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LABOR MARKET SLOWING AND SUPPLY CONSTRAINTS

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Labor market improvement in 2016 appears to have slowed relative to the previous couple of years. The unemployment rate has declined only 0.1 percentage point so far this year, compared to the ¾ percentage point decline in 2015. Payroll gains have stepped down to a pace of 180,000 per month so far in 2016, whereas they grew by nearly 230,000 in 2015.

Loosely speaking, the slowdown in the pace of labor market improvement could be due to a slowdown in the growth of labor demand, to increasing labor supply constraints (with an unchanged pace of aggregate demand expansion), or to some combination of the two. This memo pertains to the question of whether we should interpret the slowdown in labor market improvement as signaling that the labor market is approaching capacity, and thus that supply constraints are beginning to bind.[1]

After briefly describing the labor market data for the year-to-date in section 1, we turn in section 2 to aggregate evidence for labor supply constraints. We first look at the evolution of several key labor market variables in the four quarters before and after the unemployment rate gap turned negative in the previous three expansions. We find no evidence that the labor market hits a functional supply constraint at our estimate of the natural rate (or in a ½ percentage point neighborhood around it).

While several prominent indicators of labor market tightness do suggest that hiring difficulties have risen over the last several years, measures of wages and compensation do not suggest binding labor supply constraints. In section 3, we review this evidence, and then look at disaggregated data to assess if there are pockets of labor market tightness that are not yet visible in the aggregate data. Here, we find some speculative evidence—as shown by the combination of accelerating wages, decelerating employment, and falling vacancy-filling rates—that some sectors have experienced tightening this year that may have contributed to the slowdown in overall employment growth.

1   Facts on the Recent Pace of Labor Market Improvement

As shown in Table 1, several important labor market indicators suggest that the labor market has improved at a somewhat slower pace this year than in either 2014 or 2015. Most notably, payroll employment gains have slowed from a pace of about 240,000 per month in 2014 and 2015 to about 180,000 so far in 2016.[2] A couple of additional facts about the labor market in 2016 are:

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[1] One might think of this in the framework of a labor demand and labor supply diagram. If the labor supply curve is convex, then a constant pace of growth in labor demand will translate into smaller increases in labor input but faster increases in wages.

[2] The BLS recently released their preliminary estimate of the benchmark revision, which lowered the level of

- The unemployment rate has fallen only 0.1 percentage point through October of this year, compared to the ¾ percentage point decline last year.
- The share working part-time for economic reasons has edged down 0.1 percentage point, after having fallen by ¾ percentage point on average over the previous two years.
- In contrast, the improvement in the employment-to-population ratio relative to its trend (0.6 percentage point) has shown no sign of slowing this year compared with the average pace over the previous two years (0.6 percentage point). That said, the nature of this improvement looks very different than in the previous years. Specifically, the increase in LFPR relative to trend of 0.6 percentage point was substantially faster than the pace seen over 2014 and 2015, while the improvement in the unemployment rate gap was notably slower. This pattern is consistent with our forecasts in recent Tealbooks, in which we expected that a rising LFPR gap would attenuate declines in the unemployment rate.[3]

Table 1: Pace of improvement in selected labor market indicators

	2014Q4/ 2013Q4	2015Q4/ 2014Q4	2016Oct/ 2015Q4*
	(Changes, percentage points)		
Epop	0.7	0.2	0.3
LFPR	-0.1	-0.3	0.3
Unemployment Rate	-1.3	-0.7	-0.1
PTER	-0.8	-0.7	-0.1
Average payroll gains	250,000	230,000	180,000
Epop Gap	0.9	0.4	0.6
LFPR Gap	0.3	0.0	0.6
RU Gap	1.0	0.6	0.2

Note: The Employment-population ratio (Epop) gap is approximately equal to LFPR Gap + (2/3)*RU gap. The exact formula varies from quarter to quarter and depends on the actual levels of the RU and LFPR. The RU gap is defined as the difference between the natural rate of unemployment and the actual unemployment rate. PTER is defined as the number working part-time for economic reasons as a share of CPS employment.

*For Epop Gap, LFPR Gap, and RU Gap, we show the change from 2015Q4 to 2016Q4 using the staff's forecast for 2016Q4 since the staff's estimates are only available at the quarterly frequency.

