

Coronavirus Infects Surveys, Too: Survey Nonresponse Bias and the Coronavirus Pandemic

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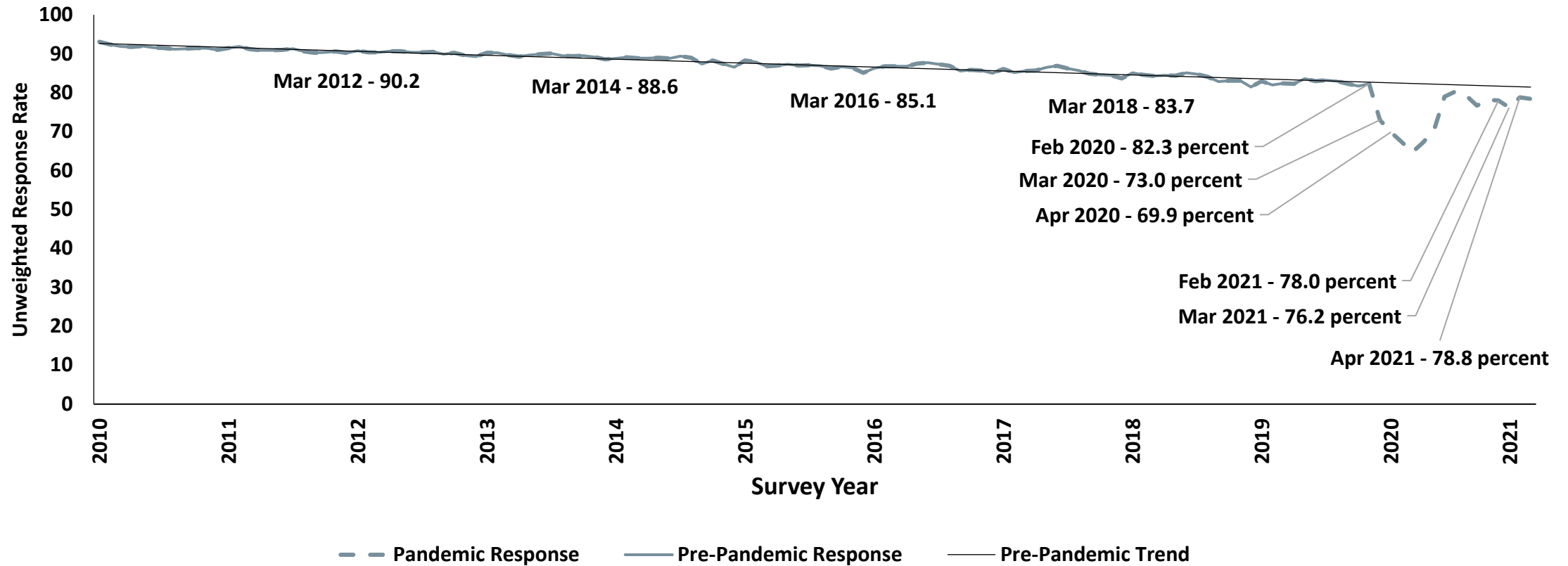
Adam Bee

US Census Bureau

Workshop on Harmonization of Poverty Statistics to Measure SDG 1 and 10
December 1, 2021

