Supporting Statement

Employment, Wages, and Contributions Report (QCEW Program)

B. COLLECTION OF DATA EMPLOYING STATISTICAL METHODS

1a. Universe

The universe of respondents to the U.S. Bureau of Labor Statistics (BLS) for the Quarterly Census of Employment and Wages (QCEW) are the 50 States, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. The ultimate source of data for these 53 entities is the Quarterly Contribution Reports (QCR) submitted to State Workforce Agencies (SWAs) by employers subject to State Unemployment Insurance (UI) laws. The QCEW data, which are compiled for each calendar quarter, provide a comprehensive business name and address file with employment and wage information by industry, at the six-digit North American Industry Classification System (NAICS) level, and at the national, State, Metropolitan Statistical Area (MSA), and county levels for employers subject to State UI laws. Similar data for Federal Government employees covered by the Unemployment Compensation for Federal Employees program (UCFE) also are included.

The QCEW program provides a virtual census of nonagricultural employees and their wages, with about 44% of the workers in agriculture covered as well. As shown in Table 1 in December 2016, the number of covered private business establishments (worksites) is about 9.48 million, and the number of covered employment is about 122.60 million. Additionally, about 60,000 Federal Government, 70,000 State government, and 169,000 local government establishments are covered. In December 2016, the total number of covered establishments is about 9.78 million, and the total number of covered employment is about 144.70 million. The QCEW series has broad economic significance in measuring labor trends and major industry developments, in time series analyses and industry comparisons, and in special studies, such as analyses of establishments, employment, and wages by size of establishment.

The BLS role in the QCEW program is to establish and enforce uniform methods and processes that yield a consistent level of data quality for the multifaceted uses of QCEW data. The BLS role is to take in raw UI administrative data, to understand error components, to address each with methods and processes to reduce resulting error, and to yield high quality economic data and sample frame. The improvement processes include but are not limited to: efficiency in data collection from large multi-establishment employers through Electronic Data Interchange (EDI); statistically valid procedures for editing, estimating missing reports and data elements, record linkage and standardized processing systems, training of staff; and quality controls procedures for data review (see Sections 2b and 2c on estimation procedures and reliability for details). After the data have gone through extensive review at the State, regional, and national levels, the BLS summarizes these data to produce totals for all counties, MSAs, the States, and the Nation by various industrial levels.

1b. Sample

The QCEW is a census of establishments; hence, every unit is in the sample and represents itself only. That is, each unit has a sampling weight of 1.00.

2a. Sample Design

The QCEW is a census. The sample design for the QCEW is very simple since all establishments are included with a sampling weight of 1.00 or with certainty. The sampling unit is the establishment or worksite.

2b. Estimation Procedure

The aggregated totals of employment and wages for each sub-domain (e.g., industry, geography, and size) are simply the sum of the micro records belonging to that sub-domain. Averages and other statistics for each sub-domain are derived by performing the appropriate arithmetic functions.

As mentioned above, the BLS role is to add quality to the raw data. One of these processes involves editing the data and conducting validation checks. The basic monthly employment edit consists of a six-step statistical test that includes the use of multiple t-test for: month-to-month change, over-the-year change, and a 12-month variation in data; some tests are conducted on levels while others are conducted on rate of change. The wage edit includes the use of an inter-quartile test developed by Hoaglin, Iglewicz, and Tukey. The Edit Conditions and Formulas are described in Appendix-F of the QCEW Operating Manual (2007).

Although the BLS receives the QCEW files from all 53 entities in a timely manner, the files contain estimates for late and missing respondents. Therefore, a step in the data process is estimation for late respondents and for missing respondents (i.e., unit non-response) and data elements (i.e., item non-response). As shown in Table 2a, about four percent of the establishments respond late or fail to respond to the QCEW in a timely manner; the corresponding figure for employment is about three percent as shown in Table 2b. The non-response rates for wages are about three percent as shown in Table 2c.

