A Study of IRS Administrative Payroll as a Substitute for Missing Payroll in the Business Expenses Survey

Melvin McCullough
U.S. Census Bureau, Company Statistics Division, Washington DC

Abstract

The Business Expenses Survey (BES) collects operating expense data of businesses in the retail, wholesale and services sectors of the United States economy. Traditionally, missing payroll expense data have been imputed using a "ratio of identicals." This method of imputing for missing payroll takes a ratio of the weighted sum of non-missing payroll to the weighted sum of operating expenses for respondents within an industry and multiplies this result by reported operating expenses to obtain an estimate for missing payroll for a given case. The availability of Internal Revenue Service (IRS) administrative payroll data as a possible alternative to the traditional ratio imputation resulted in this study. Our objective was to determine if IRS administrative payroll could be reliably substituted for missing BES payroll for single-establishment businesses. For each industry, some of the payroll respondents were randomly treated as having missing payroll (i.e., nonrespondents). These "nonrespondents" were imputed using two methods, the IRS substitution method (method1), and also the traditional ratio method (method2). Once the imputation was completed, totals were obtained by industry and comparisons were made between the known industry sum and the sums based on imputing using the two described methods. This procedure was replicated so that measures of bias and coefficients of variation could be obtained.

Key Words: general imputation, replication, bias, single units

Disclaimer: This report is released to inform interested parties of research and to encourage discussion. The views expressed are those of the author and not necessarily those of the U.S. Census Bureau.

1.0 Background

The Business Expenses Survey (BES) is divided into five quinquennial surveys by industry grouping: General Services (BES_G), Other Services (BES_X), Retail (BES_R), Wholesale (BES_W), and Accommodation and Food Services (BES_AF). For each BES quinquennial survey there exists a corresponding annual survey, which primarily collects sales revenue data. "Multiunits" are defined as businesses that operate and report data from more than one location. "Single units" are defined as businesses that operate and report data from one location. The four survey items utilized in our research were BES Payroll (E20200), BES operating expenses (E62200), sales revenue (ECSALE00), and Internal Revenue Service (IRS) administrative payroll (ECTPAY00). Note that the source of the first two survey items is BES. Sales revenue is obtained from the corresponding annual survey. IRS administrative payroll is obtained from the IRS. Operating Expenses (when available) was utilized in forming the ratio component in the ratio of identicals formula. When operating expenses was not available, sales revenue was used in place of operating expenses in the formula below.

For the purpose of our research, we chose to stratify by six-digit North American Industry Classification System (NAICS) since our imputation is based on six-digit NAICS. Additionally, a collapsing procedure was utilized. For those industries with fewer than ten cases at the six-digit NAICS level, we collapsed to a five-digit level in order to obtain a sufficient number of cases to compute a ratio. Upon collapsing to the five-digit NAICS, if there were fewer than ten available cases in the imputation base, we proceeded to collapse to the four-digit NAICS. At the four-digit NAICS level, we utilized the available number of cases to obtain imputes. The formula that we utilized to compute BES payroll using method2 is as follows:

$$E20200 = \left[\frac{\sum (W20200)}{\sum (W62200)} \right] * E62200$$

where W20200 and W62200 are the sample-weighted values for BES payroll and operating expenses, respectively. The sampling weights utilized to obtain the aggregate totals during the simulation runs are based on the BES sample design. The weights are inversely proportional to the probably of selection. The largest cases were "certainty cases" having a sampling weight of 1. The BES survey sample design was not utilized in the replication other than through utilizing the weights to calculate aggregate totals.

1.1 Research Dataset

The data set for the research study consisted of single unit BES payroll respondents for which we had administrative payroll data and a non-missing value for operating expenses or sales. We utilized 2002 data as a basis for our research. Column four in Table 1 illustrates the number of records [1] available for our research, by survey.

Table 1: Number of 2002 Records in the Original Sample and Research Study Dataset by Survey

Survey	Multiunits and Single Units	Single Units	Single Unit Respondents
BES_G	33,086	25,482	15,234
BES_X	33,470	22,970	13,801
BES_R	11,918	8,393	5,224
BES_AF	5,650	4,560	2,770
BES_W	7,089	4,477	3,113

2.0 Overview of Methods and Criteria Used to Draw Conclusions

Our goal was to investigate the possibility of using IRS administrative data to impute BES payroll data for cases that had missing payroll. We investigated pre-edited data across the five surveys.

