# An Examination of Nonresponse Bias in the Consumer Expenditure Surveys During the COVID-19 Period

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# Research Question

- Did nonresponse bias increase during the COVID-19 Pandemic?

- Did the COVID-19 Pandemic impact the effectiveness of the nonresponse adjustments within sample weighting?

- Were the variables used in the nonresponse adjustment as effective as in the past?

# Current Noninterview Adjustment

- Weighting cells approach.

- Partition the sample (both interviews and noninterviews) into cells.

- Calculate the response rates (probability of response) within cells.

- The Noninterview adjustment is the inverse of the response rate within cells.

# Current Noninterview Adjustment

- Variables used to define 192 cells
  - ▶ Number of Contacts (1, 2, 3-4, 5+)
  - ▶ Number of persons in CU (1, 2, 3-4, 5+)
  - ▶ Zip-code level IRS income (Top 10%, Middle, bottom 10%)
  - ▶ Census Region (Northeast, South, Midwest, West)
- Collapsing for large values of the noninterview adjustment and small sample sizes within cells

# CE Interview Survey Response Rates by Number of Contact Attempts
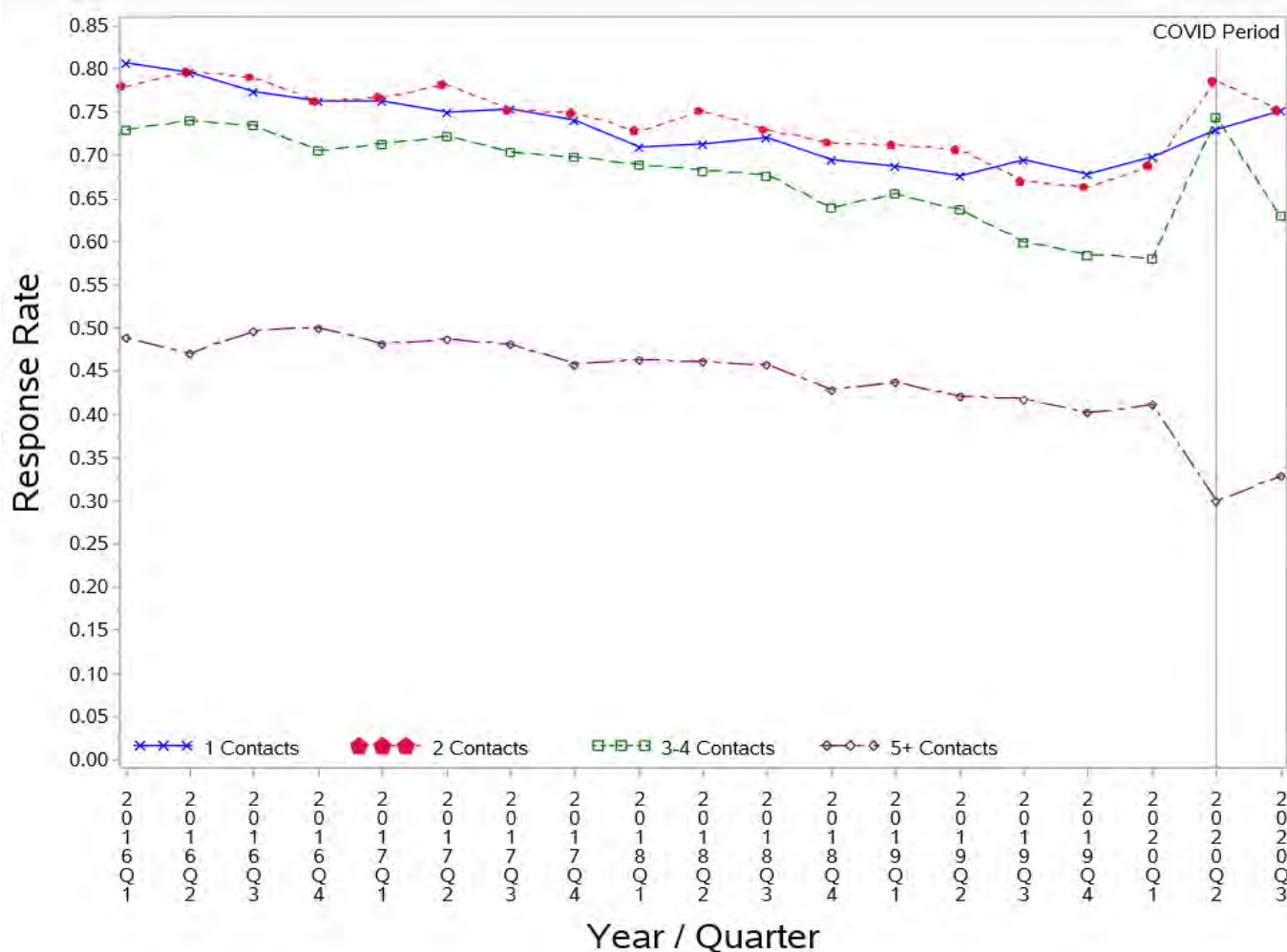
# Measuring Nonresponse Bias

