

Final Report

National Beneficiary Survey–General Waves Round 6: Nonresponse Bias Analysis

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Eric Grau

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Social Security Administration
Office of Retirement and Disability Policy
ITC Building
500 E Street, SW,
9th Floor
Washington, DC 20254
Project Officer: Mark Trapani
Contract Number: SS00-12-60094

Submitted by:

Mathematica
1100 1st Street, NE
12th Floor
Washington, DC 20002-4221
Telephone: (202) 484-9220
Facsimile: (202) 863-1763
Project Director: Jason Markesich
Reference Number: 40160.224

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ACRONYMS

AHRF	Area Health Resource File
CAPI	Computer-assisted personal interviewing
CATI	Computer-assisted telephone interviewing
CHAID	Chi-Squared Automatic Interaction Detector
DCF	Disability Control File
FRA	Full retirement age
IRS	Internal Revenue Service
MCAR	Missing completely at random
NBS	National Beneficiary Survey
PSU	Primary sampling unit
RBS	Representative beneficiary sample
SGA	Substantial gainful activity
SPSS	Statistical Package for the Social Sciences (SPSS is a registered trademark of SPSS Inc., of Chicago, Illinois)
SSA	Social Security Administration
SSDI	Social Security Disability Insurance (Title II of the Social Security Act)
SSI	Supplemental Security Income (Title XVI of the Social Security Act)
SSU	Secondary sampling unit
SWS	Successful worker sample
TTW	Ticket to Work and Self-Sufficiency

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NBS DATA DOCUMENTATION REPORTS

The following publicly available reports are available from SSA on their website (https://www.ssa.gov/disabilityresearch/nbs_round_6.html):

- **User’s Guide for Restricted- and Public-Use Data Files** (Callahan et al. 2019). This report provides users with information about the restricted-use and public-use data files, including construction of the files; weight specification and variance estimation; masking procedures employed in the creation of the public-use file; and a detailed overview of the questionnaire design, sampling, and data collection for the National Beneficiary Survey (NBS)—General Waves. The report provides information covered in the Editing, Coding, Imputation, and Weighting Report and the Cleaning and Identification of Data Problems Report (described below)—including, procedures for data editing, coding of open-ended responses, and variable construction—as well as a description of the imputation and weighting procedures and development of standard errors for the survey. In addition, this report contains an appendix addressing total survey error and the NBS.
- **NBS Public-Use File Codebook** (Bush et al. 2019). This codebook provides extensive documentation for each variable in the file, including variable name, label, position, variable type and format, question universe, question text, number of cases eligible to receive each item, constructed variable specifications, and user notes for variables on the public-use file. The codebook also includes frequency distributions and means as appropriate.
- **NBS—General Waves Questionnaire** (Callahan et al. 2019). This document contains all items on Round 6 of the NBS—General Waves and includes documentation of skip patterns, question universe specifications, text fills, interviewer directives, and checks for consistency and range.
- **Editing, Coding, Imputation, and Weighting Report** (Grau et al. 2019). This report summarizes the editing, coding, imputation, and weighting procedures as well as the development of standard errors for Round 6 of the NBS—General Waves. It includes an overview of the variable naming, coding, and construction conventions used in the data files and accompanying codebooks; describes how the sampling weights were computed to the final post-stratified analysis weights for the representative beneficiary sample; outlines the procedures used to impute missing responses; and discusses procedures that should be used to estimate sampling variances for the NBS.
- **Cleaning and Identification of Data Problems Report** (McDonald et al. 2019). This report describes the data processing procedures performed for Round 6 of the NBS—General Waves. It outlines the data coding and cleaning procedures and describes data problems, their origins, and the corrections implemented to create the final data file. The report describes data issues by sections of the interview and concludes with a summary of the types of problems encountered and general recommendations.
- **NBS Nonresponse Bias Analysis** (current report). This report discusses whether the nonresponse adjustments applied to the sampling weights of Round 6 of the NBS—General Waves appropriately accounted for differences between respondents and nonrespondents or whether the potential for nonresponse bias still exists.

The following restricted-use report is available from SSA through a formal data sharing agreement:

- **NBS Restricted-Access Codebook** (McDonald et al. 2019). This codebook provides extensive documentation for each variable in the file, including variable name, label, position, variable type and format, question universe, question text, number of cases eligible to receive each item, constructed variable specifications, and user notes for variables on the restricted-access file. The codebook also includes frequency distributions and means as appropriate.

INTRODUCTION

In all studies, final survey estimates are based solely on the survey’s respondents. Errors may arise in the estimates resulting from unit nonresponse if there are systematic differences between individuals who respond to a survey and those who do not. Nonresponse-adjusted weights attempt to account for these differences by identifying respondents and nonrespondents who are similar on characteristics available for both and adjusting the weights of the respondents to compensate for the nonrespondents. In studies where these adjustments are able to account for differences between nonrespondents and respondents, the survey estimates would have minimal potential for nonresponse bias.

The purpose of this report is to determine whether the nonresponse and post-stratification adjustments applied to the sampling weights of Round 6 of the National Beneficiary Survey (NBS)–General Waves appear to have effectively accounted for differences between respondents and nonrespondents, or whether the potential for nonresponse bias has been minimized. The study team cannot directly measure nonresponse bias without knowing how nonrespondents would have answered survey items; however, we can examine variables available for both respondents and nonrespondents that we believe are correlated with responses to survey items.

Our analysis indicates that the nonresponse adjustment alleviated all differences observed between respondents and nonrespondents in the beneficiary sample for the variables that we had at our disposal. However, there were other sources of potential bias representing some small populations where the weighted estimates from the sample differed from the frame, because these populations could not be controlled for when creating the initial sampling weights. This was because the variables representing these populations were (1) not important enough to be considered for the variables used in post-stratification and (2) not included as covariates in the final nonresponse models, most likely because the sample counts were too small. As a result, these differences could not be rectified when adjusting these weights for nonresponse or post-stratifying them to marginal population totals.

A. Study overview

Sponsored by the Office of Retirement and Disability Policy at the Social Security Administration (SSA), the NBS–General Waves collects data on the employment-related activities of working-age beneficiaries of Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI). In 2017, Mathematica Policy Research conducted the sixth round of data collection since the NBS began in 2004. We will implement a seventh round in 2019. The first four rounds of the survey—in 2004, 2005, 2006, and 2010—helped glean information about beneficiary impairments; health; living arrangements; family structure; occupation before disability; and use of non-SSA programs (for example, the Supplemental Nutrition Assistance Program). Rounds 1 to 4 also evaluated the Ticket to Work and Self-Sufficiency (TTW) program. In Rounds 5 to 7, we seek to uncover important information about the factors that promote beneficiaries’ self-sufficiency and, conversely, the factors that impede beneficiaries’ efforts to maintain employment.¹

¹ In this report, the NBS rounds conducted in 2004, 2005, 2006, 2010, 2015, and 2017 are referred to as Round 1, Round 2, Round 3, Round 4, Round 5, and Round 6, respectively. The planned 2019 round is referred to as Round 7.

For Round 6 of the NBS, we met the goals of the study through two samples: (1) a sample of all beneficiaries (the representative beneficiary sample, or RBS), and (2) a sample of a subset of beneficiaries who maintained a minimum level of earnings for a sustained period (a successful worker sample, or SWS). The survey was administered to both of these cross-sectional samples simultaneously; a subset of SWS cases will be followed longitudinally in Round 7. Mathematica collected data by using computer-assisted telephone interviewing (CATI). We deployed in-person field locators to follow-up with most CATI nonrespondents,² then conducted the interviews via CATI with a cell phone provided by the field locator. Computer-assisted personal interviewing (CAPI) was conducted only with sample members who preferred or needed an in-person interview to accommodate their disabilities. Both CATI and CAPI modes were fully integrated to simplify reporting and data processing.

The NBS–General Waves collects important beneficiary data that are not available from SSA administrative data or other sources, including more detailed information about beneficiaries’ disabilities (other than their general disability classification) as well as disability payment information, interest in work, use of services, and employment.

The survey addresses five major questions:

1. What are the work-related goals and activities of SSI and SSDI beneficiaries, particularly as they relate to long-term employment?
2. What are the short-term and long-term employment outcomes for SSI and SSDI beneficiaries who work?
3. What supports help SSA beneficiaries with disabilities find and keep jobs and what barriers to work do they encounter?
4. What are the characteristics and experiences of beneficiaries who work?
5. What health-related factors, job-related factors, and personal circumstances hinder or promote employment and self-sufficiency?

SSA will combine data from Round 6 of the NBS–General Waves with SSA administrative data to provide critical information on access to jobs and employment outcomes for beneficiaries. As a result, SSA and external researchers who are interested in disability and employment issues may use estimates from the survey for policymaking and program planning efforts.

In this report, we assess the potential for nonresponse bias separately for the RBS and SWS. We first describe the sample design and the population that each sample is supposed to represent, followed by a description of the nonresponse adjustments to the sampling weights. We then provide the unweighted and weighted response rates for each sample and its substrata. In Tables 4, 6, and 8 for the RBS, we assess (1) how well the sample represents the data from the sampling frame; (2) how ineligible sample cases differ from the rest of the sample and how this would affect comparisons with the frame; (3) how sample respondents differ from nonrespondents; and (4) how well nonresponse adjusted weights account for these differences, using the initial

² We did not employ field follow-up for a portion of the SWS. This portion, referred to as the “unclustered” sample, is described later in this chapter.

unadjusted weights and weights adjusted for nonresponse. We follow this with similar comparisons for the SWS in Tables 5, 7, and 9. The comparison between the estimates with adjusted and unadjusted weights allows us to (1) see the potential for nonresponse bias after removing nonrespondents and making no nonresponse adjustments to the weights and (2) assess the effectiveness of nonresponse adjustment procedures on the potential for nonresponse bias. For the SWS, the analysis in this report uses provisional weights. This is due to the fact that some successful workers had a lag in the posting of their earnings, . Furthermore, it did include a small number of cases (4,746 out of 89,936) that met the successful work criteria at the time of the initial extraction, but in an updated extraction from November 2020, were found to not meet the criteria during the time period in question. It is possible that the nature of the nonresponse bias using the final analysis weights may be slightly different from what is summarized in this report using the provisional weights, given that the final weighted total excludes 219 of the 4,587 that had positive provisional analysis weights.

1. Sample design and target populations

For all survey rounds, the NBS has used a multistage sampling design. In Round 6, we used such a design for both the RBS and SWS, with an independently drawn, supplemental, single-stage sample for some subset populations for the SWS.³ We drew the SWS and RBS independently from separate frames, although the SWS frame was a subset of the RBS frame. This means that some sample members could have been selected for both the RBS and the SWS—which occurred for 91 individuals (of which, 38 responded). Because most analyses do not require combining the samples, we did not adjust the RBS and SWS weights for these duplicates. However, in the event that an analysis would require combining the samples, we also created composite weights that accounted for duplicates (individuals who were selected for both samples). These composite weights also accounted for those in the RBS that were not part of the SWS but could have been potentially sampled for the SWS because they were part of the SWS frame.

In Rounds 1 through 4, we used data from SSA on the counts of eligible beneficiaries in each county in 2003 to form 1,330 primary sampling units (PSUs), each of which consisted of one or more counties. We selected a new sample of PSUs in Round 5 from the same group of 1,330 PSUs that were formed prior to Round 1 (in 2003). We used the same PSUs in Round 6 (for both the RBS and the SWS main sample) that we had selected in Round 5. We classified two PSUs as certainty selections (Los Angeles County and Cook County).⁴ These counties were certainty selections based on the selection frequencies for the PSUs computed using a composite size measure.⁵ Within these two counties, we formed secondary sampling units (SSUs) composed of one or more five-digit zip codes within each county—using counts of beneficiaries for the SSUs in each age stratum for the composite size measure—and selected a sample of SSUs within the certainty PSUs for the RBS. In the SWS, we did not use the SSUs; individuals were

³ The RBS and the main sample of the SWS involved selecting individuals within selected clusters of geographic areas; thus, they are referred to as clustered samples. The supplemental sample (for the SWS only) was selected across the entire population of successful workers and was therefore not limited to those residing in selected clusters. It is therefore referred to as an unclustered sample. This is discussed in detail later in the report.

⁴ Los Angeles County includes the city of Los Angeles; Cook County includes the city of Chicago.

⁵ The composite size measure was the sum of the products of the sampling fraction for each age category stratum in the RBS and the estimated count of beneficiaries in that stratum and PSU (Folsom et al. 1987).

selected within the entire certainty PSUs and were not limited to the selected SSUs. Details on the sample design of the NBS–General Waves, including the selection of PSUs and SSUs, are available in the Editing, Coding, Imputation, and Weighting Report (Grau et al. 2019).

