



The Unemployed and Job Openings: A Data Primer

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Summary

New information that adds to the mix of labor market indicators may be useful to Congress. The ratio of unemployed persons per job opening provides information on how many unemployed persons on average there are for every job opening. It adds to the current mix of labor market indicators such as the unemployment rate, which is a measure of the excess supply of workers. In addition, it adds to employment statistics, which measures the demand for workers that have already been met by employers. By dividing the number of unemployed persons with the number of job openings, the ratio gauges the excess supply of workers relative to the demand, where job openings serve as a measure of the unmet need for workers. The resultant statistic compares the number of persons who are actively searching for jobs to the number of available opportunities.

Four key findings arise from this analysis:

1. The ratio of unemployed persons per job opening is highly correlated with the unemployment rate between 2001 and 2012.
2. The ratio of unemployed persons per job opening rises during the recessionary periods covered in this data set. In the 2007-2009 recession, the ratio rises to very high levels, especially in the goods-producing industries (construction, manufacturing, mining and logging).
3. Although the ratio is highly correlated with changes in the unemployment rate, the ratio saw modest improvements coming out of the recent recession sooner than the reductions in the unemployment rate.
4. Even though the ratio has reduced, it remains at higher levels than prior to the 2007-2009 recession.

The analysis in this report combines two data sources:

- The *Job Openings and Labor Turnover Survey (JOLTS)*, which provide information from a survey of U.S. business establishments on the dynamic job market where job openings are created, persons are hired, and employees leave.
- The *Current Population Survey (CPS)*, which provides information on economic and demographic information from U.S. households.

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Introduction

The Bureau of Labor Statistics (BLS) publishes job openings data from the Job Openings and Labor Turnover Survey (JOLTS). Data on job openings provide information on the number of workers that employers intend to hire in the near future. This information enriches knowledge of the U.S. labor market adding to current information on unemployment rates and employment.

Many labor market indicators provide information on either the supply or demand for workers. Unemployment rates provide information on the supply of persons seeking work in excess of those currently employed. Alternatively, employment provides information on the demand for workers that is already met by employers.

This report provides information on the ratio of unemployed persons per job opening, which may be useful to Congress in that it adds nuanced information to the current mix of labor market indicators. The ratio is unique in that it combines both supply and demand measures. Using unemployed persons from the Current Population Survey (CPS) and job openings from the JOLTS, the ratio divides the number of persons generally aged 16 and older who are not employed and actively looking for jobs by the number of job openings. The advantage to the statistic is that the ratio gauges the excess supply of labor relative to the unmet needs of employers. The ratio may add useful information to data on job openings or unemployment in that it takes into consideration how many persons are actively searching for work relative to the number of opportunities.

Specifically, in this report, trends in the ratio of unemployed persons per job opening are tracked from January 2001 through February 2012.¹ Comparisons are made with the unemployment rate, which has been used as a primary labor market indicator for many years. Figures and tables are provided that show the ratio in the aggregate for the United States and across industrial sectors.

Four key findings arise from this analysis:

1. The ratio of unemployed persons per job opening is highly correlated with the unemployment rate between 2001 and 2012.
2. The ratio of unemployed persons per job opening rises during the recessionary periods covered in this data set. In the 2007-2009 recession, the ratio rises to very high levels, especially in the goods-producing industries (construction, manufacturing, mining and logging).
3. Although the ratio is highly correlated with changes in the unemployment rate, the ratio saw modest improvements coming out of the recent recession sooner than the reductions in the unemployment rate.
4. Even though the ratio has reduced, it remains at higher levels than prior to the 2007-2009 recession.

¹ JOLTS data began one month earlier in December 2000.

Unemployment and Job Openings

This section separately examines the two statistics in the ratio, unemployment and job openings. The ratio is built by placing the number of unemployed persons in the numerator and dividing by the number of job openings. Separately examining the trends in unemployment and job openings may add to understanding of policy issues related to the U.S. labor market. Comparing how these statistical indicators fluctuate through the economic cycles covered in this report may help in understanding trends in the ratio of unemployed persons per job opening.

From January 2001 through February 2012, job openings fluctuated with the economy in countercyclical movement with the number of unemployed persons. Job openings are more numerous when the economy is growing and are fewer in number when the economy is in recession. During economic expansion, business establishments begin to sell more goods and services and correspondingly hire more workers. As the economy contracts or enters a recession, businesses need fewer workers and businesses may more likely freeze their job vacancies, close the opportunity or lay off workers. Unemployment rates rise during recessions as more persons are laid-off, and other persons looking for a job are unable to find work. Not all businesses hire and not all persons are employed during economic expansion, but the overall cyclical trend is observed at the aggregate level when summing across all employer establishments.

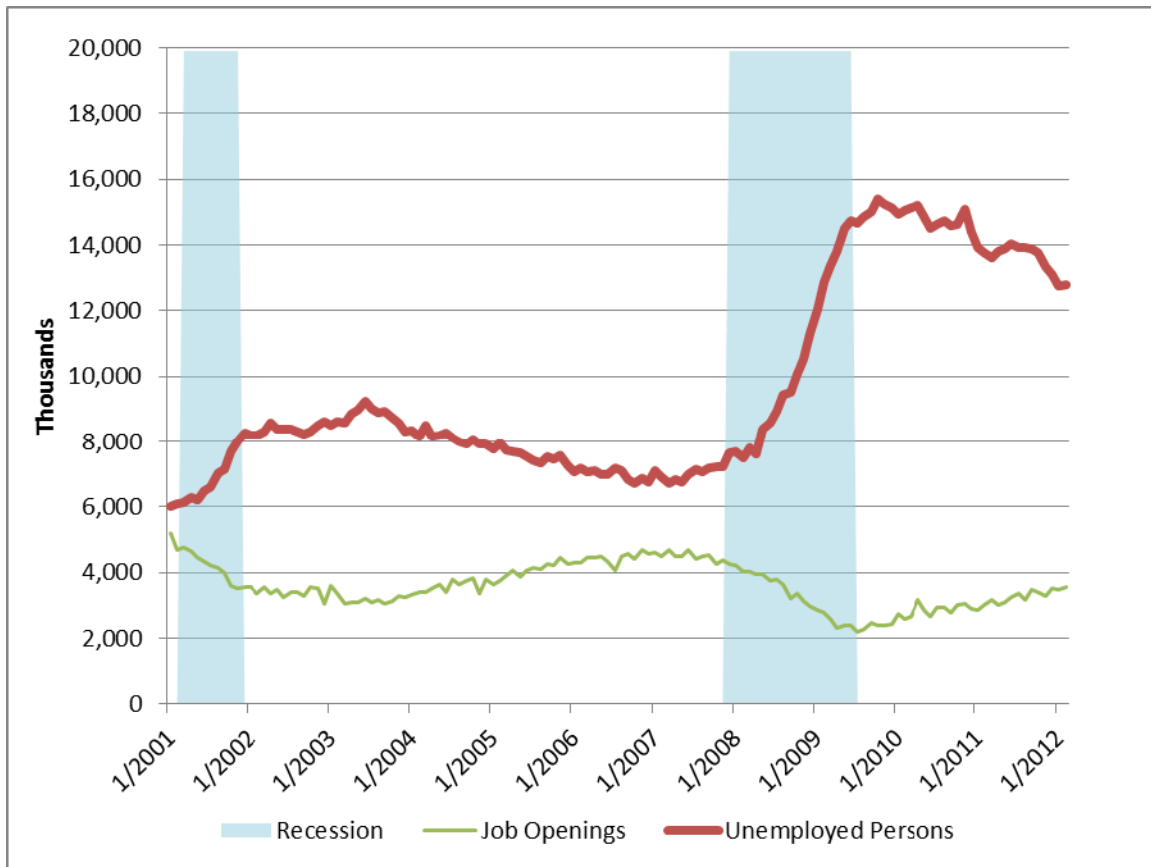
Figure 1 depicts the monthly number of unemployed and job openings from January 2001 through February 2012. The upper line is the total number of unemployed and the lower line is the total number of job openings. Each point in both lines represents a month, where the months are listed along the x-axis.