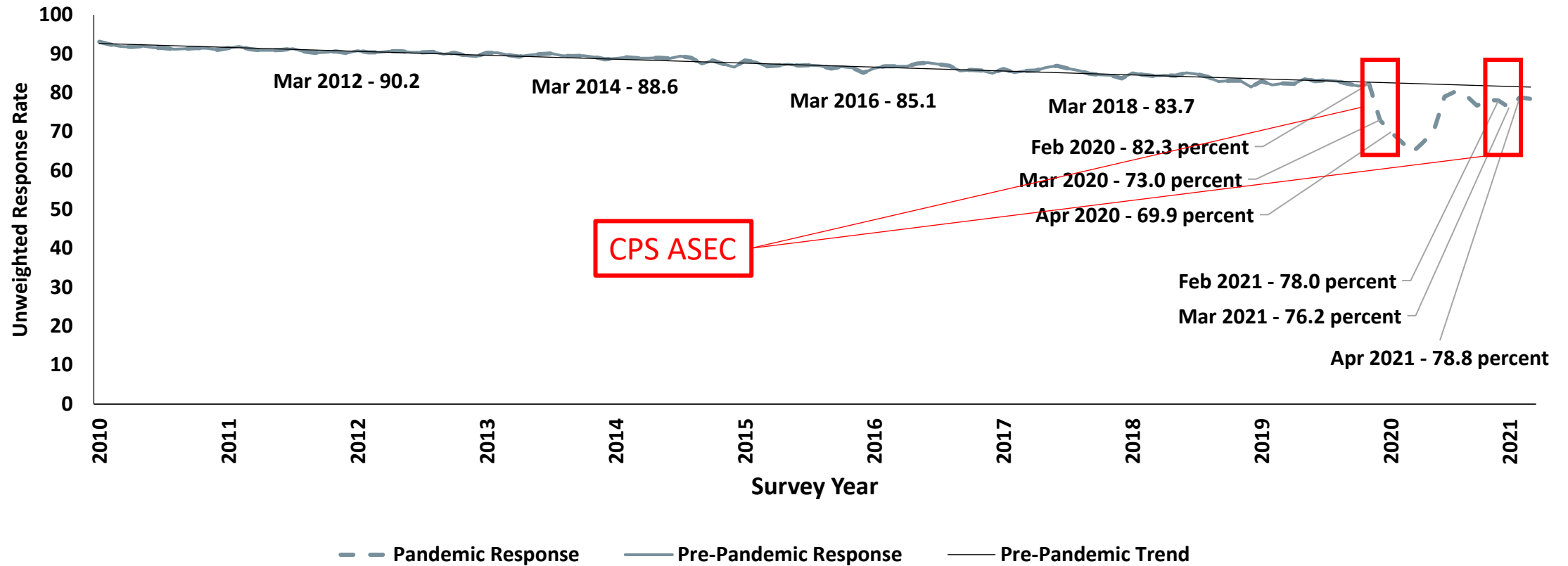
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Response in the Current Population Survey



Source: Bureau of Labor Statistics – <https://www.bls.gov/osmr/response-rates/household-survey-response-rates.htm>

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Survey Results of Concern

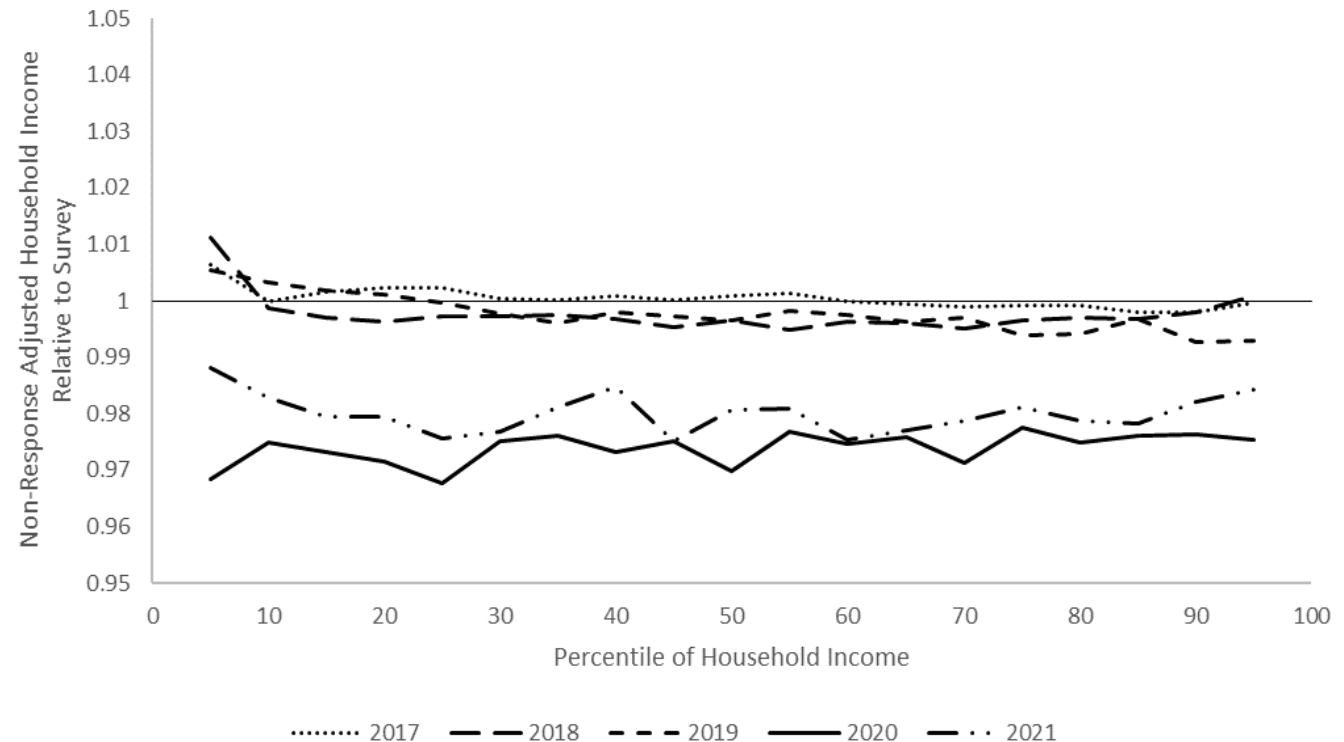
- Surprisingly large median household income growth in 2019
 - 6.8 percent – highest point estimate on record
- Changes in characteristics not controlled for in weighting
 - Citizenship – fewer non-citizens
 - Education – larger shift than expected towards higher educational attainment

