

Response Analysis Survey: Examining reasons for employment differences between the QCEW and the CES survey¹

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Abstract

The Bureau of Labor Statistics collects employment figures through two programs: the Quarterly Census of Employment and Wages (QCEW) and the Current Employment Statistics (CES) survey. These two programs collect monthly employment counts from an establishment for the same reference period so the employment figures should generally be identical for each establishment. However, differences exist in the monthly employment figures from the two programs – at the micro and aggregate levels, both at a point in time and in seasonal patterns. Using results from a 2008 response analysis survey (RAS) in which 3,000 establishments with large seasonal differences were asked about reasons for differences in employment reported to CES and QCEW, we analyze the employment differences and potential reasons behind them. The results from the RAS point to a number of different reasons for the seasonal CES and QCEW employment differences. An inconsistent use of the reporting reference period and employment definitions contribute to the seasonal differences between the two programs. In addition, differences in an establishment's CES and QCEW report preparation procedures, including where the report is prepared and by whom, contribute to the seasonal differences between the two programs.

Key Words: measurement error, survey and administrative data, employment, response analysis survey, data quality

1. Background

The QCEW is a quarterly census of all U.S. business establishments subject to Unemployment Insurances (UI) taxes. Each quarter the QCEW program receives monthly employment and quarterly wages for approximately nine million establishments. The CES program is a sample-based monthly survey of approximately 390,000 business establishments in the U.S. The CES program collects data on employment, hours, and earnings and is the source of the nonfarm payroll employment figures, a principal federal economic indicator. These two programs are related in several fundamental ways. First, the QCEW serves as the sampling frame for the CES program. Second, the CES program annually benchmarks its employment estimates to universe employment counts derived from the QCEW. Any differences in over-the-year employment growth between the two programs results in benchmark revisions to the CES.

For each program, establishments are instructed to report the number of employees who worked or received pay for the same reference period: the pay period including the 12th day of the month. Establishments are asked to include employees who worked part time or full time during the reference period as well as employees who did not work but who received paid leave during the period. Given the similarities in both reference period and

the definition of employment, the monthly employment figures reported by an establishment to the QCEW and CES should generally be identical. However, at the aggregate level, QCEW and CES have different seasonal patterns, and this difference is fairly consistent from year-to-year. Several patterns are evident from Figures 1 and 2 which plot the QCEW and CES estimates of total U.S. private nonfarm employment from March 2003 to March 2007. From July to August, the difference (QCEW minus CES) increases, as QCEW increases more than CES. From September to October, the difference falls. From October to December, the difference increases, as QCEW increases while CES typically decreases. From December to January, the difference falls, as both QCEW and CES decrease but QCEW decreases more sharply. From January to March, the difference increases, as QCEW and CES both increase but QCEW increases at a faster pace.

There are some slight differences in coverage and scope between the programs that could contribute to differences in the monthly employment figures. First, the QCEW definition of employment refers to workers covered by UI tax laws, whereas the CES definition does not require workers to be covered by UI in order to be counted. This distinction matters only for certain industries.² Second, the QCEW includes agricultural workers and private household workers, whereas these workers are outside the scope of the CES. Third, there are differences in the timing of data collection. For the CES, establishments are contacted monthly and asked about employment for the current month. For the QCEW, establishments complete UI tax forms quarterly and report their employment counts for each of the three months in the quarter on these forms at the same time.

Despite the similarities in the definition of employment (taking into account the scope differences mentioned above), there are several reasons why the QCEW and CES might have differences in employment and seasonal patterns. One class of reasons relates to how the figures are compiled and reported by establishments; we concentrate our RAS study in this area. Since the QCEW and CES data are derived from separate forms that establishments complete at different times, different methods could be followed for compiling employment figures for the two programs. For instance, differences may occur in the source records, the reference period used, the particular types of workers an establishment includes or excludes in the counts, and the person who completes the forms.