From the periods covered in this report, January 2001 through February 2012, the U.S. economy underwent two recessions, which are indicated by the shaded columns in **Figure 1**. The beginning and ending dates of each recession are determined by the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER). The NBER declares a recession during the months when economic activity declines from its peak to its trough.² The NBER further defines economic expansion as the period from trough to peak. The first recession begins in March 2001 and ends in November 2001, which will be referred to as the 2001 recession. The second is from December 2007 through June 2009 and is referred to as the 2007-2009 recession.

From January 2001 through February 2012, the number of unemployed persons fluctuates upward during recession and downward during most months of economic expansion. The number of unemployed persons decreases to 6.7 million in March 2007. In the following months, the total number of unemployed persons turns back upward reaching 7.6 million during the first month of the 2007-2009 recession. In the months during the recession, unemployment rises more sharply reaching a high of 15.4 million persons in October 2009. Afterward, unemployment modestly decreases to 12.8 million in February 2012.

² The NBER's Business Cycle Dating Committee determines the dates of the recession. In judging when a recession occurs, the committee does not have a fixed set of indicators to define economic activity. It examines various measures: real GDP, economy-wide employment, and real income. The NBER may consider other indicators, such as real sales and the Federal Reserve's index of industrial production. NBER's determination of a recession is different from another common determination often used by the financial press, which is two consecutive quarters of declining real GDP. For more information, see <http://www.nber.org/cycles/recessions.html>.

Figure 1. Job Openings and Unemployed Persons in the United States
 Monthly Data from January 2001 Through February 2012; Data are Adjusted for Seasonality



Source: Data on unemployment are from the Current Population Survey (CPS) and data on job openings are from the Job Openings and Labor Turnover Survey (JOLTS).

Notes: See **Table I** for information on unemployment and job openings data.

Job openings also fluctuate with the business cycle, but increased during most expansionary months and decreased during recession. **Figure 1** shows that in months following the 2001 recession, total job openings reaches its highest number of 4.7 million in November 2006 and again in March 2007. Afterward, job openings decrease as the economy entered the 2007-2009 recession. A low point of 2.2 million job openings is reached one month after the end of the recession in July 2009. After the recession, job openings turn back upwards and as of the end of the data on February 2012, the total number reached 3.6 million.

Job openings differ from unemployment in that job openings led unemployment in the movement away from the troughs and peaks since 2006. Job openings began to increase in July whereas unemployment rates did not reach a high until October 2009. In 2007, job openings fell from the high point of 4.7 million in March of 2007, whereas the unemployment rate did not increase until two months later in May of 2007.³

³ The number of unemployed reached a low of 6.7 million in October 2006 and March 2007.

If changes in job openings lead changes in unemployment, it may prove useful when considering some labor market policies. Whether job openings can anticipate a change in unemployment is uncertain. Although job openings led in the movement away from the high and low points after 2006, it may be coincidence, because job openings did not lead unemployment in 2003. Job openings reached a low of 3.1 million in September 2003 and unemployed persons reached a high of 0.2 million three months earlier in June 2003. More years of information would be needed to assess whether job openings might serve as an early indicator to changes in unemployment and under what circumstances. A further consideration is that even if job openings can serve as a leading indicator, its potential in practice is hampered because preliminary estimates are not published until two months after the survey is conducted and final estimates are published one month after the preliminary estimates. This means that preliminary estimates for November and final estimates for October are not available until January.⁴

The Ratio of Unemployed Persons per Job Opening: Trends and Comparisons

This section introduces the ratio of unemployed persons per job opening and discusses trends in the ratio over time. A brief comparison with a few other commonly used labor market indicators is conducted to highlight the nuanced information added by the ratio. This section also includes some technical notes about the ratio and the data.

As a brief introduction, the ratio of unemployed persons per job opening is constructed by taking the number of unemployed persons and dividing it by the number of job openings.⁵ Lower values for the ratio imply fewer unemployed persons for every job opening and possibly greater ease in finding a job. Higher values would indicate more unemployed persons searching for the same number of jobs and potentially more difficulty in finding work.

The ratio uniquely combines supply and demand measures of the labor market. The number of unemployed persons is a measure of persons looking for work, or the supply of labor in excess of those currently employed. Job openings are a measure of the demand for workers that are not currently met by employers. It can be used to consider how easy it may be to find a job given both the number of other persons looking for work and the number of available job openings. Fewer unemployed persons or more job openings may both contribute to a greater ease in finding work.⁶

⁴ By contrast, the December estimates for the number of unemployed are published in January.

⁵ For an example of using the ratio of unemployment per job opening, see Gary L. Podgornik, “Job Openings and Hires Continue to Show Modest Changes in 2011,” *Monthly Labor Review*, September 2012, pp. 28-34.

⁶ Several caveats must be kept in mind when using the ratio of unemployed person per job opening (listed in detail in the **Appendix**). Briefly, if persons choose to accept more than one job to any large extent, then the statistic may misrepresent the relative availability of jobs. Second, the ratio may vary across occupations, industries, urban and rural locations, and a variety of other relevant subgroups, which may require more analysis with other data. For example, jobs may be available in other states requiring persons to relocate in order to take the jobs so that the statistic may not reflect job availability in the short run. As another example, there may be few people to immediately fill a position because the job may require retraining. A third caveat is that even though employers may have job openings, they may be less likely to hire—for example because of more selective screening methods. See Davis, Steven J., R. Jason Faberman, and John C. Haltiwanger, *Recruiting Intensity During and After the Great Recession: National and Industry Evidence*, NBER, Working Paper no. 17782, January 2012, <http://www.nber.org/papers/w17782.pdf>.

This section has four findings. The first sub-section on trends in the ratio establishes three of the basic findings: First, the ratio of unemployed persons per job opening is highly correlated with the unemployment rate between 2001 and 2012. Second, the ratio of unemployed persons per job opening rises during the recessionary periods covered in this data set. In the 2007-2009 recession, the ratio rises to very high levels. Third, even though the ratio has reduced, it remains at higher levels than prior to the 2007-2009 recession. The following section discussing the ratio of unemployed persons per job opening as a unique indicator identifies a fourth finding: While the ratio is highly correlated with changes in the unemployment rate, the ratio saw modest improvements coming out of the recent recession sooner than the reductions in the unemployment rate.

Trends in the Ratio of Unemployed Persons per Job Opening: Basic Findings

Figure 2 graphs the monthly ratio of unemployed person per job opening from January 2001 through February 2012. The x-axis is in months and the y-axis on the left is the numerical value for the ratio. The figure also charts the unemployment rate, which is a commonly used labor market indicator. Values for the unemployment rate are listed on the y-axis on the right.

Figure 2 establishes three basic findings in this dataset. Sections to follow will further refine the conclusions from this section.

