



Which industries are filling job openings and which industries are not? Exploring the JOLTS hires-per-job-opening ratio

By Charlotte Oslund

On the last day of May 2018, there were 6.6 million jobs remaining unfilled nationwide after the 5.8 million hires that occurred during the month of May. Where are these job openings and why are there still so many after all the hires during the month? Is this a new situation with so many unfilled job openings? How have the relative levels of openings and hires changed over time? This **Beyond the Numbers** looks to answer these questions through analysis of job openings and hires data produced by the U.S. Bureau of Labor Statistics. Exploring the ratio of

hires to job openings for private industry versus government, by industry, and by region provides some answers to these questions.

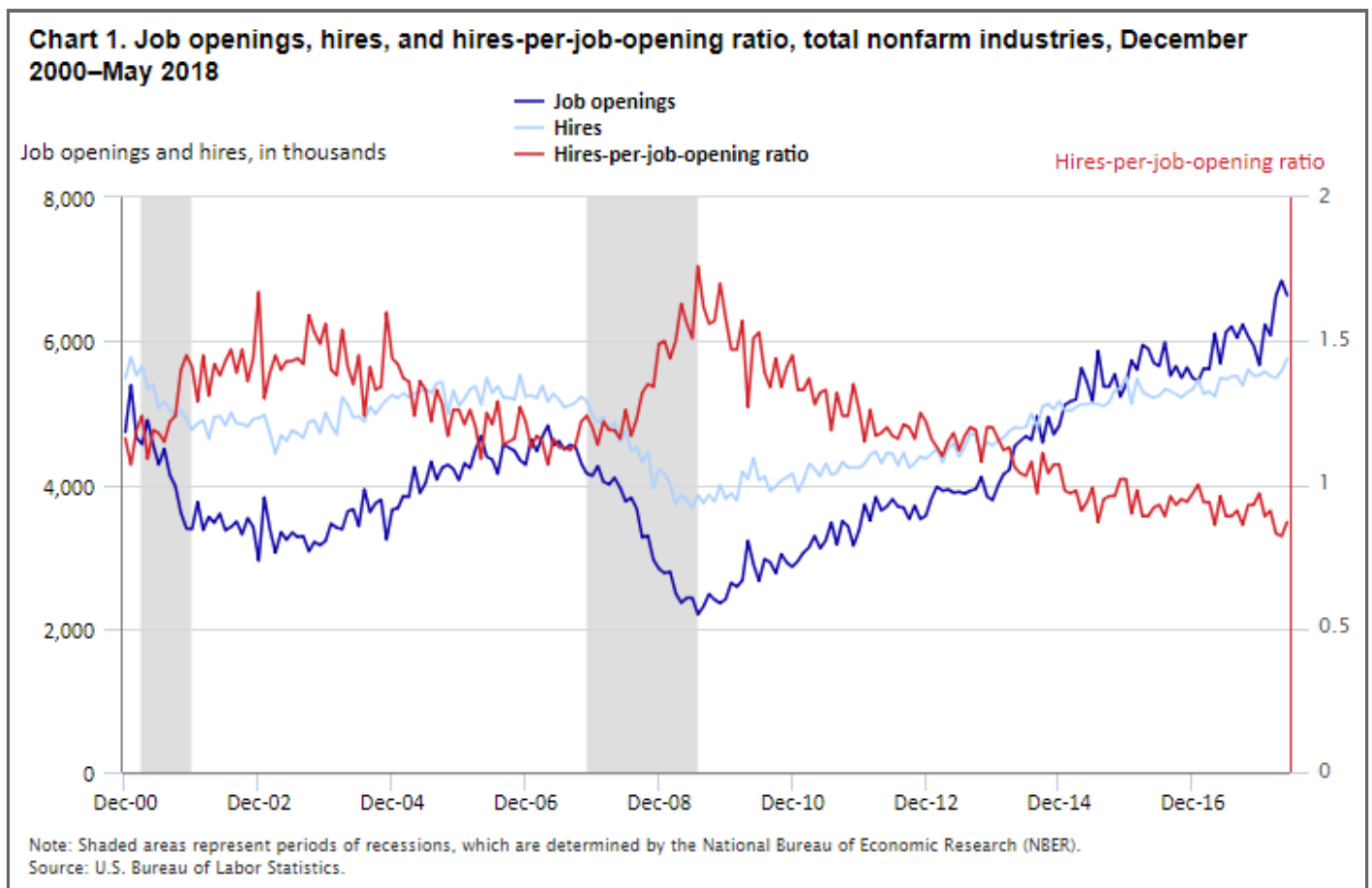
Defining the hires-per-job-opening ratio

The Job Openings and Labor Turnover Survey (JOLTS) at the U.S. Bureau of Labor Statistics produces data series for job openings, hires, and separations. Each individual series provides insightful information about the labor market, but combining two or more series can create useful new statistics. The hires-per-job-opening ratio is one such series. The hires-per-job-opening ratio divides the number of hires that occurred during a month by the number of jobs that remained open at the end of the month.¹ The higher the ratio, the more successful businesses are in filling vacant positions or the faster the hiring process is for the business. A lower ratio indicates fewer hires during the month relative to unfilled jobs at the end of the month. These lower ratio employers could be having trouble finding workers, have a longer hiring process, or have a hiring cycle or timing of job postings that results in more openings at the end of the month.

