DHI Releases New Statistics on Labor Market Tightness by Job Title

This edition of the *DHI Hiring Indicators* introduces a new method for measuring labor market tightness. Section I contains highlights. Section II explains the new method and draws on the **DHI Vacancy and Application Flow Database** to implement it. Section III draws on the Job Openings and Labor Turnover Survey to present statistics on vacancy duration and recruiting intensity per vacancy. Section IV provides additional information about the *DHI Hiring Indicators* and DHI Group, Inc.

I. Highlights

1. This month's report introduces a new method for measuring labor market tightness based on the daily flow of applications per vacancy posting.
2. Unlike other approaches, our method yields tightness measures for highly detailed job categories. The new tightness measures are available monthly since February 2012 with a short lag, making them useful for diagnosing labor market developments in real time.
3. This report illustrates the new method for a dozen job titles with frequent vacancy postings:
    a. Labor market conditions for "Software Engineers," "Programmers," "Systems Administrators" and "Systems Engineers" have become tighter since 2012 relative to other jobs in the DHI Database. That is, these titles saw a fall in the relative daily flow of applications per posting.
    b. In contrast, "Database Administrators," ".Net Developers," "SQL Developers" and "Web Developers" experienced falling relative tightness since 2012. That is, these titles saw an increase in the relative daily flow of applications per posting.
    c. "Business Analysts," "Data Analysts," "C Developers" and "Quality Assurance Testers" have experienced no persistent changes in relative labor market tightness since 2012.
4. The **DHI-DFH Mean Vacancy Duration Measure** fell to 27.4 working days in November, 0.5 days below its revised value for October and 2.1 days below its historical peak in April 2016.

"The DHI tightness measures offer a novel and granular look at U.S. labor market conditions," said Dr. Steven Davis, William H. Abbott Professor of International Business and Economics at the University of Chicago Booth School of Business. "These new measures tell us which types of jobs face a scarcity of applicants, and which enjoy an abundance." Davis is a co-developer of the DHI Database and co-creator of the DHI-DFH Mean Vacancy Duration Measure and Recruiting Intensity Index.

"Attracting, hiring and retaining technology professionals continues to be a pain point for employers across the U.S., particularly as it relates to highly-skilled talent," said Michael Durney, President and CEO of DHI Group, Inc. "When we experience a tight labor market like we are today—with low unemployment rates and companies needing talent to remain competitive—professionals are in control and hold the ability to drive their careers forward in their hands."

II. Results Based on the DHI Vacancy and Application Flow Database

The **DHI Vacancy and Application Flow Database** links daily application flows to millions of online vacancy postings. The raw data come from DHI Group, Inc., which owns and operates several specialized online platforms for posting job vacancies and attracting applications. Employer-side clients comprise organizations that directly hire their own employees, recruitment firms that solicit applicants for third parties, and staffing firms that hire workers to lease to other firms. Vacancy postings are concentrated in technology sectors, software development, other computer-related occupations, engineering, financial services, and certain other professional occupations. The DHI Database currently contains nearly 8 million unique vacancy postings from more than 50,000 employer-side clients.[1] These postings have attracted 66 million applications since January 2012.[2] More than half the applications went to positions posted by recruitment and staffing firms.

When job openings are plentiful and few people seek new jobs, each vacancy posting tends to attract few applicants. In this situation, we say labor markets are "tight." Conversely, when job openings are scarce relative to job seekers, each posting tends to attract many applicants, and we say labor markets are "slack." We use DHI data on the daily flow of applications per vacancy posting to operationalize this concept of labor market tightness. Of course, applicant numbers also depend on job characteristics. Partly for this reason, we focus on tightness measures for particular job titles such as "C Developer," "Database Administrator," "Business Analyst" and "Quality Assurance Tester."

Figure II.1 plots the daily flow of applications per active vacancy posting in the DHI Database from February 2012 to November 2016. Three results stand out. First, there is a clear seasonal pattern, with a seasonal trough in December, as analyzed in some detail in last month's edition of the *DHI Hiring Indicators*. Second, there are strong upward moves in the daily flow of applications per posting in 2015 and the first half of 2016, followed by a partial reversal. Third, we find a nearly identical time-series pattern when we control for changes over time in the mix of postings across job titles. This result tells us that shifts in the mix of vacancy postings do not explain the large moves in daily application flows per posting. Other forces must be at work.

For example, DHI modified the functionality of its Dice.com platform during our sample period in ways that affect application flows. It streamlined the registration and application process for job seekers, improved the search engine available to job seekers, and made it possible for employers to signal particular jobseekers and solicit an application. DHI implemented the most important of these changes in December 2014, and they probably account for much of the growth in applications per posting during 2015.[3] DHI also removed information from vacancy postings that, in some cases, had facilitated applications outside the DHI system. Changes to Dice.com market shares of postings and applications could also affect our measures. Finally, as discussed above, changes in market tightness affect the flow of applications per vacancy posting.

