Response Rates for the Pre-Production Test of the Occupational Requirements Survey

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Abstract

The Occupational Requirements Survey (ORS) is an establishment survey conducted by the Bureau of Labor Statistics (BLS) for the Social Security Administration (SSA). The survey collects information on the vocational preparation and the cognitive and physical requirements of occupations in the U.S. economy, as well as the environmental conditions in which those occupations are performed. In fiscal year (FY) 2015, the BLS completed data collection for the ORS pre-production test. This paper focuses on the process for computing and analyzing the response rates from the ORS pre-production test, utilizing Office of Management and Budget (OMB) approved methods and formulas to produce detail statistics –weighted and unweighted at the establishment, occupation, and item levels. The results from this process will be used to help identify important auxiliary variables for use in estimation processes to reduce potential bias due to non-response in future samples.

Key Words: response rates, efficiency rates, completion rates, non-response bias

1. Introduction

In the summer of 2012, the Social Security Administration (SSA) and the Bureau of Labor Statistics (BLS) signed an interagency agreement to begin the process of testing the collection of data on occupations. As a result, the Occupational Requirements Survey (ORS) [1] was established as a test survey in late 2012. The goal of ORS is to collect and publish occupational information that will replace outdated data currently used by SSA. All outputs generated from ORS data will be made public for use by non-profits, employment agencies, state or federal agencies, the disability community, and other stakeholders.

The ORS data are collected by field economists. The field economists are required to collect close to 70 data elements related to the occupational requirements of a job. The following four groups of data are being collected:

- Physical demands of work such as keyboarding and lifting
- Environmental conditions such as extreme heat and cold
- Vocational preparation including education, prior work experience, and training
- Mental and cognitive demands of work including decision making and communication

Response rates are one of the most important indicators of a survey's quality since they can be used as a method to gauge the potential for non-response bias. Although most surveys have procedures to adjust for non-response, a low response rate may have an impact on accuracy of a survey estimate of the population value. Therefore, it is important to monitor response rates and keep them as high as possible. The purpose of this paper is

to document the methods for analyzing response rates in ORS samples. This paper will describe the results from the pre-production test as an example of the method to be used for future production analyses. Section 2 of this paper provides additional background information on the ORS, including description of response status codes used by the survey. Section 3 describes calculation of response rates at the establishment, occupation, and ORS element level. Section 4 presents analysis of response rates at the three levels. Section 5 presents our conclusion and suggestions for future work.

2. Background Information on ORS

In addition to providing Social Security benefits to retirees and survivors, the Social Security Administration (SSA) administers two large disability programs, which provide benefit payments to millions of beneficiaries each year. Determinations for adult disability applicants are based on a five-step process that evaluates the capabilities of workers, the requirements of their past work, and their ability to perform other work in the U.S. economy. In some cases, if an applicant is denied disability benefits, SSA policy requires adjudicators to document the decision by citing examples of jobs the claimant can still perform despite restrictions (such as limited ability to balance, stand, or carry objects) [2].

For over 50 years, the Social Security Administration has turned to the Department of Labor's Dictionary of Occupational Titles (DOT) [3] as its primary source of occupational information to process the disability claims [4]. SSA has incorporated many DOT conventions into their disability regulations. However, the DOT was last updated in its entirety in the late 1970's, although a partial update was completed in 1991. Consequently, the SSA adjudicators who make the disability decisions must continue to refer to an increasingly outdated resource because it remains the most compatible with their statutory mandate and is the best source of data at this time.

When an applicant is denied SSA benefits, SSA must sometimes document the decision by citing examples of jobs that the claimant can still perform, despite their functional limitations. However, since the DOT has not been updated for so long, there are some jobs in the American economy that are not even represented in the DOT, and other jobs, in fact many often-cited jobs, no longer exist in large numbers in the American economy. For example, a job that is often cited is "envelope addressor," because it is an example of a low-skilled job from the DOT with very low physical demands. There are serious doubts about whether or not this job still exists in the economy.

SSA has investigated numerous alternative data sources for the DOT such as adapting the Employment and Training Administration's Occupational Information Network (O*NET) [5], using the BLS Occupational Employment Statistics program (OES) [6], and developing their own survey. But SSA was not successful with any of these potential data sources and turned to the National Compensation Survey program at the Bureau of Labor Statistics.

