



September 29, 2021

MEMORANDUM FOR: David Swanson, Branch Chief
Branch of Consumer Expenditure Survey
Price Statistical Methods Division
Office of Prices and Living Conditions

MEMORANDUM FROM: Lauren Vermeer, Mathematical Statistician
Branch of Consumer Expenditure Survey
Price Statistical Methods Division
Office of Prices and Living Conditions

Sharon Krieger, Mathematical Statistician
Branch of Consumer Expenditure Survey
Price Statistical Methods Division
Office of Prices and Living Conditions

SUBJECT: Response Rate Computations for the Consumer Expenditure Survey

1. Introduction

This memo documents the codes and formulas used to calculate response rates in the Consumer Expenditure Survey (CE). It updates a memo that was written by Sharon Krieger in 2004; updated by Sally Reyes-Morales in 2011; and updated again by Brian Nix in 2018. It includes more recent data as well as descriptions of the changes made in the processing of response rate codes over the years.

The CE consists of two separate surveys, a quarterly Interview survey (CEQ) and a weekly Diary survey (CED). Response rates are computed separately for each survey, since each survey has its own questionnaire and its own sample of households.¹ The United States Census Bureau (Census) carries out data collection for both surveys under contract with the Bureau of Labor Statistics (BLS).

Response rates are calculated for both surveys at different stages of data processing by both Census and BLS. Differences between these response rates are the result of changes made during data processing at both agencies, and also differences in the way interviews and noninterviews are defined by the two agencies. Response rates are calculated by two groups at Census (the Field Division, or FLD, and the Associate Directorate for Demographic Programs, or ADDP)², and by one group at BLS (the Statistical Methods Division, or CESMD). Response rates are calculated by three groups for two surveys, which makes six total response rates – three response rates for the CEQ, and three response rates for the CED.

¹ The two surveys have independent samples of households in the sense that each year a systematic sample of 12,000 addresses is drawn from the Census Bureau's sampling frame for the CEQ, and another systematic sample of 12,000 addresses is independently drawn from the sampling frame for the CED. Prior to 2015, a single sample of 240,000 addresses (= 12,000 addresses per year x 10 years x 2 surveys) was drawn for the entire decade for both surveys, with addresses alternatingly assigned to the CEQ and the CED. Thus prior to 2015 the two samples were not independent of each other, but starting in 2015 the two samples are independent of each other. In 2020, the sample sizes increased from 12,000 addresses per year in each survey to 13,175 addresses per year in the CEQ and 17,800 addresses per year in the CED.

² DSMD no longer calculates what we, for historical reasons, continue to call the DSMD response rates; however, BLS still receives them monthly from the Demographic Surveys Division (DSD) and Associate Directorate for Demographic Programs (ADDP) at Census. Since 2016, DSMD began calculating a weighted response rate for the CEQ, in response to an internal program review, and began calculating a weighted response rate for the CED in 2017. However, we do not use these weighted response rates at this time at BLS.

One formula is used for all six response rate computations:

$$\text{Response Rate} = \frac{\# \text{ Completed Interviews}}{\# \text{ Eligible Cases}} \times 100\%$$

where the denominator is the total number of eligible housing units in the sample, and the numerator is the number of eligible housing units that completed an interview. The formula is consistent throughout the three groups, however, each group has different definitions of eligible housing units and completed interviews, which cause their response rates to be different.

2. Concepts and Definitions

The response rate computation hinges on the definition of a "case," as well as key concepts to describe and categorize these cases. At the beginning of each month, a Field Representative (FR) is given a list of addresses and consumer units (CUs) from which they are expected to collect data. This list is often referred to as a FR's initial caseload. For every address on a FR's initial caseload, a separate case is created for each CU. On rare occasions, an address may have a household with more than one CU (multi-CU households), and each of these CUs is considered its own case. A FR's caseload at the end of the month includes the initial caseload, plus any additional CUs a FR found at the assigned addresses. For this reason, the total number of cases may differ between the beginning and end of a month.

For each case on their caseload a FR assigns an "outcome code," which is a three-digit code describing the success of an interview or the general reason for a noninterview. The specific outcome codes and what they mean will be described in more detail later. These outcome codes are used to categorize cases at higher levels based on three key concepts: "type," "eligibility," and "in-scope" status.

A case's "type" is determined by the outcome codes FRs assigned during the data collection process, and each case is categorized as one of four types, depending on the success of the interview or the reason for the noninterview. The four types are Completed interviews, Type A noninterviews, Type B noninterviews, and Type C noninterviews. Completed interviews occur when a sample address is an occupied housing unit whose residents are within the CE's target population (the civilian noninstitutional population), and whose residents have successfully completed an interview. In all other instances cases are noninterviews which are categorized as Type A, Type B, or Type C.

