Innovations in Income and Mobility Measures

Federal Economic Statistics Advisory Committee
Distributional Measures at Census, BEA, and BLS

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Income and Poverty Statistics at Census

Income and Poverty in the United States: 2020

Current Population Reports

By Emily A. Shrider, Melissa Kollar, Frances Chen, and Jessica Semega

Issued September 2021

P60-273

Table A-5.

Selected Measures of Equivalence-Adjusted Income Dispersion: 1967 to 2020

(Further explanation of income inequality measures is available at "The Changing Shape of the Nation's Income Distribution: 1947–1998," *Current Population Reports*, Series P60-204. Information on confidentiality protection, sampling error, nonsampling error, and definitions is available at <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar21.pdf>)

Year	Measures of income dispersion										
	Shares of equivalence-adjusted income of quintiles					Summary measures					
									Atkinson		
	Lowest	Second	Middle	Fourth	Highest	Gini index of income inequality	Mean loga-rithmic deviation of income	Theil	e=0.25	e=0.50	e=0.75
2020	3.4	8.9	14.5	22.4	50.8	0.469	0.642	0.410	0.099	0.195	0.302
2019											
2018											
2017[1]											
2017											

Table A-4a.

Selected Measures of Household Income Dispersion: 1967 to 2020

(Income in 2020 dollars, adjusted using the CPI-U-RS. Further explanation of income inequality measures is available at "The Changing Shape of the Nation's Income Distribution: 1947–1998," *Current Population Reports*, Series P60-204. Information on confidentiality protection, sampling error, nonsampling error, and definitions is available at <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar21.pdf>)

Year	Measures of income dispersion															
	Household income at selected percentiles										Household income ratios at selected percentiles					
	10th percentile limit	20th percentile limit	30th percentile limit	40th percentile limit	50th (median)	60th percentile limit	70th percentile limit	80th percentile limit	90th percentile limit	95th percentile limit	90th/ 10th	95th/ 20th	95th/ 50th	80th/ 50th	80th/ 20th	20th/ 50th
2020	15,600	27,026	39,535	52,179	67,521	85,076	107,908	141,110	201,126	273,739	12.89	10.13	4.05	2.09	5.22	0.40
2019	16,226	28,435	40,905	54,171	69,560	87,568	111,081	144,280	203,661	273,373	12.55	9.61	3.93	2.07	5.07	0.41
2018	15,080	26,389	38,143	51,541	65,127	81,994	103,250	134,008	189,973	256,396	12.60	9.72	3.94	2.06	5.08	0.41
2017[1]	15,103	26,216	37,023	49,860	64,557	81,475	103,485	133,689	191,929	257,746	12.71	9.83	3.99	2.07	5.10	0.41

- Income estimates back to 1967
  - Gini, shares by quintile, percentiles, percentile ratios,…

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Income and Poverty Statistics at Census

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- Poverty estimates back to 1959

Table B-4.

Poverty Status of People by Family Relationship, Race, and Hispanic Origin: 1959 to 2020

(Populations in thousands. Population as of March of the following year. Information on confidentiality protection, sampling error, nonsampling error, and definitions is available at <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar21.pdf>)

Race, Hispanic origin, and year	All people			People in families						Unrelated individuals		
		Below poverty		All families			Families with female householder, no spouse present				Below poverty	
					Below poverty			Below poverty				
	Total	Number	Percent	Total	Number	Percent	Total	Number	Percent	Total	Number	Percent
ALL RACES												
2020	325,713	37,247	11.4	262,398	24,982	9.5	48,141	12,307	25.6	62,293	11,916	19.1
2019	324,754	33,984	10.5	263,696	22,431	8.5	46,255	11,262	24.3	60,117	11,300	18.8
2018	323,847	38,146	11.8	262,010	25,489	9.7	46,660	12,491	26.8	60,768	12,287	20.2

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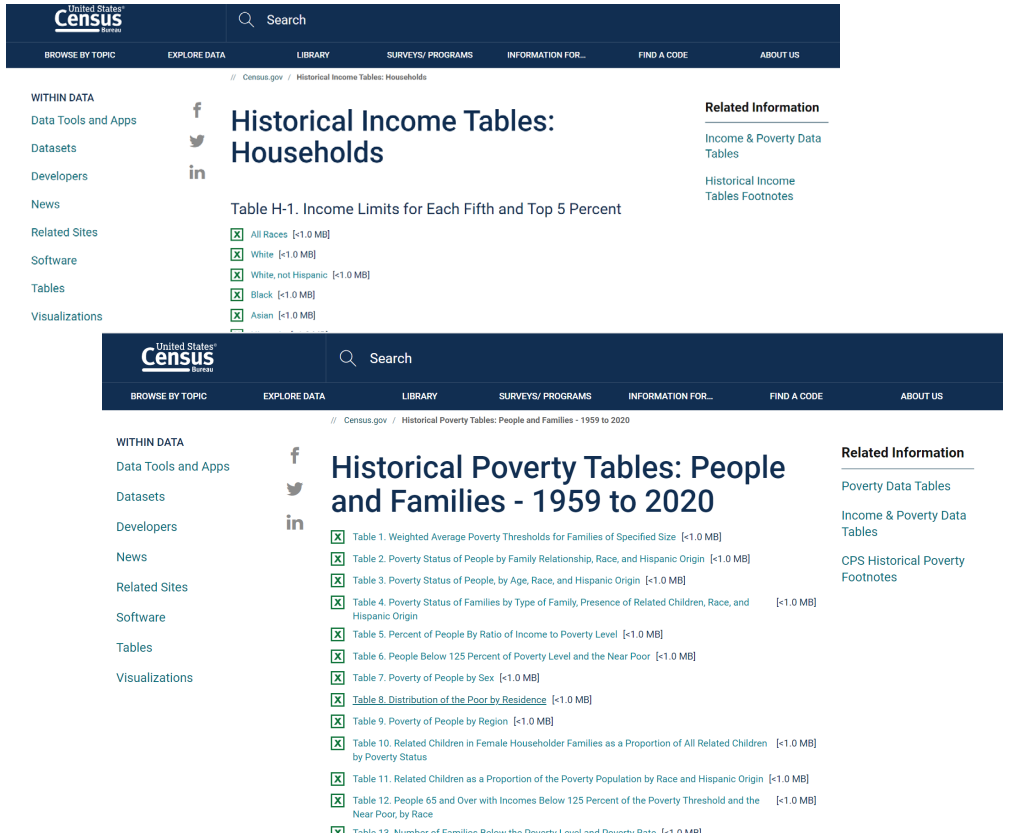
Income and Poverty Statistics at Census



- Many, many historical income and poverty tables updated annually

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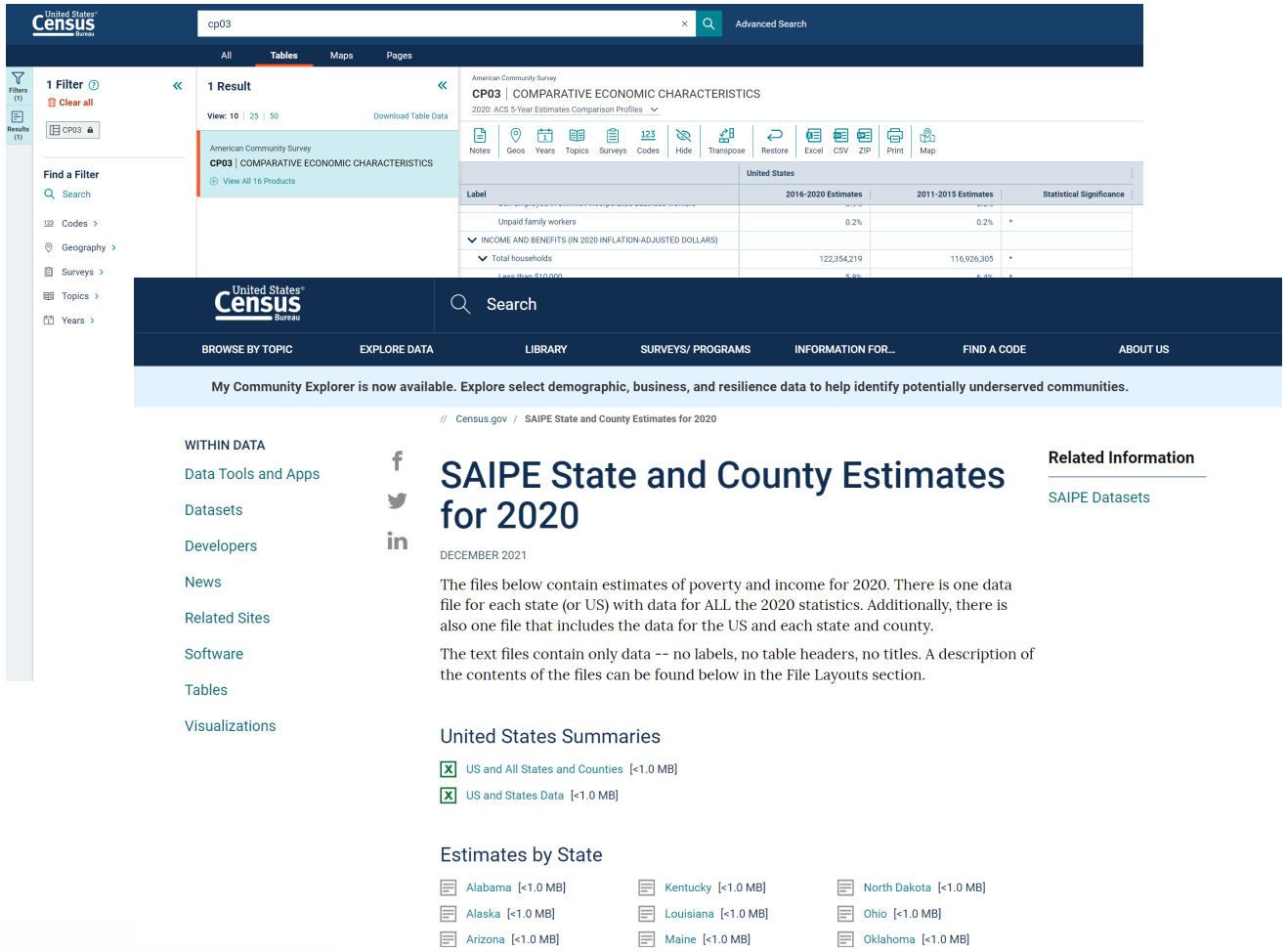
Income and Poverty Statistics at Census