Finding 1

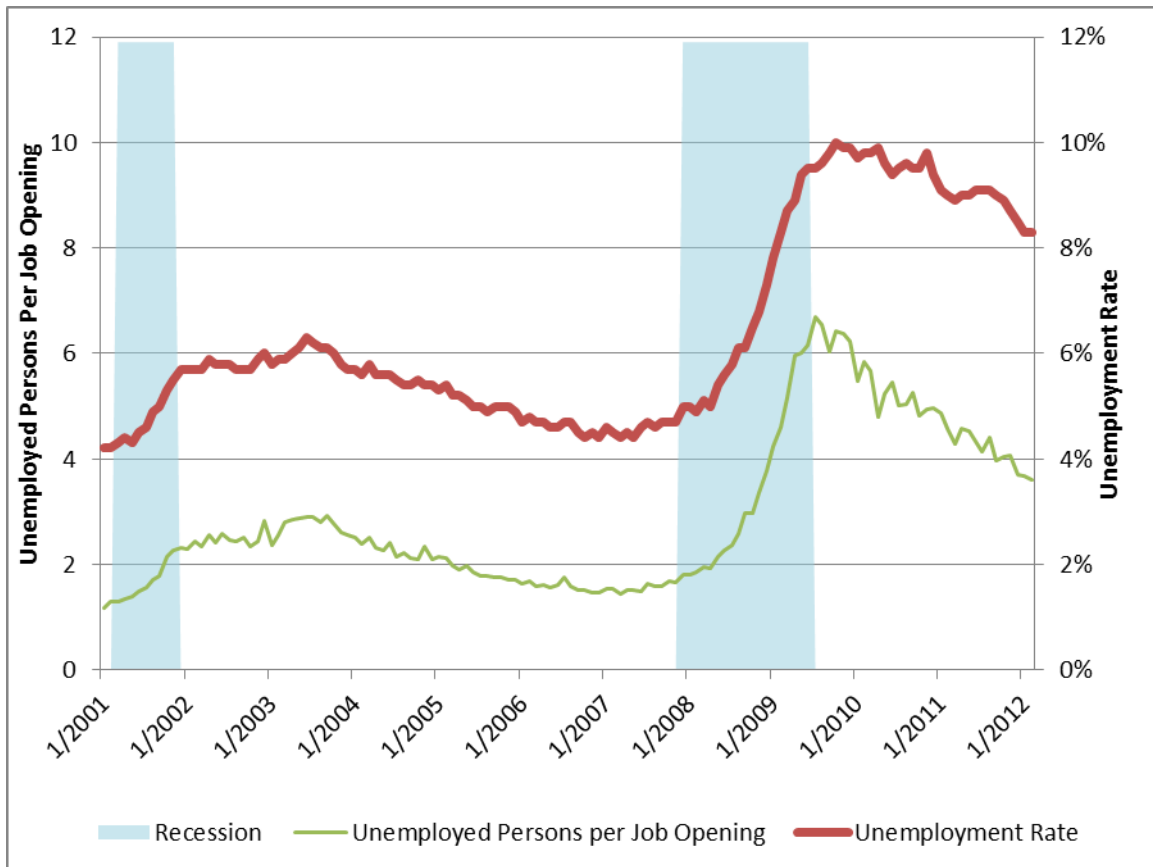
The ratio of unemployed persons per job opening is highly correlated with the unemployment rate between 2001 and 2012. **Figure 2** shows that the unemployed persons per job opening ratio and the unemployment rate fluctuate with the business cycle. Both increase within months of the recession and decrease during economic expansion. Although not perfect, the two labor market indicators have roughly corresponded with the economy.

The unemployed persons per job opening ratio rises with increases in the numerator (unemployment) or decreases in the denominator (job openings). An increase in unemployment raises the numerator suggesting more persons searching for work for the same number of jobs. Fewer job openings lower the denominator suggesting fewer opportunities for the same number of unemployed. As discussed in the previous section, job openings and unemployment follow the business cycle. The number of unemployed persons increases during periods of recession and decreases during most months of economic expansion. In contrast, job openings decrease during periods of recession and increase during most months of economic expansion.

The unemployment rate divides the number of unemployed by the number of persons in the labor force, where persons in the labor force are 16 years and older and are either employed or actively searching for work. More unemployed persons raise the numerator to the unemployment rate. Alternatively, fewer labor force participants lower the denominator, which also raises the unemployment rate.

Figure 2. Ratio of Unemployed Persons Per Job Opening and the Unemployment Rate

Monthly Data from January 2001 through February 2012, Adjusted for Seasonality



Source: Data on unemployment levels and rates are from the CPS and data on job openings are from the JOLTS.

Notes: See **Table I** for information on unemployment and job openings data.

Finding 2

The ratio of unemployed persons per job opening rises during the recessionary periods covered in this data set. In the 2007-2009 recession, the ratio rises to very high levels. **Figure 2** shows that the ratio of unemployed persons per job opening rises throughout the 2001 recession reaching its high point in September 2003. The ratio declines during most of the months of economic expansion until March 2007, 10 months before the beginning of the 2007-2009 recession. Afterward, the ratio increases from 1.4 in March of 2007 to 1.8 in December of 2007.

During the 2007-2009 recession, the ratio of unemployed persons per job opening rises to its highest level in the period covered for this report. During the first year, from December 2007 through November 2008, the ratio of unemployed persons per job opening increases from 1.8 to 3.3. From December 2008 to one-month after the end of the recession in July 2009, the ratio increases more sharply to a high of 6.7. This exceeds roughly three times the high point that occurs following the 2001 recession, which was 2.9 in September 2003.

The unemployment rate similarly fluctuates with the business cycle with higher rates during recession and lower rates during most months of economic expansion. The unemployment rate in January 2001 was 4.2%. The rate rises through the 2001 recession reaching a high of 6.3%.

As the economy expanded, **Figure 2** shows that the unemployment rate decreases to a low of 4.4% in October of 2006. Unemployment rates turn back upward again as the economy enters the 2007-2009 recession. During the recession, unemployment rates rise sharply, especially during the last year. The rate reaches a high of 10.0% in October 2009. Since then, unemployment rates have lowered to approximately 8%.

Finding 3

Even though both ratios have reduced, they remain at higher levels than prior to the 2007-2009 recession. As of February 2012, the ratio of unemployed persons per job opening is 3.6. This is higher than the 2.9 that occurred in September of 2003, which is the high point of all the monthly ratios prior to the most recent recession. As seen in the next section, even though the ratio is high, when compared with the unemployment rate and other labor market indicators, it has improved more substantially since the end of the recession.

A Unique Ratio: Differences from the Unemployment Rate and Other Labor Market Measures

This section highlights the uniqueness of the ratio by its virtue of combining both supply and demand measures. A key finding is that while the ratio is highly correlated with changes in the unemployment rate, the ratio saw modest improvements coming out of the recent recession sooner than the reductions in the unemployment rate. In addition, the correlation between the ratio and the unemployment rate has at least temporarily changed since the 2007-2009 recession, where the difference appears to arise from stagnant growth in the labor force. Finally, even though the ratio shows modest reductions, actual hires may have lagged behind job openings. This further highlights a potential issue in the labor market that jobs may currently be more difficult to find than indicated by the ratio in prior years.

The ratio of unemployed persons per job opening may serve as a useful addition to other labor market indicators. First there may be some chance that the ratio of unemployed persons per job opening may be a leading indicator to changes in the unemployment rates. The ratio of unemployed persons per job opening reached a high in July of 2009, whereas the unemployment rate reached its high four months later in October 2009. Like job openings, however, this is uncertain because the ratio did not lead the decrease in unemployment rates after the 2001 recession.