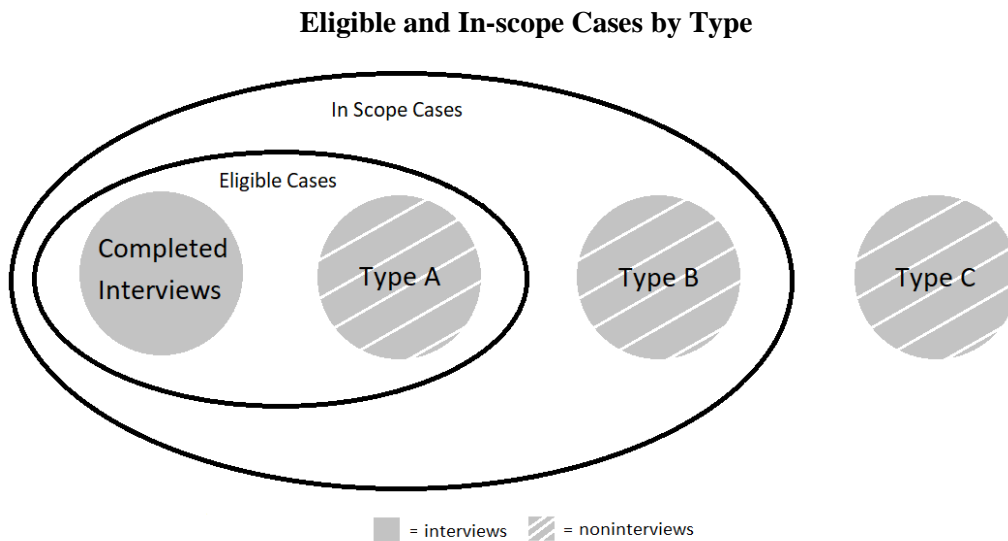
Type A noninterviews occur when a sample address is an occupied housing unit whose residents are within the CE's target population, but whose residents did not complete an interview. Type A noninterviews are most often housing units whose residents either refused to complete the interview or could not be contacted after many attempts. Type B noninterviews occur when a sample address is an unoccupied housing unit which is intended for occupancy by residents who are within the CE's target population, or an occupied housing unit which is found to be occupied by individuals who are not within the CE's target population. Type B noninterviews are most often vacant housing units that are for sale or rent, or sometimes a housing unit with occupants who have a usual residence elsewhere. Finally, Type C noninterviews occur when a sample address is a housing unit that was demolished or converted to nonresidential use, or is located in a military base or nursing home. Furthermore, Type C noninterviews have no chance of becoming part of the survey in a future interview since the condition is considered permanent.

A case's "eligibility" indicates if a sample address may participate in the survey, based on the address' residents. A case is considered eligible to participate in the survey if it has a housing unit that is occupied by residents who are within the CE's target population, whether or not a completed interview occurs; otherwise it is ineligible. Completed interviews and Type A noninterviews are both considered eligible. Type B noninterviews are considered ineligible with a chance of becoming eligible in a future interview; and Type C noninterviews are considered ineligible without a chance of becoming eligible in a future interview.

A case’s “in-scope” status indicates if a sample address may participate in the survey, based on the address’ “physical architecture,” meaning the address has a residential housing unit such as a house, condominium, or apartment. It includes residential housing units that are occupied, or intended for occupancy, by residents who are within the CE’s target population. Completed interviews and Type A/B noninterviews are considered in-scope. Since Type C noninterviews are nonresidential addresses, they are not considered to be in-scope.

The response rate (completed interviews / eligible cases) is one of three rates that can be determined from the total numbers in each type of case. The response rate is useful for measuring how representative a survey is of the sampled population, and it is the subject of this memo. The other two rates that are sometimes determined are the eligibility rate (eligible cases / in-scope cases), useful for measuring the quality of the sample, and the in-scope rate (in-scope cases / all cases), useful for measuring the quality of the sampling frame. The eligibility rate and in-scope rate will not be discussed in this memo.

The diagram below shows how “eligible” and “in-scope” cases are defined by the “type” of interview or noninterview (Type A/B/C).



3. Defining Cases at Census and BLS

An objective of this memo is to explain why Census and BLS present CEQ and CED response rates for the same survey that differ. The differences in the response rates are the result of changes made during data processing by the two agencies, and also differences in the way interviews and noninterviews are defined by the two agencies. There are two important aspects about categorizing cases into interviews and noninterviews, one being how each agency defines a case, and the other being how each agency interprets the outcome code for a case when deeming an interview successful or unsuccessful. This section explains differences in the way the two agencies define a case and use the assigned outcome codes, and a later section explains differences in the way the two agencies categorize outcome codes into interviews and noninterviews in the response rate formula.³ Since the differences are survey specific, they will be described separately for CEQ and CED.

³ Census and BLS categorize the outcome codes into interviews and noninterviews differently for some cases, and the difference centers on questions like the ones that follow. Should a housing unit whose residents are away from home for six months be included in the denominator of the response rate formula? Should an interview that was only partially completed be included in the numerator of the response rate formula? Issues such as these are one of the reasons the three groups have different response rates.

Cases in CEQ

Census and BLS define a case in basically the same way for CEQ, where each quarterly visit for an address is considered an individual case. An address is selected to be in the CEQ survey for four consecutive quarters, which means an address is represented by four cases, each of which has been assigned an outcome code by a FR during data collection. The variable OUTCOME contains these assigned outcome codes, and it is used by both Census and BLS when counting the number of completed interviews and noninterview. The values of OUTCOME for CEQ are defined and described in **Attachment A**.

Sometimes a case for CEQ may switch from one type of interview or noninterview in one quarter to another type in the following quarter. For example, it is possible that a CU may give completed interviews in the first and second quarters, then switch to a Type A noninterview in the third quarter, before finally becoming a Type B noninterview in the fourth quarter. This kind of switching from one type to another type is common in the CEQ for completed interviews and Type A/B noninterviews. However, once a case is classified as a Type C noninterview, it is not possible for it to switch to another type, so it will remain a Type C for the remaining quarters its address is in the sample. Many Type C noninterviews are found during the first quarter an address is in the sample.