In fiscal years 2013 and 2014, several feasibility tests were performed to assess the viability of collecting data on occupational requirements using the platform currently used by the NCS. These tests provided evidence that the NCS platform could be adapted to ORS data collection, which led to the pre-production test in FY 2015.[4] Unlike the earlier tests, which were small-scale and tested a subset of data elements or the viability of different collection methods, the pre-production test was designed as a relatively large-scale, nationally representative test of ORS data collection. ORS pre-production data collection began in October 2014 and continued until May 2015. The sampling, data collection, procedures, and review were designed to mimic what will occur during ORS production. [7]

The ORS sample is based on a complex two-stage stratified design with probability proportionate to employment size sampling at each stage. The first stage is a probability sample of establishments and the second stage is a probability sample of jobs (occupations) from sampled establishments. Stratification of establishments in the sampling frame is by industry and ownership, and also implicitly by region and establishment employment. The frame used for sampling is developed from the BLS Quarterly Census of Employment and Wages (QCEW) Database with railroads added in. Allocation of sample is proportional to employment size. ORS samples follow a three-year rotation. Nonresponse in ORS can occur at the establishment level, job level, and data items (elements) level. Adjustment to sample weights is done at the establishment and job levels. Imputation is used to account for missing item values. For more details on the ORS sample design, see the Ferguson and McNulty paper [8]. Under this design, it is possible for a job to be sampled more than once in a given establishment. When this occurs, the job is "collapsed" so that data for the job is only collected once. In reports about data collection, collapsed jobs are counted only once. In this response analysis, collapsed quotes are counted every time they were selected.

2.1 Response Status Codes: Non-response Types and Outcome codes

Like any survey, the ORS does not receive responses from every establishment in its sample. Ideally, the sample establishment agrees to participate in the survey and gives the Field Economist (FE) quality data. However, sometimes the FE is unable to make contact with a sample establishment's representative that is knowledgeable of the ORS data elements, or an establishment can simply refuse to participate. Also, sample establishments may go out of business or be out of the survey's scope. A list of response status codes for establishments and occupations are provided below:

Response Status (Code)	Indications
Usable (USE)	**Establishment data:** When the establishment is coded with all of the following: - description of establishment operations for the purpose of assigning North American Industry Classification System (NAICS) - total employment - eligible employment - at least one usable occupational observation **Occupational data:** When the occupation in the sample establishment is coded with all of the following: - occupational employment - worker characteristics (Full-time/Part-time, Union/Non-union, and Time/Incentive) - occupational work schedule - worker type (Supervisory, Non-supervisory, Lead) - job leveling - job duties to code the eight-digit Standard Occupational Classification (SOC) code using Training Administration's Occupational Information Network (O*NET) - at least one ORS element data

Response Status (Code)	Indications
Refusals (REF)	Refusals can take several forms: - The establishment/occupation does not have the minimum required data to be usable. - The respondent is unwilling or unable to provide data.
Out-of-Business (OOB)	**For Establishment data only:** When a sample establishment is no longer in business. Since the sample of establishments is chosen some months before the actual start of collection, it is possible that some sample units are no longer in business by the date scheduled for data collection.
Out-of-Scope (OOS)	**For Establishment data only:** A sample establishment can be out of scope for two reasons: - **Geography** When an establishment is located in or has moved to an area entirely outside of the United States, defined as the 50 states and the District of Columbia. - **Industry** When an establishment falls into one of the following industry categories: ▪ Federal Government ▪ Private households ▪ Agriculture ▪ Quasi-Federal ▪ Foreign Government ▪ International Government
No-Matching-Job (NMJ)	(**For establishment data:** When all occupations…) (**For occupational data:** When the occupation…) ( )…in the sample establishment are in one or more of the following categories: - contractors - corporate officers, trustees, and board members who do not hold a job at the firm - employees on strike more than a year - family members earning higher-than-market wages - federal work-study students - individuals on long-term disability (LTD) not expected to return - leased employees - non-working individuals with no guarantee to return - owners of unincorporated firms - temporary help employees - volunteers and unpaid workers - **For occupational data only:** employees outside the assigned area (except for situations where worker lives outside the area, but all work performed via email and phone)

Even if the sample establishment agrees to participate in the survey and gives the FE data, it would be ideal to capture all of the data for the survey, but this is not always the case. A list of response status codes for ORS element data are provided below:

Response Status (Code)	Indications
Known (KN)	Respondent provided the ORS element data.
Present, but unknown (PU)	Respondent stated the ORS element is present, but does not know the duration for which the ORS element is present.
Unknown (UK)	Respondent does not know or did not provide data on the ORS element.

3. Calculation of Response Rates

The Office of Management and Budget (OMB)-approved methods [9] and formulas [10] were used to produce detail statistics on response rates and efficiency rates.