The target population for the RBS consisted of SSI recipients and SSDI beneficiaries between the ages of 18 and full retirement age (FRA) who resided in all 50 states and the District of Columbia (excluding outlying territories) who were in an active pay status⁶ as of June 30, 2016. As of that date, the target population consisted of approximately 13.8 million beneficiaries.

For the RBS, we fielded a nationally representative sample of 7,947 SSA disability beneficiaries. Except for the way we stratified the sample of the PSUs,⁷ the sample design for the RBS was nearly identical to the design of the RBS in Rounds 1 through 5. We stratified the cross-sectional RBS by four age-based strata within the PSUs: (1) age 18 to 29, (2) age 30 to 39, (3) age 40 to 49, and (4) age 50 and older. To ensure a sufficient number of persons seeking work, we oversampled beneficiaries in the first three cohorts (age 18 to 49). The target number of completed interviews for Round 6 was 1,111 beneficiaries in each of the three younger age groups. For those age 50 and older, the target number of completed interviews was 667 beneficiaries.

The SWS target population was limited to SSI and SSDI beneficiaries who were eligible for the RBS but were considered successful workers because their earnings for a sustained period were sufficiently high. In particular, the SSI and SSDI beneficiaries were required to (1) have earnings above SSA’s non-blind substantial gainful activity (SGA) monthly earnings level (\$1,130 in 2016 and \$1,170 in 2017) for a minimum of three consecutive calendar months at any time between August 1, 2016, and July 31, 2017, and (2) be younger than age 62 on June 30, 2016. The successful work must have occurred within a time frame so that the vast majority would be interviewed within six months of the end of their successful work (if they were not currently working) and their earnings had to have been revealed in the Disability Control File (DCF) at the time of data extraction—removing from the sample frame any successful workers who had a long delay in having their earnings recorded on the DCF.⁸ Using these constraints to define the target population, we identified a population of 89,936 successful workers. From this

⁶ Active status includes beneficiaries who are currently receiving cash benefits as well as those whose benefits have been temporarily suspended for work or other reasons. It does not include beneficiaries whose benefits have been terminated.

⁷ As noted earlier, the sample design for Rounds 1 through 4 included two samples, one for all beneficiaries (the RBS) and one for the participants in the TTW program (the Ticket Participant Sample). To accommodate the rollout of the TTW program, the PSUs were sampled within strata defined by the three phases of the rollout. The sample design for Round 5 only included one sample, that of all beneficiaries. The PSUs were not drawn within strata, except those defined by the two certainty PSUs. The Round 6 sample used the same PSUs as those sampled in Round 5.

⁸ Some SSI and SSDI beneficiaries would be considered successful workers because their earnings and age met the threshold, but they had to be excluded from the target population for the sampling effort due to a delay in recording their earnings on the DCF. For these individuals, a lag of up to six years would exist between the time that they received their earnings and the time that the earnings data were recorded in the DCF, though most had their earnings recorded after three years. There was no way they could be identified in time for the data extraction.

frame, we fielded a nationally representative sample of 13,271⁹ successful workers. We included one screening question as an additional constraint: the sampled successful workers had to indicate that they had been working in the past six months.¹⁰ This frame total did not include successful workers whose earnings were not included in the DCF at the time of extraction. Furthermore, it did include a small number of cases (4,746 out of 89,936) that met the successful work criteria at the time of the initial extraction, but in an updated extraction from November 2020, were found to not meet the criteria during the time period in question. In the sample, we found that 725 of the 13,271 sample cases did not meet the criteria for successful work. In the later extraction, the actual weighted total number of successful workers was found to be 288,576. We post-stratified the provisional analysis weights to match this total and set the weights for the 725 cases that did not meet the criteria to zero. The nonresponse bias analysis for the SWS uses the provisional analysis weights representing 89,936 cases; it is possible that the conclusions using the final analysis weights may differ from those in this report.

To ensure a large enough number of successful workers for sampling, we formed seven successive frames of successful workers over time. Each one was revealed by comparing the full sampling frame to updated earnings information and identifying all successful workers at that time, then removing them from subsequent frames to make the frames mutually exclusive. The SWS sampling frames were all subsets of the same sampling frame used for the Round 6 RBS sample, and are therefore referred to as extracts from the larger frame. Within each of the seven extracts, we stratified the SWS into two strata defined by beneficiary type (SSDI only and SSI, which included both SSI only and concurrent beneficiaries) and selected a probability sample from each extract. The targeted number of completed interviews for the two strata was 2,250 interviews apiece across all extracts. We did not know the size of each extract before sample selection; the first sample size allocation to the samples in each extract was based on historical data. After the release of each extract, the allocation of sample sizes to the samples from the remaining extracts was adjusted to make the allocation as proportional as possible to the population of successful workers over time, within each of the two beneficiary-type strata (SSDI only and SSI). We did not complete sample selection until after the release of the last extract.

Because of the concerns about the number of successful workers within strata and their distribution across PSUs within each extract, we decided to supplement the main SWS (within the PSUs) with a second, independent sample of successful workers. This supplemental sample was divided into two geographic strata (successful workers residing in a sampled PSU and successful workers not residing in any of the sampled PSUs), in addition to the strata based upon the extract and beneficiary title (SSI versus SSDI only).¹¹ We refer to the multistage sample design as the clustered sample and to the second independent sample as the unclustered

⁹ For reasons explained later in this chapter, this sample includes 490 duplicates. As a result, 12,781 unique cases were sampled.

¹⁰ This screening question was included to account for situations where a long period of time had elapsed between the date when the case was released for data collection and the interview date. Few cases were actually removed from the sample due to this screening question, especially in later extracts.

¹¹ Given that the target population for the NBS did not include Puerto Rico or other outlying territories, we excluded from the frame all beneficiaries and successful workers who resided in those areas.

sample.¹² We call the combination of data from the clustered and unclustered samples to calculate estimates a dual sample design. The clustered sample included in-person follow-up for sample members who could not be located or otherwise did not respond by phone; the unclustered sample did not have in-person follow-up.

After the completion of the sample selection for all seven extracts, we created a single set of SWS composite weights that combined information from the clustered and unclustered SWS, which appropriately accounted for the different follow-up rules between the two samples.¹³

Table 1 includes selected and completed sample sizes for both the RBS and SWS. It includes the total across the clustered and unclustered samples in the SWS and does not break out the counts between these samples; it also does not account for the fact that 490 cases are duplicates. Because of the availability of administrative data for all SSI and SSDI beneficiaries, we were able to ascertain many of the true properties of each target population, which provided us with the tools we needed for the processing of this analysis.

Table 1. NBS–General Waves (RBS and SWS) Round 6 actual sample sizes, target completes, and completes

Sampling strata	Selected sample size ^a	Original target completed interviews ^b	Actual completed interviews ^c
Representative beneficiary sample	7,947	4,000	4,002
18- to 29-year-olds	2,356	1,111	1,120
30- to 39-year-olds	2,243	1,111	1,081
40- to 49-year-olds	2,153	1,111	1,129
50-year-olds or older	1,195	667	672
Successful worker sample			
December 2016 extract	2,647	631	982
SSDI only	1,123	250	397
SSI (SSI only + concurrent)	1,524	381	585
January 2017 extract	2,095	737	723
SSDI only	1,017	344	336
SSI (SSI only + concurrent)	1,078	393	387
March 2017 extract	1,890	773	739
SSDI only	873	373	350
SSI (SSI only + concurrent)	1,017	400	389
April 2017 extract	1,607	627	607
SSDI only	854	344	325
SSI (SSI only + concurrent)	753	283	282
June 2017 extract	1,849	657	582
SSDI only	922	350	313
SSI (SSI only + concurrent)	927	307	289

¹² Because of the small populations of successful workers, Mathematica often selected successful workers who resided in both the selected PSUs for the clustered and in-PSU strata of the unclustered samples. Hence, we had to account for these duplicate cases in the weighting process.

¹³ These composite weights, which combined weights from the clustered and unclustered samples in the SWS, should not be confused with the composite weights that combined the RBS sampling weights and the SWS sampling weights that we briefly alluded to in the introductory paragraphs.

Sampling strata	Selected sample size ^a	Original target completed interviews ^b	Actual completed interviews ^c
July 2017 extract	1,373	573	442
SSDI only	895	315	283
SSI (SSI only + concurrent)	478	258	159
September 2017 extract	1,807	502	512
SSDI only	1,123	274	324
SSI (SSI only + concurrent)	684	228	188
Total	13,271	4,500	4,587
SSDI only	6,807	2,250	2,328
SSI (SSI only + concurrent)	6,464	2,250	2,259

Source: NBS Round 6 (the second round of NBS–General Waves).

^aThe 13,271 SWS sample cases include 725 that were later found to not be successful workers

^bThe target completed interviews for the SWS shown here were calculated prior to receiving the first extract, using historical data from simulated successful worker populations in 2011-12, 2013-14, and 2015-16. In fact, there were actually seven allocations, with a new sample allocation calculated after the population sizes for each previous extract were revealed. This explains the sometimes large deviation between the target allocation and the actual number of completed interviews.

^cThe 4,587 SWS completed interviews include 219 that were later found to not be successful workers. In the final post-stratification, these cases had zero weight.

2. Calculation of nonresponse adjustments

Each observation had an initial weight that accounted for the sample design.¹⁴ For each sample, we calculated two adjustments to the weights to account for sample members who did not complete the questionnaire: a location adjustment to compensate for unlocated sample members and, among located cases, a response adjustment to compensate for those who refused to respond. The product of these adjustments, which constitute a nonresponse adjustment to the initial weight, were intended to reduce the potential for bias attributable to differential ability to locate or respond, across levels of a set of auxiliary variables. In this report, we assess whether the adjustments successfully decreased the potential for bias or whether a potential for significant nonresponse bias still exists.

In the absence of information about how nonrespondents would have answered survey questions, we used data from three sources for this analysis: (1) administrative data from the sampling frame provided by SSA; (2) earnings data from the DCF, also provided by SSA; and (3) data from the Area Health Resource File (AHRF), which contains demographic, health, and economic data for every county in the United States (Area Health Resource File 2016–2017). The administrative data included demographic characteristics about each beneficiary; whether the beneficiary received SSI, SSDI, or both; and the beneficiary’s general disability classification and disability payment status, including why and to whom the payments were provided. The DCF earnings data included monthly earnings for each beneficiary for 2015 and 2016, though much of the earnings data, particularly from 2016, was not complete.¹⁵ The AHRF data were

¹⁴ For the SWS, this “initial weight” was the composite weight that combined the clustered and unclustered sample weights.

¹⁵ It would generally take approximately three years after the beneficiaries received the earnings for all monthly earnings data to be recorded in the DCF file. By 2018, when this analysis was conducted, the 2015 earnings data were mostly complete, but the 2017 earnings data were not.

used to classify the county where each beneficiary lived and included urbanicity and metropolitan status and information about the county's economic and racial and ethnic characteristics.

We used selected levels of a small number of these variables to calculate the nonresponse adjustments. In this analysis, however, we looked across all the levels for the variables of greatest interest, assuming correlation between them and key survey outcomes. We believe that these data provide an effective assessment of the potential for bias in this sample.

3. NBS–General Waves Round 6 data collection effort

In November 2017, Mathematica completed the CATI and CAPI data collection for Round 6 of the NBS–General Waves. In total, Mathematica completed 8,589 interviews across the RBS and SWS (including, 132 partially completed interviews)—4,002 from the RBS and 4,587 from the SWS.¹⁶ An additional 290 beneficiaries from the RBS and 463 successful workers were deemed ineligible for the survey.¹⁷ Because of the independence of the RBS and SWS sample selections and the independence of the clustered and unclustered sample selections within the SWS, individuals could be selected for more than one sample. Therefore, the number of unique completed interviews was 8,410.¹⁸ Across both samples, Mathematica completed 8,402 cases by CATI (either directly from the survey operations center or via field staff who handed respondents a cell phone) and 8 cases by CAPI.¹⁹

The unweighted and weighted response rates for the RBS were 54.0 percent and 58.8 percent, respectively. For the SWS, the unweighted and weighted response rates were 38.1 percent and 41.3 percent, respectively (see Table 2).²⁰ These response rates along with the

¹⁶ As noted in Section A.1, the frame from which the SWS was drawn was provisional. In an updated extraction from November 2020, we found that 219 of the 4,587 completed interviews did not meet the criteria for successful work. In the updated final analysis weights, where the provisional analysis weights were post-stratified to totals from the November 2020 frame, these 219 sample members were given zero weight

¹⁷ Ineligible sample members include those who were deceased, incarcerated, in active military, or no longer living in the continental United States and those whose benefit status was pending at the time of the interview. For the SWS, ineligibles also included sample members who had not worked in the past six months at the time of the interview.

¹⁸ Among sample cases that were completed interviews only, there were 38 duplicates between the RBS and SWS (76 sample cases total) and 141 duplicates (282 sample cases total) between the clustered and unclustered samples within the SWS, for a total of 179 duplicates. The counts of ineligible cases included 15 duplicates; the number of unique ineligible cases across both samples was 738.