A logical cutoff point in the hires-per-job-opening ratio is 1.0. A ratio greater than 1.0 indicates that businesses hired more employees during the month than they had jobs remaining open at the end of the month. A ratio less than 1.0 indicates fewer hires during the month than there were open jobs at the end of the month. That is, a ratio less than 1.0 can signal less efficiency in filling vacancies. The movement of the hires-per-job-opening ratio over time is important, indicating changes in businesses' ability to fill jobs or changes in their job-posting or hiring process.

The hires-per-job-opening ratio for total nonfarm

For most of JOLTS history, December 2000–May 2018, the number of hires has exceeded the number of job openings. However, since the end of the 2007–09 recession, job openings have increased at a faster pace, catching up with hires in 2014 and surpassing hires on a regular basis beginning in 2015. As a result, the hires-per-job-opening ratio at the total nonfarm-industry level decreased steadily since the end of the Great Recession. By January 2015, the hires-per-job-opening ratio was regularly below 1.0, indicating less efficiency in filling job openings. (See chart 1.)



Average hires-per-job-opening ratio by industry, 2007–17

Not surprisingly, the hires-per-job-opening ratio varies greatly by industry. Some industries had a hires-per-job-opening ratio less than 1.0, while some had a ratio greater than 1.0 since JOLTS began collecting data. However, other industries had a ratio that has moved above and below 1.0 over time. Table 1 provides the average hires-per-job-opening ratio by year for the years 2007 (the first year of the last recession) through 2017 (the last full year of available data) for the industries and regions published by the JOLTS program. Cells in which the average ratio is less than 1.0 are bolded, indicating fewer hires than end-of-month job openings.

Table 1: Average hires-per-job-opening ratio by industry and region, 2007–17

Industry and region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total	1.15	1.26	1.58	1.43	1.30	1.19	1.16	1.07	0.96	0.93	0.92
Total private	1.19	1.32	1.70	1.52	1.36	1.24	1.20	1.12	0.99	0.95	0.95
Mining and logging	2.01	1.53	2.48	1.55	1.18	1.84	1.50	1.19	1.59	1.96	1.38
Construction	2.52	4.12	6.60	5.22	4.87	4.00	2.79	2.50	2.40	1.82	1.90
Manufacturing	1.12	1.27	1.91	1.46	1.11	0.91	0.92	0.90	0.86	0.82	0.85
Durable goods	1.06	1.28	1.97	1.29	0.94	0.85	0.88	0.86	0.83	0.86	0.83
Nondurable goods	1.22	1.27	1.87	1.86	1.48	1.07	1.01	0.96	0.92	0.79	0.89
Trade, transportation, and utilities	1.39	1.64	2.09	1.90	1.52	1.43	1.29	1.33	1.16	1.05	1.01

See footnotes at end of table.

Table 1: Average hires-per-job-opening ratio by industry and region, 2007–17

Industry and region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wholesale trade	0.89	1.37	1.71	1.44	1.12	1.01	0.94	0.99	0.87	0.76	0.74
Retail trade	1.83	1.88	2.18	2.13	1.79	1.60	1.44	1.52	1.36	1.17	1.09
Transportation, warehousing, and utilities	0.96	1.34	2.57	1.81	1.26	1.42	1.18	1.10	0.90	0.96	1.04
Information	0.56	0.80	1.15	0.73	0.58	0.68	0.75	0.72	0.75	0.90	0.80
Financial activities	0.91	0.96	1.06	0.83	0.79	0.76	0.74	0.70	0.61	0.59	0.57
Finance and insurance	0.78	0.85	0.84	0.65	0.63	0.65	0.62	0.57	0.53	0.51	0.50
Real estate and rental and leasing	1.48	1.41	1.84	1.88	1.49	1.17	1.35	1.29	0.96	0.88	0.87
Professional and business services	1.24	1.25	1.60	1.50	1.41	1.30	1.34	1.18	0.96	1.00	1.12
Education and health services	0.70	0.76	0.93	0.92	0.82	0.75	0.80	0.71	0.61	0.58	0.58
Educational services	1.14	1.21	1.51	1.36	1.27	1.23	1.13	1.00	0.88	0.92	0.95
Health care and social assistance	0.66	0.72	0.88	0.88	0.77	0.70	0.76	0.67	0.58	0.55	0.55
Leisure and hospitality	1.55	1.80	2.56	2.31	1.93	1.72	1.57	1.34	1.33	1.34	1.24
Arts, entertainment, and recreation	2.02	2.26	4.77	3.48	2.69	2.33	2.22	2.15	2.29	1.84	1.99
Accommodation and food services	1.50	1.75	2.36	2.19	1.84	1.63	1.49	1.25	1.23	1.27	1.16
Other services	1.08	1.10	1.64	1.29	1.62	1.45	1.32	1.28	1.19	0.89	0.84
Government	0.83	0.74	0.82	0.89	0.78	0.77	0.73	0.68	0.69	0.69	0.66
Federal	1.44	0.63	0.54	0.70	0.52	0.47	0.60	0.52	0.55	0.45	0.46
State and local	0.75	0.77	0.90	0.96	0.83	0.83	0.75	0.71	0.71	0.74	0.70
State and local government education	1.13	1.18	1.33	1.46	1.25	1.16	1.10	0.99	0.98	1.06	0.98
State and local government, excluding education	0.56	0.58	0.68	0.70	0.62	0.65	0.57	0.57	0.56	0.58	0.56
Region											
Northeast	1.08	1.13	1.36	1.28	1.20	1.07	1.05	0.99	0.93	0.90	0.83
South	1.13	1.21	1.61	1.51	1.35	1.21	1.20	1.11	0.98	0.95	1.02
Midwest	1.37	1.39	1.73	1.64	1.37	1.21	1.15	1.07	0.97	0.93	0.85
West	1.08	1.34	1.61	1.27	1.22	1.26	1.18	1.07	0.95	0.91	0.92

Source: U.S. Bureau of Labor Statistics.