The formulas used to compute the two rates are as follows:

Response Rate	Efficiency Rate
(For establishment and occupational data) = USE / (USE + REF) (For ORS element data) = **(**KN+PU) / (KN + PU + UK)	(For establishment data) = USE / (USE + REF + OOB + OOS + NMJ) (For occupational data) = USE / (USE + REF + NMJ)

3.1 Types of Rates

Two types of rates were calculated: response rates and efficiency rates. Response rates measure how much of the viable sample yielded usable data for estimation. Viable sample is the original sample excluding establishments or occupations that are considered out-of-business, out-of-scope, or have no matching jobs. Efficiency rates measure how much of the original sample yielded results usable for estimation. Efficiency rates are not calculated for ORS element data since all ORS elements are collected for all occupations, and none are out-of-scope. Response rates and efficiency rates both include collapsed data. Collapsed data occur when the same occupation is selected more than once from an establishment.

3.1.1 Unweighted vs. Weighted Data

Unweighted and weighted data for response rates and efficiency rates are both needed to fully evaluate survey performance. Unweighted rates provide a useful description of the operational aspect of the survey and indicate how many of the raw number of cases were successfully collected. Unweighted rates are computed using unit counts. Weighted rates provide a better indication of the potential impact of response on estimates. Weighted rates are computed using the original sample weights for each unit, rather than final sample weight, because the final sample weights are only assigned to establishments and occupations that are usable for estimation.

3.2 Types of Units

Computations for rates are based on in the following inputs:

- Establishment data: establishments in the sample
- Occupational data: selected occupations for each establishment in the sample

- ORS Element data: ORS elements eligible to be collected for each occupation in each establishment in the sample

3.3 Levels of Details

Rates are calculated at various levels of data aggregation for the three types of units. The levels of data aggregation are:

- **Aggregate industries**, which include 24 private industries and 10 government industries, as listed below.

Private Industry	Government Industry
1) Mining 2) Utilities 3) Construction 4) Manufacturing 5) Aircraft Manufacturing 6) Wholesale Trade 7) Retail Trade 8) Transportation and Warehousing 9) Information 10) Finance (excluding Insurance) 11) Insurance Carriers and Related Activities 12) Real Estate and Rental and Leasing 13) Professional, Scientific, and Technical Services 14) Management of Companies and Enterprises 15) Administrative and Support, Waste Management 16) Education (rest of) 17) Elementary & Secondary Educations 18) Colleges & Universities Educations 19) Health and Social Assistance (rest of) 20) Hospitals 21) Nursing Homes 22) Arts, Entertainment, and Recreation 23) Accommodation and Food Services 24) Other Services (except Public Administration)	1) Mining, Construction, Manufacturing 2) Wholesale and Retail Trades 3) Elementary & Secondary Educations 4) Colleges & Universities Educations 5) Educational Services 6) Hospitals 7) Nursing & Residential Cares 8) Other Health Care 9) Public Administration (excluding National Security Information, Finance, Food Services, Professionals) 10) Other service providing

- **Census Regions and Divisions**

  There are 4 census regions, each with 2 or 3 census divisions. The regions are West with Pacific and Mountain divisions; Midwest with West North Central and East North Central divisions; Northeast with Middle Atlantic and New England divisions; and South with West South Central, East South Central, and South Atlantic divisions. [11]

- **Establishment Size Class** is assigned based on establishment employment size, as listed below.

Establishment Size Class	Employment Size
1	Less than 50 employees
2	Between 50 and 99 employees
3	Between 100 and 499 employees
4	More than 499 employees

- **Ownership**

  An establishment can be labelled as private entity, state government, or local government.

- **Major occupational groups** are identified with 2-digit Standard Occupational Classification (SOC) codes, as listed below.

2-digit SOC Codes	Standard Occupational Classification
11	Management Occupations
13	Business & Finance Operations Occupations
15	Computer & Mathematical Occupations
17	Architecture & Engineering Occupations
19	Life, Physical, & Social Science Occupations
21	Community & Social Service Occupations
23	Legal Occupations
25	Education, Training, & Library Occupations
27	Arts, Design, Entertainment, Sports, & Media Occupations
29	Healthcare Practitioners & Technical Occupations
31	Healthcare Support Occupations
33	Protective Service Occupations
35	Food Preparation & Serving Related Occupations
37	Building, Grounds Cleaning, & Maintenance Occupations
39	Personal Care & Service Occupations
41	Sales & Related Occupations
43	Office & Administrative Support Occupations
45	Farming, Fishing, & Forestry Occupations
47	Construction & Extraction Occupations
49	Installation, Maintenance, & Repairing Occupations
51	Production Occupations
53	Transportation & Material Moving Occupations

4. Analysis of Response Rate

4.1 Establishment Level

Table 1 below shows that there are 2,549 establishments in the Occupational Requirements Survey pre-production sample. Of the 2,549 establishments, 168 establishments were either out of business, out of scope, or had no jobs in scope for ORS. Of the remaining 2,381 establishments, 1,851 establishments provided usable data, indicating a usable establishment unweighted response rate of 78 percent, weighted response rate of 76 percent, unweighted efficiency rate of 73 percent, and weighted efficiency rate of 69 percent.