What We Do

- Use linked administrative, census, and prior survey data to evaluate nonresponse bias
- Apply entropy balancing to reweight the sample to correct for nonresponse bias
 - Condition on linked data and external population controls
- Create public-use weights that do not condition on administrative data

Preview of Results

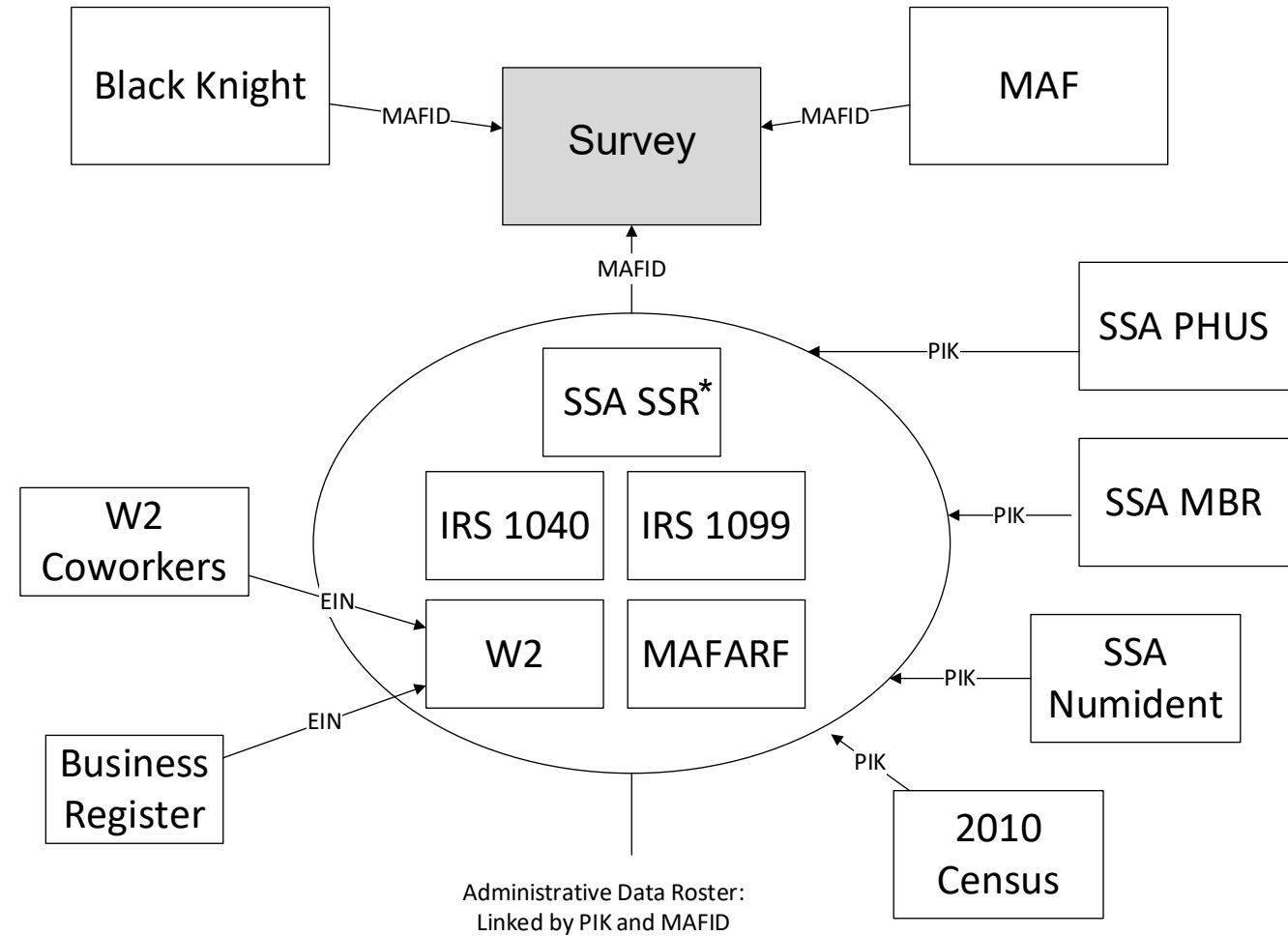
- No evidence of nonresponse bias for income or poverty from 2017-2019
- 2020 and 2021 survey estimates overstate income by 2-3 percent across the distribution