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[1] Currently, the DHI Database draws mainly from DHI's Dice.com platform. Other DHI platforms include eFinancialCareers, Biospace, Rigzone, ClearanceJobs, Health eCareers.com, and Hcareers. Analysis of the DHI Database in this report draws on "Application Flows" by Steven J. Davis and Brenda Samaniego de la Parra.
[2] When posting a vacancy, the DHI client decides whether job seekers must file an application via email through the DHI platform or through an external URL operated by the client or a third party. In the first case, the DHI database records the number of completed email applications. In the second case, the database records how often job seekers click through to the external URL. We pool these two classes of vacancies and applications in this report.
[3] See Davis and Samaniego de la Parra (2016) for additional discussion.

Since it is not possible to confidently disentangle the various forces that drive changes in the daily application flows, we simply remove them from our tightness measures for specific job titles. To do so, we proceed as follows. First, we compute the raw daily flow of applications per posting at a monthly frequency for each job title. Second, we deflate the raw measure for each job title by the composition-adjusted flow in Figure II.1. Third, we multiply each deflated series by the 2015 average value of the composition-adjusted flow. This third step restores information about the level of daily applications per vacancy posting. Figure II.2, II.3 and II.4 plot the resulting tightness measures for selected job titles. Each job title considered in these figures has 25,000 or more distinct vacancy postings during our sample period.

Figure II.1 Daily Application Flows Per Vacancy Posting, February 2012 to November 2016
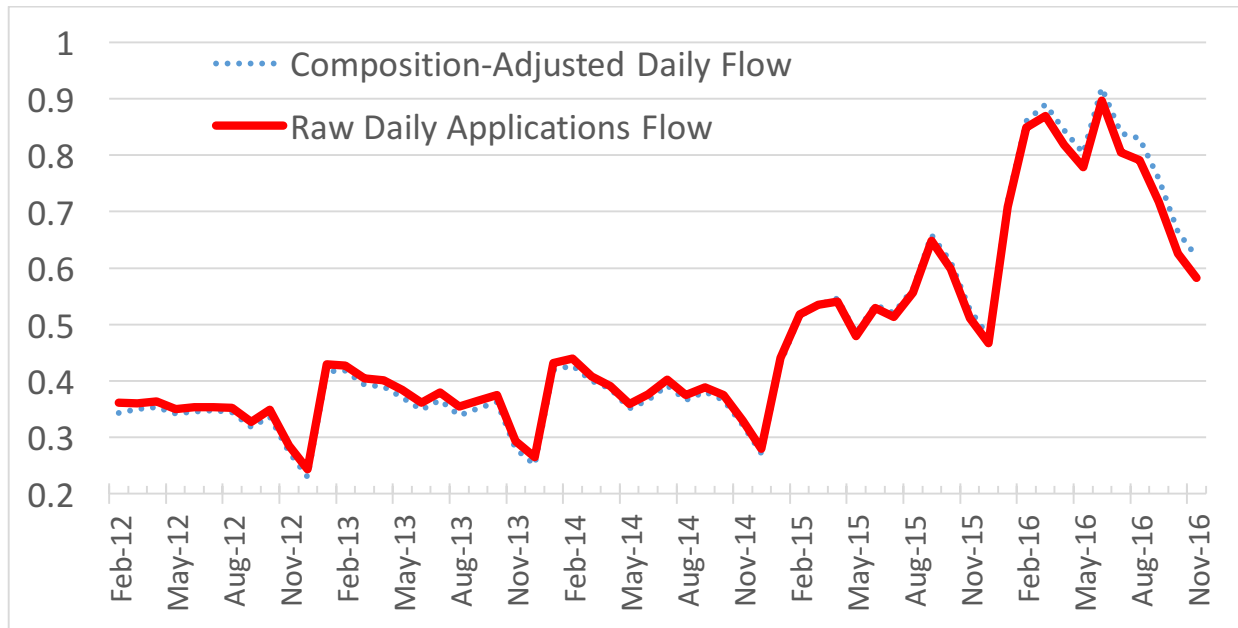
Note: This figure and the next three figures reflect data for job titles with at least 100 distinct vacancy postings in the DHI Database. The sample covers more than 3,000 job titles and contains about 5.8 million distinct vacancy postings. The "Composition-Adjusted Daily Flow" uses a regression method to control for changes in the mix of vacancy postings across job titles, as described in "Application Flows" by Davis and Samaniego de la Parra (2016).

Figure II.2 highlights four job titles that have experienced large increases in labor market tightness since 2012 relative to other job titles covered by the DHI Database. The figure shows declines since 2012 of roughly one-third to one-half in the daily flow of applications per vacancy posting for "Programmers," "Software Engineers," "Systems Administrators" and "Systems Engineers." These large declines indicate large increases in relative labor market tightness for these job titles.

Figure II.3 highlights four job titles that experienced the opposite pattern: "Database Administrators," ".Net Developers," "SQL Developers" and "Web Developers." Again, the changes are large. For example, the relative applications flow per posting for ".Net Developers" more than doubled from 2012 to 2016. Lastly, Figure II.4 highlights four job titles that experienced no persistent changes in relative tightness since 2012: "Business Analysts," "Data Analysts," "C Developers" and "Quality Assurance Tester." These comparisons illustrate how the DHI Database can use to determine which types of jobs experienced greater relative tightness or slackness over time, and by how much.