Initially, we investigated and compared unweighted and weighted BES and IRS administrative payroll totals aggregated by industry. Section 5.0 describes how we compared weighted, reported BES and IRS administrative payroll data summed by six-digit NAICS. We also produced and examined graphs of unweighted and weighted BES and IRS administrative payroll by industry. The purpose of the graphs was to identify selected industries that likely have cases with unusual BES or IRS administrative payroll values.

In an attempt to compare the IRS substitution method of imputation (method1) to the traditional ratio method of imputation (method2), we ran a simulation. For each of the five surveys, we looked exclusively at single unit businesses.

To begin, we calculated 1997 historical BES (BES_Z) payroll item nonresponse rates by industry in order to simulate those rates in the 2002 data. We sorted the 1997 BES_Z by payroll value and then divided the file into four quartiles based upon payroll. Nonresponse rates were calculated for each quartile as shown in Table 2A. We found that the first quartile companies had the highest nonresponse rates, while the large fourth quartile companies had the lowest nonresponse rates. All records in the BES_Z dataset had a reported or imputed value for payroll. For the purposes of calculating nonresponse rates, we treated imputed values as nonresponse.

Table 2A: 1997 BES_Z Record Count Nonresponse Rates by Quartile for Single Units

Quartile (Small to Large in Terms of Payroll)	BES_Z Nonresponse Rate Single Units	Nonresponse Record Count
Q1: small	68.5%	4541
Q2:	30.0%	1985
Q3:	20.5%	1362
Q4:large	15.0%	1000

We grouped the 2002 respondent cases (column four of Table 1) by industry and quartile. For each industry and quartile grouping, the desired number of cases were determined that were to be treated as nonrespondents based on the 1997 rate of nonresponse and number of cases for that grouping (industry by quartile). A random number was assigned to every ID within each grouping. The files were sorted by industry, quartile, and random number. Cases were randomly chosen within industry and quartile grouping to be treated as nonrespondents. Our procedure did generally draw a distinct simple random sample of cases to treat as nonrespondents within the grouping for each of sixteen replications[2]. The assigned non-respondent cases were imputed two ways: using method1 (substitution of IRS administrative payroll); using method2 (traditional ratio of identicals).

We completed our simulation studies by using sixteen replications. We began with five replications and observed the estimates for each replication as well as the summary statistics based on averages and standard deviations between runs. We increased the number of replications from 5 to 8, from 8 to 10, from 10 to 12, from 12 to 14, and finally from 14 to 16. During the whole process of increasing replications, we observed the estimates and how the estimates and summary statistics changed as we increased the number of runs. We reached a point at sixteen replications where we observed that the summary statistics began to converge.

[1] Records or cases are used interchangeably to refer to a company operating from a single location

[2] With certain six-digit NAICS codes, we had an insufficient number of cases to obtain an independent set of cases to treat as nonrespondents with all sixteen replications

3.0 Limitations and Assumptions of the Study

3.1 Impact of Extreme Cases

The most difficult obstacle in attempting to evaluate the reliability of using IRS administrative payroll data to impute for BES payroll was that we were working with pre-edited BES data. We utilized ratios of operating expenses to BES payroll and ratios of sales to BES payroll to detect the respective extreme cases for operating expenses and sales. Generally, we found that a small number of cases had very extreme values in their respective operating expense to BES payroll ratios. This resulted in unrealistic summed industry values. When this occurred for a particular industry, it was sometimes difficult to make a comparison between methods of imputation for that industry. The effects of the extreme cases tended to dominate the aggregate totals. The effects of variation due to the extreme values tended to dominate the overall variation so that one could not make a good comparison of the respective amounts of variability in the replication runs for method1 and method2.