Another potential reason behind the seasonal differences is how non-response is handled. The CES does not make any direct adjustment for non-response and essentially uses data from respondents to estimate the percentage growth rate of employment. The QCEW program, by contrast, imputes data for establishments that do not report for a given quarter.³ QCEW and CES also have different methods to deal with business births (openings) and deaths (closings). The QCEW captures these events in real time because it is tied to quarterly tax filings. By contrast, the CES fails to observe them in real time because its sample is drawn only once a year. As a result, the CES uses a model-based approach (using data from the QCEW) to impute the net employment change in its macro-level estimates arising from births and deaths.⁴

Other factors that have been offered as potential reasons for employment differences between the CES and QCEW include sampling error (in the CES) and payroll-processing firm and software procedures. Research on the 2006 CES benchmark revision concluded that QCEW imputation, CES non-response, and reporting procedures followed by the payroll-processing firms did not contribute substantially to employment differences. The

research did find that establishment-level reporting differences in some industries, modified estimation procedures used in the aftermath of Hurricane Katrina due to imputation procedures, and birth/death modeling all contributed, to varying degrees, to these differences (Eickman 2007).

2. Response analysis survey

BLS developed a RAS as part of its efforts to improve the quality of data. During a RAS, a respondent is contacted soon after survey completion, usually by telephone, and is asked a short series of standardized questions on record-keeping practices, records availability and use, understanding of survey instructions and definitions, discrepancies between survey definitions and answers, and other data-quality issues. The RAS focused on reasons behind the different seasonal patterns in the CES and QCEW as well as reasons for establishment-level differences in the reported CES and QCEW employment figures. Respondents were asked to provide reasons for the employment differences in their CES and QCEW reported values from January 2006 to June 2007.

Earlier RAS efforts, similar in purpose to the 2008 seasonality RAS discussed in this paper, were also aimed at identifying reasons behind the differences between QCEW and CES. The earlier RAS studies, conducted in 1994 (Werking et al. 1994), 2001, and 2007 (Applebaum et al. 2008), identified a variety of reasons for the employment differences between QCEW and CES. Among those reasons were different respondents reporting data to QCEW and CES for the same establishment, different payroll records being used as the source of the establishment's employment data, the use of payroll providers, using different reference periods, and different categories of workers being included or excluded in the QCEW or CES figures.

There are several advantages of using a RAS to assess data quality. One advantage is that it allows for direct questions to the respondent on the quality of the data provided, such as reasons for potential discrepancies, and also allows for indirect questions on survey instructions and definitions, data sources, record-keeping practices, and records availability and use. Another advantage of the RAS is the ability to use a larger sample size than other data-quality evaluation methods, such as cognitive interviews and respondent debriefings. These methods typically use a sample of size less than 100 while the sample size of BLS RAS studies range from 100 to several thousand respondents. The major difference between this RAS and others conducted by BLS is a longer recall period for respondents. Respondents had to be asked questions about prior-year data because there is a 6–7 month lag between the reporting of QCEW data and its release.

3. Sample Selection: Overview

The 2008 seasonality RAS sample consisted of 3,002 actively reporting establishments of various sizes and industries, most of which were identified as exhibiting different reporting patterns between the CES and QCEW from January 2006 to March 2007. The establishments in the RAS sample fell into at least one pre-defined error group⁵ developed to target specific types of reporting differences identified through past research and analysis, some of which are exhibited in Figures 1 and 2. The remainder of the sample (about 3%) was allocated to establishments whose reported employment data to the QCEW and CES were identical (or nearly identical) for all months in which the

establishment participated in the CES. These establishments were treated as a control group for comparison purposes. The error groups were defined as:

Group	Definition	Percentage
A	Establishments exhibiting a different over-the-month change from December 2006 to January 2007 in the CES and QCEW	40%
B	Establishments exhibiting a larger over-the-year buildup in QCEW (between the 2 nd and 4 th quarters), then a larger drop in QCEW in the 1 st quarter of the following year, all relative to CES	4%
C	Establishments exhibiting a higher over-the-year growth in QCEW relative to CES	23%
D	Establishments exhibiting a different over-the-quarter change for 4 th quarter in QCEW, relative to CES	20%
F	Establishments exhibiting constant employment within or across quarters in the QCEW (but not the CES), or with the stair-step phenomenon ⁶ in the QCEW	4.84%
H	Establishments exhibiting constant employment within or across quarters in the CES (but not the QCEW)	4.84%
J	Control group	3.33%

Error groups A, B, and D reflect the seasonal differences between CES and QCEW, seen in Figures 1 and 2. Error groups C, F, and H target other types of reporting issues that contribute to differences between CES and QCEW at both the aggregate and micro level.