Table 1. *Overall Response and Efficiency Rates for Establishment Level Data*

Total Establishments	USE	REF	OOB/OOB/NMJ
2,549	1,851	530	168
Unweighted Response Rate = 78%		**Weighted Response Rate** = 76%	
Unweighted Efficiency Rate = 73%		**Weighted Efficiency Rate** = 69%	

For the section below, refer to the *Figures* in the attachment provided at the end of the paper.

Figures 1, 3, 5, and 8 display result for establishment units. In each of the four *Figures*, the darker line represents weighted data and the lighter line represents unweighted data for both response (red) and efficiency (blue) rates. If the darker line is greater than the lighter line, then more data were collected on establishments that have greater representation in the population sampled.

Figure 1 displays the weighted and unweighted response rates and efficiency rates for private aggregate industries. The private aggregate industries are listed in descending order by (dark red) weighted response rates. The weighted response rates range from 52 percent for 'Information' industry to 93 percent for 'Utilities' industry.

Figure 3 displays the weighted and unweighted response rates and efficiency rates for census regions and divisions. ***Figure 3*** is sorted by (dark red) weighted response rates in descending order for census region and for census division within each census region. The weighted response rates for census regions range from 73 percent for 'Midwest' region to 81 percent for 'West' region. The weighted response rates for census division range from 71 percent for 'West South Central' division to 81 percent for 'Mountain' division.

Figure 5 displays the weighted and unweighted response rates and efficiency rates for employment size. The employment sizes are listed in descending order by (dark red) weighted response rates. The weighted response rates range from 72 percent for establishments with 'More than 499 Employees' to 81 percent for establishments with 'Less than 50 Employees.'

Figure 8 displays the weighted and unweighted response rates and efficiency rates for ownership status. The ownership statuses are listed in descending order by (dark red) weighted response rates. Government establishments appear to have better response rates than private establishments.

4.2 Occupation Level

Table 2 below shows within the 1,851 usable establishments, 10,495 occupational observations or quotes were attempted to be collected. Of the 10,495 quotes, 9,132 provided usable data, 1,232 refused, and 131 are out of scope. Collapsed quotes are counted once for each time selected. The occupational level response rates are 88 percent for unweighted data and 89 percent for weighted data. The occupational level efficiency rates are 87 percent for unweighted data and 88 percent for weighted data.

Table 2. *Overall Response and Efficiency Rates for Occupational Level Data*

From 1,851 Usable Establishments:			
Total Occupations 10,495	**USE** 9,132	**REF** 1,232	**NMJ** 131
Unweighted Response Rate = 88%		**Weighted Response Rate** = 89%	
Unweighted Efficiency Rate = 87%		**Weighted Efficiency Rate** = 88%	

For the section below, refer to the *Figures* in the attachment provided at the end of the paper.

Figures 2, 4, 6, and 9 display results for occupational units. In each of the four *Figures*, the darker line represents weighted data and the lighter line represents unweighted data for both response (red) and efficiency (blue) rates. If the darker line is greater than the lighter line, more data were collected on occupations that have greater representation in the population sampled.

Figure 2 displays the weighted and unweighted response rates and efficiency rates for private aggregate industry. The private aggregate industries are listed in descending order by (dark red) weighted response rates. The weighted response rates range from 65 percent for 'Colleges & Universities Educations' industry to 100 percent for 'Arts, Entertainment, and Recreation' industry.

Figure 4 displays the weighted and unweighted response rates and efficiency rates for census regions and divisions. The weighted response rates are sorted in descending order for census region and for census division within each census region. The weighted response rates for census region range from 88 percent for 'West' region to 90 percent for 'Midwest' region. The weighted response rates for census division range from 87 percent for 'Pacific' division to 93 percent for 'East South Central' division.

Figure 6 displays the weighted and unweighted response rates and efficiency rates for establishment employment size. The employment sizes are listed in descending order by (dark red) weighted response rates. The weighted response rates range from 80 percent for establishments with 'More than 499 Employees' to 93 percent for establishments with 'Less than 50 Employees.'

Figure 9 displays the weighted and unweighted response rates and efficiency rates by ownership status. The ownership statuses are listed in descending order by (dark red) weighted response rates. Private establishments appear to have better response rates than government establishments.