- Historical data from ACS and decennial long form censuses for smaller geographies
- Small Area Income and Poverty Estimates (SAIPE) for improved income and poverty estimates for small areas and school districts

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National Experimental Well-Being Statistics Project (NEWS)

- Goal - rethink how we can produce income and resource statistics
  - What is the best possible estimate given all the data currently available at Census for a given income/resource statistic?
  - Expand the set of income and resource statistics we produce

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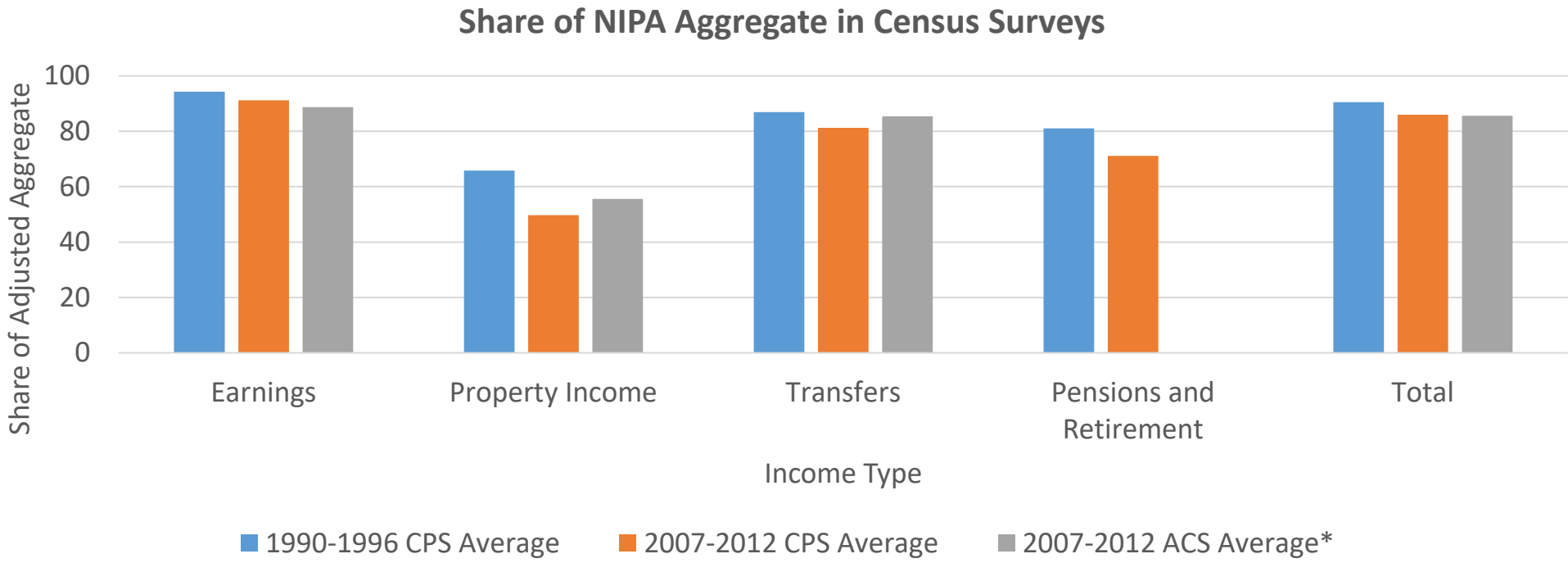
Why Does This Matter?
Survey Underreporting



Source: Rothbaum (2015)

* ACS Transfers includes both Transfers, Pension, and Retirement Income due to the lower level of detail in the questionnaire.

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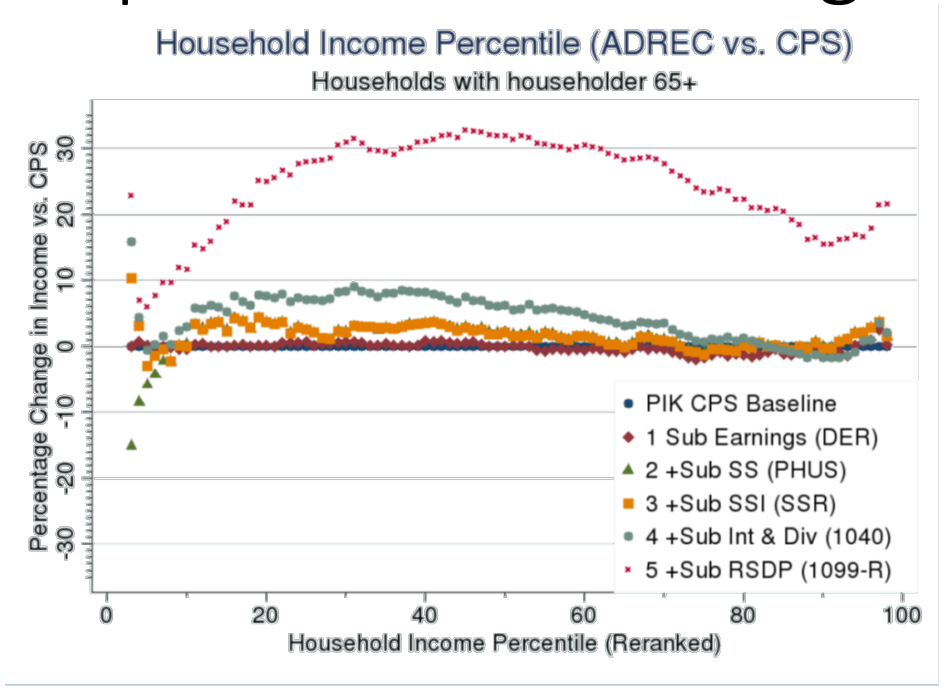
Why Does This Matter?
Misreporting Example – Income for Age 65+ Households



Source: Bee and Mitchell, 2017, "Do Older Americans Have More Income Than We Think?" using 2013 CPS ASEC linked to W-2, 1040, and 1099-R forms for persons 65+.

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Other Goals

- Experimental
  - Updated regularly with additional data and better methods
  - Expand income/resource concepts being measured
  - Longer term – move to regular production
- Transparent and replicable
  - Decisions about how to use survey and administrative income are well-documented, supported, and apolitical
  - Create linked microdata and code database that is accessible through the RDC system
  - Long term – create a set of synthetic data sets (akin to the SIPP Synthetic Beta) for public release?
- Timeline
  - 2022 – 1st set of statistics for a year or small number of years
  - 2023- Additional statistics, additional years, improved methods,…

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Which Statistics?

1. Annual Income, Resource, and Poverty Statistics
   - Same general statistics we produce in existing official reports (simple moments, distributional/inequality statistics, poverty, etc.)

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Which Statistics?

2. Longitudinal Income, Resource, and Poverty Statistics – MOVS project (Mobility, Opportunity, and Volatility Statistics)
   - Income and earnings dynamics

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Source Data – Survey and Census Data

- Information not available in administrative data
  - Demographics and socioeconomic characteristics (Race, education, etc.)
  - Income and benefits – address linkage and income coverage issues
  - Survey frames potentially provide sampling information needed for estimates (random sampling + vacancy assessments)
- Including:
  - CPS ASEC
  - ACS
  - Decennial Census

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Source Data – Administrative Data

- IRS and SSA income data
  - 1040, W-2, 1099-R, 1099-IRMF, DER, social security and SSI payment data, etc.
- LEHD
- Numident
- Master Address File
- State and federal program data
  - SNAP, TANF, WIC, HUD, VA, Medicare/Medicaid data, etc.
- Firm Data
  - Business Register, Longitudinal Business Database, Form 5500 filings
- Third-Party Data
  - Black Knight data on home values

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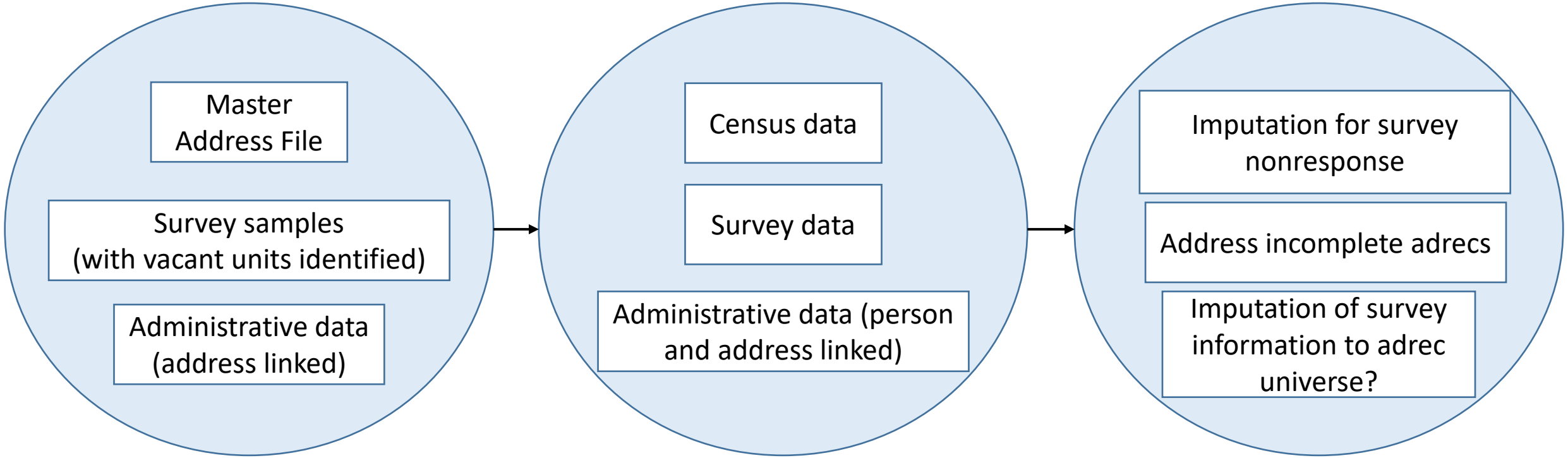
General Approach



Frame
(Housing-unit level)

Individual/Household Level

Processing and Estimation

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Challenges

- Measurement error in administrative data – earnings in particular
- Linkage challenges – incomplete linkage and errors in linkage
- Coverage and representativeness
- Incomplete geographic coverage of administrative data
- Conceptual misalignment or incomplete income coverage in administrative data
- Timeliness/availability of administrative and survey data
- Changes in administrative data that may be unrelated to changes in the underlying income or resources

Described in “The Administrative Income Statistics (AIS) Project: Research on the Use of Administrative Records to Improve Income and Resource Estimates” (Bee and Rothbaum, 2019)

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Challenge
Measurement Error in Administrative Data