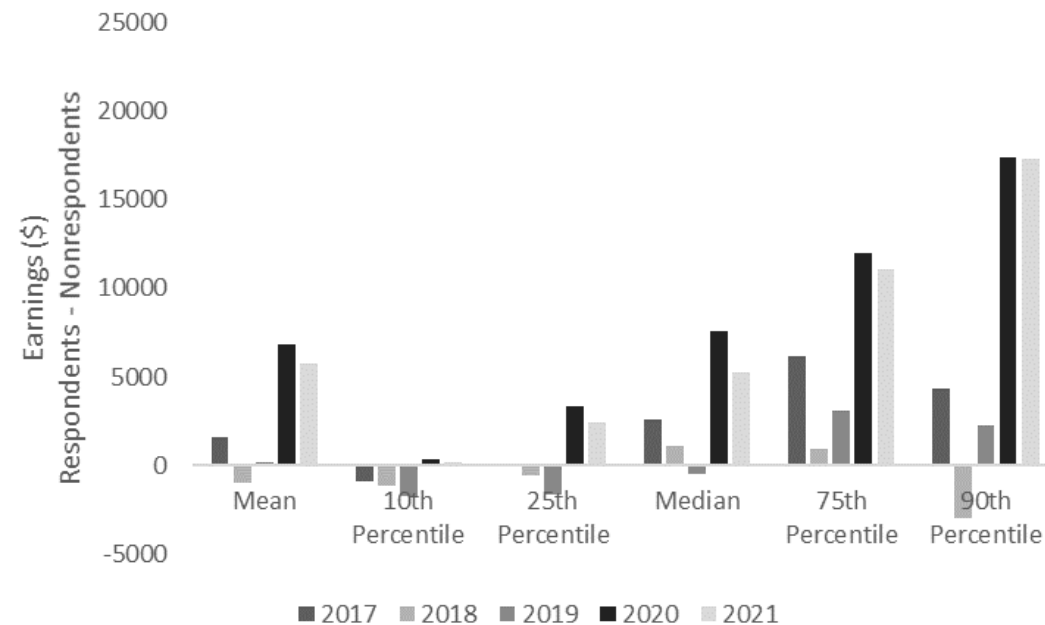
Source: U.S. Census Bureau 2017-2021 Current Population Annual Social and Economic Supplement linked to administrative, census, and survey data as indicated in Table 1. The 2017 and 2018 files are the CPS ASEC Research and Bridge Files, respectively.