4.3 ORS Element Level

There are up to 70 ORS elements [12] collected for each occupational observation. ***Table 3*** below shows response rate range for ORS elements in 9,132 usable occupations from 1,851 usable establishments. The weighted response rates range from 77 percent to 98 percent. Efficiency rates are not calculated for ORS element data since all elements are collected for all occupations, and an ORS element can never be out-of-scope.

Table 3. *Overall Response Rates for ORS Element Level Data*

From 9,132 Usable Occupations in 1,851 Usable Establishments:
Unweighted Response Rate Range: (76%, 98%)
Weighted Response Rate Range: (77%, 98%)

ORS elements data were also analyzed at various level of detail. For example, among the 5 elements with the top weighted response rates, establishments with '50 to 99 Employees' provide answers at a higher rate than establishments in the other three size classes. Whereas within the 5 elements with the bottom response rates, establishments with 'More than 499

Employees' provide answers at a lower rate than establishments in the other three size classes.

4.4 Comparison Across the Types of Units

Further analyses were performed on a combination of establishment data, occupational data, and ORS element data. ***Figure 7*** displays combined effect of establishment and occupational response on the overall response and efficiency rates. For example, the combined weighted response rate for the entire sample of occupations within establishments with 'More than 499 employees' is 58 percent. The 58 percent is the result of 72 percent response at the establishment level and 88 percent at the occupational level. The overall response rates for the entire sample of occupations within establishments range from 58 percent with 'More than 499 Employees' to 75 percent with 'Less than 50 Employees'.

5. Conclusion and Future Work

Considering the amount of data requested by ORS, the response and efficiency rates for pre-production sample are fairly high. The collected data show that the rates vary by industry, occupational group, establishment size, and ownership. This indicates that industry, occupational group, establishment size, and ownership are important auxiliary variables; and they should be used in adjustment for nonresponse process to reduce potential bias due to nonresponse.

We plan to continue to monitor, calculate, and analyze response rates by available auxiliary variables from the ongoing ORS production sample each year. The results from further analysis may lead to additional improvements in the nonresponse adjustment process for ORS. We also plan to carefully analyze the potential for non-response bias in key subsets of the data collected.

Any opinions expressed in this paper are those of the authors and do not constitute policy of the Bureau of Labor Statistics or the Social Security Administration.

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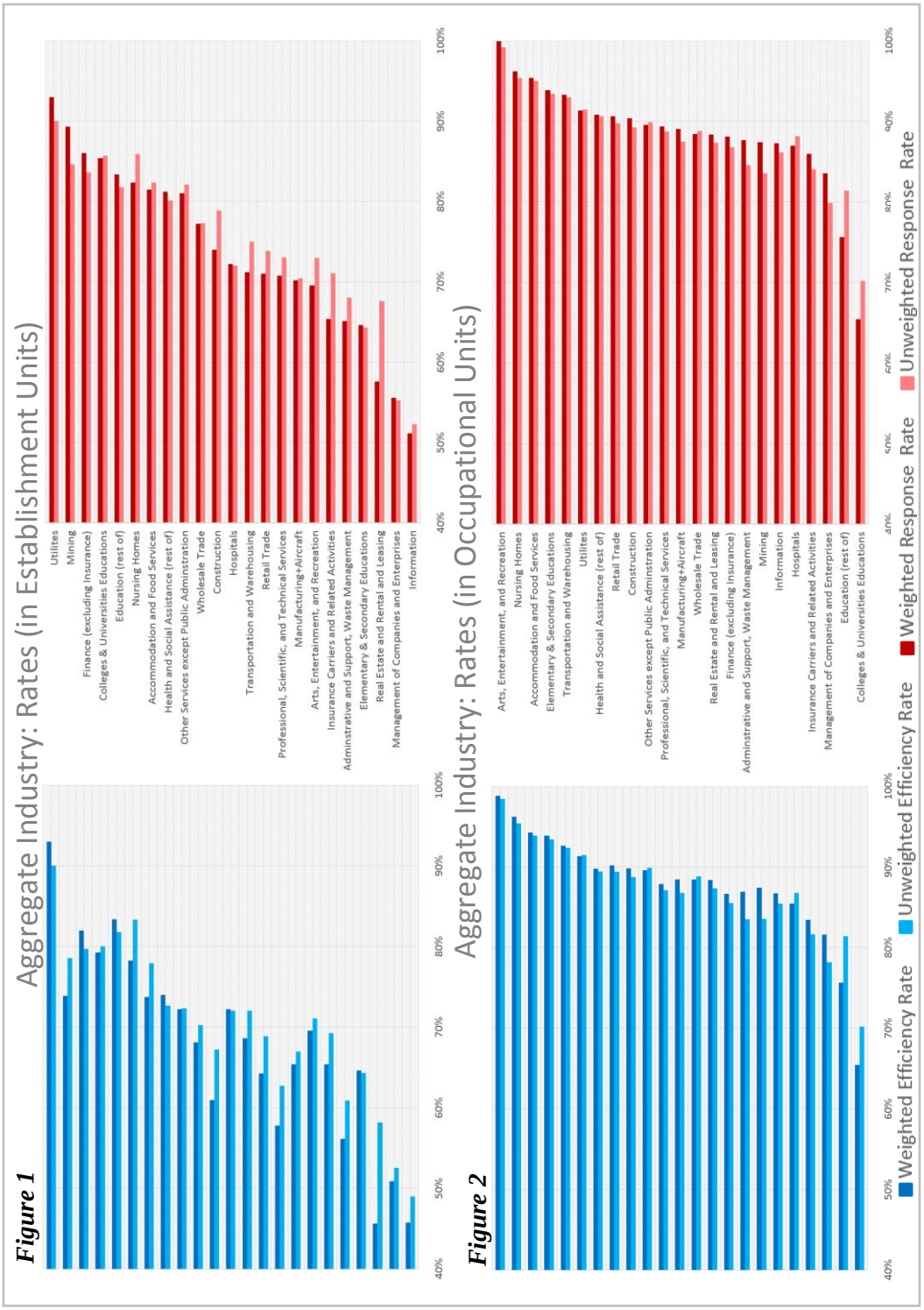
Response Rates for Establishment (Figure 1) and Occupational (Figure 2) Units by Aggregate Industry