- We want to measure the bias of estimates due to nonresponse.

- We don't know the truth.
  - ▶ We will never know the expenditures for noninterviews.

- What's the next best thing?

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# Our Research Approach – Build a Better Mousetrap for Nonresponse Bias

- Developed a noninterview adjustment tailored specifically for the COVID-19 period (2020Q2 and 2020Q3).

-  Compared current estimates with estimates derived from alternative noninterview adjustments.

- Limitation: just because we didn't catch mice, doesn't mean there aren't mice.  Could mean we need an even better mousetrap.

# Better Mousetrap for Nonresponse Bias

- Used a logistic regression model to model response.
- Considered current variables and additional variables for defining the noninterview adjustment.
  - ▶ All variables need to be known for interviews and noninterviews.
  - ▶ Included additional variables from the Census Planning Database.
  - ▶ Included variables that were significant in the logistic regression model

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# CE Interview Survey
# Alternative Noninterview Adjustments

| | Current | A2 (2020Q2) | A3 (2020Q3) |
|---|---|---|---|
| Number of Contacts | X | X | X |
| Number of People in CU | X | X | X |
| Census Region | X | | |
| IRS Zip Code-Level Income | X | | |
| Tenure | | X | X |
| Census Division | | X | X |
| Interview Number | | X | X |
| Was the PSU SR or NSR? | | X | X |
| Quartiles of proportion aged 65+ | | X | |
| Quartiles of proportion HS Grad | | X | |

