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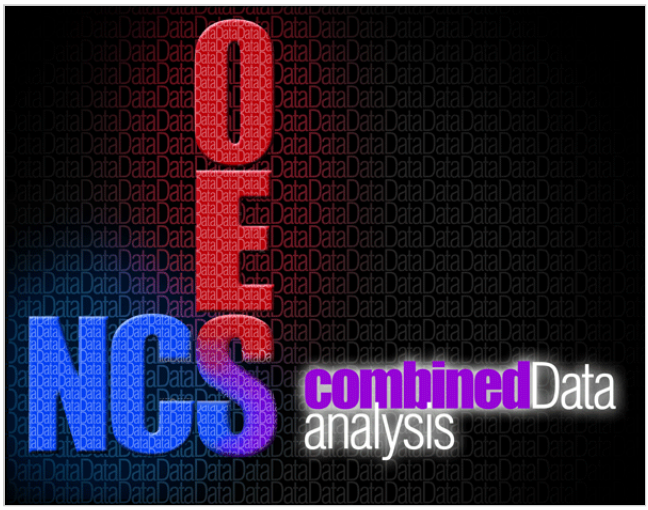
errata

On February 20, 2014, corrections were made to tables 2, 3, 4, and 5 of this article. The tables, as originally published, included estimates that were calculated using incorrect weights for some of the wage observations from the NCS sample.

# Wage estimates by job characteristic: NCS and OES program data

*An experimental set of wage estimates from two surveys provides more extensive information about workers' wage rates than either survey provides individually.*




Two statistical programs from the Bureau of Labor Statistics (BLS, the Bureau)—the National Compensation Survey (NCS) program and the Occupational Employment Statistics (OES) program—collect information about the hourly wage rates of workers by occupation. In the past, the calculation of the wage estimates from these programs has been largely separate, even though the resulting estimates can appear to measure essentially the same thing for a similar group of workers.

This article describes a procedure that combines data from the NCS and the OES survey to produce an experimental set of wage estimates by area, occupation, and job characteristic. Not only does the procedure make these wage estimates consistent with the wage information from both surveys, but it also has the potential to provide more extensive information about the wage rates of workers than either survey can provide individually.

## OES estimates of mean hourly wages

The OES program produces employment and wage estimates for about 800 occupations. Estimates are available for the nation as a whole, for individual states, and for metropolitan and nonmetropolitan areas.[1] The BLS website offers further information about wage estimates available from the OES program.

## NCS estimates of mean hourly earnings

Until 2011, the NCS program also produced estimates of annual and hourly earnings by occupation. These estimates were available for the nation as a whole, for the Census Bureau geographical divisions, and for metropolitan areas.[2] In addition, the NCS reported wage estimates broken down by job characteristic (full-time/part-time status, union/nonunion status, time-paid/incentive-paid status, and work level[3]). With the enactment of the 2011 federal budget, however, the sample size of the NCS was reduced and the program discontinued its publication of earnings estimates by occupation. Nonetheless, the data that supported these NCS wage estimates are still being collected, albeit with the reduced sample size, in order to support the compensation estimates from the Employment Cost Index/Employer Cost for Employee Compensation program and to continue to meet the requirements of the Federal Employees Pay Comparability Act of 1990.[4]

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## Combining OES and NCS data

One of the initial BLS goals in combining the NCS and OES data to produce wage estimates by area, occupation, and job characteristic was to avoid producing similar wage outputs separately. For example, the OES program reported the mean hourly wage as $17.18 for workers from protective service occupations in the Atlanta–Sandy Springs–Marietta Metropolitan Statistical Area (MSA) for May 2010, while the NCS program reported the mean hourly earnings as $16.98 for civilian workers in protective service occupations in the Atlanta–Sandy Springs–Gainesville Combined Statistical Area (CSA) for February 2010.[5] Two different wage estimates covering a similar group of workers has the potential to confuse users who are interested in wage information by area and occupation; by contrast, combining data from the two programs may provide BLS users with less confusing, higher quality information about wage rates, particularly if the combined estimates take advantage of the relative strengths of the two surveys: the large sample size of the OES survey and the data on job characteristics from the NCS.[6]

## NCS–OES estimation method

The method for calculating wage estimates by job characteristic follows essentially the procedures and formula that the OES program uses to calculate its estimates for the mean hourly wage, with a step added to incorporate the information about job characteristics from the NCS.[7] The section titled "Occupational Employment Statistics," of the *BLS Handbook of methods*, describes the OES procedures in detail. In the OES survey, wage rates of workers are typically reported as grouped data across 12 consecutive, nonoverlapping wage intervals. The survey then uses data from the NCS to calculate mean wage rates for these intervals and thereby produce estimates for the mean hourly wage. The extra step needed to produce the wage estimates for the job characteristics is to allocate the OES data by wage interval on the basis of proportions for the job characteristics from the NCS data.[8]

Consider the following illustration of OES data for a sampled establishment with 10 secretaries:[9]

An establishment employs 10 secretaries at the following wage rates:

| Rate | Number of secretaries |
|---|---|
| $8/hour | 1 |
| $9/hour | 1 |
| $12/hour | 2 |
| $13/hour | 2 |
| $14/hour | 2 |
| $16/hour | 1 |

| Rate | Number of secretaries |
|---|---|
| $17/hour | 1 |

The establishment will report its secretaries' wage rates to the OES survey as follows:

| Wage interval | Description | Number of secretaries |
|---|---|---|
| A | (under $ 7.50/hour) | 0 |
| B | ($ 7.50–$9.49/hour) | 2 |
| C | ($ 9.50–$11.99/hour) | 0 |
| D | ($12.00–$15.24/hour) | 6 |
| E | ($15.25–$19.24/hour) | 2 |