Response Rates for Establishment (Figure 3) and (Figure 4) Occupational Units by Census Regions and Divisions

Figure 3

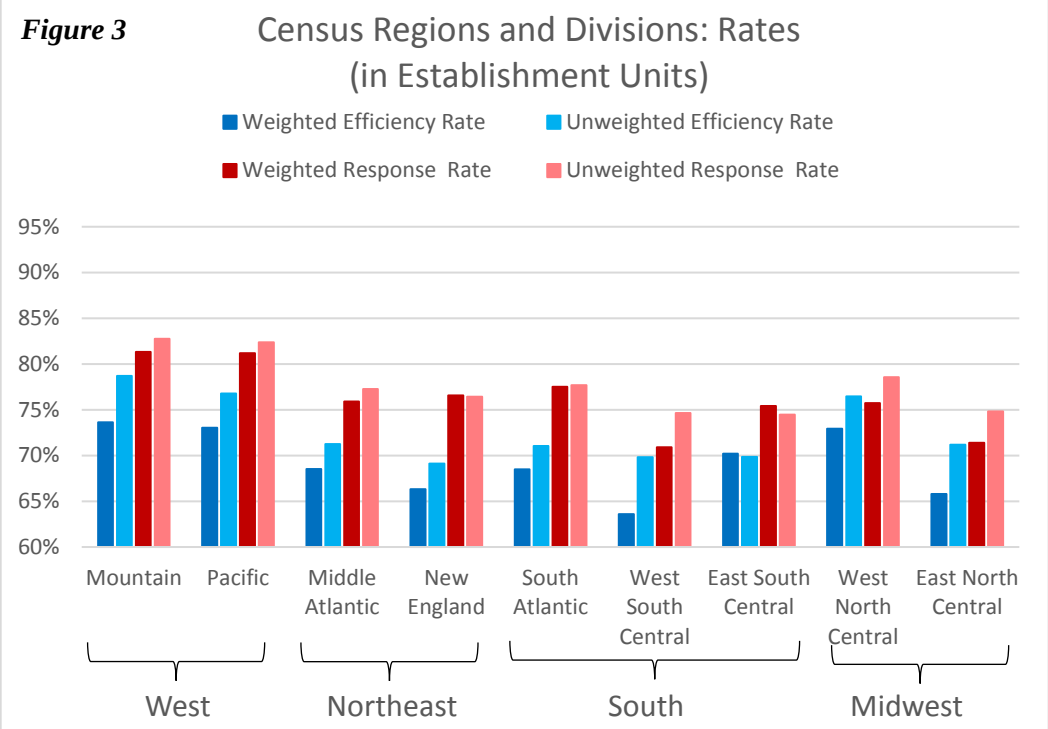
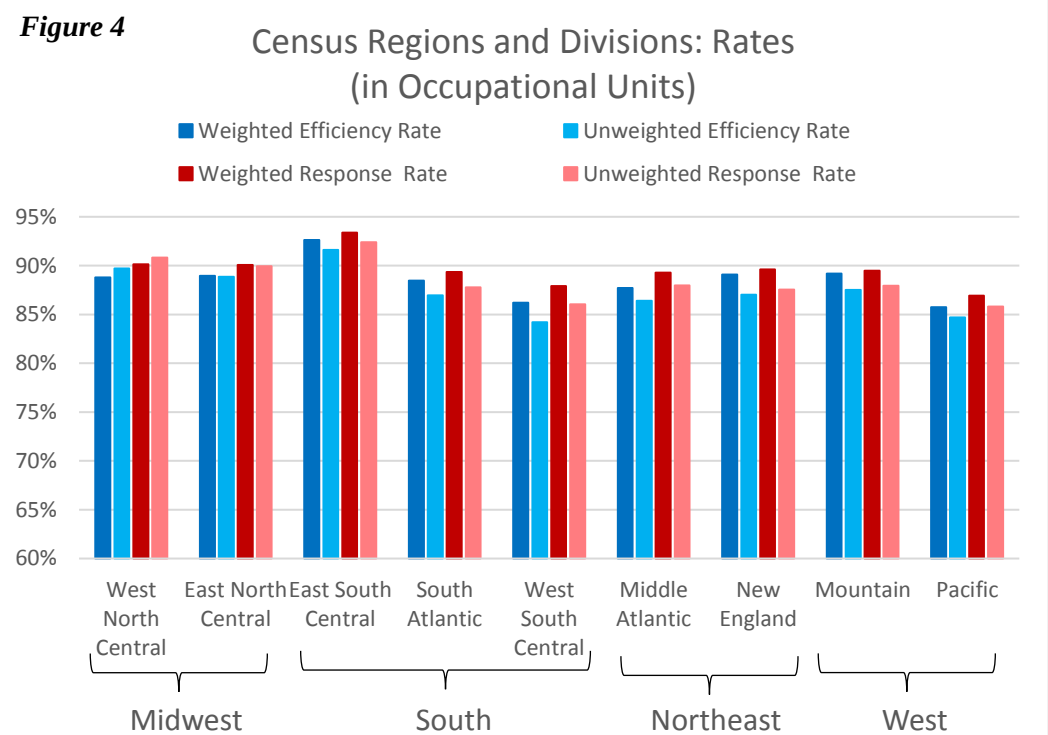
