Monthly Labor Review

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Does labor demand influence time to the doctorate?

Jeffrey A. Groen

Universities have become more concerned in recent years about the time students take to complete a doctorate. The time required to obtain a Ph.D. varies widely among students within a given field. In the humanities, for instance, some students receive a Ph.D. in as little as 5 or 6 years while others take 11 or 12 years. Universities often see long times to the doctorate as problematic because of the large investments, including financial support to students, they make in graduate education.

In "The impact of labor demand on time to the doctorate" (*Education Finance and Policy,* winter 2016), Jeffrey Groen estimates whether labor demand influences time to the doctorate. Within a field, the demand for new Ph.D. recipients varies from year to year because the number of employers hiring and the number of positions available depend on macroeconomic conditions, state budgets, and university priorities. As a result, two students from the same Ph.D. program seeking jobs in consecutive years may face quite different sets of opportunities. Because of the difficulty of measuring labor demand, prior research on the factors that affect time to the doctorate has not adequately addressed the role of labor demand. In his article, Groen constructs a measure of labor demand on the basis of the annual number of job listings advertised through professional associations such as the American Economic Association.

The data on job listings that Groen uses cover a 30-year period and seven fields in the humanities and social sciences (anthropology, classics, economics, English, history, philosophy, and political science). After constructing the annual counts for each field from 1975 to 2005, Groen presents two pieces of evidence to demonstrate that the counts are a credible measure of demand for new Ph.D. recipients. First, the movements of the job-listings series over time are correlated with a set of variables—such as state appropriations and faculty salaries—that one expects would influence the demand for new Ph.D. recipients. Second, when the number of job listings in a field is larger than in other years, students in that field who earn the Ph.D. are more likely than students in other years to have definite plans for employment or postdoctoral study at the time of completion.

With this established, Groen uses the job-listings data together with student-level data on all doctorates awarded in the seven fields by U.S. universities over the 30-year period. These data come from the Survey of Earned Doctorates and record the number of years that each student took to earn the Ph.D., along with an array of characteristics of the student and the Ph.D. program. The student-level data and the job-listings data are combined (by field and year), and a discrete-time duration model is used to estimate the impact of labor demand on the timing of doctorate completion.

Theoretically, an increase in labor demand would raise the financial payoff to obtaining a Ph.D., thereby providing students an incentive to finish the Ph.D. sooner. However, students may not be completely free to adjust the timing of their completion. For instance, some faculty advisors may push students to complete their degrees without regard to labor demand in order to avoid a large number of almost-finished Ph.D. students in their program. Also, students may have difficulty obtaining an accurate assessment of current labor demand without engaging in a time-consuming job search.

The empirical estimates indicate that, holding other factors constant, the number of job listings in a field is not correlated with expected time to degree. One implication of this finding is that cyclical variation in labor demand is not responsible for observed changes over time in average time to degree within fields. This finding is relevant for university policies that set limits on the number of years that Ph.D. students may receive financial support from the university. The results imply that there is no empirical basis for adjusting those limits on the basis of the current level of labor demand. Universities concerned about long times to the doctorate can—instead of adjusting year limits in response to labor demand—make adjustments to factors, such as advising and financial support, that prior research suggests are related to time to the doctorate.

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International migration patterns amid globalization

Scott Berridge

According to international economist Mark A. Wynne, migration is one of the “four dimensions” of globalization; he considers the others to be cross-border flows of goods, cross-border flows of capital, and the flow of ideas, such as technologies and best practices. Exploring the possibility that increased migration can benefit both the host and home countries, Wynne looks at the gains produced by international migration in International migration remains the last frontier of globalization (Federal Reserve Bank of Dallas, Economic Letter, March 2015).

Despite more legal restrictions to cross-border movement of people today than in the past, current migration flows are reminiscent of those of the great migrations of the late 19th and early 20th centuries. Migration was curtailed with the start of World War I and didn’t revive to its previous rate of around 600 per million world inhabitants until the 1990s. Despite today’s obstacles to migration such as work permits, passports, and visas, rates of international migration are historically quite high.

Regardless of the varying number of barriers to migration, immigration has always had both personal and financial costs. The financial costs in the 19th century were too high for most potential immigrants from Europe to the Americas. Relative costs have declined over many decades because of advances in transportation and because of financial help in the form of remittances to new immigrants from previous “pioneers.” Lowered costs helped establish heavy corridors of traffic from poorer countries to richer ones, such as that between Mexico and the United States or between Turkey and Germany. Nowadays, the country with the largest number of migrants is the United States—which had 42.8 million foreign-born residents in 2010, according to the World Bank—followed by Russia, Germany, France, and the United Kingdom.

In addition, other corridors have opened between less developed nations, such as between Bangladesh and India or between India and the United Arab Emirates. In 2010, there were 85 million people from less developed nations living in countries with advanced economies, while there were 91 million people who migrated into countries with developing economies.

The author posits that barriers to both international capital mobility and the integration of global trading systems today are minimal by historical standards, so any further elimination of remaining barriers would lead to only a very modest increase in global gross domestic product (GDP). Yet by eliminating all barriers to international migration, global GDP could increase by 67 to 147 percent.

What would be the economic benefits to both host and home countries? Host countries with large immigrant populations would benefit by having a broader consumer base. (Small countries, such as Qatar, Andorra, and Kuwait, have the highest percentages of foreign-born population.) Although home countries might be expected to

suffer from a loss in population, they would be compensated by remittances sent from expatriates. These remittances can be as high as 5 percent of the home country's GDP.

Wynne argues that people would be better off globally with increased migration and fewer barriers to movement. The benefits, however, are dependent on the interaction of the migrants with their host countries and the supply of public goods and services such as education and unemployment insurance. The movement of people in the future is likely to be less than that of goods, capital, and ideas, but even the current levels of migration provide significant welfare to both host and home countries; more migration would be even better.

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Which industries need workers? Exploring differences in labor market activity

Using data from the Job Openings and Labor Turnover Survey, this article takes a unique, simultaneous look at job openings, hires, and separations for individual industries and then categorizes industries as having high or low job openings and high or low hires. Studying the data items in relation to each other helps point out the differences among industries: some have high turnover, some have low turnover, some easily find the workers they need and hence have few job openings at the end of the month, and some need more workers than they can find. The author also includes fill rates and churn rates by industry and looks briefly at earnings by industry. The analysis of labor turnover patterns by industry may prove useful to jobseekers and career changers as well as employers.

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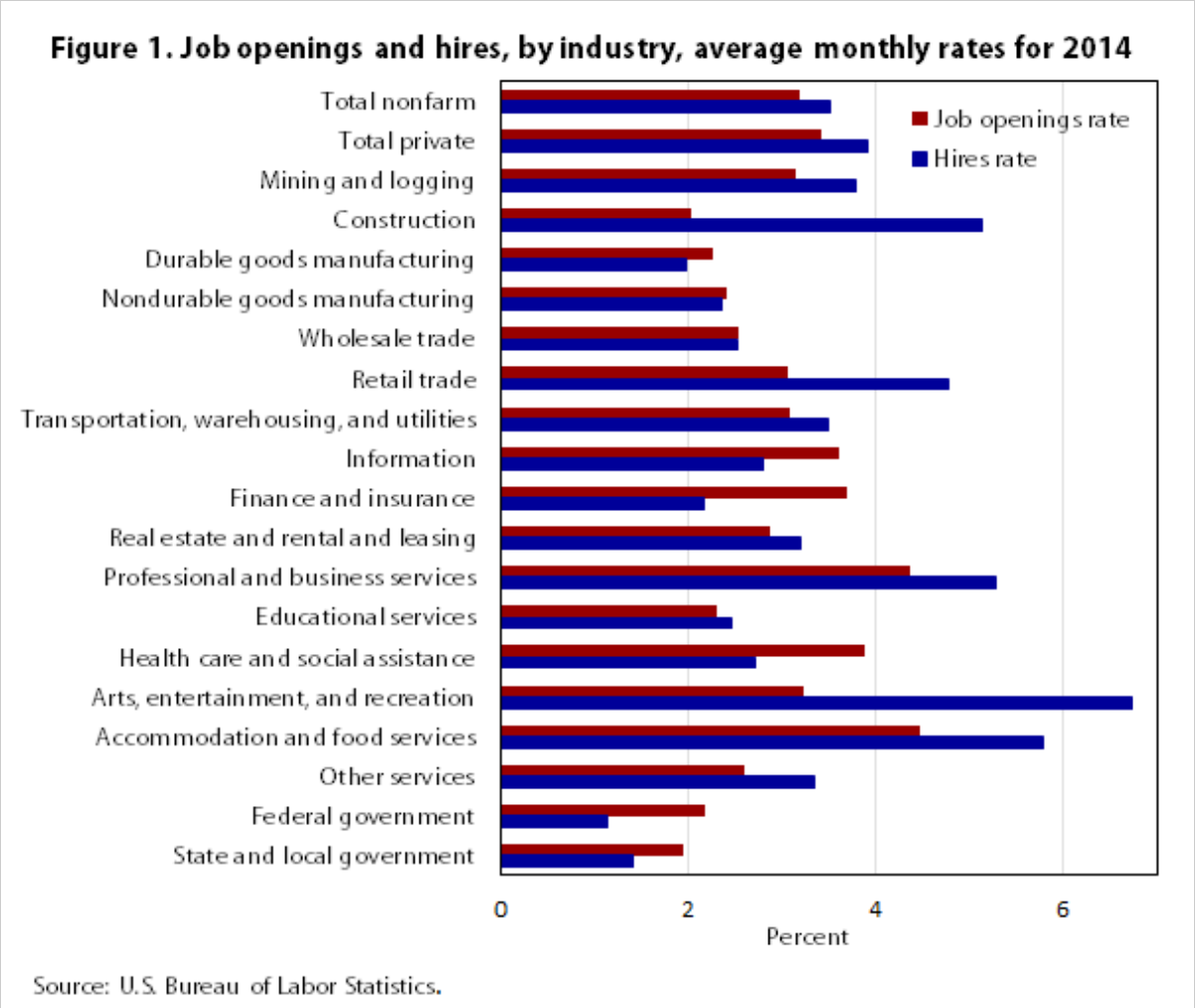
Where should new graduates look for jobs? What about career changers? In what direction should career counselors and job placement programs direct clients? Which statistics can government officials use to help determine how to stimulate job growth? How do employers know if their turnover and worker demands are typical? Industries differ in employee turnover patterns, demand for workers, and ability to hire the workers they need. Understanding the labor turnover characteristics of the different industries may help jobseekers, those assisting them, employers, and government officials better focus their efforts.

Each data element in the Job Openings and Labor Turnover Survey (JOLTS)—job openings, hires, and separations—provides information about the labor market. However, when all three data elements are studied together, an even more informative picture emerges. The job openings data tell us about the unmet demand for workers; the hires and separations data provide information about the flow of labor. Industries with high turnover and low job openings, such as construction, are easily able to hire the workers they need. But industries with high turnover and high job openings, such as professional and business services, still have open jobs at the end of the month despite their hiring efforts during the month. Those industries with consistently moderate turnover and high unmet demand for labor, such as health care, may be a good option for career changers and students selecting a

major, and officials who develop training programs and guide people into them can benefit from knowing which industries these are. Hence, analyzing the demand for and flow of workers by industry could prove helpful both to people looking for work and to those trying to help or hire them.

Job openings and hires



Studying job openings relative to hires reveals substantial differences among the industries. In some cases, hires (measured over the course of a month) are much greater than openings (on the last day of the month); in other cases, the gap between them is small.[1] For a few select industries, openings exceed hires. Comparing industries by analyzing the number of openings or hires yields little information because industries vary greatly by size. Converting the number of hires and openings to rates—by dividing the number of hires or openings by the number of people employed in the industry—allows for meaningful cross-industry comparison. Figure 1 presents the hires and job openings rates by industry. For the United States (total nonfarm industries), the job openings rate averaged about 91 percent of the hires rate in 2014. In several industries, the hires rate far exceeded the average job openings rate: construction; arts, entertainment, and recreation; and retail trade. In several industries—for instance, mining and logging, professional and business services, and accommodation and food services—the hires rate exceeded the job openings rate to a lesser degree. The exceptional industries in which the job openings

rate exceeded the hires rate were information; finance and insurance; health care and social assistance; federal government; and state and local government.

This first glance at the industries raises many questions. Why is there a large difference between the hires rate and job openings rate for some industries but not for others? What does a gap of any size mean, and is a gap good, bad, or neutral for the labor market and economy? Why do so few industries have a higher job openings rate than hires rate? Will a person looking for a job or looking to change fields have better success targeting an industry with high openings or with high hires or where openings exceed hires? Some of these questions can be answered rather easily, but others require further analysis. Before we can answer any questions, some definitions and background are needed.

Definitions and background

The Bureau of Labor Statistics (BLS) has published JOLTS estimates for job openings, hires, quits, layoffs and discharges, other separations, and total separations by industry and region for each month from December 2000 forward.

For JOLTS to consider a job !open," three requirements must be met: a particular job must exist, work can start within 30 days whether or not a suitable candidate is found, and the job must be actively advertised outside the establishment. The requirements reflect the survey"s goal of measuring current job demand in which a person seeking a job from outside the establishment has an opportunity to be hired. Job openings are a stock measure, with the count taken on the last business day of the month. Therefore, the job openings measurement represents positions that hires did not fill during the month.

The hires data are designed to capture all employer'employee relationships established during the month. A hire occurs each time an employer brings on any worker, including part-time, full-time, and seasonal. Also included are rehires of people who had previously worked for the same establishment. The hires count is a flow measure that sums all hires that occurred during the month.

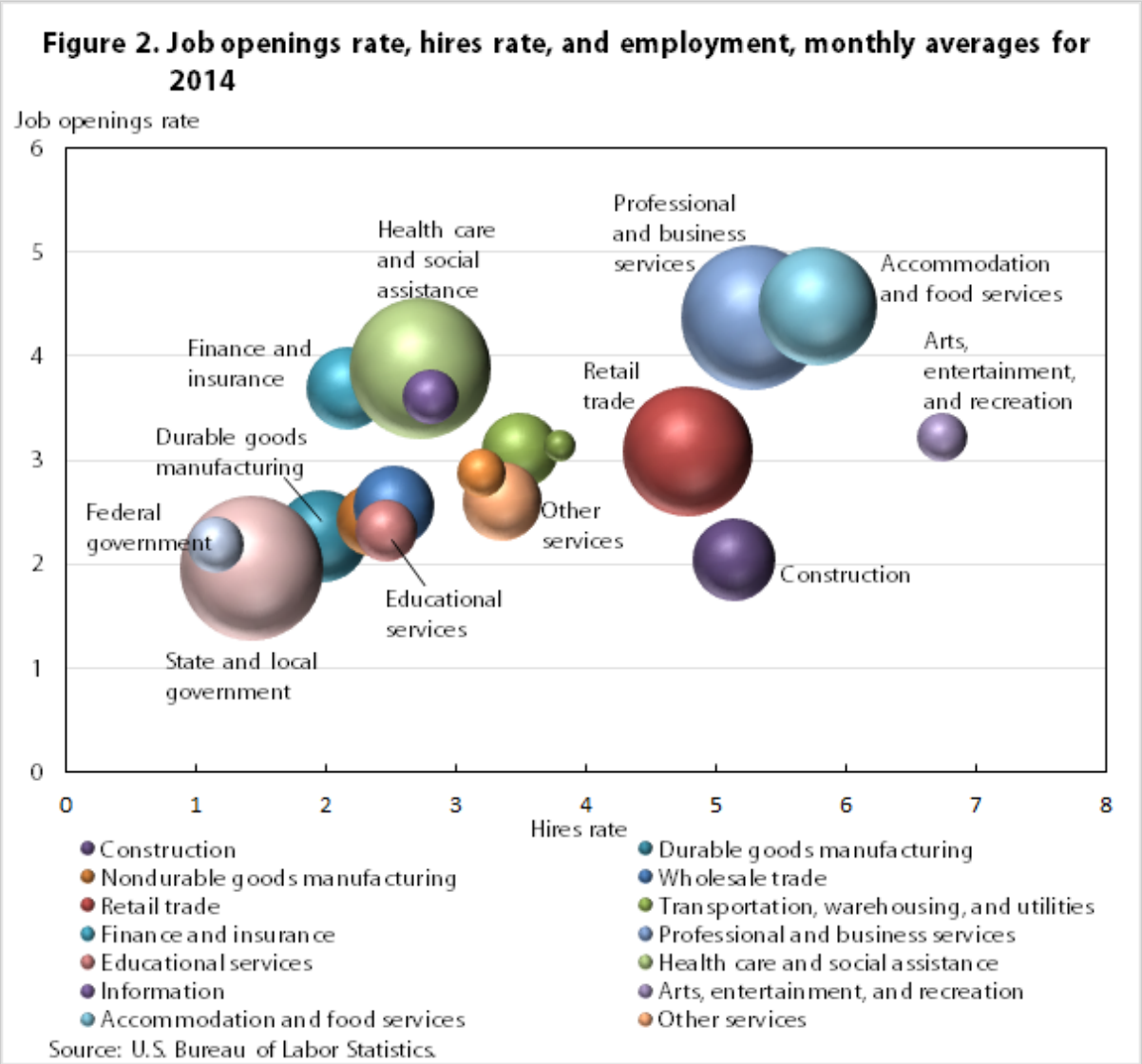
Separations data are similar to those of hires in that separations include all instances in which an employer–employee relationship ended during the month. JOLTS breaks out separations into voluntary quits, involuntary layoffs and discharges, and other separations (retirements, transfers, and separations due to death or disability).

For hires and separations, we convert the levels (counts) to rates by dividing the level by the employment and multiplying by 100.[2] Therefore, the rates show hires or separations during the month as a percentage of employment. The job openings rate is calculated slightly differently, with the job openings level divided by the sum of job openings and employment, times 100. The job openings rate indicates what percentage of all potential jobs–filled or unfilled—remained unfilled at the end of the month.

The above definitions and reference periods already answer one question: Why is it unusual for job openings to exceed hires? Given that the job openings level is a count of jobs left unfilled on the last day of the month, yet hires is a cumulative count of all employees hired throughout the month, openings outnumbering hires is noteworthy. Until 2014, only two industries had a higher job openings rate than hires rate; in 2014, however, 10 of the 18 industries had a higher job openings rate than average hires rate.

This paper focuses on the year 2014, the most recent full year for which data are available. Because JOLTS does not seasonally adjust the data for every industry, this article uses not seasonally adjusted data and calculates monthly averages for each year by industry. For the remainder of this article, —rate! will be used as a succinct way to refer to the average monthly rate for the year 2014 unless otherwise noted.

An initial exploration of the industries



For the United States (total nonfarm industries), the average hires rate for 2014 was 3.5 percent and the average job openings rate was 3.2 percent. The individual industries vary widely around these averages. Those industries which differ most noticeably can be grouped into four categories: (1) high hires and high job openings, (2) low hires and high job openings, (3) high hires and low job openings, and (4) low hires and low job openings. Figure 2 graphically represents the hires rate and job openings rate by industry along with the employment level of each industry. The hires rate is along the horizontal axis, the job openings rate is along the vertical axis, and the size of each industry bubble reflects the level of industry employment.

High hires and high job openings. Industries with a high hires rate and a high job openings rate in 2014 were professional and business services (5.3, 4.4)[3] and accommodation and food services (5.8, 4.5). The simultaneous high rates indicate that, in spite of strong hiring, even more employees are needed.

The professional and business services sector comprises services such as legal, accounting, architecture, engineering, computer, and temporary help agencies. The professional and business services industry is considered by economists to act as an early warning sign of an upcoming recession or as an early indicator of recovery.[4] At the beginning of a recovery, when employers need more workers but are not ready to commit to hiring new staff, they may hire temporary workers.[5] Employment services"which includes temporary help firms"was about 18 percent of professional and business services employment in 2014. Average monthly employment in 2014 in employment services was 38 percent higher than in 2009, which is when the recession ended. With employment of over 19 million and a high job openings rate, the professional and business services industry provides vast opportunities for jobseekers.

The accommodation and food services industry has a high turnover of workers and is affected by changes in both the season and the business cycle. The high hires reflect replacement hiring due to the high turnover, as well as seasonal hiring, and also expansion with the improving economy. The high job openings in accommodation and food services indicate an industry that is experiencing modest growth, with employment rising by just over 3 percent from 2013 to 2014.

Low hires and high job openings. These industries need workers but are not hiring them for one reason or another: information (2.8, 3.6), finance and insurance (2.2, 3.7), and health care and social assistance (2.7, 3.9). These industries may not be able to find qualified workers or they might not be offering a wage high enough to attract new employees. These industries may be of interest to jobseekers with the right skills and to job training programs preparing people for available jobs.

The reasons companies in the information industry and the finance and insurance industry need workers are not immediately obvious. The information industry includes broadcasting (radio and television), motion pictures and video, publishing (magazines, books, and newspapers), software publishing, and telecommunications. The JOLTS sample size does not allow for a finer level of industry detail to see which sections of the information industry have unmet demand. However, according to the BLS *Occupational Outlook Handbook*,[6] many computer-related occupations are projected to grow faster than average. Particularly in the information industry, employment in computer occupations is projected to rise in software publishers and other information services. Finance and insurance includes banking (including mortgage processing), financial investment, insurance, and trusts and funds (pensions, trusts, and estates). As baby boomers age, they will need these services even more, and boomers employed in these careers will need to be replaced as they retire.[7] Looking again at the *Occupational Outlook Handbook*, we find that the numbers of financial analysts and personal financial advisors are projected to grow faster than average and much faster than average, respectively, in 2012—22.

The health care industry had an especially high demand for workers, with employment of over 18 million and an average monthly job openings rate of 3.9 percent in 2014. The Bureau of Labor Statistics projects 5.0 million new jobs in health care between 2012 and 2022. The compound annual rate of change, 2.6 percent, is tied only with that of construction for highest of all industries. (See table 1.) Health care workers will be needed because of the aging of the population: the number of people needing health care will increase, as will the number of workers needed to replace retiring workers. Many of these jobs provide good pay, job security, and also job portability. The

BLS Employment Projections program estimates that over 296,000 physicians and surgeons and over 1 million registered nurses will be needed in the 2012—22 timespan to fill jobs because of occupational growth and replacement hiring. Many organizations, including the federal government, are offering college scholarships and grants in order to recruit people into the field of nursing. Many jobs in the health care industry require a doctoral or professional degree, such as pharmacists and surgeons. Because these occupations require many years of education, even if more people begin training, the supply may lag the demand. However, not all upcoming jobs related to health care require a 4-year college degree or professional degree. Dental hygienist and nuclear medicine technologist jobs typically require only an associate!s degree for entry. Phlebotomist and dental assistant positions typically require only some postsecondary study or on-the-job training for entry. Personal care aides and home health aides do not even need a high school diploma for entry, yet 1.3 million new jobs and jobs due to replacement are predicted for aides in the 2012–22 timeframe. Students selecting a field or career changers looking for retraining would find plentiful opportunities in health care.