2   Historically, has labor market improvement slowed near the natural rate?

Both the gains in payroll employment and the decline in the unemployment rate slowed this year as the unemployment rate reached our estimate of its natural rate, leading some to suggest that labor supply constraints may have become more binding. However, historical evidence does not support this hypothesis. Charts 1a-1c show that neither payroll gains, the unemployment rate gap, nor the employment-population ratio gap shows a deceleration in the four quarters after the unemployment rate crossed (from above) our estimate of the natural rate in the 1980's, 1990's,

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payrolls in March 2016 by 150,000. Under their standard methodology, this would likely lower employment growth a bit in the 11 months prior to March 2016, but not by enough to change the basic pattern described here.

[3] For evidence that the recovery in the LFPR tends to lag the decline in the unemployment rate, see the box in the January 2016 Tealbook, "Scope for improvement in labor force participation."

and 2000's.[4] Of course, the usefulness of this exercise hinges on the precision of our natural rate estimate, but these results are robust to allowing the natural rate to have been ¼ percentage point higher or ¼ percentage point lower.

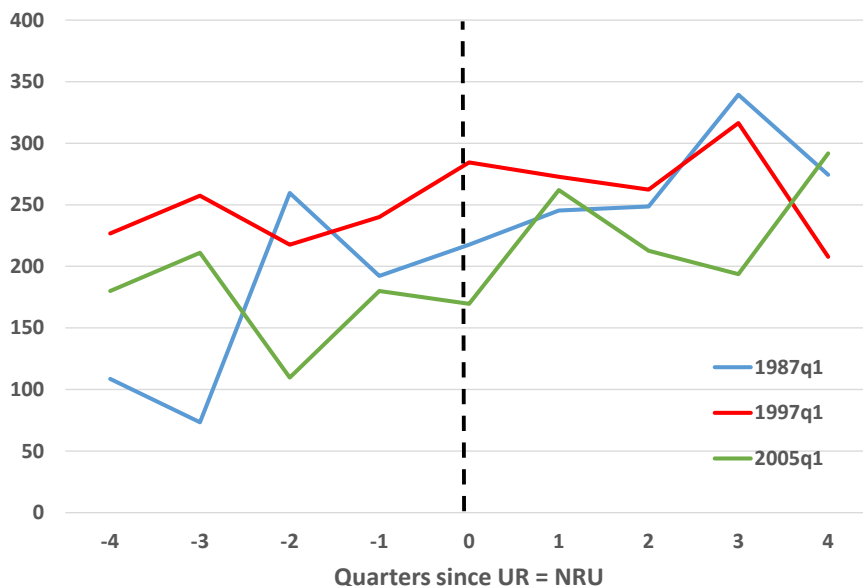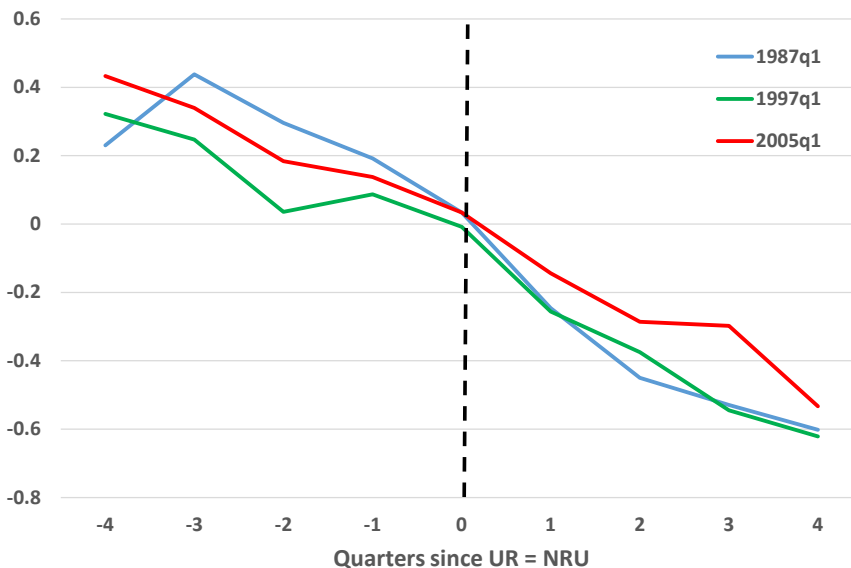**Chart 1a: Average monthly payroll gains near the natural rate**

Quarters since UR = NRU

Chart 1b: Unemployment rate gap near the natural rate

Quarters since UR = NRU

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[4] If anything, the pace of employment gains has tended to pick up in the four quarters after the unemployment rate crossed the natural rate: Payroll gains averaged about 70,000 faster in the four quarters *after* the unemployment rate gap turned negative compared to the four quarters before.