The current method of imputation applies the missing establishment a-year-ago change to the previous month's employment or quarterly wages to estimate the current month's employment or quarterly wages. That is, missing establishment current month's employment is equal to the previous month's employment multiplied by its a-year-ago change; similar procedure is applied to estimate total quarterly wages. A drawback to this procedure is that it uses a-year-ago trend rather than the current trend. The current Imputation Formulas are described in Chapter 8 and Appendix-J of the QCEW Operating Manual.

The BLS conducted extensive research on alternative imputation methods for both employment and wages. The findings of the research indicate the use of current trends of the reported data from similar cells as non–respondents. The BLS defines this procedure as the ratio method. Where, the ratio of a particular estimation cell is computed as the sum of current month's reported employment divided by the sum of previous month's reported employment. To impute this month's employment for a non-respondent, the ratio is then multiplied by the non-

respondent's previous month employment. A similar procedure is applied to impute average quarterly wages. This ratio method of imputation has been implemented in the QCEW processing system. The details of the method including various exceptions are available in Attachment 1.

Another data processing step is to link the QCEW data across quarters for various purposes including: 1) editing and imputation; 2) separation of establishments into new establishments (openings or births), continuous establishments (existing businesses), and out-of-business establishments (closings or deaths); and 3) longitudinal research. The BLS has employed the Method described in the paper "A simplified Approach to Administrative Record Linkage in the Quarterly Census of Employment and Wages" by Justin McIllece and Vinod Kapani (October, 2014), JSM 2014-Survey research Methods Section, 4392:4404.

2c. Reliability

Since the QCEW is a census, the data are only subject to non-sampling errors. To control for these non-sampling errors, the BLS has extensive quality control procedures that include: 1) improved data collection methods especially for large multi-establishment employers through EDI; 2) standardized data processing systems that include edits, imputation, record linkages including address standardization and industrial classification coding; and 3) standardized training of staff at State, regional, and national levels in the review of data according to the guidelines provided by the QCEW policy council and stated in official memorandums (available upon request). Records that fail these edits are individually reviewed. Respondent contact is frequently used to validate significant movements or to correct the data.

The three most important initiatives undertaken by the BLS to enhance the quality of QCEW data are the establishment of the Multiple Worksites Report (MWR) Survey, the Annual Re-filing Survey (ARS), and the development of a new comprehensive processing system for States use. Two separate OMB clearances are obtained for the ARS and MWR Survey. The MWR form is sent quarterly to multi-establishment employers for the purpose of asking them to break out their consolidated reports to the establishment level. For example, some employers provide data for all of their operations within a State or at the county level; the MWR asks the employer to provide information for each establishment so that all records on the file can be at the establishment level, which is generally the sampling unit for most BLS surveys. This also improves the quality of local economic data by more accurately reporting the location and type of economic activity.

The ARS is conducted annually on about one-fourth of the establishments on the frame for the purpose of updating the industrial classification, business name, reporting and physical location addresses, and auxiliary status. These establishments are selected randomly. State and regional staff are trained extensively in the industrial classification coding. Additionally, standardized systems are provided to the State and regions to process the data.

Among other things, the new State processing system will have improved data editing, imputation, and record linkage procedures.

2d. Revisions

For the first quarter of each year, QCEW data are published five times; the original data are first released in September of the same year followed by revisions in the following December, March, June, and September. For example, March 2015 data were first published in September 2015, then in December 2015, and subsequently in March, June, and September of 2016. The 2nd quarter data is published four times; the 3rd quarter data is published three times; and the 4th quarter data is published twice. Table 3a provides data for the initial publication of each quarter in 2015 to their final publication in September 2016. As shown in Table 3b, the largest revision generally occurs from initial publication to the first revision, as missing reports, including out-of-business reports, for late responding employers come in. The magnitude of revisions is relatively small; that is, less than 0.05 percentage point.

2e. Specialized Procedures

None.

2f. Data Collection Cycles

The QCEW program is quarterly, as the employers are required to file Quarterly Contribution reports (UI reports) on a quarterly basis.