This illustration can be extended to demonstrate the calculation of wage estimates by characteristic. Consider the NCS observations for secretaries from the same area as the OES-sampled establishment, and divide those observations into appropriate wage intervals based on the preceding hourly wage rates. Suppose that, among those NCS observations for which the hourly wage rate falls within interval B ($7.50–$9.49/hour), half of the workers work part time and half work full time. Then the NCS–OES estimation method would allocate the two workers from the OES-sampled establishment who fall into wage interval B as one part-time worker and one full-time worker. Suppose further that, among those NCS observations for which the wage rate falls within interval D ($12.00–$15.24/hour), the proportion of workers who work part time equals one-third. Then the six workers from the OES-sampled establishment who fall into interval D are allocated as two part-time and four full-time workers. Finally, suppose that, among those NCS observations for which the wage rate falls within interval E ($15.25–$19.24/hour), all the workers work full time. Then the two workers from the OES-sampled establishment who fall into interval E would both be allocated as full-time workers.

Thus, employment by full-time/part-time status for the sampled establishment will be allocated as follows:

| Wage interval | Description | Allocation |
|---|---|---|
| B | ($ 7.50–$9.49/hour) | 1 part-time secretary, 1 full-time secretary |
| D | ($12.00–$15.24/hour) | 2 part-time secretaries, 4 full-time secretaries |
| E | ($15.25–$19.24/hour) | 0 part-time secretaries, 2 full-time secretaries |

After the employment counts for all of the OES wage intervals are allocated among the various job characteristics, the allocated counts are used to produce estimates of mean hourly wage rates by area, occupation, and characteristic. These estimates are arrived at by means of the same formula and the same mean wage rates for the intervals as the OES survey uses to aggregate its employment counts to produce mean hourly wage rate estimates by area and occupation. Continuing with the illustration shows that, instead of using the collected value 2 as the employment count for secretaries in wage interval B for the sampled establishment, the estimate for the mean hourly wage among part-time workers would use the allocated value 1. Similarly, the part-time estimate would use the allocated value 2 in wage interval D and the allocated value 0 in wage interval E for the sampled establishment. The full-time estimate would use the allocated value 1 as the employment count for secretaries in wage interval B, the allocated value 4 for secretaries in wage interval D, and the allocated value 2 in wage interval E.

Because the method fully allocates the OES employment counts among the characteristics for each interval, it ensures that the wage estimates by characteristic will be totally consistent with the OES data by area, occupation, and wage interval, thereby taking full advantage of the large OES sample size. The method also takes advantage of the NCS information about the relationship between the characteristic and the wage rate, a relationship that is reflected by the differences in the NCS proportions for the characteristics across the OES wage intervals. For example, if there is a tendency for wage rates to be lower for part-time workers than for full-time workers in the NCS data for the occupation, the proportion of part-time workers will tend to be higher for the lower wage intervals and lower for the higher wage intervals. This difference will translate into a lower estimate for the mean hourly wage rate for part-time workers than for full-time workers.

The NCS–OES estimation method does require assumptions related to the calculation of the proportion for the characteristics, primarily to deal with the much smaller sample size for the NCS relative to the OES survey. An establishment's employment count for an occupation in a wage interval is allocated on the basis of the proportion for the characteristic among NCS observations from the same area and occupation, and with a wage rate within the interval. Thus, the estimation method assumes that an occupation's proportion for the characteristics applies uniformly to all establishments within the area. For the matching of the OES establishments to the NCS proportions, occupation is defined by the six-digit Standard Occupational Classification (SOC) code and area is defined as one of the 24 areas listed in table 1.[10] These areas comprise 15 large metropolitan areas plus the balance of the nine Census divisions, where the balance of a Census division includes all areas in the division except those in one of the 15 large areas.

**Table 1. Areas used to calculate National Compensation Survey proportions for characteristics**

| Area |
|---|
| Atlanta–Sandy Springs–Gainesville, GA–AL, Combined Statistical Area (CSA) |
| Boston–Worcester–Manchester, MA–NH, CSA |
| Chicago–Naperville–Michigan City, IL–IN–WI, CSA |
| Dallas–Fort Worth, TX, CSA |
| Detroit–Warren–Flint, MI, CSA |
| Houston–Baytown–Huntsville, TX, CSA |
| Los Angeles–Long Beach–Riverside, CA, CSA |
| Miami–Fort Lauderdale–Pompano Beach, FL, Metropolitan Statistical Area (MSA) |
| Minneapolis–St. Paul–St. Cloud, MN–WI, CSA |
| New York–Newark–Bridgeport, NY–NJ–CT–PA, CSA |
| Philadelphia–Camden–Vineland, PA–NJ–DE–MD, CSA |
| Phoenix–Mesa–Scottsdale, AZ, MSA |
| San Jose–San Francisco–Oakland, CA, CSA |
| Seattle–Tacoma–Olympia, WA, CSA |
| Washington–Baltimore–Northern Virginia, DC–MD–VA–WV, CSA |
| Balance of New England census division |
| Balance of Middle Atlantic census division |
| Balance of South Atlantic census division |
| Balance of East South Central census division |
| Balance of West South Central census division |
| Balance of East North Central census division |
| Balance of West North Central census division |
| Balance of Mountain census division |
| Balance of Pacific census division |

Source: U.S. Bureau of Labor Statistics.