The bold font in the above table draws our attention to which industries had fewer hires relative to job openings (ratio less than 1.0), and the changes in the ratio over the business cycle. The industries with an annual average ratio less than 1.0 for most or all years during 2007–17 were information (ranging from 0.56–1.15), finance and insurance (0.50–0.85), health care and social assistance (0.55–0.88), federal government (0.45–1.44), and state and local government excluding education (0.56–0.70). These industries consistently have fewer hires than job openings, implying difficulty hiring workers, a longer hiring process, or some other timing issue for job postings. These findings are similar to the findings in earlier studies.²

Other industries have an average ratio greater than 1.0 for most or all years between 2007 and 2017, indicating that, for the most part, appropriate workers were available and the businesses were able to hire them during the month: construction (ranging from 1.82–6.60), retail trade (1.09–2.18), arts, entertainment, and recreation (1.84–4.77), and accommodation and food services (1.16–2.36). Professional and business services (0.96–1.60) can be included in this group of industries, with an average ratio above 1.0 in every year except 2015 (0.96).

Another group of industries had an average hires-per-job-opening ratio above 1.0 for most of the JOLTS series, but the ratio fell below 1.0 in recent years: durable goods manufacturing, nondurable goods manufacturing, wholesale trade, real estate and rental and leasing, educational services, and other services. State and local

government education can be included in this group, with an average ratio just under 1.0 in 3 out of the past 4 years.

The movement of the hires-per-job-opening ratio over time is important. A decreasing ratio reflects the trend of decreasing hires relative to jobs left unfilled at the end of the month. Industries in this category include construction, manufacturing (durable goods and nondurable goods), wholesale trade, retail trade, finance and insurance, real estate and rental and leasing, health care and social assistance, and other services. These industries have been cited by industry groups and the Board of Governors of the Federal Reserve System as experiencing a shortage of workers in recent years and continued tightening of labor markets.³

Changes in the hires-per-job-opening ratio at the industry level in recent years were widespread enough to affect the ratio at the total nonfarm, total private, government, and regional levels. In 2015, 2016, and 2017, the average ratio for these higher levels fell below 1.0.

A graphical look at the hires-per-job-opening ratio

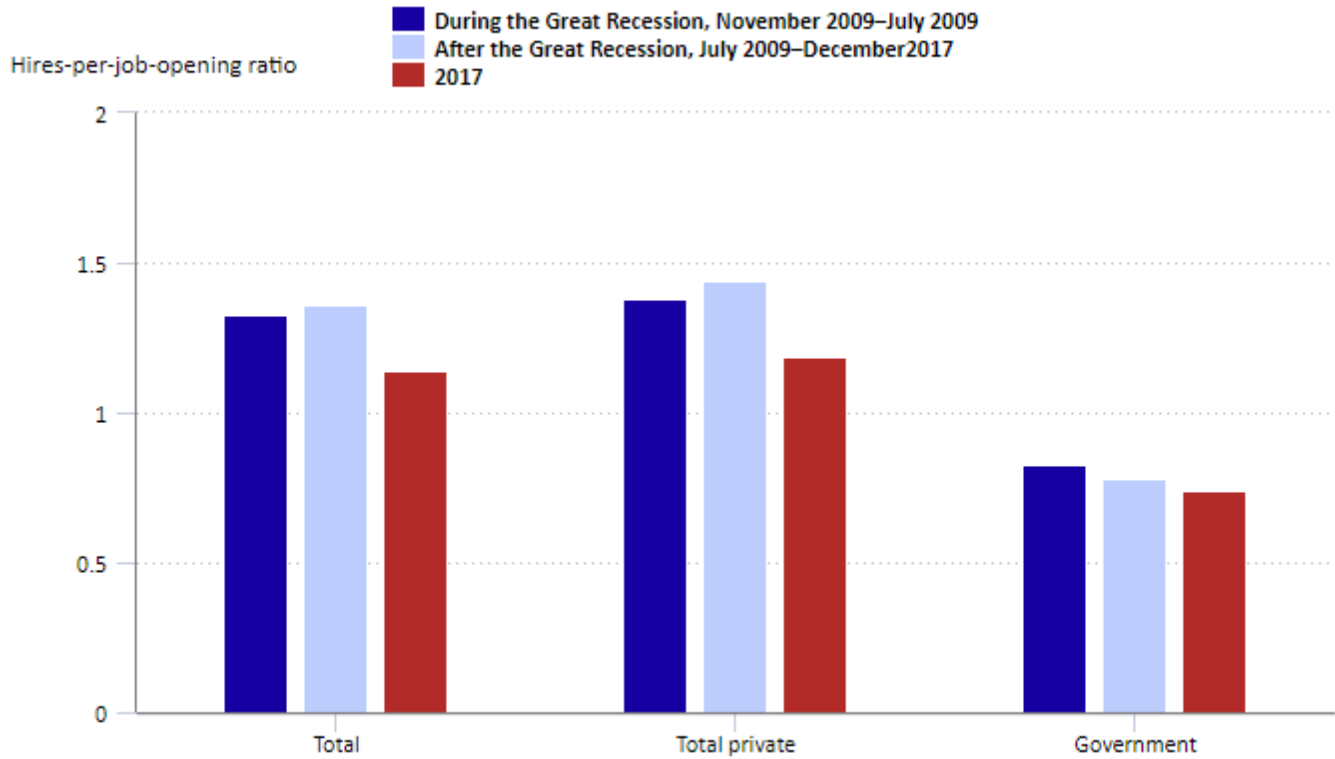
Charts 2 through 5 display the average hires-per-job-opening ratio by ownership, by government, region, and industry for different periods. The periods are December 2001–November 2007 to measure the time between the end of the 2001–03 recession and the beginning of the Great Recession of 2007–2009; December 2007–July 2009 to measure the months during the Great Recession; and August 2009 onward to measure the post-recession period.⁴