Second, **Figure 2** shows the difference between the unemployment rate and the ratio of unemployed persons per job opening is fairly constant prior to the 2007-2009 recession.⁷ Afterward, the ratio of unemployed persons per job opening fell by a larger amount in

⁷ From January 2001 to November 2007, the difference between the unemployment rate (x100, or in percentage points) and the ratio of unemployed persons per job opening ranges from 2.9 to 3.5. The variation in the difference is larger after the 2007-2009 recession, ranging from 2.8 to 5.1. This implies that the unemployment rate tracks more closely with the ratio of unemployed persons per job opening until the recession. This is a comparison between the unemployment rate (scaled by 100) and a ratio, which varies from 0 to infinity.

comparison to the unemployment rate. The shift in the relationship seems to suggest that, at least temporarily, the same ratios of unemployed persons per job opening are associated with higher unemployment rates. A decrease in the ratio potentially indicating a greater ease in finding a job does not correspond with as large of a decrease in the unemployment rate. Whether the shift in the relationship is permanent may depend upon other labor market conditions.

The differences in the measures arise because the unemployment rate is a measure of excess supply and the ratio of unemployed persons per job opening combines measures of supply and demand. More specifically, the difference is in the denominator. Both measures have the number of unemployed in the numerator. The unemployment rate divides the number of unemployed persons by the number of persons in the labor force. The ratio of unemployed persons per job opening divides the unemployed by the number of job openings. There has been a modest recovery in job openings yet labor force participation appears to remain at lower levels. **Figure 1** shows that the number of job openings increased by 63.1% from July 2007 to February 2012 (from 2.2 to 3.6 million). By comparison, participants in the labor force increased by a smaller 0.2% during this same period (from 154.5 to 154.8 million).

When examining other labor market indicators, the ratio appears to add some nuance to a description of current labor market conditions. A variety of labor market indicators show that the 2007-2009 recession is one of the most severe recessions in the post-World War II era. Unemployment, employment, labor force participation, and hours worked all indicated a substantial deterioration in labor market conditions. Since the 2007-2009 recession, the combination of statistics suggest modest growth in employment, but stagnant growth in labor force participation. The ratio of unemployed persons per job opening suggests more marked gains in the ease at which unemployed persons might find jobs, but even though jobs may be open, establishments may not be hiring as much. From the end of the recession in June 2009 to February 2012, unemployment and the unemployment rate modestly decreased. Employment increased by a modest 2.0%. Similar to stagnant growth in labor force participation, the employment to population ratio has decreased by 1.1% from July 2009 to February 2012. The job openings rate has increased by 52.9%. However, the hires rate, the proportion of hires relative to jobs plus new hires increases by a smaller 13.8%. These statistics suggest modest reductions in unemployment, modest gains in employment, but stagnant growth in the labor force and hires falling below job opportunities.⁸

⁸ For data on job hires, see the data retrieval webpage from the BLS JOLTS website, at <http://data.bls.gov/pdq/querytool.jsp?survey=jt>.

A Primer on Data and Methodology

The ratio of unemployed Persons per job opening is calculated as

$$\text{Unemployed Persons Per Job Opening} = \frac{\text{Number of Unemployed Persons}}{\text{Number of Job Openings}}$$

The indicator is constructed with two datasets. Job openings is a measure of the unmet demand for workers and the data on employers' demand come from the Job Openings and Labor Turnover Survey (JOLTS), which is a survey of about 16,000 business establishments. Unemployed is a measure of the excess supply of workers and comes from the Current Population Survey, a survey of approximately 60,000 households.

To ensure consistency in the data, the BLS defines both job openings and unemployment. Among other criteria, a job opening is a specific position that is open on the last business day of the month and the establishment must be able to start the job within 30 days. In general, unemployment is defined as an individual who is at least 16 years old, is not employed during the reference week, but available for work. Usually the reference week includes the 12th day of the month.

There are several limitations to the ratio that often apply to other aggregate statistics on the labor market. For example, differences in the ratio across occupations or earnings levels are not available. A job opening in one region of the United States may be temporarily inaccessible to a person living in another region, because that person would have to relocate to take that job. See the **Appendix** for more information on the data and its limitations.

Differences Across Industrial Sectors

Sector level information on the ratio of unemployed persons per job opening might lead to a better understanding of the trends in the aggregate ratio over time. Decomposing the aggregate ratio into its industrial sector shows substantial differences in trends, especially during the height of the 2007-2009 recession. The ratio for the goods-producing sector rises significantly above the other sectors serving to further drive upward the aggregate ratio of unemployed persons per job opening.⁹

This section examines the ratio of unemployed persons per job opening for four industrial sectors: (1) goods-producing, (2) producer services, (3) consumer services, and (4) government.¹⁰ Goods production is defined here as the production of tangible items, such as cell phones and HD-TVs. The goods-producing sector is made up of three sub-sectors, or industries. These are mining and logging, construction, and manufacturing. Services in turn are defined as the production of everything else within the private-business sector. Because services make up a significant percentage of the number of jobs (83% in February 2012), this sector is further divided in

⁹ The aggregate ratio of unemployed persons per job opening is a weighted average off the industrial sectors, where the weights are the share of job openings for the sector to the total number of job openings. Because of this, an increase in the ratio for one sector will result in an increase in the aggregate ratio of unemployed persons per job opening.

¹⁰ Producer services are classified using the following citations, where an issue commonly addressed is where to classify the trade, transportation, and utilities. Most of the studies do not include trade, transportation, or utilities as producer services. However, some studies include utilities as goods-producing industries. Because the BLS groups these industries together and because trade and transportation make up the majority of employment, the industry is categorized as a consumer service. For articles classifying producer services, see C. Michael Wernerheim and Christopher A. Sharpe, "Producer services and the 'mixed-market' problem: some empirical evidence," *Area*, vol. 31, no. 2 (1999), pp. 123-140. Daniel P. Lindahl and William B. Beyers, "The Creation of Competitive Advantage by Producer Service Establishments," *Economic Geography*, vol. 73, no. 1 (January 1999), pp. 1-20. James R. Markusen, "Trade in Producer Services and in Other Specialized Intermediate Inputs," *The American Economic Review*, vol. 79, no. 1 (March 1989), pp. 85-95.

services that are purchased primarily by producers or by consumers. Examples of producer services include financial activities and information services. Consumer services include industries such as retail trade and education and health services.

Table 1 shows the average monthly number of job openings, unemployed persons, and unemployed persons per job opening by sector and industry for 2011, where “unemployment from an industry” is the industry that the person last worked. The table helps show which industries are assigned to which sectors. Also, as shown by the numbers in the table, sectors can make up a large share of unemployed persons or job openings and still have a relatively small ratio of unemployed persons per job opening. A larger ratio of unemployed persons per job opening occurs when the sector has a larger share of unemployed persons relative to its share of job openings.¹¹ For example, consumer services comprise the largest share of unemployed persons (48.1) and largest share of job openings (49.9%). However, the ratio of unemployed persons per job opening is 3.5, which is lower than the 8.2 for the goods-producing sector. The higher ratio in the goods-producing sector is reflected by the fact that it has a higher percentage of unemployment (24.1%) relative to its share of job openings (10.6%). Producer services have a relatively lower share of unemployment (19.1%) relative to its job openings (29.0%) and have the lowest ratio of unemployed persons per job opening at 2.4.

