Addressing Nonresponse Bias in Food Security Measures Using Weighting Adjustments

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Survey Non-Response

- Response rates for the CPS and other surveys plummeted during COVID-19 and have generally fallen

- CPS module response rates have also decreased

- Non-response may lead to non-representative samples and affect estimates of food insecurity and other outcomes

- Data available within the CPS to adjust for non-response are limited

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CPS Response Rates
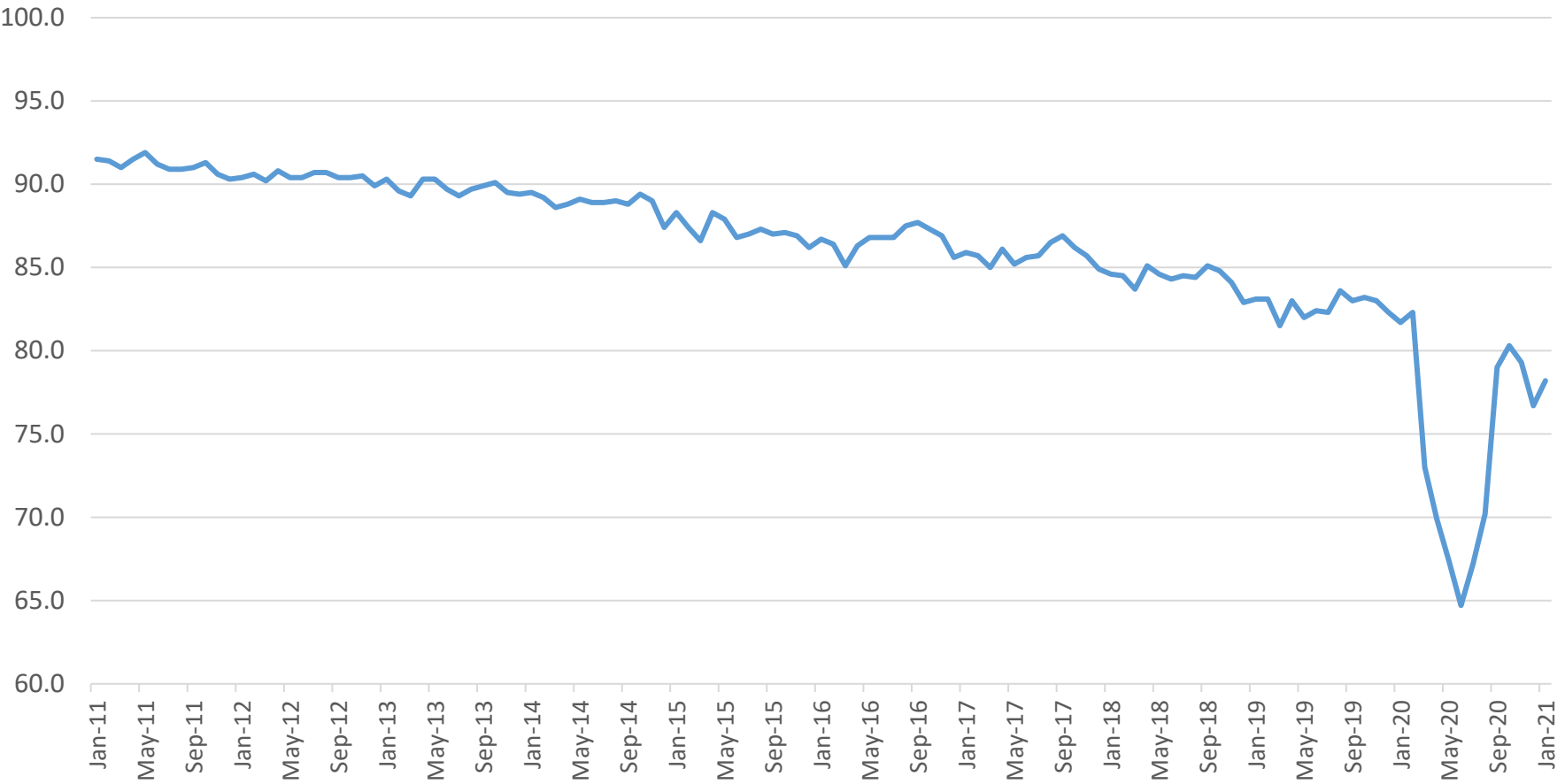
Source: BLS