4. Questionnaire

The RAS questionnaire was divided into two sections with identical questions: one section focused on the monthly CES report, the other on the Quarterly Contributions Report (QCR) which is the main source of the QCEW data. The questionnaire was designed to gather information on the following topics: payroll, data sources, reporting procedures, record keeping, reference period, types of employees included or excluded in employment counts, and the respondent's opinion of the reason why different employment figures were reported on the CES form and the QCR form.

5. Data Collection

The RAS was conducted by phone from January to June 2008 from a centralized data collection center using a computer assisted telephone interview instrument. The survey was fielded over a span of four months. From a sample of 3,002 establishments, 2,117 responded – for an overall response rate of 71%. Approximately 63% of the establishments contacted answered one or both parts of the questionnaire, while 8% declined to participate in the formal questionnaire but did agree to answer one general question on the reason for the differences. About 19% refused to answer any questions and interviewers were unable to reach the remaining 10% of the sample. Of establishments that completed one or both parts of the questionnaire, 56% completed only the CES section, 44% completed both sections, and less than 1% completed only the QCR section. We used the CES respondent as the first contact since the monthly survey has the most timely contact information. Thus, our response rates were better for the CES

questionnaire section, and in a large percentage of establishments, both the CES and QCEW sections of the questionnaire were completed. In a few establishments (the 1% noted above), interviewers were able to complete the QCEW section of the questionnaire, but not the CES section.

Response rates do not vary a great deal across industries, error groups or geographic location (Table 1). For instance, response rates by industry group vary from 64% in leisure and hospitality to 76% in construction. There generally does not appear to be a group that is represented in the RAS sample but not represented among respondents.

6. RAS Data Quality

There were three main issues thought to impact the quality of the RAS data: non-response, item non-response, and questionnaire administration. Non-response is always a concern because of the possibility that the entire sample is not properly represented in the results. However, as mentioned above, response rates for the seasonality RAS were at an acceptable level, without much difference across industry, state, or error group, and the responding establishments appear to be representative of the entire RAS sample (Table 1). Item non-response occurred when some respondents felt the survey was too burdensome or had an outside organization prepare the QCR figures. In the first situation, interviewers attempted to have respondents at a minimum provide their opinion as to why differences between the CES and QCR figures existed (8% of respondents). In the second situation, BLS did not seek follow-up with certain outside organizations such as payroll providers or did not receive permission from the respondent to contact the outside accountants; when this situation occurred, the QCR portion of the survey was not completed (34% of respondents). Lastly, the administration of the seasonality RAS questionnaire itself could impact the data quality, especially if it is not administered consistently across interviewers. The survey itself was complex and certain questions were difficult to administer. As a result, there were minor inconsistencies but they did not impact the overall results.

7. Analysis

7.1 Reference Period

The inconsistent use of reference periods by an establishment when reporting to CES and on the QCR is one possible reason for the differences between the CES and QCEW. For example, establishments using a monthly count for the QCR as opposed to a count for the pay period of the 12th might overstate the employment as everyone who was paid at any point during the month would be counted at those establishments. Because the annual CES benchmark aligns the sample-based employment estimates to the universe counts from QCEW each March, the overstating of employment counts due to the use of a monthly count might cause the QCEW to show higher growth over-the-year or quarter.

Findings from the RAS suggest that not adhering to the correct reference period adherence does contribute to differences in the employment series. Overall, respondents used the pay period of the 12th for the CES counts far more often than on the QCR form. About 79% of all establishments report CES employment counts for the pay period that includes the 12th of the month, compared to only 45% for the QCR. The control group is more likely to report employment counts for the correct pay period for both CES and QCR, 90% and 76%, respectively. Both CES and QCR respondents with seasonal

differences are more likely to use an incorrect reference period than the control group (19% to 9% for CES and 48% to 18% for QCR).