Table 1. Average Monthly Number of Job Openings, Unemployed Persons and Unemployed Persons Per Job Opening
by Sector and Industry for Calendar Year 2011

Sector or Industry	Number of Job Openings In Thousands	Percentage of Total Number of Job Openings	Number of Unemployed Persons In Thousands	Percentage of Total Number of Unemployed Persons	Unemployed Persons Per Job Opening
Goods-Producing	342.0	10.6%	2,807.8	24.1%	8.2
Mining and Logging	28.1	0.9%	52.0	0.4%	1.9
Construction	81.5	2.5%	1,383.3	11.9%	17.0
Manufacturing	232.4	7.2%	1,372.5	11.8%	5.9
Producer Services	933.3	29.0%	2,234.3	19.1%	2.4
Information	103.7	3.2%	222.0	1.9%	2.1
Financial Activities	205.5	6.4%	582.1	5.0%	2.8
Professional and Business Services	624.2	19.4%	1,430.2	12.3%	2.3
Consumer Services	1,605.3	49.9%	5,613.7	48.1%	3.5
Trade, Transportation, and Utilities	540.8	16.8%	2,318.2	19.9%	4.3
Education and Health Services	582.3	18.1%	1,216.8	10.4%	2.1

¹¹ If the ratio of unemployed persons per job opening is larger in one sector compared with another, then the share of unemployed persons divided by the share of job openings for the sector will also be larger. This is because the ratio of unemployed persons per job opening times a constant equals the ratio of the shares, where the constant is the same across all industries.

Leisure and Hospitality	362.3	11.3%	1,527.3	13.1%	4.2
Other Services	119.8	3.7%	551.4	4.7%	4.6
Government	335.3	10.4%	1,013.5	8.7%	3.0

Source: Data on unemployed persons are from the Current Population Survey (CPS) and data on job openings are from the Job Openings and Labor Turnover Survey (JOLTS).

Notes: The averages are calculated using monthly statistics within the calendar year that were not adjusted for seasonality. See **Table 1** for information on unemployment and job openings data.

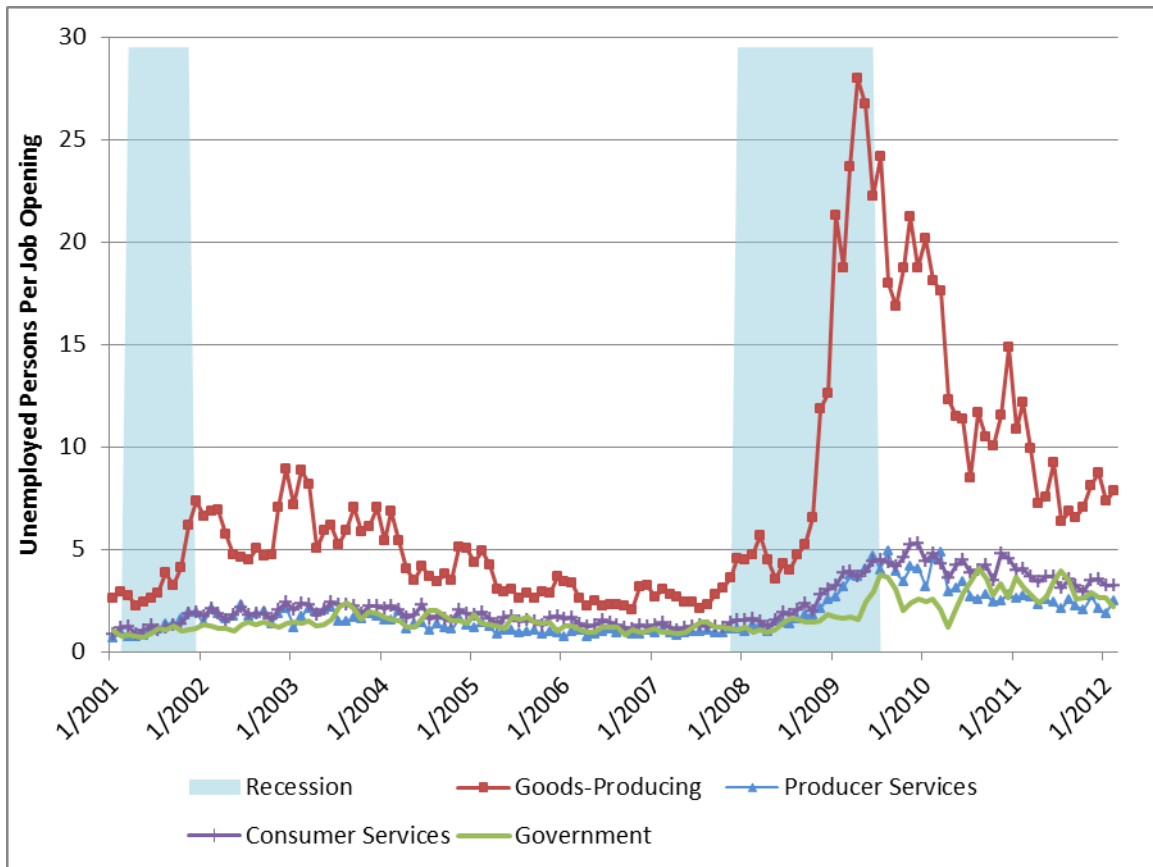
What this further implies is that the ratio does not say anything about the size of the sector. A higher ratio of unemployed persons per job opening might occur in sectors with relatively few unemployed persons or job openings. To know something about the size of the sector, the actual numbers of unemployed persons and job openings are needed.

Table 1 shows the ratio of unemployed persons per job opening by sector for each month from January 2001 through February 2012. The figure highlights several consistent patterns across industrial sectors. First the ratios are consistently higher for the goods-producing sector possibly indicating increased difficulty in finding work. As shown in the figure, from January 2001 through February 2012, the ratio is consistently higher in the goods-producing sector regardless of the economic cycle.

Second, the ratio is much more variable within the goods-producing sector. By the end of the recession in June 2009, the ratio of unemployed persons per job opening rises to 22.2 for the goods-producing sector. This is in comparison to ratios of 4.7 for producer services, 4.4 for consumer services and 2.9 for the government sectors. After the recession, the ratio in the goods-producing sector fell by a larger amount than any other sector—by 14.4 unemployed persons for every job opening in the goods-producing sector, 2.2 for producer services, 1.2 for consumer services and 0.7 for government—from June 2009 to February 2012.¹²

¹² Because BLS does not produce seasonally adjusted data for unemployment or job openings by industry or sector, the ratios constructed for the figure are also unadjusted for seasonality.

Figure 3. Ratio of Unemployed Persons Per Job Opening Across Industrial Sectors
 Monthly Data from January 2001 through February 2012, Not Adjusted for Seasonality



Source: Data on unemployed persons are from the CPS and data on job openings are from the JOLTS.

Notes: Only data that are not adjusted for seasonality are available for unemployment by industry. See **Table I** for information on unemployment and job openings data.