Even with the foregoing broad definitions of area, the NCS might still contain few, if any, observations in the area–occupation–interval category over which to calculate the proportions for the characteristic. If there are fewer than three NCS observations available, the category is broadened until it contains at least three observations. The hierarchy for broadening the category (henceforth, the "collapse hierarchy," because broadening is accomplished by collapsing the categories as one proceeds down the hierarchy) is as follows:

1. Wage interval, six-digit SOC occupation, detailed area (one of the 24 areas)
2. Wage interval, six-digit SOC occupation, census geographical division
3. Wage interval, six-digit SOC occupation, census geographical region[11]
4. Wage interval, six-digit SOC occupation
5. Wage interval, major occupation group
6. Wage interval

Returning to the earlier illustration, suppose the sampled establishment is located in the Atlanta–Sandy Springs–Gainesville CSA. Then, ideally, for the two secretaries from wage interval B, the proportion estimated to perform part-time work will be calculated with the use of NCS observations for secretaries in the Atlanta–Sandy Springs–Gainesville area who earn a wage ranging from $7.50 per hour to $9.49 per hour. However, if the NCS does not have at least three observations that fit this category, the proportion will be calculated from NCS observations for secretaries in the South Atlantic Census division who earn a wage ranging from $7.50 per hour to $9.49 per hour. If the NCS still does not have at least three observations for this broader category, the category is broadened further, down the collapse hierarchy, until there are at least three NCS observations upon which to calculate the proportion.

## Wage estimates for May 2011

Estimates for the mean hourly wage rate by characteristic were calculated for a selected set of areas and occupations. The reference date for these estimates is May 2011. Tables 2 through 5 give just a small sample of them as an illustration. The tables show the estimates for two detailed occupations—registered nurses (SOC 29-1111) and general office clerks (SOC 43-9061)—in 25 areas.[12] Registered nurses and general office clerks are among the detailed occupations with a high OES employment nationally. Table 6 shows, for each of the 25 areas, the area that was used to calculate the NCS proportions for the job characteristics in the first step of the collapse hierarchy.

**Table 2. Experimental estimates of the hourly mean wage for nurses, Standard Occupational Classification (SOC) 291111, by nonunion or union status and full- or part-time status, May 2011**

| Area | Nonunion | Union | Full time | Part time |
|---|---|---|---|---|
| Atlanta–Sandy Springs–Marietta, GA, Metropolitan Statistical Area (MSA) | $30.75 | — | $31.15 | — |
| Baltimore–Towson, MD, MSA | 35.98 | $43.11 | 35.74 | $39.00 |
| Boston–Cambridge–Quincy, MA, New England City and Town Area (NECTA) Division | 40.29 | 53.17 | 44.01 | 48.28 |
| Chicago–Joliet–Naperville, IL, Metropolitan Division | 33.41 | — | 34.56 | 32.72 |
| Cleveland–Elyria–Mentor, OH, MSA | 30.84 | 32.39 | 31.21 | 30.48 |
| Dallas–Plano–Irving, TX, Metropolitan Division | 32.56 | — | 32.87 | — |
| Denver–Aurora–Broomfield, CO, MSA | 33.21 | 38.80 | 34.65 | 33.77 |
| Houston–Sugar Land–Baytown, TX, MSA | 35.22 | — | 35.16 | — |
| Los Angeles–Long Beach–Glendale, CA, Metropolitan Division | 40.53 | 42.51 | 40.31 | 42.83 |
| Miami–Miami Beach–Kendall, FL, Metropolitan Division | 32.59 | — | 33.39 | — |
| Minneapolis–St. Paul–Bloomington, MN–WI, MSA | — | 38.22 | 39.95 | 35.13 |
| Nassau–Suffolk, NY, Metropolitan Division | 38.89 | 40.69 | 40.59 | 37.89 |
| New York–White Plains–Wayne, NY–NJ, Metropolitan Division | 38.87 | 41.38 | 40.66 | 38.49 |
| Philadelphia, PA, Metropolitan Division | 35.59 | — | 36.18 | 34.91 |
| Phoenix–Mesa–Glendale, AZ, MSA | 35.25 | — | 35.58 | 35.99 |
| Pittsburgh, PA, MSA | 29.16 | 31.19 | 30.51 | 27.81 |
| Portland–Vancouver–Hillsboro, OR–WA, MSA | 37.97 | 39.14 | 37.72 | 39.01 |
| Riverside–San Bernardino–Ontario, CA, MSA | 38.91 | 39.26 | 38.95 | 39.06 |
| San Diego–Carlsbad–San Marcos, CA, MSA | 38.73 | 43.51 | 39.56 | 41.24 |
| Santa Ana–Anaheim–Irvine, CA, Metropolitan Division | 39.16 | 40.30 | 39.48 | 38.89 |
| Seattle–Bellevue–Everett, WA, Metropolitan Division | 37.20 | 38.03 | 38.70 | — |
| St. Louis, MO–IL, MSA | 27.99 | 33.76 | 30.03 | 26.83 |
| Tampa–St. Petersburg–Clearwater, FL, MSA | 31.20 | — | 31.67 | 30.57 |
| Warren–Troy–Farmington Hills, MI, Metropolitan Division | 33.61 | — | 35.89 | 32.85 |
| Washington–Arlington–Alexandria, DC–VA–MD–WV, Metropolitan Division | 35.19 | 38.57 | 34.99 | 36.30 |

Note: Dash indicates that the NCS data were not sufficient for the estimate to be reported.