We investigated seven distinct industries among the five surveys: BES_G, two industries; BES_R, one industry; BES_AF, two industries; BES_W, one industry; and BES_X, one industry containing cases that had extreme values for either total operating expenses or sales. We utilized a ratio of BES operating expenses to BES payroll to identify extreme cases for review. For the industries investigated, we found that the aggregated weighted totals based on method2 differed drastically from the actual reported total. Moreover, the coefficients of variation estimates using method2 were much higher than the respective coefficients of variation estimates using method1[3]. Those replications for which the case with an extreme value is not selected (for imputation), the extreme value will be included in the imputation base thus affecting the method2 impute. Many times, when this occurred, the aggregated total based on method2 was greatly overstated since it was dominated by an estimate from a single case that was unrealistically too large. Although, the effect of the averaging over sixteen replications tended to dampen the effects due to a single extreme impute, the averages, to some extent, were influenced.

We also investigated the relative effects of a few industries with extreme values in terms of comparable BES and IRS administrative payroll (E20200 and ECTPAY00). There were seven industries with ratios of BES to IRS administrative payroll that exceeded 1000 to 1 for at least one case. From our simulation, we concluded that method1 and method2 performed about equally well for these industries with respect to how far the estimate was from the actual reported total. In each of the seven industries, the method1 coefficient of variation (CV) estimate was much smaller than the comparable estimated CV for method2.

3.2 Effect of Limited Cases within some Industries

Additionally, for some industries, we had insufficient data with which to get a reliable estimate using method2 due to an insufficient number of cases in the imputation base. We collapsed to five-digit NAICS when there were less than ten cases with which to form a ratio at the six-digit level. Likewise, if there were less than ten cases at the five-digit level, we collapsed to the four-digit level and used the available number of cases to form ratios to impute missing cases. Industries within each of the five surveys for which there were less than ten cases used to form the ratios (after collapsing) are marked in Table 3 with an '*'. Caution should be used in comparing method1 and method2 for those industries.

For each of the five surveys, there were some industries that had so few total cases. This resulted in some repeating of combinations of cases being selected (as nonrespondents) across the sixteen replication runs. Since quartile one had a high nonresponse rate of 0.685, the imputation base had little data from quartile one for those industries with a minimal number of cases. An extreme example found in BES_X is the industry represented by six-digit code "622218" (Psychiatric and Substance Abuse Hospitals) which had four total cases. Each of our sixteen-replication runs gave the same estimates using method1 and method2 with no coefficient of variation. No comparison information was obtained from the simulation for this industry.

For the simulation to work optimally, there must be a sufficient number of cases by industry to randomly pick a distinct combination of cases to treat as nonrespondents with each of the replication runs. We decided to set a cutoff of twenty-four cases per six-digit NAICS code and identify industries in Table 3 that have fewer than twenty-four cases with bold type. Twenty-four total cases by industry results in six cases for each quartile from which the nonrespondents are selected. The simulation results may not be reliable for those bolded industries.

[3]For more information, please review Table 3 for NAICS Codes 421310,443111,721110, and 722211

3.3 Small Companies Less Likely to be Represented in Research Dataset

The single unit payroll item nonresponse rate by record count for the 1997 historical BES_Z survey was 33.5%, as shown in Table 2B. However, the percent imputed, in terms of payroll value, was 14%. In contrast, by record count, quartile one companies made up 51% of all nonrespondents. The nonrespondents tended to be small companies representing a small portion of total weighted BES payroll.

Table 2B: Nonresponse Rates for Single Units

1997 BES_Z	2002 BES_X	2002 BES_G	2002 Combined BES_X and BES_G	2002-ALL BES Surveys
33.5%	34.0%	35.0%	34.5%	33.0%

In 2002, the payroll item nonresponse rate for the single units for the BES_X and BES_G surveys combined (the two surveys together are the equivalent of BES_Z) was 34.5%.

If the 2002 BES datasets have similar nonresponse rates, in terms of payroll, to that of the 1997 BES_Z dataset, then we can expect that approximately 68% (Table 2A) of small companies will not be found in our BES dataset, and consequently, research data set.

We might conclude that our research dataset most often represents medium-sized and large companies, in terms of payroll. In effect, we know very little about small company nonrespondents and these are the very companies that we most often impute for.