The higher ratios in the goods-producing sector are accompanied by decreases in employment within this sector. Goods-producing employment drops from 22.0 million in December 2007 to a low of 17.7 million in February 2010, seven months after the end of the recession. The 4.3 million decrease in employment is larger than the 2.4 million decrease in producer services and 2.1 million decrease in consumer services, which occur during the same months.¹³

How much employment in the goods-producing sector relates to cyclical aspects of the economy, or how much is part of a long-term trend of decreased employment, is uncertain.¹⁴ In February

¹³ These numbers correspond to the beginning of the recession in December 2007 to the lowest level of employment—October 2009 for producer services and January 2010 for consumer services. The decreased employment corresponds to an increased number of unemployed persons who worked in each of these industries. During the same months, unemployment rises by 1.6 million in goods-producing, 1.4 million in producer services, and 1.9 million in consumer services sectors.

¹⁴ For example, higher housing prices might have temporarily prevented declines in employment in the manufacturing industry. See Kerwin Ko Charles, Erik Hurst, and Matthew J. Notowidigdo, *Manufacturing Busts, Housing Booms, and Declining Employment: A Structural Explanation*, Federal Reserve Bank of Atlanta, papers presented at the conference on Employment Consequences of the Great Recession, Atlanta, GA, September 14, 2012, <http://www.frbatlanta.org/> (continued...)

2012, employment in the goods-producing sector was 18.2 million, a 0.5 million increase from the depth of the recession, but still lower than months preceding the recession. At the beginning of the recession in December 2007, goods-producing employment was 22.0 million and was even higher yet in January 2001 at 24.5 million. To return to the January 2001 employment levels, goods-producing employment would have to increase by 34.6% (8.3 million). In manufacturing, which is the largest goods-producing industry, employment decreased from 13.7 million in December 2007 to 11.5 million in February 2010 and then up by 0.4 million to 11.9 million in February 2012.¹⁵ Manufacturing employment would have to increase by 43.7%, or 5.2 million to return to employment levels in January 2001.

Fewer jobs in the manufacturing and goods-producing sector as a whole has led to a disproportionate rise in unemployment among male workers. Males, especially the non-college educated, are less likely to be employed in the 2007-2009 recession and previous recessions. The lower employment may relate to disproportionately more persons unemployed from the goods-producing industries like manufacturing and construction. Women on the other hand, have historically been more likely to be employed in less cyclical industries, such as services and public administration.¹⁶

Knowing that the goods-producing sector has decreased in employment for more than a decade and that the ratio of unemployed persons is consistently higher raises questions about the long-term prospects of the sector and whether policies might make a difference. Whether prospects exist to encourage growth in the manufacturing sector or whether there may be a need to facilitate the transition for unemployed persons in this sector is beyond the scope of this CRS report.

Also, the disproportionate impact of the recession on manufacturing and construction industries raises questions on whether these industries might deserve additional attention during recessionary periods. Even though the ratio for goods-producing jobs has reduced, that may not imply that establishments are hiring all the formerly employed workers. Unemployed workers in these industries may be transitioning to other opportunities.

The ratio of unemployed persons per job opening for consumer services is a relatively low 3.5 in 2011. This sector-wide ratio is lower partly because of lower ratios in the education and health services industry, which is 2.1. The remaining industries had ratios above the sector-wide average ranging between 4.2 and 4.6.

This consumer services sector weathered the recession with a less significant decrease in employment. From December 2007 to February 2012, employment decreased in the consumer

(...continued)

documents/news/conferences/12employment_charles_hurst_noto.pdf. See also CRS Report R41898, *Job Creation in the Manufacturing Revival*, by Marc Levinson.

¹⁵ Data are seasonally adjusted and from the Current Employment Survey maintained by the Bureau of Labor Statistics: <http://data.bls.gov/pdq/querytool.jsp?survey=ce>.

¹⁶ See Hilary W. Hoynes, Douglas L. Miller, and Jessamyn Schaller, *Who Suffers During Recessions?*, NBER, Working Paper no. 17951, March 2012, <http://www.nber.org/papers/w17951>, and Kerwin Ko Charles, Erik Hurst, and Matthew J. Notowidigdo, "Manufacturing Busts, Housing Booms, and Declining Employment: A Structural Explanation," Federal Reserve Bank of Atlanta, papers presented at the conference on Employment Consequences of the Great Recession, Atlanta, GA, September 14, 2012, http://www.frbatlanta.org/documents/news/conferences/12employment_charles_hurst_noto.pdf.

services sector by .001 million employees. By comparison, goods-producing employment decreased by 3.7 million.

The Ratio of Unemployed Persons per Job Opening Within the Goods-Producing Sector

As shown in the previous section, the ratio of unemployed persons per job opening for the goods-producing sector largely fluctuates with the business cycle in larger proportion to other sectors. To further investigate changes in the ratio over time, each of the goods-producing industries—mining and logging, construction, and manufacturing—are graphed below. A finding in this section is that the ratio for manufacturing and construction rises to very high levels during the 2007-2009 recession.

The ratio of unemployed persons per job opening for goods-producing industries may be of particular interest in that the U.S. Department of Commerce and others suggest that goods-producing industries may provide more benefits relative to other industries. For example, from 2002 through 2011, labor productivity for manufacturing increased more rapidly than aggregate productivity with an average annual increase of 3.4% for manufacturing and 2.3% for all businesses. Since the BLS began publishing hourly earnings, wage growth in the manufacturing industry has kept pace with the private sector increasing by 10.2% in the manufacturing industry and by 10.0% for the private sector. In addition, the Department of Commerce and the National Science Foundation note that the majority of expenditures for Research and Development, 70.1% in 2009, takes place within the manufacturing industry. Note, however, that employment in the manufacturing industry has been decreasing. From 2007 through 2011, total non-farm sector employment decreased by 4.5% in comparison to 15.5% in the manufacturing industry.

Figure 4 shows the ratios of unemployed persons per job opening for the goods-producing industries of mining and logging, construction, and manufacturing. The figure shows that the goods-producing industries are hit hard by the recession.¹⁷ The not seasonally adjusted ratio of unemployed persons per job opening rises to its highest level since the beginning of the data in 2001—66.8 in April 2009 for construction, 31.6 in July 2009 for mining and logging, and 20.7 in May 2009 for manufacturing.¹⁸