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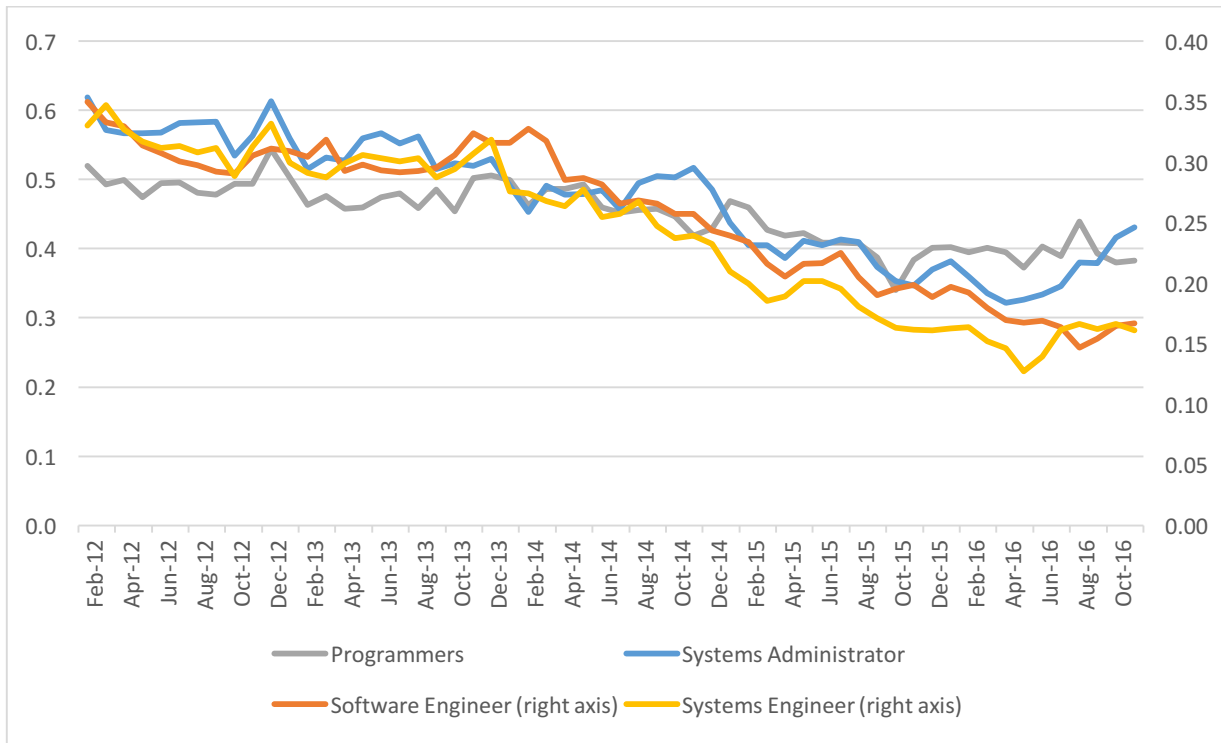Figure II.2 Selected Job Titles with Increased Relative Tightness Since 2012

Legend: Programmers — Systems Administrator — Software Engineer (right axis) — Systems Engineer (right axis)