Source: U.S. Bureau of Labor Statistics, National Compensation Survey and Occupational Employment Statistics.

**Table 3. Experimental estimates of the hourly mean wage for nurses, Standard Occupational Classification (SOC) 291111, by full- or part-time status, by work level, May 2011**

| Area | Full time | | | | Part time | | |
|---|---|---|---|---|---|---|---|
| | Level 7 | Level 8 | Level 9 | Level 11 | Level 7 | Level 8 | Level 9 |
| Atlanta–Sandy Springs–Marietta, GA, Metropolitan Statistical Area (MSA) | — | — | $29.68 | — | — | — | — |
| Baltimore–Towson, MD, MSA | — | $32.52 | 33.36 | — | — | $42.47 | $37.62 |
| Boston–Cambridge–Quincy, MA, New England City and Town Area (NECTA) Division | — | 44.21 | 42.46 | — | — | — | 48.18 |
| Chicago–Joliet–Naperville, IL, Metropolitan Division | — | 31.94 | 34.07 | — | — | — | 34.67 |
| Cleveland–Elyria–Mentor, OH, MSA | $28.60 | 29.53 | 29.24 | $37.14 | — | 29.26 | 30.60 |
| Dallas–Plano–Irving, TX, Metropolitan Division | — | — | — | — | — | — | — |
| Denver–Aurora–Broomfield, CO, MSA | — | 33.90 | 31.67 | — | — | 30.68 | 35.41 |
| Houston–Sugar Land–Baytown, TX, MSA | — | — | — | — | — | — | — |
| Los Angeles–Long Beach–Glendale, CA, Metropolitan Division | — | 36.98 | 40.38 | — | — | — | 41.99 |
| Miami–Miami Beach–Kendall, FL, Metropolitan Division | — | — | 31.17 | — | — | — | — |
| Minneapolis–St. Paul–Bloomington, MN–WI, MSA | — | — | 35.60 | — | — | — | 34.82 |
| Nassau–Suffolk, NY, Metropolitan Division | 34.12 | 33.34 | 38.70 | 49.74 | — | 31.96 | 38.22 |
| New York–White Plains–Wayne, NY–NJ, Metropolitan Division | 35.63 | 34.89 | 39.02 | 50.29 | — | 33.80 | 38.02 |
| Philadelphia, PA, Metropolitan Division | — | 32.97 | 34.21 | — | — | 37.53 | 34.00 |
| Phoenix–Mesa–Glendale, AZ, MSA | — | — | — | — | — | — | — |
| Pittsburgh, PA, MSA | 27.82 | 25.67 | 31.55 | — | — | 25.98 | 34.23 |
| Portland–Vancouver–Hillsboro, OR–WA, MSA | — | — | 36.48 | — | — | — | 39.59 |
| Riverside–San Bernardino–Ontario, CA, MSA | — | 34.69 | 39.23 | — | — | — | 38.75 |
| San Diego–Carlsbad–San Marcos, CA, MSA | — | — | 37.88 | — | — | — | 41.96 |
| Santa Ana–Anaheim–Irvine, CA, Metropolitan Division | — | 35.04 | 40.19 | — | — | — | 38.33 |
| Seattle–Bellevue–Everett, WA, Metropolitan Division | — | — | 37.78 | — | — | — | — |
| St. Louis, MO–IL, MSA | 25.72 | 29.03 | 29.30 | — | $26.31 | — | 29.67 |
| Tampa–St. Petersburg–Clearwater, FL, MSA | 23.71 | 29.91 | 28.05 | 42.21 | 27.76 | 31.47 | 29.52 |
| Warren–Troy–Farmington Hills, MI, Metropolitan Division | — | — | 33.35 | — | — | — | 31.79 |
| Washington–Arlington–Alexandria, DC–VA–MD–WV, Metropolitan Division | — | 32.71 | 33.68 | — | — | 36.50 | 37.36 |

Note: Dash indicates that the NCS data were not sufficient for the estimate to be reported.

Source: U.S. Bureau of Labor Statistics, National Compensation Survey and Occupational Employment Statistics.

Table 2 shows the estimates for registered nurses by job characteristic. Wage estimates are shown for union and nonunion workers and for part-time and full-time workers. Table 3 shows wage estimates by work level for full-time workers and for part-time workers. To date, no methodology for calculating standard errors for these estimates has been developed, so the tables show only estimates for which the amount of NCS data that contributed to the estimate would typically have been enough to support a publishable estimate under the (now discontinued) NCS wage program.[13]

**Table 4. Experimental estimates of the hourly mean wage for general office clerks, Standard Occupational Classification (SOC) 439061, by nonunion or union status and full- or part-time status, May 2011**

| Area | Nonunion | Union | Full time | Part time |
|---|---|---|---|---|
| Atlanta–Sandy Springs–Marietta, GA, Metropolitan Statistical Area (MSA) | $12.57 | — | $14.43 | — |
| Baltimore–Towson, MD, MSA | 14.02 | $19.63 | 15.83 | — |

See footnotes at end of table.