Table 1. Job openings, hires, churn, and fill rates, by industry, 2014, and projected annual rate of employment change, 2012–22

Industry	Job openings rate	Fill rate = hires/ job openings	Hires rate	Separations rate	Churn rate = hires rate + separations rate	Projected annual rate of employment change 2012'22
Total nonfarm	3.2	1.1	3.5	3.3	6.9	1.1
Total private	3.4	1.1	3.9	3.7	7.6	1.2
Mining and logging	3.1	1.2	3.8	3.4	7.2	1.2
Construction	2.0	2.5	5.1	4.8	9.9	2.6
Durable goods manufacturing	2.3	0.9	2.0	1.8	3.8	-0.3
Nondurable goods manufacturing	2.4	1.0	2.4	2.3	4.7	-0.8
Wholesale trade	2.6	1.0	2.5	2.4	4.9	0.8
Retail trade	3.1	1.5	4.8	4.6	9.4	0.7
Transportation, warehousing, and utilities	3.1	1.1	3.5	3.2	6.7	0.5
Information	3.6	0.8	2.8	2.7	5.5	-0.2
Finance and insurance	3.7	0.6	2.2	2.1	4.2	0.8
Real estate and rental and leasing	2.9	1.1	3.2	3.0	6.2	1.2
Professional and business services	4.4	1.2	5.3	5.0	10.3	1.8
Educational services	2.3	1.0	2.5	2.3	4.7	1.9
Health care and social assistance	3.9	0.7	2.7	2.5	5.3	2.6
Arts, entertainment, and recreation	3.2	2.0	6.7	6.5	13.2	1.1
Accommodation and food services	4.5	1.2	5.8	5.5	11.3	0.9
Other services	2.6	1.3	3.4	3.2	6.6	1.0
Federal government	2.2	0.5	1.2	1.2	2.3	-1.6

See footnotes at end of table.

Table 1. Job openings, hires, churn, and fill rates, by industry, 2014, and projected annual rate of employment change, 2012–22

Industry	Job openings rate	Fill rate = hires/ job openings	Hires rate	Separations rate	Churn rate = hires rate + separations rate	Projected annual rate of employment change 2012'22
State and local government	2.0	0.7	1.4	1.4	2.8	0.5

Source: U.S. Bureau of Labor Statistics.

High hires and low job openings. Two different scenarios describe industries with a high hires rate and low job openings rate: an industry could have a lot of turnover (separations with replacement hires) and an easy time finding new employees to fill open jobs so that few jobs are left open by the end of the month, or an industry could be expanding but is able to find the needed workers to fill the open jobs by the end of the month. These expanding industries could have any rate of turnover, from low to high. Three industries are of the high-hires-and-low-job-openings nature: construction (5.1, 2.0), retail trade (4.8, 3.1), and arts, entertainment, and recreation (6.7, 3.2).

Construction is the one industry in which hires are always high and job openings are always low. Turnover is high because workers can move from site to site and employer to employer. For example, construction workers who are trained in framing a house or operating construction equipment can apply that skill either at new worksites their employer moves them to or at worksites for different construction companies as they change employers. Unfilled openings are low because of employers– ability to quickly find the workers they need. As already mentioned, construction has a 2.6 percent compound annual rate of change for 2012!22. According to BLS projections, the most rapid growth occupations in construction are mechanical insulation workers; helpers of brickmasons, blockmasons, stonemasons, and tile and marble setters; and segmental pavers. The construction industry has a wide variety of occupations. Even though construction is an average-sized industry, employing 6.1 million people on average in 2014, construction may provide jobs for many jobseekers given its predicted high rate of growth in the near future.

Two other industries with high hires and relatively low job openings are retail trade (4.8, 3.1) and arts, entertainment, and recreation (6.7, 3.2). Because retail experience can be applied at any number of retail establishments that are hiring, high separations in retail trade are quickly followed by high hires; the result is a low number of open jobs at the end of the month. Jobseekers tend to have success finding a job in retail because retail trade is a very large industry–with an employment level exceeding 15 million people on average in 2014–and high turnover generates a large amount of replacement hiring. Arts, entertainment, and recreation has the highest hires rate among all industries because of the high turnover and resulting replacement hiring. Also, the high hires cause arts, entertainment, and recreation to have the largest difference between the hires rate and job openings rate of any industry.

Low hires and low job openings. A number of industries fell into the category of low hires and low job openings in 2014. Very little labor market activity occurred in the following industries: durable goods manufacturing, nondurable goods manufacturing, wholesale trade, educational services, federal government, and state and local government. Although these industries employed over 37 million workers per month in 2014, very little hiring occurred and open

jobs were scarce. Although workers with particular skills may find employment within these industries, workers seeking employment or career changes would likely not target these industries on the basis of the 2014 data.

In the federal government and state and local government, the situation is slightly different from the private sector because their job openings rates were higher than their hires rates. Even though the openings rate is low for the public sector, the fact that openings outnumber hires indicates a need for workers.

In public education (which is a subset of state and local government), the larger number of job openings than hires at first appears to support the claim that teachers are in demand. However, with the recession and slow recovery, this very large industry posted few openings relative to its average 10 million employees in 2014. The lack of posted openings reasonably can be attributed to declining tax revenue at the national, state, and local levels, resulting in budget cuts affecting school budgets in many states. According to a 2010 survey by the American Association of School Administrators, 77 percent of school districts experienced a cut in state and local funds between the 2009'10 and 2010–11 school years.[8] A lack of adequately trained teachers may help explain why some jobs go unfilled at the end of the month. However, budget cuts and lack of trained teachers may not be the full story. The National Center for Education Statistics estimated 3,377,900 teachers were in public elementary and secondary schools in the United States in the 2011—12 school year, the most recent year for which statistics are available. Of those 3.4 million teachers, 8 percent left the profession the following year. Of those teachers who left the field, only 38 percent retired. That means 62 percent left the teaching field to find other work or exited the labor force for reasons other than retirement. These numbers indicate the demand for teachers, albeit relatively low, is due primarily to a high rate of departure from the occupation, although positions vacated by retiring baby boomers also contribute to the openings.[9]

The educational services industry includes private schools of all levels as well as tutoring establishments. As with state and local education, teacher turnover and rising student populations create the need for teachers and tutors. However, private schools depend on the limited number of families that can afford often costly tuition payments, and tutors can be too costly for families struggling to pay a mortgage. The low turnover likely indicates that employees are staying put because tight private-school budgets translate into few postings of openings for potential job changes.[10]

The appearance of the federal government in this category of low hires and low openings but with openings outnumbering hires reflects that qualified applicants are difficult to find for some positions. The government jobs website www.USAJobs.gov, which posts all federal jobs, lists the following as what it calls —highly targeted careers:! medical officers, attorneys, administrative law judges, senior executives, and federal cybersecurity careers. This varied list reflects both the need for health care workers in the federal government as we saw in the private sector and the need for senior executives because of a retiring workforce.

Both durable goods manufacturing and nondurable goods manufacturing appear in this low-hires-and-low-job-openings category. This could be due to a long-term trend of decreased U.S. manufacturing employment and suppressed production during and following the Great Recession; together, these factors result in fewer jobs being posted and fewer job-changing opportunities.

Average hires and average job openings. The remainder of the industries fell around the averages for hires, job openings, or both: mining and logging; transportation, warehousing, and utilities; real estate and rental and leasing; and other services. In these industries, the hires and the vacancies were not especially high or low compared with

the other industries. Almost all the industries with an average rate of job openings or hires had fewer job openings than hires, indicating employers in these industries were able to find the workers they need. One industry–wholesale trade–had an openings rate slightly higher than the hires rate but only by one-tenth of a percentage point.

Figure 3. Industries grouped by rates of hires and job openings, 2014

Information Finance and insurance Health care and social assistance	Professional and business services Accommodation and food services
Low hires High job openings	High hires High job openings
Low hires Low job openings	High hires Low job openings
Durable goods manufacturing Nondurable goods manufacturing Wholesale trade Educational services Federal government State and local government	Construction Retail trade Arts, entertainment, and recreation

Source: U.S. Bureau of Labor Statistics.

Figure 3 summarizes in which of the hires-and-job-openings quadrants industries fell. Not shown are the industries that were average in hires and openings.

Other measures of industry labor demand and turnover

Other measures allow us to further explore the industries–the fill rate, the churn rate, and employment projections data. The fill rate and churn rate are created from the JOLTS data, and we have already touched upon employment projections data earlier in this article.

Fill rate. The fill rate is the hires level divided by the job openings level and then multiplied by 100. The rate is a measurement of how much hiring is occurring relative to how many openings remain at the end of the month. The interpretation is slightly complicated by the fact that hires is a flow measure, capturing all hires during the month, and job openings is a stock measure, capturing only jobs remaining open at the end of the month. The fill rate is still useful, however, because it provides another way to visualize the differences among the industries.

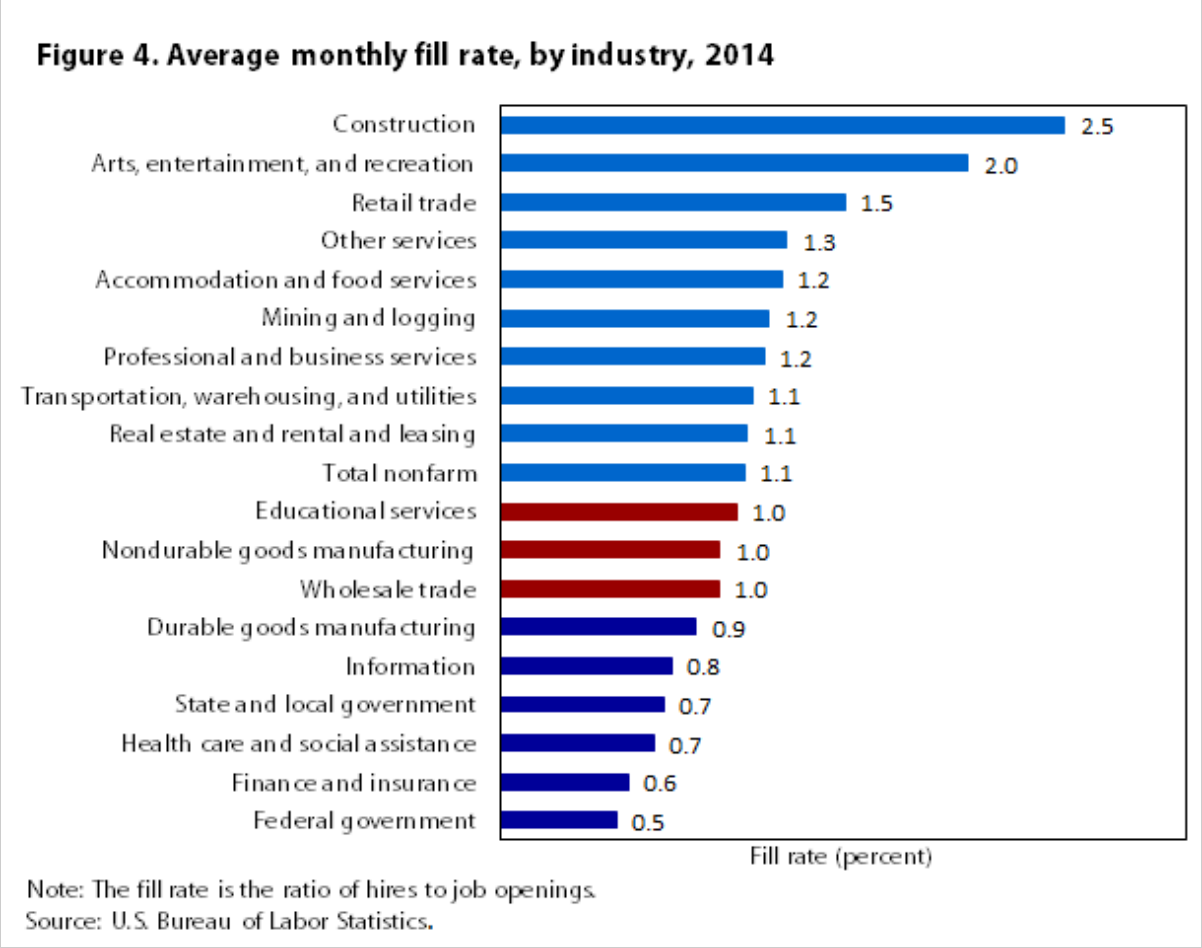


Figure 4 shows the average monthly fill rate in 2014 was 1.1 percent for total nonfarm industries, indicating just slightly more hires during the month than unfilled jobs remaining at the end of the month. The fill rate for the industries ranged from 0.5 percent for the federal government to 2.5 percent for construction in 2014.

Recalling the full-month reference period for hires versus the 1-day reference period for job openings, we find industries with a fill rate less than 1.0 noteworthy because they have more job openings than hires. In 2014, 6 industries had a fill rate less than 1.0, 3 had a fill rate of exactly 1.0, and 10 (including total nonfarm industries) had a fill rate greater than 1.0. Note that a fill rate close to 1.0 indicates the hires and job openings levels are close together but does not indicate if the individual rates are high or low. The fill rate can be close to 1.0 when both hires and openings are high or when both are low. A fill rate of less than 1.0 (more job openings than hires) is historically unusual; the unfilled jobs indicate a labor market with excess demand for workers. A later section of this article looks at the labor demand and turnover patterns of the industries across the years.

The high-demand industries are toward the bottom of the figure and have the lower fill rates; jobseekers may best focus their efforts on these industries. The industries with the lowest fill rates are those which had both low hires and high job openings or low hires and low job openings, as shown in figure 3.

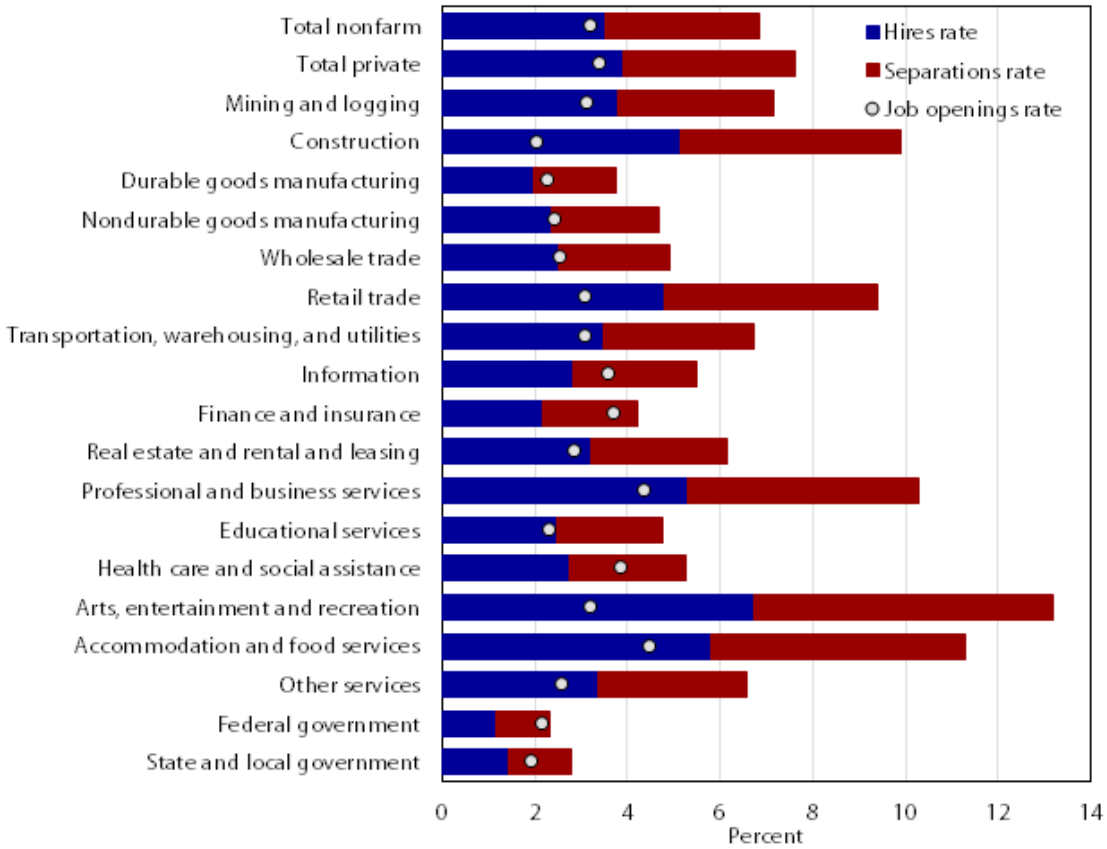
Toward the top of figure 4, industries with the highest fill rates are construction; arts, entertainment, and recreation; and retail trade, which had high hires and low openings. These industries are still a good source of jobs because of

the vast number of hires taking place. Table 1 provides data on job openings, hires, and fill rates by industry and also includes churn rates, which are discussed next.

Churn rate. One thing missing from this analysis so far is separations. Without separations, we do not know if the hires are for expansion of an industry or for replacement hiring following separations within the industry. To fully understand industries“ labor turnover, we need to consider separations as well as hires. When hires exceed separations, the industry is expanding. When hires and separations are at about the same level, industry employment is steady and we can deduce that the hires are mainly replacement hires. When hires are below separations, the industry is contracting.

The ”churn rate! is defined in this article as the sum of the hires rate and the separations rate. Therefore, a high churn rate indicates an industry with high hires or high separations or both. A low churn rate indicates an industry with little turnover—that is, with low hires and low separations. As we did with the other data series in this article, we calculated the churn rate using the average monthly hires rate and average monthly separations rate for each industry. Figure 5 provides the average churn rate and average job openings rate by industry for 2014.

Figure 5. Churn, hires, separations, and job openings rates by industry, monthly averages for 2014



Note: The churn rate is the sum of the hires rate and separations rate.
Source: U.S. Bureau of Labor Statistics.

Figure 5 shows that the industries with the highest churn rates are arts, entertainment, and recreation; accommodation and food services; professional and business services; construction; and retail trade. These are high-turnover industries. Not surprisingly, the industries with the lowest churn rates are the federal government and

state and local government. Not many people separate from government jobs and not many people are hired into government jobs. In 2014, almost all of the industries had fairly equal hires and separations rates with hires slightly exceeding separations, indicating employers generally were comfortable with replacement hiring plus a little more. None of the industries grew or shrank notably, but the mining and logging industry and the construction industry had the largest gap between average hires and separations rates for 2014, with a 0.4-percentage-point difference, indicating slight growth. The gap between hires and separations parallels the slight increase in employment in 2014.[11] For both federal government and state and local government, the average hires and separations rates were equal in 2014, indicating replacement hiring but no expansion.

Combining the churn rate with the job openings rate provides additional perspective. For example, the churn rate in construction, at 9.9 percent in 2014, was very high relative to that of other industries. With a job openings rate of only 2.0 percent—one of the lowest job openings rates among the industries—construction establishments have many employees coming and going, but the businesses can easily hire needed workers. Two of the industries with high churn (arts, entertainment, and recreation; and retail trade) are mostly able to fill open positions by the end of the month, resulting in a low job openings rate. In contrast, professional and business services and accommodation and food services both have high churn and higher than average job openings rates, indicating they need more workers in addition to replacement hires.

Among the industries with low churn, several have higher than average job openings rates, including information, finance and insurance, and health care and social assistance. These industries have few employees separating, but they also have few employees to hire and they have a considerable need for workers. The remaining industries fall somewhere between with moderate churn and moderate openings.

We can see in figure 5 that, in 2014, the same industries that had low hires and high openings and some of the lowest fill rates also had below-average churn with job openings nearly as high as the churn. These industries were information, finance and insurance, and health care and social assistance. Both federal government and state and local government also had low hires and a job openings rate nearly as high as the churn. For these establishments, separations are low, hires are low, and open jobs are left unfilled. See table 1 for a full list of industries with their corresponding rates for job openings, hires, separations, fill, and churn.

A faster way to compare the industries on the basis of job openings and churn is to create a combined rank for both. Table 2 shows that accommodation and food services; professional and business services; arts, entertainment, and recreation; and mining and logging had the highest combined labor market activity in 2014 with regard to job openings and churn. The lowest activity industries in this regard are toward the bottom of the table, with federal government and state and local government being the lowest. The industries in the middle of the table have either low openings and high churn, high openings and low churn, or medium values of both.

Table 2. Industry rankings by job openings rate and churn rate, 2014

Industry	Rank by job openings rate	Rank by churn rate	Combined rank
Accommodation and food services	1	2	1
Professional and business services	2	3	2
Arts, entertainment, and recreation	6	1	3
Mining and logging	7	6	4

See footnotes at end of table.

Table 2. Industry rankings by job openings rate and churn rate, 2014

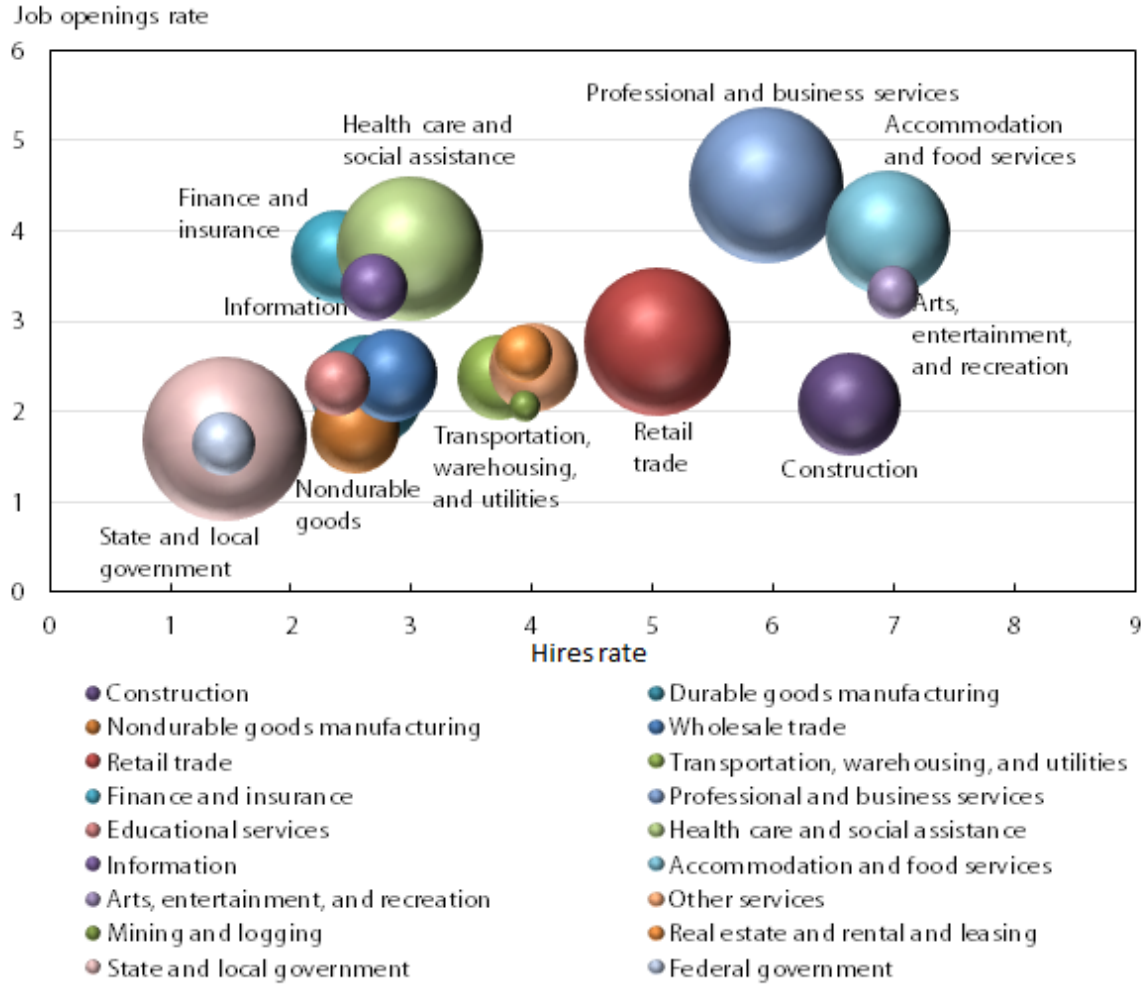
Industry	Rank by job openings rate	Rank by churn rate	Combined rank
Retail trade	9	5	5
Health care and social assistance	3	11	5
Transportation, warehousing, and utilities	8	7	6
Information	5	10	6
Other services	11	8	7
Real estate and rental and leasing	10	9	7
Finance and Insurance	4	15	7
Construction	17	4	8
Wholesale trade	12	12	9
Educational services	14	13	10
Nondurable goods manufacturing	13	14	10
Durable goods manufacturing	15	16	11
Federal government	16	18	12
State and local government	18	17	13

Source: U.S. Bureau of Labor Statistics.