Figure II.3 Selected Job Titles with Falling Relative Tightness Since 2012

Legend: Database Administrator — .NET Developer — SQL Developer — Web Developer (right axis)
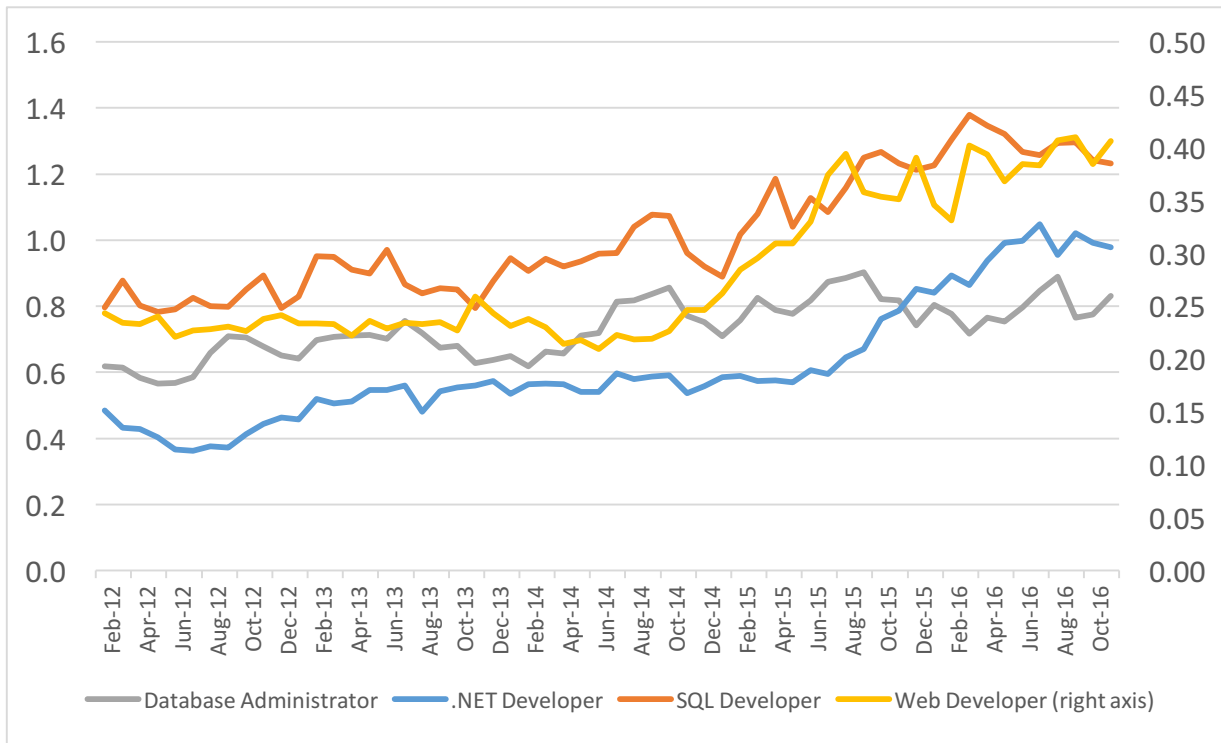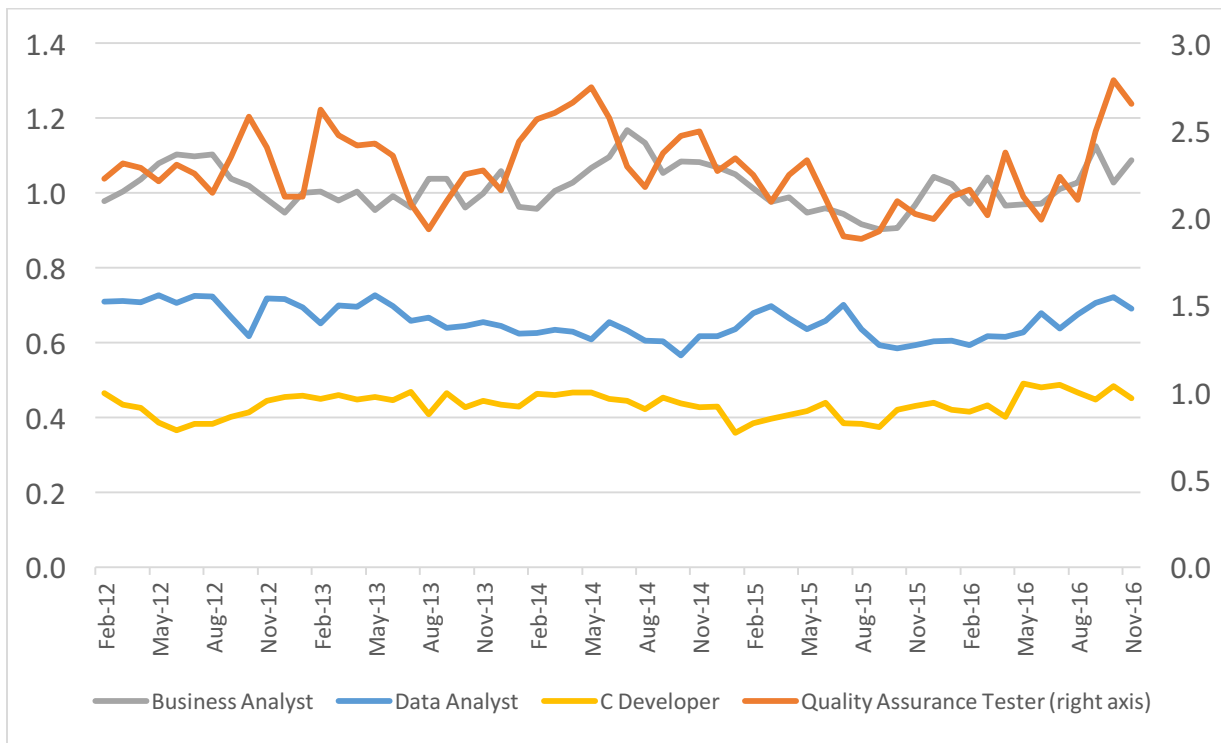
Figure II.4 Selected Job Titles No Persistent Changes in Relative Tightness Since 2012

III. Results Based on the Job Openings and Labor Turnover Survey

The **DHI-DFH Mean Vacancy Duration Measure** fell to 27.4 working days in November, 0.5 days below its revised value for October and 2.1 days below its historical peak in April 2016. Figure III.1 shows the evolution of the mean vacancy duration in the United States since 2001. This vacancy duration measure reflects the vacancy concept in the Job Openings and Labor Turnover Survey (JOLTS). Specifically, a job opening gets "filled" according to JOLTS when a job offer for the open position is accepted. So the vacancy duration statistics refer to the average length of time required to fill open positions. Typically, there is also a lag between the fill date and the new hire's start date on the new job.

