Chapter 18.
Job Openings and Labor Turnover Survey

The Job Openings and Labor Turnover Survey (JOLTS) program of the Bureau of Labor Statistics (BLS) produces monthly data on job openings, hires, and separations. The JOLTS target sample size is approximately 16,400 establishments and covers all nonfarm establishments in the private sector as well as federal, state, and local governments in the 50 states and the District of Columbia. JOLTS data series are published on a monthly basis and seasonally adjusted data are also published for most JOLTS series.

Background

The Bureau of Labor Statistics began developing the JOLTS program in 1998 in order to assess the unmet demand for labor in the U.S. labor market. The collection, estimation, and analysis of data subsequently began in 2000. JOLTS data were first released to the public in 2002 with a monthly series dating back to December 2000. Prior to the inception of the current JOLTS program, a federal-state cooperative BLS program called the Labor Turnover Survey (LTS) published turnover data from 1959 to 1981. Questions on job vacancies were added to the LTS in 1969. BLS produced vacancy rates from 1969 through 1973 for nine selected manufacturing industries and selected states and metropolitan areas.

Concepts

Establishment. An establishment is an economic unit, such as a factory, mine, store, or office that produces goods or services. An establishment is generally a single physical location, where business is conducted or where services or industrial operations are performed (for example, a factory, mill, store, hotel, movie theater, mine, farm, airline terminal, sales office, warehouse, or central administrative office). There are cases where distinct and separate economic activities are performed at a single physical location, for example, shops in a hotel. These shops, operated out of the same physical location as the hotel, are identified as separate establishments and classified in retail trade while the hotel is classified in accommodations. In such cases, each activity is treated as a separate establishment provided: (1) no one

industry description in the classification includes such combined activities; (2) separate reports can be prepared on the number of employees, their wages and salaries, sales or receipts, and expenses; and (3) employment and output are significant for both activities.

Employment. Employment includes persons on the payroll who worked or received pay for the pay period that includes the 12th day of the reference month. Full-time, part-time, permanent, short-term, seasonal, salaried, and hourly employees are included, as are employees on paid vacation or other paid leave. Proprietors or partners of unincorporated businesses, unpaid family workers, or persons on leave without pay or on strike for the entire pay period are not counted as employed. Employees of temporary help agencies, employee leasing companies, outside contractors, and consultants are

counted by their employer of record, not by the establishment for which they are working.

Job openings. Establishments submit information on job openings that existed on the last business day of the reference month. A job opening entails that (1) a specific position exists and there is work available for that position, (2) work could start within 30 days whether or not a suitable candidate is found during that time, and (3) the employer is actively recruiting from outside the establishment to fill the position. Included are full-time, part-time, permanent, short-term, and seasonal openings. Active recruiting means that the establishment is taking steps to fill a position by advertising in newspapers, on television, or on radio; posting Internet notices; posting help-wanted signs; networking or making "word of mouth" announcements; accepting applications; interviewing candidates; contacting employment agencies; or soliciting employees at job fairs, state or local employment offices, or similar sources. Excluded from being categorized as a job opening are positions open only to internal transfers, promotions, demotions, or recall from layoffs; positions with starting dates more than 30 days in the future; positions for which employees have been hired but have not yet reported for work; and positions to be filled by employees of temporary help agencies, employee leasing companies, outside contractors, or consultants. The job openings rate is computed by dividing the number of job openings by the sum of the number of people employed and the number of job openings and multiplying the resulting quotient by 100.

Hires. Hires are the total number of additions to the payroll occurring at any time during the reference month, including both new and rehired employees; full-time, part-time, permanent, short-term, and seasonal employees; employees recalled to the location after a layoff (i.e., formal suspension from pay status) lasting more than 7 days; on-call or intermittent employees who returned to work after having been formally separated; workers who were hired and separated during the month; and employees transferred from other locations of the same business. The hires count does not include workers transferred or promoted within the reporting location or employees returning after being on strike. Employees of temporary help agencies or employee leasing companies, employees of outside contracting companies, or consultants are counted as hired by their employer of record. The hires rate is computed by dividing the number of people hired by the number of people employed and multiplying the resulting quotient by 100.