4.0 Criteria Used to Compare Imputation Methods Based on the Simulation

As a result of the simulation, we produced two summary tables: weighted and unweighted. The weighted averages and coefficients of variation of the sixteen-replication runs are displayed in Table 3. Table 3 includes the industry code, actual reported weighted sum aggregated by industry, averages of the sixteen aggregated weighted sums based on method1 and method2, coefficients of variation, and a measure of "relative bias" for each method. The method1 relative bias as referred to in Table 3 is the difference between the actual total and the averaged total across replications divided by the actual total and the result multiplied times 100. The method2 relative bias as referred to in Table 3 is the difference between the "actual reported" and the "method2 ratio imputation average" divided by the actual total and the result multiplied times 100. We utilized standard formulas to compute standard deviations for the variation between aggregate totals across replicate runs. The coefficients of variation of the method1 and method2 aggregate totals were computed by:

$$CV = \left\{ \sqrt{\frac{\sum_{i=1}^{16} (Y_i - \overline{Y})^2}{15}} \div actualtotal \right\} * 100$$

Please note that "CV" refers to the coefficient of variation for method1 and method2. $\overline{Y}$ is the mean average of the aggregate totals averaged across the 16 replications and Y_i refers to the aggregate totals.

In accessing the reliability of each of the imputation methods, we compared the distribution of individual totals aggregated by six-digit NAICS code for method1 and method2 along with the corresponding summary measures (averages, coefficients of variation, and measures of " relative bias").

4.1 Accommodation and Food Services (BES_AF)

We produced and investigated graphs of weighted and unweighted totals by six-digit NAICS codes for BES and IRS administrative payroll. We found four industries that had quite large differences in BES and IRS administrative payroll totals. For one of the four industries, we found that the large aggregated difference of BES to IRS administrative payroll totals was due to a single case. For one of the other four industries, the large aggregated BES to IRS administrative payroll total difference was due to the cumulative effects of a few cases. For two of the remaining four industries, the large aggregated differences were due to the cumulative effects of several cases. As a criterion for detecting extreme cases, we utilized the ratios of BES to IRS administrative payroll.

Looking at Table 3 from the simulation, we observed that for 11 out of 15 industries, the method1 average aggregated totals were closer to the actual aggregated totals than were the corresponding average aggregated totals using method2. Additionally, the estimates for coefficient of variation using method1 were much lower than the corresponding estimated coefficient of

variation using method2 for most of the industries within foods.

We performed a correlation analysis on BES payroll and IRS administrative payroll by six-digit NAICS and found that 8 industries out of 15 had correlations of 0.95 or higher. We found that 2 industries (721211 and 722212) out of the 15 for the BES_AF survey had fairly weak correlations between BES and IRS administrative payroll. The strong pair-wise correlation results reinforced the notion that IRS administrative payroll could be reliably used to substitute for missing BES payroll.

4.2 Wholesale (BES_W)

We produced graphs and investigated the differences between weighted and unweighted BES to IRS payroll totals aggregated by six-digit NAICS for wholesale. We found three industries for which the BES totals were much larger than the corresponding IRS administrative payroll totals. For two of these three industries, the large aggregated difference of BES to IRS administrative payroll totals was due to the differential effects of a single case. For the remaining industry, the large aggregated difference of BES to IRS administrative payroll totals was due to the combined effects of a single case along with the cumulative effects of several other cases within that industry.

After investigating Table 3 from the simulation, we found that for about 70% of the industries, the method1 average aggregated totals were closer to the actual aggregated totals than the corresponding measures using method2. Additionally, the estimates for coefficient of variation using method1 were much lower than the corresponding estimated coefficient of variation using method2 for almost all industries within wholesale.

We performed a correlation analysis on BES and IRS administrative payroll by six-digit NAICS and found that 49 industries out of 68 had correlations of 0.95 or higher. We found that three industries had weak pair-wise correlations between BES and IRS administrative payroll.

4.3 Retail (BES_R)

We produced graphs and investigated the differences between weighted and unweighted BES to IRS totals aggregated by six-digit NAICS code. We found five industries had quite large differences between BES to IRS aggregated totals. We found that the large aggregated difference between BES to IRS administrative payroll totals for four industries was due to the differential effects of a single case. For the remaining industry, we found that the large aggregated difference in totals was due to the combined effects of a single case along with the cumulative effects of several other cases within that industry.