3. Methods to Maximize Response Rates

Since employers are required to file Quarterly Contributions Reports under the UI law for each State, the response rates are generally very high. The unit response rates for employment are about 96 percent (Table 2a) and about 97 percent (Table 2c) for wages as reporting of wages are required by UI law. The response rates based on total covered employment are about 97 percent (Table 2b), as the non-response is mostly concentrated among the small establishments.

Growth of EDI, the direct transfer of data from the firm to the BLS, also provides a high level of response and stability. The BLS currently collects over 80,000 reports from nearly 100 large firms with about 10 million employees via EDI. For final estimates, virtually all of these firms provide data.

4. Tests

The BLS has undertaken several initiatives in the area of research on control and measurement of non-sampling error. The 1991 benchmark of Current Employment Statistics Survey's (CES) estimate of employment to the QCEW revealed a substantial non-sampling error problem caused by payroll processing firms. The American Statistical Association formed a committee to review BLS procedures and issued a report in January 1994 (American Statistical Association, 1994). The BLS adopted most of the report's recommendations. The BLS also conducted a Response Analysis Survey of Payroll Processing Firms (Goldenberg, Moore, and Rosen, 1994). The purpose of the survey was to identify practices that can affect the data collected by the CES and QCEW programs (the benchmark source data) and educate payroll processors on proper reporting procedures. The BLS also conducted a Response Analysis Survey (RAS) of CES and

QCEW covering employment reporting (Werking, Clayton, and Rosen, 1995). The survey identified factors affecting both CES and QCEW reporting within the same firm. Based on these RAS studies, the BLS undertook an extensive education program with CES respondents. This included highlighting correct reporting of problem items on the CES report form and the inclusion of special notices on correct reporting on the monthly advance notice fax message. Another RAS was conducted in 2008; an Executive Summary of the report detailing those findings is in Attachment 2.

5. Statistical and Analytical Responsibility

Mr. Larry Huff, Chief, Statistical Methods Division of the Office of Employment and Unemployment Statistics, is responsible for the statistical aspects of the QCEW program. As mentioned in the above paragraph, the BLS seeks consultation with other outside experts on an as needed basis. The QCEW Policy Council, composed of ten representatives of the SWAs and BLS staff, has been consulted on the content, uses, and methodology of the program.

6. References

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Table 1--QCEW summary data for 50 States, D.C., Puerto Rico, and Virgin Island on NAICS basis

(October, November, December 2016 in thousands)

Industry	Description	No. of Establishments	Employment Oct, 2016	Employment Nov, 2016	Employment Dec, 2016
	Total	9778	144336	144832	144702
	Total Private	9478	122300	122664	122598
11	Agriculture, forestry, fishing and hunting	105	1342	1238	1151
21	Mining	33	600	600	602
22	Utilities	17	551	550	550
23	Construction	773	6926	6853	6702
31	NDR manufacturing	283	10121	10135	10157
33	DUR manufacturing	60	2227	2217	2217
42	Wholesale trade	614	5903	5912	5928
45	Retail Trade	1044	16023	16488	16596
49	Transportation and Warehousing	239	4854	4957	5081
51	Information	157	2807	2827	2826
52	Finance and insurance	481	5880	5895	5918
53	Real estate and rental and leasing	378	2160	2153	2160
54	Professional, Scientific and Technical Services	1170	8921	8963	8973
55	Management of companies and enterprises	63	2246	2254	2262
56	Administrative and support and waste management services	526	9266	9249	9148
61	Educational services	114	2891	2903	2863
62	Health care and social assistance	1509	19141	19198	19254
71	Arts, entertainment, and recreation	138	2229	2122	2115
72	Accommodation and food services	683	13446	13386	13337
81	Other services, except public administration	829	4427	4417	4402
91	Federal Government	60	2814	2819	2849
92	State Government	70	4782	4788	4772
93	Local Government	169	14439	14559	14481
99	Unclassified	251	329	338	346