Separations. Separations are the total number of terminations of employment occurring at any time during the reference month and are reported by type of separation: quits, layoffs and discharges, and other separations. Quits are generally voluntary separations initiated by employees (except for retirements, which are reported as "other separations"). Layoffs and discharges are involuntary separations initiated by the employer and include layoffs with no intent to rehire; formal layoffs lasting or expected to last more than 7 days; discharges resulting from mergers, downsizing, or closings; firings or other discharges for cause; terminations of permanent or short-term employees; and terminations of seasonal employees. The category of "other separations" includes retirements, transfers to other locations, deaths, and separations due to disability. Separations do not include employees transferred within the same location, employees who are on strike, employees of temporary help agencies or employee leasing companies, employees of outside contracting companies, or consultants. The separations rate is computed by dividing the number of workers separated from their jobs by the number of people employed and multiplying the resulting quotient by 100. The quits, layoffs and discharges, and "other separations" rates are computed similarly, by dividing the number of workers who, respectively, quit their jobs, were laid off or discharged, and were otherwise separated, by the number of people employed and multiplying the resulting quotient by 100.

Industry classification. The industry classifications are in accordance with the 2012 version of the North American Industry Classification System (NAICS). To ensure the highest possible quality of data, state workforce agencies, operating under QCEW, verify with employers and update as necessary, the industry code, location, and ownership classification of all establishments covered under the QCEW program. Verification and updating are done on a 3-year cycle. Changes in establishment characteristics resulting from the verification process are always introduced into the JOLTS sampling frame together with the data reported for the first quarter of the year.

Data Sources

The JOLTS sampling frame is derived from the approximately 9 million establishments of the BLS Quarterly Census of Employment and Wages (QCEW) program. The QCEW, a virtual census of establishments in the private sector, as well as state and local government, includes all establishments covered by state Unemployment Insurance (UI) programs. The QCEW also includes federal government establishments, which are covered by the Unemployment Compensation for Federal Employees (UCFE) program. A frame of railroad establishments, provided by the Federal Railroad Administration, is added to the QCEW to complete the JOLTS sampling frame. All postal services that are not privately owned (NAICS 491110) are on the frame but are not sampled. Instead, the U.S. Postal Service provides JOLTS with data from a census of postal establishments.

In-scope establishments are nonfarm establishments with one or more employees who are covered by UI tax laws (private and state or local government) or by the UCFE program (federal government). This sampling frame covers the 50 states and the District of Columbia. The result is about 7.5 million in-scope establishments.

The following types of establishments are classified as out of the scope of the survey:

- Establishments that are inactive or out of business

- Establishments with an invalid NAICS code (000000 or 999999) or a missing code

- Agricultural establishments (NAICS 11), except logging (NAICS 1133)

- Private households (NAICS 814110)

- Establishments with no legal name or trade name

- Establishments outside of the 50 states or the District of Columbia

- Establishments that report zero employment for the most recent 6 months on the sampling frame

Sample Design

The JOLTS sample design is a probability-based stratified random sample. The basic sample unit is an establishment at a single physical location. Most sampled establishments remain in the survey for 24 months and then are not sampled again for at least 3 years. The sample of establishments is stratified by ownership (private or public), region (the four Census regions: Northeast, Midwest, South, and West), industry sector, and size class. Establishment level industry codes are assigned using the NAICS. (The establishments are then classified according to a specific set of JOLTS sampling strata. The private sector is stratified into the following subsectors: mining and logging; construction; durable goods manufacturing; nondurable goods manufacturing; wholesale trade; retail trade; transportation, warehousing, and utilities; information; finance and insurance; real estate and rental and leasing; professional and business services; educational services; health care and social assistance; arts, entertainment, and recreation; accommodation and food services; and other services. The government sector is stratified into federal government and state and local government. There are six employment size classes: 1-9; 10-49; 50-249; 250-999; 1,000-4,999; and 5,000 or more. All establishments with 5,000 or more employees are included in the sample with virtual certainty and remain in the sample as long as they remain at or above 5,000 employees.

The sample is divided into a single certainty panel and 24 noncertainty panels. Each month, a new noncertainty panel is rolled into the sample while an old noncertainty panel rolls out of the sample. This approach maintains 24 active noncertainty panels, in addition to the certainty panel, from which to produce estimates. Noncertainty sample units are requested to provide data for 24 months.