Looking at specific incorrect reference periods, using a monthly count accounted for about 79% of all incorrect reporting for the QCR, compared to other incorrect reporting types. This would mean those who use a monthly count instead of the pay period of the 12th for the QCR would be more likely to fall into error groups B and C, which indicate greater buildup in the QCEW. The numbers support this theory, as we find that establishments using an incorrect reference period for the QCR are more likely to be in groups B and C (conversely, those reporting correctly are less likely to be in group B and C).

7.2 CES and QCEW employment definitions

In general, CES and QCR respondents should be using the same definition of employment for both reports. However, since the CES and QCEW employment definitions do not include every type of worker an establishment might have on its payroll; this may lead to respondent confusion and inconsistent reporting between the two programs. For example, the employee counts should include employee types such as seasonal and temporary workers, executives and corporate officers, part-time employees, and employees on paid vacation or other paid leave. The employment counts should exclude employee types such as out-of-state employees, persons on leave without pay, and employees who were on-call but not working.

Overall, respondents appear to be reporting most employee types correctly. There is a higher incidence of incorrect reporting among CES respondents. Several types of employees were more likely to be incorrectly reported: out-of-state employees, temporary and seasonal employees, executives and corporate officers, employees on unpaid leave, and on-call employees.⁷ For example, out-of-state employees should not be included in the CES and QCR employment counts. However, nearly 16% of CES respondents incorrectly included out-of-state employees in their counts compared to 8% of QCR respondents. Both temporary and seasonal employees and executives and corporate officials should be included in the CES and QCR employment counts. CES respondents were slightly more likely to incorrectly exclude temporary or seasonal employees and executives and corporate officers from their counts (4% and 9%, respectively) than their QCR counterparts (1% and 4%).

While there are definite inconsistencies between how respondents report certain employee groups to the two programs, the majority of employee types are reported correctly to both programs. When the same person completed both the CES and QCR reports the percentages of incorrect reporting of employee types declined. Since the observed inconsistencies go both ways and the number of observations were small given the variety of employee types among the respondents, we were unable to evaluate the impact of this reporting issue on the particular error groups.

7.3 Payrolls and report preparation

Results from the questions on payrolls and report preparation, including payroll practices and origins of the employment values, suggest that while we cannot point to one major issue that causes the CES and QCEW discrepancies, several issues were identified that appear to contribute to the reported employment differences.

Looking at payrolls, we find that establishments with complex or multiple payrolls are more likely than other firms to exhibit seasonal differences between CES and QCEW. Firms with multiple payrolls have some workers that are paid on one frequency and at least one other set of workers paid on another frequency. Most RAS respondents have a single payroll (84%). However, having multiple payrolls is associated with differences in seasonal patterns between the QCEW and CES: respondents with seasonal differences are more likely to have multiple payrolls than the control group (14% to 1%). Also, establishments with multiple payrolls are more likely than establishments with single payrolls to have differences in employment and seasonal patterns. For example, among establishments with multiple payrolls, 58% are in error group C, exhibiting a higher over-the-year growth in QCEW relative to CES. In contrast, only 44% of establishments with single payrolls are in this error group (Table 2).

Establishments that obtain their CES or QCR employment value from a source other than the payroll tend to report different employment values to the CES and QCR. While only a small percentage of respondents actually reported using a source other than payroll for one or both of the reports, practically all of them had reported employment differences between the two programs. While the location of the payroll processing does not appear to contribute to reported employment differences, the location of the monthly and quarterly report preparation does. Our results suggest that the preparation of the CES or QCR employment report by an outside organization such as a payroll processor, accountant, or corporate headquarters is associated with differences in reported employment between the two programs. This likely means the two reports are not completed by the same person. Additional tabulations suggest that respondents with seasonal differences are more likely to have different people complete the reports than the control group (60% to 39%).

Making changes to software, reports, or other data sources used to compile the employment figures also appears to be associated with reported employment differences between the two programs. A small percentage of respondents (4%) indicated that some sort of change took place that might have affected their CES employment counts during 2006-07; the percentage was identical for the QCEW. While these percentages are small, nearly all of these establishments had reported employment differences between the two programs.