# Distribution of 2020Q2 Interview Survey Noninterview Factors
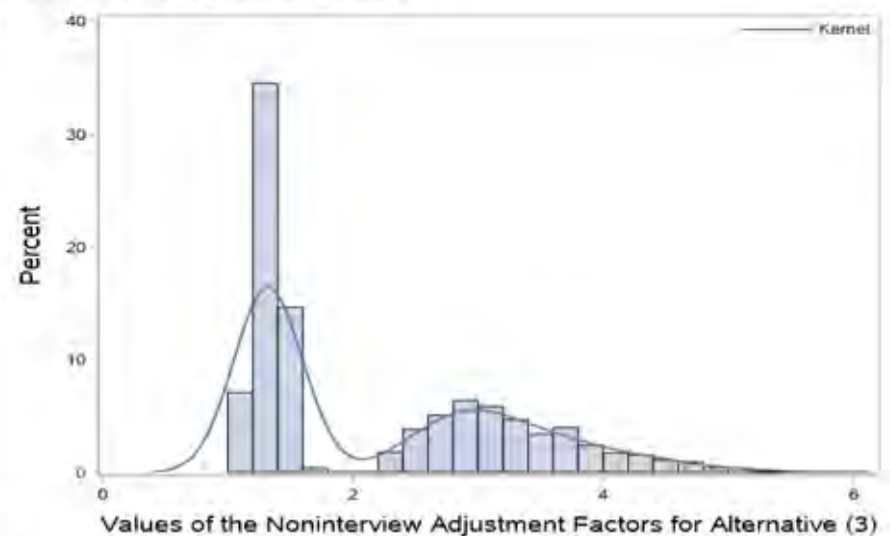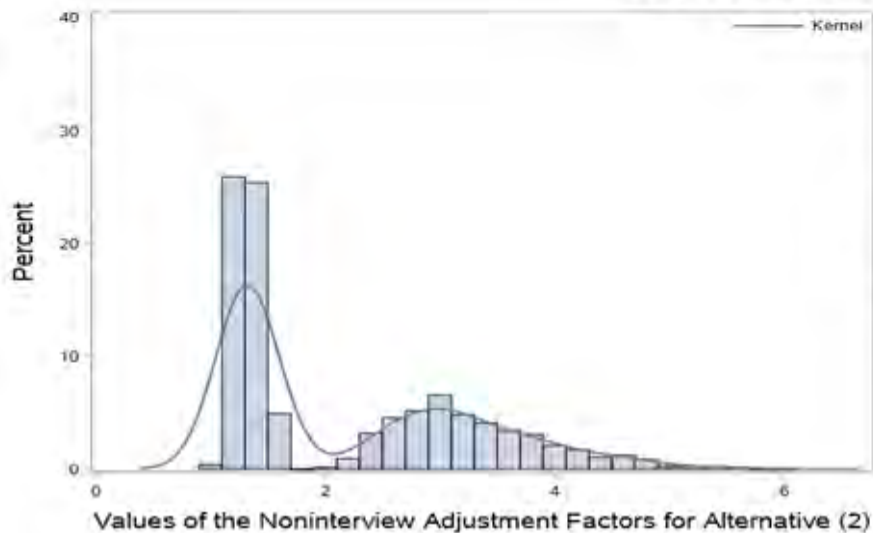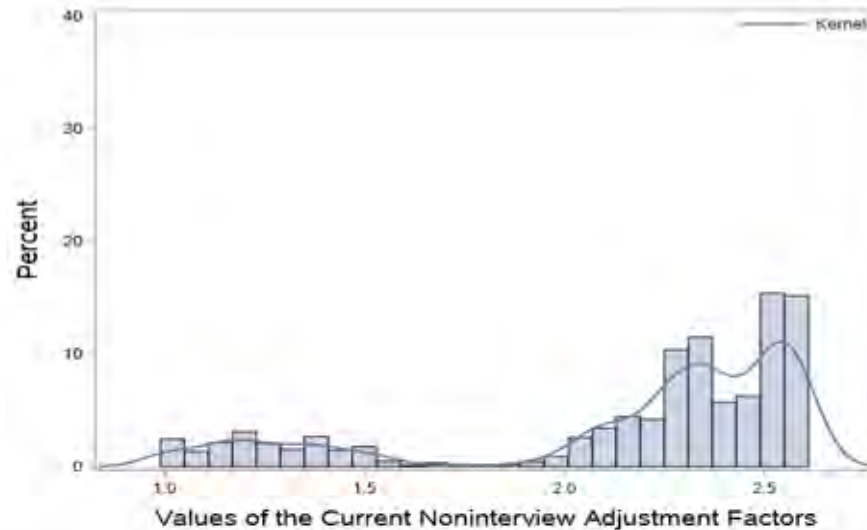
# 2020Q2 Interview Survey
# Annual Estimates of Expenditures