Chart 1c: Employment-population ratio gap near the natural rate

Quarters since UR = NRU

1987q1
1997q1
2005q1
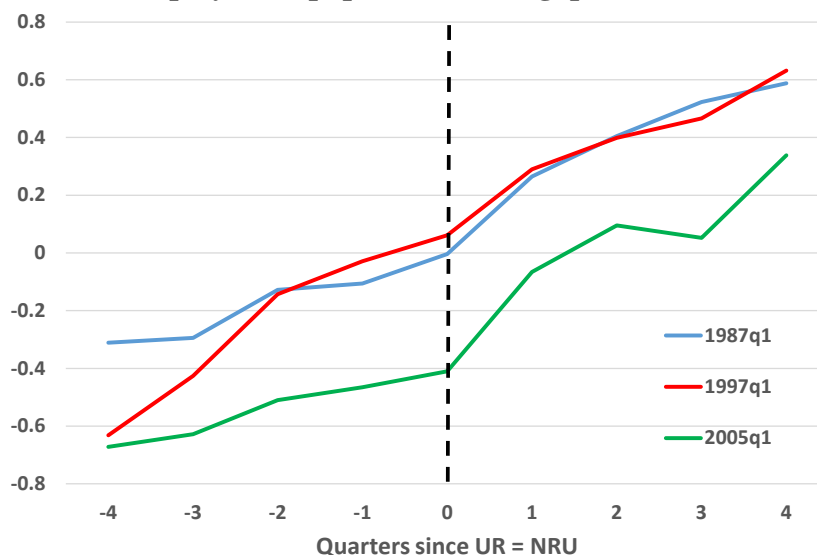
State-level evidence from Goldman Sachs

The preceding analysis is consistent with recent state-level evidence presented by David Mericle (Goldman Sachs). Chart 2 shows the difference in employment growth in year *t* as a function of the unemployment rate gap in year *t-1* compared to employment growth when the unemployment rate gap was greater than 3 percentage points (for instance, the bars on the left show that on average at the state level, employment growth is about 1.3 percentage points slower when the unemployment rate is at least 3 percentage points below the natural rate compared to when the unemployment rate was at least 3 percentage points above the natural rate).[5] As the chart shows, only when a state's labor market gets very tight—when the unemployment rate is 1 or 2 percentage points below the natural rate—do payrolls in that state begin to noticeably decelerate.

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[5] Mericle uses a state-level panel dataset to predict year-ahead payroll employment growth based on state-level unemployment rate gaps. They calculate the state-level unemployment rate gaps by adjusting the CBO national unemployment rate gap by each state's average difference in unemployment from national unemployment using data from 1980 forward. In addition, they add controls for state fixed effects and population growth, and they exclude recessionary periods. See David Mericle (2016), "US Daily: The Payrolls Slowdown: Supply or Demand?" Goldman Sachs, June 9.

