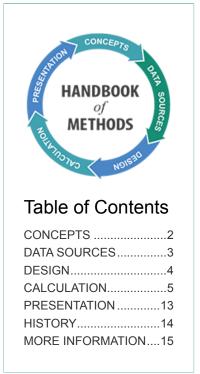# Job Openings and Labor Turnover Survey

The Job Openings and Labor Turnover Survey (JOLTS) program produces data on job openings, hires, and separations.

Quick Facts: Job Openings and Labor Turnover Survey	
Subject areas	Employment
Key measures	Hires Job openings Separations
How the data are obtained	Survey of businesses
Classification system	Geography, Industry
Periodicity of data availability	Monthly
Geographic detail	National
Scope	Private sector
Key products	• Job opening and labor turnover news release
Program webpage	• www.bls.gov/jlt

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Calculation

Occupational Requirements Survey: *Calculation*

The ORS estimates provide data about the physical demands, environmental conditions, education and training (or specific vocational preparation (SVP)), and mental requirements for how a job is typically performed. Many of the ORS data elements have the percentage of workers, mean (in hours, days, or percentage of a day), percentiles, and mode estimates for each occupational definition. For example, one ORS data element measures the amount of time during a typical workday that a nurse, spends stooping. Physical demands, such as stooping, are captured in hours, so mean and percentile estimates (10th, 25th, 50th, 75th, and 90th percentiles) are calculated. Also, the number of hours spent stooping are grouped within duration categories, and a percentage-of-workers estimate is calculated for each category.

Finally, the mode of the categories is identified, that is, which duration category with the largest weighted number of workers. The formulas used to calculate these estimates are shown below. The type of estimator used depends on the type of data element. For any categorical data element, a percentage of workers is calculated, and a mode identified for these percentages. For continuous data elements (such as duration and maximum weight lifted/carried elements), mean and percentile estimates is calculated.

Field economists collect 74 ORS data elements; however, as shown by the example given, many estimates can be calculated from one element. This results in many more calculated ORS estimates per occupation (or occupational group). For a full list of calculated elements, please see Appendix A at the end of this section.

Percentage. The formula for the percentage of employees with a given characteristic out of all employees in the domain is

$$\frac{\sum_{i=1}^{I}\sum_{g=1}^{G_i} OccFW_{ig} \times X_{ig} \times Z_{ig}}{\sum_{i=1}^{I}\sum_{g=1}^{G_i} OccFW_{ig} \times X_{ig}} \times 100$$

where

> *i* is the establishment,

g is the occupation within establishment i,

I is the total number of establishments,

G_i is the total number of quotes in establishment i,

X_{ig} is 1 if worker ig meets the condition set in the domain (denominator) condition and 0 otherwise.

Z_{ig} is 1 if worker ig meets the condition set in the characteristic condition and 0 otherwise.

$OccFW_{ig}$ is the final quote weight for occupation g in establishment i.

Average (mean). The formula for the average value of a quantity for a characteristic is

$$\frac{\sum_{i=1}^{I}\sum_{g=1}^{G_i} OccFW_{ig} \times X_{ig} \times Z_{ig} \times Q_{ig}}{\sum_{i=1}^{I}\sum_{g=1}^{G_i} OccFW_{ig} \times X_{ig} \times Z_{ig}}$$

where

i is the establishment,

g is the occupation within establishment i,

I is the total number of establishments,

G_i is the total number of quotes in establishment i,

X_{ig} is 1 if worker ig meets the condition set in the domain (denominator) condition and 0 otherwise.

Z_{ig} is 1 if worker ig meets the condition set in the characteristic condition and 0 otherwise.

$OccFW_{ig}$ is the final quote weight for occupation g in establishment i.

Q_{ig} is the value of a quantity for a specific characteristic for occupation g in establishment i.

Percentiles. The grouping of various categories are used to describe the distribution of a numeric value. The following percentiles p are calculated: 10th, 25th, 50th (median), 75th, and 90th. The pth percentile is the value Q_{ig}, where the value of a quantity is for a specific category, such that

·   the sum of final quote weights (OccFW$_{ig}$) across quotes with a value less than Q$_{ig}$ is less than p percent of all final quote weights and

·   the sum of final quote weights (*OccFW$_{ig}$*) across quotes with a value more than Q_{ig} is less than (100 – p) percent of all final quote weights.

It is possible that there is no specific quote *ig* for which both of these properties hold. This occurs when there exists a quote for which the *OccFW$_{ig}$* of records whose value is less than Q_{ig} equals *p* percent of the total weighted quote employment. In that situation, the *p*th percentile is the average of Q_{ig} and the value on the quote with the next-lowest value.

Mode. The mode is <u>the</u>a category of a characteristic with the largest weighted number of workers within the associated ~~estimate~~ <u>category</u> group. Refer to appendix A at the end of this section for a list of elements that have mode estimates.