Addresses classified as Type C noninterviews are handled in unique ways by Census and BLS. When a case in the CEQ is deemed to be a Type C noninterview in one quarter, the address is removed from a FR's caseload for the remaining quarters it was selected to be in the sample, and it is not visited again. It is presumed that a Type C case cannot improve to a completed interview, or to a Type A/B noninterview, therefore not warranting another visit to the address in a subsequent quarter. In addition, Census does not include these Type C cases for the remaining quarters they are in the sample when they transmit the survey data to BLS. However, the system at Census does include them in their case totals for the remaining quarters they were expected to be in the sample, which keeps the total number of addresses in the sampling frame consistent. This is because Census' purpose is to measure the quality of the sampling frame.

Unlike Census, the system at BLS does not include these Type C cases in its case totals for the remaining quarters they were expected to be in the sample. And since Census does not include these cases when they transmit the survey data to BLS, the system at BLS will automatically generate a Type C case during data processing for the remaining quarters they were expected to be in the sample. This allows BLS to maintain a complete history for these Type C cases for all four quarters they were expected to be in the sample, even though they are not included in the case totals BLS shows in internal response rate memos. This is because BLS's purpose is to measure the success of the interview process, and a Type C address is no longer part of that process.

A unique situation occurs when a CEQ case becomes a Type C noninterview with an outcome code describing that a "CU moved." This means an "original" CU moved away from a sample address during one of its four quarters in the sample, and it is one of the most common reasons for a Type C noninterview. The CE's sample is a random selection of addresses and not a random sample of CUs, so a FR does not follow an original CU to its new location when it moves away from a sample address. Instead a FR attempts to get an interview from a "replacement" CU that moves into this sample address. A replacement CU will participate in the survey for the remaining quarters a sample address was expected to be in the sample when it was selected. This means that a replacement CU will participate in the survey for fewer than four quarters.

Cases in CED

Census and BLS define a case differently for CED, where Census treats the two weekly diaries at an address as one case, while BLS treats them as two individual cases. An address is selected to be in the CED survey for two consecutive weeks, each of which has been assigned an individual outcome code by a FR during data collection. In addition to the outcome code assigned for the week 1 diary (PICK_UP1) and the outcome code assigned for the week 2 diary (PICK_UP2), Census assigns a third outcome code which summarizes the individual outcome codes from the two weekly diaries (OUTCOME). In summary, each case in Census' data has information about two weekly diaries, and includes three outcome code variables (PICK_UP1, PICK_UP2, and OUTCOME).

After receiving the monthly data from Census, BLS separates the two weekly diaries at each address into two unique cases, one case for the week 1 diary and another case for the week 2 diary. This means that the number of cases in BLS's data is twice the number of cases in Census' data. Then BLS uses the individual outcome codes a FR assigned for the week 1 diary (PICK_UP1) and for the week 2 diary (PICK_UP2) to create a common variable in its data called PICKCODE, which contains the value in PICK_UP1 if the case is a week 1 diary and the value in PICK_UP2 if the case is a week 2 diary. The summary level outcome code assigned by Census (OUTCOME) is also copied into the BLS's data. In summary, each case in BLS's data has information about one weekly diary, and includes two outcome variables (PICKCODE and OUTCOME).

When counting the number of completed interviews and noninterviews for CED, the variable OUTCOME is used by FLD, the variables PICK_UP1 and PICK_UP2 are used by ADDP, and the variable PICKCODE is used by BLS. The values of PICK_UP1, PICK_UP2, OUTCOME, and PICKCODE for CED are defined and described in **Attachment A**.

Sometimes a case for the CED may switch between a completed interview and a noninterview during the two diary weeks, but this occurs much less frequently in the CED than in the CEQ. Less switching occurs because the CED takes place in two consecutive weeks and the CEQ takes place over four consecutive quarters, and a CU's circumstances are less likely to change between weeks in comparison to between quarters. For example, it is possible that a CU may give a completed interview in its first week, and then switch to a Type A noninterview in its second week, and vice versa. When this happens, FLD at Census counts the case as one complete interview, while ADDP at Census and BLS count one case as a completed interview and the other case as a Type A noninterview. However, this kind of switching is in the CED rare, and it is restricted to completed interviews and Type A noninterviews. When a case in the CED is assigned as a Type B noninterview by a FR, then it is a Type B noninterview for both weekly diaries, and when a case in the CED is assigned as a Type C noninterview by a FR, then it is a Type C noninterview for both weekly diaries. These differences in the way Census and BLS define a case for CED contribute to the different response rates reported by Census and BLS.

4. Monthly Reports from Census

Every month, Census sends BLS two progress reports on the collection process -- one showing response rates for CEQ and CED calculated by FLD ("Field RR"), and another showing response rates for CEQ and CED calculated by ADDP ("DSMD RR"). In this memo, the response rates presented in these two reports are compared with the response rates calculated by CESMD.

The first progress report, "CE Comparison and Progress Final Report," includes response rates ("Field RR") calculated using the outcome codes pulled directly from the Regional Office Survey Control Operation (ROSCO) system. These response rates are calculated using the outcome codes assigned in the field during data collection. The "Field RR" report uses the variable OUTCOME for both CEQ and CED.

The second progress report, "CE Diary Regional Group Monthly Rates" and "CE Quarterly Regional Group Monthly Rates," includes the response rates ("DSMD RR") calculated by ADDP, at both the national level and for each of the regional offices. These response rates are calculated using the final outcome codes after data processing at Census has finished, which means the response rates in this progress report are different from those in the first progress report. The "DSMD RR" report uses the variable OUTCOME for CEQ, and it uses the variables PICK_UP1 and PICK_UP2 for CED.