JOLTS sample units (noncertainties) will be allocated to the various strata using a standard Neyman allocation formula:

$$n_h = n(\frac{N_h S_h}{\sum N_h S_h})$$

where:

n_h is the number of units assigned to stratum h

n is the number of sample units to be allocated

N_h is the number of population elements in stratum h

S_h is the variance of the population in stratum h

This formula assigns sample units to each stratum based on the number of frame units in each stratum and the variance within the stratum relative to other strata. The variance of the population is approximated based on the frame employment of the strata. That is, stratums with larger N_h or larger variance S_h get more sample relative to those with smaller N_h or S_h.

Each year, a new 12-panel sample is selected. At the time of the annual sample selection, not all of the panels from previously selected samples have rolled out of the sample. Therefore, there are panels from multiple sample active in the current sample at any given time. Each year, the older panels are updated with respect to current strata characteristics (industry, size, region); updating also includes the removal of establishments that go out of business. The sampling weights of establishments to be used in the survey are recomputed to reflect the current population and post-stratification done to represent the updated age structure of the frame. In other words, each sample unit is re-weighted.

To ensure that newly opened establishments ("births") are represented in the sample as soon as possible, a sample of birth units is selected from the updated frame every quarter. Quarterly birth samples were first implemented in April 2009. The birth units (1) are selected from establishments that first reported positive employment during the current quarter and (2) belong to JOLTS size class 1-9, 10-49, or 50-249. The birth units are sampled from strata defined by age, industry, and size.

Each stratum's birth sample size is calculated by dividing the number of births in the stratum by the annually updated sample weight (that is, stratum reweight) of the stratum with a minimum birth sample size of three. If the stratum has three or fewer birth units, then all the birth units in the stratum are selected. Weights are assigned to the birth sample units by dividing the number of available birth units by the actual number of birth units selected for each stratum. All

the sampled birth units are then distributed evenly into three sample panels that are rolled into the sample over the quarter.

Data Collection and Review

Data collection process. Data are collected at the JOLTS Data Collection Center in Atlanta, GA. Interviewers refine the addresses and contact information for their assigned sample units. An enrollment package is mailed to the establishment, and the interviewer follows up by telephone to solicit participation. If the establishment agrees to participate, it is enrolled and data collection begins.

Initial data collection takes place via Computer Assisted Telephone Interview (CATI) for 6 months, allowing the respondent to learn the data elements and definitions and encouraging the respondent to report monthly. After 6 months using CATI, the respondent is encouraged to move to self-reporting, choosing from the Web, Touchtone Data Entry (TDE), fax, email, or U.S. mail for the remainder of their time in the sample. Some respondents prefer to remain on CATI collection in order to receive a call from the interviewer each month.

Reporters use a standard form to assist them in determining the values of the data elements they report. Specially designed forms are provided to reporters for collecting data from education establishments or temporary help and employee-leasing establishments.

Special collection procedures. An implied measure of employment change can be derived from the JOLTS data by subtracting separations from hires for a given month. Historically, however, aggregating these monthly changes across the time series produced overstated implied employment levels compared with total nonfarm employment as measured by the BLS Current Employment Statistics (CES) survey. Research into this problem showed that a considerable amount of the divergence between the CES employment levels and the derived JOLTS employment levels was traceable to the employment services industry and to state government—specifically, colleges and universities. Businesses in the employment services industry have a difficult time reporting hires and separations of temporary help workers; colleges and universities have difficulty reporting hires and separations of student workers and adjunct professors. As a result, BLS devotes additional resources to the collection, editing, and review of data on these industries. BLS analysts more closely examine reported data that do not provide a consistent picture over time and then recontact the respondents as necessary. Analysts work with the respondents to improve their reporting practices as much as possible. Establishment data that are incorrect and that cannot be reconciled are not used; instead, imputed values are used.

Data review. All data reported are edited and reviewed in several stages. The editing ensures, to the degree possible, that the data adhere to JOLTS definitions and reference periods and are consistent with data reported in the past by each establishment.