¹⁹ We reserved CAPI mode for special situations in which respondents were unable to complete the interview by using another method; only eight respondents requested an in-person interview. Of the 8,402 CATI completes, 1,396 were call-ins from the field that were a direct result of field locating, while another 532 were sent to the field at some point.

²⁰ We expected response rates for the SWS to be very low, particularly for later extracts (as shown in Table 2), given the short amount of time available for data collection. Using information from the updated frame from November 2020, the updated weighted SWS response rate was 40.8 percent. This reduction of 0.5 percent was due to the fact that a large percentage of the 725 sampled cases who were not successful workers were found to be ineligible at data collection. Removing these sample cases had a negative effect on the weighted response rate.

response rates broken out by the substrata for the RBS (age category) and the clustered SWS (extract and beneficiary title, with concurrent and SSI only collapsed) are provided in Table 2.

Table 2. Sample sizes and response rates, overall and by strata

	Sample (unweighted counts)					Response rate (percent) ^a	
	Total sample ^b	Respondents	Nonrespondents			Unweighted	Weighted ^c
			Located	Unlocated	Ineligibles		
Beneficiaries	7,947	4,002	3,040	615	290	54.0	58.8
Age 18–29	2,356	1,120	923	226	87	51.2	51.9
Age 30–39	2,243	1,081	902	190	70	51.3	52.1
Age 40–49	2,153	1,129	803	141	80	56.2	56.6
Age 50–65	1,195	672	412	58	53	60.7	61.6
Successful workers	13,271	4,587	4,793	1,329	463	38.1	41.3
Dec. 2016	2,647	982	806	198	86	40.3	42.6
Jan. 2017	2,095	723	655	147	82	38.4	41.0
Mar. 2017	1,890	740	693	110	102	44.6	49.2
Apr. 2017	1,607	606	530	81	63	41.6	45.8
June 2017	1,849	582	744	190	76	35.6	36.9
July 2017	1,373	442	571	206	32	34.5	35.8
Sept. 2017	1,810	512	794	397	21	29.7	29.4
SSDI only	6,807	2,328	2,547	730	217	37.4	41.1
SSI	6,464	2,259	2,246	599	246	38.8	41.4

^aResponse rates are calculated by taking the number of respondents and ineligibles as the numerator and dividing by the total number of sample members. Because the eligibility of very few nonrespondents is known, the response rate calculation is close to a more commonly used response rate calculation: numerator = number of respondents and denominator = number of respondents + number of eligible nonrespondents + eligibility rate * number of nonrespondents with unknown eligibility. In subpopulations where a dual sample design was used, we did not include some sample cases in the denominator. Details are beyond the scope of this report but may be found in the Editing, Coding, Imputation, and Weighting Report (Grau et al. 2019).

^bThe 13,271 sample cases include 725 that were later found to not meet the criteria for successful work, according to a November 2020 extract. The breakdown for these 725 cases follows: 219 completes, 100 ineligibles, 43 refusals, 74 unlocated, and 169 other nonrespondents. The 219 completes were given zero weight in the final post-stratification using information from the November 2020 frame. The 725 sample cases also include 120 cases that were already set to have zero weight due to dual sample rules.

^cUsing information from the updated frame from November 2020, the updated weighted SWS response rate was 40.8 percent. This reduction of 0.5 percent was due to the fact that a large percentage of the 725 sampled cases who were not successful workers were found to be ineligible at data collection. Removing these sample cases had a negative effect on the weighted response rate

4. Rationale for nonresponse bias analysis

The purpose of the nonresponse bias analysis was to determine if there were systematic differences between respondents and nonrespondents that could result in the potential for nonresponse bias for either sample, and to determine whether the nonresponse adjustments to the weights addressed those differences.

B. Response rates

As indicated previously, the beneficiary population includes all SSI or SSDI beneficiaries age 18 to FRA in active pay status as of June 30, 2016. In Table 2, we present the total number of beneficiaries sampled and the number of respondents, nonrespondents, and sample members who were ineligible due to death, incarceration, or other reasons, by stratum. In addition, we

present the unweighted response rates and weighted response rates by using the initial weight. The weighted response rates ranged from a low of 51.8 percent for 18- to 29-year-olds to a high of 61.7 percent for those who were 50 years old or older.

The successful worker population included successful workers within the beneficiary frame described above, provided they could be identified. The weighted responses rates ranged from a low of 29.4 percent in the last extract (September 2017) to a high of 49.2 percent in the third extract (March 2017). Weighted response rates in the later extracts were much lower than in earlier extracts due to the shortened data collection period, but they did not differ much between the SSDI-only stratum and the SSI stratum. Table 2 also presents the total number of successful workers within beneficiary title strata.

C. Methodology

The nonresponse bias analysis used data on individual members of the sampling frame and sample. The total number of beneficiaries in the target population (excluding U.S. territories) was 13,839,056, with some data missing for items of interest. For the SWS, the total number of successful workers in the target population was 89,936.²¹ The following were the variables that we used in the analysis (all categorical):

1. Age category (4 levels)
 - 18 to 29
 - 30 to 39
 - 40 to 49
 - 50 to FRA
2. Gender (2 levels)
 - Male
 - Female
3. Beneficiary type (3 levels)
 - SSI only
 - SSDI only
 - Both SSI and SSDI
4. Race and ethnicity (6 levels)
 - Non-Hispanic white
 - Non-Hispanic black

²¹ As noted in Section A.1, this total did not include successful workers whose earnings were not yet uploaded to the DCF at the time of extraction due to a lag in the posting of earnings for some beneficiaries. Furthermore, it did include a small number of cases (4,746 out of 89,936) that met the successful work criteria at the time of the initial extraction, but did not meet the criteria for the time period in question in the updated extraction from November 2020. In the later extraction, the actual weighted total number of successful workers was found to be 288,576. We post-stratified the provisional analysis weights to match this new total.

- Non-Hispanic Asian
 - Non-Hispanic American Indian
 - Non-Hispanic other
 - Hispanic
5. Constructed disability status (5 levels)
- Hearing disability
 - Cognitive disability
 - Mental illness
 - Physical disability
 - Disability not given
6. Racial and ethnic characteristics of beneficiary's county (5 levels)
- County with plurality or majority non-Hispanic black population
 - County with plurality or majority Hispanic population
 - County with racially and ethnically mixed population, no majority group
 - County with majority but less than 90 percent non-Hispanic white population
 - County with at least 90 percent non-Hispanic white population
7. Economic characteristics of county (10 overlapping levels, each listed as binary variables)
- Government-dependent economy county²²
 - Recreation-dependent economy county²³
 - Nonspecialized-dependent economy county²⁴
 - Manufacturing-dependent economy county²⁵
 - Counties with high levels of children living in persistent poverty²⁶
 - Counties with high levels of poverty²⁷

²² Fifteen percent or more of average annual labor and proprietors' earnings derived from federal and state government from 2010 to 2012.

²³ This indicator is based on three sources: (1) percentage of wage and salary employment in entertainment and recreation, accommodations, eating and drinking places, and real estate as a percentage of all employment reported by the Bureau of Economic Analysis; (2) percentage of total personal income reported for these same categories by the Bureau of Economic Analysis; and (3) percentage of vacant housing units intended for seasonal or occasional use reported in the 2010 census. The AHRF documentation does not provide the specific percentage from these three sources.

²⁴ County did not meet the dependence threshold for service, government, farming, mining, or manufacturing.

²⁵ Twenty-three percent or more of the county's average annual labor and proprietors' earnings were derived from manufacturing, or 16 percent or more of jobs were in manufacturing.

²⁶ Twenty percent or more of the county's children under age 18 were persistently poor, based on census data from 1980, 1990, and 2000, and recent data from the American Community Survey.

²⁷ Twenty percent or more of residents were poor, based on recent data from the American Community Survey.

- Counties with persistent levels of poverty²⁸
 - County with low education²⁹
 - Population-loss county³⁰
 - Retirement-destination county³¹
8. Metropolitan status of county (6 levels)
- Metropolitan area of 1 million population or more
 - Metropolitan area of 250,000 to 999,999 population
 - Metropolitan area of fewer than 250,000 population
 - Nonmetropolitan area adjacent to large metropolitan area
 - Nonmetropolitan area adjacent to medium or small metropolitan area
 - Nonmetropolitan area not adjacent to metropolitan area
9. Geographic region (U.S. census region) of beneficiary's residence (4 levels)
- West
 - South
 - Northeast
 - Midwest
10. Geographic region (U.S. census division) of beneficiary's residence (9 levels)
- East North Central
 - West North Central
 - New England
 - Middle Atlantic
 - South Atlantic
 - East South Central
 - West South Central
 - Mountain
 - Pacific

²⁸ Twenty percent or more of residents were persistently poor, based on census data from 1980, 1990, and 2000, and recent data from the American Community Survey.

²⁹ Twenty-five percent or more of residents age 25 to 64 had neither a high school diploma nor GED, as determined by the American Community Survey, 5-year average data for 2008 to 2012.

³⁰ Number of residents declined both between the 1990 and 2000 censuses and between the 2000 and 2010 censuses.

³¹ Number of residents 60 and older grew by 15 percent or more between 2000 and 2010 due to net in-migration.

11. Earnings category (5 levels for RBS)³²

- Three consecutive months of earnings above SGA³³ at some point in 2015 or 2016
- At least one month of earnings above \$7,000 in 2015 or 2016
- At least one month of earnings above \$2,000 in 2015 or 2016,
- At least one month of earnings above \$0 in 2015 or 2016,
- No monthly earnings in 2015 or 2016.

Earnings category (5 levels for SWS)³⁴

- At least one month of earnings above \$30,000 in 2015 or 2016,
- At least one month of earnings above \$20,000 in 2015 or 2016,
- At least one month of earnings above \$15,000 in 2015 or 2016,
- At least one month of earnings above \$7,000 in 2015 or 2016,
- Did not meet the earnings thresholds given above.

12. Extract (for SWS only)

After examining the extent of missing data for the above variables in the sampling frame (Table 3), we used the initial weights to compare the distributions of the variables across the frame; the total sample; and the sample split into two parts, the ineligible and the remainder of the sample with ineligible removed (Tables 4 and 5 for the RBS and SWS, respectively). In Tables 6 (RBS) and 7 (SWS), we compared the distributions of variables between the respondents (with ineligible) and nonrespondents. We then compared the distributions among respondents with ineligible by using nonresponse-adjusted weights against the original sample with the original sample weights (Table 8 for the RBS, Table 9 for the SWS).

³² We arrived at the five categories used for the earnings variable in the RBS after a lengthy investigation in Round 5 using both (annual) Internal Revenue Service (IRS) and (monthly) DCF earnings. Using data from the 2014 sampling frame, we calculated the percentage with positive IRS earnings in 2014 (considered “working”), as well as the mean and median IRS 2014 earnings, both overall and among those who were working. We compared these values to several sets of post-stratified weights, where the post-stratification was based on a variety of earnings-related categorical variables—each with different cut points; some with IRS earnings and some with DCF earnings. We determined that, although the IRS earnings are more accurate than DCF earnings, IRS earnings are only available annually, which raised timing issues and diluted the advantage of accuracy. It was also more difficult to use IRS earnings because only SSA staff could access them. We arrived at the cut points given above because using them resulted in estimated annual earnings that were closest to the IRS values. We used the same cut points for the earnings category variable used for the RBS in Round 6.

³³ The monthly non-blind SGA earnings level was \$1,090 in 2015 and \$1,130 in 2016.

³⁴ We arrived at the five categories used for the earnings category variable in the SWS by looking at the distribution of earnings across all successful workers and creating cut points that resulted in five roughly equal categories.

Table 3. Percentage of missing values for variables of interest

Variable	Weighted percent missing ^a				
	In frame	In entire sample	Among respondents	Among nonrespondents	Among ineligible
Beneficiaries					
Race/ethnicity	14.6	15.1	11.6	11.6	10.1
Disability status	1.8	2.1	1.9	2.0	6.1
Successful workers					
Race/ethnicity	19.4	20.2	19.1	20.4	22.7
Disability status	1.0	1.1	1.2	1.0	0.8

^aThe weights in the table are the initial base weights. None of the other variables have missing values in the sampling frame.

In each table, we used SUDAAN to calculate standard errors in order to accommodate the sample design.³⁵ The sample statistics consisted of proportions with an attribute (presented as percentages). We conducted comparisons for all beneficiaries. Several variables had missing values in the sample frame. In particular, in the beneficiary frame, race and ethnicity and disability type had missing values. In each case, the proportions with each attribute that were used in the following analyses were calculated among cases without missing data.