The charts also include the average ratio for the year 2017, the most-recent full year of available data.

Ratios for private business and government

Chart 2 provides the hires-per-job-opening ratio by ownership (private versus government). We see that the private sector has an average ratio greater than 1.0 before, during, and after the Great Recession. The ratio was highest during the recession when job openings declined even more rapidly than hires. Post-recession, the ratio declined, with the average ratio for 2017 falling below 1.0. The ratios show that, historically, private sector businesses have been able to fill their job openings, but that hires declined relative to job openings in 2017. In contrast, government establishments historically are not able to fill their job openings as shown by a declining ratio with the ratio less than 1.0 before, during, and after the recession as well as in 2017. The long administrative process of filling hires in government may be a contributor to the lack of hires. The ratio movement at the total U.S. level is similar to the total private level since the private sector accounts for about 85 percent of U.S. employment.

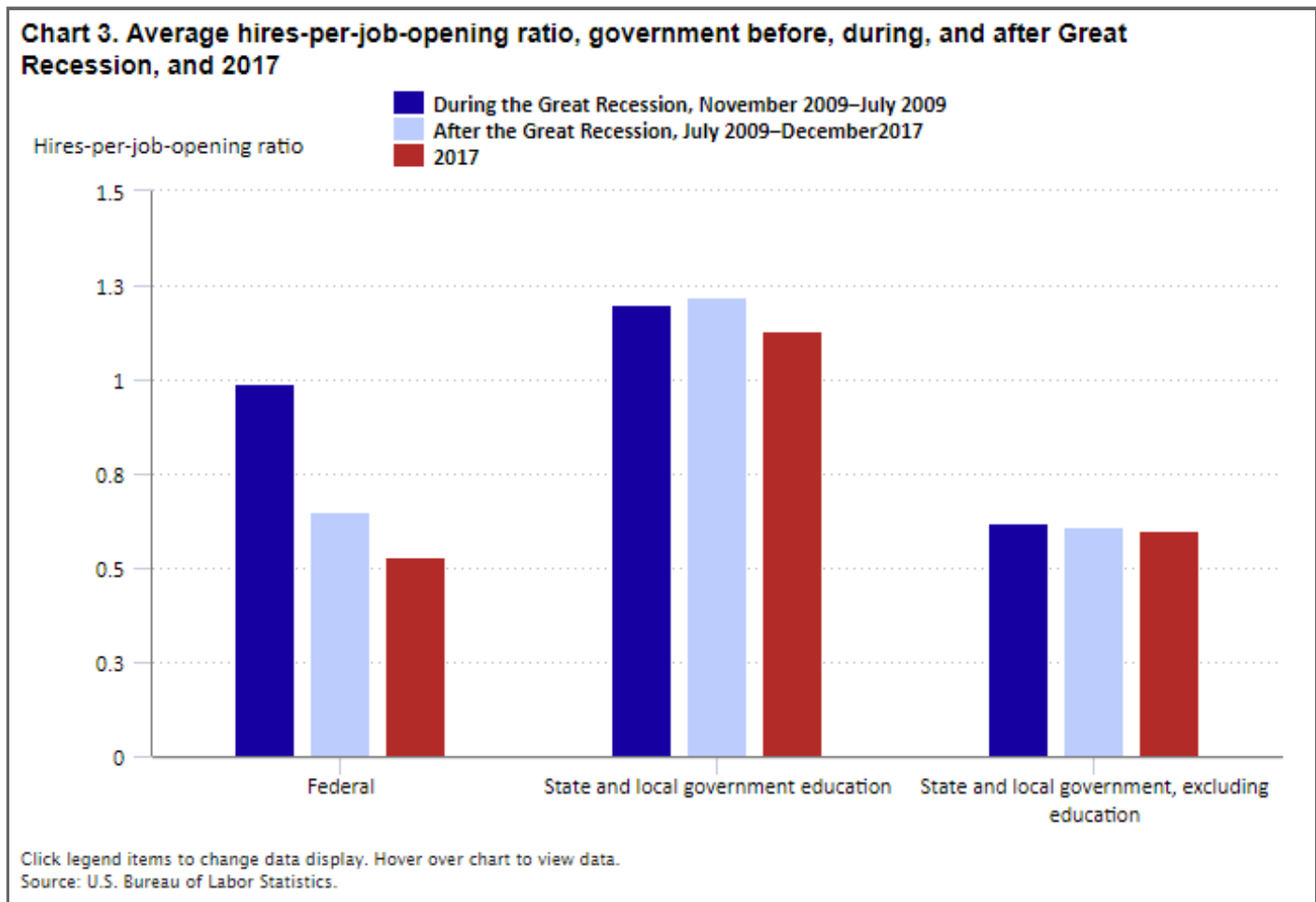
Chart 2. Average hires-per-job-opening ratio by ownership before, during and after the Great Recession, and 2017



Click legend items to change data display. Hover over chart to view data.
 Source: U.S. Bureau of Labor Statistics.