| Mean of … | Current Method | Alternative Method (A2) | | Alternative Method (A3) | |
|---|---|---|---|---|---|
| | Estimate | Estimate | Percent Difference | Estimate | Percent Difference |
| Total Expenditures | 56,314 (848) | 56,519 (781) | 0.4 | 56,668 (832) | 0.4 |
| Housing Expenditures | 19,563 (268) | 19,672 (273) | 0.6 | 19,705 (281) | 0.6 |
| Transportation Expenditures | 9,399 (490) | 9,420 (498) | 0.2 | 9,454 (517) | 0.2 |
| Food Expenditures | 8,536 (115) | 8,549 (106) | 0.2 | 8,557 (107) | 0.2 |
| Personal Insurance Expenditures | 6,583 (139) | 6,586 (121) | 0.0 | 6,615 (128) | 0.0 |
| Health Expenditures | 4,867 (106) | 4,850 (110) | -0.3 | 4,854 (109) | -0.3 |

# 2020Q3 Interview Survey
# Annual Estimates of Expenditures

| Mean of … | Current Method | Alternative Method (A2) | | Alternative Method (A3) | |
|---|---|---|---|---|---|
| | Estimate | Estimate | Percent Difference | Estimate | Percent Difference |
| **Total Expenditures** | 57,455 (636) | 58,208 (712) | -1.3 | 58,428 (701) | 1.7 |
| **Housing Expenditures** | 20,294 (250) | 20,608 (297) | -1.5 | 20,700 (282) | 2.0 |
| **Transportation Expenditures** | 9,503 (332) | 9,618 (357) | -1.2 | 9,614 (357) | 1.2 |
| **Food Expenditures** | 8,528 (98) | 8,604 (104) | -0.9 | 8,624 (101) | 1.1 |
| **Personal Insurance Expenditures** | 6,339 (132) | 6,405 (138) | -1.0 | 6,444 (140) | 1.7 |
| **Health Expenditures** | 4,949 (116) | 4,952 (113) | -0.0 | 4,964 (111) | 0.3 |

# CE Diary Survey
# Alternative Noninterview Adjustments

| | Current | A2 (2020Q2) | A3 (2020Q3) |
|---|:---:|:---:|:---:|
| Number of Contacts | X | X | X |
| Number of People in CU | X | | |
| Census Region | X | | |
| IRS Zip Code-Level Income | X | X | |
| Tenure (owner/renter) | | X | X |
| Census Division | | X | X |
| Quartiles of Hispanic Origin | | X | X |
| Month | | | X |