For CED, the "Field RR" report and the "DSMD RR" report are different for two reasons, one being changes during data processing at Census, and the other being that the "Field RR" report shows counts and statistics for cases using the variable OUTCOME, and the "DSMD RR" report shows counts and statistics for weekly diaries using the variables PICK_UP1 and PICK_UP2.

5. Data Processing at BLS

Monthly data are received at BLS from the Census Bureau for both surveys and are processed by the Initial Edit System (IES), formerly known as the Phase 2 system. When BLS receives the monthly data from Census, the data is reformatted with BLS variable names and saved into SAS datasets in the IES database for CEQ and CED, as detailed in the IES data dictionaries. For CED this includes the process when each case in the Census data is separated into two cases in the BLS data, one case for a CU's week 1 diary and one case for a CU's week 2 diary.

The IES has several screening processes in place to ensure data quality. One of these is to screen out CEQ and CED cases with an outcome code of 290 (Type C – spawned in error), which gets assigned when an additional CU case for an address in the sample is accidentally generated during the data collection process. These erroneous cases are screened out early in the process when BLS drops them from the monthly data received from Census.

Another IES screening process is the minimal expenditure edit, a process which screens out cases with no entries or unusually low reported total expenditures, and then reclassifies their response status from interviews to noninterviews. The minimal expenditure edit has been in place in the CED since 2002, and in the CEQ since 2006.

In the minimal expenditure edit in the CEQ, households are selected by an automated procedure, then manually reviewed on an individual basis before being reclassified as Type A noninterviews with an OUTCOME of 219. However, in the CED, the minimal expenditure edit is an entirely automated procedure, and none of the selected diaries are manually reviewed before being reclassified as Type A noninterviews with a PICKCODE of 219. On average, 0.3% of all CEQ cases and 7.5% of all CED cases are reclassified under the minimal expenditure edit.

The next stage of processing is the Edit and Estimation System (EES), formerly known as Phase 3. After the EES is completed, the official response rates are calculated by CESMD, using the variable OUTCOME for the CEQ and the variable PICKCODE for the CED.

(For complete OUTCOME and PICKCODE definitions, see **Attachment A**.)

6. Response Rate Computation

As mentioned earlier, an objective of this memo is to explain why Census and BLS present differing CEQ and CED response rates for the same survey. Since all three groups at Census and BLS use the same formula it is natural to think all three response rates would be exactly the same for each survey. However, relatively small differences exist in spite of using the same formula. The general reason is that Census and BLS use the outcome codes assigned to cases in the response rate calculation to measure different concepts, and therefore they sometimes categorize them differently into interviews and noninterviews. Census is measuring the performance of its FRs over all their assigned cases, while BLS is measuring the FRs' ability to collect usable data for the final expenditure estimates.

This section focuses on how the specific outcome codes FRs assigned to cases in CEQ and CED are categorized as completed interviews and Type A noninterviews in the response rate formula. Since the differences are survey specific, they will be described separately for CEQ and CED.

This section also describes the trend lines for annual response rates presented by "Field," "DSMD," and BLS from 2010 to 2020, which are shown in Graph 1 below for CEQ, and in Graph 2 below for CED. **Attachment B** shows a table with the annual response rates from "Field," "DSMD," and BLS, which were used to generate the trend lines in Graph 1 and Graph 2, along with difference measures between the three groups.

CEQ Response Rates

For CEQ, all three response rate calculations (“Field,” “DSMD,” and BLS) use the outcome code in the variable OUTCOME, where each quarterly interview is considered an individual case. This is the formula:

$$\begin{aligned}
 \text{CEQ Response Rate} &= \frac{\text{Completed Interviews}}{\text{Eligible Cases}} \times 100\% \\
 &= \frac{\text{Completed Interviews}}{\text{Completed Interviews} + \text{Type A Noninterviews}} \times 100\% \\
 &= \frac{(201 + 203)}{(201 + 203) + (215 + 216 + 217 + 219 + 321 + 322 + 323 + 324)} \times 100\%
 \end{aligned}$$

Currently, the annual response rates from all three groups are relatively similar (except for 2020), as seen in Graph 1, but they differ slightly for Census and BLS prior to 2015. One reason for the change is that prior to 2015, the CEQ consisted of five interviews; and Census used all five interviews in their response rate calculations, but BLS used only the last four interviews in their response rate calculations. The first interview was a "bounding interview," which provided baseline data and was designed to remove out-of-scope expenditures that respondents tend to report through a flawed cognitive process called “telescoping.”⁴ Census included the bounding interview in its response rate calculations, because expenditure information was collected. However, BLS did not include the bounding interview in its response rate calculations, because the expenditure information collected was not used in the published expenditure estimates. The difference in how Census and BLS treated bounding interviews in their response rate calculations resulted in the slight differences observed prior to 2015.