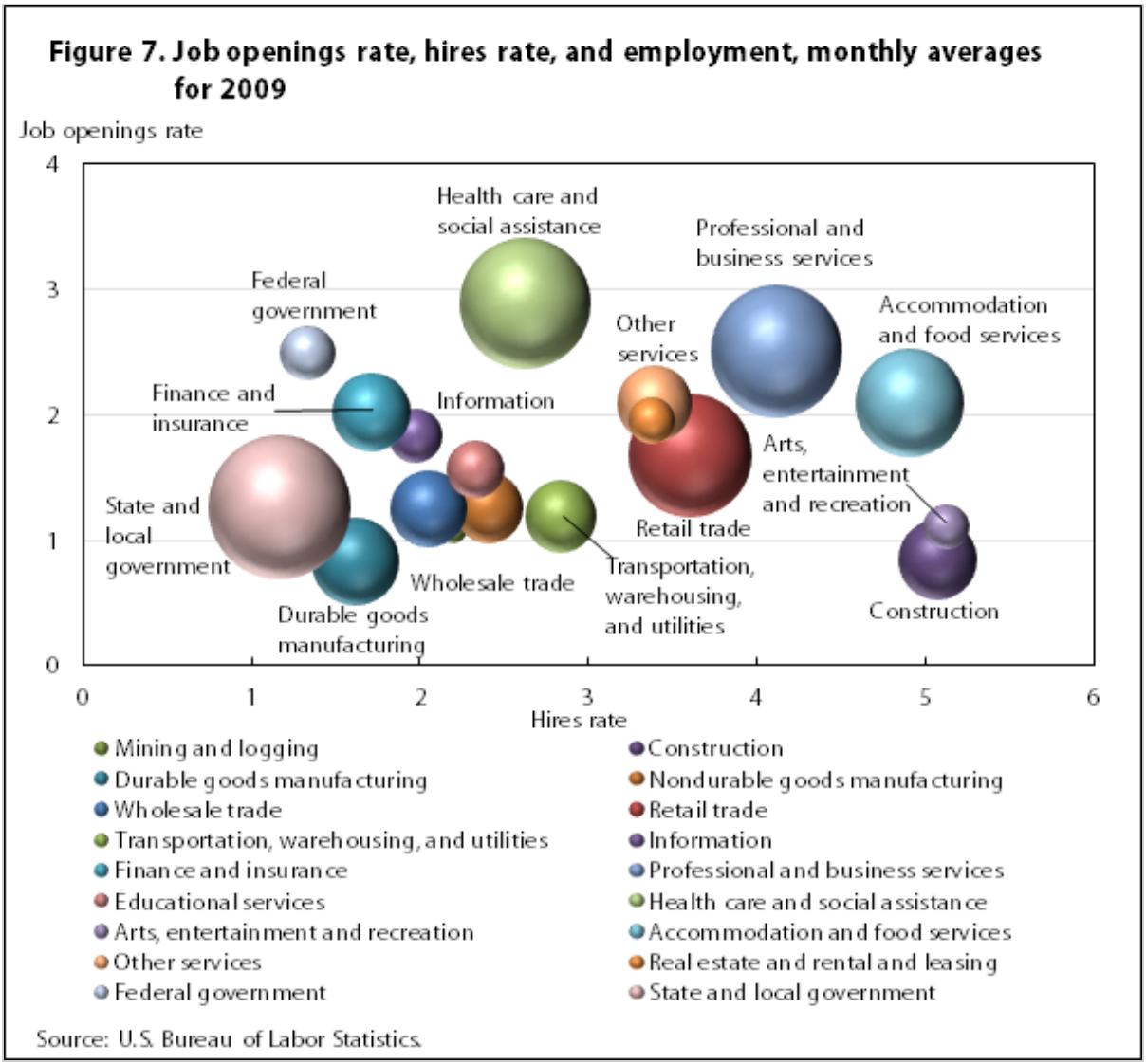
Exploration of the industries over time

So far, the analysis of industries has looked only at the year 2014. One question left to answer is whether the labor demand and turnover characteristics within industries changed over the course of the business cycle and with structural changes in the economy. In short, these characteristics did not change, for the most part, over the period for which we have JOLTS data, 2001 through 2014. Each industry retained its characteristics regarding rates for job openings, hires, separations, fill, and churn.

Figure 6. Job openings rate, hires rate, and employment, monthly averages for 2005



Source: U.S. Bureau of Labor Statistics.



Although all the industries were affected by the Great Recession of December 2007!June 2009, the basic characteristics of the industries did not change across the business cycle. Figures 6 and 7 show bubble charts for 2005 (before the recession) and 2009 (the last year of the recession), which can be compared with figure 2 for 2014. In all 3 years, the same group of industries is on the right side of the figure, which indicates relatively high hires rates. Likewise, no changes occurred in which of the industries appear in the left part of the graph, indicating relatively low hires rates. For example, construction maintained a high hires rate and low job openings rate across the years, while health care and social assistance maintained a low hires rate and high job openings rate, and state and local government maintained low hires and low openings.

The one industry to experience some change over time is the federal government. In most years, it had very little labor market activity with low and nearly equal hires and openings, but in the years 2008, 2009, and 2010, job openings exceeded hires. The rise in job openings in 2009 and 2010 was due to increased labor demand and hiring for the preparation and administration of the 2010 Decennial Census. The higher job openings rate for the federal government in 2009 can be seen in figure 7.

Fill rates over time. Fill rates across the years from 2001 through 2013 have similarities to those for 2014. The industries with the highest fill rates year after year are construction; retail trade; arts, entertainment, and recreation; and accommodation and food services. These are mostly the industries with both high hires levels and high hires relative to openings. The industries with the lowest fill rates year after year include information; finance and insurance; health care and social assistance; federal government; and state and local government. These are the same industries that fell in the low-hires-and-high-openings or low-hires-and-low-openings categories. The exception, as mentioned before, is the federal government because of the 2010 Decennial Census. Table 3 provides the fill rates by industry across the years from 2001 through 2014.

Table 3. Fill rate (hires divided by job openings) by industry, by year, 2001'14

Industry	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total nonfarm	1.2	1.4	1.5	1.4	1.3	1.2	1.2	1.2	1.6	1.4	1.3	1.2	1.2	1.1
Total private	1.3	1.5	1.5	1.5	1.3	1.2	1.2	1.3	1.7	1.5	1.4	1.2	1.2	1.1
Mining and logging	1.6	2.4	3.0	2.6	1.9	1.5	2.0	1.5	2.0	1.5	1.1	1.7	1.4	1.2
Construction	2.6	3.6	4.1	3.5	3.1	2.6	2.3	3.6	6.0	4.6	4.4	3.8	2.8	2.5
Durable goods manufacturing	1.1	1.5	1.7	1.5	1.2	1.0	1.0	1.2	1.9	1.2	0.9	0.8	0.9	0.9
Nondurable goods manufacturing	1.6	1.7	1.7	1.5	1.4	1.3	1.2	1.2	1.9	1.8	1.5	1.0	1.0	1.0
Wholesale trade	1.1	1.5	1.5	1.3	1.2	1.0	0.9	1.2	1.6	1.4	1.1	1.0	0.9	1.0
Retail trade	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.9	2.1	2.1	1.8	1.6	1.5	1.5
Transportation, warehousing, and utilities	1.2	1.5	1.5	1.9	1.5	1.2	1.0	1.3	2.4	1.7	1.2	1.4	1.2	1.1
Information	0.9	1.1	1.1	0.9	0.8	0.6	0.5	0.8	1.0	0.7	0.6	0.7	0.7	0.8
Finance and insurance	0.7	0.8	0.8	0.7	0.6	0.6	0.8	0.8	0.8	0.6	0.6	0.6	0.6	0.6
Real estate and rental and leasing	1.4	1.7	1.6	2.0	1.4	1.3	1.4	1.2	1.7	1.7	1.4	1.1	1.3	1.1
Professional and business services	1.4	1.6	1.3	1.3	1.3	1.3	1.2	1.2	1.6	1.5	1.4	1.3	1.3	1.2
Educational services	1.3	1.1	1.4	1.2	1.0	1.0	1.1	1.2	1.4	1.3	1.3	1.2	1.1	1.0
Health care and social assistance	0.6	0.7	0.8	0.7	0.8	0.7	0.7	0.7	0.9	0.9	0.8	0.7	0.8	0.7
Arts, entertainment, and recreation	2.2	2.3	2.9	2.5	2.0	1.9	1.9	2.2	4.6	3.2	2.6	2.3	2.1	2.0
Accommodation and food services	1.5	2.0	2.0	1.9	1.7	1.6	1.5	1.7	2.3	2.2	1.8	1.6	1.5	1.2
Other services	0.9	1.4	1.6	1.4	1.6	1.2	1.0	1.1	1.6	1.2	1.6	1.4	1.3	1.3
Federal government	0.7	1.0	0.7	0.7	0.9	1.2	1.4	0.5	0.5	0.7	0.5	0.4	0.6	0.5
State and local government	0.8	0.8	0.8	0.9	0.8	0.8	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7

Source: U.S. Bureau of Labor Statistics.

Although the nature of the industries relative to other industries remained the same across the business cycle with regard to the fill rate, differences in the labor market can be seen by comparing the fill rates from 2005 (prerecession), 2009 (end of recession), and 2014. In 2005, the fill rate for total private industries was 1.3, with 5 industries having a fill rate of less than 1.0 (openings outnumbering hires) and 12 industries having a fill rate greater than 1.0 (hires outnumbering openings). In contrast, in 2009 at the end of the recession, the fill rate for total private industries had risen to 1.7, which reflects the decline of hires but even steeper decline of openings during the recession. In 2014, a year when we had mostly recovered from the recession, the numbers resemble 2005 with a fill rate of 1.1 for total private industries, with nine industries having a fill rate greater than 1.0 and six industries having a fill rate of less than 1.0.

Churn rates over time. As with the other measures, the churn rates by industry for the years 2001"13 are similar to the 2014 churn rates regarding the labor turnover characteristics of the industries. However, they also illustrate the effect of the business cycle. As seen in table 4, the industries with consistently high churn rates year after year are

construction; retail trade; professional and business services; arts, entertainment, and recreation; and accommodation and food services. The lowest churn rates each year are for the federal government and state and local government. The effect of the business cycle can be seen in the lower churn rates during the recession, specifically as hires and quits slowed in 2008 and 2009. Churn has increased steadily since the end of the recession as both hires and quits have risen but has not yet recovered to prerecession levels. As of 2014, the churn rate for total nonfarm industries was 6.9 compared with the 7.4 prerecession rate, and total private churn measured 7.6 in 2014 compared with 8.3 before the recession. The one different industry is construction, in which churn did not fall much during the recession. Construction is especially prone to layoffs, and the industry"s rise in layoffs counteracted its falling quits to keep churn steady through the recession.

Table 4. Churn rate (hires rate plus separations rate) by industry, by year, 2001—14

Industry	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total nonfarm	8.0	7.5	7.3	7.5	7.7	7.6	7.4	6.9	6.2	6.2	6.2	6.4	6.5	6.9
Total private	9.0	8.4	8.2	8.4	8.6	8.5	8.3	7.7	6.9	6.9	7.0	7.1	7.2	7.6
Mining and logging	7.4	6.9	7.2	7.6	7.2	6.7	7.2	7.3	5.7	5.9	6.1	7.3	6.5	7.2
Construction	13.4	12.8	13.1	12.5	12.8	11.4	10.6	11.2	11.7	12.5	12.3	11.5	10.6	9.9
Durable goods manufacturing	5.1	5.2	5.0	5.3	5.3	5.0	5.1	4.7	4.5	4.1	3.8	3.8	3.7	3.8
Nondurable goods manufacturing	6.6	5.8	5.2	5.4	5.3	6.1	6.3	5.5	5.4	5.1	4.8	4.4	4.3	4.7
Wholesale trade	5.7	5.7	5.4	5.8	5.5	5.4	5.8	5.3	4.6	4.3	4.4	4.5	4.1	4.9
Retail trade	10.4	9.4	9.2	10.0	10.0	10.3	9.7	8.9	7.5	7.7	7.6	7.8	8.4	9.4
Transportation, warehousing, and utilities	6.5	6.0	5.9	6.8	7.3	6.9	6.0	6.0	6.2	5.4	5.6	6.2	6.1	6.7
Information	7.0	5.6	5.3	5.1	5.5	5.7	5.2	4.5	4.4	4.2	4.6	4.8	5.1	5.5
Finance and insurance	5.3	4.6	4.3	4.6	4.6	5.0	5.5	4.6	3.7	3.9	3.4	4.0	4.4	4.2
Real estate and rental and leasing	7.3	7.3	7.9	8.4	7.7	8.2	7.9	7.3	7.3	6.0	5.9	6.4	6.7	6.2
Professional and business services	11.9	12.1	11.2	11.0	11.5	10.9	10.4	9.7	8.6	9.1	9.8	9.6	9.6	10.3
Educational services	4.9	4.2	4.8	4.4	4.6	4.9	4.9	4.8	4.6	4.6	4.6	4.4	4.5	4.7
Health care and social assistance	6.4	5.9	5.6	5.5	5.7	5.8	5.6	5.5	5.1	4.8	4.6	4.9	5.1	5.3
Arts, entertainment, and recreation	16.2	13.7	14.8	14.2	13.8	13.0	13.3	12.3	10.6	11.2	12.6	12.7	12.5	13.2
Accommodation and food services	15.1	13.3	13.0	13.5	13.8	13.9	13.6	12.2	10.0	9.5	10.0	10.4	10.7	11.3
Other services	6.8	7.0	7.2	7.6	8.0	7.0	6.9	6.7	6.9	6.1	6.8	6.8	6.7	6.6
Federal government	2.6	3.1	2.7	2.7	2.9	4.1	4.9	1.9	2.5	5.5	2.1	2.2	2.4	2.3
State and local government	3.2	2.9	2.7	2.9	2.8	3.0	2.9	2.6	2.4	2.6	2.6	2.7	2.7	2.8

Source: U.S. Bureau of Labor Statistics.

Earnings

No discussion of labor market data would be complete without at least mentioning how much the workers in the industry earn. Are high openings or high turnover due to low earnings? Or is the market more complicated than that? An analysis of earnings by industry or occupation as it relates to labor activity could be a whole article itself, but table 5 provides a quick look at job openings, churn, and average hourly earnings by industry. The earnings data are from the BLS Current Employment Statistics survey.[12] The values range from an average of $13.03 per hour in the accommodation and food services industry to $34.01 per hour in the information industry. Not surprisingly, earnings are lowest in the accommodation and food services industry, which has the second highest churn rate and the highest job openings rate. However, professional and business services has one of the higher earnings rates yet has high churn and openings rates similar to accommodation and food services. The highest

earnings are in the information industry in which the churn is modest and the openings rate is high. The construction industry has the sixth highest earnings but has high churn and very low openings. This combination of wages, churn, and openings suggests a more complicated labor market than one influenced simply by supply and demand and employee earnings. Much more analysis would be needed to sort through the interactions of these variables as well as to compare earnings, wages, and total compensation, all of which are different measurements.

Table 5. Job openings rate, churn rate, and hourly earnings, by industry, monthly averages for 2014

Industry	Job openings rate	Churn rate	Hourly earnings
Accommodation and food services	4.5	11.3	$13.03
Professional and business services	4.4	10.3	29.28
Health care and social assistance	3.9	5.3	24.98
Finance and insurance	3.7	4.2	33.00
Information	3.6	5.5	34.01
Total private	3.4	7.6	24.47
Arts, entertainment, and recreation	3.2	13.2	19.47
Mining and logging	3.1	7.2	30.78
Transportation, warehousing, and utilities	3.1	6.7	24.21
Retail trade	3.1	9.4	17.00
Real estate and rental and leasing	2.9	6.2	23.65
Other services	2.6	6.6	21.98
Wholesale trade	2.6	4.9	28.09
Nondurable goods manufacturing	2.4	4.7	22.40
Durable goods manufacturing	2.3	3.8	26.18
Construction	2.0	9.9	26.69

Source: U.S. Bureau of Labor Statistics.

Conclusion

Macroeconomic indicators such as employment, job openings, hires, separations, and earnings are essential for understanding the state of the economy and the labor market specifically. The data at the total nonfarm- or total private-industries level are quite informative. We learn even more by studying the data by industry. But analysis using only one or two of these data items misses much of the story. Studying more data items at once in relation to each other uncovers a much more complicated story of how different the industries within our economy are from each other. Some have very high turnover (arts, entertainment, and recreation), while some have very low turnover (government). Some easily find the workers they need and have few openings (construction), some need more workers than they can find (health care and social assistance), while others do not have much labor market activity at all (manufacturing). Because each industry is different, users of these labor data can benefit from studying the labor activity characteristics of the industries. Jobseekers and career changers can use the data to guide their education or job search. Job counselors could use the data to assist their clients. Employers might use the data to adjust benefits, wages, or on-the-job training opportunities if they are having trouble hiring. Government officials can learn from the data where to spend money, provide grants, develop training programs, or institute new policies. All of these people and entities are invested in the labor market and can benefit from the data series discussed in this article, all of which are readily available from the Bureau of Labor Statistics.

SUGGESTED CITATION

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NOTES

1 The JOLTS job openings count excludes jobs to be filled only by internal transfers, promotions, demotions, or recall from layoffs; jobs with start dates more than 30 days in the future; jobs for which employees have been hired but have not yet reported for work; and jobs to be filled by employees of temporary help agencies, employee leasing companies, outside contractors, or consultants.

2 The employment levels used in calculating JOLTS rates at the estimation level are from the Current Employment Statistics program at the Bureau of Labor Statistics.

3 For this article, the data will be written as the ordered pair (hires rate, job openings rate).

4 Tian Luo, Amar Mann, and Richard Holden, “The expanding role of temporary help services from 1990 to 2008,” *Monthly Labor Review*, August 2010, https://www.bls.gov/opub/mlr/2010/08/art1full.pdf.

5 Stephen D. Simpson, “The 6 signs of an economic recovery,” *Investopedia*, August 16, 2010, http://www.investopedia.com/financial-edge/0810/the-6-signs-of-an-economic-recovery.aspx.

6 The *Occupational Outlook Handbook* is a publication of the Employment Projections program of the Bureau of Labor Statistics; see https://www.bls.gov/ooh/.

7 Lisa Baron, “Demand for financial advisors to grow,” *Benefitspro*, February 24, 2014, http://www.benefitspro.com/2014/02/24/demand-for-financial-advisors-to-grow.

8 Noelle M. Emerson, “Surviving a thousand cuts: America’s public schools and the recession,” American Association of School Administrators economic impact study series, December 2010, http://www.aasa.org/uploadedFiles/Policy_and_Advocacy/files/AASAThousandCutsFINAL121610.pdf.

9 Rebecca Goldring, Soheyla Taie, Minsun Riddles, and Chelsea Owens, “Teacher attrition and mobility: results from the 2012–13 teacher follow-up survey, first look,” National Center for Education Statistics, U.S. Department of Education, September 2014, http://nces.ed.gov/pubs2014/2014077.pdf.

10 The National Center for Education Statistics provides teacher demand estimates for public and private schools, among other statistics, from the Schools and Staffing Survey, http://nces.ed.gov/surveys/sass/.

11 Current Employment Statistics, www.bls.gov/ces.

12 Earnings are different from wages. For a discussion, see “Current Employment Statistics frequently asked questions,” https://www.bls.gov/web/empsit/cesfaq.htm.

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One hundred years of Current Employment Statistics data collection

To help mark the Monthly Labor Review's centennial, the editors invited several producers and users of BLS data to take a look back at the last 100 years. This article describes the evolution of data collection methods used by the Current Employment Statistics (CES) program. Over the past century, the program has made major strides in developing new survey instruments and processes, all designed to improve data quality and minimize respondent burden.

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Current Employment Statistics (CES) survey data,[1] our nation's primary read on the economic heartbeat of employers, are released by the Bureau of Labor Statistics (BLS) at the beginning of each month. The data are part of the Employment Situation, commonly referred to as the Jobs Report.[2] This Principal Federal Economic Indicator celebrated its 100th anniversary in October 2015. Although the CES survey started in 1915 as a modest establishment survey of employment, earnings, and hours for four U.S. manufacturing industries, by 2015 it had grown to cover all nonfarm industries.[3]

CES data collection has evolved over the past century to incorporate a number of collection instruments, all tailored to efficiently gather monthly employment data on a large scale. The CES survey—a multimodal survey believed to be the largest of its type in the world—is designed to maximize survey response and data quality while minimizing cost and respondent burden. As a quick-response survey,[4] it requires substantial resources to collect high-quality data before first preliminary estimates are calculated. By definition, the CES program collects information on employment, earnings, and hours for payrolls that include the 12th of the month. Preliminary national estimates are then released at the beginning of the subsequent month (typically on the first Friday of the month).[5] CES has between 10 and 16 business days to collect data before the cutoff for calculation of initial estimates. Collection begins on the first business day after the 12th of the month and continues until the Monday of release week. Data collected after the closing date for initial estimates can be included in subsequent revisions.

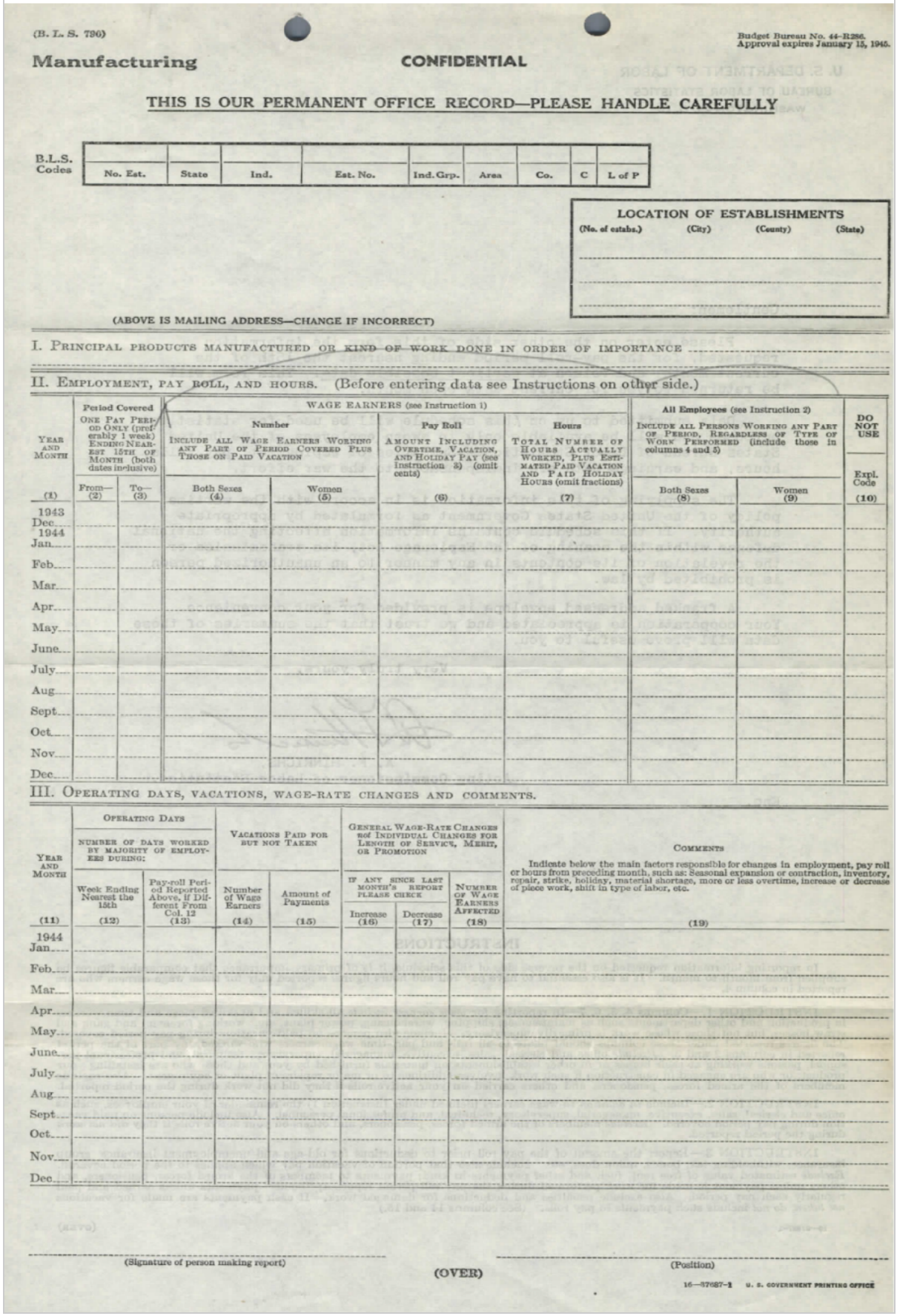
Monthly data collection primarily occurs during the second half of the month. Data collection centers (DCCs) in Atlanta, Dallas, Kansas City, and Fort Walton Beach, FL, fill with a flurry of activity, as BLS data collection agents contact 85,000 worksites nationwide. Concurrently, analysts at the BLS regional office in Chicago are parsing payroll data files provided electronically by some of the country's largest employers, representing nearly 130,000 worksites. Secure servers in Washington, DC, come to life as nearly 45,000 worksites report their employment data through Web-based applications and another 7,000 by touchtone data entry (TDE), an automated phone process. Further, state Labor Market Information agencies collect an additional 7,000 reports for CES, the vast majority of which are state government worksites.