In the first stage of editing, data pass through basic edits within the Web collection instrument and the TDE system upon entry. In addition, all reported data pass through edits in the CATI system. Therefore, all forms of microdata collected undergo the same editing in the CATI instrument. A second stage of editing and review is performed by the national office staff. The data are screened electronically, and common problems and potential errors are output for review by hand. A third level of microdata editing is performed as part of the estimation process. Edit screening includes a check for reported employment values that differ from the sampled employment and checks for unusually high rates in each data element (job openings, hires, quits, layoffs and discharges, other separations, and total separations) among others.

Estimation Methodology

Unit nonresponse adjustment. A multiplicative nonresponse adjustment factor (NRAF) is used to inflate the weight of respondents in an estimation cell to adjust for nonrespondents. The weight of all nonrespondents is redistributed among the respondents to preserve the total weighted employment of the cell. The NRAF is calculated by dividing the weighted frame employment of the viable establishments in the cell by the weighted frame employment of usable sample units in the cell:

$$\mathrm{NRAF}_{\mathrm{cell}} = \frac{\sum\limits_{i \in \text{cell, viable}} w_i \mathrm{ori.emp}_i}{\sum\limits_{i \in \text{cell, usable}} w_i \mathrm{ori.emp}_i}.$$

Here,

the subscript "cell" denotes the industry division, census region, and establishment size,

i designates the ith establishment,

viable units are those in-scope sampled units which are capable of reporting; that is, sampled units that are not out of business, out of scope, or duplicates,

usable units, a subset of viable units, are those units which responded to the JOLTS with usable data,

$\mathrm{ori.emp}_i$ is the sample frame employment of the ith unit, and

w_i is the sampling weight of the ith unit

Note: By definition, NRAF ≥ 1 since the number of usable units is less than or equal to the number of viable units.

Automated outlier detection. Winsorization is a statistical process commonly used to reset outlier values to a predetermined threshold (cutoff) value. In JOLTS, an independent cutoff value is established for each employment

size and characteristic (job openings, hires, etc.). Any reported value exceeding the cutoff is reset to the cutoff value.

The Winsorization algorithm determines the interquartile range of the log-transformed ratios (that is, the log of the level for each characteristic divided by employment) for the cell. Any log-transformed reported value greater than 5 times the interquartile range is reset. The reset ratio is multiplied by the reporting unit's employment to generate the new or replacement value for the characteristic.

Item nonresponse adjustment. A respondent may report some of the JOLTS data items, but not all, resulting in item nonresponse. The JOLTS program uses the hot-deck nearest neighbor imputation algorithm to impute missing data items within a reporting establishment. The underlying assumption is that individual missing item responses can be represented by responding establishments whose geographic location, industry, and size are similar to those of the establishment with the missing data.

In nearest neighbor imputation, the recipient (the establishment with missing data) receives a value from the "nearest" donor within the same imputation cell, where "nearness" is defined by a prespecified distance function. In JOLTS, the reporting establishments are first sorted by region, industry division, and employment. The nearest neighbor donor is the establishment with reported employment closest to the reported employment of the recipient. The donor's ratio of the data element to employment is donated to the recipient. For example, if the donor has 4 hires and 10 reported employees, then its ratio of hires to employment (0.4) is multiplied by the recipient's employment to calculate the imputed hires value. The imputed values are left unrounded.

Estimating procedures. A Horvitz–Thompson estimator with a ratio adjustment is used to produce estimates of levels of surveyed characteristics at different degrees of geographical and industrial detail.

To calculate the estimated level for each survey characteristic (job openings, hires, quits, layoffs and discharges, other separations, and total separations) for a given month in a basic estimation cell, the following steps are performed:

1. For each reporting month, reported employment is multiplied by the final sampled weight to obtain weighted employment for each reporting sample unit.