Additional Data

- Data Linkage
 - Link administrative data to addresses of both **respondents and nonrespondents**
- What We Have
 - Housing – MAF, Black Knight
 - Income/Employment – W2, 1040, 1099s, PHUS, SSR, MBR, Business Register
 - Demographics – Numident, 2010 Census. Includes race, Hispanic-origin, citizenship, age, gender
 - Household composition/marital status – 1040
- What We Don't Have
 - Direct measures of education, health insurance status, among other stats
 - Any information in linked data for households that can't be linked by MAFID



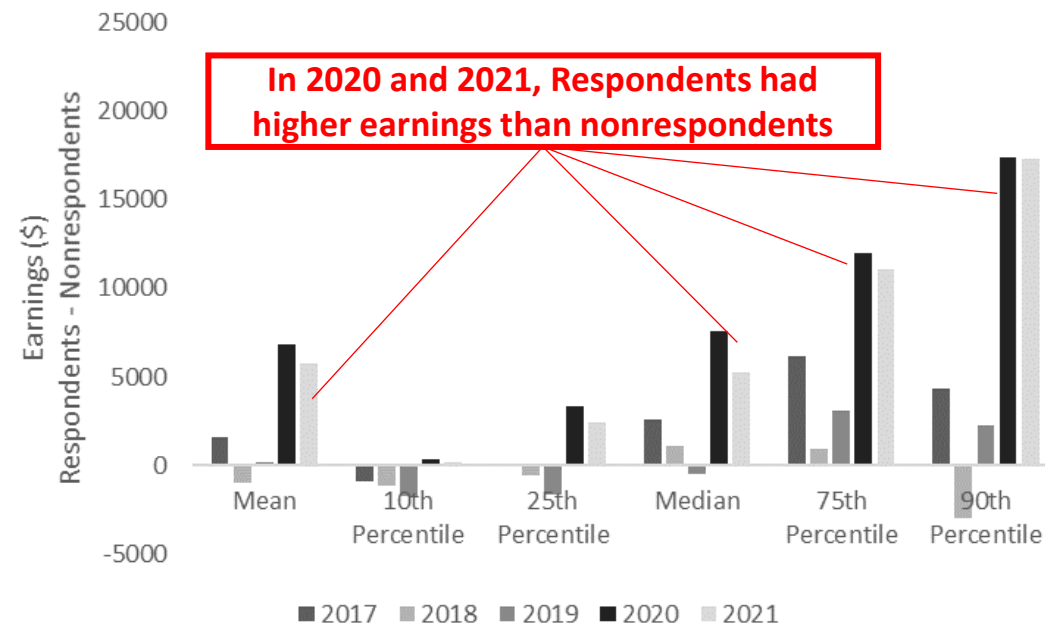
Nonrandom Nonresponse Income Difference between Respondents and Nonrespondents



Source: U.S. Census Bureau 2017-2021 Current Population Annual Social and Economic Supplement linked to administrative, census, and survey data as indicated in Table 1. The 2017 and 2018 files are the CPS ASEC Research and Bridge Files, respectively.

Notes: This figure shows the difference in income by address between respondents and nonrespondents. This shows total W-2 earnings at that address in the reference year of the survey.