As a celebration of the 100th anniversary of CES, this article reviews the development of the program's data collection procedures and instruments over the past century. The discussion tracks the transition from single-mode to multimode CES data collection.

Collecting CES data by mail (1915–83)

The CES program was established in October 1915 to collect, calculate, and publish statistics on monthly employment, hours, and earnings. Originally, the program surveyed only four industries. By the end of 1916, however, it had expanded its coverage to include 13 industries, representing a sample of 574 establishments.

Figure 1. CES data collection form, 1944



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B.L.S. Codes	No. Est.	State	Ind.	Est. No.	Ind. Grp.	Area	Co.	C	L of P

LOCATION OF ESTABLISHMENTS

(No. of estabs.) (City) (County) (State)

(ABOVE IS MAILING ADDRESS—CHANGE IF INCORRECT)

I. PRINCIPAL PRODUCTS MANUFACTURED OR KIND OF WORK DONE IN ORDER OF IMPORTANCE

II. EMPLOYMENT, PAY ROLL, AND HOURS. (Before entering data see Instructions on other side.)

Year and Month (1)	Period Covered: One Pay Period Only (preferably 1 week) Ending Nearest 15th of Month (both dates inclusive) From— (2)	To— (3)	Wage Earners (see Instruction 1): Number — Include all Wage Earners Working any Part of Period Covered Plus Those on Paid Vacation: Both Sexes (4)	Women (5)	Pay Roll — Amount Including Overtime, Vacation, and Holiday Pay (see Instruction 3) (omit cents) (6)	Hours — Total Number of Hours Actually Worked, Plus Estimated Paid Vacation and Paid Holiday Hours (omit fractions) (7)	All Employees (see Instruction 2): Include all Persons Working any Part of Period, Regardless of Type of Work Performed (include those in columns 4 and 5): Both Sexes (8)	Women (9)	DO NOT USE: Expl. Code (10)
1943 Dec.									
1944 Jan.									
Feb.									
Mar.									
Apr.									
May									
June									
July									
Aug.									
Sept.									
Oct.									
Nov.									
Dec.									

III. OPERATING DAYS, VACATIONS, WAGE-RATE CHANGES AND COMMENTS.

Year and Month (11)	Operating Days: Number of Days Worked by Majority of Employees During: Week Ending Nearest the 15th (12)	Pay-roll Period Reported Above, If Different From Col. 12 (13)	Vacations Paid For but Not Taken: Number of Wage Earners (14)	Amount of Payments (15)	General Wage-Rate Changes not Individual Changes for Length of Service, Merit, or Promotion: If any since last month's report please check: Increase (16)	Decrease (17)	Number of Wage Earners Affected (18)	Comments: Indicate below the main factors responsible for changes in employment, pay roll or hours from preceding month, such as: Seasonal expansion or contraction, inventory, repair, strike, holiday, material shortage, more or less overtime, increase or decrease of piece work, shift in type of labor, etc. (19)
1944 Jan.								
Feb.								
Mar.								
Apr.								
May								
June								
July								
Aug.								
Sept.								
Oct.								
Nov.								
Dec.								

(Signature of person making report)

(OVER)

(Position)

16—37627-1 U. S. GOVERNMENT PRINTING OFFICE

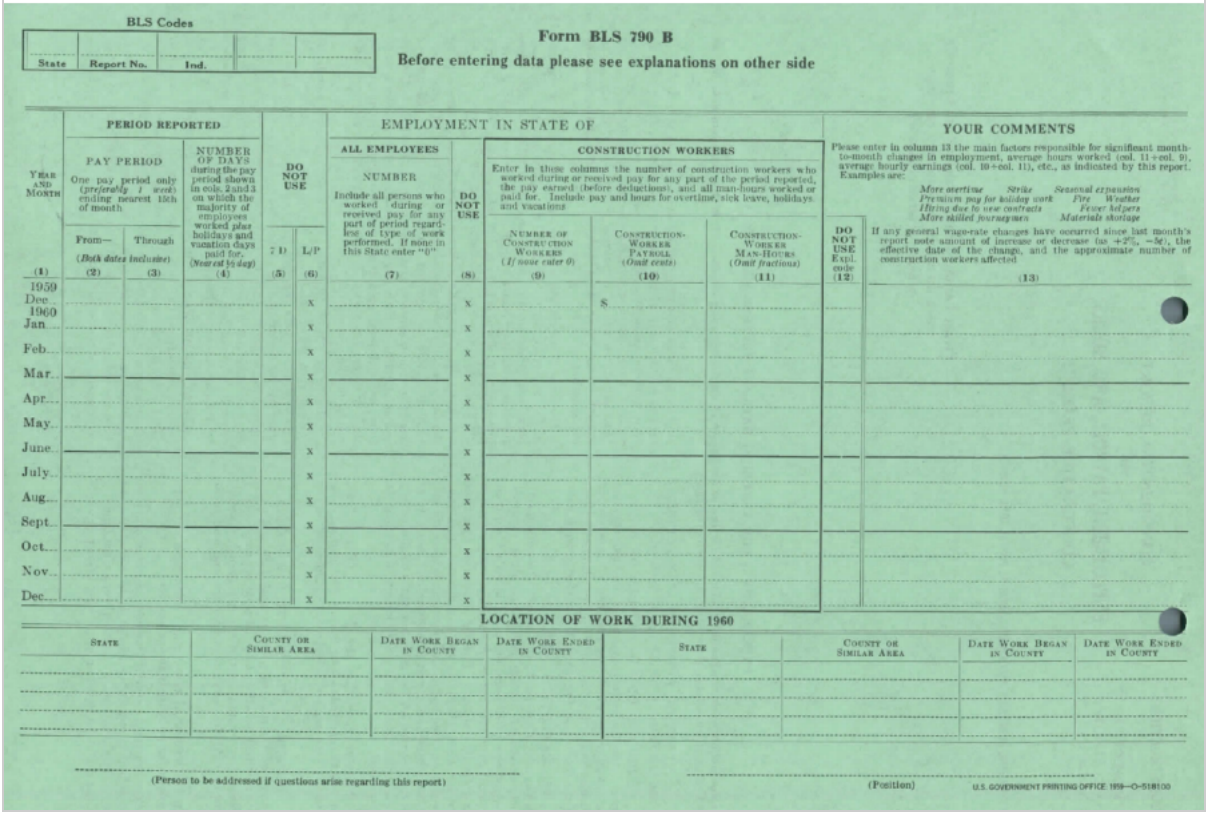
From the CES inception up until 1983, mail served as the primary data collection instrument. A paper form, called the “mail shuttle,” was printed and mailed to each sample unit at the beginning of the year, with space for all 12 months of employment, earnings, and hours data. (See figure 1.) After entering data for a given month, respondents mailed the form to the appropriate BLS-funded state workforce agency, where it would be read and tabulated before being returned to the respondent for entry of the following month’s data. In this environment, collection was extremely disaggregated, because nearly identical functions were being carried out in all states and the District of Columbia.

Given the short collection period of the survey, the mail shuttle was typically able to collect only 40–50 percent of the expected reports for first preliminary estimates.[6] By the time final estimates were published (2 months after the preliminary release), response rates would eventually approach 90 percent. Mail collection was particularly problematic for data that were flagged for edit reconciliation.[7] States had to review such data in order to determine the source of the error and, in some cases, had to follow up with respondents. Given the limited time for receiving and processing information, these additional steps would almost certainly prevent data from being included in the initial preliminary estimates.

The mail-shuttle collection method was costly, because forms had to be mailed twice each month. Further, the forms were processed manually, which required transcription, tabulation, edit reconciliation, and followup with nonrespondents. Despite the shortcomings of the mail shuttle, it was the best collection instrument for a number of decades, given the technology of the period.

As the U.S. economy grew rapidly in the years following the end of the Great Depression and World War II, employment statistics received more attention. With the growth in industries covered by CES, states in 1946 began printing on color-coded forms, to allow for rapid sorting.

Figure 2. CES data collection form, 1960



BLS Codes

State | Report No. | Ind.

Form BLS 790 B

Before entering data please see explanations on other side

PERIOD REPORTED

Year and Month

PAY PERIOD

One pay period only (preferably 1 week) ending nearest 15th of month

From— (Both dates inclusive) (2)

Through (3)

NUMBER OF DAYS during the pay period shown in cols. 2 and 3 on which the majority of employees worked plus holidays and vacation days paid for. (Nearest ½ day) (4)

DO NOT USE (5) (6)

EMPLOYMENT IN STATE OF

ALL EMPLOYEES

NUMBER

Include all persons who worked during or received pay for any part of period regardless of type of work performed. If none in this State enter "0" (7)

DO NOT USE (8)

CONSTRUCTION WORKERS

Enter in these columns the number of construction workers who worked during or received pay for any part of the period reported, the pay earned (before deductions), and all man-hours worked or paid for. Include pay and hours for overtime, sick leave, holidays and vacations

Number of Construction Workers (If none enter 0) (9)

Construction-Worker Payroll (Omit cents) (10)

Construction-Worker Man-Hours (Omit fractions) (11)

DO NOT USE Expl. code (12)

YOUR COMMENTS

Please enter in column 13 the main factors responsible for significant month-to-month changes in employment, average hours worked (col. 11÷col. 9), average hourly earnings (col. 10÷col. 11), etc., as indicated by this report. Examples are:

More overtime *Strike* *Seasonal expansion*
Premium pay for holiday work *Fire* *Weather*
Hiring due to new contracts *Fewer helpers*
More skilled journeymen *Materials shortage*

If any general wage-rate changes have occurred since last month's report note amount of increase or decrease (as +2%, −5¢), the effective date of the change, and the approximate number of construction workers affected (13)

Year and Month	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1959 Dec.						X		X		$			
1960 Jan.						X		X					
Feb.						X		X					
Mar.						X		X					
Apr.						X		X					
May						X		X					
June						X		X					
July						X		X					
Aug.						X		X					
Sept.						X		X					
Oct.						X		X					
Nov.						X		X					
Dec.						X		X					

LOCATION OF WORK DURING 1960

State	County or Similar Area	Date Work Began in County	Date Work Ended in County	State	County or Similar Area	Date Work Began in County	Date Work Ended in County

(Person to be addressed if questions arise regarding this report) (Position)

U.S. GOVERNMENT PRINTING OFFICE 1959—O-518100

The basic process of CES data collection was largely unchanged over the next several decades. There were some minor changes to the format of the form and the data requested. The page orientation of the 1960 form was shifted to landscape, and this format persisted until 1996. (See figure 2.) The 1968 form dropped the collection of data for female production workers, a practice that continues to this day.[8]

Toward multimodal CES data collection (1984–present)

In the early 1980s, CES began researching methods that could improve survey response rates and data quality. Even the most efficient mail-shuttle collection process could gather only about half of the data in time for the production of first estimates of employment and wages. This limitation led to large revisions in subsequent months, as additional data were collected.[9]

In 1984, in its first evaluation of new collection methods, CES enrolled respondents as part of a personal visit and then randomly assigned them to report by either mail or phone. The initial series of phone interviews was done without computer assistance and required the manual tracking and entry of data.

Figure 3. CES CATI establishment enrollment screen

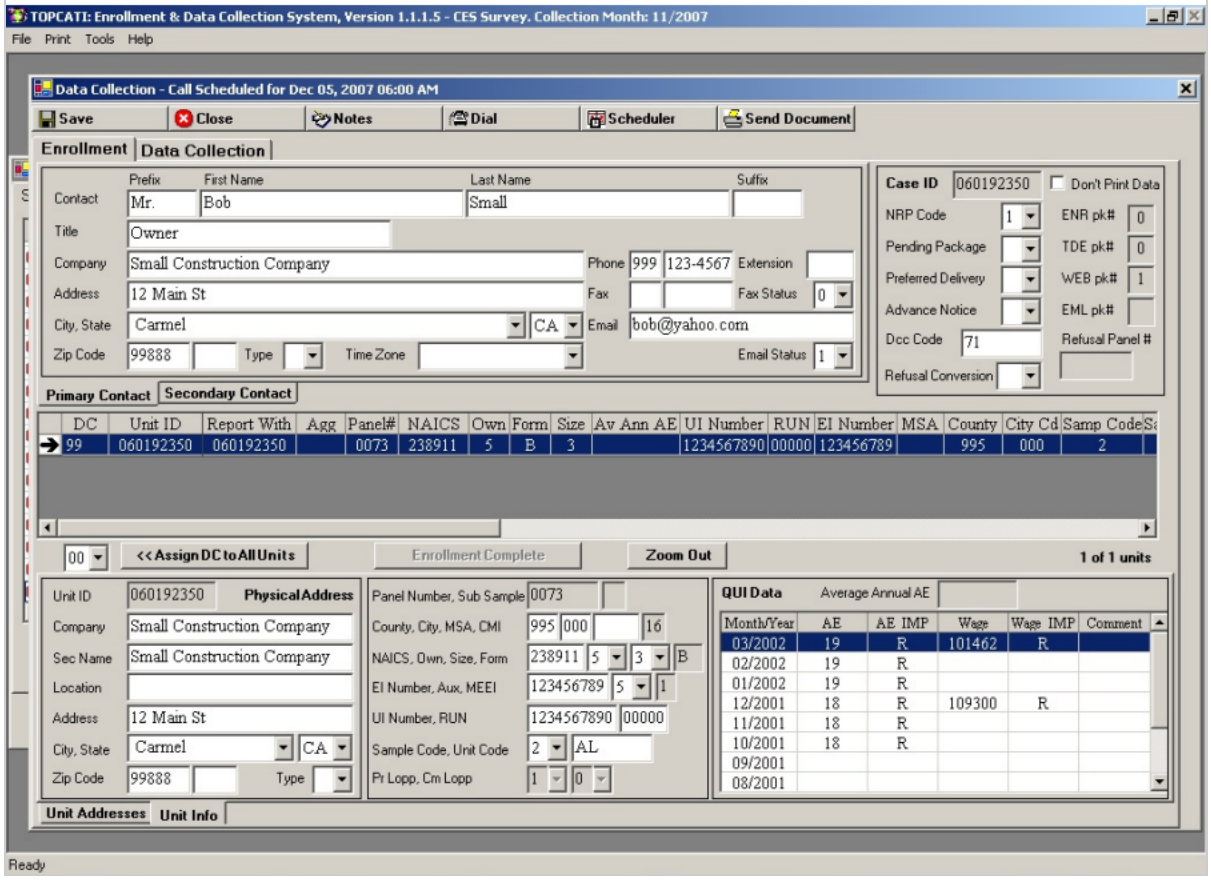
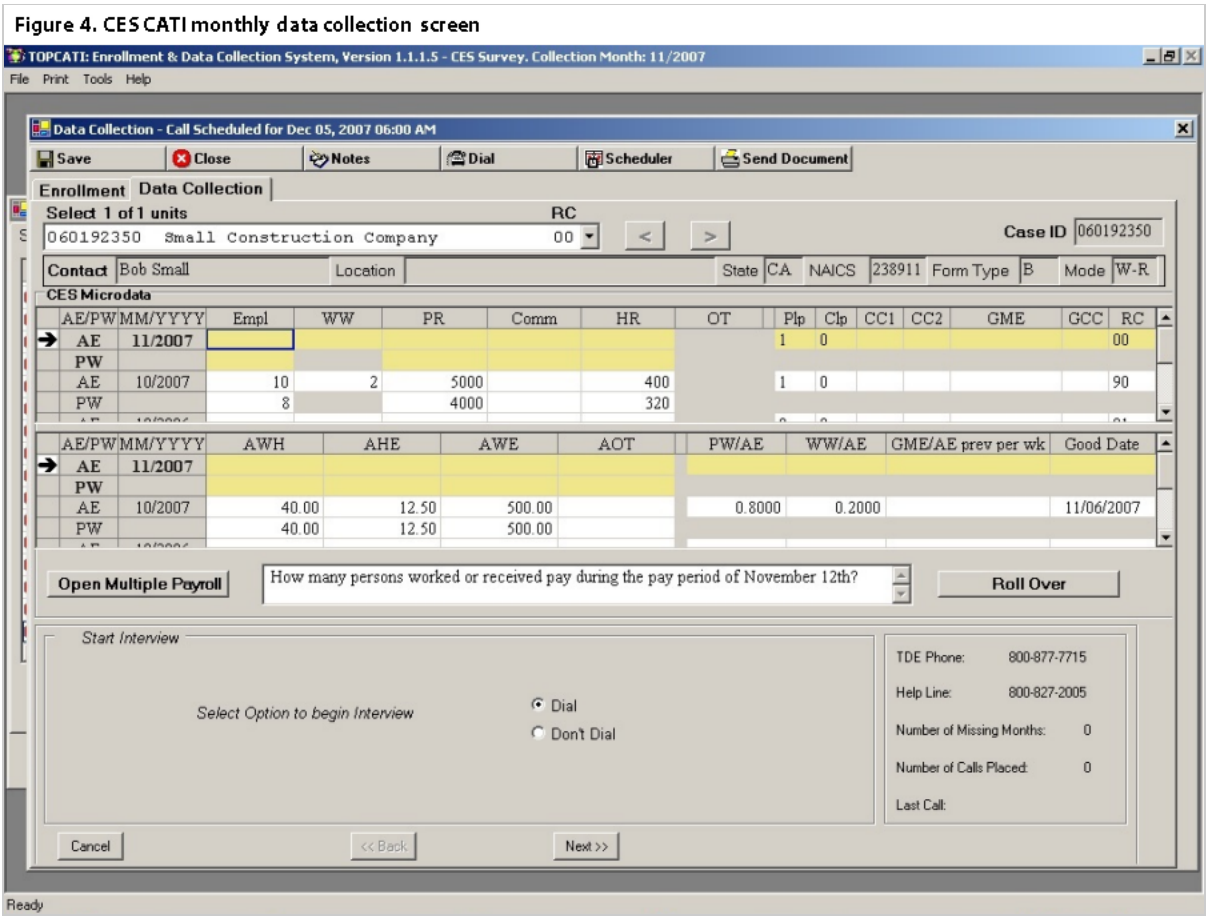


Figure 4. CES CATI monthly data collection screen



Computer-assisted telephone interviewing (1985). After initial testing success, BLS began evaluating the suitability of computer-assisted telephone interviewing (CATI) for CES data collection. CATI software is designed to provide prompting information and data capture to survey interviewers collecting information by phone. (See figures 3 and 4.) The computer program maintains call lists, allows for autodialing, and then provides interviewers with prompts that guide data collection. If the collected data do not meet expectations during data entry into the system, the computer prompts interviewers to follow up with more questions. Additional visual cues can also be provided to interviewers, to allow for the live editing of data.

In 1985, BLS used CATI software developed by the University of California at Berkeley in an initial test targeting 370 CES respondents in Maine and Florida. The test sample was representative of the CES survey for these states and included a range of industries and business establishments of various sizes. During the test, more than 95 percent of respondents agreed to provide data by phone on a monthly basis. Even more impressive was that the response rate at first preliminary estimates (i.e., data that would be included in the initial national release of employment estimates) went from 45 percent to 85 percent. Further, the CATI method required only an average of 1.5 calls, totaling 5 minutes, for successful data collection. Initial testing aimed at determining and setting collection procedures and was performed by states under BLS oversight.

The next phase of testing was expanded to include nine states. Of those, six states (Alaska, Iowa, Maine, Missouri, Nebraska, and Vermont) tested a representative subsample and three states (Alabama, California, and Florida) targeted respondents that were consistently late in returning their mail-shuttle forms. These tests included 3,300 sample units in 1987 and, after the addition of two more states in 1988 (Georgia and Mississippi), an

additional 2,500 sample units. The goal of this round of tests was to measure interviewer productivity, staff utilization, and cost. This information would help determine the practicality of a full implementation of CATI data collection.

The expanded series of tests enjoyed much of the same success as the initial round, with first-month collection rates at 85 percent (nearly double the mail response rates). Interviewers needed only an average of 1.7 calls to collect data, spending a total of 4.4 minutes on each case (2.5 minutes of which was on the phone). Perhaps not surprisingly, attrition was cut in half. While respondents could tacitly refuse to complete and return their forms under the mail-shuttle system, they had to overtly refuse to provide data during a phone-based CATI collection.[10]

The CATI tests highlighted the advantages of phone collection over mail collection and resulted in a paradigm shift for CES. The new model of actively collecting data by phone would fully harness new technologies available to both BLS and respondents.

Collecting CES data by CATI, while relatively costly, is advantageous for a number of reasons, none more so than the timeliness of collection. CES respondents cannot submit data before their firm's reference pay period has been processed. Business payrolls can be weekly, biweekly, semimonthly, or even monthly. This variation is a major challenge for a quick-response survey, because respondents may have only a limited number of days from the time payroll is processed until CES completes its data collection for first preliminary estimates. In fact, depending on the calendar, monthly payrolls are frequently not available before this early collection deadline. (Recent research by CES has determined that 11.3 percent of the CES sample for private businesses is collected from monthly payrolls.[11]) This time constraint makes mail collection problematic. The majority of respondents simply do not have enough time to process payroll, complete mail forms, and return these forms in time for first preliminary estimates. By contrast, CATI collection excels as a quick-response data collection instrument, because phone calls can be scheduled to meet each firm's payroll processing schedule. Not only are respondents considerably more likely to provide information consistently, but they are also much more likely to provide it before CES runs its first monthly estimate.