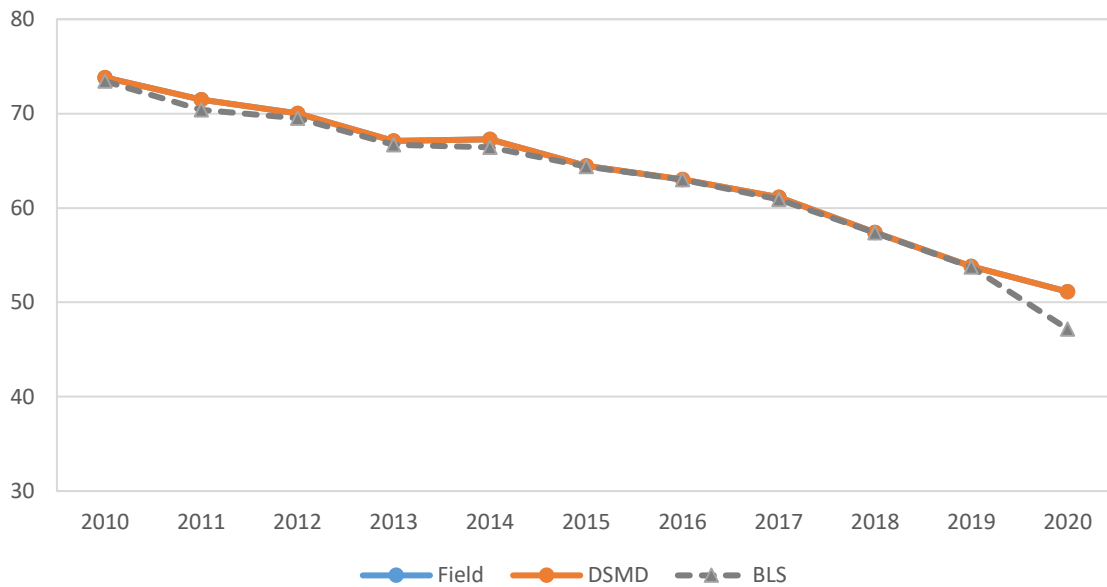
Overall, for the annual CEQ response rates shown in Graph 1 and **Attachment B**, the “Field” and “DSMD” response rates are nearly identical for most years, and the BLS response rates tend to be lower, except in 2020 when there is a more noticeable difference. The small differences in the response rates calculated by the three groups are primarily the result of changes made to the response status of a few cases during data processing. At BLS these changes occur during the minimal expenditure edit, which screens out cases with no entries or unusually low reported total expenditures, and then reclassifies their response status from completed interviews to Type A noninterviews.

Graph 1 shows that response rates for CEQ have been declining in recent years, and in 2020 the COVID-19 pandemic contributed further to this trend. In mid-March of 2020, the COVID-19 pandemic temporarily impacted the CE data collection process, such that FRs were instructed to transition to telephone interviews in place of the usual in-person interviews. The impact of the pandemic on data collection resulted in a drop in the 2020 response rates for both Census and BLS, but more significantly for BLS. Between 2010 and 2019, the average difference between the “DSMD” response rate and the BLS response rate was 0.37 percentage points, but in 2020 the difference increased to 3.95 percentage points.

⁴ Telescoping is the flawed cognitive process in which a respondent incorrectly recalls expenditures made outside the recall period to have been made inside the recall period. In 1964, John Neter and Joseph Waksberg found that telescoping was a significant problem in expenditure surveys, and they developed the concept of the bounding interview to reduce its effect. However, past research by various people in the CE program (Ian Elkin, Catherine Hackett, Neil Tseng, et. al.) found that it was no longer a significant problem in our survey, paving the way for the removal of the bounding interview from the CE survey in 2015.

The pandemic was more impactful on BLS response rates than on Census response rates because the two agencies treated cases of unknown eligibility differently (i.e., FRs were unable to establish phone contact with someone at an address). Census considered these cases as Type B noninterviews because they wanted to avoid a FR’s performance level from being negatively impacted by restrictions during the pandemic; BLS considered these cases as Type A noninterviews because they wanted to be conservative when classifying cases of unknown eligibility, in line with recommendations of the American Association for Public Opinion Research (AAPOR). For Census, this meant fewer Type A noninterviews in the denominator of their response rate calculation, and for BLS this meant more Type A noninterviews in the denominator of their response rate calculation.

Graph 1: CEQ Annual Response Rates (2010-2020)



CED Response Rates

Although the response rate formula shown in the introduction is used to calculate all of the response rates for CED, differences in the way the three groups at Census and BLS define a case, as well as differences in how they categorize some of the outcome codes into completed interviews and Type A noninterviews, can result in big differences among response rate calculations from Census and BLS.

This is the formula all three groups use:

$$\begin{aligned}
 \text{CED Response Rate} &= \frac{\text{Completed Interviews}}{\text{Eligible Cases}} \times 100\% \\
 &= \frac{\text{Completed Interviews}}{\text{Completed Cases} + \text{Type A Cases}} \times 100\%
 \end{aligned}$$

Currently, the “Field”, “DSMD,” and BLS each use a different version of the RR formula

The “Field” version of the RR formula for CED uses the variable OUTCOME and is as follows:

$$RR = \frac{(201 + 203 + 206 + \text{reclassified cases})}{(201 + 203 + 206 + \text{reclassified cases}) + (216 + 217 + 219 + 320 + 321 + 322 + 323 + 324 + 325 + 326)} \times 100\%$$

The “DSMD” version of the RR formula for CED uses the variables PICK_UP1 and PICK_UP2 and is as follows:

$$RR = \frac{(201 + \text{reclassified cases})}{(201 + \text{reclassified cases}) + (216 + 217 + 219 + 321 + 322 + 323 + 324 + 325 + 326)} \times 100\%$$

BLS also uses a different version of the RR formula, where each weekly diary is considered to be a separate case, and the cases' outcome codes are in the variable PICKCODE.⁵

The BLS version of the RR formula for CED uses the variable PICKCODE and is as follows:

$$RR = \frac{(201 + 217)}{(201 + 217) + (216 + 219 + 320 + 321 + 322 + 323 + 324 + 325 + 326 + \text{reclassified cases})} \times 100\%$$

The response rates between the three groups has differed throughout the years, as visible in Graph 2. This difference can be partially attributed to the fact that three different response rate formulas are used – one formula used by “Field”, one formula used by “DSMD”, and one formula used by BLS. Other differences between the CED response rates can be attributed to historical changes over the years, such as the 2013 government shutdown, reclassification of codes, and COVID-19.