Figure III.2 displays four other indicators of labor market slack alongside the mean vacancy duration. All five measures show a pronounced tightening of U.S. labor markets since 2009. Three of the measures – mean vacancy duration, the vacancy-unemployment ratio, and the ratio of vacancies to the number of persons unemployed for 26 weeks or less – now exceed their peak values prior to the recession of 2008-2009. The post-recession rise in the mean vacancy duration is especially pronounced.

The **DHI-DFH Recruiting Intensity Index,** plotted in Figure III.3, was 1.01 in November, essentially unchanged from its revised level in October.   Tables III.1 and III.2 below report industry-level statistics for mean vacancy duration and recruiting intensity per vacancy, respectively.

Figure III.1. DHI-DFH Measure of National Mean Vacancy Duration, January 2001 to November 2016
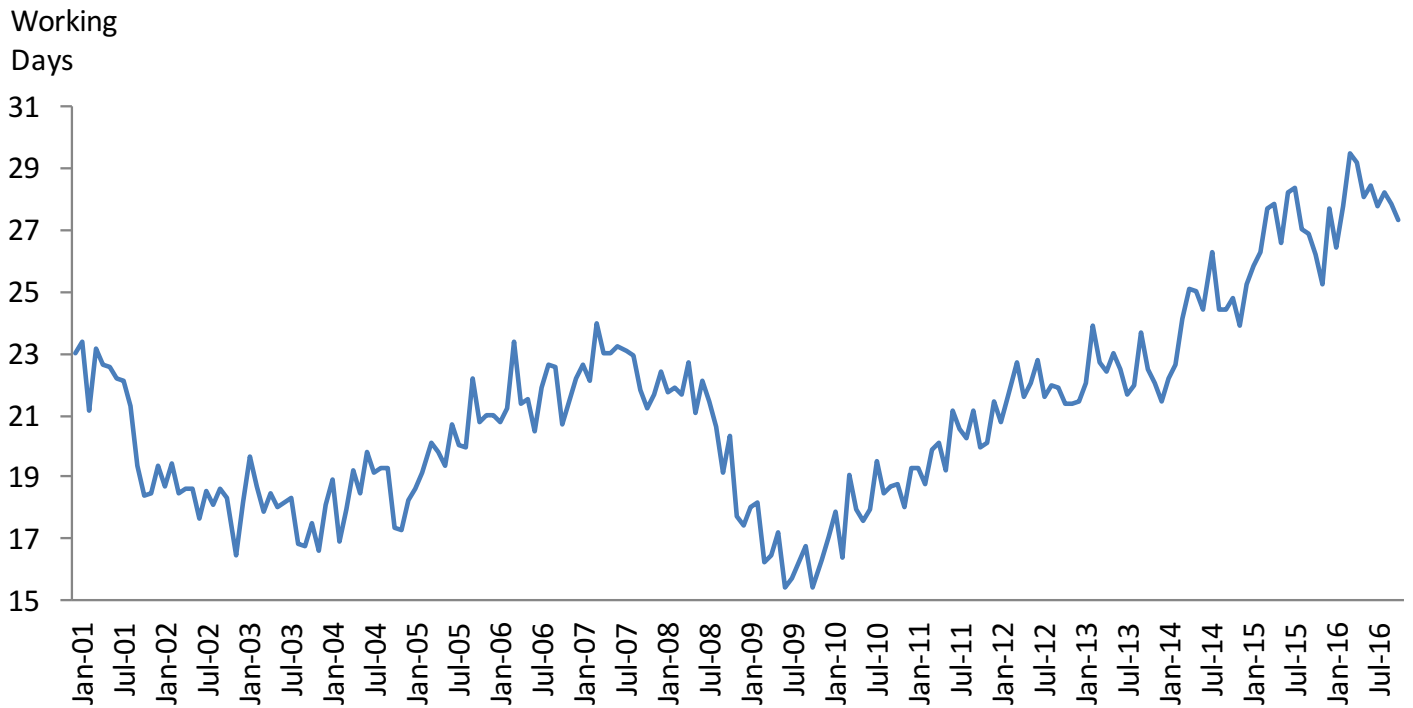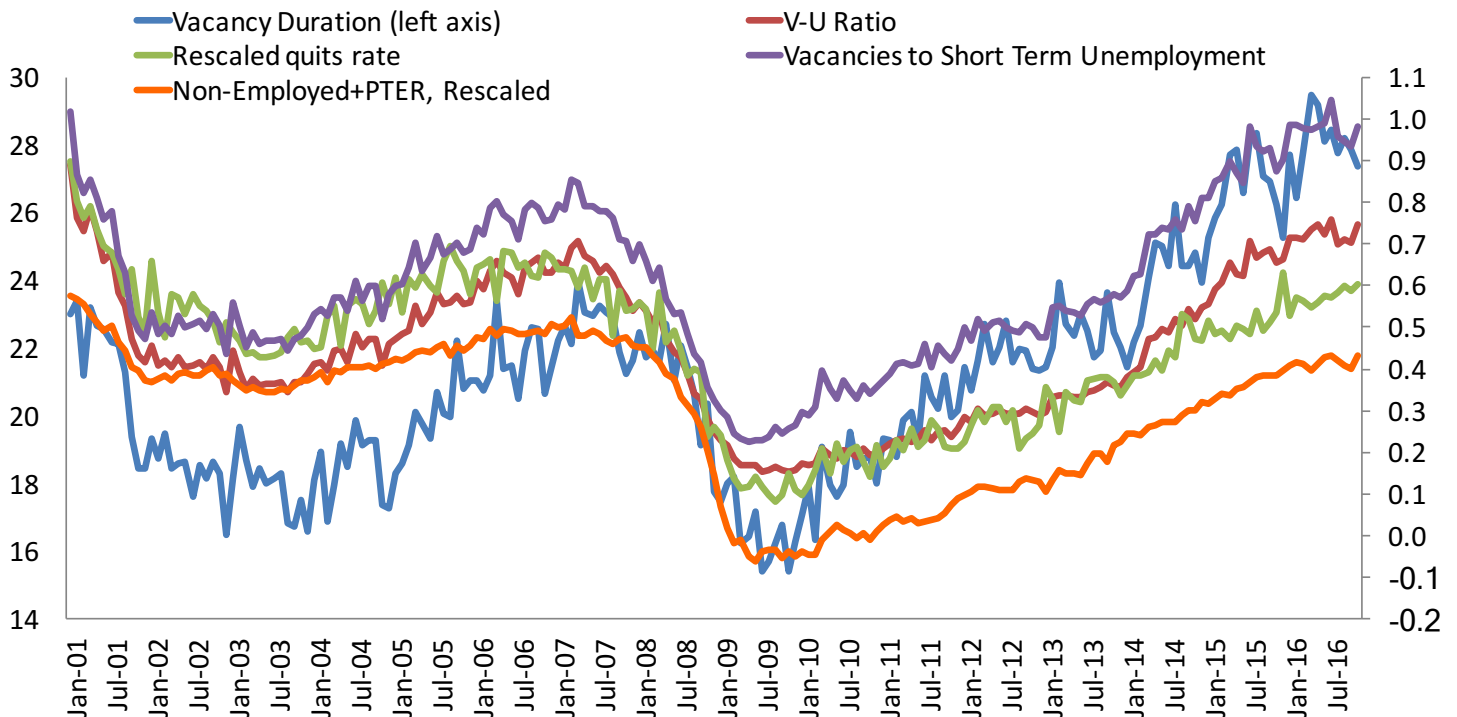
Working
Days