In addition to being successful in collecting data at high rates (see appendix), CATI collection allows for the instantaneous edit and screening of data. Sophisticated CATI systems can flag data that either fail a logical edit (e.g., presence of more female employees than total employees) or a screening check (e.g., presence of high average earnings for a particular industry). As the interviewer enters data collected over the phone, the computer system immediately flags suspect data for followup questions. Flagging minimizes respondent burden (by eliminating, or at least reducing, followup inquiries) and ensures the collection of accurate data. Results from feasibility tests indicate that more than half of cases are completed during a single phone call and fewer than 20 percent of cases require more than two phone calls (these figures include calls not answered and busy signals).

In 1990, after successful CATI testing, BLS opened its first CES data collection center (DCC) in the Atlanta regional office. Initially, this DCC was modestly staffed with three contract interviewers and a first-line supervisor overseen by a federal manager. DCC operations grew over time as similar centers were opened in Kansas City in 1992, Dallas in 1997, and Niceville, FL, in 2004 (the Niceville DCC has since moved to Fort Walton Beach, FL).[12] Staff levels increased considerably as CATI became the primary method for enrolling new respondents and collecting data. There are now more than 300 contract staff working at these DCCs. Some staff work only part time

during the second half of the month, for peak collection. In recent years, DCCs have added bilingual interviewers to allow for the enrollment of Spanish-speaking respondents.

DCCs are responsible for the following steps in data collection:

(1) *Address refinement*. After receiving a monthly panel of sample units, DCCs are responsible for confirming the location of each unit and identifying a point of contact for CES survey enrollment.

(2) *Survey enrollment*. A DCC interviewer sends an information packet to the identified business establishment contact, providing an overview of the CES program and a sample form. Shortly after this packet is received, the interviewer calls the potential respondent and attempts to enroll his or her establishment in the CES survey.

(3) *Data collection.* After enrollment, the interviewer becomes responsible for monthly data collection. The interviewer typically schedules a CATI call for a time when payroll data are available. During this call, the interviewer collects data and, if necessary, asks followup questions to ensure that the data pass edit and screening tests or have the appropriate comment codes assigned. These comment codes are later used by estimation staff in the review of data.

(4) *Collection rolling.* Because of the relatively high cost of CATI data collection, CES prefers to transfer establishments to a self-reporting method after 5 months of CATI collection. The interviewer is responsible for identifying respondents who would be a good fit for self-reporting and then for providing guidance on the transfer. Some establishments, however, remain in a permanent CATI status if the interviewer considers them ineligible for self-reporting or if they request such status.

(5) *Edit reconciliation*. For data that are self-reported and fail edit and screening tests, a group of interviewers is responsible for performing edit reconciliation. This process involves a followup with the respondent to determine if the data are correct and, if so, to properly document the reasons for the unexpected data change.

DCCs produce strong returns, but CATI operations entail considerable labor costs. CATI collection has proven to be very effective in enrolling new respondents and “training” them in providing CES data, but its high cost constrains the sample size CES can maintain. In order to maximize the returns of our nation’s “data dollar,” CES had to develop a more efficient method to collect data from respondents who had been initially enrolled in CATI. It was clear that respondents were becoming knowledgeable about reporting data during their several months of working with a CES data collector. This fact suggested that an eventual shift to a self-reporting method could lower costs without sacrificing data quality.

Touchtone data entry (1987). In 1987, the CES program began testing touchtone data entry (TDE) as a collection instrument.[13] This system provides respondents with a toll-free number that is available around the clock. The caller enters an identification number (known in CES as a “report number”), triggering an automated interview. The respondent is given a computer-based interview that replicates the entries that appear on paper forms or the standard questions asked by interviewers during a CATI call. The respondent then provides the data by selecting the correct keys on his or her touchtone telephone. For verification purposes, the answers are read aloud by the computer. When the call is complete, the data are submitted to CES.

After successful testing for a small number of respondents in Maine and Florida, TDE was implemented nationwide. Each state maintained a toll-free number and managed its own help-desk and edit-reconciliation processes. To streamline data collection, CES did not perform editing during the initial automated phone call. TDE was used only for respondents who had been “trained” during 5 months of CATI collection. If, at 6 months, the CATI interviewer determined that a respondent was sufficiently reliable and knowledgeable about the reporting process, that respondent would be transitioned to TDE reporting. If a respondent was either a poor fit for TDE or unwilling to adopt the new method, then collection would continue by CATI.

In 2004, the toll-free number, as well as the help-desk and edit-reconciliation processes, moved away from individual states and became centralized at BLS, where everything remains today. This transition resulted in substantial efficiency gains and cost savings for the program. Unlike CATI collection, in which BLS interviewers provide edit and screening during a CATI phone call, TDE relies on a followup phone call only if a TDE response fails edit and screening tests. In 2012, CES added a Spanish-language option for TDE.

Under the TDE system, respondents receive a monthly fax or postcard reminder to report their data. This practice has proven to increase collection rates. TDE collection rates have risen to 85 percent in recent years (see appendix), but when the method was used on a larger scale (with less selectivity of respondents), collection rates were typically between 70 and 75 percent. These rates are lower than those for CATI, but they come at a substantially lower cost (TDE has less than half the per-unit cost of CATI). At peak usage in the 1990s, more than 30 percent of the CES sample was collected by TDE. In 2005, CES began requesting additional data items, which made TDE too cumbersome for most respondents. Currently, TDE is used to complete only 3 percent of CES reports and is reserved mostly for state and local government respondents (these respondents have fewer data items to complete) and for special requests.

Fax (1995). With fax machines becoming ubiquitous in business during the early 1990s, CES in 1995 introduced a faxable version of the traditional form for respondents with multiple worksites. Each month, CES faxed a blank form to respondents, asking them to complete the form and return it by fax. Upon fax receipt, DCC staff would keypunch the data into the CES CATI system. Fax collection proved to be a reliable method, registering an 85-percent collection rate by first preliminary estimates. (See appendix.) This rate was comparable to that of CATI, but achieved at a lower cost. The existing fax process still requires human effort for data entry. However, the process remains relatively efficient, because respondents can provide data for a large number of worksites in a single response.

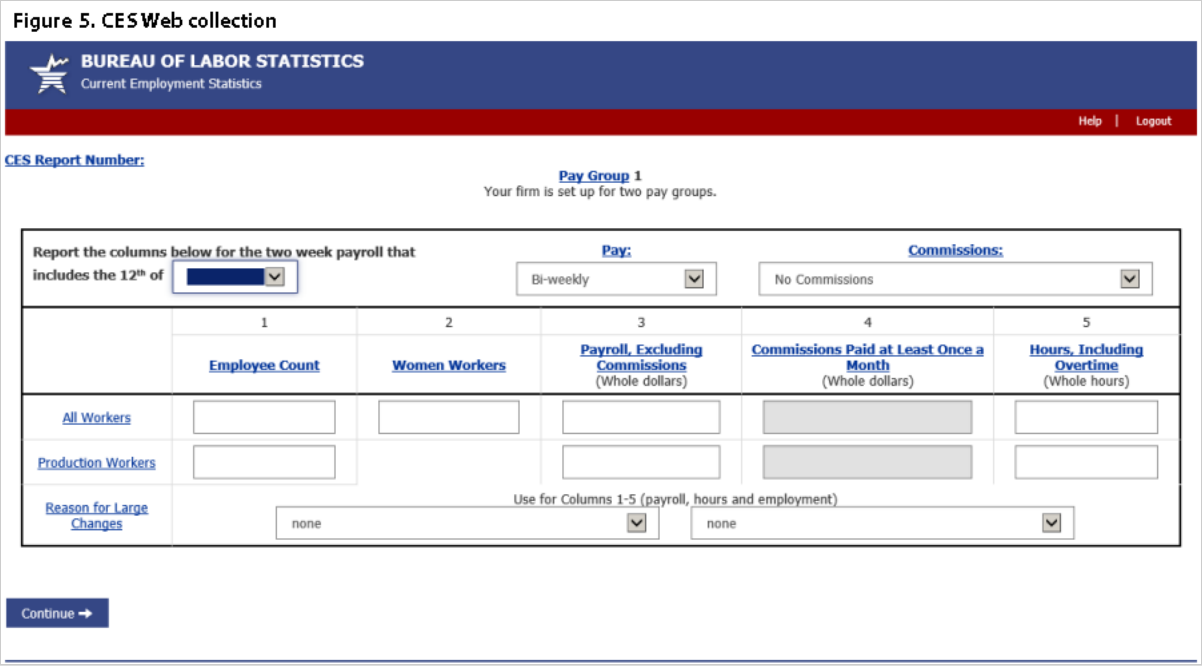
Electronic data interchange (1995). As it became more common for firms with multiple worksites to maintain large central computer databases with payroll information, BLS developed a procedure for using these data. In February 1995, it opened an electronic data interchange (EDI) center in Chicago, with the purpose of transforming the large datasets into usable data for CES and another BLS federal–state program, the Quarterly Census of Employment and Wages (QCEW).

The EDI method has large upfront costs, because it requires a team of economists, analysts, and programmers to process and analyze massive data files provided voluntarily by firms. Using proprietary software developed by BLS, analysts transform these firm files into data usable by CES and QCEW. The large upfront costs associated with this effort are balanced by low monthly processing costs. On a monthly basis, the EDI staff ensures that the

data files being processed conform to the established format and then performs edit reconciliation on worksites that are flagged for potential errors.

The EDI method provides tremendous value—more than 40 percent of CES worksites are processed with relatively limited respondent burden and low costs for BLS. (See appendix.) However, this method depends heavily on data being available to BLS before the deadline for first preliminary estimates. Collection rates for EDI respondents could be highly volatile, particularly in short months, because a lack of data from a few major firms can affect overall CES response (as data become available, these firms are included in later revisions of the Employment Situation). Further, only a small percentage of firms have enough worksites to make EDI collection an efficient option. Previous research by CES has indicated that EDI is a practical option for only about 5 percent of U.S. firms.

Figure 5. CES Web collection



Web-based collection (1996). As computer usage and Internet availability expanded in the 1990s, CES became the first federal program to test Web reporting. After a small-scale test in 1996, CES decided in 1998 to begin full production of a Web-based data collection application. (See figure 5.) For respondents who had access to a computer and the Internet, the Web application would provide an alternative to TDE, which had been the predominant self-reporting method for the previous decade.

Web respondents are prompted by email when it is time for them to provide data. If data are not submitted, reminder emails are sent as a followup. Email prompting proved more advantageous than the mail and fax reminders of TDE, because its low cost and low perceived burden allowed for more contact with respondents. CES also found that, when presented with a Web interface displaying a visual cue (similar to paper forms) of the full request, Web respondents were more likely to provide all requested data items. Compared with other self-reporting methods, Web collection had the advantage of being able to display edit-reconciliation prompts to the respondent during data entry. If an entry failed edit or screening tests, the respondent would be prompted to review the entry and either correct the reported data or provide a comment or an explanation code. This process substantially

reduced the number of followup contacts with the respondent, minimizing respondent burden and providing more usable data for preliminary estimates.

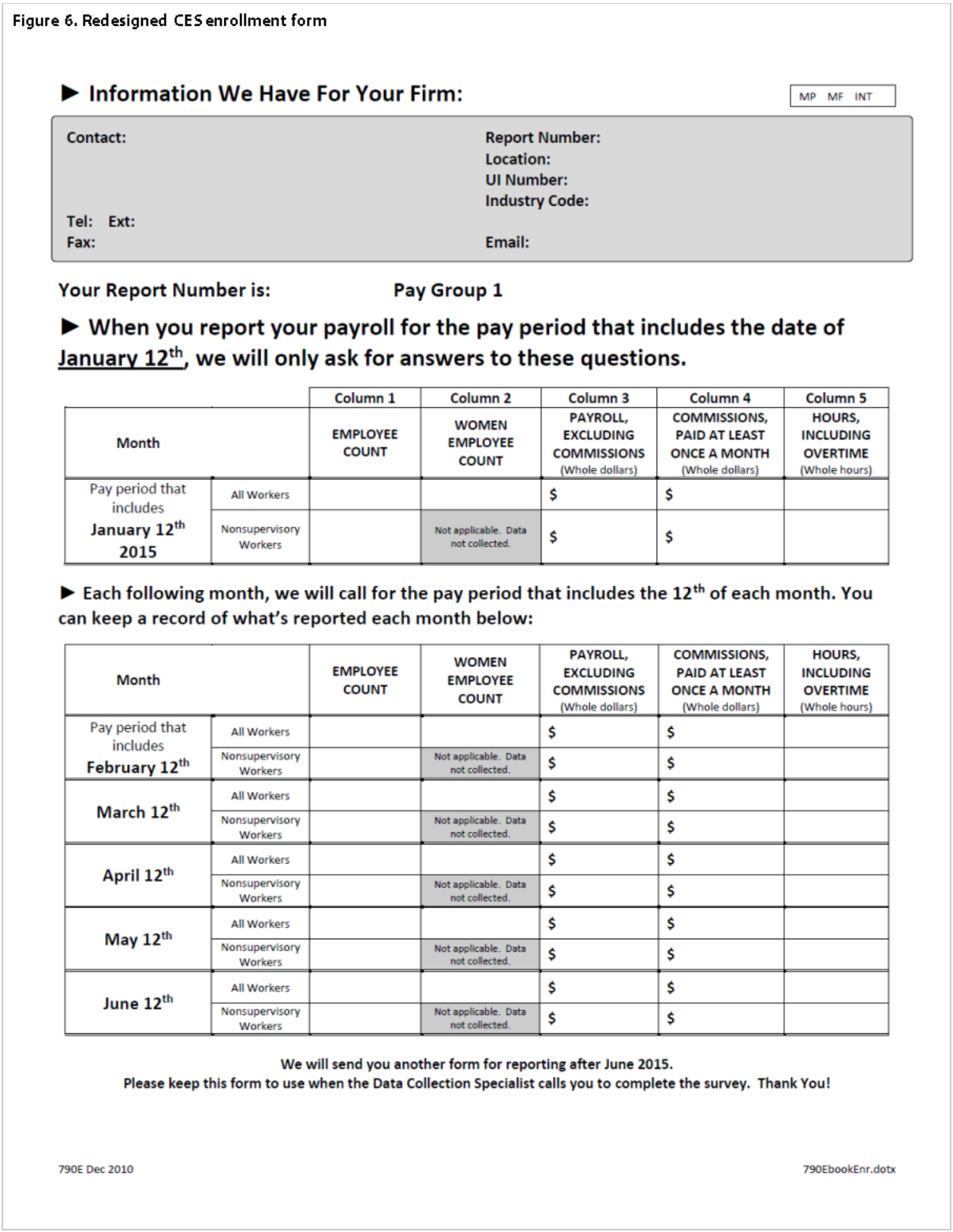
Despite its advantages, the Web method consistently trailed TDE in collection rates. One major issue identified by CES was that respondents had trouble maintaining login passwords. The issue was particularly problematic in cases with respondent change, a frequent occurrence when firms remain in sample for a period of 2 to 4 years. In 2006, CES tested a new Web design, called “Web-lite,” that did not require a password. Under the new design, respondents access the Web-lite page by clicking on a link (sent by CES in an email) and completing a CAPTCHA.[14] Because the application is no longer password protected, firm-identifying information or data entries that were required in earlier designs are not requested. This feature limits edit and screening requirements at this stage of the process. Full edit and screening tests are performed internally by BLS after Web data are imported. Entries that fail these tests are sent through an edit-reconciliation process that involves a followup phone contact with the respondent for confirmation and explanation of changes. Further, respondents cannot see their contact information displayed, so it is not always clear when this information needs to be updated. The system is designed to provide semiannual reminders to respondents, asking them to update their contact information. Despite these issues, Web-lite tests indicated far better collection rates and lower overall respondent burden than earlier Web-based methods. After completing the tests, CES adopted Web-lite as the standard Web-entry application.[15] A Spanish-language version of Web-lite was created in 2011.

Web collection rates are typically around 80 percent for first preliminary estimates, trailing CATI collection rates by only about 10 percentage points. (See appendix.) However, data from Web respondents can be collected at about a third of the cost of CATI collection—a considerable cost saving. The success of Web is largely due to the initial CATI collection period. During this period, respondents are screened (to ensure that Web is the appropriate data collection instrument for their situation) and trained in providing data and establishing a monthly routine. Similarly to TDE, Web collection is considered a complement to, not a replacement for, CATI collection and enrollment.

Modernizing the paper form (1996). Seeking to catch up with the times, in 1996 BLS modernized the mail form with a sans serif typeface and space for collecting an email address. After decades of asking respondents to provide the start and end dates of their pay periods, the mail form introduced checkboxes for selecting the length of the pay period. Another major addition was a comment-code section. While previous versions of the form had allowed respondents to provide open-ended comments, the modernized version was the first to provide a list of comment codes for selection. This comment-code redesign permitted much faster processing. Although mail was largely replaced by modern data collection instruments in the late 1990s, CES continues to use paper forms in mailed enrollment packages and for replacement forms (when the enrollment forms have been completed). Paper forms are no longer used as a mail shuttle, but rather as a method for allowing respondents to view instructions, visualize data requests, and maintain records of their responses. The forms also include BLS contact information, providing respondents with a single point of contact for any questions.

In 2008, CES made further improvements to the form.[16] After research and testing, the program adopted a redesign consisting of a single 11" × 17" piece of paper folded to form four pages. The first page is a cover letter providing BLS contact information and informing a business establishment that it has been selected by the CES survey. The second page contains instructions, the third page is the newly revised form, and the final page is a thank-you letter.

Figure 6. Redesigned CES enrollment form



► **Information We Have For Your Firm:** MP MF INT

Contact:
Tel: Ext:
Fax:

Report Number:
Location:
UI Number:
Industry Code:
Email:

Your Report Number is: **Pay Group 1**

► **When you report your payroll for the pay period that includes the date of January 12th, we will only ask for answers to these questions.**

Month		Column 1 EMPLOYEE COUNT	Column 2 WOMEN EMPLOYEE COUNT	Column 3 PAYROLL, EXCLUDING COMMISSIONS (Whole dollars)	Column 4 COMMISSIONS, PAID AT LEAST ONCE A MONTH (Whole dollars)	Column 5 HOURS, INCLUDING OVERTIME (Whole hours)
Pay period that includes January 12th 2015	All Workers			$	$	
	Nonsupervisory Workers		Not applicable. Data not collected.	$	$	

► **Each following month, we will call for the pay period that includes the 12th of each month. You can keep a record of what's reported each month below:**

Month		EMPLOYEE COUNT	WOMEN EMPLOYEE COUNT	PAYROLL, EXCLUDING COMMISSIONS (Whole dollars)	COMMISSIONS, PAID AT LEAST ONCE A MONTH (Whole dollars)	HOURS, INCLUDING OVERTIME (Whole hours)
Pay period that includes February 12th	All Workers			$	$	
	Nonsupervisory Workers		Not applicable. Data not collected.	$	$	
March 12th	All Workers			$	$	
	Nonsupervisory Workers		Not applicable. Data not collected.	$	$	
April 12th	All Workers			$	$	
	Nonsupervisory Workers		Not applicable. Data not collected.	$	$	
May 12th	All Workers			$	$	
	Nonsupervisory Workers		Not applicable. Data not collected.	$	$	
June 12th	All Workers			$	$	
	Nonsupervisory Workers		Not applicable. Data not collected.	$	$	

We will send you another form for reporting after June 2015.
Please keep this form to use when the Data Collection Specialist calls you to complete the survey. Thank You!

790E Dec 2010 790EbookEnr.dotx

The revised form includes a shaded box that contains complete contact information for the respondent. The form highlights this important information and reminds the respondent to provide updates as the information changes. The most substantial form modification is the visual separation of the first month of reporting from subsequent

months. (See figure 6.) This modification lessens the visual burden on the respondent and signals that only 1 month of data needs to be completed at a time.

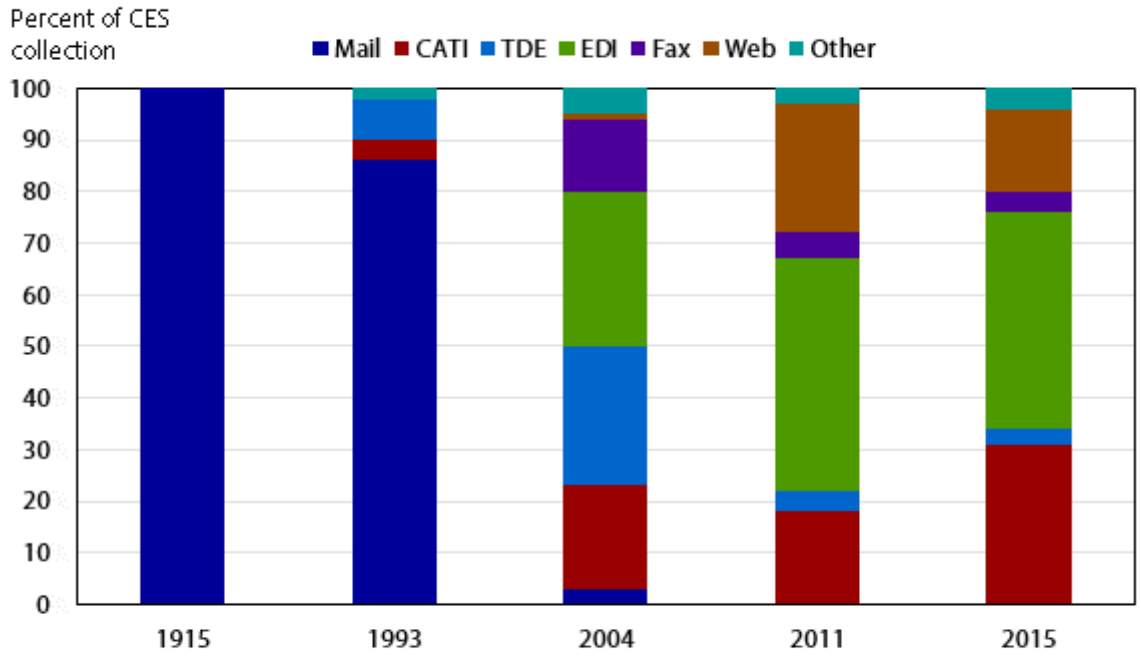
During testing, CES compared the response rates achieved with the new form with those of the previous forms. Although little impact was observed for unit response rates, the new form proved to increase item response rates.[17] The booklet print format also eliminated the possibility of forms from different firms being mismatched during assembly and mailout.

Collection by spreadsheet (2007). In recent years, as the use of fax by businesses has declined, CES has introduced alternative methods to collect data from midsized firms. One process, called WebFTP, involves the completion of a preformatted Excel spreadsheet. Upon completing the spreadsheet, respondents upload it to the CES website with a file transfer protocol. This process, which CES began using in 2007, was originally developed by West Virginia, before the bulk of data collection responsibility shifted to BLS. Currently, the method is the collection instrument with the lowest respondent burden for midsized firms. However, despite its promise as a low-cost instrument, WebFTP has been problematic for BLS because the processing of spreadsheets has proven rather time consuming in practice. The spreadsheets' flexibility has made their automated reading difficult, as respondents frequently make changes to the data format. In addition, respondents often provide notes with the expectation that their responses are reviewed by a human. Currently, CES is working to develop improved procedures for this process and, ideally, develop a replacement data collection instrument for midsized firms.