Government ratios

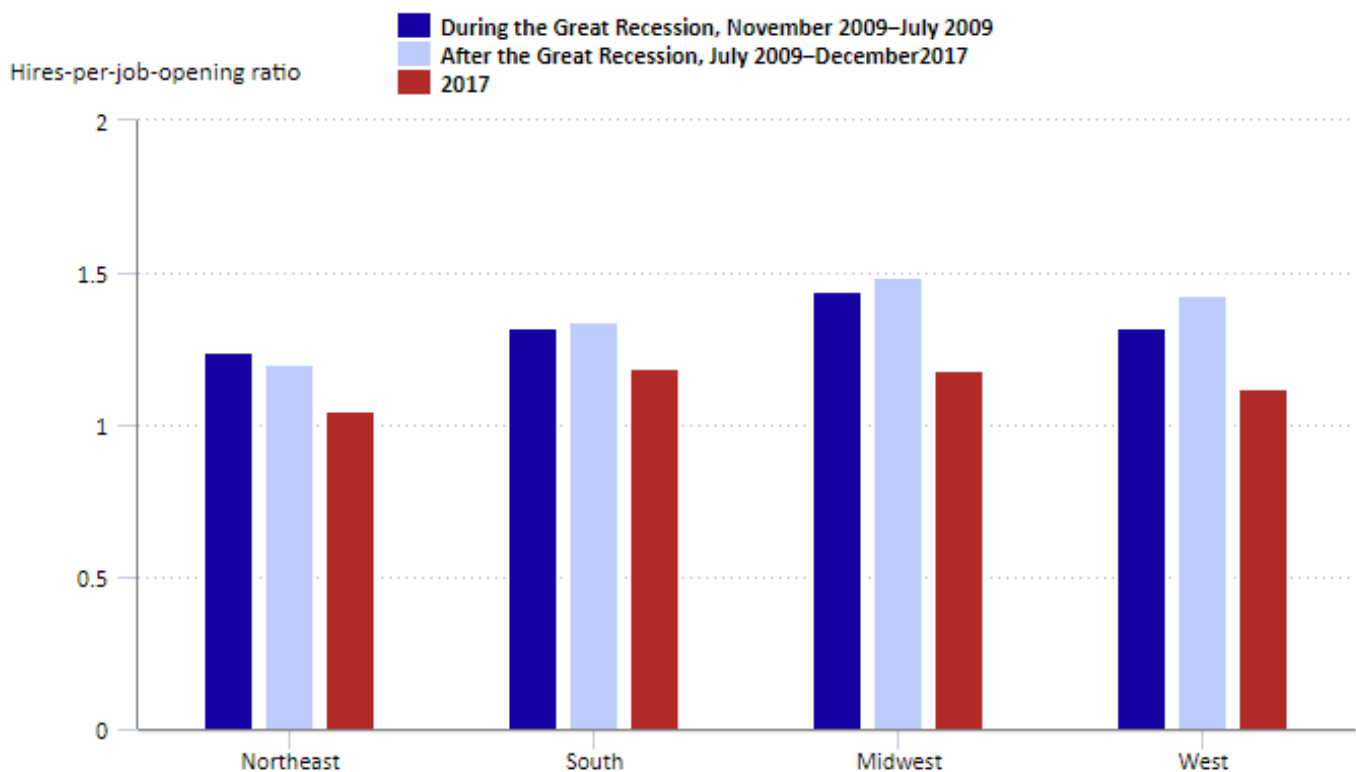
Chart 3 provides the hires-per-job-opening ratio for government. State and local government education has had some success in filling job openings, as shown by the average ratios slightly above 1.0 before, during, and after the recession. The average ratio fell just below 1.0 in 2017, however. State and local government excluding education and federal government have an average ratio below 1.0 for all time periods, indicating more difficulty filling job openings through all parts of the business cycle. All three breakouts of government have a declining ratio and a 2017 average ratio less than 1.0.



Regional ratios

In chart 4, we see some similarities and some differences in the hires-per-job-opening ratio across the regions. With the exception of the Northeast, businesses had more success filling positions during the Great Recession as hires declined at a slower pace than job openings. (See chart 1 above.) Businesses in the Midwest had slightly more success than businesses in the other regions in filling job openings before and during the recession. Post-recession, each region experienced a decline in the ratio and further decline in 2017. The South region fared the best in 2017 with an average ratio of 1.02; the ratio in the other regions fell below 1.0 in 2017. Overall, the ration in the South region varied the least over the business cycle, ranging from 1.02 in 2017 to 1.34 in during the Great Recession. It is, of course, the industry composition of each region that produces the ratios at the regional level; further analysis of employment by industry in each region could provide insight to differences in the ration by region.