As is apparent from Table 3, the level of missingness for race and ethnicity was high, with approximately 15 percent of the frame missing this variable among all beneficiaries and approximately 19 percent of the frame among successful workers. Any conclusions drawn from race and ethnicity therefore must be viewed with caution.

D. Results

As stated in the introduction to Section A of this report, the nonresponse bias analysis for the SWS in this report uses the provisional analysis weights that sum to 89,936. It is possible that the nature of the nonresponse bias using the final analysis weights (that sum to 288,576) may be slightly different than what is summarized in this report using the provisional weights, given that 219 of the 4,587 completed cases had positive provisional analysis weights and zero final analysis weights.

In Tables 4 and 5, we compared sample statistics of the variables for all sampled cases in the RBS and SWS, respectively. The values are percentages for each level of the categorical variables, with the associated standard errors (se) in parentheses. The frame values do not have a standard error because they represent the original population and are without sampling error. Unknown categories were not included in the levels for these variables; proportions were calculated for the cases without missing data.³⁶ In Tables 4 and 5, we applied initial weights to

³⁵ SUDAAN is a statistical package that was developed specifically for survey data by Research Triangle Institute, now called RTI International. A hard copy manual is available for Version 9.0 (Research Triangle Institute 2004). An online version is available for Version 11.0 (see www.rti.org/sudaan).

³⁶ Values are assumed to be missing completely at random (MCAR). Although MCAR is normally a strong assumption, the level of missingness was so small for all but race and ethnicity that deviations from this assumption would not significantly change the conclusions.

sample values for all columns except the frame percentage, for which no weights were required (percentages calculated by using the entire population).

We compared two types of variables. Greater emphasis was placed on the variables that were likely to be correlated with important outcome variables: beneficiary type, disability type, demographic variables, and the categorical earnings variable. Other variables were less likely to be highly correlated with outcome variables and thus received less emphasis: geographic and economic characteristics associated with the beneficiary's county.

Table 4. Percentages with various attributes (categorical variables) in the RBS, using initial sampling weights

Variable	Frame percent ^a	Entire sample		Sample with known ineligible removed		Sampled ineligible	
		Percent	(se)	Percent	(se)	Percent	(se)
Beneficiary type							
SSI only	29.4	29.3	(0.8)	28.4	(0.9)	50.2	(5.0)*
SSDI only	56.8	56.6	(0.9)	57.2	(1.0)	41.6	(5.1)*
Both SSI and SSDI	13.8	14.1	(0.5)	14.4	(0.5)	8.2	(2.4)*
Constructed disability status							
Hearing	0.7	0.8	(0.1)	0.8	(0.2)	0.5	(0.3)
Cognitive	11.8	12.4	(0.5)	12.6	(0.6)	8.2	(2.0)
Mental	29.8	28.9	(0.9)	28.6	(0.9)	34.7	(4.6)
Physical	57.7	58.0	(0.9)	58.0	(0.9)	56.6	(5.1)
Sex							
Male	51.1	51.1	(0.8)	50.7	(0.8)	60.0	(4.3)*
Beneficiary's age							
18–29 years	10.0	10.0	(0.2)	10.0	(0.2)	8.9	(1.2)
30–39 years	10.7	10.7	(0.1)	10.8	(0.1)	8.9	(1.3)
40–49 years	16.0	16.0	(0.1)	16.0	(0.2)	14.7	(2.0)
50–64 years	63.4	63.4	(0.3)	63.2	(0.4)	67.5	(3.6)
Race/ethnicity							
White	66.4	66.9	(2.5)	66.9	(2.5)	66.6	(5.4)
Black	22.7	23.2	(2.3)	23.1	(2.3)	26.4	(5.0)
Hispanic	3.9	3.6	(2.6)	3.8	(0.6)	1.1	(0.5)*
All others	7.0	6.3	(0.8)	6.2	(0.8)	5.9	(2.4)
County racial/ethnic profile							
County with plurality or majority non-Hispanic black population	4.2	2.4	(1.7)	2.5	(1.7)	0.7	(0.5)*
County with plurality or majority Hispanic population	9.6	8.1	(2.5)	8.3	(2.6)	5.5	(2.0)
County with majority but less than 90% non-Hispanic white population	38.4	46.8	(5.3)	46.8	(5.3)	45.4	(7.4)
County with racially/ethnically mixed population, no majority group	33.9	33.5	(5.1)	33.3	(5.1)	39.0	(7.3)
County with at least 90% non-Hispanic white population	13.4	9.2	(3.0)	9.2	(3.0)	9.5	(3.6)

Table 4 (continued)

Variable	Frame percent ^a	Entire sample		Sample with known ineligible removed		Sampled ineligible	
		Percent	(se)	Percent	(se)	Percent	(se)
Economic characteristics of county							
Government-dependent economy county	11.9	10.0	(3.1)	9.9	(3.1)	10.6	(4.4)
Manufacturing-dependent economy county	9.8	8.8	(2.6)	8.8	(2.6)	8.3	(3.2)
Nonspecialized-dependent economy county	65.4	67.9	(4.7)	67.9	(4.7)	68.4	(6.3)
Recreation-dependent economy county	8.2	9.3	(3.1)	9.4	(3.1)	6.0	(3.0)
County with high levels of poverty	18.6	11.8	(3.3)*	11.8	(3.3)*	12.4	(4.4)
County with high levels of persistent poverty	8.4	4.5	(2.1)	4.7	(2.1)	1.4	(0.9)*
County with high levels of persistent child poverty	19.2	15.9	(4.0)	16.0	(4.0)	13.8	(4.5)
County with low education	13.5	12.3	(3.1)	12.5	(3.2)	8.2	(2.5)*
Population-loss county	8.7	3.5	(1.8)*	3.4	(1.8)*	4.2	(2.1)*
Retirement-destination county	13.8	15.5	(3.7)	15.6	(3.7)	14.1	(5.3)
Metropolitan status of county							
Metropolitan area of 1 million population or more	46.7	44.6	(5.3)	44.8	(5.3)	39.9	(7.1)
Metropolitan area of 250,000 to 999,999 population	27.4	26.3	(4.8)	26.5	(4.8)	20.3	(5.9)
Metropolitan area of fewer than 250,000 population	10.6	12.2	(3.5)	12.0	(3.4)	18.3	(6.3)
Nonmetropolitan area adjacent to large metropolitan area	4.4	4.2	(2.0)	4.3	(2.0)	1.7	(1.7)
Nonmetropolitan area adjacent to medium or small metropolitan area	9.0	9.3	(2.9)	9.1	(2.9)	11.8	(4.1)
Nonmetropolitan area not adjacent to metropolitan area	6.9	3.4	(1.8)	3.1	(1.6)*	8.0	(5.3)
Census region							
West	18.7	18.4	(4.1)	18.3	(4.1)	18.8	(5.6)
South	41.3	42.2	(5.5)	42.0	(5.5)	46.8	(7.6)
Northeast	18.3	18.2	(4.3)	18.4	(4.3)	13.4	(4.4)
Midwest	21.8	21.3	(4.4)	21.3	(4.5)	21.0	(5.7)
Census division							
East North Central	15.7	15.2	(3.8)	15.2	(3.9)	15.0	(4.8)
West North Central	6.2	6.1	(2.7)	6.1	(2.7)	6.0	(3.5)
New England	5.0	4.7	(2.3)	4.7	(2.3)	4.0	(2.5)
Middle Atlantic	13.3	13.5	(3.8)	13.7	(3.9)	9.4	(3.8)
South Atlantic	20.3	19.9	(4.6)	19.8	(4.6)	23.4	(6.9)
East South Central	9.3	10.2	(3.4)	10.2	(3.4)	11.1	(5.1)
West South Central	11.7	12.0	(3.6)	12.0	(3.6)	12.3	(5.5)
Mountain	5.7	6.0	(2.6)	6.0	(2.6)	6.0	(3.4)
Pacific	13.0	12.4	(3.4)	12.3	(3.4)	12.8	(4.7)

Table 4 (continued)

Variable	Frame percent ^a	Entire sample		Sample with known ineligible removed		Sampled ineligible	
		Percent	(se)	Percent	(se)	Percent	(se)
Earnings categories for 2015-2016 time period							
Three consecutive months of monthly earnings above SGA	2.7	2.9	(0.3)	2.9	(0.3)	2.8	(0.3)*
Monthly earnings above \$7,000 in at least one month in '15 or '16	1.2	1.3	(0.2)	1.3	(0.2)	0.4	(0.1)*
Monthly earnings above \$2,000 in at least one month in '15 or '16	2.3	2.5	(0.3)	2.5	(0.3)	5.4	(1.2)*
Monthly earnings above zero in at least one month in '15 or '16	2.6	2.8	(0.3)	2.8	(0.3)	1.8	(0.3)*
Monthly earnings always zero in 2015 and 2016	91.2	90.6	(0.6)	90.6	(0.6)	90.6	(1.2)*

^aThe frame percentages for race and disability category are calculated amongst non-missing values. All other variables do not have any missing data.

*Denotes a difference between the sample and frame value of more than two standard errors.

Table 5. Percentages with various attributes (categorical variables) in the SWS, using initial sampling weights

Variable	Frame Percent	Entire sample		Sample with known ineligible removed		Sampled ineligible	
		Percent	(se)	Percent	(se)	Percent	(se)
Beneficiary type							
SSI only	27.2	27.5	(0.8)	27.5	(0.8)	27.3	(2.4)
SSDI only	51.3	51.3	(0.9)	51.4	(0.9)	48.9	(2.8)
Both SSI and SSDI	21.5	21.2	(0.6)	21.1	(0.6)	23.8	(2.5)
Constructed disability status							
Hearing	3.1	3.3	(0.2)	3.3	(0.2)	2.6	(0.7)
Cognitive	13.4	12.8	(0.5)	12.7	(0.5)	14.1	(1.9)
Mental	36.2	37.4	(0.8)	37.6	(0.8)	32.1	(2.5)
Physical	47.3	46.5	(0.9)	46.3	(0.9)	51.3	(2.6)
Sex							
Male	54.2	54.6	(0.7)	54.6	(0.7)	52.8	(3.0)
Beneficiary's age							
18–29 years	24.5	24.2	(0.6)	24.5	(0.6)	15.6	(2.1)*
30–39 years	23.5	24.1	(0.5)	23.9	(0.5)	27.7	(2.5)
40–49 years	22.1	22.2	(0.5)	22.0	(0.6)	25.6	(2.3)
50–64 years	29.9	29.6	(0.6)	29.5	(0.7)	31.2	(2.6)
Race/ethnicity							
White	55.8	56.0	(2.0)	56.2	(2.0)	50.9	(3.9)
Black	30.4	31.3	(1.8)	31.1	(1.8)	35.5	(3.5)
Hispanic	5.3	5.0	(0.5)	5.0	(0.5)	5.6	(1.4)
All others	8.5	7.7	(0.6)	7.7	(0.6)	8.0	(1.5)
County racial/ethnic profile							
County with plurality or majority non-Hispanic black population	4.0	2.8	(1.2)	2.8	(1.2)	3.4	(1.6)
County with plurality or majority Hispanic population	10.1	8.7	(1.7)	8.5	(1.7)	13.3	(2.9)
County with majority but less than 90% non-Hispanic white population	39.3	44.4	(4.1)	44.7	(4.1)	36.7	(4.4)
County with racially/ethnically mixed population, no majority group	35.5	34.6	(4.0)	34.5	(4.0)	38.2	(4.3)
County with at least 90% non-Hispanic white population	10.9	9.4	(2.3)	9.4	(2.3)	8.1	(2.4)

Table 5 (continued)