A century of improving CES data collection

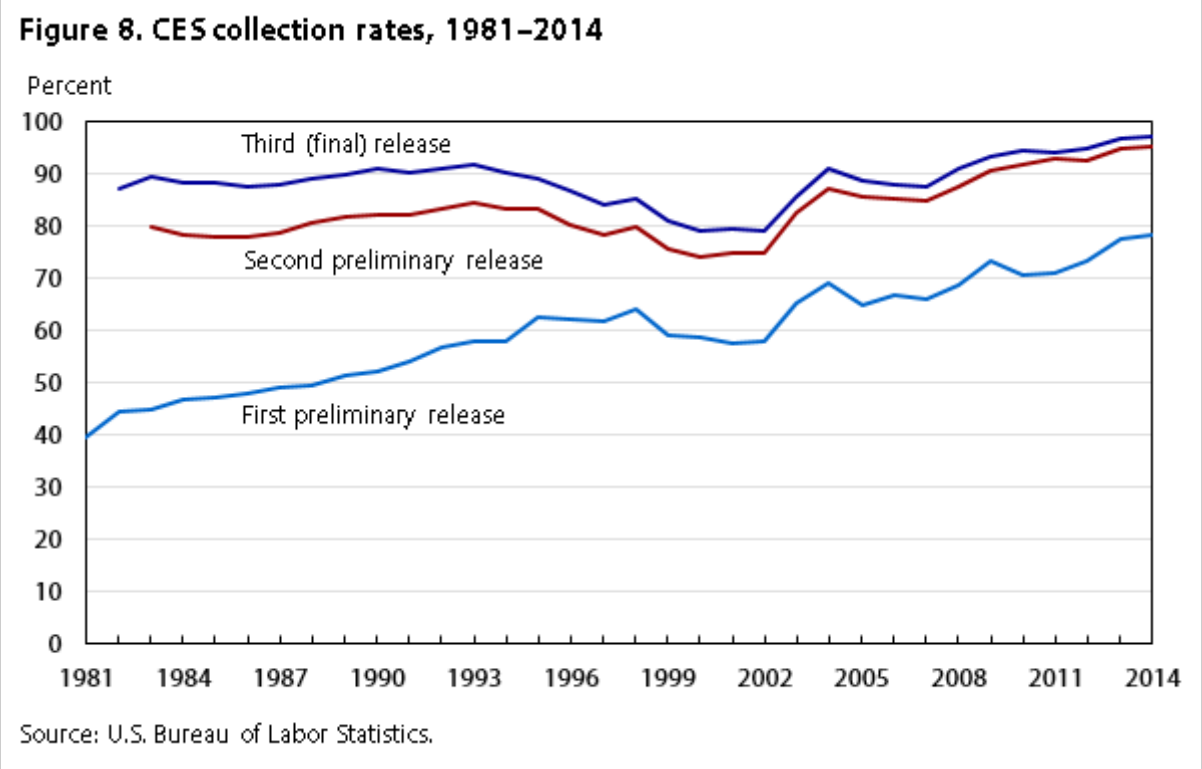
The CES survey has evolved substantially over the past 100 years. Initially, it used a mail-shuttle form to cover four industries with several hundred sample units. Today, it uses diverse collection methods and covers all nonfarm industries, representing more than 500,000 sample units. This modern multimodal survey maximizes response by reducing respondent burden while ensuring the highest quality of data. As a quick-response survey, it collects as much data as possible in time for first preliminary estimates. These estimates are part of the Employment Situation, typically released on the first Friday of each month. Although collection for first preliminary estimates ends around the turn of each month, CES continues to gather additional data for revisions that occur over the next 2 months.

Figure 7. CES data collection methods, 1915–2015



Note: The years shown represent major inflection points in the transition over time from mail to multimodal CES collection.
Source: U.S. Bureau of Labor Statistics.

The evolution of CES data collection over the past 100 years clearly demonstrates the shift in methodology.[18] (See figure 7.) As the CATI and TDE methods entered production in the late 1980s, they started chipping away at the mail shuttle. By 2004, CES efforts to offer innovative collection instruments clearly began to show, as CATI, TDE, EDI, Web, and fax almost completely displaced mail collection. By 2011, Web had taken over most of TDE collection, and EDI continued to expand. An interesting change, caused by a shift in program resources, came about in 2015, when CATI increased as a percentage of total CES data collection.[19] Expansion occurred in both the Kansas City and Fort Walton Beach DCCs, to allow for the collection of data from a greater number of permanent CATI respondents. (A permanent CATI respondent is simply a respondent who continues CATI reporting after 5 months of initial collection.) This extended collection could occur for various reasons, including the size of the establishment, the respondent's willingness to report through CATI, or the complexity of data that need to be collected. The CATI expansion was based on CES research indicating that a number of establishments that were being rolled over to Web were experiencing considerable dips in collection rates. CES identified certain firm-size classes and industries that responded better to CATI collection than to Web and provided the additional CATI resources to allow for this collection.



After nearly 70 years of relying on a single mail-shuttle form, the CES program devoted substantial resources to modernizing and enhancing the data collection process. In particular, the program sought to improve collection rates for first preliminary estimates, the earliest read on employment. Figure 8 clearly demonstrates the gains that have been made over the past 30 years with the addition of the CATI, TDE, EDI, fax, and Web instruments. Collection rates for the national first preliminary estimates have nearly doubled, reaching almost 80 percent by 2015 and substantially reducing later data revisions. Gains have also been made for the second preliminary release, which occurs 1 month after the first preliminary release. In the last three decades, collection rates for the second release have risen from approximately 80 percent to approximately 95 percent. Finally, by the time CES reaches its third, and final, release (2 months after the first preliminary release), approximately 97 percent of data have been collected.

The future of CES data collection

To enhance data collection methods, CES experts are constantly working to evaluate current processes in light of new technologies. Several efforts in this direction are underway.

Collection of data from midsized firms with multiple worksites remains the most challenging effort for CES. Currently, research is in progress to determine if an updated Web collection instrument, which would target respondents that report for five or more worksites, would be helpful in reducing respondent burden. While the current Web form is appropriate for respondents with fewer than five worksites, it is inadequate for respondents with five or more worksites. The new Web form, which is in the early stages of development, would allow for the entry of more than one worksite on a single page, reducing the burden on multiworksite respondents.

Other ongoing efforts aim at reducing data collection risks. The quick-response nature of the CES survey, although partially ameliorated by multimodal diversification, is still susceptible to the inherent risks posed by extreme weather and equipment failure. Power outages, hurricanes, and winter weather—events that can close a DCC or limit its operations—are just a sampling of the types of problems that can occur during peak CES collection. A current project is seeking to develop a fax-based optical character recognition (OCR) system that would allow machine reading of incoming faxes. The new system would enable CES to collect data even during a DCC closure. As one illustration, imagine that a hurricane closed a DCC for the final week of data collection. With the click of a button, a broadcast fax system could send faxes to all respondents from the impacted DCC, requesting that data be provided by fax. As the faxes were returned, the BLS computer system would employ modern OCR technology to read and accept the data directly into the CES processing system. CES software would then run edit and screening tests to determine which data should be included in estimation.

One collection method that has proven somewhat elusive in recent years has been email data collection. There has been demand from respondents, particularly over the past 15 years, to report CES data by email. Although some informal collection by email exists, there has been no formally established collection procedure for email. In 2007 and 2008, CES performed research to design an email collection instrument that would allow respondents to provide data in a form located in the body of an email. Unfortunately, testing of this process identified a number of insurmountable problems, chief among which was the lack of consistent reporting among email clients. A new method relying on a fillable PDF form is now in development and may be deployed in the near future. The method could be used both for regular data collection and in conjunction with the emergency fax solution detailed earlier.

The CES program continues to evaluate current data collection instruments. The transition to a multimodal survey over the past 30 years has considerably improved collection rates for preliminary estimates. As a result, data revisions have been reduced substantially. Collectively, these efforts and improvements allow for a clearer picture of the state of our economy, at the earliest possible time—a clear benefit for our entire nation. As the CES program celebrates a milestone birthday, we would like to thank our respondents for providing data over the past 100 years. These data allow BLS to provide key decisionmakers, and the nation, with the most accurate gauge of the labor market.

Appendix

Collection costs and rates, by collection method

Collection method	Cost	Typical first release collection (percent)	Typical final release collection (percent)	Current percent of CES collection	Period of peak CES collection
Computer-assisted telephone interviewing (CATI)	$$$ $$	90	97	31	2010–15
Touchtone data entry (TDE)	$$	85	97	3	1995–2005
Fax	$$$ $	85	97	4	1995–2006
Electronic data interchange (EDI)	$	60	95	42	2010–15
Web-based collection	$$	80	93	16	2013

See footnotes at end of table.

Source: U.S. Bureau of Labor Statistics.

SUGGESTED CITATION

Nicholas Johnson, "One hundred years of Current Employment Statistics data collection," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, January 2016, https://doi.org/10.21916/mlr.2016.2.

NOTES

1 For more information, see https://www.bls.gov/ces/.

2 The Employment Situation presents statistics from two major surveys, the Current Population Survey (household survey) and the Current Employment Statistics survey (establishment survey). The household survey—a sample survey of about 60,000 eligible households conducted by the U.S. Census Bureau for BLS—provides information on the labor force, employment, and unemployment. The establishment survey provides information on employment, hours, and earnings of employees on nonfarm payrolls. BLS collects these data each month from the payroll records of a sample of nonagricultural business establishments.

3 In 1915, the CES sample covered fewer than 500 business establishments. Today, it includes 143,000 businesses and government agencies, representing 588,000 unique worksites.

4 The CES survey is typically considered a quick-response survey because of the short turnaround time between the program's reference period and data release.

5 CES data are also used to produce state and area estimates, which are typically released 2 weeks after the release of national estimates. These state and area estimates are revised in the following month before being considered final. This revision differs from that for national estimates, which are revised twice, both in the first month and the second month after initial release.

6 For historical collection rates, see https://www.bls.gov/web/empsit/cesregrec.htm.

7 CES performs checks on collected data to identify potential errors. Data flagged during these checks are verified with the respondent during edit reconciliation. Data are not used in estimates until verification has occurred.

8 For more information on the history of CES forms, see Louis J. Harrell, Jr., and Edward Park, "Revisiting the survey form: the effects of redesigning the Current Employment Statistics survey's iconic 1-page form with a booklet style form," *Proceedings of the Joint Statistical Meetings* (American Statistical Association, October 2012), pp. 4900–4914, https://www.bls.gov/osmr/research-papers/2012/pdf/st120260.pdf.

9 For more information on CES revisions, see Thomas Nardone, Kenneth Robertson, and Julie Hatch Maxfield, "Why are there revisions to the jobs numbers?" *Beyond the Numbers*, vol. 2, no. 17, July 2013, https://www.bls.gov/opub/btn/volume-2/revisions-to-jobs-numbers.htm.

10 For more information on the initial testing of CATI collection for CES, see George Werking, Richard Clayton, Richard Rosen, and Debbie Winter, "Conversion from mail to CATI in the Current Employment Statistics survey," *Proceedings of the Survey Research Methods Section* (American Statistical Association, 1988), pp. 431–436, https://www.amstat.org/Sections/Srms/Proceedings/papers/1988_079.pdf.

11 For more information on the pay frequency of private businesses in the CES sample, see Matt Burgess, "How frequently do private businesses pay workers?" *Beyond the Numbers*, vol. 3, no. 11, May 2014, https://www.bls.gov/opub/btn/volume-3/how-frequently-do-private-businesses-pay-workers.htm.

12 For more information on the organization and management of a DCC, see Paul Calhoun, Laura Jackson, and John Wohlford, "Organization and management of a data collection center," *Proceedings of the Joint Statistical Meetings* (American Statistical Association, August 2011), https://www.bls.gov/osmr/research-papers/2001/st010200.htm.

13 Voice recognition (VR) software was also tested in 1989 and produced similar results to TDE. As testing was underway, the use of touchtone phones became near universal, so the need to update TDE with VR software was no longer considered cost effective. Therefore, voice recognition technology was never implemented.

14 CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart) is a method for ensuring that it is a human and not a computer that is attempting access to an online application. CES has gradually shifted from using a text-based CAPTCHA to using a picture-based CAPTCHA, which respondents find more user-friendly.

15 For more information on CES Web collection, see Richard J. Rosen, Christopher D. Manning, and Louis J. Harrell, Jr., "Web-based data collection in the Current Employment Statistics survey," *Proceedings of the Survey Research Methods Section* (American Statistical Association, 1998), pp. 354–359, https://www.amstat.org/sections/srms/Proceedings/papers/1998_058.pdf. For more information on BLS Web collection, see Stephen Cohen, Dee McCarthy, Richard Rosen, and William Wiatrowski, "Internet collection at the Bureau of Labor Statistics: an option to report data," *Monthly Labor Review*, February 2006, pp. 47–57, https://www.bls.gov/opub/mlr/2006/02/art4full.pdf.

16 This work was conducted under contract with Dr. Don Dillman of the Social and Economic Sciences Research Center at Washington State University.

17 Unit response rate refers to the percentage of establishments (or units) that responded with at least partial data. Item response rate is calculated for each individual data item requested from establishments. For example, CES requests information on employee count, female-employee count, payroll, commissions, hours, and overtime for both all workers and production workers (female-employee count is requested only at the all-employee level). CES measures response rates for each of these data items because not all establishments are able or willing to provide data for each individual request.

18 For more information on the expansion of CES data collection over the past 100 years, see Richard L. Clayton, "Implementation of the Current Employment Statistics redesign: data collection," *Proceedings of the Survey Research Methods Section* (American Statistical Association, 1997), pp. 295–297, http://www.amstat.org/sections/srms/proceedings/papers/1997_048.pdf; Kenneth W. Robertson and Julie Hatch Maxfield, "Data collection in the U.S. Bureau of Labor Statistics' Current Employment Statistics survey" (Geneva, Switzerland: United Nations Economic Commission for Europe, Conference of European Statisticians, 2012), http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.44/2012/mtg2/WP20.pdf; and Richard J. Rosen and David O'Connell, "Developing an integrated system for mixed mode data collection in a large monthly establishment survey" (U.S. Bureau of Labor Statistics, 1997), https://www.bls.gov/osmr/research-papers/1997/pdf/st970150.pdf.

19 For more information, see https://www.bls.gov/sae/cesprocs.htm.

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Monthly Labor Review

BLS

January 2016

The laboring labor share of income: the “miracle” ends

Brian I. Baker

Economists classify the income earned by U.S. households as either labor earnings or capital earnings. From about 1950 to 2001, the labor share of income never wavered far from 62 percent, even as the nation underwent a transformation from an economy based primarily on manufacturing to one grounded chiefly in services. Earlier, the economist John Maynard Keynes called this kind of behavior—in which two opposing forces pull the labor force in opposite directions, yet manage to cancel out, so that the labor share remains stable—“a bit of a miracle.” As applied to the 1950–2001 period, the “miracle” inhered in the singular coincidence of a falling labor share in manufacturing industries and a rising one in service-providing industries balancing each other out, resulting in no change in the overall labor share. However, Keynes’s “bit of a miracle” eventually ended: beginning in 2001 through the present, the labor share slowly fell, dropping to about 56 percent of income by 2014. But why did the “miracle” end? That question is what Roc Armenter seeks to answer in “A bit of a miracle no more: the decline of the labor share,” published in the Federal Reserve Bank of Philadelphia *Business Review* for the third quarter of 2015.

After acknowledging a number of difficulties associated with measuring the U.S. labor share of income, Armenter presents three alternative measures that attempt to deal with one particular difficulty: what economists call *proprietor’s income*, the income of self-employed individuals working either as sole proprietors or in partnerships. The problem with proprietor’s income is that, although the self-employed earn both labor income and capital income, there is no need for them to distinguish between the two, so their records do not reflect the difference. Therefore, economists struggle to decompose proprietor’s income into how much is labor income and how much is capital income—ergo the three alternative measures. The main measure, developed by the U.S. Bureau of Labor Statistics (BLS) estimates proprietors’ labor compensation by assuming that proprietors earn the average hourly compensation that the employees working in the same sector earn. The BLS-estimated proprietors’ labor compensation is added to the employees’ labor compensation, and their sum is divided by output to yield the BLS *headline* labor income share. This methodology is the same for the entire range of the BLS labor share series, currently from 1947 to 2016. A charting of the BLS labor share series shows the labor share’s steady behavior at about 62 percent from 1950 to 2001 and falloff from then on. An alternative measure, formulated to take account of a decline in the BLS-estimated proprietors’ labor compensation as a proportion of proprietors’ total income, shows that at least one-third, and possibly half, of the drop in the headline labor income share is due to the BLS methodology. The other half to two-thirds of the drop is real, however, and like the overall trend, the alternative measure’s labor share of income declined after 2000. Finally, the third alternative measure ignores proprietor’s

income altogether. Armenter shows that this measure, too, exhibits a stable trend from 1950 to about 2001 and then drops off significantly.

Following a discussion showing that the chief culprit in ending the “bit of a miracle” was wage stagnation in the manufacturing industry, Armenter takes up the question of what the “ultimate cause” is behind the decline of the U.S. labor share of income. Conceding that “economists have several hypotheses but no definite answer yet,” he cites the three leading hypotheses purporting to explain the decline.

First, there is the hypothesis of *capital deepening*: technological innovations of various kinds produce better and cheaper equipment—robots, ATM machines, powerful software—that replaces workers and redistributes income from labor to capital. But this hypothesis is challenged by a logical consequence of the combination of economic theory and empirical fact: even when innovation replaces workers with equipment, the remaining workers should be more productive; that is, innovation accelerates labor productivity rather than making wages stagnate. But this is not what happened in the manufacturing sector over the period examined.

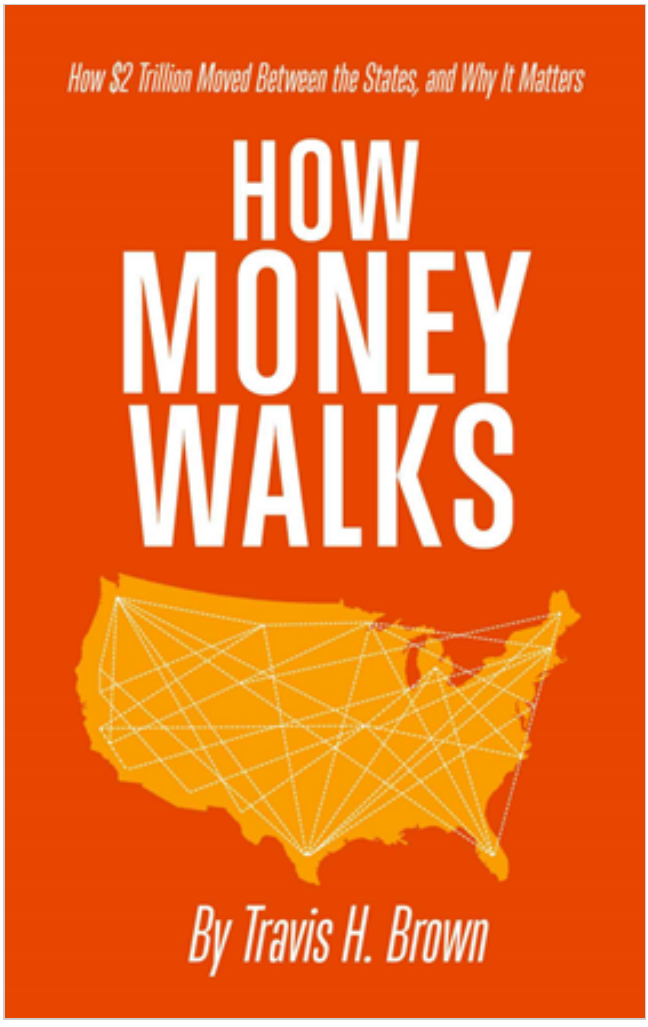
Second is the *hypothesis of inequality*. According to this hypothesis, technological innovation augments productivity more for highly skilled workers than for low-skilled workers, making the low-skilled workers redundant and thereby dispensable. As a result, wage inequality between workers increases. Consequently, the capital share of income increases and the labor share decreases. The principal challenge to this hypothesis is that empirical evidence appears to show that the rise in wage inequality—particularly the increase in top wages—has actually sustained the labor share, not diminished it.

Finally, the *globalization* hypothesis links that phenomenon to the falling labor share of income: U.S. industries that are more labor intensive will outsource their work to countries with cheap labor while industries that are more capital intensive will remain in the United States. The result is an increase in the capital share of income and a decrease in the labor share. The trouble with this hypothesis, according to Armenter, is that there is little evidence to support it: the hypothesis predicts that the nation will import goods produced with a lot of labor and export goods produced with a lot of capital, whereas U.S. international trade involves exchanging goods that are quite similar, such as cars.

Monthly Labor Review
BLS
January 2016

Money walks, money talks: why it travels from state to state, and what it means for states and you

How Money Walks: How $2 Trillion Moved Between the States, and Why It Matters. By Travis H. Brown, St. Louis, MO: Travis H. Brown, Pelopidas, LLC, 256 pp., $14.95 paperback.



Ronald Johnson
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The author of this book, Travis H. Brown, is an entrepreneur from St. Louis, Missouri who cofounded the public affairs and advocacy firm Pelopidas, LLC, in 2007. He has a passion for helping cities and states grow through the use of smart tax policies, so this book was a natural outcome of his work in that area. The subtitle of the book, "How $2 Trillion Moved Between the States, and Why It Matters," indicates the seriousness of the situation he is confronting. To paraphrase former Senator Everett Dirksen of Illinois, "A trillion here, a trillion there, and pretty soon you are talking about real money." Using official statistics from the Internal Revenue Service (IRS), Brown was able to determine that $2 trillion of adjusted gross income (AGI) passed from states with a high income tax rate to states with a low income tax rate during the period from 1995 to 2010. He also was able to identify the states that saw the greatest gains and losses as citizens migrated. Several times in the book, Brown asserts that taxes may be only one of a number of reasons that people leave one state for another, but the data he presents make a very persuasive argument for taxes being the primary motivation.

Because the withholding in a person's paycheck is composed of federal, state, and local income taxes, along with Medicare and Social Security contributions and possibly some other things, such as health insurance premiums, it is not easy to see how much a person's state and local tax burden is. Furthermore, it is not readily evident how much money a person could save by living elsewhere in the country. That is one reason this is an important book. Also, it is the reason Dr. Arthur Laffer (he of the Laffer curve) could write in the foreword that, when

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he read the book, he thought, “It’s about time.” The book lays bare migration patterns within the United States and can aid a reader who wants to estimate how much money he or she will save by moving to another part of the country. The savings can be huge. In an early chapter, Brown provides a hypothetical illustration. He contrasts the Smith family of California with the Millers of Miami, Florida. Both families have wages of $250,000, but the Smiths face a marginal income tax rate of 9.3 percent while the Millers have no state income tax, so the Millers will be able to keep $17,772 more of their earnings than the Smiths will every year. All else being equal, who wouldn’t move for a savings like that? Another big problem for states with a high income tax rate is that those people most likely to move are the ones with the highest incomes—probably the most productive workers in the state. If a state then tries to compensate for its loss of tax revenue by raising its income tax rate, the result could be a vicious cycle or “death spiral.”

Much of the book consists of tables with data for states and Metropolitan Statistical Areas (MSAs). Brown points out the nine states with no personal income tax and shows how much they gained (or lost) in AGI; cumulatively, the sum amounted to a $146.2 billion gain. By contrast, the nine states with the highest marginal income tax rates lost a combined $107.4 billion. Similarly, the 10 states with the lowest state and local tax burdens per capita gained $69.9 billion in AGI, whereas the 10 states with the highest state and local tax burdens per capita lost $139 billion. For each of the 10 states with the greatest net gain in AGI, Brown provides a table that shows (1) the amount of that net gain, (2) the top five states that contributed to the gain, (3) the state’s cumulative population gain, (4) the top income tax rate in the state, (5) the state and local tax burdens in the state, (6) the amount of taxes per capita in the state, and (7) the state’s national tax burden ranking. Florida had the greatest net gain in AGI: $86.4 billion. Similar tables show the 10 states that saw the greatest net loss in AGI; New York led, with a net loss of $58.6 billion.