Chart 2: Goldman Sachs evidence on nonlinearities near natural rate
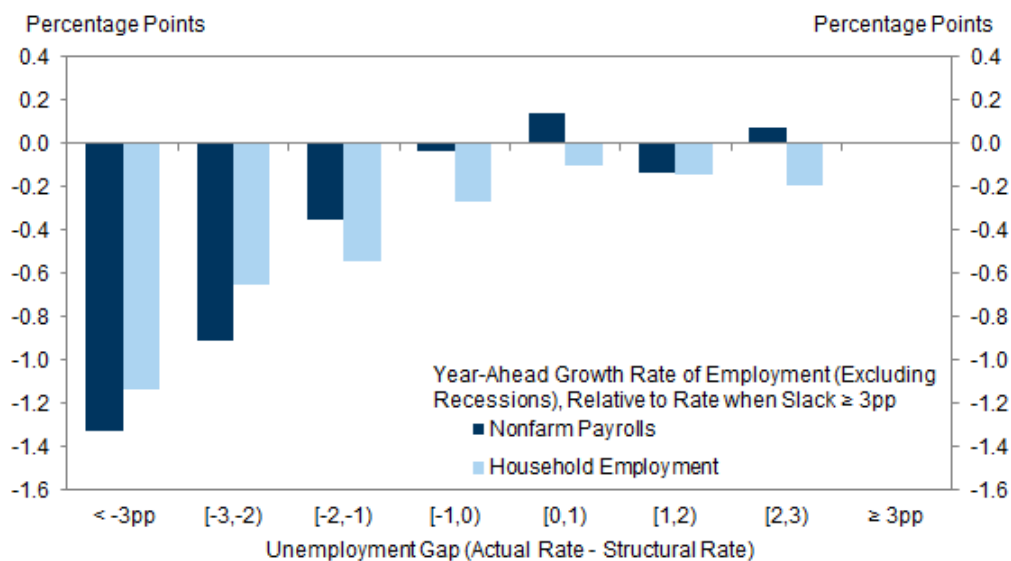
Source: Goldman Sachs.

Mericle concludes that labor supply constraints *do* become binding on employment gains when the labor market is very tight. However, he also notes that the aggregate labor market is currently not nearly as tight as would be required for supply constraints to begin to slow employment gains, and thus they are not the cause of the slowing in 2016.[6]

3   Evidence on supply constraints in the current labor market

Although there is no evidence from the last three expansions that the labor market slowed sharply after the unemployment rate gap was closed, this does not preclude the possibility that emerging labor supply constraints have contributed importantly to the slowdown in employment gains in the current expansion. In this section we look for evidence that hiring conditions tightened noticeably coincident with the slowdown in payrolls. The evidence appears to be mixed.
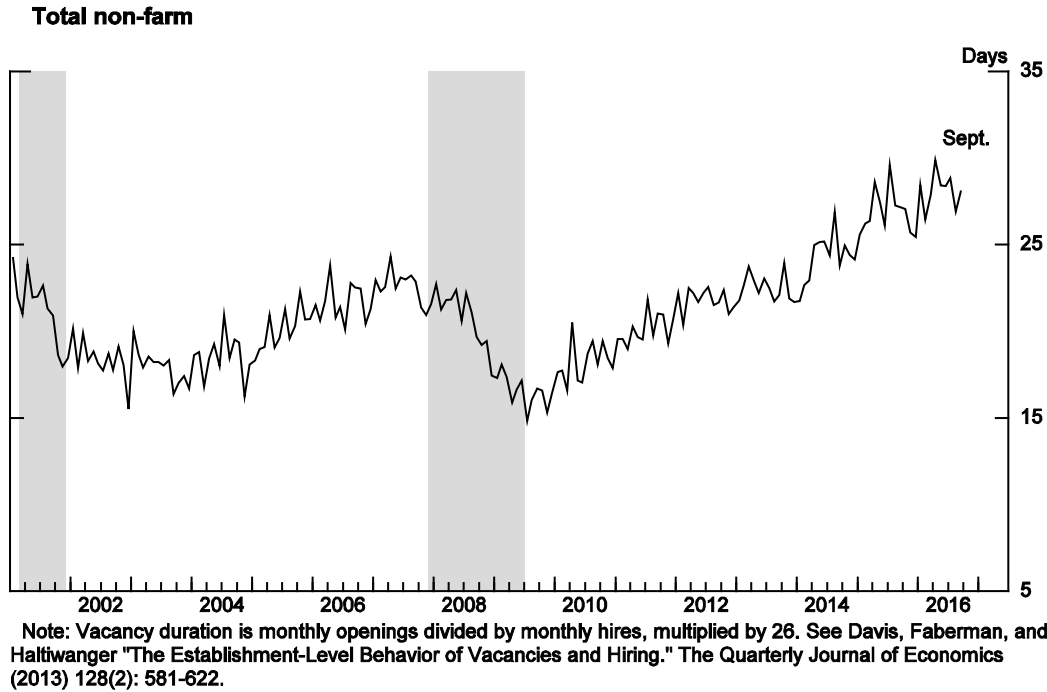
On the one hand, responses to a special battery of questions asked of firms in the June 2015 and 2016 Beige Books do not show a rise in the proportion of firms reporting hiring difficulties. In particular, in both surveys, one-third of employers reported that they do not have enough qualified applicants to fill their job vacancies.