We performed a correlation analysis on BES and IRS administrative payroll by six-digit NAICS and found that 51 industries out of 73 had correlations of 0.95 or higher. We found one industry that had a weak correlation.

After investigating Table 3 from the simulation, we found that for about two-thirds of the industries, the method1 average aggregated totals were closer to the actual aggregated totals than were the corresponding measures using method2. The estimates for coefficient of variation using method1 were much lower than the corresponding estimated coefficient of variation using method2 for an overwhelming majority of industries within retail. When observing the totals from Table 3 for the five industries mentioned previously, we noted generally that the averaged totals were far from the actual reported total. Additionally, we noted that the estimates were not consistent across replications as can be seen by the large estimates for coefficient of variation.

4.4 General and Other Services (BES_G and BES_X)

For BES_G and BES_X, we went through a similar procedure of evaluation as was done with BES_AF, BES_W, and BES_R. The results based on investigation of the graphs of BES to IRS administrative aggregated totals, correlations of BES to IRS administrative payroll (grouped by six-digit NAICS), and review of summary measures gave results similar to the other surveys[4]

5.0 Comparisons of Reported BES to IRS Totals Aggregated by Industry

We created a subset of the original files that included all records with both BES and IRS administrative payroll and a non-missing value for operating expenses or sales. We computed the actual aggregated weighted totals, aggregated weighted totals based on IRS substitution, and a relative percent difference between the two. We noted all industries within each survey for which the aggregate differences (BES to IRS) were greater than 10% in absolute value. For BES_X, of the 87 industries, we found 24 industries had aggregated

[4] For more information, please contact the author for tables of summary measures for the BES_G and BES_X surveys.

totals meeting the above criteria. For BES_W, out of 68 industries, we noted 12 industries had aggregate differences exceeding 10% in absolute value. For BES_R, there were 16 industries out of 73 industries that had greater than a 10% difference between aggregated BES and IRS payroll totals. BES_AF had 6 out of 15 industries for which the relative difference of the aggregate totals were more than 10%. BES_G had 30 out of 165 industries for which aggregated BES to IRS payroll totals differed by more than 10% (in absolute value).

6.0 Conclusions Based Upon Examination of Estimates and Summary Statistics Over All Five Surveys

We utilized the nonparametric sign test to determine whether or not there was a statistically significant difference between the relative bias of method1 and method2 for each of the five surveys. We tested the null hypothesis that the bias of method1 is equal to the bias of method2 against the one-sided alternative hypothesis that the bias of method2 is greater than the bias of method1. We found for each of the five surveys that method1 had a significantly smaller relative bias than did method2. For BES_AF, the test was significant with a one-sided p-value of 0.0197. The remaining four surveys BES_W, BES_R, BES_X, and BES_G all tested highly significant with associated p-values of less than 0.001 indicating that the relative bias of method2 was significantly greater than the corresponding relative bias for method1.

As mentioned in section 3.3, quartile one companies were not as well represented in our research data set as the larger companies. Even so, for many of the quartile one companies, we had a sufficient number of cases within the group to get distinct samples across the replications. If there were a sufficient number of cases, then these quartile one companies made contributions (although small) to the summary statistics displayed in Table 3 of the appendix. For those with an insufficient number of cases per group, we marked with an "*" in Table 3.

Our research methods included graphing and comparing the respective BES to IRS administrative aggregate totals, the pair-wise correlation analysis between BES and IRS payroll, and the simulation study. Generally, we found that one method tended to reinforce the others. For example, most of the industries that showed a weak pair-wise correlation between BES and IRS administrative payroll provided results in the simulation that suggested that method2 was the better imputation approach. For each of the five surveys, most of the industries showed strong pair-wise correlations between BES and IRS administrative payroll. For these industries, generally, the simulation provided evidence that method1 provided as good or a better impute on average, as did method2 based on the summary measures from Table 3.