Variable	Frame Percent	Entire sample		Sample with known ineligible removed		Sampled ineligible	
		Percent	(se)	Percent	(se)	Percent	(se)
Economic characteristics of county							
Government-dependent economy county	12.5	12.6	(3.0)	12.6	(3.0)	13.5	(3.3)
Manufacturing-dependent economy county	7.7	7.7	(2.0)	7.7	(2.0)	7.7	(2.0)
Nonspecialized-dependent economy county	68.1	67.9	(3.8)	67.8	(3.9)	70.2	(4.0)
Recreation-dependent economy county	8.0	8.9	(2.5)	9.0	(2.6)	6.3	(1.7)
County with high levels of poverty	13.9	11.1	(2.3)	10.9	(2.3)	14.3	(3.2)
County with high levels of persistent poverty	6.2	4.5	(1.4)	4.4	(1.4)	6.2	(2.0)
County with high levels of persistent child poverty	15.0	13.3	(2.6)	13.0	(2.6)	19.5	(3.7)
County with low education	11.7	11.6	(2.2)	11.4	(2.3)	16.3	(3.0)
Population-loss county	8.0	4.6	(1.4)*	4.6	(1.4)*	4.9	(2.0)
Retirement-destination county	11.7	12.4	(2.6)	12.5	(2.6)	10.0	(2.3)
Metropolitan status of county							
Metropolitan area of 1 million population or more	54.8	54.3	(4.1)	54.4	(4.1)	52.9	(4.4)
Metropolitan area of 250,000 to 999,999 population	21.6	23.8	(3.5)	23.8	(3.6)	23.8	(3.9)
Metropolitan area of fewer than 250,000 population	9.6	10.1	(2.4)	10.0	(2.4)	11.9	(3.3)
Nonmetropolitan area adjacent to large metropolitan area	3.1	3.3	(1.2)	3.3	(1.2)	4.2	(1.8)
Nonmetropolitan area adjacent to medium or small metropolitan area	6.1	5.4	(1.3)	5.5	(1.4)	4.0	(1.5)
Nonmetropolitan area not adjacent to metropolitan area	4.8	3.1	(0.8)*	3.1	(0.8)*	3.2	(1.5)
Census region							
West	22.2	22.4	(3.6)	22.6	(3.7)	18.0	(3.0)
South	32.5	32.3	(3.8)	32.1	(3.8)	35.8	(4.3)
Northeast	22.0	22.4	(3.7)	22.5	(3.7)	19.7	(3.7)
Midwest	23.2	23.0	(3.5)	22.8	(3.5)	26.5	(4.2)
Census division							
East North Central	15.7	15.4	(2.8)	15.3	(2.8)	16.3	(3.3)
West North Central	7.5	7.6	(2.5)	7.5	(2.5)	10.2	(3.3)
New England	7.0	6.6	(2.3)	6.7	(2.3)	4.4	(1.6)
Middle Atlantic	15.1	15.8	(3.2)	15.8	(3.2)	15.3	(3.4)
South Atlantic	15.7	15.0	(2.7)	14.8	(2.7)	18.2	(3.5)
East South Central	5.7	6.4	(1.9)	6.4	(1.9)	6.4	(2.1)
West South Central	11.1	10.9	(2.6)	10.9	(2.6)	11.2	(2.9)
Mountain	5.9	6.1	(2.0)	6.1	(2.0)	4.2	(1.6)
Pacific	16.4	16.4	(3.2)	16.5	(3.3)	13.8	(2.6)

Table 5 (continued)

Variable	Frame Percent	Entire sample		Sample with known ineligibles removed		Sampled ineligible	
		Percent	(se)	Percent	(se)	Percent	(se)
Earnings categories for 2015-2016 time period							
Monthly earnings above \$30,000 in at least one month in '15 or '16	21.1	21.4	(0.7)	21.4	(0.7)	21.6	(2.5)
Monthly earnings above \$20,000 in at least one month in '15 or '16	22.3	21.7	(0.5)	21.7	(0.5)	14.3	(1.9)*
Monthly earnings above \$15,000 in at least one month in '15 or '16	18.0	17.9	(0.4)	17.9	(0.4)	12.6	(1.8)*
Monthly earnings above \$7,000 in at least one month in '15 or '16	23.0	22.3	(0.5)	22.3	(0.5)	19.8	(2.2)
Monthly earnings did not meet the thresholds above	15.6	16.7	(0.5)*	16.7	(0.5)*	31.7	(2.6)*
Extract							
December 2016 extract	19.0	19.0	(0.5)	19.1	(0.5)	15.6	(1.8)
January 2017 extract	14.5	14.5	(0.5)	14.5	(0.5)	13.3	(1.6)
March 2017 extract	19.6	19.6	(0.5)	19.2	(0.5)	29.1	(2.4)*
April 2017 extract	12.6	12.6	(0.3)	12.5	(0.4)	16.0	(2.0)
June 2017 extract	15.0	15.0	(0.4)	15.0	(0.4)	15.4	(1.9)
July 2017 extract	11.2	11.2	(0.3)	11.4	(0.3)	8.1	(1.7)
September 2017 extract	8.2	8.2	(0.2)	8.4	(0.2)	2.4	(0.5)*

*Denotes a difference between the sample and frame value of more than two standard errors.

For each variable, approximate 95 percent confidence intervals were created by adding and subtracting two standard errors from each point estimate among the sample values. We did not account for the fact that these confidence intervals were considered simultaneously, which would increase the Type I error (the probability that the confidence interval did not include the true value, or the probability of rejecting the null hypothesis when it was true). Hence, one must consider this when significant results are observed.

1. Comparison of entire sample with frame

Before conducting a nonresponse analysis, we must determine if the sample distribution adequately matches the frame distribution on important variables. This is necessary to ascertain whether the estimates using the sampling weights produce estimates that are consistent with population values. As shown in Tables 4 and 5, the statistics estimated from the entire sample (using the initial sampling weight) among all beneficiaries are generally close to those computed with the full frame, although a few estimates—especially among the county-level variables defined from the AHRF—deviate from the frame value by more than two standard errors. (Those varying by more than two standard errors are denoted by an asterisk.)

a. Representative beneficiary sample

Within PSUs, the RBS was selected within explicit strata defined by age category and implicit strata defined by disability status; beneficiary title (SSI, SSDI, or both); race and ethnicity; gender; and zip code, in that priority order.³⁷ We would expect the distribution of all these variables to resemble the frame. This is especially true for age category and the higher priority implicit stratification factors. Looking at Table 4, we see that this is the case, as none of the listed covariates differed significantly from the frame. Among other non-geography-based variables, no significant differences were found between the frame percentages and weighted sample percentages in the beneficiary sample. Larger differences were found with geographic county-level variables, including some levels of the racial and ethnic profile, economic characteristics, and metropolitan status of the sample member's county of residence. In particular, the estimates of the proportions of beneficiaries residing in population-loss counties and those residing in counties with high levels of poverty based on the initial sampling weights were significantly less than the frame values. The estimate of the proportion of beneficiaries residing in nonmetropolitan counties that were not adjacent to a metropolitan area was also a lot less than the frame. Although the difference did not meet the 5 percent significance threshold, the *p*-value would not exceed 0.05 by very much and would fit the pattern of a sample that underestimates, using initial sampling weights, regions that are poor, very rural, and in decline. Other variables for which the weighted sample estimates differed from the frame by more than

³⁷ With explicit stratification, the population is subdivided into subpopulations (strata) defined by the levels of the explicit stratification variables. Independent samples are drawn from each stratum, where the sampling fraction may or may not differ between strata. With this type of stratification, the size of the sample of each stratum is controlled. With implicit stratification, population members within each explicit stratum are sorted in priority order by the implicit stratification and the sample is selected using a sequential selection procedure. This imposes some control on the distribution of these variables in the sample.

one but less than two standard errors included: cognitive disability, three of the five county racial and ethnic profile variables, and counties with high levels of persistent poverty.³⁸

b. Successful worker sample

Within PSUs, the clustered sample of the SWS was selected within explicit strata defined by extract and beneficiary title, with SSI only and concurrent beneficiaries included in the same strata. We defined implicit strata for the SWS by using the same variables that we used for the RBS: disability status, beneficiary title, race and ethnicity, gender, and zip code, in that priority order. For the unclustered sample, the explicit strata were the same as those used as secondary strata in the clustered sample: extract and beneficiary title, with all SSI-only and concurrent cases combined into a single stratum. Whether the sample case was in a PSU or not was also used for explicit stratification. The implicit strata were identical to those used in the clustered sample. As with the RBS, we would expect the distribution of all these variables to resemble the frame. Looking at Table 5, we see that this is the case, as none of the listed covariates differed significantly from the frame. Among other non-geography-based variables, the proportion in the smallest earnings category was slightly more than two standard errors higher than that observed in the frame. As with the RBS, larger differences were found with geographic county-level variables. The estimated proportions of successful workers residing in population-loss counties and those residing in nonmetropolitan counties that were not adjacent to metropolitan counties were significantly less than the frame values using the initial sampling weights. This is a similar story to the RBS, except that the underestimate of the proportion of successful workers residing in poor counties did not reach the level of statistical significance. Other variables for which the weighted sample estimates differed from the frame by more than one but less than two standard errors included: cognitive disability, mental disability, two of the five county racial and ethnic profile variables, counties with high levels of poverty, and counties with high levels of persistent poverty.³⁹

2. Removal of ineligible cases from the sample

If there were systematic differences between the estimates for the sampled eligible and ineligible cases, then this could point to a problem in the frame—where the sample frame covers a different population than the target population. For example, if the sample frame consisted of a large number of individuals with a particular disability who were found to be deceased, the target population (as measured by the eligible sample) could have a smaller proportion with that disability than the sample frame. Approximately 3.8 percent of the RBS was found to be ineligible at data collection, representing about 4.1 percent of the population of SSI and SSDI beneficiaries on June 30, 2016. Similarly, approximately 3.5 percent of the SWS was found to be ineligible at data collection, representing about 3.9 percent of the population of successful workers. With these small percentages, it is unlikely that the populations that include ineligible cases will differ significantly from the populations that do not. Nevertheless, it was instructive to investigate whether the population represented by eligible sample cases differed from the sample

³⁸ We only present statistically significant findings in this text to show patterns. Some results may be significant simply because we are conducting multiple tests without correcting for multiple comparisons.

³⁹ As with the RBS, statistical significance should be read with caution because we did not correct for multiple comparisons.

frame. There was some imprecision in this exercise because the eligibility for the majority of nonrespondents was unknown. Therefore, some of the cases included in the column for sample cases with known ineligibles removed will in fact be ineligible because they were nonrespondents with unknown eligibility. Because we observed a small percentage of ineligible sample members among our respondents, we assumed that the number of cases like this would be small. In Tables 4 and 5, we placed asterisks by the estimates from the sample with ineligible cases removed (using initial weights) that differed from the frame by more than two standard errors. There were instances where ineligible cases differed from the sample and from the frame, but when the ineligible cases were removed from the sample, the proportions did not change very much due to the small number of ineligible cases. For these samples, it appears that the eligible samples did not differ markedly from the initial samples; the patterns of deviation from the frame that were observed in the initial sample were also observed with eligible cases.⁴⁰ Any differences between the sample and the frame did not change markedly whether ineligible cases were included or not.

3. Assessment of differences between respondents and nonrespondents before nonresponse adjustment

To avoid the issue of unknown ineligibles among nonrespondents, we looked at the comparison between respondents and nonrespondents by including ineligibles among the respondents. These comparisons are shown in Tables 6 and 7. We calculated the t-statistic by calculating the differences between the proportions within the levels of each covariate and creating an estimate of the variance of the difference by combining the standard error estimates obtained from SUDAAN. Looking at general tendencies for the non-geographic variables in Table 6, RBS respondents and ineligibles were more likely than nonrespondents to (1) be female, (2) be age 50 or older, (3) have physical (non-hearing) disabilities, and (4) be a successful worker. They were also less likely to be SSI only beneficiaries (particularly as opposed to concurrent beneficiaries). The race categories did not show any significant differences. No significant differences were apparent for the geographic variables between respondents and nonrespondents.

For the SWS (Table 7), the same patterns held for gender, age, and disability status, though respondents and nonrespondents did not differ on the response rates for the beneficiary title variable. We observed significant differences between respondents and nonrespondents for the earnings category variable that was used for the SWS. Respondents were more likely than the frame as a whole to come from counties where the population was at least 90 percent white. Finally, response rates in later extracts were far lower than that observed in earlier extracts.

⁴⁰ In other words, the pattern of asterisks between the columns for entire sample percentage and eligible sample percentage are nearly identical.