Brown then moves from the state level to that of MSAs. MSAs can encompass areas in more than one state, so it is interesting (and probably not a coincidence) that each of the 10 MSAs that gained the most AGI covers an area that lies entirely within just one state. As one might expect, those 10 MSAs are all in states with low state and local tax burdens, whereas the reverse holds for the 10 with the greatest loss. The Phoenix–Mesa–Scottsdale, Arizona, MSA experienced the greatest gain in both AGI ($17.1 billion) and population (326,653), while the New York City–Northern New Jersey MSA had the greatest corresponding loss: $66.1 billion and 781,417 people. (*Monthly Labor Review* readers may be especially interested in knowing that the Washington, DC, MSA, which includes parts of Maryland, Virginia, and West Virginia, ranked sixth worst, with losses of $11.3 billion in AGI and 55,424 in population.)

Because Florida was the state with the greatest net gain in AGI, Brown then drills down further and lists the top 10 U.S. counties from which people moved to Florida. Most of them came from the New York City area. He provides similar information for each of the following Florida MSAs: Miami–Fort Lauderdale–Pompano Beach, Naples–Marco Island, Tampa–St. Petersburg–Clearwater, Cape Coral–Fort Myers, and North Port–Bradenton–Sarasota. Then, because New York was the state with the greatest net loss in AGI, Brown lists the top 10 counties to which the New York City MSA lost AGI and population. As one might expect, Florida MSAs show up often on both New

York City lists. In a chapter titled “East Coast Blues,” Brown lists the counties to which AGI and people migrated from the Boston, Philadelphia, and Washington, DC, MSAs.

For much of the 20th century, California saw massive inflows of people drawn by the golden sunshine, majestic mountains, beautiful beaches, great universities, and Hollywood. As a result, it easily became the nation’s most populous state. However, during the 1995–2010 period that the book examines, the state actually saw a net decline in population and it came in second to New York in net loss in AGI. The two nearby states of Nevada and Arizona (both with a low tax burden) were the primary beneficiaries of California’s misfortune. For each of four large California MSAs, Brown lists the top 10 U.S. counties that gained from those MSAs’ losses, along with their dollar gain. Because so many Californians left for Nevada and Arizona, Brown looks at these two states next—especially the Phoenix and Las Vegas MSAs—to see which other states and MSAs were on the losing end of migration to them.

The chapter “Midwest Blues” considers the 12 Midwest states, 9 of which are in the top half of the 50 states in terms of state and local tax burdens. As with the top 10 AGI-losing states, Brown presents information on the Midwest states’ net loss or gain in AGI, top personal income tax rate, taxes paid per capita, etc. Finally, he has a chapter on Texas and Georgia, two big beneficiaries of AGI and population migration from other states.

Readers of book reviews invariably want more than anything else an answer to the question “Should I read this book?” For *How Money Walks*, my answer would be both “It depends on what you are looking for” and “Yes, with reservations.” By “It depends,” I mean that you must be a person who likes to look at numbers and tables. My second answer means that, even if you are the type of person who would enjoy the book, it has several problems that will diminish that enjoyment and any other benefits you receive from reading it. The chief problem is that much of the book consists of top-10 or top-5 lists and most of the narrative simply describes and discusses the ramifications of the content of those lists. Second, even though this is not a long book, there is a lot of repetition in it; after a while, one might tire of reading, for example, that Florida had a net gain of $86.4 billion in AGI. Brown came up with all of his statistics on the movement of AGI from one state to another from IRS taxpayer data files. Does this mean that he was able to obtain individual tax returns? I thought that that information was confidential, but if he was not looking at individual returns, I’m not sure how he was able to determine that a person who moved from one state or MSA to another had a certain AGI. Fortunately, he does state that he obtained the information on cumulative population gain and loss from the Census Bureau, and he says that he got the top state income tax rates, the state and local tax burdens, and the taxes per capita from the Washington, DC, based Tax Foundation’s annual report and rankings, and the rankings are based on the state and local tax burdens. I would have appreciated it if he had clearly stated how the state and local tax burden was calculated. Is it simply the tax revenues received divided by the cumulative AGI? It’s never said.

The author mentions in a single paragraph that corporations make decisions on where to locate on the basis of tax rates, but the tax rates he cites are personal tax rates rather than corporate tax rates. Because companies sometimes move from one state to another in order to be subject to a lower corporate tax rate, many of their employees will be forced to move also. The book could have devoted a chapter to this subject as well. A final shortcoming of the book is that it could have been better proofread. Three factual errors are illustrative. First, immediately after a table showing that four of the nine states with the highest personal income tax rates showed (admittedly small) gains in AGI, the accompanying text states that only three of them did. Second, on the bottom of one page the narrative says that the worst 10 MSAs lost $186 billion in AGI, yet at the top of the next page it says

that the worst *5* MSAs did. Third, in his discussion of Boston and Massachusetts, Brown writes, “Heck, it’s where it all began,” forgetting about the Jamestown colony in Virginia, established 13 years before the Pilgrims landed at Plymouth. I won’t go into the several other mistakes that exist in the book.

Having listed some of the book’s drawbacks, I don’t want to leave the reader of this review with the impression that I would not recommend the book. To the contrary, *How Money Walks* is a short work that can be read quickly, so you can read it to obtain the gist of the author’s argument, along with information that is important and perhaps relevant to your personal situation, without spending a lot of time poring over some of the other details. However, don’t expect the book to be a page-turner that you can’t put down.

Monthly Labor Review

BLS

January 2016

Reflections on the occasion of the 100th anniversary of the Monthly Labor Review

Editor's note: This essay is part of a series being published to help commemorate the Monthly Labor Review's centennial (July 1915–July 2015). The essays—written by eminent authorities and distinguished experts in a broad range of fields—cover a variety of topics pertinent to the Review and the work of the Bureau of Labor Statistics. Each essay is unique and comprises the words and opinion of the author. We've found these essays to be enlightening and inspirational. We hope you do as well.

Lawrence D. Brown

Lawrence D. Brown is chair of the Committee on National Statistics and Professor of Statistics at the Wharton School, University of Pennsylvania.

Lisa M. Lynch

Lisa M. Lynch is a member of the Committee on National Statistics and Professor of Social and Economic Policy, Brandeis University.

Constance F. Citro

Constance F. Citro is director of the Committee on National Statistics at the National Academy of Sciences.

It is an honor to comment on directions for the Monthly Labor Review MLR over its next 25 years. The MLR is the federal government's oldest continuous publication—first printed in 1915 and now published online by the Bureau of Labor Statistics (BLS), one of the nation's oldest statistical agencies, established in 1884. BLS embodies the standards articulated by the Committee on National Statistics (CNSTAT) in the fifth edition of its quadrennial volume Principles and Practices for a Federal Statistical Agency (National Research Council, 2013). P&P lays down four principles: that a statistical agency produce data relevant to policy issues, earn credibility with data users, earn the trust of data providers (e.g., households, businesses), and maintain independence from political and other undue external influence. P&P also offers 13 practices, such as the continual development of more useful data, openness about data sources and limitations, wide dissemination of data, an active research program, and collaboration with other statistical agencies. The MLR exemplifies many of these practices and thereby helps BLS achieve the principles we believe are critical to the success of a federal statistical agency. Not only does the MLR serve as an accessible outlet for authoritative labor statistics, but it also publishes original articles that cover substantive issues related to the state of the labor force and methodological developments, all the while maintaining objectivity and policy neutrality. A quick review of recent

tables of contents reveals that the MLR editors look far and wide in their search for relevant articles. That editorial policy epitomizes best practice for a statistical agency and helps explain the wide appeal of this publication.

In thinking about the future scope of the MLR, it makes sense to look back at the climate in which BLS was founded. Agitation for a federal statistical agency began as early as the 1860s and gathered steam with the formation of organized labor groups such as the Knights of Labor and the American Federation of Labor. Finally, in 1884, overwhelming majorities in both houses of Congress approved a bill to establish the Bureau of Labor [Statistics]. One representative declared, “A great deal of public attention in and out of Congress has been given to the American hog and the American steer. I submit, Mr. Chairman, that it is time to give more attention to the American man [and woman]” (Ewan Clague, quoted in Joseph P. Goldberg and William T. Moye, The First Hundred Years of the Bureau of Labor Statistics, Bulletin 2235 (U.S. Bureau of Labor Statistics, September 1985), p. 3.

BLS was charged to produce statistics on conditions, broadly defined, of the American worker in an era of rapid industrialization. Topics of early BLS study included hours and wages of men and women workers, child labor, effects of immigration in labor markets, labor force conditions for minorities, household living standards, prices and the cost of living, and strikes, lockouts, and other aspects of industrial relations.

In the future, the editors of the MLR will need to keep in mind the reason there is a BLS: to report on the conditions of American workers and American households, disaggregated by geographic area and such demographic characteristics as gender, age, ethnicity, race, and more. Analogous to concerns articulated 100 years ago are those voiced today about the adequacy of wages and benefits, the growth of inequality, and work schedules that do or do not accommodate family or personal needs. The effects of immigration and the cost of living are also as much a focus of attention today as they were 100 years ago.

Although topics of interest may resemble those of the past, the challenge for the MLR editors is to keep up to date with nuances of emerging issues—for example, implications for workers of the meteoric rise of sharing businesses, such as Uber and Airbnb. Regular perusal of social media may give the editors valuable signals about developments that require added or modified data—from BLS’s own programs or those of other agencies, the private sector, or academia, with which BLS might usefully partner. Similarly, the MLR editors need to keep abreast of societal changes with data quality implications, such as declining survey response rates and the increasing availability of data streams from other sources, to make sure that the pages of this designed-to-be-informative journal alert readers to both the changes and their effects. In these ways, the MLR can continue not only to serve its primary function of informing the nation about labor conditions, but also to help BLS identify areas of needed data improvement in order to fulfill its mission of reporting on the economic status of the American worker and household.

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The lure of big cities for the highly educated

Edith S. Baker

It is well known among economists and other social scientists that large cities have disproportionately large shares of highly educated workers, and the trend has been growing in recent decades. The correlation between city size and education is also well known. But what draws educated workers to large cities? Economists have found two kinds of relative advantages that big cities offer to the more highly educated: "production amenities"—that is, gains in productivity, which translate into higher wages; and "consumption amenities"—both natural benefits, such as good weather and scenic beauty, and endogenous benefits, such as a sophisticated transportation infrastructure, first-class restaurants, and a greater variety of goods and services. In an article titled "Big cities and the highly educated: what's the connection?" (Federal Reserve Bank of Philadelphia *Business Review*, third quarter 2015), Jeffrey C. Brinkman seeks to learn which of these two factors is more influential in attracting educated workers to large cities. As might be expected, the answer he finds is nuanced and could affect local policymakers' decisions.

Production amenities are greater in large cities. Economists often attribute this increase in productivity to what they call *agglomeration externalities*: gains in efficiency achieved because high concentrations of workers, customers, suppliers, and even rival firms coexist in a given city. These gains are, of course, reflected in higher wages, but extend as well to technological advantages, including greater prospects of innovation through the spillover of knowledge from firm to firm and industry to industry. Thus, it is not surprising that highly educated workers, especially those working in research and development, are attracted to the production amenities of large cities. Indeed, researchers have established two important links: that between having a college education and choosing to live in a big city and that between earning a higher wage and choosing to live in a big city. Moreover, the greater the percentage and the higher the wage premium of those with a college education, the bigger is the city in which they live. Brinkman points out that these wage effects attract highly educated workers to large cities. He also presents research results which show that production amenities play the chief role in attracting highly educated workers to large cities for the following reasons: (1) wages of college graduates grow faster with city size than do wages of those without college degrees; (2) highly educated workers adapt more readily to new technologies and thus are better able than less educated workers to thrive in large cities, where those technologies are more available; and (3) agglomeration externalities are stronger for high-tech industries, high-skilled manufacturing industries, and finance industries, all of which often require a college education. Moreover, these reasons prevail even more in big cities.

But cities are increasingly also being valued for their consumption amenities. Brinkman cites two papers that compared incomes in a given location with the cost of living in that location (which is the standard way economists measure the amenity value for a city). One found a slight positive correlation between city size and amenity value; the other showed that high-amenity cities grew fast in recent decades. Thus, both papers appear to establish a positive relationship between city size and consumption amenities. The question remains, then: How do people in different income groups (a proxy for education) value the consumption amenities that large cities offer? To answer

this question, Brinkman cites two more papers which suggest that workers with higher incomes (and hence, by proxy, more education) place a higher value than do low-income workers (and hence, by proxy, those with less education) on the consumption amenities of large cities because of the greater variety and quality of the products those cities provide. In other words, workers *self-sort* into large cities with more consumption amenities according to their income (and hence, by proxy, education) levels.

In sum, although production amenities remain the chief reason that highly educated workers seek to live in big cities, the consumption amenities of those cities are being increasingly valued by those same workers. This increased interest, argues Brinkman, should spur policymakers to invest in such amenities as parks and museums because, even though these kinds of amenities have no direct effect on productivity, people are valuing them more and more in the large cities they move into—and they may even forgo higher wages as long as the city has those amenities.

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January 2016

Nonprofit pay and benefits: estimates from the National Compensation Survey

A BLS study reveals that, in the aggregate, workers at nonprofit businesses earn a pay premium compared with their for-profit counterparts. Detailed analyses, however, show a more nuanced picture: using wages as the pay measure indicates a slight wage disadvantage for management, professional, and related workers, and a wage advantage for service workers, at nonprofits and wage parity between nonprofit and for-profit sales and office workers; using total compensation as the pay measure indicates compensation parity between nonprofit and for-profit businesses for management, professional, and related workers and for sales and office workers and a compensation premium for nonprofit service workers.

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Economic theory provides mixed evidence on whether nonprofit workers are at a compensation advantage or disadvantage relative to their for-profit counterparts. On the one hand, because profits cannot be retained by a nonprofit firm, managers of such firms have few incentives to maximize profits. Hence, managers of nonprofits may have an increased incentive to transfer returns to workers in the form of higher compensation.[1] On the other hand, employees who work for nonprofits might be willing to accept lower levels of pay because of the altruistic tendencies and nonpecuniary rewards associated with working for a nonprofit.[2]

Empirical evidence on whether the gap between nonprofit and for-profit wages is positive or negative is likewise mixed. Laura Leete found no overall wage gap and small wage penalties for nonprofit managers compared with their for-profit counterparts.[3] In a study of hospital workers, Edward Schumacher found a wage advantage for workers at nonprofits, which disappears after controlling for worker characteristics.[4] Like Schumacher, Christopher Ruhm and Carey Borkoski concluded that workers with

similar characteristics receive similar pay whether employed at a nonprofit or for-profit firm, but they also found results consistent with some relatively small premiums and penalties for subgroups of nonprofit workers.[5]

Most studies that test the pay gap between nonprofit and for-profit firms use household microdata from the Current Population Survey or the decennial census, as well as self-reported information, to determine whether an individual's employer is a nonprofit. This practice, however, may result in misclassification, biasing the results. Nor do these datasets include comprehensive measures of benefits; therefore, the wage gap, rather than a more complete measure of total compensation, is used to measure the for-profit–nonprofit pay differential. In this article, we consider both wages and total compensation in evaluating the existence and magnitude of such a differential. We also use administrative data as the indicator of nonprofit status.

The article is organized into six sections. The next section describes the data used in the analysis. The third section presents wage and compensation measures separately for industry and occupational groups by nonprofit status. The fourth section offers an analysis of employer-provided benefits by nonprofit status. Results from a regression-based approach to measuring the compensation gap are presented in the fifth section. The final section summarizes the results.

Data description

In the first few years of the 21st century, staff from the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) program partnered with researchers from the Johns Hopkins University to produce a set of research data on nonprofits. The research method they used involved matching QCEW data with Internal Revenue Service (IRS) data on tax-exempt organizations.[6] More recently, BLS researchers in the QCEW program revisited matching their data with the IRS Exempt Organization Business Master File (EOBMF) and created research data on the nonprofit sector that incorporate both information from the EOBMF and information on "reimbursable" establishments identified in state unemployment insurance reports.[7] The resulting QCEW file includes indicators for nonprofit establishments (defined as 501(c)3 establishments). The QCEW provides the framework from which establishments are sampled for the National Compensation Survey (NCS).

From 2007 to 2010, the NCS published information on the wages of workers in private nonprofit establishments in the publication "National Compensation Survey: occupational earnings in the United States."[8] Given that this information has not been published since 2010, having a nonprofit indicator in the QCEW provides the opportunity to match that indicator with the establishment-level information collected in the NCS and produce estimates of wages, compensation, and benefits for private sector nonprofit and for-profit establishments. In what follows, we match data on private sector establishments from the March 2014 National Compensation Survey with the nonprofit indicator in the QCEW. Each establishment is assigned a unique multidigit identifying number when it first appears in the QCEW. This identifier is retained when establishments selected from the QCEW are added to the NCS. We subsequently used these identifying numbers to match NCS establishments back into the QCEW and were able to match 90 percent of establishments in the NCS with establishments in the QCEW.[9] The estimates presented in this article are based on these matched establishments.

Nonprofit workers make up 11.7 percent of private sector workers. The proportion of nonprofit workers who work full time[10] is 76.4 percent, statistically no different than the proportion of for-profit workers who work full time (73.3

percent).[11] The proportion of union workers[12] is also statistically equivalent across nonprofit status: 8.6 percent of nonprofits and 8.9 percent of for-profits.

At first glance, workers in nonprofits appear to receive higher wages and more costly benefits. Table 1 presents estimates of the average hourly wages for nonprofit and for-profit workers, as well as their total hourly compensation.[13] Breakouts are provided for two of the most costly benefit categories: health insurance, and retirement and savings.

Table 1. Employer compensation costs per employee hour worked, by nonprofit and for-profit status, private industry, March 2014

Category	Nonprofit	Confidence interval	For-profit	Confidence interval
Total compensation	$36.62	$34.51–$38.73	$28.76	$28.30–$29.23
Wages	25.30	23.92–26.68	20.17	19.86–20.47
Health insurance	3.21	3.05–3.37	2.22	2.17–2.27
Retirement and savings	1.66	1.31-2.00	1.08	1.03–1.12

Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

On average, workers at nonprofit establishments earn $5.13 per hour more than workers at for-profit establishments. The costs of health insurance benefits paid to nonprofit workers are also higher—$0.99 per hour more, on average—and the employer cost of retirement and savings plans is $0.58 per hour higher for workers at nonprofits. As a result, average total compensation for nonprofit workers is $7.86 per hour higher than that for for-profit workers.

A top-line look at the numbers, however, does not account for the fact that the industries in which we find nonprofit establishments are very different from those we see among for-profit establishments. Nonprofits also have a different pattern of occupational groups than for-profits have.

Industrial and occupational profile and compensation costs

We first look at the industry distribution in the NCS by nonprofit status. (See table 2.) As one might expect, nonprofit establishments are found primarily in service-providing industries, particularly education and health services.

Table 2. Industry share of workers, by nonprofit and profit status, March 2014 (in percent)

Industry group	Share of nonprofit workforce	Share of for-profit workforce
Goods producing	—	19
Service providing	—	81
Trade, transportation, and utilities	—	27
Information	—	2
Financial activities	—	7
Professional and business services	5	18
Education and health services	83	10
Leisure and hospitality	—	14

See footnotes at end of table.

Table 2. Industry share of workers, by nonprofit and profit status, March 2014 (in percent)

Industry group	Share of nonprofit workforce	Share of for-profit workforce
Other services	7	3

Note: Dash indicates no workers in this category or data did not meet publication criteria.

Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

There are just three industry groups in which data are sufficient to provide a comparison: professional and business services, education and health services, and the catchall group titled “other services.” Comparing wage and compensation costs between nonprofit and for-profit establishments by industry for these groups, we see a pay premium for workers in nonprofits within educational and health services and professional and business services. (See table 3.)

Table 3. Employer compensation costs per employee hour worked, by nonprofit and for-profit status, selected service-providing industries, private sector, March 2014

Industry group	Average hourly wage	Confidence interval	Total compensation	Confidence interval	Health insurance	Confidence interval	Retirement and savings	Confidence interval
Nonprofit:								
Professional and business services	32.29	$28.04–$36.54	47.85	$41.81–$53.39	4.34	$3.67–$5.01	2.02	$1.43–$2.59
Education and health services	25.60	23.99–27.20	37.17	34.72–39.62	3.32	3.15–3.49	1.73	1.32–2.15
Other services	18.31	15.73–20.89	24.79	21.31–28.28	1.46	1.11–1.82	.93	.67–1.19
For-profit:								
Professional and business services	25.09	24.06–26.11	34.75	33.29–36.21	2.18	2.06–2.30	1.15	1.05–1.25
Education and health services	19.15	17.69–20.62	25.89	23.63–28.15	1.72	1.53–1.90	.54	.30–.76
Other services	19.03	17.72–20.32	26.58	24.50–28.66	2.07	1.70–2.43	1.2	.88–1.52

Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

Within professional and business services, wages for workers in nonprofits are, on average, $7.20 per hour more than those in for-profits. The gap increases to $13.10 per hour for total compensation. In education and health services, the nonprofit wage advantage is $6.45 per hour and the total-compensation gap is $11.28 per hour. For “other services,” there is no statistically significant difference in the average hourly wage or total compensation between nonprofits and for-profits.

Pay gaps by industry do not control for the different types of labor used in an establishment. For example, within education and health services, a nonprofit may employ a larger share of physicians and managers while a for-profit

may employ a larger share of nursing assistants and janitorial staff. Past research finds that controlling for the type of work performed is critical in explaining wage gaps between workers at for-profits and workers at nonprofits.[14]

As seen in table 4, there are higher proportions of management, professional, and related workers and service workers, and lower proportions of sales and office workers; natural resources, construction, and maintenance workers; and production, transportation, and material moving workers, in nonprofits than in for-profits. Table 5 demonstrates that the mix of occupations explains a lot of the nonprofit wage premiums seen in tables 1 and 3.

Table 4. Occupational share of workers, by nonprofit and for-profit status, private industry, March 2014 (in percent)

Occupation group	Share of nonprofit workforce	Confidence interval	Share of for-profit workforce	Confidence interval
Management, professional, and related	55.6	52.8–58.4	21.1	20.3–21.9
Service	25.5	22.8–28.3	21.8	20.7–23.0
Sales and office	16.0	14.1–17.9	29.6	28.7–30.5
Natural resources, construction, and maintenance	1.6	1.0–2.2	8.8	8.2–9.3
Production, transportation, and material moving	1.2	.8–1.7	18.6	17.9–19.4

Note: Because of rounding, entries for occupation groups may not sum to 100 percent.

Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

Table 5. Employer compensation costs per employee hour worked, by nonprofit and for-profit status and by occupation group, private industry, March 2014

Occupation group	Hourly wage	Confidence interval	Total compensation	Confidence interval	Health insurance	Confidence interval	Retirement and savings	Confidence interval
Nonprofit:								
Management, professional, and related	$34.14	$31.96–$36.31	$49.09	$45.75–$52.73	$3.90	$3.68–$4.11	$2.45	$1.83–$3.06
Service	12.39	11.91–12.87	18.01	17.11–18.90	1.87	1.65–2.08	.48	.41–.54
Sales and office	16.57	15.88–17.25	24.71	23.60–25.82	3.01	2.73–3.28	.87	.76–.97
Natural resources, construction, and maintenance	20.19	18.23–22.14	31.17	28.15–34.18	3.44	2.85–4.02	1.39	1.12–1.66
Production, transportation, and material moving	14.02	11.63–16.40	21.28	16.74–25.81	2.24	1.35–3.13	.86	.25–1.46
For-profit:								
Management, professional, and related	37.50	36.56–38.44	53.76	52.34–55.19	3.49	3.39–3.60	2.41	2.24–2.57

See footnotes at end of table.