Education and training (specific vocational preparation (SVP))

Although most of the estimates for these requirements are simply based on establishment responses about the selected occupations' various tasks, there are some that require an additional level of calculation. One such type of estimation is SVP level which is determined by the amount of preparation time required by the worker in order to develop the skills needed to perform the given occupation. The elements that make up this preparation are the minimum education, pre-employment training, previous work experience, and post-employment training for the job. These elements are then aggregated and used to determine the SVP level needed for the job shown in the table below:

Strength

Another element that is based off of other elements' estimates is strength. It is measured in five levels; from sedentary to very heavy work. The levels are determined by how much weight a worker is required to lift or carry occasionally, frequently, and constantly, as well as standing/walking in some special cases. The strength level is determined by satisfying at least one of the lifting/carrying conditions shown in the table below, or as defined by the "strength special cases" table. For example, if a job requires a worker to lift or carry 11–20 pounds *occasionally*, then it would be classified as light work. However, if that same job were to require lifting or carrying that same weight *frequently*, then it would be classified as medium work.

The following table outlines the special cases for strength. In instances where field economists are unable to determine from the respondent certain job requirements, they code these data as unknown. See the section "Weighting, Nonresponse Adjustment, Imputation, and Benchmarking" for more information.

Reliability of ORS estimates

ORS estimates are derived from a sample of occupations selected from responding establishments. Two types of errors are possible in an estimate based on a sample survey: sampling and nonsampling errors. *Sampling errors* occur because the sample makes up only a part of the population it represents. The sample used for the survey is one of a number of possible samples that could have been selected under the sample design, each producing its own estimate. A measure of the variation among sample estimates is the *standard error*. *Nonsampling errors* are data errors that stem from any source other than sampling error, such as data collection errors and data-processing errors.

Standard errors can be used to measure the precision with which an estimate from a particular sample approximates the expected result of all possible samples. The chances are about 68 out of 100 that an estimate from the survey differs from a complete population figure by less than the standard error. The chances are about 90 out of 100 that this difference is less than 1.6 times the standard error. Statements of comparison appearing in ORS publications are significant at a level of 1.6 standard errors or better. This means that, for differences cited, the estimated difference is more than 1.6 times the standard error of the difference.

The ORS uses *balanced repeated replication* (BRR) to estimate the standard error. The procedure for BRR entails first partitioning the sample into variance strata composed of a single sampling stratum or clusters of sampling strata, and then splitting the sample units in each variance stratum evenly into two variance primary sampling units (PSUs). Next, half-samples are chosen, so that each contains exactly one variance PSU from each variance

stratum. Choices are not random but are designed to yield a "balanced" collection of half-samples. By using half-samples, we can compute a "replicate" estimate with the same formula for the regular, or "full-sample," estimate, except that the final weights are adjusted. If a unit is in the half-sample, its weight is multiplied by $(2 - k)$; if not, its weight is multiplied by k. For all ORS publications, $k = 0.5$, so the multipliers are 1.5 and 0.5.

The BRR estimate of standard error with R half samples is

$$SE(\hat{Y}) = \sqrt{\frac{1}{R(1-k)^2} \sum_{r=1}^{R} \left(\hat{Y}_r - \hat{Y}\right)^2} \,,$$

where

the summation is over all replicates of half-samples $r = 1,...,R$,

$\hat{Y}_r$ is the rth replicate estimate, and

$\hat{Y}$ is the full-sample estimate.

Data collection and processing errors are mitigated primarily through quality assurance programs that include the use of data collection reinterviews, observed interviews, computer edits of the data and systematic professional review of the data. The programs also serve as a training device to provide feedback to field economists, or data collectors, on errors and the sources of errors that can be remedied by improved collection instructions or computer-processing edits. Field economists receive extensive training to maintain high standards in data collection.

Once estimates of occupational requirements are produced, the estimates are verified, or validated. The focus of the verification at this stage is to compare the estimates with their expected values. These values are based on comparisons with leveling information, the Dictionary of Occupational Titles (DOT), the Occupational Information Network (O*NET), testing estimates and environmental scanning for related data or research on occupational requirements. In addition, we compare data between similar occupations.

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The data are designated as "fit for use" in publication, once the estimates are evaluated for confidentiality and reliability. Not all calculated series meet the criteria for publication. Before any series is published, it is reviewed to make sure that it meets specified statistical reliability and confidentiality requirements. The review prevents the publication of a series that could reveal information about a specific establishment or that has a large sampling error. For additional information on data review and estimate validation, see "Validation of Estimates in the Occupational Requirements Survey: Analysis of Approaches" and "Occupational Requirements Survey (ORS) Data Review Process."