- Earnings - 80% of income
  - Wage and salary earnings is probably the best reported of any income category in surveys (70% of income)
    - Particularly for aggregates and extensive margin agreement
    - Still, error in earnings matters more than in any other income type

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Challenge
Measurement Error in Administrative Data

- Wage and salary – under-the-table earnings
  - Detailed occupation level differences in administrative and survey earnings largely match expectations about workers that are likely to be paid under the table (construction, food service/bartending, etc., from Bollinger et al., 2015 and our work with linked ACS data)
- Self-employment – tax avoidance
  - Confirmed by audit studies and consumption/income relationship for the self-employed
  - Nearly ½ of self-employment income in the National Income and Product Accounts is imputed due to under-reporting to the IRS

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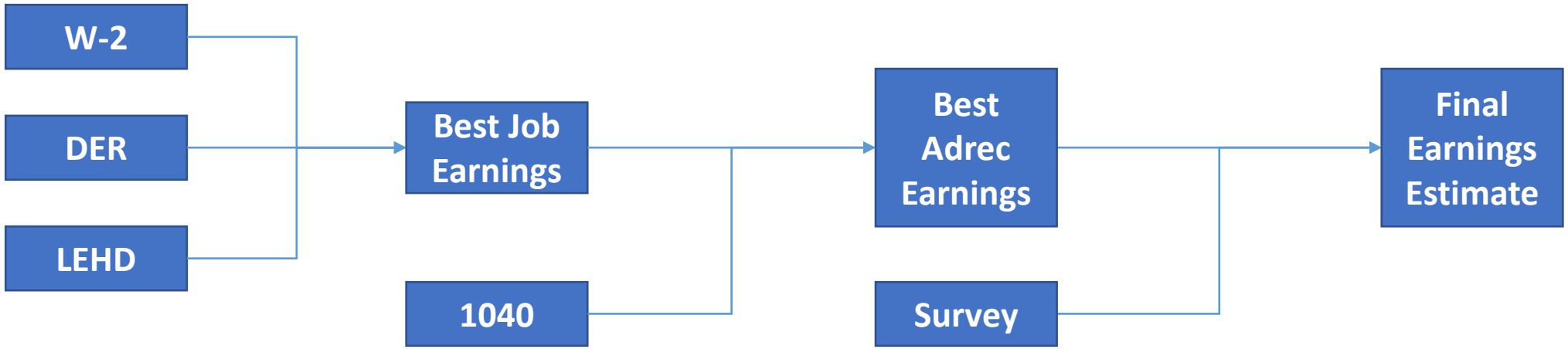
Combining Survey and Adrec Earnings
(Bee, Mitchell, and Rothbaum 2020)

1. Use job-level Information to get "best possible" administrative job-level earnings

2. Compare to 1040 to check for missing earnings (at tax-unit level)

3. Compare to survey and decide for which individuals to use adrec or survey earnings

4. Final "best" estimate of earnings for each individual/household



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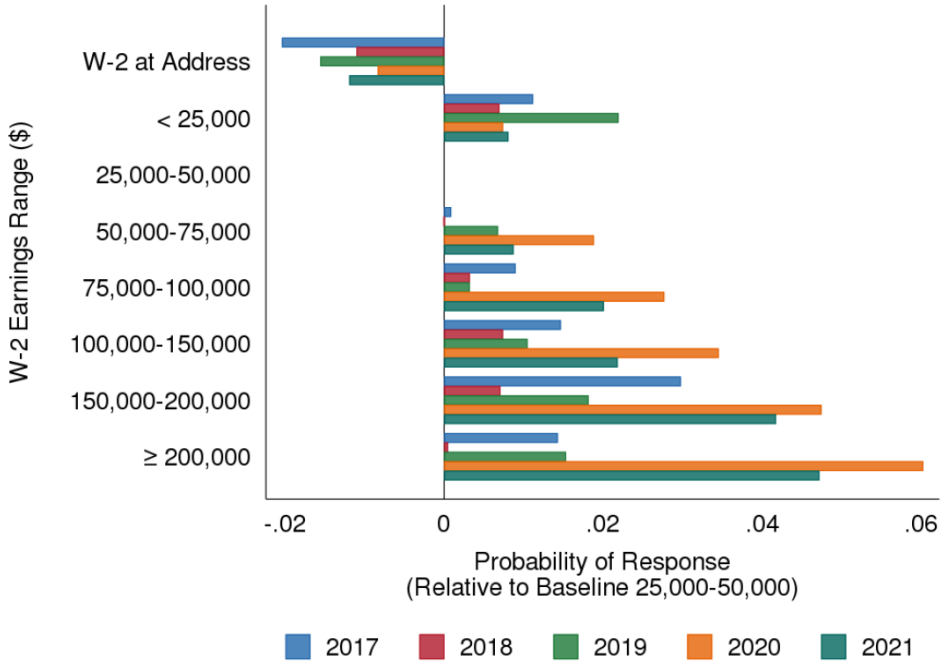
Challenge
Coverage and Representativeness

Response Propensity by W-2 Earnings at Address

(Controlling for linked demographics, such as race and age)



Source: Rothbaum and Bee, 2020. "Coronavirus Infects Surveys, Too: Nonresponse Bias During the Pandemic in the CPS ASEC"

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Challenge
Linkage Issues

- Addressing misreporting
  - ~10% of individuals in a survey cannot be linked to their SSN
- Representativeness/Weighting
  - Administrative records may come from nonrepresentative samples
  - Surveys have random samples but nonrandom selection into response
- Linkage error – understudied

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Challenge
Incomplete geographic coverage of administrative data

- Some data is only available for some locations (and in some years)
- Examples
  - **SNAP**
  - LEHD (in some years)
  - TANF
  - WIC
- Missing information problem - Impute

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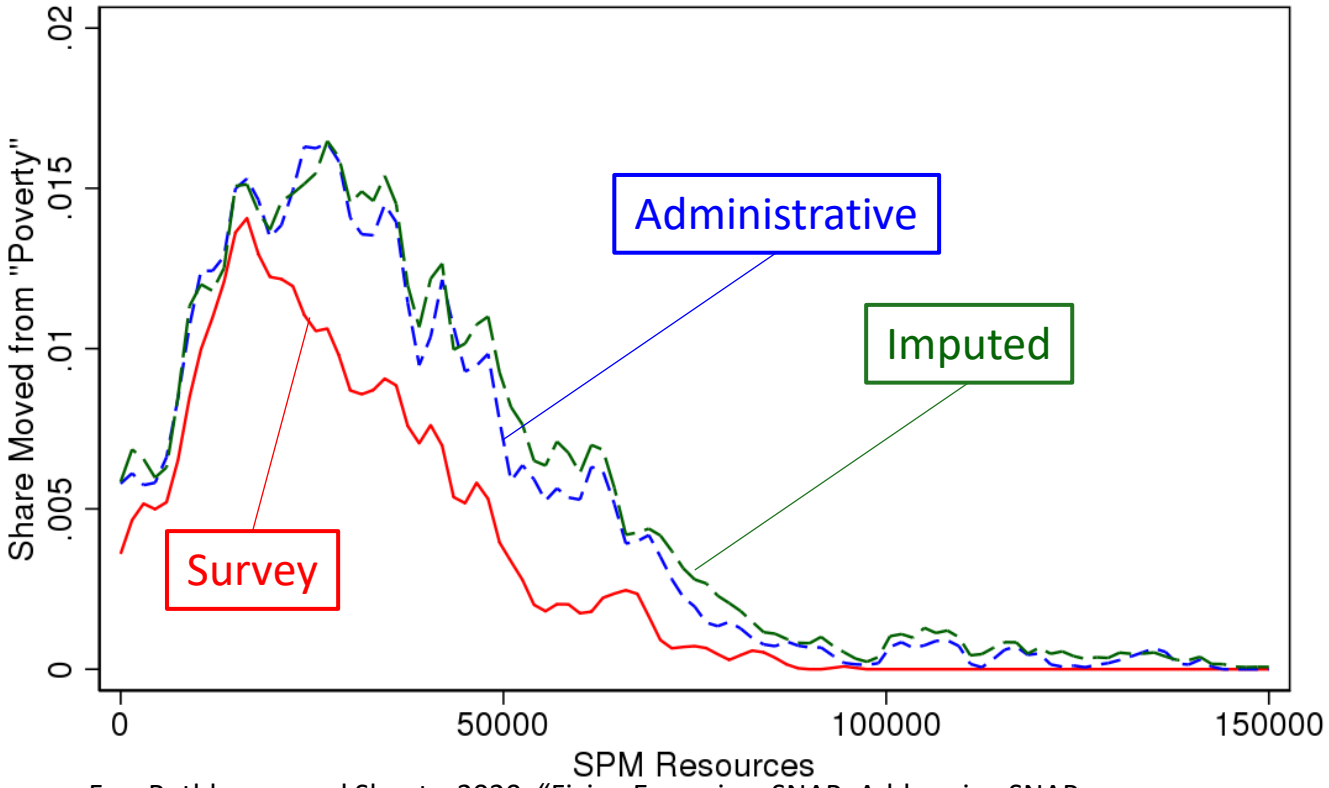
Addressing Incomplete Geographic Coverage Imputing to States without Adrecs



Source: Fox, Rothbaum, and Shantz, 2020. "Fixing Errors in a SNAP: Addressing SNAP Under-Reporting to Evaluate Poverty"