Also, the purging of employee records appears to be associated with different employment values. With regards to the CES, establishments in the control group (no differences in reported employment between the CES and QCR) were more likely to say that they did not clean up or purge records, by a wide margin (73% vs. 51% when compared to establishments that exhibited differences in reported employment). Likewise, with regards to the QCR report, the same general percentages apply. Overall, the data suggest that the purging of employee records contributes to reported employment differences between the two programs.

7.4 Respondent explanation for differences

At the end of the interview, respondents were asked their opinion of what they thought caused the reporting discrepancy between their two reports. The most frequently cited reasons behind the discrepancies were the adherence to the requested employment definition and the use of a reference period other than the pay period that includes the 12th of the month (Table 3). Respondents indicated issues with the employment definition

(incorrect inclusion or exclusion of some employee types) were largely related to the CES while the use of an incorrect reference-period, particularly the use of a monthly count, was largely associated with the QCEW.

Respondents also indicated differences arose from worksite differences (where the data included more than just the requested location), human error such as a clerical or posting error, data sources or timing differences, the counting of checks, and automatic reporting issues where there was an error or a change in the payroll software or provider (Table 4). About 25% of all responses were “don’t know”, in many cases because the respondent was not completing the reports during the time frame in question. The majority of those who answered “don’t know” were from establishments where information was only gathered about one program.

8. Conclusion

The RAS results point to various reasons behind the CES and QCEW differences. Both CES and QCEW are subject to a number of sources of error and the errors vary by program. The reference period, the employment definition requested by both CES and QCEW, complex payroll situations, changes to payroll practices, and general respondent knowledge all contribute to the differences in employment and seasonal patterns.

Our analyses show that using an incorrect reference period leads to seasonal differences. Establishments are less likely to adhere to the 12th of the month reference period when reporting QCR employment counts, a finding supported by respondents’ explanations of reasons for differences. We identified the exclusion or inclusion of certain employee groups as a reason for employment differences; this was also the most commonly reported reason by respondents for CES and QCR differences. The incorrect inclusion or exclusion of employees was primarily associated with the CES.

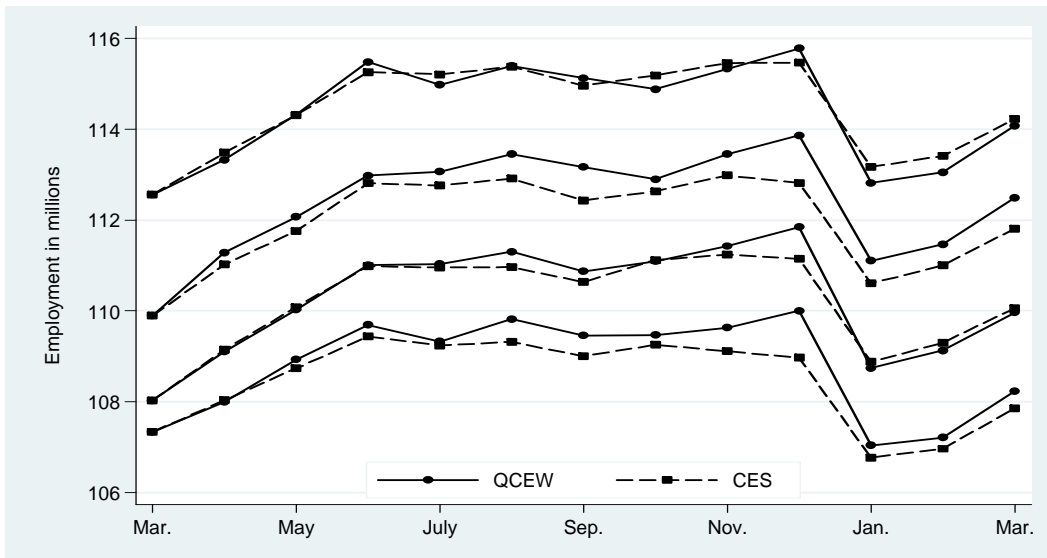
The RAS showed that establishments with more complex payroll situations display larger seasonal differences between the CES and QCEW. In addition to establishments with multiple payrolls, establishments with a single payroll that is weekly compared to monthly are more likely to display different seasonal patterns. This result indicates the greater the payroll complexity and frequency, the greater the odds that CES and QCR employment data are reported differently.