Figure III.2. National Labor Market Slackness Measures, January 2001 to November 2016

Short Term Unemployment is the number of persons unemployed for 26 weeks or less. The Quit Rate is rescaled to have the same mean and variance as the Vacancy-Unemployment Ratio from January 2001 to date. Non-Employment + PTER, an index developed by Hornstein, Kudlyak and Lange, reflects all persons who are not employed (weighted by labor force attachment) plus persons who are working part time for economic reasons and would prefer to work full time. Here, their index is multiplied by minus one and then rescaled to have the standard deviation as the Vacancy-Unemployment Ratio from January 2001 to date.

Notes: Short Term Unemployment is the number of persons unemployed 26 weeks or less. The Quit Rate is rescaled to have the same mean and variance as the Vacancy-Unemployment Ratio from January 2001 to date. Non-Employment + PTER, an index developed by Hornstein, Kudlyak and Lange, reflects all persons who are not employed (weighted by

labor force attachment) plus persons working part time for economic reasons who would prefer full-time work full. Here, their index is multiplied by minus one and then rescaled to have the standard deviation as the Vacancy-Unemployment Ratio from January 2001 to date.

Figure III.3.DHI-DFH Index of Recruiting Intensity per Vacancy, January 2001 to November 2016
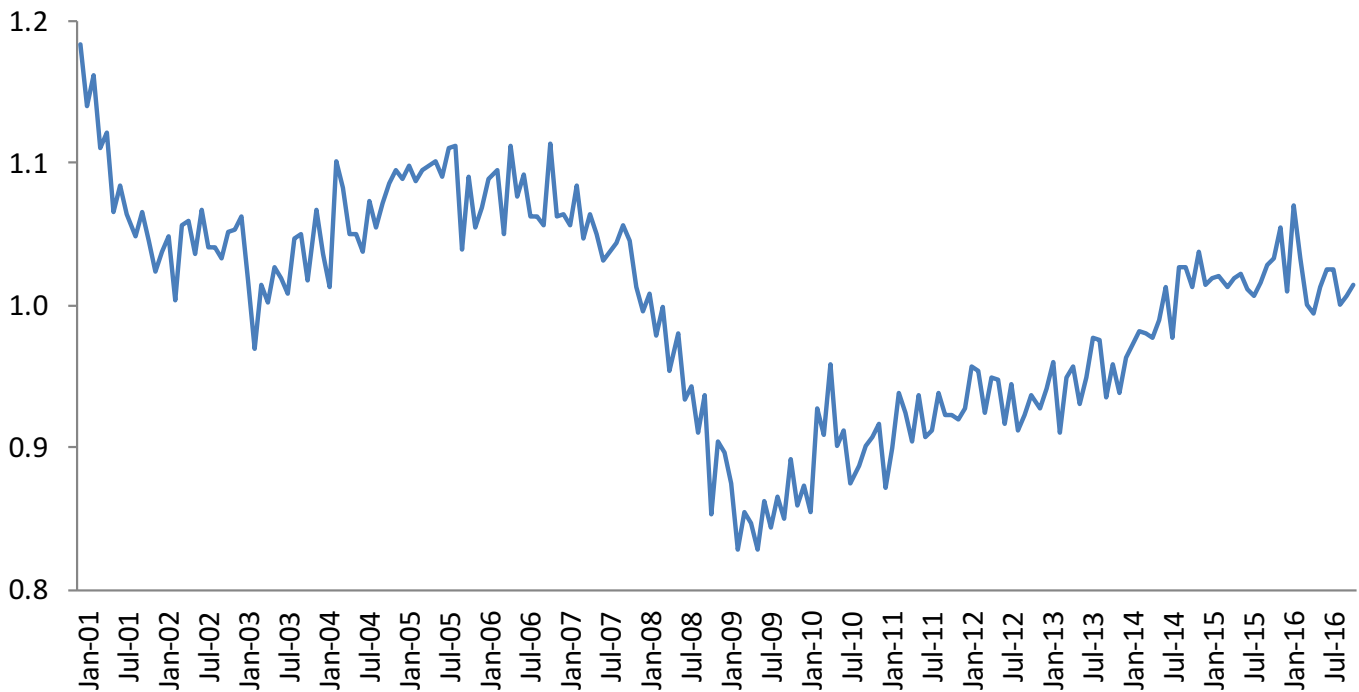

Table III.1. DHI-DFH Measure of Mean Vacancy Duration by Industry and Time Period, No. of Working Days, January 2001 to November 2016

	2001 to 2003	2004 to 2006	2008	2009	2010 to 2012	2013	2014	2015	Jan.-Nov. 2016
Resources	12.0	14.0	18.1	13.5	18.7	17.3	22.5	16.5	13.4
Construction	7.9	8.8	7.3	4.3	6.1	9.5	10.9	11.5	15.5
Manufacturing	17.4	20.9	21.6	13.8	23.4	28.4	29.2	30.6	32.8