2. The total employment value is obtained from the CES survey for the basic estimating cell for the month for which estimates are being made. The CES employment estimate is estimated using a much larger sample than JOLTS and is therefore considered statistically more reliable. The CES employment estimate serves as a benchmark for JOLTS employment; benchmarking JOLTS employment to CES employment increases the statistical reliability of all JOLTS estimates. The

CES benchmark employment value is used to calculate the benchmark factor (BMF) as follows:

$$\mathrm{BMF_{id,\,r}} = \mathrm{CES_{id,cr}} / \sum\nolimits_{i \in \mathrm{id,cr}} w_i \times e_i.$$

Here,

the subscript *id,cr* denotes industry division and census region,

$\mathrm{BMF}_{id,cr}$ is the benchmark factor for industry and census region,

$\mathrm{CES}_{id,cr}$ designates U.S. industry division and census region employment,

w_i is the sampling weight reflecting all adjustments (NRAF, atypical data adjustment, etc.) for sample unit i, and

e_i = reported employment from sample unit i.

Thus, the equation used to compute the estimate of a characteristic is

$$\sum\nolimits_{\mathrm{cell}} (\mathrm{weight} \times \mathrm{NRAF} \times \mathrm{BMF}) \times \mathrm{reported\_characteristic},$$

where weight is the recomputed (i.e., re-weight) sampling weight.

Birth–Death Model

As with any sample survey, the JOLTS sample can only be as current as its sampling frame. The time lag from the birth of an establishment until its appearance in the sampling frame is approximately 1 year. In addition, many new establishments fail within the first year. Because these universe establishments cannot be reflected in the sampling frame immediately, the JOLTS sample cannot capture job openings, hires, and separations from these establishments during their early existence. The BLS has developed a model for estimating birth and death activity in current months by examining data on birth and death activity in previous years as collected by the QCEW, and projecting forward to the present using over-the-year change in the CES. The birth–death model also uses historical JOLTS data to estimate the amount of "churn" (hires and separations) that exists in establishments of various sizes. The model then combines the estimated churn with the projected employment change to estimate the number of hires and separations that take place in these establishments, but that cannot be measured through sampling.

The model-based estimate of total separations is distributed to the three components of total separations—quits, layoffs and discharges, and other separations—in proportion to their contribution to the sample-based estimate of total separations. In addition, job openings in the establishments modeled are estimated by computing the ratio of openings to hires in the collected data and applying that ratio to the modeled hires. The estimates of job openings, hires, and separations produced by the birth–death model are then added to the

sample-based estimates produced from the survey to arrive at the estimates for job openings, hires, and separations.

Point Estimates Review and Manual Selection of Outliers

Outliers are identified by examining atypical or large movements in the estimates and investigating them at the microdata level. Values that appear questionable are then flagged for verification. With the exception of monthly employment change, no lower threshold is considered for outliers because the lowest possible value that can be reported for job openings, hires, or separations is zero.

Alignment

The JOLTS figure for hires minus separations should be comparable to the CES net employment change. Because of its large sample size and annual benchmarking to universe counts of employment from the QCEW program, the CES series is considered a highly accurate measure of net employment change. However, definitional differences, as well as sampling and nonsampling errors between the two surveys, have caused JOLTS to diverge from the CES survey over time. To limit the divergence and to improve the quality of the JOLTS hires and separations series, BLS implemented a monthly alignment method. Simply put, there are three steps to this method: align, back out the seasonal adjustment factors, and re-seasonally adjust. This monthly alignment method applies the seasonally adjusted CES employment trend to the seasonally adjusted JOLTS implied employment trend (hires minus separations), keeping the two trends consistent while preserving the seasonality of the JOLTS data. First, the two series are seasonally adjusted and the difference between the JOLTS implied employment trend and the CES net employment change is calculated. Next, the JOLTS implied employment trend is updated to equal the CES net employment change through a proportional adjustment. This proportional adjustment procedure modifies the two components (hires and separations) in proportion to their contribution to the total churn (hires plus separations). For example, if the hires estimate makes up 40 percent of the churn for a given month, it will receive 40 percent, and separations will receive 60 percent, of the needed adjustment.

Example: Let hires = 40, seps = 60, change of cesemp = –25, in which case hires minus separations does not equal change in CES employment.