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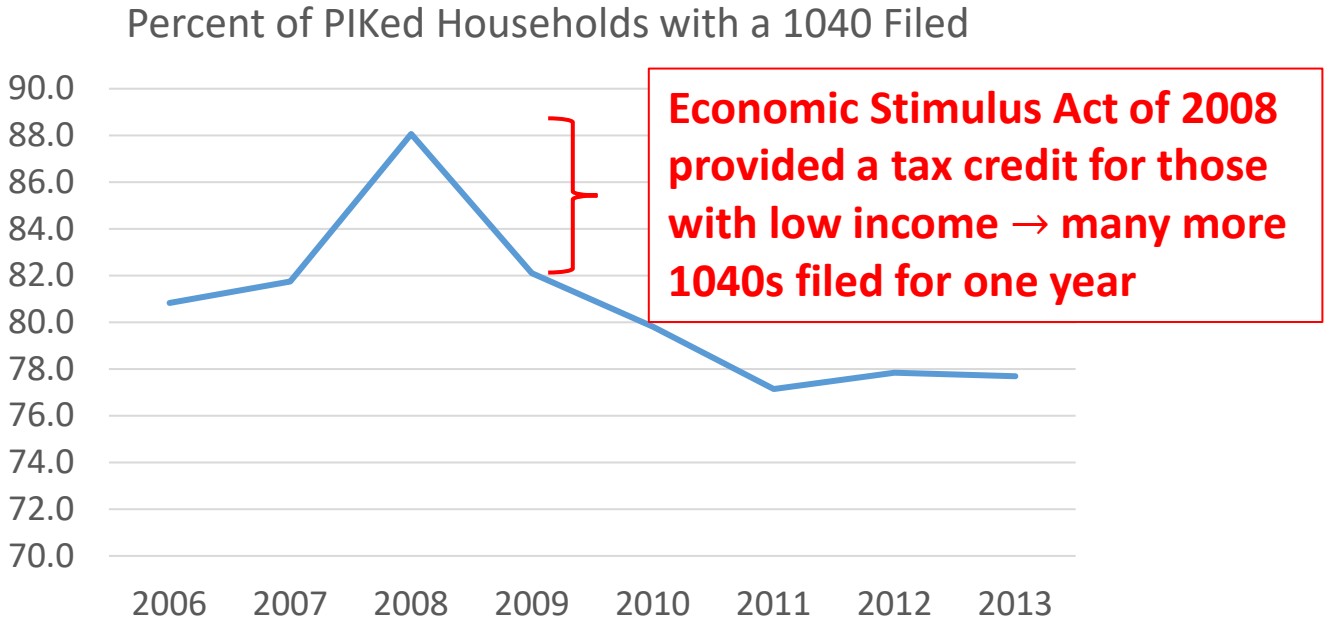
Changes in Administrative Data

- Can change over time due to statutory/regulatory changes that affect programs and agencies



Source: Rothbaum, 2018
2006-2013 ACS Linked to IRS records.

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Changes in Administrative Data

- Can change over time due to statutory/regulatory changes that affect programs and agencies
  - Auten and Splinter (2018) argue that much of the inequality increase in tax data from 1960 to present in work by Piketty, Saez, and Zucman is due to changes in the tax code and the nature of tax reporting, not in actual underlying income changes

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Outline

- Enhance Income Measurement and Statistics Using Expanded IRS Data
- *Inter*generational Mobility
- *Intra*generational Mobility
- Income Distributions

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Enhance Income Measurement and Statistics Using Expanded IRS Data

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Evaluation of Potential Benefits of Expanded IRS Data

- Virtually all Title 26 data at Census falls under the current limits of 6103(j)
  - Limited individual tax forms such as 1040s, W-2s, and 1099-Rs with only select fields provided
  - No clear way to assess data completeness, presence of duplicates, or amended returns
- Goal of this project is to illustrate benefits of expanded tax data obtained under 6103(n) to the American Community Survey (ACS)
  - Validate survey income responses with new administrative data analogs
  - Gain a better understanding of current tax data obtained under 6103(j)
  - Produce enhanced repeated cross-sectional statistics measuring the distribution of income

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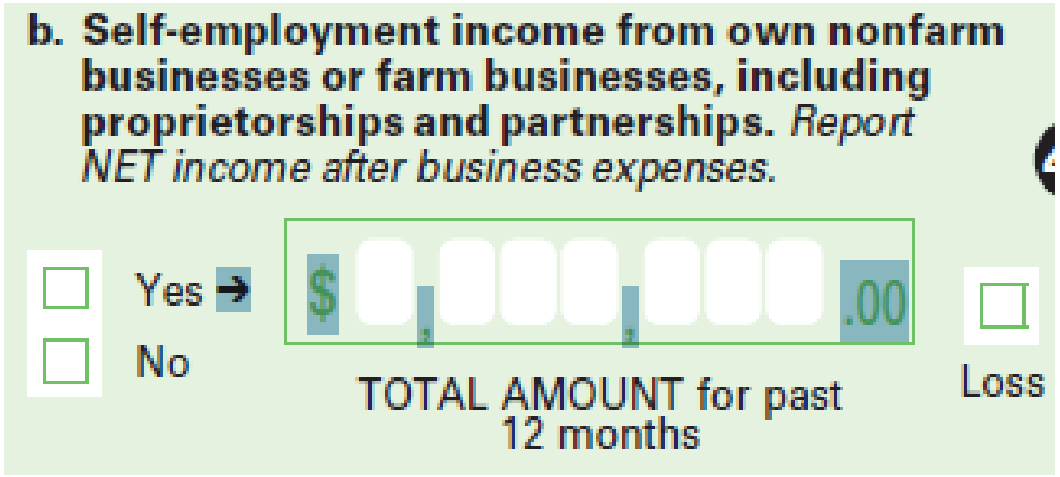
Preliminary Findings on Self-Employment Income
2011 ACS-IRS Data (TY 2010)

- IRS self-employment income could be from a variety of sources
  - Sole proprietorships (includes independent contractors)
  - Partnerships
  - Corporations (S vs. C)
- ACS Question 43b



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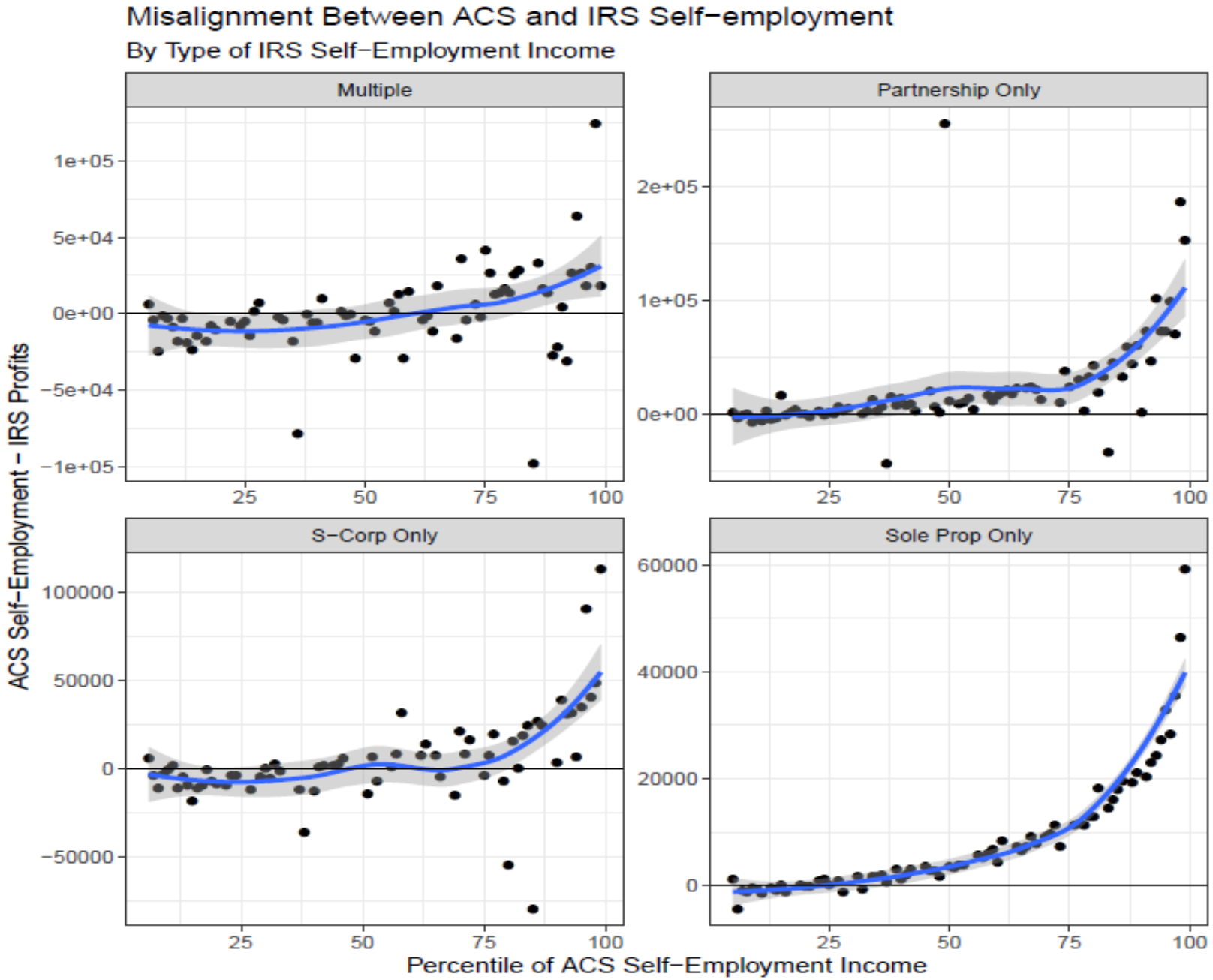

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DRB # CBDRB-FY2020-CES010-019

Preliminary Findings on "Other Income"
2011 ACS-IRS Data (TY 2010)

- Final component of income question intended to capture remaining elements of money income (regular income)
  - Explicitly excludes one-time payments such as realized capital gains
  - Difficult to fully validate given its breadth and inclusion of some non-taxable components

- ACS Question 43h

h. Any other sources of income received regularly such as Veterans' (VA) payments, unemployment compensation, child support or alimony. *Do NOT include lump sum payments such as money from an inheritance or the sale of a home.*