**Table 4. Experimental estimates of the hourly mean wage for general office clerks, Standard Occupational Classification (SOC) 439061, by nonunion or union status and full- or part-time status, May 2011**

| Area | Nonunion | Union | Full time | Part time |
|---|---|---|---|---|
| Boston–Cambridge–Quincy, MA, New England City and Town Area (NECTA) Division | 16.79 | — | 16.95 | $17.07 |
| Chicago–Joliet–Naperville, IL, Metropolitan Division | 14.03 | 20.28 | 16.69 | 12.36 |
| Cleveland–Elyria–Mentor, OH, MSA | 13.77 | 17.09 | 15.54 | 11.19 |
| Dallas–Plano–Irving, TX, Metropolitan Division | 14.19 | — | 16.69 | 11.12 |
| Denver–Aurora–Broomfield, CO, MSA | 15.55 | 17.88 | 16.56 | — |
| Houston–Sugar Land–Baytown, TX, MSA | 14.05 | — | 14.57 | — |
| Los Angeles–Long Beach–Glendale, CA, Metropolitan Division | 13.37 | 20.47 | 16.65 | 12.45 |
| Miami–Miami Beach–Kendall, FL, Metropolitan Division | 12.24 | — | 13.41 | — |
| Minneapolis–St. Paul–Bloomington, MN–WI, MSA | 13.78 | 17.47 | 15.71 | 11.72 |
| Nassau–Suffolk, NY, Metropolitan Division | 13.80 | 17.22 | 16.53 | 10.15 |
| New York–White Plains–Wayne, NY–NJ, Metropolitan Division | 13.50 | 16.92 | 16.24 | 10.02 |
| Philadelphia, PA, Metropolitan Division | 14.70 | — | 16.37 | — |
| Phoenix–Mesa–Glendale, AZ, MSA | 14.67 | — | 15.77 | — |
| Pittsburgh, PA, MSA | 13.46 | 15.98 | 14.76 | 11.82 |
| Portland–Vancouver–Hillsboro, OR–WA, MSA | 14.48 | 16.70 | 16.38 | 11.18 |
| Riverside–San Bernardino–Ontario, CA, MSA | 13.43 | 18.79 | 15.96 | 12.47 |
| San Diego–Carlsbad–San Marcos, CA, MSA | 14.21 | 16.99 | 16.53 | 10.98 |
| Santa Ana–Anaheim–Irvine, CA, Metropolitan Division | 13.62 | 20.04 | 16.71 | 12.60 |
| Seattle–Bellevue–Everett, WA, Metropolitan Division | 15.05 | 19.68 | 16.94 | 14.22 |
| St. Louis, MO–IL, MSA | 14.00 | 21.93 | 16.11 | 11.89 |
| Tampa–St. Petersburg–Clearwater, FL, MSA | 12.54 | 17.28 | 13.75 | 9.90 |
| Warren–Troy–Farmington Hills, MI, Metropolitan Division | 13.86 | — | 16.09 | — |
| Washington–Arlington–Alexandria, DC–VA–MD–WV, Metropolitan Division | 14.97 | 21.96 | 17.36 | — |

Note: Dash indicates that the NCS data were not sufficient for the estimate to be reported.

Source: U.S. Bureau of Labor Statistics, National Compensation Survey and Occupational Employment Statistics.

**Table 5. Experimental estimates of the hourly mean wage for general office clerks, Standard Occupational Classification (SOC) 439061, by full- or part-time status, by work level, May 2011**

| Area | Full time | | | | Part time | |
|---|---|---|---|---|---|---|
| | Level 2 | Level 3 | Level 4 | Level 5 | Level 2 | Level 3 |
| Atlanta–Sandy Springs–Marietta, GA, Metropolitan Statistical Area (MSA) | — | — | — | — | — | — |
| Baltimore–Towson, MD, MSA | — | $14.01 | $17.62 | $19.40 | — | — |
| Boston–Cambridge–Quincy, MA, New England City and Town Area (NECTA) Division | — | — | 14.97 | — | — | — |
| Chicago–Joliet–Naperville, IL, Metropolitan Division | — | — | 18.21 | 17.75 | — | — |
| Cleveland–Elyria–Mentor, OH, MSA | $9.72 | 13.51 | 15.73 | 19.23 | $9.75 | $10.75 |
| Dallas–Plano–Irving, TX, Metropolitan Division | — | 15.02 | 13.52 | 22.76 | — | — |
| Denver–Aurora–Broomfield, CO, MSA | — | 13.01 | 16.03 | 21.00 | — | — |
| Houston–Sugar Land–Baytown, TX, MSA | — | 11.07 | 16.33 | — | — | — |
| Los Angeles–Long Beach–Glendale, CA, Metropolitan Division | — | 15.80 | 18.64 | 21.92 | — | — |
| Miami–Miami Beach–Kendall, FL, Metropolitan Division | — | — | — | — | — | — |
| Minneapolis–St. Paul–Bloomington, MN–WI, MSA | — | 15.73 | — | 18.40 | — | — |
| Nassau–Suffolk, NY, Metropolitan Division | 11.79 | 16.64 | 17.86 | 18.98 | — | — |

See footnotes at end of table.

**Table 5. Experimental estimates of the hourly mean wage for general office clerks, Standard Occupational Classification (SOC) 439061, by full- or part-time status, by work level, May 2011**