Differences in data sources and the location of employment report preparation, along with changes to the data source and/or report software, factor into CES and QCR employment differences. Establishments that obtain their CES or QCR employment from sources other than payroll tend to report different employment values. In addition, the preparation of CES or QCR reports by outside organizations is associated with seasonal differences, as reports are not completed by the same person. While changes to the software and associated reports used to compile the employment are not commonplace among establishments, they do occur and are associated with employment differences for a small percentage of respondents. Likewise, the purging of employee records appears to be associated with employment differences.

9. Next Steps

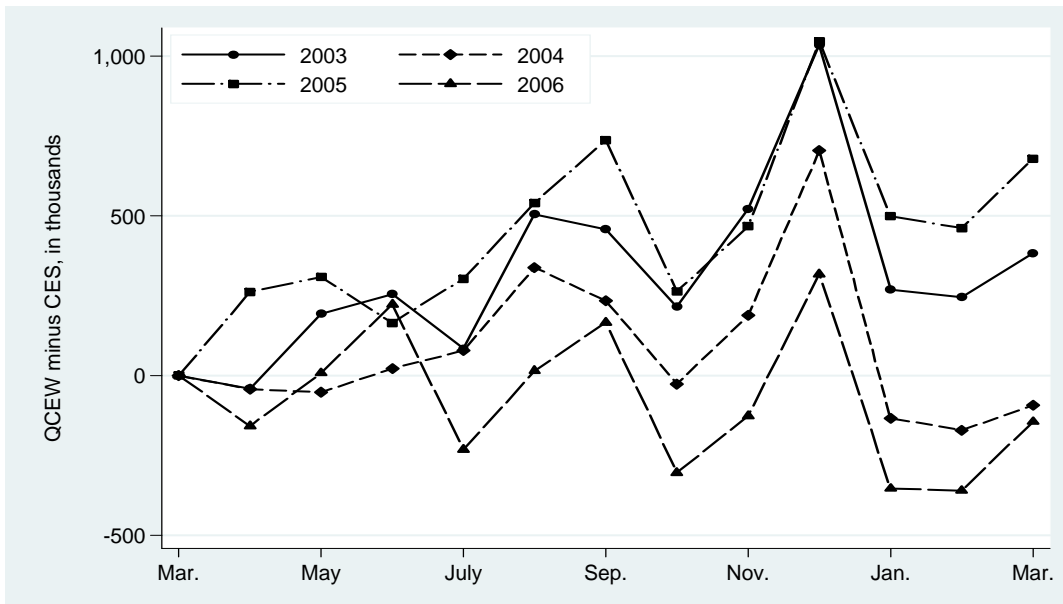
The RAS yielded a large dataset with various options for further analysis. One next step might involve using more multivariate analysis with this dataset to see what other explanations or tendencies might emerge. The RAS indicated that the preparation of CES or QCR reports by outside organizations is associated with seasonal differences, so further analysis of payroll providers might yield additional information. We have conducted a similar survey with some of these various payroll providers concerning how systems tabulate employment counts and are analyzing those data. Finally, a possible internal step to take may involve increasing respondent and interviewer awareness of some of the common reporting errors we observed such as using the incorrect reference period and not adhering to employment definitions (incorrectly including or excluding certain employee types).

Figure 1. QCEW and CES Estimates of Employment, March 2003–March 2007



Notes: Employment is total U.S. private nonfarm employment. The series shown, from bottom to top, start in March 2003-2006 (after the benchmark) and end in March 2004-2007 (before the benchmark).

Figure 2. Difference between QCEW and CES Employment, March 2003–March 2007



Notes: Employment is total U.S. private nonfarm employment. The series labels correspond to the year at the beginning of a given 13-month period; for instance, the series labeled “2003” begins in March 2003 (after the benchmark) and ends in March 2004 (after the benchmark).