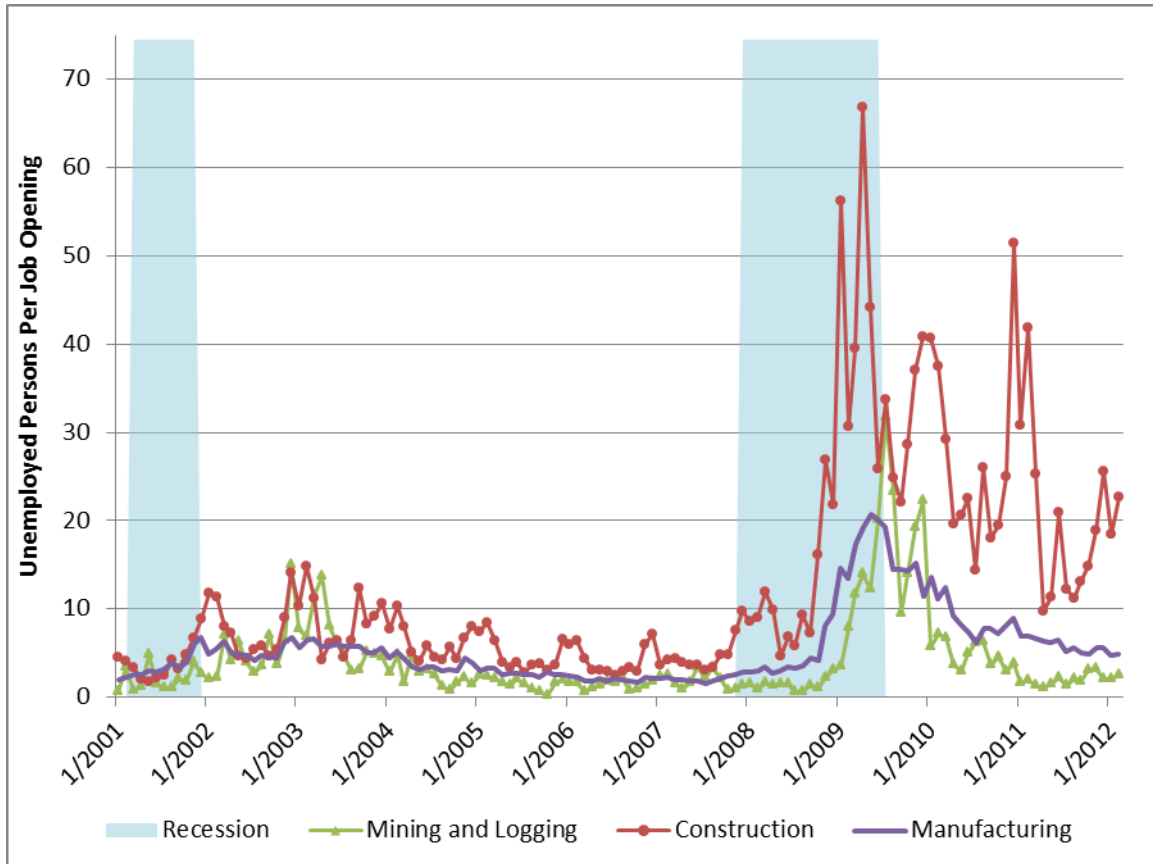
Table A-1 in the Appendix lists the ratios of unemployed persons per job opening for individual industries within the producer services and consumer services for the years 2001 through 2011. The table shows that average monthly ratios of unemployed persons per job opening for the construction and manufacturing sectors are higher for all years, more than twice the other producer and consumer services and government sector. Also, at the high points within the recession, the ratios for the goods-producing industries are more than twice the ratios of the other

¹⁷ During the 137 months since the beginning of the dataset (2001), the ratio of unemployed persons per job opening is higher than the services industry or government sector for every month except two for the construction industry and for 10 months for the manufacturing industry.

¹⁸ As precautionary notes, JOLTS data do not include sole proprietors (or individual contractors), which may inflate the ratios depending on how many households hire sole proprietors. In addition, the height of these peaks may partly reflect the seasonality of the data, but even when averaging the monthly information into years, in the **Appendix** shows that the peak of the ratios in 2009 for mining and logging (12.6), construction (34.4) and manufacturing (15.8) are more than twice that of the other industries.

services-producing industries (12.6 for mining and logging, 34.4 for construction, and 15.8 for manufacturing in comparison to the highest ratio in the services-producing sectors of 6.2 in trade, transportation and utilities).

Figure 4. Unemployed Persons Per Job Opening For Goods-Producing Industries
 Monthly Data from January 2001 through February 2012, Not Adjusted for Seasonality



Source: Data on unemployed persons are from the CPS and data on job openings are from the JOLTS.

Notes: Only data that are not adjusted for seasonality are available for unemployment by industry. See **Table A-I** for information on unemployment and job openings data.

Discussion

The analysis presented in this report highlights four key findings:

1. The ratio of unemployed persons per job opening is highly correlated with the unemployment rate between 2001 and 2012.
2. The ratio of unemployed persons per job opening rises during the recessionary periods covered in this data set. In the 2007-2009 recession, the ratio rises to very high levels, especially in the goods-producing industries (construction, manufacturing, mining and logging). The higher ratio indicates more unemployed persons for every job opening.

3. Although the ratio is highly correlated with changes in the unemployment rate, the ratio saw modest improvements coming out of the recent recession sooner than the reductions in the unemployment rate. Because job openings was unable to anticipate the high point in unemployment rates after the 2003 recession and because of a limited number of years since the data were first collected (starting in 2001), more years of data would be needed to assess whether and under what circumstances might job openings serve as an early indicator to unemployment.
4. Even though the ratio has reduced, it remains at higher levels than prior to the 2007-2009 recession. Three years after the end of the recession, the ratio still remains higher than any month in the data set prior to the 2007-2009 recession. This may have to do with the depth of the recession and slow job growth since the end of the recession.

A variety of labor market indicators show that the 2007-2009 recession is one of the most severe recessions in the post-World War II era. Unemployment, employment, labor force participation, and hours worked all indicated a substantial deterioration in labor market conditions.¹⁹ The ratio of unemployed persons per job opening is similar to the unemployment rate with higher ratios during recessions and lower ratios during periods of economic growth, but with some nuanced differences to unemployment rates. For four months following the 2007-2009 recession, unemployment rates continued to climb to 10.0 until October 2009, whereas the ratio of unemployed persons per job opening began to decrease one month after the end of the recession in July 2009. The ratio of unemployed persons per job opening may serve as a useful addition to other labor force statistics providing information on the demand for workers by employers and the population of persons who are currently available for work.

¹⁹ Michael W. Elsby, Bart Hobijn, and Aysegul Sahin, *The Labor Market in the Great Recession*, NBER, Working Paper no. 15979, May 2010, <http://www.nber.org/papers/w15979>.

Appendix. Additional Statistics by Industry and Information About the Datasets

This appendix provides data on the ratio of unemployed persons per job opening by industry and year and information about potential limitations of the data.

Table A-1 shows the number of unemployed persons per job opening by industry for each year from 2001 through 2011. The table provides monthly averages for each calendar year and is constructed using data on unemployment from the Current Population Survey (CPS) and data on job openings from the Job Openings and Labor Turnover Survey (JOLTS).

Table A-1. Unemployed Person Per Job Opening By Industry and Year
Monthly Averages of Not Seasonally Adjusted Data from 2001 through 2011

Industry	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Goods-Producing	3.2	5.7	6.5	4.4	3.3	2.6	2.8	5.4	21.1	12.7	8.2
Mining and Logging	1.7	4.1	5.9	2.3	1.5	1.3	1.7	1.3	12.6	4.5	1.9
Construction	3.5	7.2	7.9	6.0	4.6	3.8	4.3	9.7	34.4	24.7	17.0
Manufacturing	3.2	5.1	5.8	3.7	2.7	2.0	2.1	3.9	15.8	8.7	5.9
Producer Services	1.1	1.8	1.7	1.4	1.0	0.9	1.0	1.5	3.8	3.0	2.4
Information	1.3	3.1	3.4	2.1	1.6	0.8	0.8	2.1	5.6	3.9	2.1
Financial Activities	1.0	1.5	1.6	1.3	0.9	0.8	1.1	1.7	3.9	3.0	2.8
Professional and Business Services	1.1	1.7	1.6	1.3	1.0	1.0	1.0	1.3	3.5	2.9	2.3
Consumer Services	1.2	1.9	2.2	1.9	1.6	1.3	1.3	1.9	4.2	4.2	3.5
Trade, Transportation, and Utilities	1.7	2.8	2.9	2.3	1.9	1.7	1.6	2.6	6.2	5.8	4.3
Education and Health Services	0.6	0.8	1.1	1.0	1.0	0.8	0.8	1.0	2.1	2.4	2.1
Leisure and Hospitality	1.5	2.4	2.6	2.2	1.8	1.5	1.5	2.4	6.0	5.5	4.2
Other Services	1.0	2.1	2.6	2.1	2.0	1.7	1.2	1.8	3.7	3.5	4.6
Government	1.0	1.3	1.7	1.6	1.4	1.1	1.1	1.3	2.4	2.6	3.0
Total	1.4	2.2	2.4	2.0	1.6	1.4	1.4	2.1	5.1	4.5	3.6

Source: Bureau of Labor Statistics, CPS and JOLTS.