| Area | Full time | | | | Part time | |
|---|---|---|---|---|---|---|
| | Level 2 | Level 3 | Level 4 | Level 5 | Level 2 | Level 3 |
| New York–White Plains–Wayne, NY–NJ, Metropolitan Division | 11.71 | 16.51 | 17.61 | 18.66 | — | — |
| Philadelphia, PA, Metropolitan Division | — | — | — | — | — | — |
| Phoenix–Mesa–Glendale, AZ, MSA | — | — | — | — | — | — |
| Pittsburgh, PA, MSA | — | 12.27 | 15.24 | 16.23 | 9.45 | — |
| Portland–Vancouver–Hillsboro, OR–WA, MSA | 12.35 | 13.65 | 16.09 | 18.66 | — | — |
| Riverside–San Bernardino–Ontario, CA, MSA | — | 15.98 | 17.71 | 19.73 | — | — |
| San Diego–Carlsbad–San Marcos, CA, MSA | 12.12 | 13.08 | 16.28 | 19.01 | — | — |
| Santa Ana–Anaheim–Irvine, CA, Metropolitan Division | — | 15.94 | 18.44 | 20.87 | — | — |
| Seattle–Bellevue–Everett, WA, Metropolitan Division | — | — | — | — | — | — |
| St. Louis, MO–IL, MSA | — | 12.19 | 15.38 | 20.49 | — | 11.45 |
| Tampa–St. Petersburg–Clearwater, FL, MSA | 10.63 | 12.89 | 14.38 | 16.60 | 8.52 | — |
| Warren–Troy–Farmington Hills, MI, Metropolitan Division | — | — | — | — | — | — |
| Washington–Arlington–Alexandria, DC–VA–MD–WV, Metropolitan Division | — | 14.10 | 19.19 | 20.84 | — | — |

Note: Dash indicates that the NCS data were not sufficient for the estimate to be reported.

Source: U.S. Bureau of Labor Statistics, National Compensation Survey and Occupational Employment Statistics.

**Table 6. Areas used to calculate the National Compensation Survey (NCS) proportions for characteristics during the first step of the collapse hierarchy**

| Area with wage estimate | Area used for proportions for characteristics |
|---|---|
| Atlanta–Sandy Springs–Marietta, GA, Metropolitan Statistical Area (MSA) | Atlanta–Sandy Springs–Gainesville, GA–AL, CSA |
| Baltimore–Towson, MD, MSA | Washington–Baltimore–Northern Virginia, DC–MD–VA–WV, CSA |
| Boston–Cambridge–Quincy, MA, NECTA Division | Boston–Worcester–Manchester, MA–NH, CSA |
| Chicago–Joliet–Naperville, IL, Metropolitan Division | Chicago–Naperville–Michigan City, IL–IN–WI, CSA |
| Cleveland–Elyria–Mentor, OH, MSA | Balance of East North Central Census division |
| Dallas–Plano–Irving, TX, Metropolitan Division | Dallas–Fort Worth, TX, CSA |
| Denver–Aurora–Broomfield, CO, MSA | Balance of Mountain Census division |
| Houston–Sugar Land–Baytown, TX, MSA | Houston–Baytown–Huntsville, TX, CSA |
| Los Angeles–Long Beach–Glendale, CA, Metropolitan Division | Los Angeles–Long Beach–Riverside, CA, CSA |
| Miami–Miami Beach–Kendall, FL, Metropolitan Division | Miami–Fort Lauderdale–Pompano Beach, FL, MSA |
| Minneapolis–St. Paul–Bloomington, MN–WI, MSA | Minneapolis–St. Paul–St. Cloud, MN–WI, CSA |
| Nassau–Suffolk, NY, Metropolitan Division | New York–Newark–Bridgeport, NY–NJ–CT–PA, CSA |
| New York–White Plains–Wayne, NY–NJ, Metropolitan Division | New York–Newark–Bridgeport, NY–NJ–CT–PA, CSA |
| Philadelphia, PA, Metropolitan Division | Philadelphia–Camden–Vineland, PA–NJ–DE–MD, CSA |
| Phoenix–Mesa–Glendale, AZ, MSA | Phoenix–Mesa–Scottsdale, AZ, MSA |
| Pittsburgh, PA, MSA | Balance of Middle Atlantic census division |
| Portland–Vancouver–Hillsboro, OR–WA, MSA | Balance of Pacific census division |
| Riverside–San Bernardino–Ontario, CA, MSA | Los Angeles–Long Beach–Riverside, CA, CSA |
| San Diego–Carlsbad–San Marcos, CA, MSA | Balance of Pacific census division CSA |
| Santa Ana–Anaheim–Irvine, CA, Metropolitan Division | Los Angeles–Long Beach–Riverside, CA, CSA |
| Seattle–Bellevue–Everett, WA, Metropolitan Division | Seattle–Tacoma–Olympia, WA, CSA |

See footnotes at end of table.

**Table 6. Areas used to calculate the National Compensation Survey (NCS) proportions for characteristics during the first step of the collapse hierarchy**

| Area with wage estimate | Area used for proportions for characteristics |
|---|---|
| St. Louis, MO–IL, MSA | Balance of West North Central census division |
| Tampa–St. Petersburg–Clearwater, FL, MSA | Balance of South Atlantic census division |
| Warren–Troy–Farmington Hills, MI, Metropolitan Division | Detroit–Warren–Flint, MI, CSA |
| Washington–Arlington–Alexandria, DC–VA–MD–WV, Metropolitan Division | Washington–Baltimore–Northern Virginia, DC–MD–VA–WV, CSA |

Note: The balance of a Census division comprises all areas in the division except those included in one of the 15 specific areas in table 1.

Source: U.S. Bureau of Labor Statistics, based on U.S. Census Bureau areas.

Table 4 shows wage estimates for general office clerks by job characteristic in the 25 areas selected. Table 5 then shows wage estimates by work level separately for full-time and part-time workers. Among the full-time workers, work levels 2 through 5 predominate, while among part-time workers, levels 2 and 3 predominate.