Table 6. Percentages with various attributes (categorical variables) in the RBS, using initial sampling weights among respondents (with ineligible) and nonrespondents

Variable	Frame percent	Entire sample		Respondents and ineligible		Nonrespondents		Comparison	
		Percent	(se)	Percent	(se)	Percent	(se)	Difference	t-statistic
Beneficiary type									
SSI only	29.4	29.3	(0.8)	27.0	(1.0)	32.7	(1.4)	-5.7	-3.4*
SSDI only	56.8	56.6	(0.9)	57.7	(1.1)	54.9	(1.5)	2.8	1.5
Both SSI and SSDI	13.8	14.1	(0.5)	15.3	(0.8)	12.4	(0.8)	2.9	2.6*
Constructed disability status									
Hearing	0.7	0.8	(0.1)	0.5	(0.1)	1.2	(0.3)	-0.7	-2.3*
Cognitive	11.8	12.4	(0.5)	11.3	(0.7)	14.0	(0.9)	-2.7	-2.4*
Mental	29.8	28.9	(0.9)	26.1	(1.1)	32.8	(1.3)	-6.8	-4.1*
Physical	57.7	58.0	(0.9)	62.2	(1.1)	52.0	(1.4)	10.1	5.7*
Sex									
Male	51.1	51.1	(0.8)	48.3	(1.2)	55.1	(1.4)	-6.9	-3.7*
Beneficiary's age									
18–29 years	10.0	10.0	(0.2)	8.8	(0.3)	11.7	(0.4)	-2.9	-5.5*
30–39 years	10.7	10.7	(0.1)	9.5	(0.3)	12.4	(0.4)	-2.9	-6.1*
40–49 years	16.0	16.0	(0.1)	15.3	(0.3)	16.9	(0.5)	-1.6	-2.7*
50–64 years	63.4	63.4	(0.3)	66.4	(0.7)	59.0	(1.0)	7.4	6.2*
Race/ethnicity									
White	66.4	66.9	(2.5)	66.1	(2.8)	67.9	(2.7)	-1.8	-0.5
Black	22.7	23.2	(2.3)	24.6	(2.6)	21.3	(2.3)	3.3	1.0
Hispanic	3.9	3.6	(2.6)	3.3	(0.6)	4.1	(0.8)	-0.8	-0.8
All others	7.0	6.3	(0.8)	6.0	(0.9)	6.7	(1.2)	-0.7	-0.5
County racial/ethnic profile									
County with plurality or majority non-Hispanic black population	4.2	2.4	(1.7)	2.2	(1.6)	2.7	(1.9)	-0.5	-0.2
County with plurality or majority Hispanic population	9.6	8.1	(2.5)	6.8	(2.3)	10.1	(3.0)	-3.3	-0.9
County with majority but less than 90% non-Hispanic white population	38.4	46.8	(5.3)	46.2	(5.4)	47.5	(5.5)	-1.3	-0.2
County with racially/ethnically mixed population, no majority group	33.9	33.5	(5.1)	34.8	(5.3)	31.7	(5.0)	3.0	0.4
County with at least 90% non-Hispanic white population	13.4	9.2	(3.0)	10.0	(3.3)	8.0	(2.7)	2.0	0.5

Table 6 (continued)

Variable	Frame percent	Entire sample		Respondents and ineligible		Nonrespondents		Comparison	
		Percent	(se)	Percent	(se)	Percent	(se)	Difference	t-statistic
Economic characteristics of county									
Government-dependent economy county	11.9	10.0	(3.1)	9.8	(3.1)	10.2	(3.4)	-0.5	-0.1
Manufacturing-dependent economy county	9.8	8.8	(2.6)	9.1	(2.6)	8.4	(2.7)	0.8	0.2
Nonspecialized-dependent economy county	65.4	67.9	(4.7)	68.5	(4.7)	67.1	(4.9)	1.3	0.2
Recreation-dependent economy county	8.2	9.3	(3.1)	8.5	(2.9)	10.4	(3.4)	-1.8	-0.4
County with high levels of poverty	18.6	11.8	(3.3)	12.3	(3.4)	11.0	(3.2)	1.3	0.3
County with high levels of persistent poverty	8.4	4.5	(2.1)	4.9	(2.3)	4.0	(2.0)	0.9	0.3
County with high levels of persistent child poverty	19.2	15.9	(4.0)	16.4	(4.1)	15.2	(4.0)	1.2	0.2
County with low education	13.5	12.3	(3.1)	12.1	(3.2)	12.5	(3.2)	-0.3	-0.1
Population-loss county	8.7	3.5	(1.8)*	3.5	(1.8)	3.4	(1.8)	0.2	0.1
Retirement-destination county	13.8	15.5	(3.7)	14.9	(3.6)	16.3	(4.0)	-1.4	-0.3
Metropolitan status of county									
Metropolitan area of 1 million population or more	46.7	44.6	(5.3)	42.0	(5.4)	48.4	(5.5)	-6.4	-0.8
Metropolitan area of 250,000 to 999,999 population	27.4	26.3	(4.8)	26.2	(4.8)	26.3	(4.9)	-0.1	-0.1
Metropolitan area of fewer than 250,000 population	10.6	12.2	(3.5)	12.6	(3.7)	11.7	(3.3)	0.9	0.2
Nonmetropolitan area adjacent to large metropolitan area	4.4	4.2	(2.0)	4.8	(2.3)	3.2	(1.7)	1.7	0.6
Nonmetropolitan area adjacent to medium or small metropolitan area	9.0	9.3	(2.9)	10.6	(3.3)	7.6	(2.4)	3.0	0.7
Nonmetropolitan area not adjacent to metropolitan area	6.9	3.4	(1.8)	3.8	(2.0)	2.9	(1.5)	0.9	0.4
Census region									
West	18.7	18.4	(4.1)	16.3	(3.9)	21.3	(4.6)	-5.0	-0.8
South	41.3	42.2	(5.5)	43.6	(5.6)	40.1	(5.6)	-3.5	0.4
Northeast	18.3	18.2	(4.3)	17.2	(4.2)	19.4	(4.6)	-2.0	-0.3
Midwest	21.8	21.3	(4.4)	22.8	(4.8)	19.2	(4.2)	3.5	0.6
Census division									
East North Central	15.7	15.2	(3.8)	16.9	(4.3)	12.8	(3.4)	4.1	0.8
West North Central	6.2	6.1	(2.7)	5.9	(2.6)	6.5	(2.9)	-0.6	-0.2
New England	5.0	4.7	(2.3)	4.4	(2.2)	5.1	(2.6)	-0.8	-0.2
Middle Atlantic	13.3	13.5	(3.8)	13.0	(3.8)	14.2	(4.1)	-1.2	-0.2
South Atlantic	20.3	19.9	(4.6)	20.3	(4.7)	19.4	(4.6)	0.9	0.1
East South Central	9.3	10.2	(3.4)	10.9	(3.6)	9.3	(3.2)	1.5	0.3
West South Central	11.7	12.0	(3.6)	12.5	(3.8)	11.4	(3.6)	1.1	0.2
Mountain	5.7	6.0	(2.6)	6.4	(2.8)	5.5	(2.5)	0.8	0.2
Pacific	13.0	12.4	(3.4)	10.0	(2.8)	15.8	(4.1)	-5.8	-1.2

Table 6 (continued)

Variable	Frame percent	Entire sample		Respondents and ineligible		Nonrespondents		Comparison	
		Percent	(se)	Percent	(se)	Percent	(se)	Difference	t-statistic
Earnings categories for 2013-2014 time period									
Three consecutive months of monthly earnings above SGA	2.7	2.9	(0.3)	2.3	(0.3)	3.6	(0.5)	-1.3	-2.2*
Monthly earnings above \$7,000 in at least one month in '13 or '14	1.2	1.3	(0.2)	1.2	(0.2)	1.4	(0.3)	-0.2	-0.6
Monthly earnings above \$2,000 in at least one month in '13 or '14	2.3	2.5	(0.3)	2.6	(0.4)	2.4	(0.3)	0.2	0.4
Monthly earnings above zero in at least one month in '13 or '14	2.6	2.8	(0.3)	2.5	(0.3)	3.1	(0.5)	-0.7	-1.2
Monthly earnings always zero in 2013 and 2014	91.2	90.6	(0.6)	91.5	(0.7)	89.5	(0.9)	2.0	1.8

*Denotes a difference between the sample and frame value of more than two standard errors.

Table 7. Percentages with various attributes (categorical variables) in the SWS, using initial sampling weights among respondents (with ineligible) and nonrespondents

Variable	Frame Percent	Entire sample		Respondents and ineligible		Nonrespondents		Comparison	
		Percent	(se)	Percent	(se)	Percent	(se)	Difference	t-statistic
Beneficiary type									
SSI only	27.2	27.5	(0.8)	27.7	(0.8)	27.4	(1.0)	0.3	0.2
SSDI only	51.3	51.3	(0.9)	51.1	(0.9)	51.4	(1.2)	-0.2	-0.2
Both SSI and SSDI	21.5	21.2	(0.6)	21.2	(0.7)	21.3	(0.7)	-0.0	-0.0
Constructed disability status									
Hearing	3.1	3.3	(0.2)	2.3	(0.2)	4.0	(0.3)	-1.7	-3.9*
Cognitive	13.4	12.8	(0.5)	11.9	(0.5)	13.4	(0.7)	-1.5	-1.6
Mental	36.2	37.4	(0.8)	36.1	(0.9)	38.3	(1.0)	-2.2	-1.7
Physical	47.3	46.5	(0.9)	49.7	(0.9)	44.3	(1.0)	5.4	3.9*
Sex									
Male	54.2	54.6	(0.7)	52.1	(1.0)	56.3	(0.8)	-4.2	-3.4*
Beneficiary's age									
18–29 years	24.5	24.2	(0.6)	21.4	(0.7)	26.2	(0.8)	-4.7	-4.3*
30–39 years	23.5	24.1	(0.5)	21.5	(0.7)	25.9	(0.7)	-4.3	-4.3*
40–49 years	22.1	22.2	(0.5)	22.7	(0.6)	21.8	(0.7)	1.0	1.0
50–64 years	29.9	29.6	(0.6)	34.3	(0.8)	26.2	(0.9)	8.1	7.0*
Race/ethnicity									
White	55.8	56.0	(2.0)	55.6	(1.9)	56.4	(2.2)	-0.8	-0.3
Black	30.4	31.3	(1.8)	32.0	(1.8)	30.8	(2.0)	1.2	0.4
Hispanic	5.3	5.0	(0.5)	5.2	(0.5)	4.9	(0.6)	0.2	0.3
All others	8.5	7.7	(0.6)	7.3	(0.6)	7.9	(0.7)	-0.6	-0.6
County racial/ethnic profile									
County with plurality or majority non-Hispanic black population	4.0	2.8	(1.2)	3.1	(1.1)	2.6	(1.3)	0.5	0.3
County with plurality or majority Hispanic population	10.1	8.7	(1.7)	8.9	(1.5)	8.6	(2.0)	0.4	0.2
County with majority but less than 90% non-Hispanic white population	39.3	44.4	(4.1)	42.9	(3.5)	45.5	(4.6)	-2.6	-0.4
County with racially/ethnically mixed population, no majority group	35.5	34.6	(4.0)	34.6	(3.4)	34.6	(4.5)	0.1	0.0
County with at least 90% non-Hispanic white population	10.9	9.4	(2.3)	11.9	(0.8)	9.1	(0.8)	2.8	2.4*

Table 7 (continued)

Variable	Frame Percent	Entire sample		Respondents and ineligible		Nonrespondents		Comparison	
		Percent	(se)	Percent	(se)	Percent	(se)	Difference	t-statistic
Economic characteristics of county									
Government-dependent economy county	12.5	12.6	(3.0)	13.2	(2.8)	12.2	(3.2)	1.0	0.2
Manufacturing-dependent economy county	7.7	7.7	(2.0)	7.7	(1.8)	7.6	(2.3)	0.0	0.0
Nonspecialized-dependent economy county	68.1	67.9	(3.8)	68.2	(3.3)	67.6	(4.4)	0.6	0.1
Recreation-dependent economy county	8.0	8.9	(2.5)	7.6	(1.7)	9.8	(3.1)	-2.2	-0.6
County with high levels of poverty	13.9	11.1	(2.3)	12.0	(2.0)	10.4	(2.6)	1.7	0.5
County with high levels of persistent poverty	6.2	4.5	(1.4)	5.1	(1.4)	4.0	(1.5)	1.0	0.5
County with high levels of persistent child poverty	15.0	13.3	(2.6)	13.8	(2.3)	12.9	(2.9)	1.0	0.3
County with low education	11.7	11.6	(2.2)	11.9	(2.0)	11.4	(2.5)	0.5	0.2
Population-loss county	8.0	4.6	(1.4)	5.1	(1.2)	4.2	(1.6)	0.8	0.4
Retirement-destination county	11.7	12.4	(2.6)	10.9	(2.0)	13.3	(3.1)	-2.4	-0.7
Metropolitan status of county									
Metropolitan area of 1 million population or more	54.8	54.3	(4.1)	52.9	(3.5)	55.3	(4.6)	-2.4	-0.4
Metropolitan area of 250,000 to 999,999 population	21.6	23.8	(3.5)	23.7	(3.2)	23.8	(3.9)	-0.1	-0.0
Metropolitan area of fewer than 250,000 population	9.6	10.1	(2.4)	10.6	(2.2)	9.7	(2.5)	1.0	0.3
Nonmetropolitan area adjacent to large metropolitan area	3.1	3.3	(1.2)	3.1	(0.8)	3.5	(1.6)	-0.3	-0.2
Nonmetropolitan area adjacent to medium or small metropolitan area	6.1	5.4	(1.3)	5.9	(1.4)	5.1	(1.4)	0.8	0.4
Nonmetropolitan area not adjacent to metropolitan area	4.8	3.1	(0.8)*	3.7	(0.7)	2.7	(0.9)	1.0	0.9
Census region									
West	22.2	22.4	(3.6)	21.5	(2.9)	23.1	(4.2)	-1.6	-0.3
South	32.5	32.3	(3.8)	32.7	(3.2)	31.9	(4.3)	0.8	0.1
Northeast	22.0	22.4	(3.7)	21.4	(3.0)	23.0	(4.2)	-1.6	-0.3
Midwest	23.2	23.0	(3.5)	24.4	(3.2)	22.0	(3.8)	2.4	0.5
Census division									
East North Central	15.7	15.4	(2.8)	16.3	(2.6)	14.7	(3.0)	1.6	0.4
West North Central	7.5	7.6	(2.5)	8.1	(2.3)	7.3	(2.7)	0.8	0.2
New England	7.0	6.6	(2.3)	6.1	(1.7)	6.9	(2.7)	-0.8	-0.3
Middle Atlantic	15.1	15.8	(3.2)	15.3	(2.7)	16.1	(3.6)	-0.7	-0.2
South Atlantic	15.7	15.0	(2.7)	16.0	(2.5)	14.2	(3.0)	1.8	0.5
East South Central	5.7	6.4	(1.9)	6.9	(1.9)	6.1	(1.9)	0.8	0.3
West South Central	11.1	10.9	(2.6)	9.8	(1.8)	11.6	(3.1)	-1.8	-0.5
Mountain	5.9	6.1	(2.0)	6.3	(1.9)	5.9	(2.2)	0.4	0.1
Pacific	16.4	16.4	(3.2)	15.2	(2.5)	17.2	(3.8)	-2.0	-0.4