Table 1. Response Rates and Distribution of Respondents/Non-respondents

	N	Response Rate	Percent of Respondents	Percent of Non-respondents
All	3,002	70.5	100.0	100.0
Size				
1 to 9	491	64.2	14.9	19.9
10 to 19	458	67.7	14.6	16.7
20 to 49	694	71.2	23.3	22.6
50 to 99	470	73.2	16.3	14.2
100 to 249	472	74.4	16.6	13.7
250 or more	417	72.7	14.3	12.9
Industry				
Manuf. & Nat'l Res/Mining	411	73.5	14.3	12.3
Construction	490	76.3	17.7	13.1
Trade, Transp., Utilities	441	71.4	14.9	14.2
Info. & Financial Activities	141	78.0	5.2	3.5
Prof. & Bus. Svcs.	531	68.9	17.3	18.6
Health & Other Svcs.	390	69.2	12.8	13.6
Leisure & Hospitality	598	63.5	18.0	24.6
Multi or single				
Single	2,846	70.1	94.2	96.2
Multi	156	78.2	5.8	3.8

Table 2. Single/Multiple Payrolls and Employment Differences between CES and QCEW

	Group A	Group D	Group C	Group B	Group F	Group H	Group J
<u>Percentage in error group</u>							
Single payroll	38.2	36.4	43.7	10.2	14.6	9.2	4.5
Multiple payrolls	43.8	37.2	57.5	15.9	10.7	8.7	0.4

Table 3. Distribution of Major Reasons for Employment Difference

	All Respondents
Employee Type Reporting Issues	28%
Reference Period Problems	26%
Worksite Differences	11%
Human Error	9%
Data Sources or Timing Differences	7%
Counting Checks	6%
Automatic Reporting Issues	4%
Don't know/Not Respondent at the time	25%

Table 4. Major categories and codes for open-ended question on respondent provided reasons for employment differences between the programs

Note: Most frequently used code in each category is in parens and bold text, along with percentage of use.

MAJOR CATEGORIES	CATEGORY CODES
Human Error	<ul style="list-style-type: none"> ▪ Clerical/posting error (94%) ▪ BLS error/change request
Reference Period Problems	<ul style="list-style-type: none"> ▪ Not reporting the pay period including the 12th of the month ▪ Monthly count of all who worked (62%) ▪ Quarterly count of all who worked ▪ Cumulative count of employees
Automatic Reporting Issues	<ul style="list-style-type: none"> ▪ Switched payroll software and/or processing firm ▪ Error/changes in payroll software and/or processing firm (66%) ▪ Changes to in-house reporting procedures ▪ Clean up of records procedures differ
Employee Type Reporting Issues	<ul style="list-style-type: none"> ▪ Inconsistent reporting of seasonal workers ▪ Layoffs/ closings ▪ Different employee types included/excluded in employee counts (73%) ▪ Turnovers
Counting Checks	<ul style="list-style-type: none"> ▪ Counting of checks rather than employees (95%) ▪ Counting of bonus checks in December
Worksite Differences	<ul style="list-style-type: none"> ▪ CES and QCEW worksites are linked incorrectly ▪ Data includes more than one location (87%) ▪ Business structure definition change – buyouts/mergers
Data Source or Timing Difference	<ul style="list-style-type: none"> ▪ Reports are compiled at different times ▪ Reports generated from different data sources ▪ Manual/from memory count/estimation of all employees (40%)
Don't know/Not respondent during time:	<ul style="list-style-type: none"> ▪ Response unclear ▪ Do not know (67%) ▪ Respondent was not the contact person at the time ▪ Other ▪ Question not answered

Notes

1. The views expressed here are the authors and do not necessarily represent the policies of the Bureau of Labor Statistics.
2. Railroads, religious organizations, education, and hospitals are four examples of industries that have employees not covered by Unemployment Insurance tax laws.
3. Typically about 10% of the worksites and 5% of the total employment in the QCEW is imputed in a given quarter.
4. We do not address non-response, birth-death modeling, or sampling error in this study.
5. Although establishments often fell into more than one error group, for sample selection each establishment was assigned to only one error group.
6. A stair-step pattern is a graduate increase (or decrease) in employment over a quarter followed by a decrease (or increase) in the first month of the following quarter.
7. Since the QCR has tax implications, it may have greater oversight than the CES, and as a result more accurate reporting of out-of-state employees. Also, information on corporate officials and executives is sometimes considered proprietary, and may not be readily available to the CES respondent.

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