As seen in “Field” version of the RR formula, are two outcome codes, 203 and 206, which the “DSMD” and BLS versions of the formula do not use. This is because “Field” uses an outcome status for both diary weeks combined in their calculation (OUTCOME), and these two codes are not applicable in neither the “DSMD” nor BLS version of the RR formula. “Field” assigns the outcome code 203 when a case is “Week 1 interview, Week 2 Type A,” and the outcome code 206 when a case is “Week 1 Type A, Week 2 interview,” and treats these cases as completed interviews in their response rate calculation, even though only one diary week was a completed interview. In contrast, both “DSMD” and BLS treat one diary week as a completed interview and one diary week as a Type A noninterview in their response rate calculation. This contributes to differences between “Field,” “DSMD,” and BLS response rate calculations for CED.

Both formulas mention “reclassified cases,” which are the interviews automatically selected by the minimal expenditure edit to be Type A noninterviews. However, “Field” and “DSMD” consider these reclassified cases to be Complete Interviews, while BLS considers them to be Type A noninterviews.

While CED response rates have been trending downward, there was a sharp decline in 2013. This was due to the 2013 federal government shutdown, when data could not be collected because sample households were not able to be visited.

⁵ The variable PICKCODE in the BLS data is a recode of the variables PICK_UP1 and PICK_UP2 in the Census data. When Census FRs visit a case, they assign an outcome code for each of the two weekly diaries, which are in the variables PICK_UP1 and PICK_UP2, and later on another outcome code is assigned which summarizes the outcome status of both weekly diaries in the variable OUTCOME. Census transmits the CED monthly data to BLS in their format using their variable names, where a case is two weekly diaries for each CU, with three outcome code variables (PICK_UP1, PICK_UP2, and OUTCOME). After receiving the monthly data, BLS separates each CED case from Census into two cases for each CU, where one case is for the CU in Week 1 and the other case is for the same CU in Week 2, with each case having two outcome codes (PICKCODE and OUTCOME). The variable PICKCODE at BLS is created using PICK_UP1 for Week 1 diaries and PICK_UP2 for Week 2 diaries; and the variable OUTCOME is the same at Census and BLS.

Since 2017, the annual response rates for CED from “Field” and “DSMD” have been relatively similar, despite the use of different formulas. This similarity seen from 2017 onward can be attributed to the reclassification of “Temporarily Absent” cases (outcome code 217) which occurred in 2016. (Temporarily Absent cases occur when the CU is not at home during the interview period, due to vacation or business trip, lasting less than six months. Since they have no expenditures at home during that week, BLS considers them complete diaries, with a valid total expenditure of \$0.) Prior to 2017⁶, Temporarily Absent cases were classified as Type B noninterviews for “Field’s” calculations, but were classified as Type A noninterviews for “DSMD’s” calculations. As of 2017, both “Field” and “DSMD” classified Temporarily Absent cases as Type A noninterviews, resulting in similar response rates from the two groups.

Another reclassification occurred in 2017 for Census’ two groups, with outcome code 326. This outcome code describes a case which are blank diaries, where the majority of items recalled by the respondent are without receipts. Prior to 2017, both “Field” and “DSMD” classified outcome code 326 as Type B noninterviews, and BLS classified outcome code 326 as Type A noninterviews. In 2017, BLS requested that “Field” and “DSMD” reclassify these cases to Type A noninterviews, meaning the classification is now streamlined between the three groups.

COVID-19 also factored into the 2020 CED response rates differing between the three groups, but with more significant response rate differences than CEQ. Similar to CEQ, CED data collection abided by mandated changes, which initially required contact attempts and interviews to be conducted only by phone. However, unlike CEQ, these selected addresses had not been visited prior to the pandemic. This meant that the CU’s contact information may not have been reliable, and there was a larger chance that the CU could not be reached. Due to this limitation, CED saw a sharper decrease and larger difference in response rates in 2020. The average historical difference between “DSMD’s” CED response rate and BLS’ response rate was 1.65 percentage points. However, in 2020, the CED response rate difference increased to 10.69 percentage points.

⁶ Prior to 2017, “Field” and “DSMD” used earlier versions of the RR formula, where the main difference was that the outcome code 217 (Temporarily absent) was treated as a Type B noninterview in “Field’s” version of the formula. Other differences have to do with outcome codes 203, 206, and 320.