Notes: The data are annual averages of the monthly ratio of unemployed persons per job opening, where the monthly ratios are not adjusted for seasonality.

Table A-2 provides additional information about the CPS and JOLTS data that may be useful in understanding the potential limitations of the statistics and analysis.

Table A-2. Description of the Data Used in this Analysis
 Current Population Survey (CPS) and Job Opening and Labor Turnover Survey (JOLTS)

Category	Current Population Survey For Estimates on the Number of Unemployed Persons	Job Openings and Labor Turnover Survey For Estimates on Job Openings
Description of the Dataset	The CPS is a survey of households that is designed to represent the civilian noninstitutional population of the United States. Included in the data are information on the labor force and other demographic characteristics.	JOLTS data provide demand-side indicators of labor and labor shortages at the national level. The data include information on job openings, hires quits, layoffs and discharges and involuntary separations.
Statistic Needed for Analysis	Number of Unemployed Persons as a measure of the excess supply of labor	Number of Job Openings as a measure of the demand by employers
Survey Respondents in the Sample	Each month, about 72,000 housing units are assigned for data collection, of which about 60,000 are occupied and thus eligible for interview. Information is obtained each month for about 110,000 persons 16 years of age or older.	The sample is drawn from approximately 8 million establishments in the ES-202 Quarterly Census of Employment and Wages (QCEW) file. This includes private nonagricultural establishments covered under the Unemployment Insurance (UI) system as well as Federal, State, and local government entities in the 50 States and the District of Columbia. Railroads are sampled from an auxiliary frame. The sample does not cover private households or agriculture, forestry, fishing and hunting. However, logging is included.
Are Data Available on a Monthly Basis?	Yes	Yes
Sample Size	Approximately 60,000 households	Approximately 16,000 business establishments
Definition of Statistic Used in the Analysis	Unemployment means not employed during the reference week but were available for work (excluding temporary illness) and had made specific efforts to find employment some time during the four-week period ending with the reference week. Individuals who were waiting to be recalled to a job from which they had been laid off need not have been looking for work to be classified as unemployed. People waiting to start a new job must have actively looked for a job within the last 4 weeks in order to be counted as unemployed. Persons must be at least 16 years old.	A job opening means an employer has a specific position and there is work available for that position. The position can be full-time or part-time, and it can be permanent, short-term, or seasonal. The establishment can start the job within 30 days, whether or not they find a suitable candidate. Also, there is active recruiting for workers from outside the establishment location.
Earliest Date that the Statistic was Available	January 1948	December 2000

Category	Current Population Survey For Estimates on the Number of Unemployed Persons	Job Openings and Labor Turnover Survey For Estimates on Job Openings
Difference in Who, or What, is Included in the Industry Statistics	Unemployment by industry is by last industry the person worked in and excludes new entrants.	Job openings by industry list the number of job openings reported by establishments for each industry. This includes all establishments.
Adjustment for Seasonality (Available Except for Unemployment by Industry)	Unemployment adjusted for seasonality is available for the U.S. and by region, but not by industry.	Job openings adjusted for seasonality is available in the aggregate, by region and by industry.
Differences in When Survey Respondent is Sampled	Persons are asked if they are unemployed during the reference week, which is usually the week including the 12 th day of the month.	Establishments are asked to report all job openings on the last business day of the month
Differences in the Most Recently Published Month	Data are published on the first week of the month for data collected during the reference week of the previous month.	Data are published on the second Tuesday or Thursday of each month with preliminary estimates from two months ago and final estimates from three months ago. For example, data published in December include preliminary estimates for October and final estimates for September.
Other Information Available in the Dataset	Unemployment levels by Age, Gender, Race, Education, Occupation and other characteristics are available. Also, the CPS collects information on other labor force statistics such as labor force participation and employment.	Researchers within the BLS are currently working on making data available by establishment size. Other variables besides job openings include employment, job hires, job quits, involuntary separations and other separations from job.
Website for Data	http://www.bls.gov/cps/ht	tp://www.bls.gov/jlt/

Source: CPS website http://www.bls.gov/opub/hom/homch1_itc.htm; and JOLTS website <http://www.bls.gov/jlt/>.

Table A-3. Aspects of the Data and the Ratio of Unemployed Persons Per Job Opening That May Be Relevant For This Report

Aspects	Description
Difference Between Employment and a Job	A job can be part-time or full-time and temporary or permanent. Also, when a person becomes employed, they may work more than one job.
Adjustment for Seasonality	Data used from both sources are adjusted for seasonality except for unemployment by industry within the CPS. Because of this, the ratio of unemployed persons per job opening is not adjusted for seasonality.

Aspects	Description
Industry Unemployment Statistics	<p>Unemployment by industry includes only those who were formerly employed by an industry and excludes new entrants without previous work experience. The number of persons unemployed in the goods-producing and some other industries may be overstated in that persons who work in central offices are employed in the professional services industry. For example, an employee for an auto manufacturer working in the central office should be classified as working in the professional services industry. Thus some respondents who state the industry they last worked in as manufacturing, goods-producing or some other industry may be misclassified. Analysts from BLS note that efforts are made using other survey responses to minimize such potential errors and suggest that the amounts are small.</p>
When Information is Collected and What is Asked	<p>The differences on when information is collected can produce some differences on the number of unemployed and job openings. Statistics on unemployment are collected during the reference week, which is usually the week that includes the 12th day of the month. Survey respondents are asked if they were unemployed over the last four week period. The number of job openings is for the last business day of the month, which is a shorter period that may not capture as many job openings comparison to asking over the last four weeks.</p>
Years of Data	<p>The JOLTS data is only available from December 2000 onward, which does not provide any information for recessions in prior years. This maybe particularly relevant in assessing long-term changes such as slowed employment growth dating back 20 years or more.</p>
Who is not Sampled Within JOLTS	<p>The JOLTS data samples from the QCEW and does not include several establishment types such as sole proprietors, religious establishments and agricultural establishments. This might bias some estimates on job openings. For example, sole proprietors who work as contractors in the construction industry may not be included in the job openings statistics.</p>
Aggregate as Opposed to Group Specific	<p>Aggregate statistics with regard to the nation, its four Census regions and industry provide some information, but perhaps more information may be useful with regard to specific groups such as occupations and individual cities. CPS data provides information on the occupations, place of residence and other demographic statistics. However, JOLTS does not.</p> <p>Employers may have job openings and may be actively recruiting, but may not hire for a longer period of time. Examples of how this may occur is when employers are looking for exact matches to job openings, or when persons are available, but in different geographic locations.</p>

Aspects	Description
Sample Size	When considering smaller categories, sample sizes may approach smaller amounts, which may reduce the accuracy of the estimates. The CPS roughly samples 60,000 households and the JOLTS roughly samples 16,000 establishments. Even though the samples are weighted to reflect the rest of the population, small subcategories of the data may inherently result in larger variances. This may be especially true if the sub-categories still contain groups that are different in perhaps ways substantively important to understanding the statistic.

Source: Table prepared by the Congressional Research Service (CRS).

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