In section 4.0, approximately two-dozen industries, within the five surveys are mentioned in which we found the aggregated BES to IRS totals to be greatly different. Typically, these differences were as a result of the differential effects (BES to IRS) of either one or a few cases within that industry. The correlation analysis tended to reinforce the notion that IRS administrative payroll can usually be reliably substituted for BES payroll. In unusual cases, we may get an unrealistic value for BES payroll based on the substitution. Based on the simulation, though, the aggregated totals derived by substitution of missing payroll will on average be as good as the aggregated totals based on a ratio estimate used for missing payroll.

When comparing how close the averages are from the true aggregated totals, we observed that for most industries, method1 gave estimates closer to the actual totals than did method2. This was true for all five of the surveys. Additionally, we observed that the method1 estimated totals were more consistent than the method2 totals. By consistent, we mean that across replications, for most industries, the method1 estimates had lower coefficients of variation than did the method2 estimates. Again, this was true for all five surveys.

Due to the length of the tables, we chose to include the entire result of the simulation as Table 3 for BES_AF and selected industries for BES_R and BES_W.

Reference: www.census.gov/csd/bes

Appendix

Table 3 for BES_W
The Averages and Coefficients of Variation are Based on Sixteen Runs
Estimates are For Weighted BES Payroll and are in Units of $1000

NAICS00	Actual Reported	Method1 IRS Admin AVG	Method2 ratio AVG	Method1 Coefficient of Variation	Method2 Coefficient of Variation	Method1 Relative% Bias	Method2 Relative% Bias
421110	1724568	1739176	1829091	0.57	13.62	0.85	6.06
421120	1711770	1732393	1700358	1.91	5.88	1.20	-0.67
***421130**	235918	243476	281175	3.30	32.31	3.20	19.18
421140	575605	574714	615038	0.10	9.75	-0.15	6.85
421210	1111055	1120200	1277853	1.25	59.32	0.82	15.01
421220	1602636	1631756	1612187	0.87	3.78	1.82	0.60
421310	2121774	2116061	4277879	1.82	491.87	-0.27	101.62
421320	522243	505278	525671	3.81	5.08	-3.25	0.66
421330	238225	246129	209736	2.68	18.58	3.32	-11.96
421390	395068	397642	404343	3.90	8.28	0.65	2.35
***421410**	505219	510288	500619	1.51	2.00	1.00	-0.91
421420	1404657	1454882	1386709	5.17	8.54	3.58	-1.28
421430	5032797	5232128	5072563	1.82	4.62	3.96	0.79
421440	693929	711199	792627	6.59	12.65	2.49	14.22
421450	1254810	1243459	1339353	2.18	6.67	-0.90	6.74
***421460**	535085	534289	542451	0.04	3.96	-0.15	1.38
***421490**	504226	512588	459950	2.44	4.37	1.66	-8.78
421511	2672158	2727783	2655846	0.93	6.52	2.08	-0.61
***421512**	87163	81961	83094	5.66	6.22	-5.97	-4.67
421513	289484	291952	270632	0.66	13.10	0.85	-6.51
421520	112715	113961	103553	1.03	17.43	1.11	-8.13
421610	2046027	2058222	2051035	0.92	3.69	0.60	0.24
421620	805036	803329	796285	1.10	8.70	-0.21	-1.09
421690	3992077	3999141	3998333	4.04	18.84	0.18	0.16
421710	1737957	1753578	1691540	0.79	6.32	0.90	-2.67
421720	751428	770579	794729	3.34	10.42	2.55	5.76
421730	500646	505214	513951	1.28	15.44	0.91	2.66
***421740**	194657	195074	224893	0.33	25.08	0.21	15.53
421810	1117615	1111054	1153631	0.83	5.75	-0.59	3.22

Table 3 for BES_AF
The Averages and Coefficients of Variation are Based on Sixteen Runs
Estimates are for Weighted BES Payroll and are in Units of $1000

NAICS00	Actual Reported	Method1 IRS Admin AVG	Method2 ratio AVG	Method1 Coefficient of Variation	Method2 Coefficient of Variation	Method1 Relative% Bias	Method2 Relative% Bias
721110	18730116	18869101	24383556	0.17	59.85	0.74	30.18
721120	1244628	1293534	1239764	1.44	6.04	3.93	-0.39
721191	154736	156027	168331	1.75	3.31	0.83	8.79
721199	41262	40772	44616	1.05	10.49	-1.19	8.13
721211	287083	284647	314447	5.97	4.62	-0.85	9.53
721214	304883	308702	328082	1.09	2.78	1.25	7.61
721310	165959	165130	179053	1.21	4.31	-0.50	7.89
722110	22840347	23088618	23957566	4.22	4.18	1.09	4.89