(Footnote continued on next page)

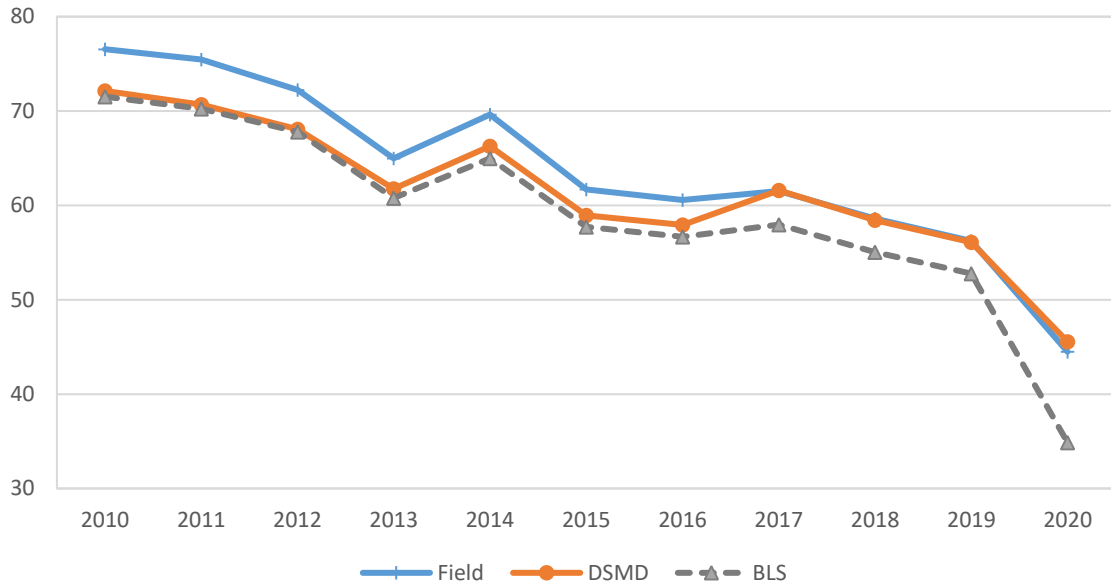
Pre-2017 version of the “Field” CED Response Rate formula:

$$RR = \frac{(201 + 203 + 206 + \text{reclassified cases})}{(201 + 203 + 206 + \text{reclassified cases}) + (210 + 216 + 219 + 320 + 321 + 322 + 323 + 324 + 325)} \times 100\%$$

Pre-2017 version of the “DSMD” CED Response Rate formula:

$$RR = \frac{(201 + \text{reclassified cases})}{(201 + \text{reclassified cases}) + (210 + 216 + 217 + 219 + 321 + 322 + 323 + 324 + 325)} \times 100\%$$

Graph 2: CED Annual Response Rates (2010-2020)



7. Further Reading

Bass, S. (2008). “Reclassifying Low-Expenditure Consumer Units in the Consumer Expenditure Interview Survey.” Consumer Expenditure Survey Anthology, 2008. (<https://www.bls.gov/cex/anthology08/csxanth6.pdf>)

Elkin, I. (2013). “Recommendation Regarding the Use of a CE Bounding Interview.” BLS research paper. (https://www.bls.gov/cex/research_papers/pdf/Recommendation-Regarding-the-Use-of-a-CE-Bounding-Interview.pdf)

Hackett, C. (2011). “Consumer Expenditure Quarterly Interview Survey: Effectiveness of the Bounding Interview.” BLS internal report.

Neter, J. and Waksberg, J. (1964). “A study of response errors in expenditure data from household interviews.” Journal of the American Statistical Association, 59, 18-55.

Reyes-Morales, S. (2011). “Consumer Expenditure Survey: Differences in Response Rates.” BLS internal report.

Tseng, N., and Tan, L. (2009). “An exploration of the effectiveness of the Bounding Interview in the Consumer Expenditure Interview Survey.” BLS internal report.

cc: S. Ash
B. Nix
B. Steinberg
D. Swanson

ATTACHMENT A: 2020 Outcome Codes for CEQ and CED

CEQ Codes	Completed Interviews				Type A Noninterviews								Type B Noninterviews								Type C Noninterviews																
Field/DSMD	201	203			215	216	217	219		321	322	323	324			224	225	226	228	229	231	232	233	331	332	240	241	243	244	245	247	248	252	258	259	341	342
BLS	201	203			215	216	217	219		321	322	323	324			224	225	226	228	229	231	232	233	331	332	240	241	243	244	245	247	248	252	258	259	341	342

CED Codes	Completed Interviews				Type A Noninterviews								Type B Noninterviews								Type C Noninterviews																
Field	201	203	206			216	217	219	320	321	322	323	324	325	326	224	225	226	228	229	231	232	233	331	332	240	241	243	244	245	247	248	252	258	259	341	342
DSMD	201					216	217	219		321	322	323	324	325	326	224	225	226	228	229	231	232	233	331	332	240	241	243	244	245	247	248	252	258	259	341	342
BLS	201			217		216		219	320	321	322	323	324	325	326	224	225	226	228	229	231	232	233	331	332	240	241	243	244	245	247	248	252	258	259	341	342

The CEQ codes in the above table are given as OUTCOME for Field, DSMD, and BLS; and the CED codes in the above table are given as OUTCOME for Field, PICK_UP1/PICK_UP2 for DSMD, and PICKCODE for BLS.

**Completed interview codes were expanded in 2020 by both Field and DSMD to include online diary cases, as a result of COVID-19. Codes 204, 205, 207, 208, 298, and 299 indicate a completed CED interview for Field, and codes 298 and 299 indicate a completed CED interview for DSMD. Descriptions of these new-for-2020 codes can be found below.

