program available upon request).

Exhibit 1

Linked Micromap With School Proficiency Index, Percent Non-White, and Poverty Rate



Sources: Great Schools 2011–2012 (school proficiency index); 2010 decennial census (percent non-White); 2006–2010 American Community Survey (poverty rate)

Exhibit 2

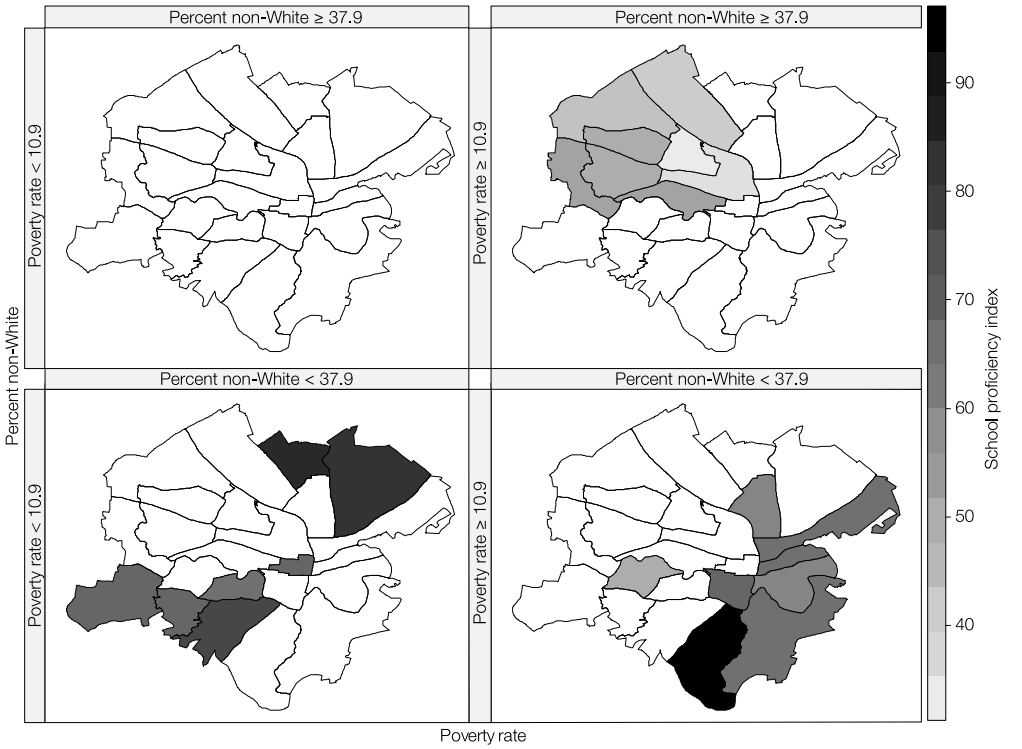
School Proficiency Index Summary Statistics

Percent Non-White Category	Poverty Rate Category	School Proficiency Index					Standard Deviation
		n	Minimum	Median	Mean	Maximum	
Low: < 37.9%	Low: < 10.9%	8	65.9	71.9	74.7	86.0	7.0
Low: < 37.9%	High: ≥ 10.9%	7	48.0	65.2	66.3	93.0	12.7
High: ≥ 37.9%	High: ≥ 10.9%	8	35.3	47.7	45.8	53.0	6.9

Sources: Great Schools 2011–2012 (school proficiency index); 2010 decennial census (percent non-White); 2006–2010 American Community Survey (poverty rate)

Exhibit 3

Map of School Proficiency Index Conditional on Percent Non-White and Poverty Rate



Sources: Great Schools 2011–2012 (school proficiency index); 2010 decennial census (percent non-White); 2006–2010 American Community Survey (poverty rate)

Conclusion

To help HUD program participants affirmatively further the purposes of the Fair Housing Act, HUD launched a new AFFH database. HUD is also providing a geospatial tool to generate a series of maps of tables with the AFFH data. Both the tool and database provide a new means for HUD program participants, researchers, and the public to assess neighborhood opportunity on a national basis.

The AFFH database contains a large amount of demographic, socioeconomic, and housing data at the census-tract and block-group levels. The database also includes seven indices to measure neighborhood school proficiency, jobs accessibility, environmental health, poverty, labor market conditions, transit use, and transportation costs.

This article introduces readers to the new AFFH database and compares it with other sources of data on neighborhood opportunity.

As an example of the type of data analysis possible with the AFFH database, I analyzed the relationship among school proficiency, the minority population, and poverty for 23 census tracts in Roanoke, Virginia. Results indicate that school proficiency is negatively related with both the percent of the population that is non-White and the poverty rate. Eight geographically contiguous tracts with the highest percent non-White and highest poverty also tend to have the lowest school proficiency.

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