Table 7 (continued)

Variable	Frame Percent	Entire sample		Respondents and ineligible		Nonrespondents		Comparison	
		Percent	(se)	Percent	(se)	Percent	(se)	Difference	t-statistic
Earnings categories for 2015-2016 time period									
Monthly earnings above \$30,000 in at least one month in '15 or '16	21.1	21.4	(0.7)	19.3	(0.7)	22.9	(0.9)	-3.6	3.1*
Monthly earnings above \$20,000 in at least one month in '15 or '16	22.3	21.7	(0.5)	20.5	(0.8)	22.5	(0.7)	-2.0	-1.9
Monthly earnings above \$15,000 in at least one month in '15 or '16	18.0	17.9	(0.4)	19.9	(0.7)	16.6	(0.5)	3.3	3.6*
Monthly earnings above \$7,000 in at least one month in '15 or '16	23.0	22.3	(0.5)	22.7	(0.7)	22.1	(0.7)	0.6	0.6
Monthly earnings did not meet the thresholds above	15.6	16.7	(0.5)*	17.7	(0.7)	16.0	(0.6)	1.7	1.9
Extract									
December 2016 extract	19.0	19.0	(0.5)	19.6	(0.6)	18.5	(0.7)	1.0	1.1
January 2017 extract	14.5	14.5	(0.5)	14.4	(0.5)	14.5	(0.7)	-0.2	-0.2
March 2017 extract	19.6	19.6	(0.5)	23.3	(0.8)	16.9	(0.6)	6.4	6.2*
April 2017 extract	12.6	12.6	(0.3)	14.0	(0.5)	11.6	(0.5)	2.3	3.3*
June 2017 extract	15.0	15.0	(0.4)	13.4	(0.5)	16.1	(0.6)	-2.7	-3.5*
July 2017 extract	11.2	11.2	(0.3)	9.5	(0.5)	12.5	(0.5)	-3.0	-4.4*
September 2017 extract	8.2	8.2	(0.2)	5.9	(0.3)	9.8	(0.4)	-3.9	-9.0*

*Denotes a difference between the sample and frame value of more than two standard errors

4. Nonresponse adjustment

Nonresponse adjustments made to initial weights seek to reduce the potential for bias that might result from differential nonresponse on the basis of the variables used in the nonresponse adjustment. We calculated two separate nonresponse adjustments by using a logistic propensity model for location and another logistic propensity model for cooperation. Known ineligible were considered to be located and cooperating for these models. The predicted value from each model was the probability that a sample member was located or responded to the survey. We used a Chi-square Automatic Interaction Detector (CHAID) analysis in SPSS to identify possible statistically significant interactions.⁴¹ If an interaction was included in a candidate model, then the main effects associated with that interaction were also included. At a particular level of a given covariate or interaction, if all respondents either were located or unlocated (for the location models), complete or not complete (for the cooperation models), or the total number of sample members at that level was fewer than 20, we combined levels if doing so was possible or logical. If combining levels was not possible, we excluded the covariate or interaction from the pool.

We used forward and backward stepwise selection logistic regression procedures with normalized weights to reduce the pool of covariates, which included both main effects and the interactions from CHAID.⁴² Next, we carefully evaluated a series of models by comparing the following measures of predictive ability and goodness of fit: the Generalized Coefficient of Determination (also known as the Generalized R-squared statistic),⁴³ percentage of concordant and discordant pairs,⁴⁴ and the Hosmer-Lemeshow goodness-of-fit test.⁴⁵ The selection of the final model involved evaluating these measures in concert, choosing a parsimonious model that

⁴¹ CHAID normally is attributed to Kass (1980) and Biggs and colleagues (1991). Its application in SPSS is described in Magidson (1993). The CHAID procedure iteratively segments a data set into mutually exclusive subgroups that share similar characteristics based on their effect on nominal or ordinal dependent variables. It automatically checks all variables in the data set and creates a hierarchy that shows all statistically significant subgroups. The procedure generates a tree that identifies the set of variables and interactions among the variables that have an association with the ability to locate a sample member (and the propensity of a located sample member to respond or be ineligible). We first ran CHAID with all covariates and then re-ran it a few times with the top variable in the tree removed, in order to ensure that all potentially important interactions were retained for further consideration.

⁴² The stepwise logistic regression procedure does not take into account the sampling design when computing standard errors, so the variances are usually underestimated. The final model is developed by using SUDAAN to incorporate the sample design features of stratification and clustering as well as weighting. For the locatability stepwise regression model, we normalized the initial weight so that it summed to the sample size. For the cooperation stepwise regression model, we normalized the location-adjusted weight so that it summed to the sample size.

⁴³ The Generalized Coefficient of Determination (Cox and Snell 1989) is a measure of the adequacy of the model, where higher numbers indicate a greater difference between the likelihood of the model in question and the likelihood of the null model. The Max rescaled R-Square scales this value to have a maximum of 1.

⁴⁴ A pair of observations is concordant if a responding subject has a higher predicted value than the nonresponding subject, discordant if not, and tied if both members of the pair are either respondents, nonrespondents, or have the same predicted values. The predicted value is the probability of location or response from the logistic propensity model. It is desirable to have as many concordant and as few discordant pairs as possible among all possible pairs of observations (Agresti 1990).

⁴⁵ The Hosmer-Lemeshow goodness-of-fit test is a test for goodness of fit of logistic regression models. Unlike the Pearson and deviance goodness-of-fit tests, it may be used to test goodness of fit even when some covariates are continuous (Hosmer and Lemeshow 1989).

was among the best in all or most of these measures using SUDAAN. Model fitting also involved a review of the statistical significance of the coefficients of the covariates in the model and avoidance of any unusually large adjustment factors. In addition, we manipulated the set of variables to avoid data warnings in SUDAAN.⁴⁶ Once we finalized the model, we calculated the location and cooperation adjustments as the inverse of the propensity scores. We multiplied the initial weight by the two adjustments to form the nonresponse-adjusted weights. We then trimmed the nonresponse-adjusted weights (if necessary) to reduce the variance attributable to outlier weights.⁴⁷ Finally, we post-stratified the RBS weights so that the weighted totals for beneficiary type, age category, gender, and RBS earnings category added up to frame totals for the RBS. In addition, for the 45 respondents (and one ineligible case) in the RBS who were also in the SWS frame, we ensured that their weights added up to the total in the SWS frame. We post-stratified the SWS weights so that the weighted totals by beneficiary type, age category, SWS earnings category, and extract, added up to the SWS frame totals.

5. Comparison of respondents and ineligibles to the sampling frame after nonresponse adjustment for the RBS and SWS

The purpose of nonresponse adjustments is to account for differences between respondents and nonrespondents, in order to make respondents look like the original sample as much as possible. In this section, we evaluate how well the nonresponse adjustments accounted for those differences.

In Tables 8 and 9, we included percentages from the sample frame, estimates from the entire sample (using initial sampling weights), and nonresponse-adjusted weighted estimates among respondents and ineligibles (again, including ineligibles because the number of ineligibles among nonrespondents was unknown) for the RBS and SWS, respectively. We made comparisons between the estimates using nonresponse-adjusted weights and the sample frames, but there were differences between the selected sample and the frame that the nonresponse adjustments would not be able to rectify. We post-stratified the counts to match the frame for beneficiary type, age, gender, and the earnings categories in the RBS and for beneficiary type, age, earnings categories, and extract for the SWS.

a. Representative beneficiary sample

As Table 8 indicates, the nonresponse and post-stratification adjustments to the sampling weights alleviated all of the differences observed between respondents and nonrespondents, as the proportions observed for age, disability, gender, beneficiary type, and the RBS earnings categories (using nonresponse-adjusted weights) were all within one standard error of the

⁴⁶ SUDAAN data warnings usually included one or more of the following: (1) an indication of a response cell with a zero count, (2) one or more parameters approaching infinity (which may not be readily observable with the parameter estimates themselves), and (3) degrees of freedom for overall contrast less than the maximum number of estimable parameters. We tried to avoid all such warnings, although avoiding the first two was the highest priority. The warnings almost always were caused by a response cell with a count that was too small, which required dropping the covariate or combining categories of a covariate.

⁴⁷ Trimming is a process whereby outlier weights are trimmed to be closer to the rest of the weights in the distribution. The trimmed amount is reallocated to the rest of the weights in the same trimming class. The decision about how much to trim is a subjective one, and is based on the balance between reducing the variance in the weights, and minimizing any increase in bias that might result from trimming.

sampling frame and no new differences were generated by these adjustments. However, it did not rectify differences that were observed in some of the geographic variables between the selected sample and the frame. In particular, the estimated proportions of beneficiaries residing in high-poverty counties and those residing in population-loss counties were significantly underestimated when compared to the frame (using nonresponse-adjusted weights). The proportion of beneficiaries estimated to be in nonmetropolitan counties not adjacent to metropolitan counties was also quite a bit less than that observed in the frame, though the difference was not statistically significant at the 5 percent level.

b. Successful worker sample

As with the RBS, the nonresponse and post-stratification adjustments to the sampling weights in the SWS alleviated all of the differences observed between respondents and nonrespondents. In the case of the SWS, as Table 9 shows, the estimated proportions observed for age, gender, county racial and ethnic composition, SWS earnings categories, and the extracts (using nonresponse-adjusted weights) were all within one standard error of the sampling frame values and no new differences were generated by these adjustments. The estimated proportions for the disability categories were very close to those of the selected sample and were within two standard errors of the proportion in the frame. Differences in the disability categories between the nonresponse-adjusted sample estimates and the frame values were therefore due to the differences between the estimates based on the initial sampling weights and the frame values. Among the geographic variables, differences between the nonresponse-adjusted estimates and the sampling frame exceeded two standard errors, but these were also due to the differences between the selected sample estimates, based on the initial sampling weights and the frame values that were not rectified by the adjustments. In particular, the estimated proportions of beneficiaries residing in population-loss counties and those residing in nonmetropolitan counties not adjacent to metropolitan counties were significantly less than that observed in the sampling frame.