TWO BLS STATISTICAL PROGRAMS—the NCS and the OES survey—collect and report information about the hourly earnings of workers by occupation. This article has described a procedure that combines data from these programs to produce a consistent set of wage estimates by area, occupation, and job characteristic. The procedure takes advantage of the large sample size of the OES survey and the detailed information about job characteristics from the NCS to provide more extensive information about the wage rates of workers than either program can produce individually. The article then presented the resulting experimental wage estimates for two occupations in 25 areas as a demonstration of the estimation procedure. The Bureau seeks to make more wage estimates based on this procedure available in the future.

# Appendix: Definitions and examples

*Definitions of geographic areas .* Metropolitan and micropolitan statistical areas are geographic entities defined by the Office of Management and Budget (OMB) for use by federal statistical agencies. A metropolitan statistical area contains a core urban area with a population of at least 50,000, and a micropolitan statistical area contains an urban core with a population of at least 10,000 but less than 50,000. Combined statistical areas then consist of two or more adjacent metropolitan or micropolitan statistical areas that have substantial employment interchange. As an example of how these definitions interrelate, the following is a list of the areas that make up the Washington–Baltimore–Northern Virginia, DC–MD–VA–WV, CSA:

- Baltimore–Towson, MD, Metropolitan Statistical Area
- Culpeper, VA, Micropolitan Statistical Area
- Lexington Park, MD, Micropolitan Statistical Area
- Washington–Arlington–Alexandria, DC–VA–MD–WV, Metropolitan Statistical Area
    - Bethesda–Rockville–Frederick, MD, Metropolitan Division
    - Washington–Arlington–Alexandria, DC–VA–MD–WV, Metropolitan Division
- Winchester, VA–WV, Metropolitan Statistical Area

The Washington–Baltimore–Northern Virginia CSA is thus composed of three metropolitan statistical areas and two micropolitan statistical areas. One of the metropolitan statistical areas, Washington–Arlington–Alexandria, is then further divided between two metropolitan divisions. A metropolitan division is a smaller grouping of counties or equivalent entities within a metropolitan statistical area; it contains a single core with a population of at least 2.5 million.[14]

*Parallels between NCS–OES estimation method and benchmarking.* The example that follows demonstrates the BLS estimation procedure and how it relates to benchmarking the NCS sample weights to OES employment totals, thereby “harmonizing” the two sets of wage estimates. For simplicity, suppose that there are only two possible values for wage rates: $10 and $20. Then the following tabulation summarizes counts of observations from separate OES and NCS samples for this hypothetical example:

| | Employment | | | |
|---|---|---|---|---|
| Hourly earnings | **OES total** | **NCS total** | **NCS full time** | **NCS part time** |
| $10.00 | 1,000 | 100 | 75 | 25 |
| $20.00 | 1,500 | 100 | 95 | 5 |
| Average | $16.00 | $15.00 | $15.59 | $11.67 |

In the OES sample, there are 1,000 observations of hourly earnings of $10 and 1,500 observations of hourly earnings of $20. Assuming that all the OES observations receive equal weight, the average for hourly earnings in the OES survey equals $16. In the NCS sample, there are 100 observations of hourly earnings of $10 and 100 observations of hourly earnings of $20. Assuming that all the NCS observations also receive equal weight, the average for hourly earnings in the NCS equals $15. The NCS also provides information on the workers' full-time or part-time status. In this example, average hourly earnings in the NCS equal $15.59 for full-time workers and $11.67 for part-time workers.

The basic strategy for harmonizing the NCS and OES estimates is to apply benchmark factors to the NCS observations on the basis of the OES employment totals. The term "benchmarking" refers to adjusting for inconsistencies in the frequency of occurrence of a variable between two data sources, usually by adjusting the sample weights in one of the sources to make the frequency of the variable match its frequency in the other source. Observations of $10 constitute 40 percent of the OES total, while they constitute 50 percent of the NCS total. Therefore, reducing the sample weights for the NCS hourly earnings observations of $10 by a benchmark factor of 0.8 and increasing the sample weights for the NCS hourly earnings observations of $20 by a benchmark factor of 1.2 makes the NCS estimates for hourly earnings consistent with OES hourly earnings at $16 each.[15]

The following tabulation gives the harmonized OES and NCS results after benchmarking:

| | Employment | | | |
|---|---|---|---|---|
| Hourly earnings | **OES total** | **NCS total** | **NCS full time** | **NCS part time** |
| $10.00 | 1,000 | 0.8 × 100 | 0.8 × 75 | 0.8 × 25 |
| $20.00 | 1,500 | 1.2 × 100 | 1.2 × 95 | 1.2 × 5 |
| Average | $16.00 | $16.00 | $16.55 | $12.31 |

The benchmarked sample weights also are applied to the estimates by full-time or part-time status. Doing so adjusts the average hourly earnings estimates to $16.55 for full-time workers and $12.31 for part-time workers, so these estimates, too, are now consistent with the overall OES estimate for average hourly earnings.