☐ Yes → $, .00

☐ No

TOTAL AMOUNT for past 12 months

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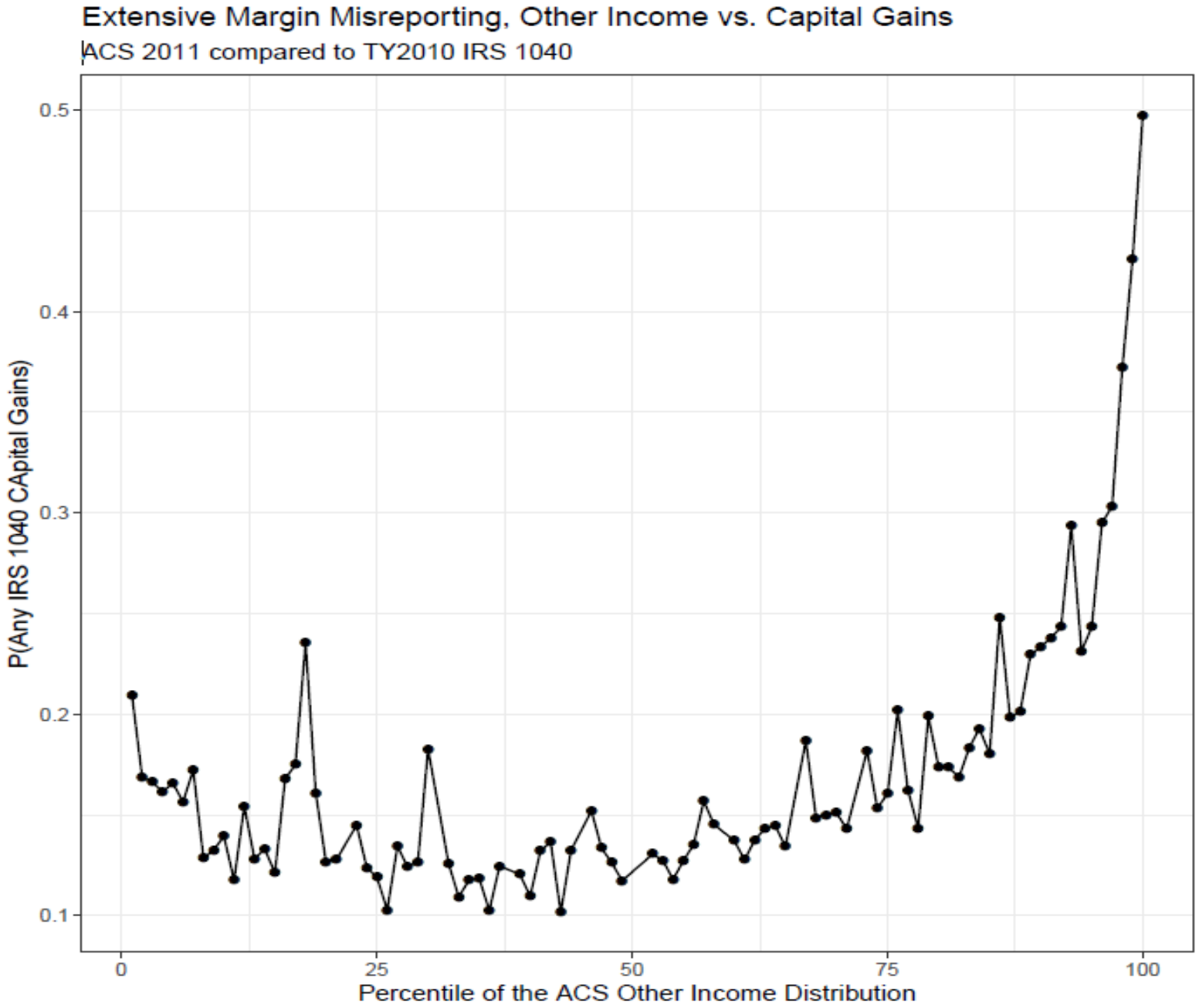

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DRB # CBDRB-FY21-CES014-006

In Progress and Moving Forward

- Comprehensively validate income questions for 2011-2019 ACS
  - What factors explain discrepancies?
  - Are discrepancies between ACS and IRS data changing over time?
- Develop new imputation models to address item non-response
- Produce enhanced median income, poverty, and inequality series based on linked data
- Future research may include validating other ACS characteristics (e.g., health insurance, school enrollment)

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*Inter*generational Mobility

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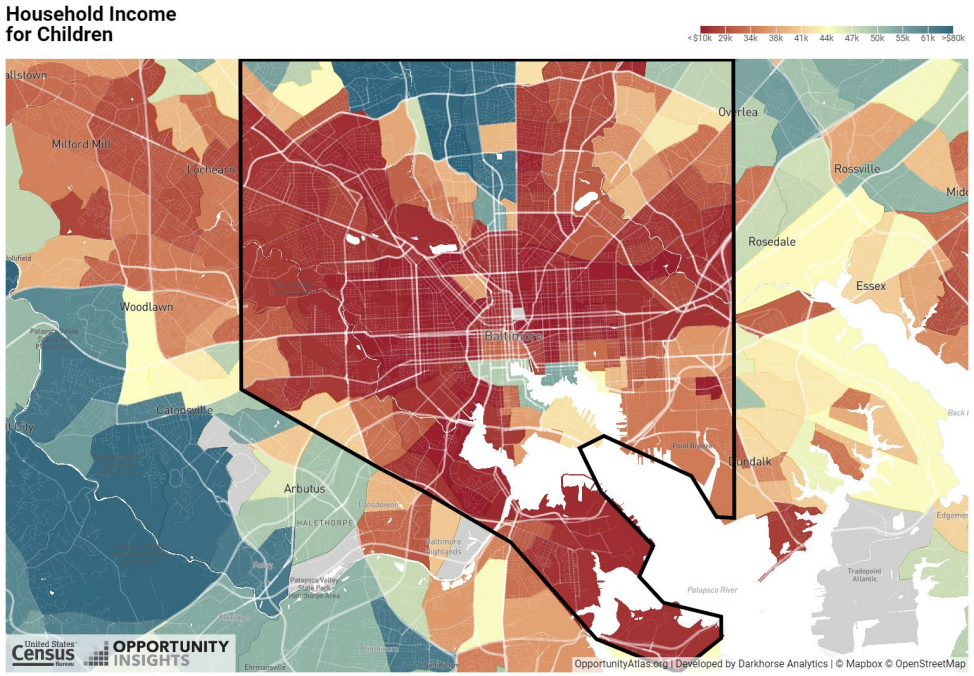
Opportunity Atlas

- Comprehensive census tract-level atlas of children's outcomes in adulthood
- Children's income distributions, incarcerations rates, and other outcomes in adulthood by parental income, race, and gender
- Users can view data for every census tract in America, overlay their own data, export data for their own analysis, download full datasets, and save images of maps
- Users can also utilize filters to observe a combination of characteristics
- Places with high incarceration, low employment, low income by race groups and sex or places with high income, high college graduation rates by race groups



DRB #: CBDRB-FY18-319.

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22 Outcomes By Parental Income, Race, and Sex		13 Neighborhood Characteristics
Household Income	Frac in Top 20 % Based on Individual Income	Median Rent 2012-2016
Incarceration Rate	Frac in Top 1% Based on Individual Income	Job Growth Rate 2004-2013
Teenage Birth Rate	% Staying in Same CZ as Adults	Median Household Income 2012-2016
Individual Income	% Staying in Same Tracts as Adults	Median Household Income 1990
Fraction Married	Household Income Stayed in CZ	Poverty Rate in 2012-2016
Spouses Income	Individual Income Stayed in CZ	Fraction College Grad. in 2012-2016
Employment Rate	Household Income for U.S. Natives	Fraction Non-White in 2010
High School Graduation Rate	Household Income for Immigrants	Foreign-Born Share in 2012-2016
College Graduation Rate	Number of Children	Frac. Single Parents in 2012-2016
Hours Worked Per Week		Population Density 2010
Hourly Wages		Density in Jobs in 2013
Fraction in Top 20% Based on HH Income		Fraction with Short Commutes 2012-2016
Fraction in Top 1% Based on HH Income		2010 Census Response Rate

Data Sources and Sample Definitions

- Data sources: Census data (2000, 2010, ACS) covering U.S. population linked to federal income tax returns from 1989-2015
- Target sample: Children in 1978-83 birth cohorts who were born in the U.S. or are authorized immigrants who came to the U.S. in childhood
- Analysis sample: 20.5 million children

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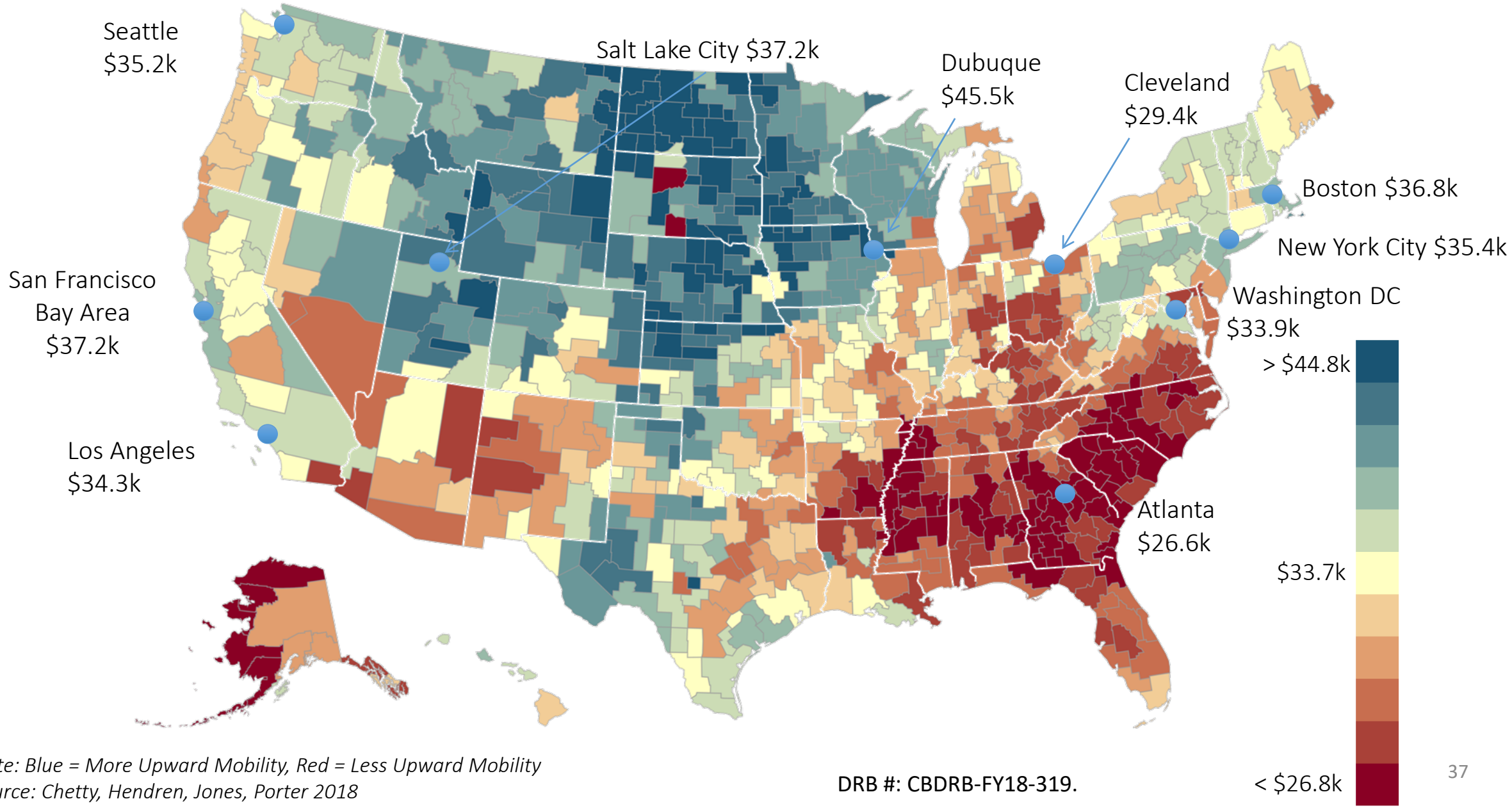
The Geography of Upward Mobility in the United States