Table 2a. U.S. Percentage of imputed establishments by year and month

year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	5.96	5.96	5.99	5.72	5.73	5.81	5.04	5.06	5.08	5.02	5.04	5.09
2002	5.57	5.58	5.57	5.12	5.12	5.19	4.98	4.99	5.04	4.75	4.78	4.82
2003	6.25	6.26	6.26	5.65	5.62	5.70	5.27	5.27	5.29	5.49	5.51	5.57
2004	5.98	5.97	5.98	5.83	5.80	5.93	5.50	5.50	5.62	5.33	5.35	5.45
2005	5.66	5.68	5.74	5.13	5.11	5.28	5.23	5.25	5.26	4.65	4.71	4.80
2006	5.96	5.98	6.01	4.96	4.91	5.01	4.89	4.97	5.01	4.46	4.55	4.60
2007	5.14	5.28	5.31	4.59	4.70	4.78	4.37	4.40	4.45	4.15	4.18	4.25
2008	5.29	5.27	5.33	4.19	4.18	4.31	4.19	4.17	4.24	3.83	3.88	3.99
2009	4.88	4.90	4.99	4.12	4.09	4.21	3.71	3.72	3.79	3.64	3.66	3.81
2010	4.85	4.87	4.89	4.22	4.22	4.42	4.33	4.34	4.56	3.83	3.87	4.02
2011	4.76	4.80	4.88	5.02	5.02	5.21	3.44	3.46	3.59	2.93	3.00	3.12
2012	3.73	3.73	3.79	3.71	3.70	3.84	3.38	3.38	3.52	4.00	4.03	4.14
2013	4.28	4.19	4.27	3.43	3.43	3.58	3.01	2.95	3.06	2.95	2.90	3.04
2014	4.11	4.04	4.11	2.89	2.81	2.95	2.74	2.74	2.87	2.65	2.68	2.77
2015	3.38	3.38	3.41	2.78	2.74	2.84	3.36	3.36	3.49	2.52	2.56	2.68
2016	4.46	4.46	4.54	3.16	3.16	3.33	2.77	2.78	2.87	3.16	3.20	3.31

Table 2b. U.S. Percentage of imputed employment by year and month

year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	5.14	5.09	5.10	4.76	4.70	4.74	4.41	4.38	4.47	4.68	4.68	4.74
2002	4.41	4.42	4.38	4.16	4.13	4.24	4.49	4.44	4.47	4.26	4.20	4.23
2003	4.92	4.93	4.82	4.36	4.29	4.39	4.62	4.54	4.58	4.62	4.61	4.57
2004	4.52	4.42	4.35	4.70	4.59	4.77	5.07	5.01	5.24	4.54	4.48	4.49
2005	4.10	4.09	4.12	3.80	3.74	4.09	3.96	3.95	3.83	3.82	3.78	3.79
2006	3.78	3.74	3.75	3.14	3.04	3.06	3.29	3.31	3.28	3.23	3.28	3.27
2007	3.28	3.28	3.24	2.95	2.89	2.94	3.08	3.08	3.10	2.86	2.82	2.87
2008	3.07	2.97	3.00	2.60	2.53	2.68	2.69	2.58	2.68	2.49	2.44	2.56
2009	2.84	2.75	3.26	2.35	2.29	2.36	2.34	2.30	2.51	2.34	2.26	2.34
2010	2.85	2.81	2.79	2.32	2.25	2.43	2.70	2.67	3.09	2.42	2.44	2.57
2011	2.80	2.79	2.89	3.04	2.99	3.25	2.32	2.33	2.41	2.22	2.23	2.27
2012	2.49	2.41	2.45	2.37	2.30	2.45	2.31	2.18	2.29	2.71	2.53	2.64
2013	2.72	2.54	2.62	2.17	2.13	2.28	2.34	2.14	2.26	2.21	1.97	2.13
2014	2.46	2.31	2.37	1.88	1.80	1.92	1.91	1.84	1.96	2.13	2.09	2.19
2015	2.07	2.03	2.07	1.78	1.71	1.83	1.96	1.89	2.05	1.73	1.73	1.87
2016	2.17	2.14	2.23	1.56	1.56	1.87	1.72	1.67	1.84	1.94	1.90	2.00

NOTE: Tables 2a & 2b are based on Imputed Employment Indicator and all ownerships, and exclude Puerto Rico & Virgin Islands