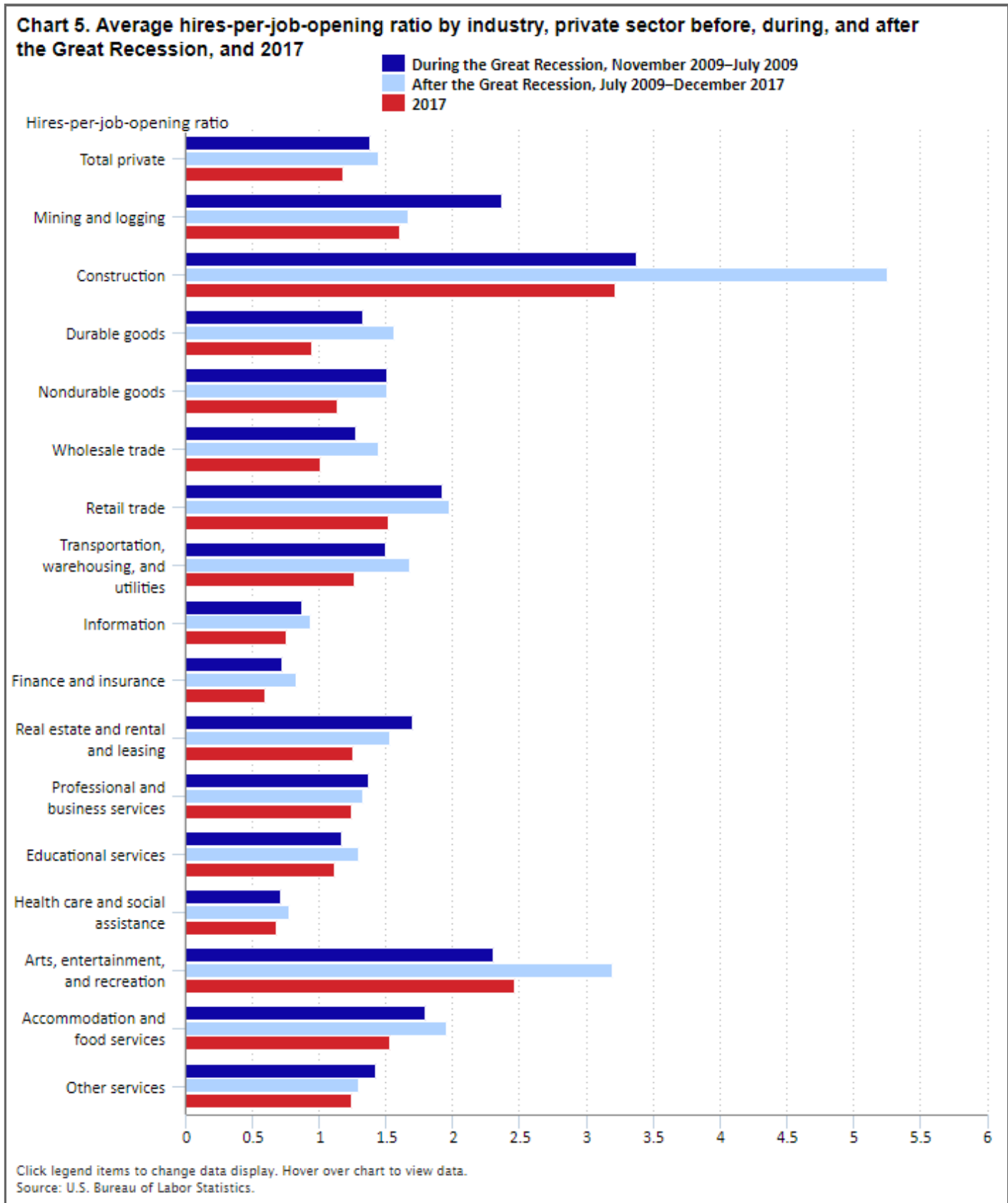
Chart 4. Average hires-per-job-opening ratio, by region before, during, and after Great Recession, and 2017



Click legend items to change data display. Hover over chart to view data.
 Source: U.S. Bureau of Labor Statistics.

Private sector ratios

Chart 5 provides the hires-per-job-opening ratio by private sector industry. The ratio varies greatly by industry, with the average ratio for 2017 ranging from 0.48 for finance and insurance to 2.0 for arts, entertainment, and recreation. During the Great Recession, when ratios were highest, the range was from 0.77 in health care and social assistance to 5.26 in construction. As we saw earlier, industries with consistently low hires and high job openings are information, finance and insurance, and health care and social assistance. These industries have average ratios less than 1.0 for all time periods. As we saw in the other charts, the ratios declined after the recession and again in 2017 for each industry as the unfilled job openings increased faster than the hires. The one exception is in the information industry where the ratio was steady at 0.75 after the recession and 0.77 in 2017. The declining ratios show widespread tightening of the labor market or changes in the jobs-posting and hiring processes across the industries.



Presented another way, table 2 lists the industries sorted in increasing order of the average hires-per-job-opening ratio for 2017. The industries at the top of the table had the least success in filling job openings in 2017, perhaps

for varying reasons. The industries at the bottom of the table had more success filling their job openings. The 2017 average ratio ranges from 0.46 in federal government to 2.0 in arts, entertainment, and recreation. Fourteen of the industries had a 2017 ratio that was less than 1.0, compared with six that had a ratio more than 1.0. One industry, transportation, warehousing, and utilities, had a ratio of 1.00 exactly.