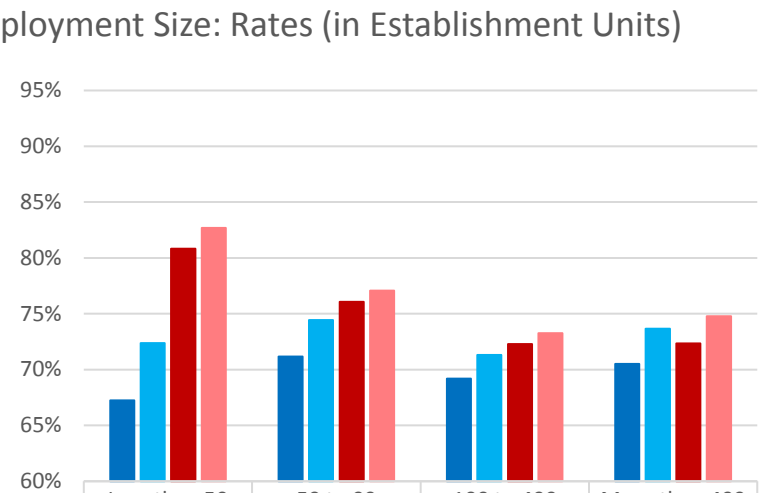


Figure 4



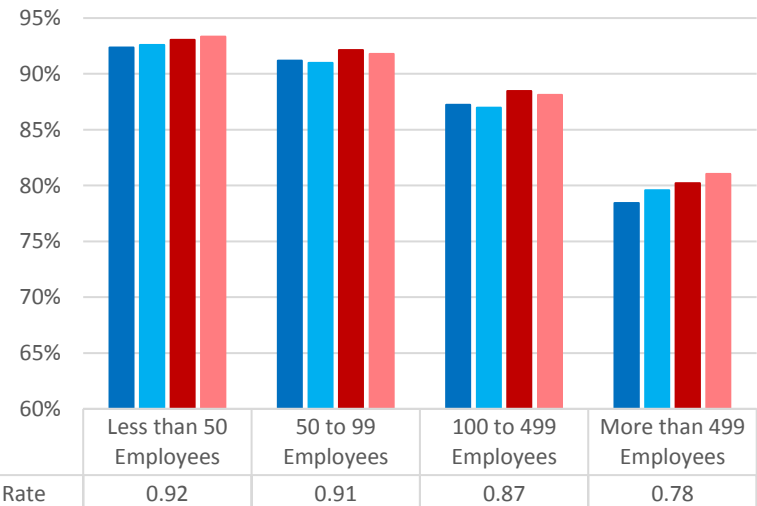
Response Rates for Establishment (Figure 5) and Occupational (Figure 6 & 7) Units by Employment Size