Table 2c: Percentage of imputed wage by year and quarter

Year	Total Establishments Count Q1	Percent imp wage records Q1	Total Establishments Count Q2	Percent imp wage records Q2	Total Establishments Count Q3	Percent imp wage records Q3	Total Establishments Count Q4	Percent imp wage records Q4
2001	7,743,963	4.26	7,752,694	4.24	7,803,541	3.18	7,839,471	3.11
2002	7,891,412	3.94	7,901,173	3.40	7,935,862	3.31	7,973,775	3.28
2003	8,013,297	4.78	8,002,961	3.76	8,060,296	3.46	8,081,182	3.50
2004	8,129,247	4.31	8,133,737	4.07	8,192,688	3.71	8,259,088	3.70
2005	8,314,712	4.15	8,335,131	3.62	8,407,905	3.65	8,464,375	3.13
2006	8,542,371	4.39	8,550,053	3.61	8,617,164	3.52	8,703,001	3.06
2007	8,718,045	3.94	8,720,237	3.49	8,785,200	3.20	8,836,877	2.96
2008	8,875,359	4.04	8,876,227	3.34	8,918,706	3.24	8,943,568	2.99
2009	8,878,407	4.10	8,819,252	3.27	8,826,095	3.08	8,845,544	2.93
2010	8,802,125	3.99	8,769,242	3.53	8,802,038	3.30	8,842,899	2.94
2011	8,820,545	4.32	8,828,478	4.08	8,876,724	2.59	8,921,357	1.95
2012	8,951,937	2.89	8,968,693	2.84	8,918,033	2.59	8,958,625	3.25
2013	8,946,733	3.33	9,003,016	2.68	9,047,292	2.29	9,050,707	2.46
2014	9,045,619	3.45	9,041,974	2.14	9,092,059	2.17	9,149,628	1.96
2015	9,178,990	2.69	9,221,367	2.21	9,266,222	2.86	9,319,488	1.85
2016	9,320,160	3.88	9,371,351	2.72	9,432,306	2.35	9,489,189	2.76

NOTE: Table 2c is based on Imputed Wages Indicator of "E" and all ownerships, and excludes Puerto Rico & Virgin Islands

Table 3a: Revisions in published data, U.S. total

Mar-15	Mar-15	Mar-15	Mar-15	Mar-15					
September 2015 release	December 2015 Release	March 2016 Release	June 2016 Release	September 2016 Release	First revision	Second Revision	Third revision	Fourth revision	Total revision since September2015
137,412,381	137,409,835	137,393,814	137,392,429	137,387,791	-2,546	-16,021	-1,385	-4,638	-24,590
	Jun-15	Jul-15	Aug-15	Sep-15					
	December 2015 Release	March 2016 Release	June 2016 Release	September 2016 Release	First revision	Second Revision	Third revision		Total revision since Dec-2015
	140,594,927	140,621,882	140,617,064	140,616,268	26,955	-4,818	-796		21,341
		Sep-15	Oct-15	Nov-15					
		March 2016 Release	June 2016 Release	September 2016 Release	First revision	Second Revision			Total revision since March 2016
		140,442,224	140,505,653	140,495,791	63,429	-9,862			53,567
			Dec-15	Dec-15					
			June 2016 Release	September 2016 Release	First revision				Total revision since June-2016
			141,924,459	141,976,263	51,804				51,804

Table 3b: Percentage of revision from original to next publication				
Preliminary publication	Mar-15	Jun-15	Sep-15	Dec-15
Revised Publication	December 2015 Release	March 2016 Release	June 2016 Release	September 2016 Release
%revision from Preliminary Publication	-0.001853	0.0191721	0.045164	0.036501
Table 3c: Percentage of revision from original to final publication				
Preliminary Publication	Mar-15	Jun-15	Sep-15	Dec-15
Revised Publication	September 2016 Release	September 2016 Release	September 2016 Release	September 2016 Release
%Revision from preliminary published data	-0.01790	0.01518	0.03814	0.03650