On the other hand, several indicators of hiring conditions do suggest that the labor market is quite tight. Chart 3 shows average vacancy duration (derived from JOLTS data), a direct

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[6] The state-level analysis may not be directly comparable to the analysis of the aggregate labor market. Labor supply is likely more elastic at the state level than in the aggregate because workers can move into tight labor markets and away from loose labor markets. Accordingly, because these migration flows will support faster employment growth in tight labor markets, the unemployment rate in a particular state may need to fall further below the natural rate before supply constraints begin to bind and employment decelerates noticeably.

measure of the speed at which job vacancies are being filled. This measure surpassed its pre-recession level around the end of 2014 and remains very elevated.[7]

Chart 3: Vacancy Duration

Total non-farm

Note: Vacancy duration is monthly openings divided by monthly hires, multiplied by 26. See Davis, Faberman, and Haltiwanger "The Establishment-Level Behavior of Vacancies and Hiring." The Quarterly Journal of Economics (2013) 128(2): 581-622.

Similarly, Chart 4 presents data from the National Federation of Independent Business (NFIB) survey on the fraction of firms that report having at least one hard to fill job. This measure also has been rising and is elevated compared to pre-recession levels; however, it has not reached levels seen during the late 1990's when we believed that supply constraints were binding in the labor market.

Chart 4: Fraction of Small Businesses with Job Openings Hard to Fill

Percent with positions not able to fill right now
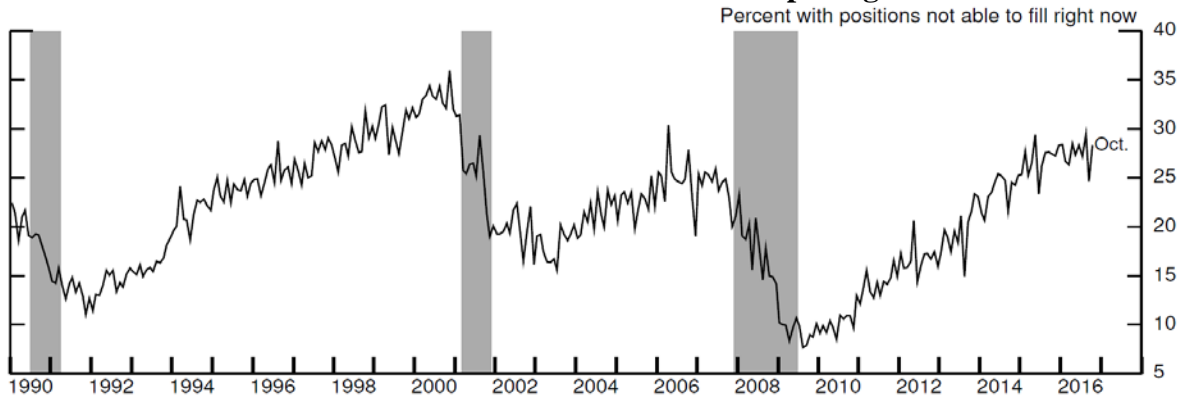
Source: National Federation of Independent Business.

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[7] Although the rise in vacancy durations may indicate difficulties in hiring, others have argued instead that it is a sign that employer recruiting intensity has not recovered fully. See Steven J. Davis, R. Jason Faberman, and John C. Haltiwanger (2012), "Recruiting Intensity during and after the Great Recession: National and Industry Evidence," *American Economic Review Papers and Proceedings*, vol. 102, no. 3, pp. 584-588.