Table 8. Percentages with various attributes (categorical variables) in the RBS, comparing frame percent with final weighted estimate (using nonresponse-adjusted weights)

Variable	Frame percent	Entire sample percent using initial weights		Respondents/ineligibles with attribute	Respondents/ineligibles weighted percent using adjusted weights	
		Percent	(se)		Percent	(se)
Beneficiary Type						
SSI only	29.4	29.3	(0.8)	1,552	29.4	(1.1)
SSDI only	56.8	56.6	(0.9)	1,675	56.8	(1.1)
Both SSI and SSDI	13.8	14.1	(0.5)	785	13.8	(0.7)
Constructed Disability Status						
Hearing	0.7	0.8	(0.1)	29	0.8	(0.2)
Cognitive	11.8	12.4	(0.5)	821	12.5	(0.7)
Mental	29.8	28.9	(0.9)	1,418	28.9	(1.2)
Physical	57.7	58.0	(0.9)	1,689	57.8	(1.1)
Sex						
Male	51.1	51.1	(0.8)	2,002	51.1	(1.1)
Beneficiary's Age						
18–29 years	10.0	10.0	(0.2)	1,121	10.0	(0.3)
30–39 years	10.7	10.7	(0.1)	1,085	10.7	(0.3)
40–49 years	16.0	16.0	(0.1)	1,133	15.9	(0.4)
50–64 years	63.4	63.4	(0.3)	673	63.4	(0.7)
Race/Ethnicity						
White	66.4	66.9	(2.5)	1,978	66.7	(2.6)
Black	22.7	23.2	(2.3)	759	23.4	(2.4)
Hispanic	3.9	3.6	(2.6)	171	3.6	(0.7)
All others	7.0	6.3	(0.8)	196	6.2	(0.9)
County Racial/Ethnic Profile						
County with plurality or majority non-Hispanic black population	4.2	2.4	(1.7)	97	2.3	(1.6)
County with plurality or majority Hispanic population	9.6	8.1	(2.5)	321	8.4	(2.7)
County with majority but less than 90% non-Hispanic white population	38.4	46.8	(5.3)	1,855	46.0	(5.4)
County with racially/ethnically mixed population, no majority group	33.9	33.5	(5.1)	1,342	33.9	(5.2)
County with at least 90% non-Hispanic white population	13.4	9.2	(3.0)	397	9.4	(3.1)

Table 8 (continued)

Variable	Entire sample percent using initial weights			Respondents/ ineligibles with attribute	Respondents/ineligibles weighted percent using adjusted weights	
	Frame percent	Percent	(se)		Percent	(se)
Economic Characteristics of County						
Government-dependent economy county	11.9	10.0	(3.1)	431	10.1	(3.2)
Manufacturing-dependent economy county	9.8	8.8	(2.6)	356	8.5	(2.5)
Nonspecialized-dependent economy county	65.4	67.9	(4.7)	2,720	67.9	(4.8)
Recreation-dependent economy county	8.2	9.3	(3.1)	326	9.4	(3.2)
County with high levels of poverty	18.6	11.8	(3.3)*	489	11.6	(3.3)*
County with high levels of persistent poverty	8.4	4.5	(2.1)	193	4.7	(2.2)
County with high levels of persistent child poverty	19.2	15.9	(4.0)	620	15.8	(4.0)
County with low education	13.5	12.3	(3.1)	494	12.5	(3.2)
Population-loss county	8.7	3.5	(1.8)*	145	3.2	(1.6)*
Retirement-destination county	13.8	15.5	(3.7)	584	15.2	(3.8)
Metropolitan Status of County						
Metropolitan area of 1 million population or more	46.7	44.6	(5.3)	1,754	44.8	(5.4)
Metropolitan area of 250,000 to 999,999 population	27.4	26.3	(4.8)	1,095	26.6	(4.9)
Metropolitan area of fewer than 250,000 population	10.6	12.2	(3.5)	491	12.0	(3.5)
Nonmetropolitan area adjacent to large metropolitan area	4.4	4.2	(2.0)	182	4.1	(1.9)
Nonmetropolitan area adjacent to medium or small metropolitan area	9.0	9.3	(2.9)	345	9.2	(2.9)
Nonmetropolitan area not adjacent to metropolitan area	6.9	3.4	(1.8)	145	3.4	(1.8)
Census Region						
West	18.7	18.4	(4.1)	715	18.2	(4.1)
South	41.3	42.2	(5.5)	1,665	43.0	(5.6)
Northeast	18.3	18.2	(4.3)	700	17.7	(4.2)
Midwest	21.8	21.3	(4.4)	932	21.2	(4.5)
Census Division						
East North Central	15.7	15.2	(3.8)	674	15.7	(4.0)
West North Central	6.2	6.1	(2.7)	258	5.4	(2.4)
New England	5.0	4.7	(2.3)	203	4.5	(2.2)
Middle Atlantic	13.3	13.5	(3.8)	497	13.2	(3.8)
South Atlantic	20.3	19.9	(4.6)	763	20.0	(4.6)
East South Central	9.3	10.2	(3.4)	403	10.3	(3.5)
West South Central	11.7	12.0	(3.6)	499	12.7	(3.8)
Mountain	5.7	6.0	(2.6)	269	6.5	(2.8)
Pacific	13.0	12.4	(3.4)	446	11.7	(3.2)

Table 8 (continued)

Variable	Frame percent	Entire sample percent using initial weights		Respondents/ineligibles with attribute	Respondents/ineligibles weighted percent using adjusted weights	
		Percent	(se)		Percent	(se)
Earnings Categories for 2015-2016 Time Period						
Three consecutive months of monthly earnings above SGA	2.7	2.9	(0.3)	180	2.7	(0.3)
Monthly earnings above \$7,000 in at least one month in '15 or '16	1.2	1.3	(0.2)	68	1.2	(0.2)
Monthly earnings above \$2,000 in at least one month in '15 or '16	2.3	2.5	(0.3)	175	2.3	(0.3)
Monthly earnings above zero in at least one month in '15 or '16	2.6	2.8	(0.3)	189	2.6	(0.3)
Monthly earnings always zero in 2015 and 2016	91.2	90.6	(0.6)	3,400	91.2	(0.7)

*Denotes a difference of more than two standard errors between the sample estimate (either from the entire sample or using the nonresponse-adjusted weight) and the frame value.

Table 9. Percentages with various attributes (categorical variables) in the SWS, comparing frame percent with final weighted estimate (using nonresponse-adjusted weights)

Variable	Frame percent	Entire sample percent using initial weights		Respondents/Ineligibles with Attribute	Respondents/ineligibles weighted percent using adjusted weights	
		Percent	(se)		Percent	(se)
Beneficiary type						
SSI only	27.2	27.5	(0.8)	1,301	27.2	(0.8)
SSDI only	51.3	51.3	(0.9)	2,328	51.3	(0.8)
Both SSI and SSDI	21.5	21.2	(0.6)	958	21.5	(0.7)
Constructed disability status						
Hearing	3.1	3.3	(0.2)	102	3.1	(0.3)
Cognitive	13.4	12.8	(0.5)	514	12.6	(0.5)
Mental	36.2	37.4	(0.8)	1,663	37.8	(0.9)
Physical	47.3	46.5	(0.9)	2,250	46.6	(0.9)
Sex						
Male	54.2	54.6	(0.7)	2,344	54.8	(1.0)
Beneficiary's age						
18–29 years	24.5	24.2	(0.6)	984	24.5	(0.8)
30–39 years	23.5	24.1	(0.5)	947	23.5	(0.7)
40–49 years	22.1	22.2	(0.5)	1,015	22.1	(0.6)
50–64 years	29.9	29.6	(0.6)	1,641	29.9	(0.7)
Race/ethnicity						
White	55.8	56.0	(2.0)	1,906	55.9	(1.9)
Black	30.4	31.3	(1.8)	1,264	31.5	(1.7)
Hispanic	5.3	5.0	(0.5)	210	5.2	(0.5)
All others	8.5	7.7	(0.6)	301	7.3	(0.6)
County racial/ethnic profile						
County with plurality or majority non-Hispanic black population	4.0	2.8	(1.2)	168	2.9	(1.0)
County with plurality or majority Hispanic population	10.1	8.7	(1.7)	457	8.7	(1.5)
County with majority but less than 90% non-Hispanic white population	39.3	44.4	(4.1)	1,808	44.1	(3.5)
County with racially/ethnically mixed population, no majority group	35.5	34.6	(4.0)	1,829	34.8	(3.3)
County with at least 90% non-Hispanic white population	10.9	9.4	(2.3)	315	9.2	(2.0)

Table 9 (continued)

Variable	Entire sample percent using initial weights			Respondents/ Ineligibles with Attribute	Respondents/ineligibles weighted percent using adjusted weights	
	Frame percent	Percent	(se)		Percent	(se)
Economic characteristics of county						
Government-dependent economy county	12.5	12.6	(3.0)	541	13.3	(2.8)
Manufacturing-dependent economy county	7.7	7.7	(2.0)	246	7.2	(1.6)
Nonspecialized-dependent economy county	68.1	67.9	(3.8)	3,353	67.4	(3.3)
Recreation-dependent economy county	8.0	8.9	(2.5)	307	8.9	(1.9)
County with high levels of poverty	13.9	11.1	(2.3)	558	11.6	(1.9)
County with high levels of persistent poverty	6.2	4.5	(1.4)	251	4.8	(1.4)
County with high levels of persistent child poverty	15.0	13.3	(2.6)	671	13.2	(2.2)
County with low education	11.7	11.6	(2.2)	620	11.7	(2.0)
Population-loss county	8.0	4.6	(1.4)*	202	4.9	(1.1)*
Retirement-destination county	11.7	12.4	(2.6)	486	12.0	(2.1)
Metropolitan status of county						
Metropolitan area of 1 million population or more	54.8	54.3	(4.1)	2,843	53.4	(3.5)
Metropolitan area of 250,000 to 999,999 population	21.6	23.8	(3.5)	1,060	24.2	(3.2)
Metropolitan area of fewer than 250,000 population	9.6	10.1	(2.4)	300	10.4	(2.1)
Nonmetropolitan area adjacent to large metropolitan area	3.1	3.3	(1.2)	100	3.0	(0.8)
Nonmetropolitan area adjacent to medium or small metropolitan area	6.1	5.4	(1.3)	162	5.5	(1.2)
Nonmetropolitan area not adjacent to metropolitan area	4.8	3.1	(0.8)*	122	3.6	(0.6)*
Census region						
West	22.2	22.4	(3.6)	1,052	22.6	(3.0)
South	32.5	32.3	(3.8)	1,405	32.1	(3.2)
Northeast	22.0	22.4	(3.7)	1,143	22.8	(3.1)
Midwest	23.2	23.0	(3.5)	987	22.6	(2.9)
Census division						
East North Central	15.7	15.4	(2.8)	687	14.9	(2.3)
West North Central	7.5	7.6	(2.5)	300	7.7	(2.1)
New England	7.0	6.6	(2.3)	354	6.5	(1.8)
Middle Atlantic	15.1	15.8	(3.2)	789	16.3	(2.8)
South Atlantic	15.7	15.0	(2.7)	722	15.8	(2.4)
East South Central	5.7	6.4	(1.9)	265	6.7	(1.9)
West South Central	11.1	10.9	(2.6)	418	9.6	(1.8)
Mountain	5.9	6.1	(2.0)	237	6.8	(2.0)
Pacific	16.4	16.4	(3.2)	815	15.8	(2.6)

Table 9 (continued)

Variable	Entire sample percent using initial weights			Respondents/ Ineligibles with Attribute	Respondents/ineligibles weighted percent using adjusted weights	
	Frame percent	Percent	(se)		Percent	(se)
Earnings categories for 2015-2016 time period						
Monthly earnings above \$30,000 in at least one month in '15 or '16	21.1	21.4	(0.7)	853	21.1	(0.7)
Monthly earnings above \$20,000 in at least one month in '15 or '16	22.3	21.7	(0.5)	973	22.3	(0.8)
Monthly earnings above \$15,000 in at least one month in '15 or '16	18.0	17.9	(0.4)	906	18.0	(0.7)
Monthly earnings above \$7,000 in at least one month in '15 or '16	23.0	22.3	(0.5)	1,066	23.0	(0.7)
Monthly earnings did not meet the thresholds above	15.6	16.7	(0.5)*	789	15.6	(0.6)
Extract						
December 2016 extract	19.0	19.0	(0.5)	982	19.0	(0.6)
January 2017 extract	14.5	14.5	(0.5)	723	14.5	(0.5)
March 2017 extract	19.6	19.6	(0.5)	740	19.6	(0.7)
April 2017 extract	12.6	12.6	(0.3)	606	12.6	(0.4)
June 2017 extract	15.0	15.0	(0.4)	582	15.0	(0.5)
July 2017 extract	11.2	11.2	(0.3)	442	11.2	(0.5)
September 2017 extract	8.2	8.2	(0.2)	512	8.2	(0.3)

* Denotes a difference of more than two standard errors between the sample estimate (either from the entire sample or using the nonresponse adjusted weight) and the frame value.

E. Summary and implications for analyses

Our analysis has shown that, despite a few minor differences between the sample frame and the weighted estimates from the sample using initial weights, the selected samples for both the RBS and SWS were representative of their populations of interest among variables used for either explicit or implicit stratification. Because we did not achieve an 80 percent response rate, the main purpose of this nonresponse bias analysis was to determine if systematic differences between respondents and nonrespondents were alleviated by nonresponse adjustments to the weights, or if the potential for nonresponse bias was still likely in the weighted estimates.

We found that the nonresponse and post-stratification adjustments alleviated all differences observed between respondents and nonrespondents in both samples. In addition, it does not appear that the nonresponse and post-stratification adjustments created new biases. Although we did not find evidence that the potential for nonresponse bias exists, we did find bias in the initial sampling weights representing some small populations that could not be controlled for when selecting the sample and creating the initial sampling weights. Due to their small sample counts, it was also not possible to create adjustments to the sampling weights that would accommodate their small populations. The selected sample in the RBS underestimated (using the initial sampling weights) the proportion of beneficiaries residing in population-loss counties and those residing in high-poverty counties. Further, the nonresponse and post-stratification adjustments to the weights did not rectify this. Similarly, the selected sample in the SWS underestimated (using the initial sampling weights) the proportions of successful workers residing in population-loss counties and those residing in nonmetropolitan areas not adjacent to metropolitan areas. The nonresponse and post-stratification adjustments to the weights did not rectify this.

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