To assist users in ascertaining the reliability of ORS estimates, we publish standard errors. Standard errors provide users with a measure of the precision of an estimate to ensure that it is within an acceptable range for their intended purpose. The standard errors are calculated from collected and imputed data. BLS is researching methods for estimating the variance excluding imputed values. For additional information, see https://www.bls.gov/ncs/ors/orse.htm.

Weighting, nonresponse adjustment, imputation, and benchmarking

Participation in the survey is voluntary; therefore, a company official may refuse to participate in the survey. In addition, some establishments selected from the sampling frame may be out of the scope of the survey or may have gone out of business. To address the problems of nonresponse and missing data, the ORS program adjusts the weights of the remaining establishments and imputes missing values, to ensure that occupational requirement estimates are representative of requirements for civilian workers during the estimation process. This section describes the current weight adjustments, imputation, and benchmarking methods.

Weight adjustments and imputation are made in accordance with the following steps:

1. An establishment is considered *responding* if it provided information on at least one usable occupation. An occupation is classified as usable if the following data are present: occupational attributes (full-time or part-time schedule, union or nonunion status, and time or incentive type of pay), work schedule, and occupational requirements data for any of the data elements. An establishment is considered *nonresponding* if it provided neither occupational requirements, occupational classification, worker attributes, nor work schedule data for any occupation. Establishment nonresponse during the initial interview is treated with adjustments that redistribute the weights of nonrespondents to similar respondents by characteristics such as the industry, size class, and geographic area of the establishment. For example, if the nonresponding establishment was in the manufacturing industry and had an employment of 350 workers, the ORS program would adjust the weights of responding manufacturing establishments with 250–

499 workers by a nonresponse factor during estimation. This nonresponse adjustment factor (NRAF) at the establishment level is calculated using the following formula:

$$NRAF = \frac{\sum A + \sum B}{\sum A},$$

where:

$\sum A$ = weighted employment of all usable establishments in the nonresponse cell

$\sum B$ = weighted employment of all viable but not usable establishments in the nonresponse cell

If there are no responding establishments to reweight within the industry/employment group, then additional responding units from similar geographic areas are considered.

Establishments no longer in operation or out of the scope of the survey, and establishments with no workers within the scope of the survey, are excluded from the survey estimates.

2.   Other response and nonresponse adjustment factors may be included for any special situations that may have occurred during data collection. For example, an establishment weight factor is applied when a sample unit is one of two establishments owned by a given company and the respondent provides data for both locations combined instead of data for the sampled unit, the weight of the sampled unit is adjusted to reflect the employment data collected.

3.   *Item nonresponse* is a situation in which an establishment responds to the survey but is unable or unwilling to provide some of the occupational requirements data or worker attributes for a given sampled occupation. Item nonresponse is addressed through item imputation in certain situations. Item imputation replaces missing values for an item or items with values derived from establishments with similar establishment and worker characteristics that have a value for the item. For ORS estimates, items with missing values are imputed within groups of ORS characteristics that are related. For example, one ORS group refers to categorical variables only and includes such characteristics as hearing, vision, and driving. Within the group, values are imputed using occupational information from similar occupations in similar establishments. Imputation of one group of ORS characteristics does not affect the imputation for any other group.

4.   *Poststratification*, or *benchmarking*, is the process of adjusting the weight of each establishment in the survey to match the most current distribution of employment by industry. The ORS establishment sample is drawn from the Quarterly Census of Employment and Wages (QCEW). Because the sample of establishments used to collect ORS data are chosen ahead of time, establishment weights reflect employment at the time of sampling, not collection. The benchmark process updates those weights by

current employment. Benchmarking ensures that survey estimates reflect the most current industry–government (hereafter, ownership) employment counts in proportions consistent with the private industry, state government, and local government sectors. For example, let's say 40 private industry, 10 local government, and 5 state government units in the service sector were selected from the ORS sampling frame. These units consist of establishments employing 200,000 private workers, 30,000 local government workers, and 10,000 state government workers. If, by the time of survey processing, the private service sector experienced an employment increase of 10,000 workers (or 5 percent) and there is no increase in employment in the service sectors of state and local government, then the sample would underrepresent current employment in the private industry service sector in the absence of benchmarking. In this example, the ORS would adjust the sample weights of the 40 service sector firms in private industry to ensure that the number of workers in establishments in the sampling frame rises to 210,000. The ownership employment counts for the private industry service sector would then reflect the current proportions of 84 percent for private industry, 12 percent for local government, and 4 percent for state government employment.

Employment information is derived from the Quarterly Census of Employment and Wages (QCEW) Longitudinal Database, a file of railroad employment, and the Current Employment Survey (CES). The QCEW and the railroad information provide employment data, but since these sources do not have current employment data, the CES is used to make an adjustment to the employment.

For more information please see Estimation Processes Used in the Occupational Requirements Survey and Imputation Methodology for the Occupational Requirements Survey (ORS).

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More Information

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