Table 3 for BES_AF
The Averages and Coefficients of Variation are Based on Sixteen Runs
Estimates are for Weighted BES Payroll and are in Units of $1000

NAICS00	Actual Reported	Method1 IRS Admin AVG	Method2 ratio AVG	Method1 Coefficient of Variation	Method2 Coefficient of Variation	Method1 Relative% Bias	Method2 Relative% Bias
722211	10218831	10276438	10658214	1.33	9.45	0.56	4.30
722212	3268074	2699686	4359887	37.70	54.42	-17.39	33.41
722213	1632440	1616217	1698609	3.45	4.44	-0.99	4.05
722310	511704	505596	515407	2.52	4.06	-1.19	0.72
722320	856132	896636	926364	2.04	4.14	4.73	8.20
722330	118530	119891	129115	1.34	7.19	1.15	8.93
722410	6147116	5527812	7223517	25.33	38.54	-10.07	17.51

Table 3 for BES_R
The Averages and Coefficients of Variation are Based on Sixteen Runs
Estimates are For Weighted BES Payroll and are in Units of $1000

NAICS00	Actual Reported	Method1 IRS Admin AVG	Method2 ratio AVG	Method1 Coefficient of Variation	Method2 Coefficient of Variation	Method1 Relative% Bias	Method2 Relative% Bias
441110	30255812	31281081	32084492	0.55	1.78	3.39	6.04
441120	1895216	1903783	1972297	0.74	3.64	0.45	4.07
441210	653513	650996	651997	2.07	2.45	-0.39	-0.23
441221	1089407	1132652	1114224	2.76	4.85	3.97	2.28
441222	640185	639964	665263	0.70	8.16	-0.03	3.92
441229	309658	319667	307293	1.66	8.52	3.23	-0.76
441310	2102546	2098582	2146782	1.12	2.35	-0.19	2.10
441320	1611097	1617953	1780630	0.67	4.27	0.43	10.52
442110	2932371	2933041	3113959	0.31	2.82	0.02	6.19
442210	1929714	1953697	2094899	1.43	3.26	1.24	8.56
442291	190958	186800	213796	6.14	12.45	-2.18	11.96
442299	509378	540478	537942	2.75	4.66	6.11	5.61
443111	809592	808974	2591696	1.07	370.82	-0.08	220.12
443112	1520848	1551907	1526755	2.43	8.16	2.04	0.39
443120	927933	919329	953202	1.22	3.41	-0.93	2.72
443130	94875	94996	103263	0.46	5.79	0.13	8.84
***444120**	225581	225429	212006	0.13	7.47	-0.07	-6.02
444130	1344772	1341280	1348604	0.64	3.70	-0.26	0.28
444190	6476359	6607197	6589134	0.71	5.13	2.02	1.74
444210	481189	482137	502318	0.73	13.52	0.20	4.39
444220	1289038	1323788	1313878	4.00	6.75	2.70	1.93
445110	15163471	13358010	17161410	25.71	37.66	-11.91	13.18
445120	667063	663695	782679	1.87	12.55	-0.50	17.33
445210	486850	491832	515264	0.92	9.57	1.02	5.84
445220	83986	84805	83661	2.28	8.48	0.98	-0.39
445230	199383	199019	235682	3.44	16.04	-0.18	18.21
445291	160498	156378	174355	5.49	8.35	-2.57	8.63
445292	89757	92577	89232	4.10	4.11	3.14	-0.59
445299	307484	302953	308206	2.55	3.03	-1.47	0.23
445310	1300338	1307419	1251376	1.69	3.62	0.54	-3.77
446110	3423896	3472983	3633331	0.72	7.23	1.43	6.12
446120	477337	457028	490508	6.20	16.47	-4.25	2.76
446130	398011	421177	414205	10.52	6.50	5.82	4.07
446199	607916	603183	614441	0.68	2.37	-0.78	1.07