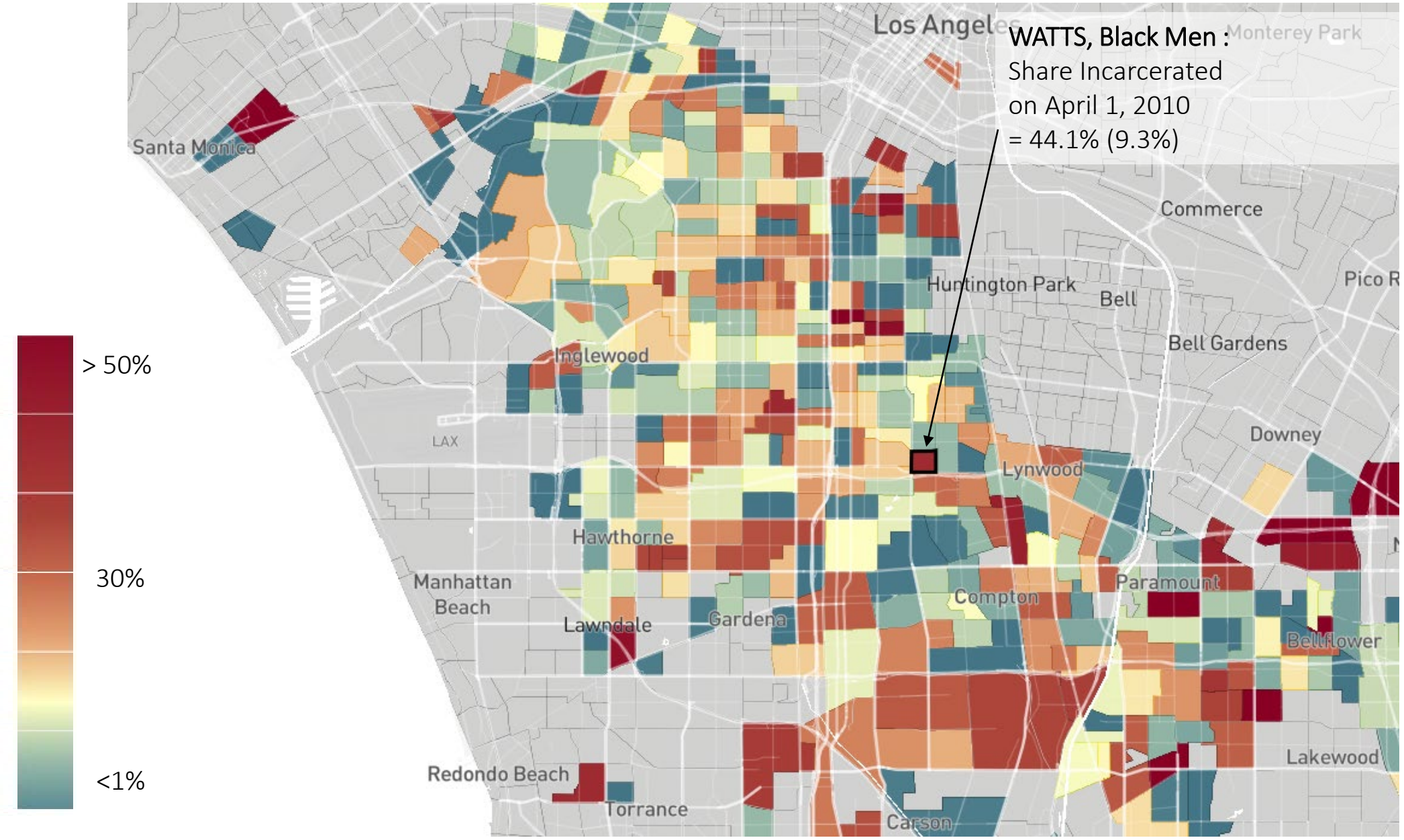
Average Household Income for Children with Parents Earning $27,000 (25th percentile)



Note: Blue = More Upward Mobility, Red = Less Upward Mobility
Source: Chetty, Hendren, Jones, Porter 2018

DRB #: CBDRB-FY18-319.

Incarceration Rates for Black Men in Los Angeles with Parents Earning < $2,200 (1st percentile)



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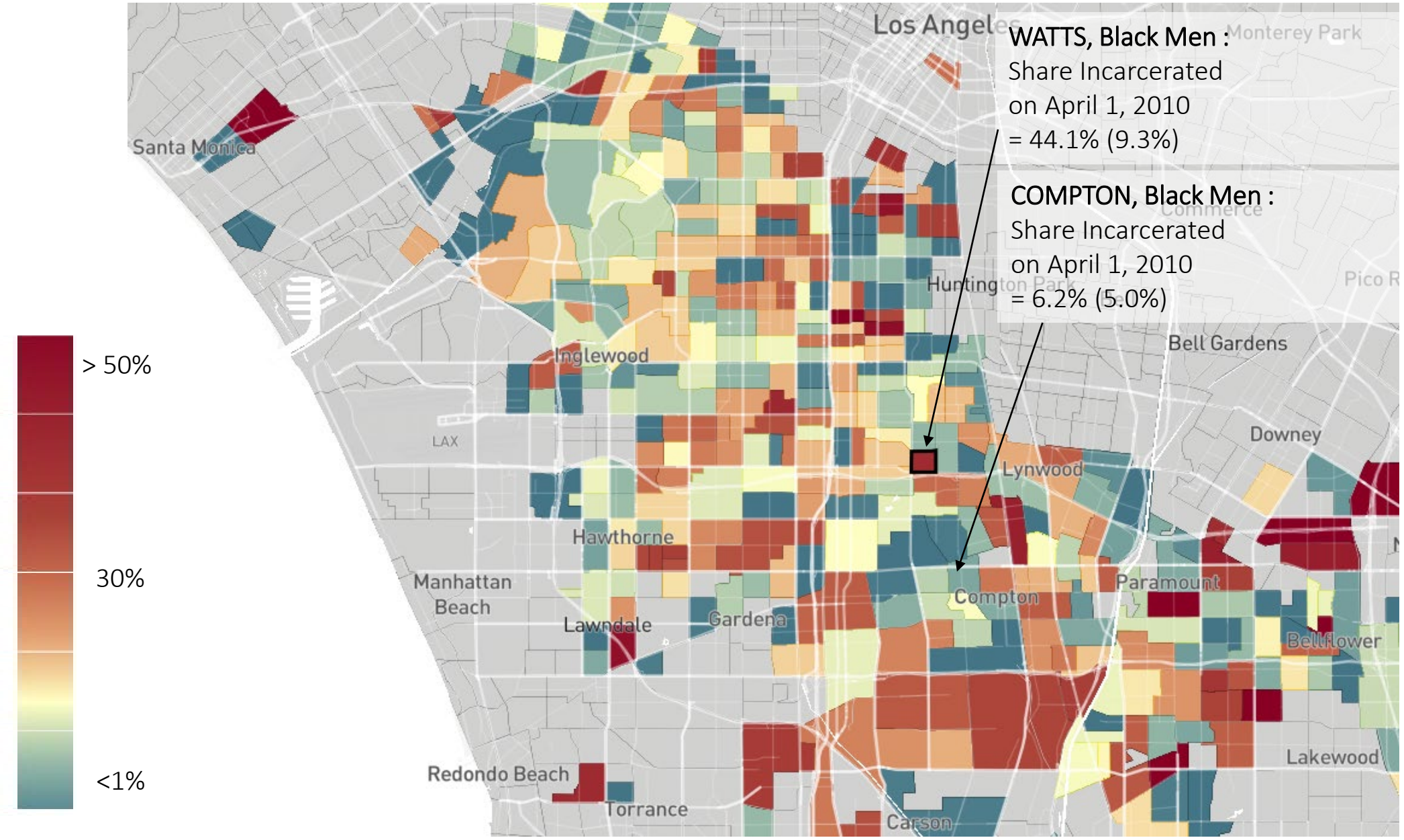