Nonrandom Nonresponse Income Difference between Respondents and Nonrespondents



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Weighting in the CPS ASEC

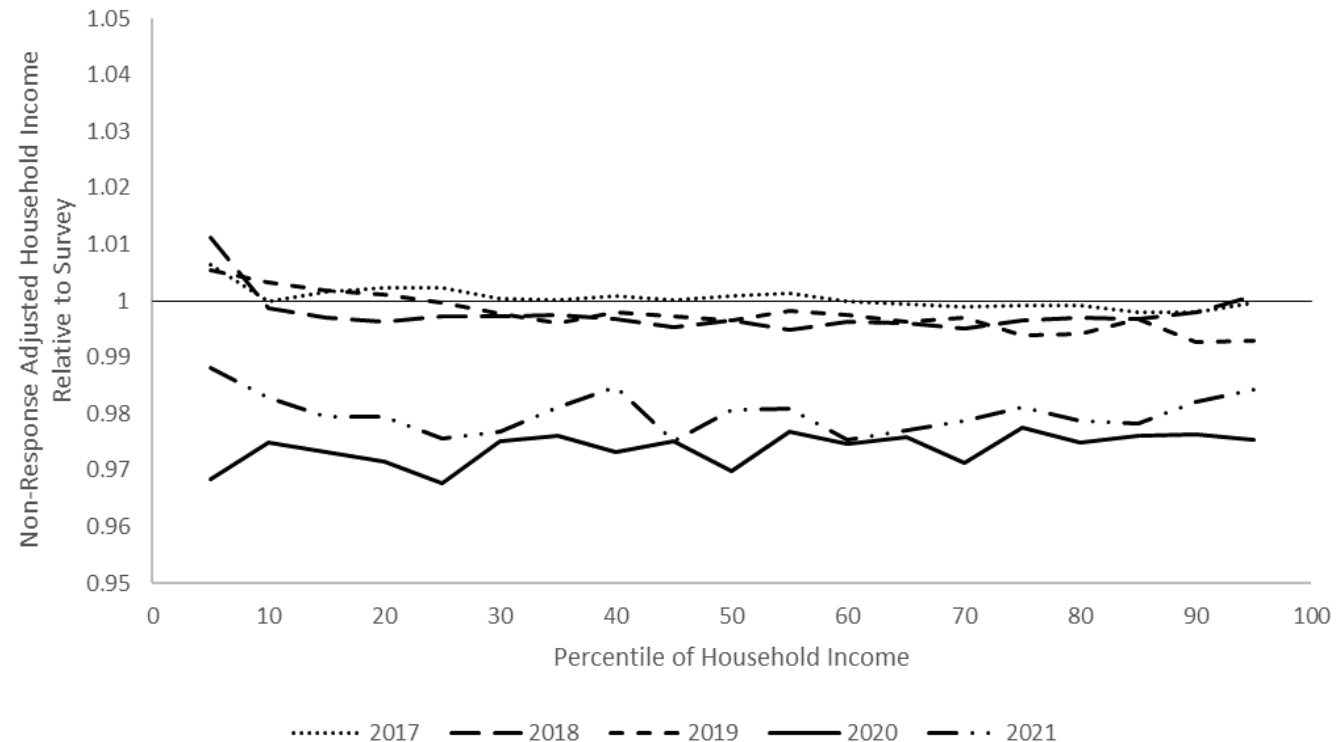
- Weight to population controls (race x age x gender x state)
- Income-response relationship is robust to controlling for demographics in pop controls

Entropy Balancing

- Hainmueller, 2012. “Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies”
 - Reweight a control group to match the characteristics of a treatment group
 - Application of exponential empirical calibration (Deville and Särndal, 1992)
 - Treat reweighting as an optimization problem, rather than starting from a regression

Results - Income

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Results – Poverty

- Poverty is higher in both years
 - 0.46 percentage points higher in 2019 (10.92 vs. 10.46)
 - 0.44 higher in 2020 (11.88 vs. 11.44)

Public-Use Weights

- Problem – weights were estimated by conditioning on a high-dimensional set of administrative characteristics
 - How to show that they did not disclose information about respondents?
- Solution
 - Don't
 - Make new weights that only condition on information in the survey
- Weights available at <https://www.census.gov/data/datasets/time-series/demo/income-poverty/data-extracts.html>

Future Plans

- Extend the work to other surveys, currently or planning to work on:
 - ACS
 - Consumer Expenditure Survey (joint with BLS)
 - Household Pulse Survey
 - 1940 decennial census (for use with linked data to estimate long-term outcomes of children)
- Use entropy balancing to help with weighting linked survey and administrative data to be representative of population (NEWS project)
- Stata package that wraps around ebalance.ado file to easily do survey reweighting using entropy balancing with multiple sets of moment conditions (mostly complete)

Contact Information

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