Outcome Code Descriptions for Eligible Cases – Interviews and Type A Noninterviews

Code	<u>Description for CEQ</u>	<u>Description for CED</u>		Notes about Response Rates
	Field/DSMD/BLS (OUTCOME)	Field (OUTCOME)	BLS (PICKCODE) & DSMD (PICK_UP1, PICK_UP2)	
201	Completed interview	Completed interview	Completed interview	
203	Transmit, no more follow-up possible (Through Section 20 complete)	Week 1 interview, Week 2 Type A		Completed interview for CEQ in BLS RRs; Completed interview for CED in Census RRs
206		Week 1 Type A, Week 2 interview		Completed interview for CED in Census RRs
215	Type A – Insufficient partial			
216	Type A – No one home, unable to contact	Type A – No one home, unable to contact	Type A – No one home, unable to contact	
217	Type A – Temporarily absent	Interview – Temporarily Absent	Type A – Temporarily Absent	Completed interview for CED only in BLS RRs; Otherwise Type A
219	Type A – Other	Type A – Other	Type A – Other	
320			Type A – Week 2 diary picked up too early	Type A for CED only in BLS RRs
321	Type A – Refused, Hostile respondent	Type A – Refused, Hostile respondent	Type A – Refused, Hostile respondent	
322	Type A – Refused, Time-related excuses	Type A – Refused, Time-related excuses	Type A – Refused, Time-related excuses	
323	Type A – Refused, Language problems	Type A – Refused, Language problems	Type A – Refused, Language problems	
324	Type A – Refused, Other	Type A – Refused, Other	Type A – Refused, Other	
325		Type A – Diary placed too late	Type A – Diary placed too late	
326		Type A – Blank Diary (majority of items recalled without receipts)	Type A – Blank Diary (majority of items recalled without receipts)	

ATTACHMENT A: 2020 Outcome Codes for CEQ and CED -- *continued*

Outcome Code Descriptions for Ineligible Cases – Type B and Type C Noninterviews

Code	Description for CEQ and CED
224	Type B – All persons under 16
225	Type B – Occupied by persons with URE
226	Type B – Vacant for rent
331	Type B – Vacant for sale
332	Type B – Vacant other
228	Type B – Unfit, to be demolished
229	Type B – Under construction, not ready
231	Type B – Unoccupied tent/trailer site
232	Type B – Permit granted, construction not started
233	Type B – Other
240	Type C – Demolished
241	Type C – House or trailer moved
243	Type C – Converted to permanent nonresidential use
244	Type C – Merged units within the same structure
245	Type C – Condemned
246*	Type C – Built After April 1, 1990
247	Type C – Unused serial number on listing sheet
248	Type C – Other
252	Type C – Located on military base or post
256*	Type C – Removed during subsampling
257*	Type C – Unit already had a chance of selection
258	Type C – Unlocated sample address
259	Type C – Unit does not exist or is out of scope
341	Type C – CU moved
342	Type C – CU merged with another CU within the same address

*As of 2015, these ineligible case codes are no longer used.

Outcome Code Descriptions for Completed Interviews – Used ONLY by Field and DSMD, added in 2020

Code	Description for CED: Field (OUTCOME)	Description for CED: DSMD (PICK_UP1, PICK_UP2)
204	Online diary with CAPI recall in Week 1, Online diary in Week 2	
205	Online diary in Week 1 interview, Week 2 Type A	
207	Online diary in Week 1, Online diary with CAPI recall in Week 2	
208	Week 1 Type A, Online diary in Week 2	
298	Online diaries with CAPI recall in Week 1 and Week 2 interview	Online diaries with CAPI recall in Week 1 and Week 2 interview
299	Online diaries in Week 1 and Week 2 interview	Online diaries in Week 1 and Week 2 interview

ATTACHMENT B: Consumer Expenditure Survey Response Rates: CEQ and CED

CEQ Response Rates from 2010 – 2020

COLLECTION YEAR	FIELD RR %	DSMD RR %	DIFFERENCE (FIELD – DSMD)	BLS RR %	DIFFERENCE (DSMD – BLS)
2010	73.83	73.83	0.00	73.43	0.40
2011	71.49	71.49	0.00	70.38	1.11
2012	70.03	70.03	0.00	69.51	0.52
2013	67.09	67.09	0.00	66.70	0.39
2014	67.27	67.27	0.00	66.43	0.85
2015	64.46	64.45	0.01	64.40	0.04
2016	62.99	63.03	-0.04	63.01	0.02
2017	61.14	61.14	0.00	60.90	0.24
2018	57.40	57.40	0.00	57.37	0.03
2019	53.80	53.81	-0.01	53.73	0.08
2020	51.13	51.13	0.00	47.18	3.95

CED Response Rates from 2010 – 2020

COLLECTION YEAR	FIELD RR %	DSMD RR %	DIFFERENCE (FIELD – DSMD)	BLS RR %	DIFFERENCE (DSMD – BLS)
2010	76.55	72.13	4.42	71.52	0.61
2011	75.45	70.69	4.76	70.25	0.44
2012	72.23	68.07	4.16	67.79	0.28
2013	64.99	61.75	3.24	60.78	0.97
2014	69.62	66.28	3.33	64.98	1.30
2015	61.70	58.93	2.77	57.71	1.21
2016	60.58	57.94	2.64	56.66	1.28
2017	61.52	61.59	-0.07	57.97	3.63
2018	58.60	58.45	0.15	55.03	3.42
2019	56.23	56.11	0.12	52.77	3.34
2020	44.49	45.56	-1.07	34.87	10.69