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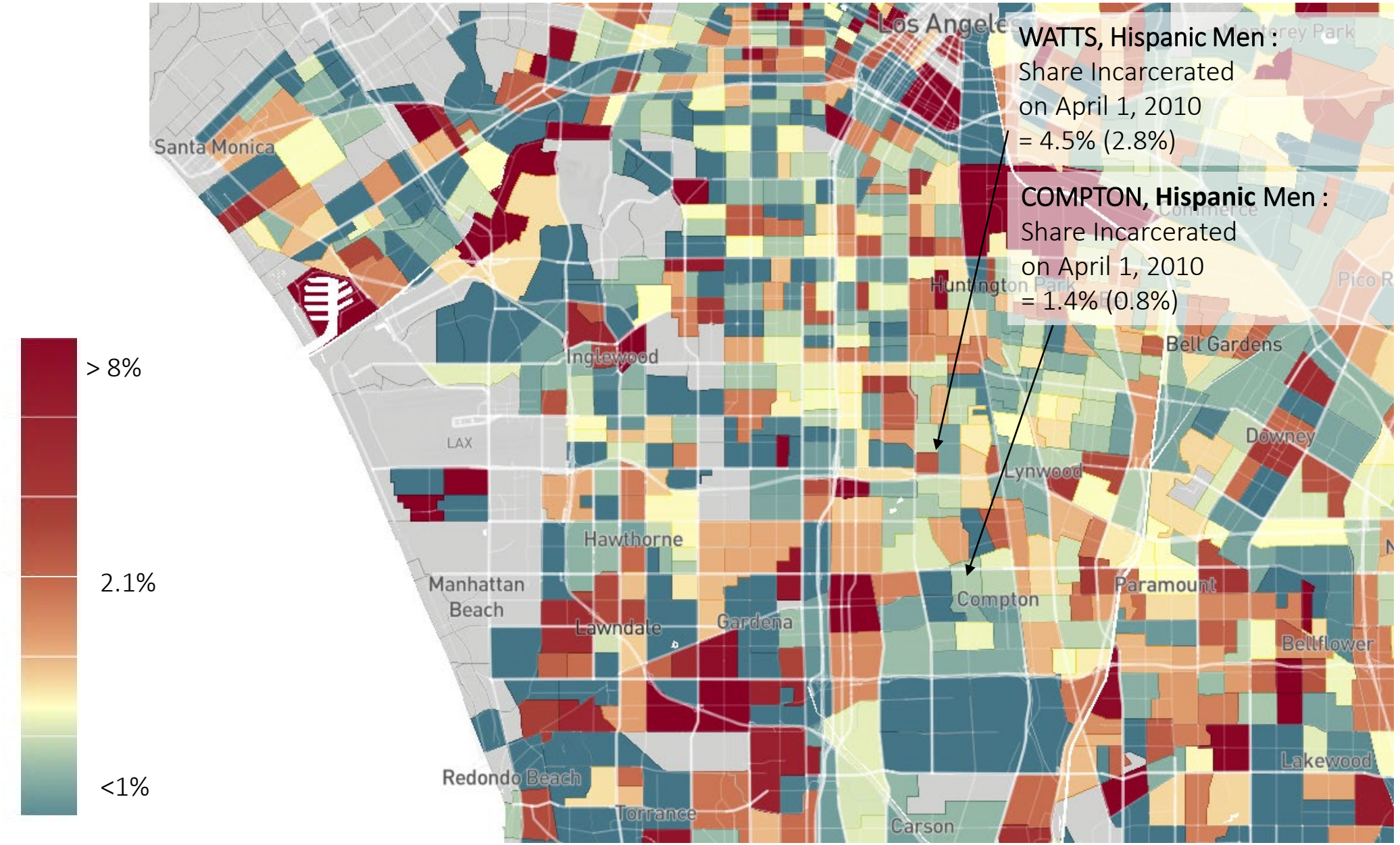
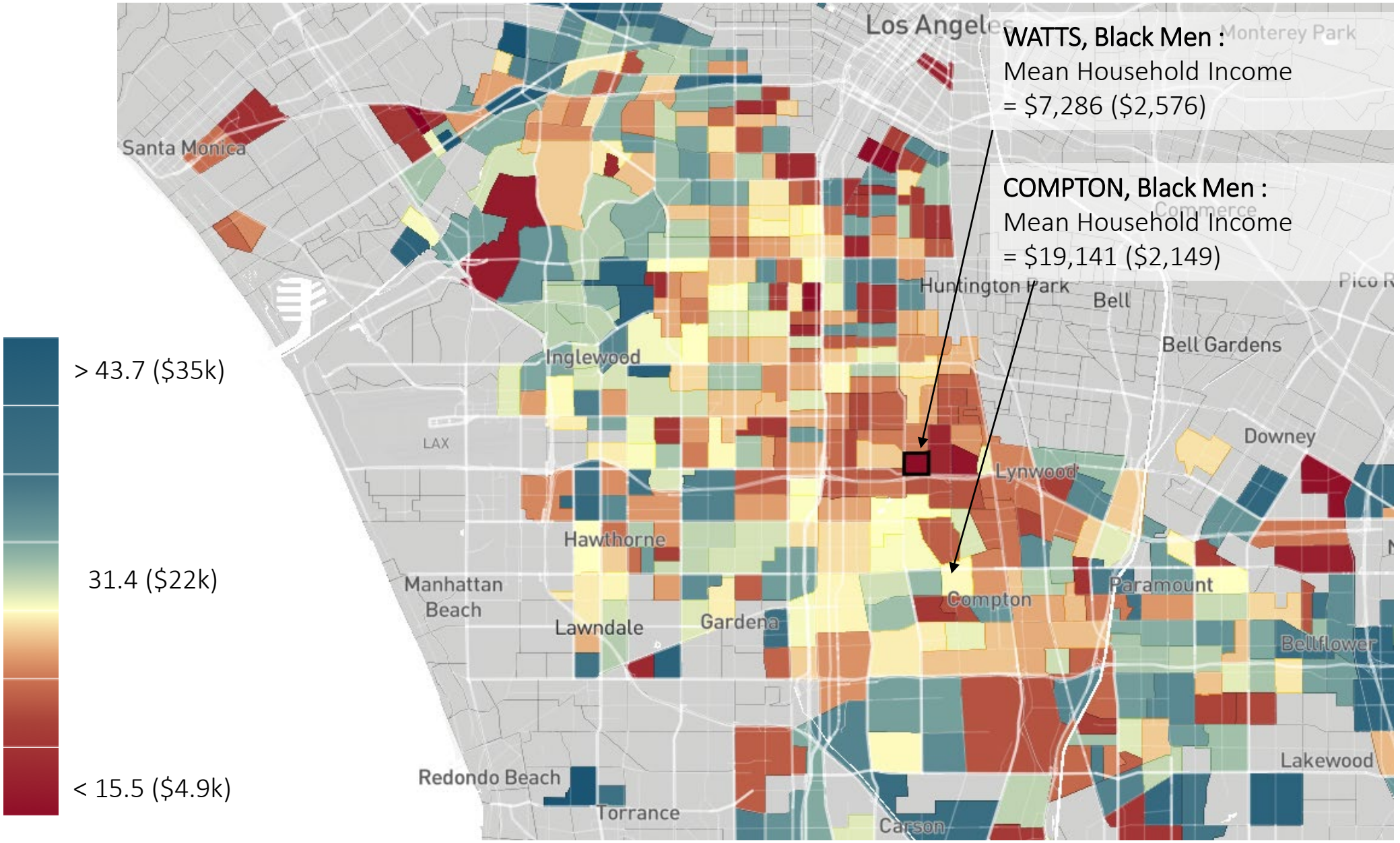
Incarceration Rates for Hispanic Men in Los Angeles with Parents Earning < $2,200 (1st percentile)



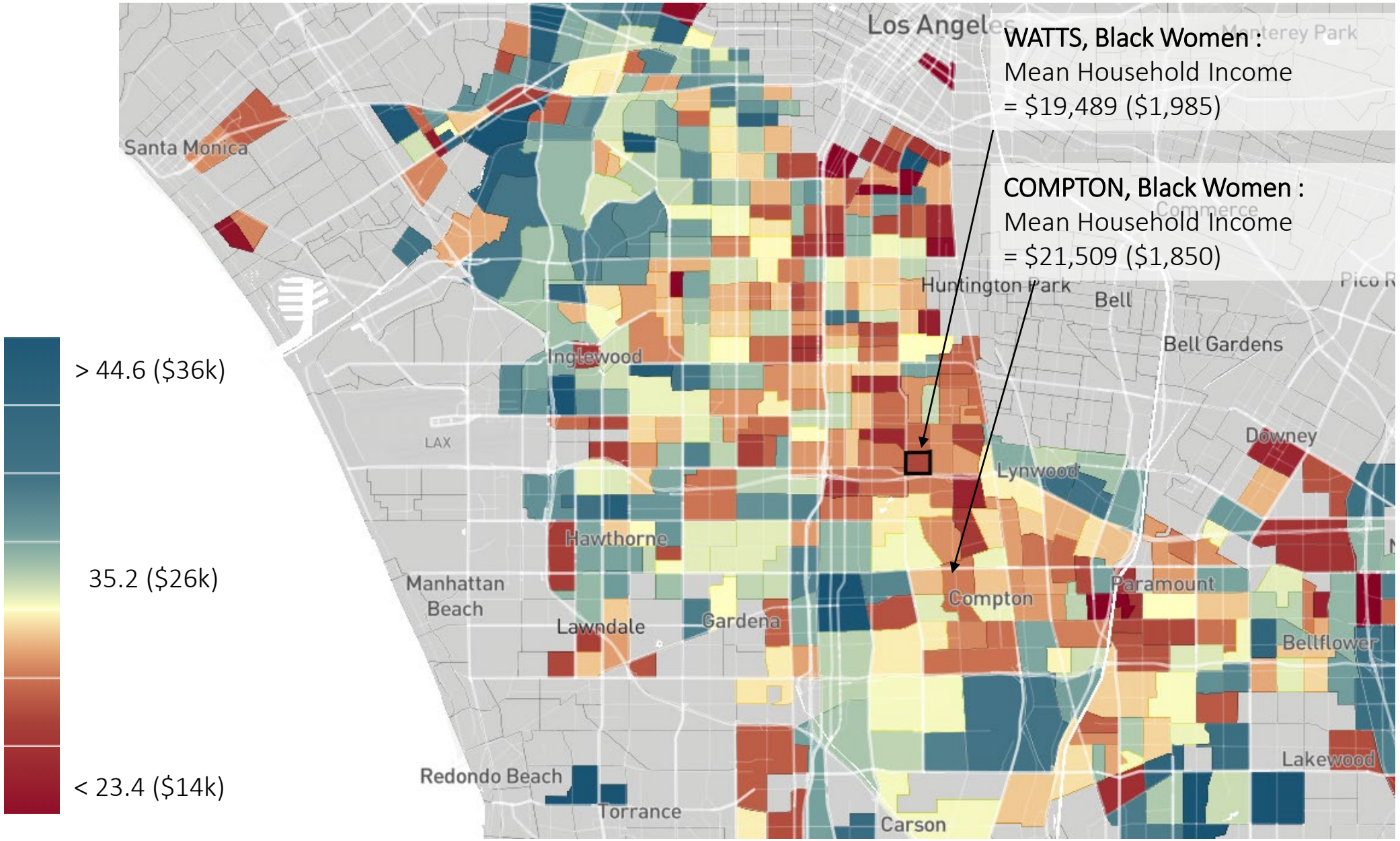
DRB #: CBDRB-FY18-319.

Mean Household Income for Black Men in Los Angeles with Parents Earning $27,000 (25th percentile)



DRB #: CBDRB-FY18-319.

Mean Individual Income for Black Women in Los Angeles with Parents Earning $27,000 (25th percentile)



DRB #: CBDRB-FY18-319.