As described in this article, the method actually employed to harmonize the NCS and OES estimates uses proportions for the characteristic from the NCS to allocate OES employment counts by wage interval. However, this approach turns out to be essentially equivalent to benchmarking the NCS sample weights to OES employment totals. The following tabulation demonstrates this equivalence by continuing the simplified example:

| | Employment | | | |
|---|---|---|---|---|
| Hourly earnings | **OES total** | **NCS full-time factor** | **Full time** | **Part time** |
| $10.00 | 1,000 | 0.75 | 750 | 250 |
| $20.00 | 1,500 | 0.95 | 1,425 | 75 |
| Average | $16.00 | … | $16.55 | $12.31 |

Among observations in the NCS for which hourly earnings equal $10, 75 percent are the earnings of full-time workers while 25 percent are the earnings of part-time workers. Therefore, the OES total of 1,000 employed at a rate of $10 per hour is allocated as 750 full-time workers and 250 part-time workers. Similarly, among NCS observations for which hourly earnings equals $20, 95 percent are the earnings of full-time workers while 5 percent are the earnings of part-time workers. Therefore, the OES total of 1,500 employed at a rate of $20 per hour is allocated as 1,425 full-time workers and 75 part-time workers. The resulting values for average hourly earnings are the same as those obtained under the benchmarking procedure: $16.55 for full-time workers and $12.31 for part-time workers. Moreover, because the allocated number of full-time workers is 2,175 (750 + 1,425), or 87 percent of

the total count of 2,500 workers, the full-time and part-time estimates are again made consistent with the overall OES estimate of $16.

The allocation approach starts out mathematically equivalent to the benchmarking approach, but it then lends itself more readily to a method for dealing with the relatively smaller sample sizes from the NCS. For the actual wage estimates, the NCS characteristic factors are applied to the OES employment totals by combinations of area, occupation, and the OES wage intervals. Because the OES sample is so much larger than the NCS sample, there will inevitably be wage intervals by area and occupation for which there are no corresponding NCS observations. In terms of the simple example presented here, it would be as if there are no NCS observations with hourly earnings equal to $10, a situation that would make it impossible to calculate the benchmark factor. That is, there would be no observations upon which to calculate the benchmark factor of 0.8 from the example, and there would be no NCS observations to which the factor could be applied. However, with the allocation method, what is ultimately required is the allocation factor for the characteristic. Therefore, if the NCS has no matching observations for the specific area, occupation, and wage interval combination, the area or occupation group (or both) can be broadened until there are matching NCS observations. Consequently, a factor for the characteristic can always be calculated, albeit under the assumption that the factor calculated from the broadened area and occupation group provides a good estimate of the factor for the smaller group to which it will be applied.

## SUGGESTED CITATION

Michael K. Lettau and Dee A. Zamora, "Wage estimates by job characteristic: NCS and OES program data," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, August 2013, https://doi.org/10.21916/mlr.2013.27.

## NOTES

[1] See *Occupational Employment Statistics: May 2012 metropolitan and nonmetropolitan area definitions* for the area definitions used for the OES estimates.

[2] See Local Area Unemployment Statistics: Census regions and divisions (U. S. Bureau of Labor Statistics, October 16, 2001) for the states in each census division; and OMB Bulletin No. 10-02 for the definitions of the metropolitan areas. See also the appendix of the latter publication for an example of how the various definitions of metropolitan areas interrelate.

[3] Work levels are a ranking of the duties and responsibilities within an occupation and enable comparisons of wages across occupations. Work levels are determined by the number of points given for specific aspects, or factors, of the work. (For a complete description of point factor leveling, see *National Compensation Survey: Guide for evaluating your firm's jobs and pay.*)

[4] For the history of how BLS occupational wage surveys were used for federal pay comparability, see John E. Buckley, "Fifty years of BLS surveys on federal employees' pay," *Monthly Labor Review*, September 2009, pp. 36–46, https://www.bls.gov/opub/mlr/2009/09/art3full.pdf.

[5] See OMB Bulletin No. 10-02 for the differences between Combined Statistical Areas (CSAs) and Metropolitan Statistical Areas (MSAs).

[6] The 2012 OES estimates were constructed from a sample of about 1.2 million establishments, while the March 2013 NCS had a sample of approximately 9,200 private establishments and 1,400 establishments in state and local government.

[7] For a detailed description of the OES procedures, see "Occupational Employment Statistics," *BLS handbook of methods* (U.S. Bureau of Labor Statistics, December 10, 2009), https://www.bls.gov/opub/hom/homch3.htm.

[8] See the appendix for a demonstration of the parallels between this procedure and a standard procedure of benchmarking the NCS sample weights to OES employment counts by area, occupation, and wage interval.

[9] The illustration is taken from "Occupational Employment Statistics," *BLS Handbook of methods.*

[10] See *Standard Occupational Classification* for a description of the major occupation groups and the six-digit SOC occupation codes.

[11] See Local Area Unemployment Statistics for a listing of the states in each census region.

[12] These 25 areas were chosen because they each have a large OES estimate of total employment for May 2011.

[13] The amount of NCS data that supports the wage estimate is the amount of NCS data for the job characteristic in the six-digit SOC area-by-occupation cell for which the proportions for the job characteristic are calculated. In other words, for a given area, the area is that shown in the rightmost column of table 6: the area used to calculate the proportions for the characteristics for the estimate in question. For example, the wage estimate for part-time nurses in the Nassau–Suffolk, NY, Metropolitan Division would use the amount

of NCS data available for part-time nurses in the New York–Newark–Bridgeport, NY–NJ–CT–PA, CSA to determine whether the estimate is shown.

[14] See *Metropolitan and micropolitan: Metropolitan and micropolitan statistical areas—main* (U.S. Census Bureau) and *Geography: Geographic terms and concepts—core based statistical areas and related statistical areas* (U.S. Census Bureau) for further information about the BLS definitions of geographic areas.

[15] For hourly earnings of $10.00, the benchmark factor is calculated as [1,000/(1,000 + 1,500)] ÷ [100/(100 + 100)] = 0.8. For hourly earnings of $20.00, the benchmark factor is calculated as [1,500/(1,000 + 1,500)] ÷ [100/(100 + 100)] = 1.2.

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