**Using Contact History to Adjust for Nonresponse in the Current Population Survey**

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**Introduction**

The Current Population Survey (CPS) adjusts the sampling weights for nonresponse to match population controls based on cells which combine similar primary sampling units (PSU) based on size and urbanicity. This would increase weights for responding units in PSUs with higher nonresponse. The adjustment method assumes that the nonresponse is random within the adjustment cells. The present study uses information from the Contact History Instrument (CHI) to adjust the weights based on the patterns of responses interviewers experience in contacting and attempting to interview households. This additional adjustment has the potential to reduce nonresponse bias.

**Data Sources**

 Details about the CPS can be found in Technical Paper 66. The CPS is the primary source of information on the labor force characteristics of the U.S. population. The CPS uses a multistage probability sample based on the results of the decennial census, with coverage in all 50 states and the District of Columbia. The sample is continually updated to account for new residential construction. In the first stage of the sampling process, PSUs are selected for sample. Base weights are created from this sampling. Nonresponse factors are estimated based on the response rates. Second stage weights are produced using population controls.

 The Contact History Instrument (CHI) was added to the CPS in 2009 to collect detailed contact history data (Bates, 2004). The interviewer records times and outcomes of attempted contacts, problems or concerns reported by reluctant households, and strategies used to gain contact or overcome reluctance. This provides a very rich source for studying the interview process, which is only lightly used in this study.

Dixon (2010) found that estimates of nonresponse bias for the Consumer Expenditure Survey and the National Health Interview Survey weren't impacted much by the addition of call history variables.

CPS base weights

3,141 counties and independent cities, is divided into 2,007 PSUs

The 2,007 PSUs are grouped into strata within each state. Then, one PSU is selected from each stratum with the probability of selection proportional to the population of the PSU to produce 754 PSUs, then 72,000 households are selected from the 754 sample areas, or PSUs. The single PSU randomly selected from each of these strata is non-self-representing because it represents not only itself but the entire stratum. The probability of selecting a particular PSU in a non-self-representing stratum is proportional to its population.

Metropolitan areas within a State are used as a basis for forming many PSUs. Outside of metropolitan areas, two or more counties normally are combined to form a PSU except when the geographic area of an individual county is too large. Combining counties to form PSUs provides greater heterogeneity; a typical PSU includes urban and rural residents of both high and low economic levels and encompasses, to the extent feasible, diverse occupations and industries

**Methods**

***Non-interview adjustment.***

The current noninterview adjustment is made separately for clusters of similar sample areas that are usually, but not necessarily, contained within a state. Similarity of sample areas is based on metropolitan statistical area (MSA) status and size. Within each cluster, there is a further breakdown by residence type. Each MSA cluster is split by “central city” and “balance of the MSA.” Each non-MSA cluster is split by “urban” and “rural” residence categories. The weights would be further adjusted to population totals (giving different person weights by adjusting for demographic characteristics; sex, race, age), previous values (composite weights), or for longitudinal use.

This study only examines the estimates for the base-weight and non-interview adjustments.

The current non-interview adjustments assume the missing data aren’t related to estimates after conditioning on the non-interview clusters. This study adds process information about the non-interviews to try to adjust for nonresponse differences within the clusters.

***Non-response surrogates; CHI vs clusters.***

Contact History Instrument (CHI) responses are used to categorize responders to the CPS as similar to nonresponders based on their contact history and reasons for not responding.

Propensity scores are predicted values from a logistic model based on the CHI.

These are used to adjust the weights on the CPS in a general linear model. Refusal is significant in this model, but noncontact has no impact on adjusting the weights.

Since we don’t know how nonrespondents respond to the survey we have to use respondents who are similar to nonrespondents. Call history information can be used to have reluctant respondants represent refusers and difficult to contact respondents to represent noncontacts.

The nonresponse factor used in the adjustment of the base weights were modified to include propensity scores from the CHI factors related to refusal and noncontact.

**Results**

Table 1: Unemployment estimates and standard errors for different stages of weighting.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Base-weight** **(S.E.)** | **NR Adjusted(S.E)**  | **CHI Adjusted(S.E)**  | **Published Estimate**  |
| Unemp  |  **0.086** (0.0014)  | **0.089** (0.0014)  | **0.089** (0.0013)  | **0.090**  |
| Unemp Male  | **0.088**  (0.0019)  | **0.093**   (0.0018)  | **0.093**  (0.0018)  | **0.094**  |
| Unemp Female  | **0.083** (0.0019)  | **0.085**  (0.0018)  |  **0.085**  (0.0018)  | **0.086**  |
| Unemp Asian  | **0.070**   (0.0048)  | **0.073**  (0.0053)  | **0.074**   (0.0053)  | **0.071**  |
| Unemp Black  |  **0.148**  (0.0052)  | **0.149** (0.0048)  |  **0.149**  (0.0048)  | **0.152**  |
| Unemp White  | **0.078**  (0.0015)  | **0.081**  (0.0014)  |  **0.081**  (0.0014)  | **0.081**  |

Table 1 shows that differences between the baseweight estimates and the nonresponse estimates were small relative to their standard errors (but sometimes statistically significant at alpha=.05), and the differences between the nonresponse adjusted weights were even smaller (and not significantly different). For example, unemployment differences greater than 3 tenths of a percent are considered “interesting” to economists; the difference between the baseweighted estimate and the nonresponse adjusted estimate is .003. The difference between the traditional nonresponse adjusted estimate and the CHI adjusted estimate is only .0001.

Table 2: Mean estimates for different stages of weighting.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Baseweight(S.E.)** | **NR Adjusted(S.E)**  | **CHI Adjusted(S.E)**  |
|  Age  | **37.85** (0.114)  | **37.74** (0.108)  | **37.75** (0.107)  |
| Male  | **0.487** (0.0013)  | **0.487** (0.0012)  | **0.487** (0.0012)  |
| Earnings  | **26716**   (701)  | **26020**  (666)  |  **26033**  (663)  |
| Disability  |  **0.115**  (0.0014)  | **0.113** (0.0012)  | **0.113** (0.0012)  |

Table 2 shows other estimates from the CPS for different weights. The differences between the baseweighted estimates and the nonresponse adjusted weight estimates were small. The differences between the two nonresponse adjusted estimates were even smaller.

**Summary**

The potential biases found were moderate in the unemployment estimates (about 3% underestimate, or .003 percentage points), and were largely adjusted for by the customary adjustment cell method.

The direction of adjustments were the same for both methods for all estimates.

Surrogate nonresponse is always a leap of faith. Sensitivity analysis could help show how worried we should be.

While this analysis showed slight overall effects for using contact history, larger effects may be present for subgroups or other estimates.

While nonresponse may not relate to sampling (and thus weights) it may relate to estimates, so other adjustments may be necessary.

**References**

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**Questions:**

1. Other methods of incorporating nonresponse propensity into weights.
2. For the sensitivity analysis, what parameters other than the relationship between nonresponse and the estimates would make sense?