Table 2: Average hires-per-job-opening ratio by industry, 2017

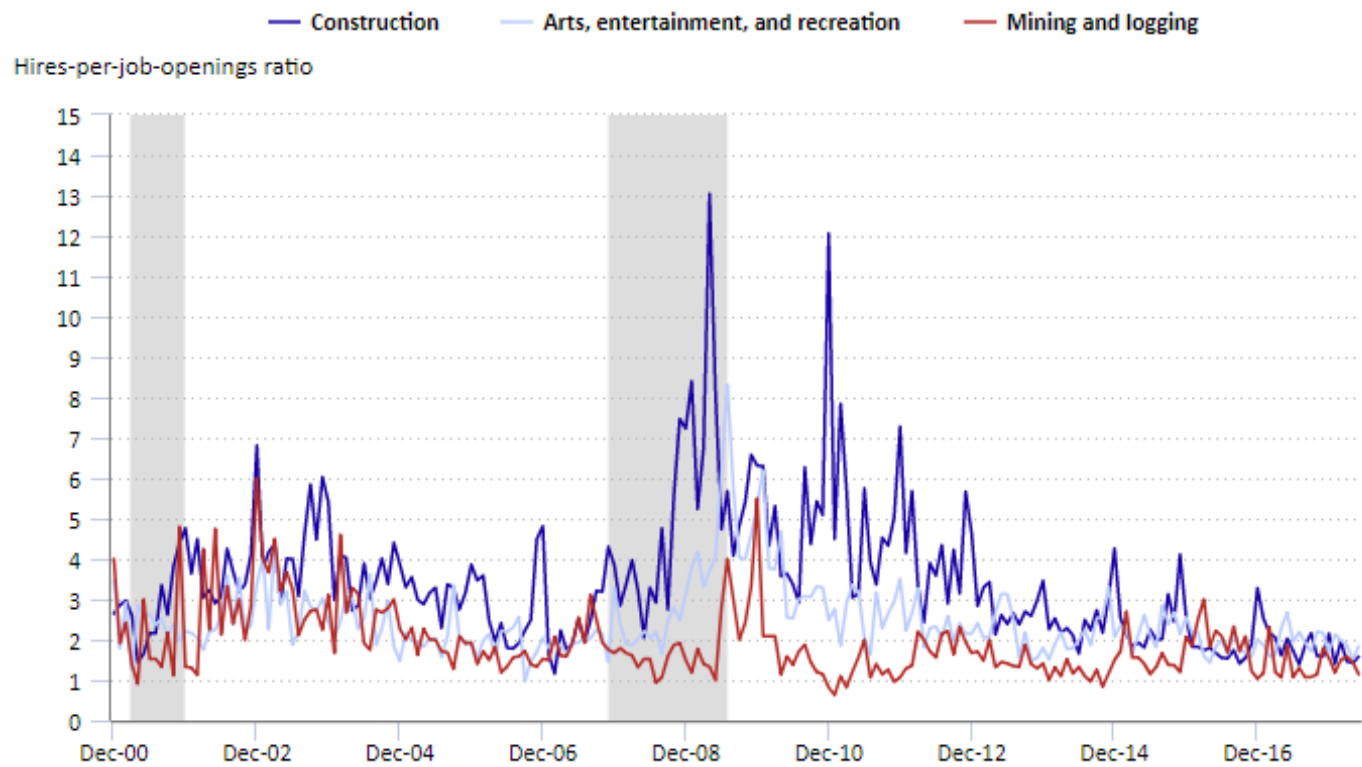
Industry	Ratio
Federal government	0.46
Finance and insurance	0.48
Health care and social assistance	0.55
State and local government, excluding education	0.56
Education and health services	0.58
Government	0.65
State and local government	0.70
Wholesale trade	0.73
Information	0.77
Durable goods manufacturing	0.82
Other services	0.84
Real estate and rental and leasing	0.89
Nondurable goods manufacturing	0.90
Total	0.91
Total private	0.94
Educational services	0.95
State and local government education	0.98
Transportation, warehousing, and utilities	1.00
Retail trade	1.08
Professional and business services	1.11
Accommodation and food services	1.14
Mining and logging	1.42
Construction	1.81
Arts, entertainment, and recreation	2.00

Source: U.S. Bureau of Labor Statistics.