Wholesale and Retail Trade	14.2	15.8	15.5	13.1	15.9	19.8	18.6	20.6	23.6
Warehouse, Trans. & Utilities	18.6	17.0	20.6	11.3	18.2	22.5	23.9	28.0	27.7
Information	25.8	36.0	34.4	23.4	40.9	36.5	36.7	35.3	30.4
Financial Services	28.0	32.1	27.6	25.7	33.3	36.2	37.2	43.0	45.6
Professional and Business Services	18.3	19.9	21.3	16.6	18.8	19.6	21.9	26.5	26.2
Education	21.3	25.0	22.0	18.5	21.1	23.8	26.5	31.1	29.5
Health Services	39.1	35.8	36.4	29.8	33.5	34.6	38.4	45.0	47.6
Leisure and Hospitality	13.7	14.8	14.9	10.4	13.3	16.6	19.3	19.7	19.5
Other Services	22.5	18.6	25.2	16.9	18.9	20.1	20.9	22.0	28.3
Government	33.2	30.7	35.7	32.2	33.0	35.9	37.7	38.0	36.9
Non-Farm	19.3	20.0	21.1	16.6	20.0	22.5	24.1	26.8	28.0

Table III.2. DHI-DFH Recruiting Intensity Index by Industry and Time Period, January 2001 to November 2016

	2001 to 2003	2004 to 2006	2008	2009	2010 to 2012	2013	2014	2015	Jan.-Nov. 2016
Resources	0.99	1.06	1.05	0.70	1.00	0.98	1.04	0.92	1.04
Construction	1.07	1.04	0.89	0.90	1.01	0.94	0.89	0.88	0.86
Manufacturing	1.02	1.09	0.95	0.85	0.94	0.88	0.92	0.92	0.95
Wholesale and Retail Trade	1.05	1.10	0.96	0.84	0.89	0.94	1.04	1.04	1.02
Warehouse, Trans. & Utilities	0.96	1.13	0.94	0.92	0.96	1.01	1.11	1.10	1.06
Information	1.10	1.08	0.87	0.83	0.91	1.06	1.10	1.15	1.10
Financial Services	1.06	1.09	0.99	0.84	0.87	0.99	0.95	0.95	0.92
Professional and Business Services	1.08	1.07	0.90	0.83	0.94	0.96	1.00	1.01	1.00
Education	1.00	0.99	1.04	0.96	0.99	0.95	1.00	1.00	1.04
Health Services	1.08	1.04	1.01	0.93	0.89	0.92	0.96	1.01	1.00
Leisure and Hospitality	1.08	1.08	0.97	0.84	0.88	0.92	0.96	1.00	1.01
Other Services	1.02	1.07	0.94	0.96	0.95	0.98	0.96	1.04	0.96
Government	1.05	1.05	0.94	0.87	0.93	0.93	0.99	1.09	1.14
Non-Farm	1.05	1.08	0.95	0.86	0.92	0.95	1.00	1.02	1.02