CPS Food Security Supplement

- Focus on CPS Food Security Supplement

- Sponsored by the Economic Research Service-USDA and fielded by the Census Bureau as an annual supplement to the December CPS

- Source for federal statistics on household food security in U.S.

- Food security: *access at all times to enough food for an active, healthy life for all household members*

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Household Food Security in the United States in 2021

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Non-response in the Food Security Supplement

- Recent research on the CPS Annual Social and Economic Supplement finds lower income people are less likely to respond (Rothbaum & Bee, 2020)

- Differential non-response affects estimates of poverty rates and other income distribution statistics

- Not fully addressed by standard weighting procedures

- Because of the relationship between income and food security,
  - Differential non-response likely occurs in the Food Security Supplement
  - And may affect estimates of food security

This paper

- Applies the methodology developed in research on the basic monthly CPS to improve the weighting correction for non-response

- Utilizes data from multiple administrative data sources including IRS 1040 and 1099 data, SSA benefit data, earnings data from the Longitudinal Employer-Household Dynamics, state public assistance records, and other sources

- Develops and calibrates new weights from these sources

- Applies the weights and compares estimates based on the standard weighting methodology and this new methodology

Weighting Overview

What Do Survey Weights Do?

- Simple overview: weights increase or decrease the "importance" of individual respondents to make the responding sample look more like the target population

- For example, if older individuals are more likely to respond to a survey than younger individuals, we would give older individuals lower weight values and younger people higher weight values to make the sample (hopefully!) more representative

Overview of CPS-FSS's Weighting Algorithm

1. Household Noninterview Adjustment

   - Using *microdata* on both respondent and nonrespondent households, distribute the weights of nonrespondents to the respondent households with similar characteristics

2. Second Stage Adjustment

   - Adjust CPS-FSS weighted counts of age, race, Hispanic origin, and sex to independent Census population estimates at national and state levels

   - Also adjust CPS-FSS metro status and income statistics to same measures calculated on the Basic Monthly CPS

Overview of CPS-FSS's Weighting Algorithm

- Current Household Noninterview Adjustment

  - Adjustment based only on geography (state and metropolitan status)

  - Concern: this may not fully account for economic characteristics that influence response

- Calibration Step

  - While had adjustment for income, target based on CPS basic respondents, which may be nonrepresentative

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Administrative Data

- Add the following administrative data to CPS-FSS's weighting algorithm

  - IRS 1040 and 1099

  - SSA program benefit data

  - Demographic data from 2010 Census and SSA

  - Industry data from the Census Business Register

  - Third-party home value data

  - Quarterly earnings data from the Longitudinal Employer-Household Dynamics (LEHD) program

  - State SNAP/TANF/WIC Data

- Have these data not only for many respondents, but also for CPS-FSS and CPS Basic nonrespondents

Modifications to Weighting Algorithm

- Replace geography-based noninterview adjustment with one based on IRS microdata and other administrative data

  - Create new cells with CART (Classification and Regression Tree)

  - Run model of household food security on administrative data in order to create cells that have a good correlation with our key outcome of interest

  - Estimate model on respondents. Apply model output to both respondents and nonrespondents to create noninterview adjustment cells.