Let "hires" denote the number of hires, "seps" designate the number separated from their jobs, and "cesemp" represent CES employment. Then

D = (hires – seps) – change of cesemp = 40 – 60 – (–25) = 5,
PropAdj_Hires = hires / (hires + seps) x D = (40 / (40 + 60)) x 5 = 2,

PropAdj_Seps = seps / (hires + seps) x D = (60 / (40 + 60)) x 5 = 3,

Hires_sa = Hires – PropAdj_Hires = 40 – 2 = 38,

Seps_sa = Seps + PropAdj_Seps = 60 + 3 = 63,
where D denotes the divergence between CES employment trend and JOLTS hires minus separations, "PropAdj_Hires" designates the number of proportionally adjusted hires, "PropAdj_Seps" represents the number of proportionally adjusted separations, "Hires_sa" is the seasonally adjusted hires estimate, and "Seps_sa" denotes the seasonally adjusted separations estimate. This yields the following: seasonally adjusted hires minus seasonally adjusted separations is equal to the change in CES employment.

(Hires_sa – Seps_sa) = change in CES employment
(38 – 63) = –25

Job openings are aligned based on the ratio of job openings to hires from the not seasonally adjusted estimates. This ratio of job openings to hires is applied to the updated hires to compute the updated job openings. The adjusted job openings, hires, and separations are converted back to not seasonally adjusted data by reversing the application of the original seasonal factors. The monthly alignment procedure assures a close match of the JOLTS implied employment trend with the CES employment trend for the not seasonally adjusted data. The aligned not seasonally adjusted estimates are then published.

Example: Let job openings = JO = 11. To align, set JO = (11/40) x 38 = 10.45.

Seasonal Adjustment

After alignment, the X-12-ARIMA seasonal adjustment program is used to seasonally adjust the JOLTS series. Seasonal adjustment is the process of estimating and removing periodic fluctuations caused by events such as weather, holidays, and the beginning and ending of the school year. Seasonal adjustment makes it easier to observe fundamental changes in data series, particularly those associated with general economic expansions and contractions. Each month, a concurrent seasonal adjustment methodology uses all relevant data, up to and including the data for the current month, to calculate new seasonal adjustment factors.

Moving averages are used as seasonal filters in seasonal adjustment. JOLTS seasonal adjustment includes both additive and multiplicative models, as well as REGARIMA (regression with autocorrelated errors) modeling, to improve the seasonal adjustment factors at the beginning and end of the series and to detect and adjust for outliers in the series.

Variance Estimation

The estimation of sample variance for the JOLTS survey is accomplished by using the balanced half samples (BHS) method. This replication technique uses half samples of the original sample to calculate estimates. The sample variance is calculated by measuring the variability of the subsample

estimates. The sample units in each cell—where a cell is based on region, industry, and size classification—are divided into two random groups. The basic BHS method is applied to both groups. The cells are subdivided systematically, in the same order as the initial sample selection. Weights for units in the half sample are multiplied by a factor of $1 + \alpha$, whereas weights for units not in the half sample are multiplied by a factor of $1 - \alpha$, where

$$\alpha = (1 + \gamma\sqrt{1 - f_{t,h}}),$$

in which γ is Fay's factor (0.5).

The finite population correction (fpc) factor is calculated as

$$f_{t,h} = \frac{r_{t,h}}{\sum\limits_{i=1}^{n_h} w_i^{\text{SEL}}},$$

where $r_{t,h}$ is the number of units reporting employment in allocation stratum h at time t and n_h is the number of sample units in allocation stratum h. The variable w_i^{SEL} is the sample selection weight of sample unit i.

Retabulation and Annual Estimates

The JOLTS data are revised annually to reflect annual updates to the CES employment estimates. The JOLTS employment levels (not published) are ratio adjusted to the CES employment levels, and the resulting ratios are applied to all JOLTS data elements. This annual benchmarking process results in revisions to both the seasonally adjusted and not seasonally adjusted JOLTS data series, for the period since the last benchmark was established. The seasonally adjusted data are recalculated for the most recent 5 years in order to reflect updated seasonal adjustment factors. Further, the new adjustment methodology incorporated in 2009 created a dependency of the estimates that are not seasonally adjusted on the seasonal adjustment process. Therefore, the data series that are not seasonally adjusted are also recalculated for the most recent 5 years, in order to reflect the effect of the updated seasonal adjustment factors on the alignment process.

Data Presentation

The JOLTS program currently publishes at the total nonfarm, total private, and government levels. In addition, JOLTS publishes not seasonally adjusted estimates for all sampled NAICS sectors and subsectors, as well as seasonally adjusted estimates for select NAICS sectors and subsectors. Estimates are published monthly, with the specific dates set prior to the beginning of each calendar year. Estimates are released at 10 a.m. on the publication dates, usually in the second week of the month.