IV. About the DHI Hiring Indicators

The creation of the **DHI Vacancy and Application Flow Database** is a cooperative effort between DHI Group, Inc. and two researchers at the University of Chicago, Professor Steven J. Davis and Brenda Samaniego de la Parra, a Ph.D. student. Their research paper on "Application Flows" contains additional information about the DHI Database and the analysis of the DHI data in this report.

The **DHI-DFH Recruiting Intensity Index** quantifies the effective intensity of recruiting efforts per vacancy by employers with vacant job positions. The index is normalized to an average value of 1.0 for the period from January 2001 to December 2012. It complements the monthly Job Openings Rate produced by the U.S. Bureau of Labor Statistics (BLS) from the Job Openings and Labor Turnover Survey.

The pace of new hires in the economy depends on the number and types of job seekers, the number and types of job vacancies, and employer actions that affect how quickly vacant jobs are filled. These actions include the choice of recruiting methods, expenditures on help-wanted ads, how rapidly employers screen job applicants, hiring standards, and the attractiveness of compensation packages offered to prospective new hires. The BLS Job Openings Rate captures the availability of job vacancies in the economy, while the **DHI-DFH Recruiting Intensity Index** captures the intensity of employer efforts to fill those vacancies. The index is available at the national, regional and industry levels and by establishment size class (number of employees).

The index construction follows the method developed by Steven J. Davis, R. Jason Faberman and John Haltiwanger (DFH) in "The Establishment-Level Behavior of Vacancies and Hiring," published in the May 2013

issue of the *Quarterly Journal of Economics,* and extended to industry and regional indices in "[Recruiting Intensity during and after the Great Recession: National and Industry Evidence](#)," published in the May 2012 issue of the *American Economic Review.*

The **DHI-DFH Vacancy Duration Measure** quantifies the average number of working days taken to fill vacant job positions. It supplements other measures often used to assess the tightness of labor market conditions such as the ratio of vacant jobs to unemployed workers.

Vacancy durations depend on the relative numbers of job seekers and job vacancies, the recruiting and search methods available to employers and job seekers, employer recruiting intensity per vacancy, the search intensity of job seekers, and the degree to which the requirements of jobs on offer match the skills, locations and preferences of job seekers. Other things equal, a larger ratio of job vacancies to job seekers yields longer vacancy durations.

The **DHI-DFH Vacancy Duration Measure** follows the method developed by Steven J. Davis, R. Jason Faberman and John Haltiwanger (DFH) in "[The Establishment-Level Behavior of Vacancies and Hiring](#)," published in the May 2013 issue of the *Quarterly Journal of Economics.* That method combines a simple model of hiring dynamics with data on hires and vacancies from the [Job Openings and Labor Turnover Survey](#) (JOLTS) conducted by the U.S. Bureau of Labor Statistics. Using their model and the JOLTS data, DFH estimate an average daily job-filling rate for vacant job positions in each month. Taking the reciprocal of the daily job-filling rate yields the **DHI-DFH Vacancy Duration Measure**, which is available at the national, regional and industry levels and by establishment size class.

The average daily job-filling rate is closely related to the "vacancy yield," the ratio of hires during the month to the stock of vacancies on the last business day of the previous month. Unlike the vacancy yield, however, the daily job-filling rate (and the **DHI-DFH Vacancy Duration Measure**) adjusts for job vacancies that are posted and filled within the month. Working days are defined as Mondays through Saturdays, excluding major national holidays.

About DHI Group, Inc.

DHI Group, Inc. (NYSE: DHX) is a leading provider of data, insights and connections through our specialized services for professional communities including technology and security clearance, financial services, energy, healthcare and hospitality. Our mission is to empower professionals and organizations to compete and win through expert insights and relevant employment connections. Employers and recruiters use our websites and services to source and hire the most qualified professionals in select and highly-skilled occupations, while professionals use our websites and services to find the best employment opportunities in and the most timely news and information about their respective areas of expertise. For over 25 years, we have built our company on providing employers and recruiters with efficient access to high-quality, unique professional communities, and offering the professionals in those communities access to highly-relevant career opportunities, news, tools and information. Today, we serve multiple markets located throughout North America, Europe, the Middle East and the Asia Pacific region.

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