- Add administrative data to calibration step as well

  - Use same CART model. Target is predicted probabilities of food security status, where the administrative data are the inputs for creating the predicted probabilities

Strength and Weaknesses of Administrative Data

- Administrative data includes information that should be highly related to food security

  - IRS Income

  - SNAP and WIC receipt

- Nevertheless, we don't actually observe food security in the administrative data

- If there are additional factors correlated with both food security and response even after controlling for these observables, some nonresponse bias will remain

  - E.g. Don't observe expenditures. Differences in expenditures decisions for a given level of income and SNAP benefit amounts could affect food security, but could also be correlated with behavioral differences that influence whether someone responds to a survey

Results-Household Food Insecurity

	Percent Food Insecure (Low or Very Low Security) Production Estimate	Change in Food Insecurity Estimates with Using Administrative Data	
	2019	2019	2020
All households	10.54%	0.20%	0.36%
With children < 18 years old	13.65%	0.41%	0.49%
____With children < 6 years old	14.47%	0.20%	0.31%
____Married-couple families	7.54%	0.17%	0.43%
____Female head, no spouse	28.73%	0.95%	0.28%
____Male head, no spouse	15.37%	-0.42%	0.29%
With no children < 18 years	9.27%	0.10%	0.31%
____More than one adult	6.72%	0.13%	0.24%
____Women living alone	13.05%	0.30%	0.40%
____Men living alone	12.84%	-0.37%	0.29%
With elderly	7.22%	0.24%	0.36%
____Elderly living alone	8.70%	0.32%	0.46%

Source: 2019 and 2020 CPS-FSS + Administrative Data

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	Percent Food Insecure (Low or Very Low Security) Production Estimate	Change in Food Insecurity Estimates with Using Administrative Data	
	2019	2019	2020
White, non-Hispanic	7.93%	0.22%	0.32%
Black, non-Hispanic	19.07%	0.25%	0.46%
Hispanic	15.63%	0.17%	0.45%
Other, non-Hispanic	9.47%	-0.01%	0.21%
Under 1.00 Poverty Line	34.86%	-0.28%	0.19%
Under 1.30 Poverty Line	33.02%	-0.31%	-0.01%
Under 1.85 Poverty Line	27.65%	-0.33%	-0.05%
1.85 and over Poverty Line	5.08%	0.04%	0.13%
Income unknown	8.38%	-0.08%	0.32%
Northeast	9.60%	0.30%	0.32%
Midwest	10.53%	0.17%	0.39%
South	11.19%	0.25%	0.33%
West	10.16%	0.06%	0.42%

Source: 2019 and 2020 CPS-FSS + Administrative Data

Results-Child Food Insecurity

	Percent Food Insecure (Low or Very Low Security) Production Estimate	Change in Food Insecurity Estimates with Using Administrative Data	
	2019	2019	2020
All households	7.04%	0.36%	0.12%
____With children < 6 years old	6.65%	0.42%	-0.09%
____Married-couple families	3.40%	0.12%	0.08%
____Female head, no spouse	16.89%	1.01%	0.03%
____Male head, no spouse	7.02%	-0.46%	-0.09%
White, non-Hispanic	5.25%	0.18%	0.14%
Black, non-Hispanic	13.54%	0.98%	0.19%
Hispanic	8.28%	0.49%	-0.03%
Other, non-Hispanic	5.35%	0.22%	0.01%
Under 1.00	20.91%	0.61%	-0.32%
Under 1.30	19.88%	0.33%	-0.18%
Under 1.85	17.23%	0.13%	-0.14%
1.85 and over	2.36%	0.09%	0.17%
Income unknown	5.53%	0.22%	0.31%
Northeast	7.35%	0.38%	-0.01%
Midwest	7.38%	0.10%	-0.08%
South	6.77%	0.48%	0.15%
West	6.96%	0.36%	0.32%

Source: 2019 and 2020 CPS-FSS + Administrative Data

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Conclusion

- Adding administrative data to CPS-FSS's weighting algorithm results in a modest change in food security estimates

  - Shifts largely from change in estimates of the income distribution

  - Change in estimates larger in 2020 compared to 2019 for household food security

  - Pattern reversed/not as consistent for child food security

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