# Distribution of 2020Q3 Diary Survey Noninterview Factors
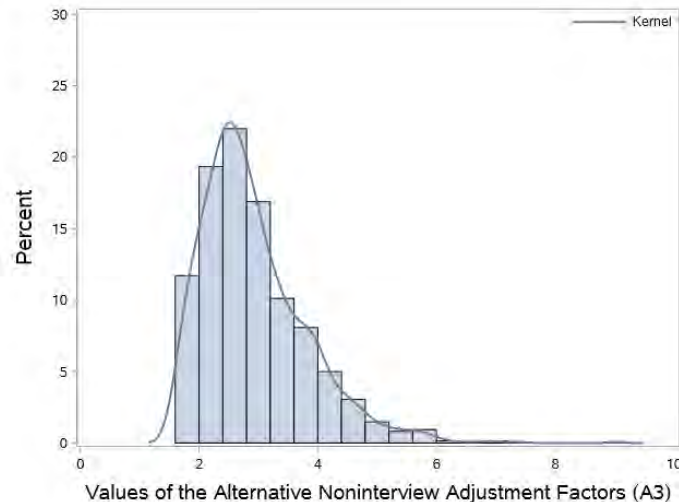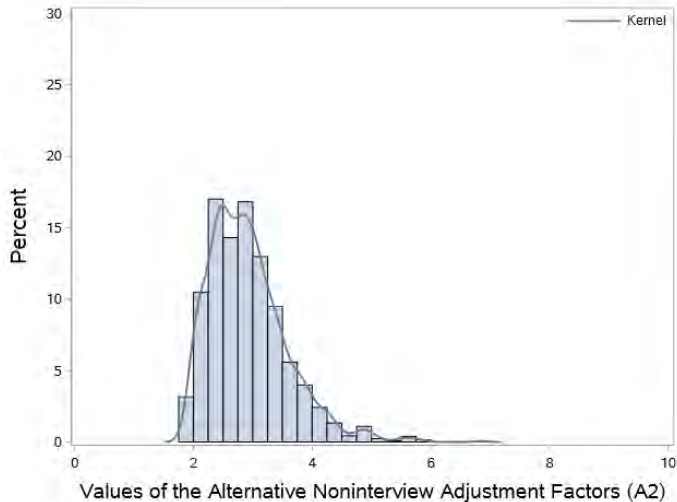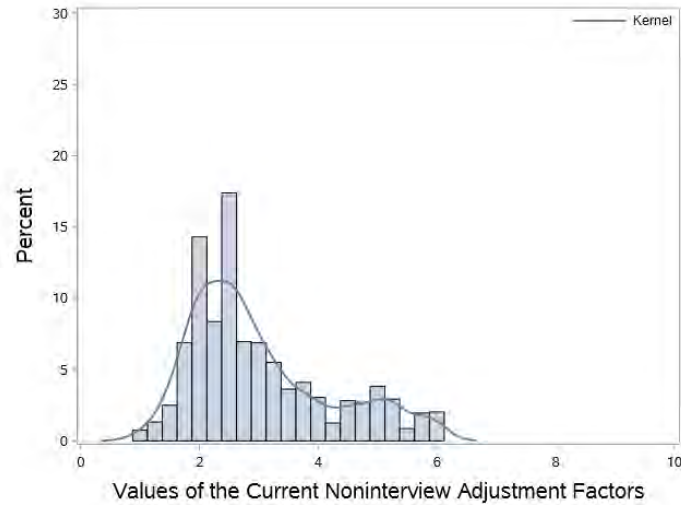
# 2020Q2 Diary Survey
# Monthly Estimates of Expenditures

| Mean of … | Current Method | Alternative Method (A2) | | Alternative Method (A3) | |
|---|---|---|---|---|---|
| | Estimate | Estimate | Percent Difference | Estimate | Percent Difference |
| Total Expenditures | 2,825 (175) | 2,754 (206) | -2.5 | 2,840 (236) | 0.5 |
| Meal Purchases Away from Home | 124 (8) | 123 (9) | -0.6 | 125 (9) | 1.5 |
| Food Purchased for Home Consumption | 407 (15) | 393 (13) | -3.4 | 398 (14) | -2.2 |
| Clothing | 82 (12) | 81 (13) | -0.5 | 83 (13) | 1.8 |
| Other | 2,214 (168) | 2,158 (198) | -2.5 | 2,234 (228) | 0.9 |

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# 2020Q3 Diary Survey
# Monthly Estimates of Expenditures

| Mean of … | Current Method | Alternative Method (A2) | | Alternative Method (A3) | |
|---|---|---|---|---|---|
| | Estimate | Estimate | Percent Difference | Estimate | Percent Difference |
| Total Expenditures | 3,422 (184) | 3,317 (172) | -3.1 | 3,388 (186) | -1.0 |
| Meal Purchases Away from Home | 165 (9) | 164 (9) | -0.7 | 163 (9) | -1.0 |
| Food Purchased for Home Consumption | 415 (12) | 417 (14) | 0.6 | 421 (14) | 1.5 |
| Clothing | 94 (7) | 97 (8) | 2.7 | 95 (8) | 0.8 |
| Other | 2,789 (182) | 2,639 (172) | -4.0 | 2,709 (185) | -1.4 |

# Conclusion

- Not enough evidence of nonresponse bias.

- A future research project with Census will consider using Administrative data from the IRS in the noninterview adjustment.

# Contact Information

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