Estimates of rates and levels are summarized in the JOLTS monthly press release and are available on the Internet (**http://www.bls.gov/news.release/pdf/jolts.pdf**). Archived press releases are also available on the JOLTS website. A monthly "Graphs and Highlights" summary provides graphs and a short discussion of data from JOLTS and other BLS series. These materials illustrate and discuss the historical behavior of JOLTS data elements, both alone and compared with the other series, as the economy moves through the business cycle. Significant Change Tables provide tests of significance for over-the-month and over-the-year changes. Time series data are accessible via the JOLTS website by using the database tools (**http://www.bls.gov/jlt/data.htm**). The "JOLTS Publications" portion of the JOLTS website provides JOLTS-related articles from the *Monthly Labor Review* and other BLS sources.

Annual estimates of rates and levels of hires, quits, layoffs and discharges, other separations, and total separations are released with the January news release each year in March. These estimates are requested by business data users as a tool for comparing individual company turnover rates with industry average turnover rates. (The JOLTS annual estimates of levels are the sum of the 12 published monthly levels.) The annual estimates of rates are computed by dividing the annual level by the CES annual average employment level and multiplying the resulting quotient by 100. The annual rate is approximately equal to the sum of the 12 monthly rates. Note that both the JOLTS and CES annual levels are rounded to the nearest thousand before the annual estimates are calculated.

Annual estimates are not calculated for job openings. Job openings are a stock, or point-in-time, measurement for the last business day of each month. Only jobs still open on the last day of the month are counted. For the same reason that job openings cannot be cumulated throughout each month, annual figures for job openings cannot be created by summing the monthly estimates. Because hires and separations are flow measures and are cumulated over the month with a total reported for the month, these annual figures can be calculated by summing the monthly estimates.

Guide to Data Usage

For the original data series, a full complement of panels based on the 1997 Standard Industrial Classification (SIC) system was not completely enrolled in the survey until January 2002. The supplemental panels needed to create NAICS estimates were not completely enrolled until May 2003. The data collected up until those points are from less than a full sample. Therefore, estimates from earlier months should be used with caution, because fewer sampled units were reporting data at that time.

In March 2002, BLS procedures for collecting data on hires and separations were revised to address possible underreporting. As a result, JOLTS estimates of hires and separations for months prior to March 2002 may not be comparable with estimates for March 2002 and later.

The federal government reorganization that involved transferring approximately 180,000 employees to the new Department of Homeland Security is not reflected

in the JOLTS hires and separations estimates for the federal government. Office of Personnel Management records show that these transfers were completed in March 2003. The inclusion of transfers in the JOLTS definitions of hires and separations is intended to cover ongoing movements of workers between establishments. By contrast, the Department of Homeland Security reorganization was a massive one-time event, and the inclusion of these intergovernmental transfers would distort the federal government time series.

Reliability of the Estimates

JOLTS estimates are subject to two types of error: sampling error and nonsampling error. When a sample, rather than an entire population, is surveyed, there is a chance that the sample estimates may differ from the true population values they represent. The exact difference, or sampling error, varies with the particular sample selected, and this variability is measured by the standard error of the estimate. BLS analysis is generally conducted at the 90-percent level of confidence. This means that there is a 90-percent chance that the true population mean will fall into the interval created by the sample mean plus or minus 1.65 standard errors. Estimates of sampling and nonsampling errors are released on a monthly basis as part of the significant-change tables on the JOLTS webpage and are available upon request. Analysts in the JOLTS program test for significant change, using median standard errors which are updated annually with data from 2002 forward.

The JOLTS estimates are also affected by nonsampling error. Nonsampling error can occur for many reasons including the failure to include a segment of the population, the inability to obtain data from all units in the sample, the inability or unwillingness of respondents to provide data on a timely basis, mistakes made by respondents, errors made in the collection or processing of the data, and errors from the employment benchmark data used in estimation.

The JOLTS program uses quality control procedures to reduce nonsampling error in the survey's design. See the Data Collection and Review section.

Technical References

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