Figure 5



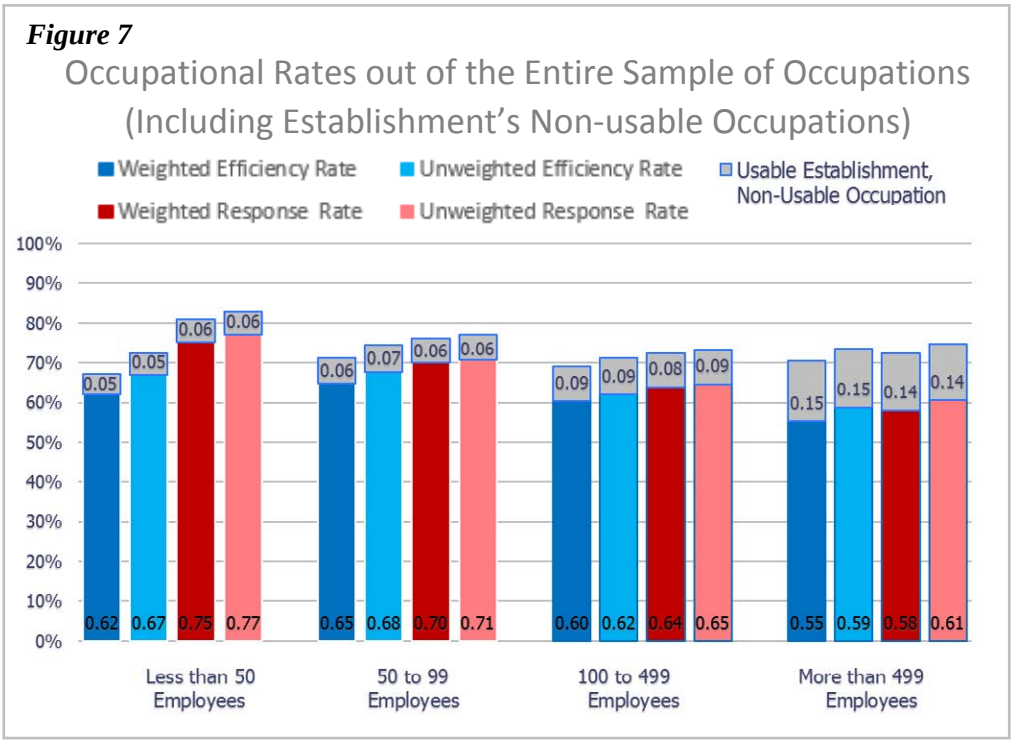
	Less than 50 Employees	50 to 99 Employees	100 to 499 Employees	More than 499 Employees
Weighted Efficiency Rate	0.67	0.71	0.69	0.71
Unweighted Efficiency Rate	0.72	0.74	0.71	0.74
Weighted Response Rate	0.81	0.76	0.72	0.72
Unweighted Response Rate	0.83	0.77	0.73	0.75

Figure 6



	Less than 50 Employees	50 to 99 Employees	100 to 499 Employees	More than 499 Employees
Weighted Efficiency Rate	0.92	0.91	0.87	0.78
Unweighted Efficiency Rate	0.93	0.91	0.87	0.80
Weighted Response Rate	0.93	0.92	0.88	0.80
Unweighted Response Rate	0.93	0.92	0.88	0.81

Figure 7



Response Rates for Establishment (Figure 8) and Occupational (Figure 9) Units by Ownership Status

Figure 8 Ownership Status: Rates (in Establishment Units)

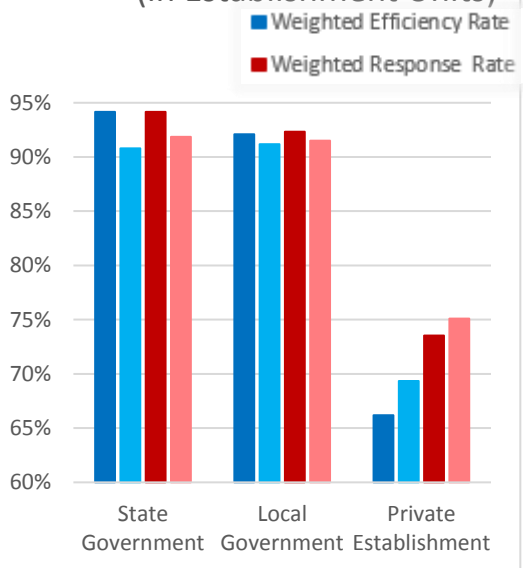


Figure 9 Ownership Status: Rates (in Occupational Units)