Table 5. Employer compensation costs per employee hour worked, by nonprofit and for-profit status and by occupation group, private industry, March 2014

Occupation group	Hourly wage	Confidence interval	Total compensation	Confidence interval	Health insurance	Confidence interval	Retirement and savings	Confidence interval
Service	10.40	10.09–10.72	13.45	13.02–13.89	.69	.62–.75	.17	.15–.20
Sales and office	16.25	15.87–16.62	22.64	22.14–23.14	1.97	1.90–2.03	.62	.59–.66
Natural resources, construction, and maintenance	22.20	21.61–22.79	32.86	31.78–33.95	2.74	2.57–2.91	1.79	1.55–2.02
Production, transportation, and material moving	17.27	16.87–17.67	26.21	25.53–26.90	2.74	2.61–2.86	1.01	.93–1.08

Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

Wages of management, professional, and related workers at nonprofits are, on average, $3.36 per hour less than those of their counterparts employed by for-profits. Once the cost of benefits is added in, the difference in total compensation is $4.67 per hour less. Workers employed in production, transportation, and material moving occupations at nonprofits earn $3.25 per hour less, on average, than for-profit workers earn; when the cost of benefits is included, the difference in mean total compensation is $4.93 per hour less.

Service workers at nonprofits earn $1.99 per hour more than service workers at for-profit establishments, and the gap increases to $4.56 per hour for total compensation. The wage gap for sales and office workers is not statistically different from zero; however, the mean total compensation of these workers in nonprofits is $2.07 per hour more than that of sales and office workers at for-profit establishments.

Thus, comparing nonprofit and for-profit pay, even at broad occupational groupings, gives a different picture than the aggregate estimates provide. Across all private sector workers, those at nonprofits earn more than those at for-profit establishments, but this gap is driven largely by differences in occupations seen in these establishments. Managers and professionals make up a disproportionately large share of workers at nonprofits (an observation which makes sense, given that nonprofits tend to be colleges, universities, and hospitals), and the high average earnings of managers skew the aggregate numbers. Accordingly, when we examine pay by occupational group, we see groups for which the wages of nonprofit workers are *lower* than those of corresponding workers at for-profit firms. We also see different measures of the pay gap, whether we examine wages or total compensation. Gaps in total compensation suggest that nonprofits and for-profits either have a different likelihood of offering benefits, offer benefits that differ in their generosity, or both.

Benefit offerings by nonprofit status

We turn next to an examination of the types of benefits offered to workers by nonprofit and for-profit establishments. We focus on health insurance and on retirement and savings benefits, and we split retirement and

savings benefits into defined-benefit plans and defined-contribution plans. Table 6 presents the availability of health and retirement plans by nonprofit and for-profit status for broad occupational groups.

Table 6. Availability of health and retirement benefits, by nonprofit and for-profit status, March 2014 (percentage of workers offered benefit)

Occupation group	Health insurance offered				Defined benefit offered				Defined contribution offered			
	Nonprofit	CI	For-profit	CI	Nonprofit	CI	For-profit	CI	Nonprofit	CI	For-profit	CI
All workers	81	79–84	67	66–68	25	22–27	17	17–18	68	65–71	59	58–60
Management, professional, and related	88	85–90	87	85–88	28	25–31	25	23–26	75	72–78	76	74–78
Service	65	58–71	36	33–39	20	16–24	5	4–6	54	47–61	32	29–34
Sales and office	86	82–90	68	67–70	22	17–27	16	15–17	66	59–73	65	63–66
Natural resources, construction, and maintenance	—	…	75	72–78	—	…	24	21–26	—	…	59	56–62
Production, transportation, and material moving	—	…	76	74–79	—	…	23	22–25	—	…	61	59–64

Note: Dash indicates no workers in this category or data did not meet publication criteria. CI = Confidence interval.

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

Employees at nonprofits are more likely than workers at for-profits to be offered benefits. Eighty-one percent of all workers at nonprofit establishments are offered medical plans by their employers, compared with 67 percent of workers at for-profit establishments. This disparity cannot be attributed simply to the disproportionate share of managers and professionals at the former establishments. In fact, there was no statistically significant difference in the offering of medical plans for management and professional workers by nonprofit status. Most striking is that sales and office workers and service workers at nonprofit establishments are much more likely than their counterparts at for-profit establishments to be offered medical plans. The gap for service workers is nearly 30 percentage points.

Nonprofits are more likely than for-profit establishments to offer defined-benefit plans. This difference is driven mostly by service workers. Nonprofits are also more likely than for-profits (68 percent versus 59 percent) to offer defined-contribution plans. Again, this difference is driven largely by the benefits offered to service workers: fifty-four percent of service workers at nonprofits are offered defined-contribution plans, as opposed to 32 percent of service workers at for-profits.

Wage and compensation gaps

Although comparisons of wages and compensation by broad occupational groups provide some evidence of pay gaps between for-profits and nonprofits, such gaps may be the result of workers at nonprofits doing substantially different types of work than those at for-profits. In this regard, it is likely that the service workers one sees at nonprofits have very different jobs than the service workers one sees at for-profits. For example, healthcare

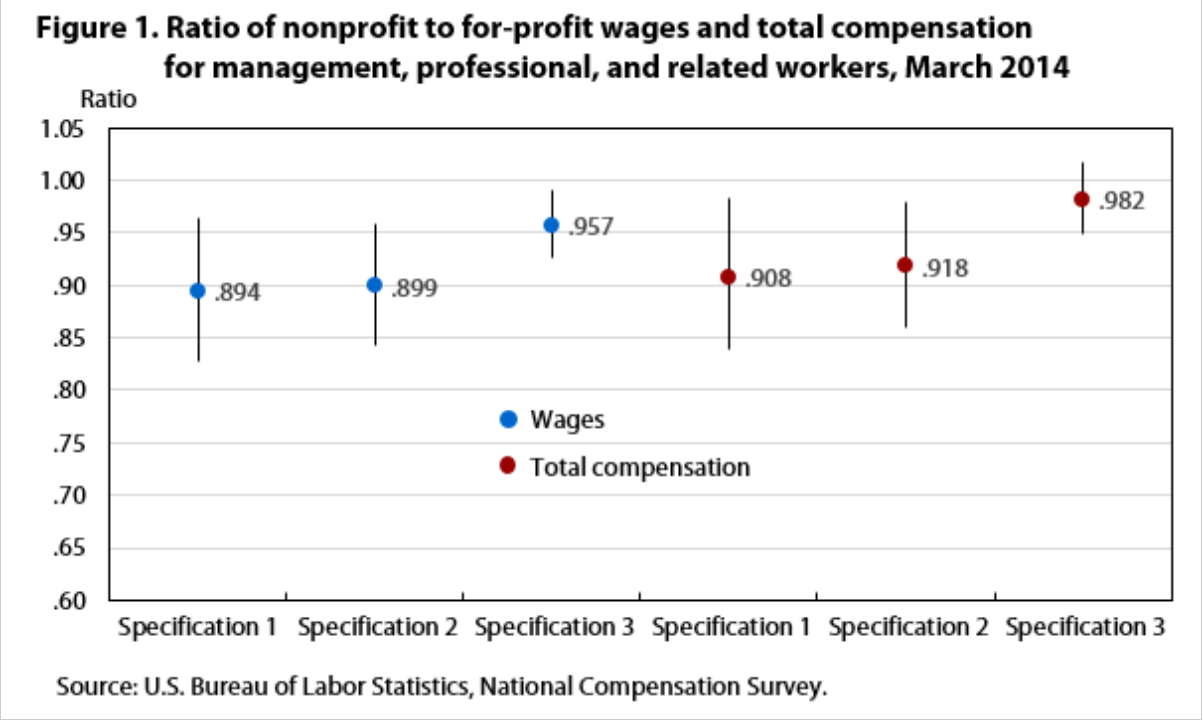
support occupations are more prevalent among nonprofits and food preparations occupations are more prevalent among for-profits. One approach to controlling for this likelihood might be to compare wages for detailed occupations, as defined by the Standard Occupational Classification system. Unfortunately, the relatively small sample size of the NCS makes this approach infeasible.

The NCS has a unique feature, however, that allows comparison of levels of work. Most jobs in the NCS undergo a process of "point leveling," whereby they are assigned points on the basis of four factors: knowledge, job controls and complexity, contacts, and physical environment.[15]

We incorporate this leveling into the regression analysis that follows, enabling us to assess how controlling for job characteristics affects the pay differential between for-profits and nonprofits by broad occupational group. Regressions are estimated first with the natural logarithm of the hourly wage as the dependent variable and then with the natural logarithm of hourly total compensation as the dependent variable.

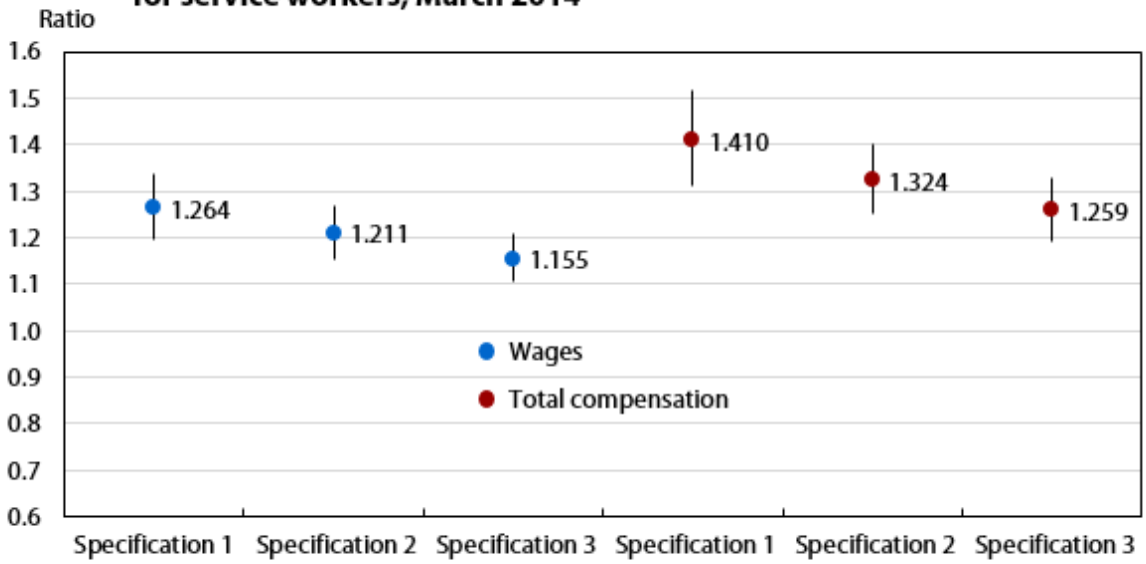
We estimate three specifications: (1) no controls, aside from an indicator variable for nonprofit status; (2) an indicator variable for nonprofit status, as well as indicators for full-time and union coverage; (3) the variables identified in (2), as well as the total number of leveling points and its square.[16] Because we are interested in the relative pay between nonprofit and for-profit jobs, we focus on the estimates of the nonprofit coefficients. To allow easier interpretation of relative pay, figures 1–3 present the exponents on the coefficient of the nonprofit indicator for the three largest broad occupational groups: management, professional, and related workers; service workers; and sales and office workers.

The measure e^b, where b is the coefficient from the regression with the natural logarithm of the hourly wage as the dependent variable, can be interpreted to mean that a worker in a nonprofit job earns e^b times the pay of the equivalent worker in a for-profit job. If $e^b < 1$, then the nonprofit pay is less than the for-profit pay; if $e^b > 1$, then the nonprofit pay is more than the for-profit pay. The associated confidence interval is a 95-percent interval (i.e., $p \leq .05$); if the confidence interval contains the number 1.0, then there is no statistical difference in the pay of nonprofit and for-profit workers for the given job.



Controlling for job characteristics matters a great deal in estimating the wage gap between nonprofit and for-profit workers. The left half of each figure shows the value of e^b—equivalent to the wage ratio of nonprofit to for-profit workers—and the right half shows the estimated total-compensation ratio—also of nonprofit to for-profit workers—for the three specifications shown. Turning first to figure 1, we see that controlling for job characteristics lessens the wage gap between nonprofit and for-profit workers: once the levels of the job are included in the wage regression, management, professional, and related workers at nonprofit businesses are seen to earn wages that are 96 percent of the level of their for-profit counterparts. Estimates from the model that uses the logarithm of total compensation as the dependent variable show that the ratio of nonprofit to for-profit compensation for these workers is 0.98.

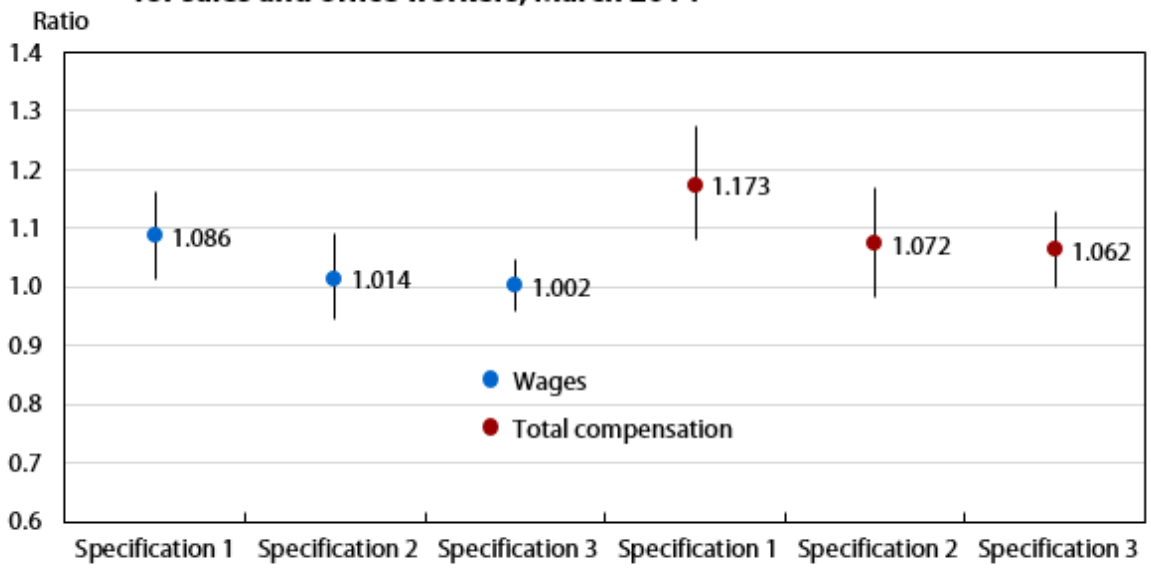
Figure 2. Ratio of nonprofit to for-profit wages and total compensation for service workers, March 2014



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

Recall from table 5 that service workers in nonprofits have higher wages and higher total compensation than for-profit workers have. This fact would lead us to anticipate a nonprofit to for-profit ratio greater than 1 for these workers. Figure 2 shows this wage premium. Although the point estimates of the ratio appear to decrease as we add job characteristic controls to the model, the lower bound of the 95-percent confidence level for specification 1 is roughly equivalent to the upper bound of the 95-percent confidence interval for specification 3, for both the wage and total-compensation models. Therefore, we cannot say definitively that the point estimates are statistically decreasing. When we control for leveling, the point estimate for the wage ratio indicates that service workers employed at nonprofits earn 16 percent more than those at for-profits, and the gap becomes roughly 26 percent once total compensation is considered, even upon controlling for union membership, full-time work, and job level.

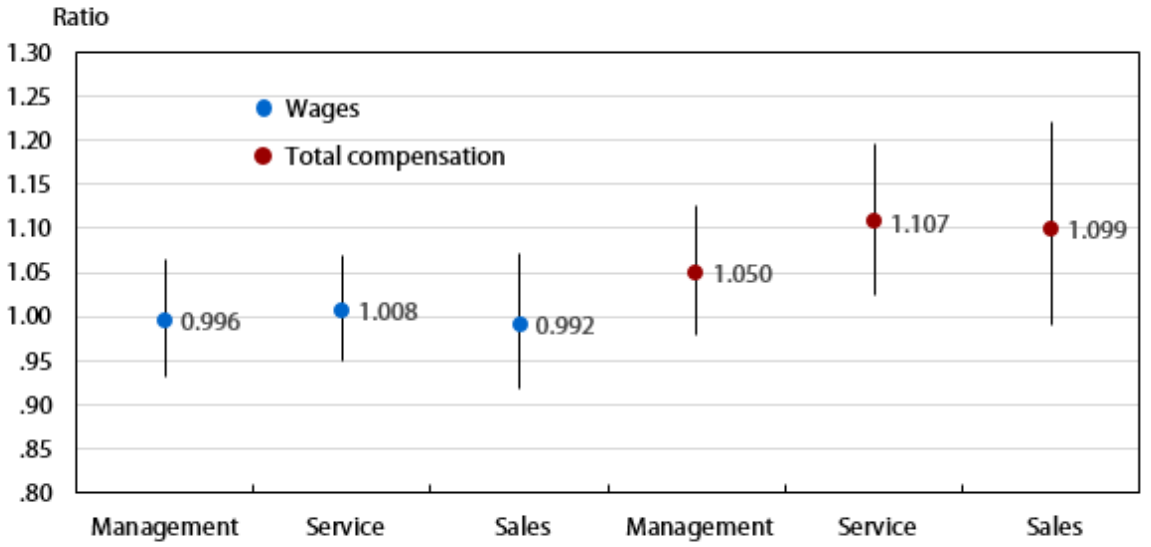
Figure 3. Ratio of nonprofit to for-profit wages and total compensation for sales and office workers, March 2014



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

With no controls, sales and office workers at nonprofits appear to have a wage and total-compensation advantage over those at for-profits. (See figure 3.) However, once all job characteristics, including levels, are controlled for, the nonprofit–for-profit ratio is equivalent to 1.0 for both wages and total compensation.

Figure 4. Ratio of nonprofit to for-profit wages and total compensation for education and health services workers, March 2014



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

In these models, we are unable to control for industry. As seen in table 2, some industries have very few nonprofit workers, a circumstance that poses problems for including industry indicators in regression analysis. Fortunately, the industry grouping of education and health services workers has a sample size large enough to estimate wage and total-compensation models. Rather than reporting the results for all three specifications, we present only the

results from specification 3 (containing the full set of job controls), shown in figure 4 for all three occupational groups.

Within the broad industry group of education and health services, once we control for job characteristics, there is no statistical difference in nonprofit and for-profit wages for any occupational group. (All confidence intervals for the exponent of the coefficient contain the number 1.0.) Although the point estimates for total compensation are greater than 1.0 for management, professional, and related workers and for sales and office workers, neither of these point estimates is statistically different from 1.0. The only group for which there is a compensation ratio statistically different from 1.0 is service workers: nonprofit service workers in education and healthcare earn a statistically significant 11 percent more than their for-profit counterparts.

Summary and conclusions

Matching QCEW and NCS data enables us to generate estimates of wage and compensation costs by nonprofit and for-profit status. The estimates indicate that, in the aggregate, nonprofit workers earn a pay premium, but still, industry and occupation patterns differ greatly between nonprofits and for-profits and explain a great deal of the pay gap.

Using regression analysis to control for the level of work performed, we find a slight wage disadvantage for management, professional, and related workers at nonprofits, a wage advantage for service workers at nonprofits, and no statistical wage gap between nonprofit and for-profit sales and office workers. If we use total compensation costs rather than wages as our pay measure, the results change: there is no statistical compensation gap between nonprofit and for-profit businesses for management, professional, and related workers and for sales and office workers, but there is a compensation premium for service workers at nonprofits. These results highlight the importance of a pay measure that includes benefits: across both occupations and levels, workers at nonprofits receive more costly benefits. Thus, ignoring this component of pay can lead to incorrect inferences regarding the pay gap.

It is not possible to control for industry in our analysis because of the relatively small share of nonprofit workers in some industries. We note, however, that if we restrict the analysis to educational and health service industries, we find a persistent total compensation premium for service workers employed at nonprofits.

SUGGESTED CITATION

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NOTES

[1] See Martin S. Feldstein, *The rising cost of hospital care* (Washington, DC: Information Services Press, 1971).

[2] See Susan Rose-Ackerman, “Altruism, nonprofits, and economic theory,” *Journal of Economic Literature*, June 1996, vol. 34, no. 2, pp. 701–728.

[3] Laura Leete, “Whither the nonprofit wage differential? Estimates from the 1990 census,” *Journal of Labor Economics*, January 2001, vol. 19, no. 1, pp. 136–170.

[4] Edward J. Schumacher, "Does public or not-for-profit status affect the earnings of hospital workers?" *Journal of Labor Research*, March 2009, vol. 30, no. 1, pp. 9–34.

[5] Christopher J. Ruhm and Carey Borkoski, "Compensation in the nonprofit sector," *The Journal of Human Resources*, autumn 2003, vol. 38, no. 4, pp. 992–1021.

[6] A comprehensive description of the project is found in Lester M. Salamon and S. Wojciech Sokolowski, "Nonprofit organizations: new insights from QCEW data," *Monthly Labor Review*, September 2005, pp. 19–26, https://www.bls.gov/opub/mlr/2005/09/art3full.pdf.

[7] For a detailed description of the matching process, see "Research data on the nonprofit sector," *Business Employment Dynamics* (U.S. Bureau of Labor Statistics, April 30, 2015), https://www.bls.gov/bdm/nonprofits/nonprofits.htm.

[8] The information presented was based on the BLS Locality Pay Survey (LPS). The last of these NCS reports is "National Compensation Survey: occupational earnings in the United States, 2010," *National Compensation Survey*, Bulletin 2753 (U.S. Bureau of Labor Statistics, May 2011), https://www.bls.gov/ncs/ncswage2010.htm. The LPS was discontinued with the 2011 federal budget. (See "Announcement," *National Compensation Survey—wages* (U.S. Bureau of Labor Statistics), https://www.bls.gov/ocs/.) The data in the NCS publication provided the basis for two BLS reports by Amy Butler in *Compensation and Working Conditions* that compared the wages of nonprofit workers with the wages of those employed at for-profit firms as well as the wages of state and local government workers: "Wages in the nonprofit sector: management, professional, and administrative support occupations" (U.S. Bureau of Labor Statistics, October 28, 2008); and "Wages in the nonprofit sector: occupations typically found in educational and research institutions" (U.S. Bureau of Labor Statistics, November 26, 2008).

[9] We analyzed matched and unmatched NCS data to determine whether both establishment size and average compensation were statistically different between the two groups. The point estimates obtained indicate that the matched establishments were less likely to employ fewer than 50 workers and more likely to have slightly higher average compensation, but the differences were not statistically significant.

[10] The NCS defines "full time" and "part time" on the basis of the establishment's definition of these terms, not on actual number of hours worked.

[11] All significance testing for this article was performed at the 95-percent level of confidence.

[12] A union worker is defined as a worker who is covered by a collective-bargaining agreement.

[13] Throughout this article, "wages" refers to wages and salaries.

[14] See, for instance, Zack Warren, "Occupational employment in the not-for-profit sector," *Monthly Labor Review*, November 2008, pp. 11–43, https://www.bls.gov/opub/mlr/2008/11/art2full.pdf; Leete, "Whither the nonprofit wage differential?"; Schumacher, "Does public or not-for-profit status?" and Ruhm and Borkoski, "Compensation in the nonprofit sector."

[15] For more details on the leveling process, see "National Compensation Survey: guide for evaluating your firm's jobs and pay," May 2013, https://www.bls.gov/ncs/ocs/sp/ncbr0004.pdf.

[16] Initial analysis provided evidence of a quadratic relationship between the logarithm of pay and the number of leveling points; that is, pay tends to increase with the point total, but in a nonlinear fashion.

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