Moving Forward

- Current Results and Additional Information can be found at: https://www.opportunityatlas.org/
- Coming soon – The Radius of Economic Opportunity: Evidence from Migration and Local Labor Markets – paper, dataset, and data tool
- Future planned work includes:
  - Opportunity Atlas - integrating additional years of data
  - Studying the relationship between social mobility and factors such as placed based policies, labor markets, gentrification, and characteristics at birth, plus additional research on race and ethnicity
  - Studying the relationship between income, race, and mortality

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*Intra*generational Mobility

Local Area Earnings Inequality and Mobility Statistics

- Goal: Extend measures of inequality and mobility to local areas.
- LEHD administrative earnings data will be used to create an interactive web application, showing both national and MSA level estimates of:
  - Inequality – dispersion of worker earnings at a point in time (typically annual)
  - Volatility – dispersion of the change in worker earnings (short duration, year-to-year)
  - Mobility – movement of a worker from one part of the earnings distribution to another (long duration, multiple years of earnings)
- Estimates will be non-parametric when possible, decomposable, and allow for comparisons across MSA's, time, and demographic characteristics

Example: Measuring Inequality

- Inequality measures are typically based on the distribution of employment and total earnings across earnings bins (histogram)
- There are various single number measures of inequality that summarize these distributions:
  - Gini coefficients, Percentile Ratios, Earnings Share Ratios
- Each of the above measures places a particular weight/importance on different parts of the earnings/total earnings distribution
- In addition to single number measures, we plan to show the earnings and total earnings distributions for each MSA, allowing the user to better understand why inequality is changing

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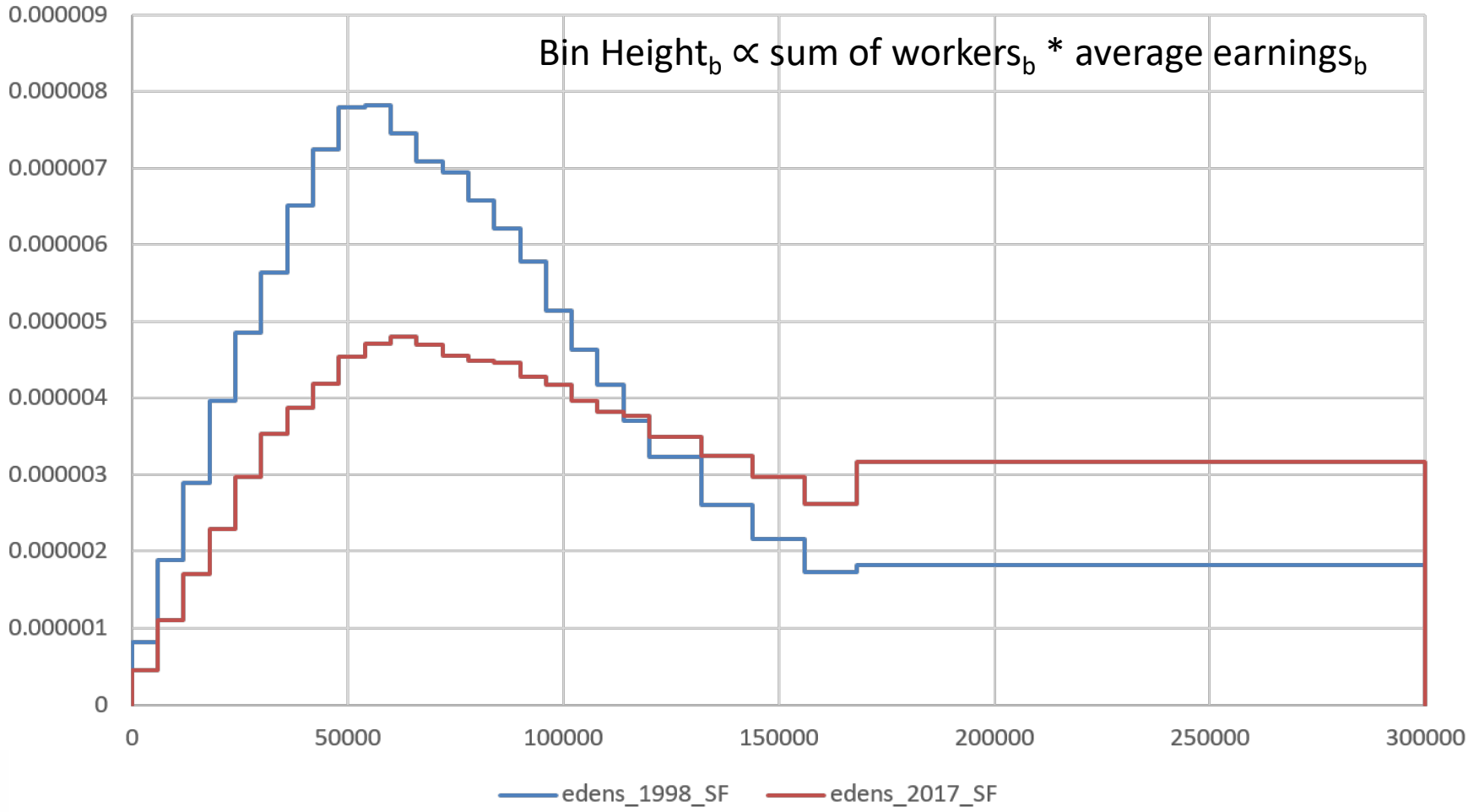
Total Earnings: San Francisco 1998 and 2017
Gini 1998 – 0.512 Gini 2017 – 0.525



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Mobility, Opportunity, and Volatility (MOVS)

- Goal: integrated, regular release of household and individual income, income growth, and income persistence statistics
- Leverage administrative record and Census Bureau collected data
- Focus on three core concepts:
  - mobility in terms of individual's simple change in position over time
  - changes in the concentration of income
  - average direction of position change for demographic groups within the distribution
- A suite of statistics on income mobility, income volatility, and related topics
  - Income growth curves, rank-rank profiles, transition matrices
  - Concentration of affluence or poverty

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MOVS First Phase: Longitudinal Market Income

- Define the working-age population for 2005 using combined demographic data, a variety of administrative records, and Census Bureau collected data
- Link year-to-year IRS 1040 and W2 income and earnings
  - Develop annual household unit identifiers and equivalence scales, calculate equivalized income for individuals in age range
- Intended product is a public-use data tool of statistics by demographic group and geography

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Intragenerational Mobility: Moving Forward

- Goal is to provide high value mobility, opportunity, volatility, and inequality statistics
- Plan to develop and disseminate a suite of experimental statistics for households, workers, and individuals for varying levels of geography and subgroups
- Aiming to release an initial set of measures in Fiscal Year 2023

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Income Distributions

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Research to Better Understand Income Distributions

- Demographic Measures (example research below)
  - Akee, Randy, Maggie R. Jones, and Sonya R. Porter. 2019. “Race Matters: Income Shares, Income Inequality, and Income Mobility for All U.S. Races,” *Demography* 56(3).
  - Bee, Adam and Mitchell, Josh. 2017. “Do older Americans have more income than we think?” SEHSD Working Paper #2017-39.
  - Chetty, Raj, Nathaniel Hendren, Maggie R. Jones, and Sonya Porter. 2020. “Race and Economic Opportunity in the United States: An Intergenerational Perspective.” Quarterly Journal of Economics 135(2): 711-783.
  - Foster, Thomas B., Marta Murray-Close, Liana Christin Landivar, and Mark DeWolf. 2020. "An Evaluation of the Gender Wage Gap Using Linked Survey and Administrative Data." Center for Economic Studies Working Paper Series, #20-34
- Migration (example research below)
  - Foster, Thomas B., Mark Ellis, and Lee Fiorio. 2019. "Only on the Margins: Using Linked IRS Administrative and Census Survey Records to Measure the Economic Returns to Migration for Married Men and Women in the United States." Population Association of America Annual Meetings: Austin, TX. April 12, 2019.
  - Foster, Thomas B., Mark Ellis, and Lee Fiorio. 2018. "The Opportunities and Challenges of Linked IRS Administrative and Census Survey Records in the Study of Migration." CARRA Working Paper Series, #2018-06
  - Foster, Thomas B., Lee Fiorio, and Mark Ellis. 2021. "The Effects of COVID-19 on Internal Migration in the United States." Population Association of America Annual Meetings. May 6, 2021.

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- Firm Inequality and Labor Market Fluidity (example research below)
  - Haltiwanger, John C, Henry R Hyatt, James Spletzer. 2022. "Industries, mega firms, and increasing inequality". NBER Working Paper No. 29920. http://www.nber.org/papers/w29920
  - Haltiwanger, John and James Spletzer. 2020. "Between-firm changes in earnings inequality the dominant role of industry effects." NBER Working Paper No. 26786. http://www.nber.org/papers/w26786
  - Haltiwanger, John and James Spletzer. 2020. "Rising between-firm inequality and declining labor market fluidity: evidence of a changing job ladder." Paper presented at NBER/CRIW conference on Measuring and Understanding the Distribution and Intra/Inter-Generational Mobility of Income and Wealth, March

- Global Income Dynamics (example research below)
  - McKinney, Kevin, John M Abowd, and Hubert P. Janicki. 2022. "U.S. Long-Term Earnings Outcomes by Sex, Race, Ethnicity, and Place of Birth"
  - https://mebdi.org/global-repository-income-dynamics

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- Item Non-Response (example research below)
  - Brummet, Quentin, Denise Flanagan-Doyle, Joshua Mitchell, John Voorheis, Laura Erhard, and Brett McBride. 2018. “What can administrative tax information tell us about income measurement in household surveys? Evidence from the Consumer Expenditure Surveys” Statistical Journal of the IAOS, 34(4): 513-520.
  - Hokayem, Charles, Raghunathan, Trivellore, and Rothbaum, Jonathan. 2022. “Match bias or nonignorable nonresponse? Improved imputation and administrative data in the CPS ASEC.” Journal of Survey Statistics and Methodology, 10(1):81-114.
  - Bollinger, Christopher, Hirsch, Barry, Hokayem, Charles, and Ziliak, Jim. 2018. “Trouble in the tails? What we know about earnings nonresponse thirty years after Lillard, Smith, and Welch.” Journal of Political Economy.
  - Bee, C. Adam, and Joshua Mitchell Amy O’Hara. 2016. "Preliminary Research for Replacing or Supplementing the Income Question on the American Community Survey with Administrative Records." American Community Survey Research and Evaluation Report Memorandum Series, #ACS16-RER-6.
- Unit Non-Response (example research below)
  - Eggleston, Jonathan and Westra, Ashley. 2020. “Incorporating administrative data in survey weights for the Survey of Income and Program Participation.” U.S Census Bureau SEHSD Working Paper #2020-07.
  - Rothbaum, Jonathan and Bee, Adam. 2021. “Coronavirus Infects Surveys, Too: Survey Nonresponse Bias and the Coronavirus Pandemic.” U.S Census Bureau SEHSD Working Paper #2020-10.
  - Rothbaum, Jonathan, Eggleston, Jonathan, Bee, Adam, Klee, Mark, and Mendez-Smith, Brian. 2021. “Addressing Nonresponse Bias in the American Community Survey during the Pandemic Using Administrative Data.” U.S Census Bureau SEHSD Working Paper #2021-24.

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Thank you!

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