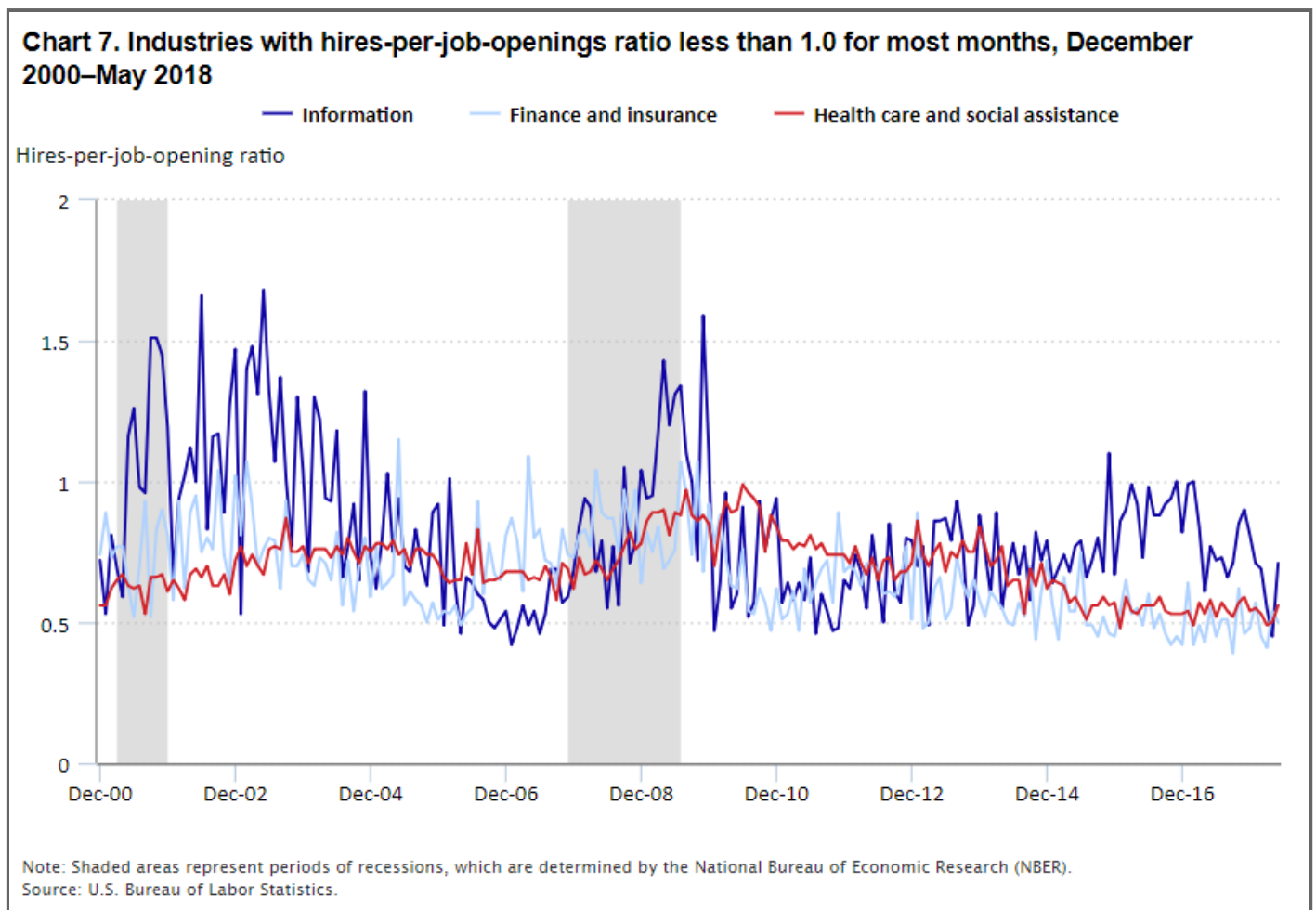
Ratios by industry

The effects of the business cycle on the hires-per-job-opening ratio is evident at the industry level. In most of the industries, the ratio decreases as the Great Recession approaches, then increases during the recession, then declines slowly and steadily post-recession. The changes in the ratio indicate that businesses' ability to fill open positions changes with the state of the economy. Charts 6 and 7 present the hires-per-job-opening ratios for the industries that JOLTS publishes from December 2000 (the beginning of the JOLTS time series) through May 2018 (the most-recent month available at the writing of this article). Chart 6 contains 3 (construction, arts and entertainment, and mining and logging) of the 14 industries studied that typically have a hires-per-job-opening ratio greater than 1.0 (more hires than job openings).⁵ Chart 7, by comparison, contains industries that typically have a hires-per-ratio less than 1.0 (fewer hires than job openings).

Chart 6. Industries with hires-per-job-openings ratio greater than 1.0 for most months, December 2000–May 2018



Note: Data for all 14 industries can be found in a table format by clicking on view chart data.
 Shaded areas represent periods of recessions, which are determined by the National Bureau of Economic Research (NBER).
 Source: U.S. Bureau of Labor Statistics.



Conclusion

With the job openings levels rising during the past few years, reaching series highs in 2017 and again in 2018, the topic of matching people to open jobs is on many people’s minds. One key to a profitable business is the ability to hire qualified workers into open positions. The business can suffer if there are not enough applicants, if the applicants do not have the needed skills, or if for some other reason, the applicants do not accept the business’ offer. The hires-per-job-opening ratio derivative series that combines the JOLTS hires and job openings data provides a useful analytic tool. The ratio allows for the exploration of businesses’ abilities to fill open jobs, finding similarities and differences between private businesses and government entities, among industries, among regions, and over the business cycle. The data show that as the economy slowed before the Great Recession, businesses were not as successful filling open jobs. But during the recession, as job openings declined steeply and hires less steeply, the ratio increased as businesses were better able to fill the remaining jobs they had open. After the recession, the ratio declined as job openings increased at a much greater pace than hires in many industries. That is, as the economy has improved, businesses are not filling their open jobs as efficiently.

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NOTES

¹ Some economists use the prior month job openings in the denominator since the openings at the end of one month are attempted to be filled the following month. The two approaches produce similar ratios so for simplicity, this article uses the current month's job openings. This ratio has also been referred to in other articles as the fill rate or the vacancy yield.

² Steven J. Davis, R. Jason Faberman, and Jon Haltiwanger, "The Establishment-Level Behavior of Vacancies and Hiring," *Quarterly Journal of Economics*, December 2012.

Charlotte Oslund, "Which industries need workers? Exploring differences in labor market activity," *Monthly Labor Review*, January 2016, <https://www.bls.gov/opub/mlr/2016/article/which-industries-need-workers-exploring-differences-in-labor-market-activity.htm>.

³ Examples of reports are the *Construction Outlook Survey* by The Associated General Contractors of America and issues of the *Beige Book* in 2017 and 2018 by the Federal Reserve Board.

⁴ Recessions are determined by the National Bureau of Economic Research (NBER).

⁵ The complete list includes the following industries: durable goods manufacturing; nondurable goods manufacturing; wholesale trade; retail trade; transportation; warehousing and leasing; professional and business services; educational services; accommodation and food services; other services; and state and local government education. The data for these industries can be found by selecting the view chart data for chart 6.

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