Both of these indicators exhibit substantial cyclicality, so concluding that supply constraints have begun to bind purely from the time series movement in these data is difficult. Corroborating evidence, particularly in wage acceleration, would clarify whether such constraints were in fact emerging.
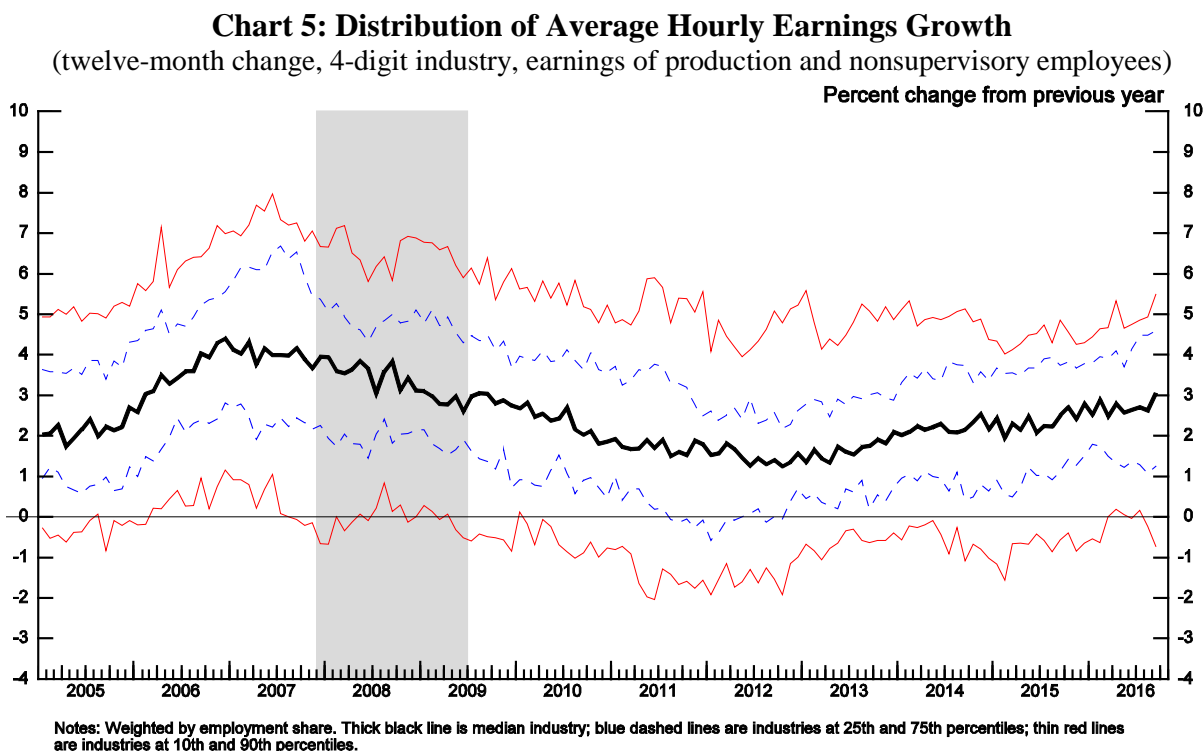
Regarding this question, in the July 2016 pre-FOMC briefing, the staff presented evidence that aggregate compensation growth in recent years has been consistent with predictions from a model based on the staff's estimated level of slack and the growth rate of productivity. The model's reasonably good fit therefore does not support the view that the natural rate is appreciably higher, and the labor market tighter, than the staff estimates. Moreover, if supply constraints were binding importantly, they might be expected to generate a nonlinear response of wages to slack and so lead to particularly large deviations from the model predictions. Instead, the model's residuals have been small in magnitude, suggesting that any supply constraints are not sufficiently binding in the aggregate to have caused a substantial pickup in aggregate compensation growth.

Industry-level evidence

Of course, it is possible that labor shortages have arisen in certain pockets of the economy, and that these sectoral shortages could provide an early indication of bottlenecks that are not yet readily apparent in aggregate measures. We now turn to analysis of industry-level data.

First, we look for pockets of tightness at the industry level using nominal average hourly earnings growth from the CES for 195 4-digit industries. In Chart 5, we plot percentiles of the yearly growth distribution, in particular, the 10th, 25th, 50th, 75th, and 90th percentiles. If some industries have recently faced labor supply constraints, we would expect to see a rise in the top tail of the earnings growth distribution, despite relatively subdued median earnings growth. However, the 90th percentile of wage gains has moved up only modestly over the last year, about in line with the median. Further, the difference in wage growth between the 90th percentile and the 50th percentile is smaller now than it was in 2005, the last time we considered the labor market to be roughly in equilibrium, and also smaller than it was prior to the last recession.[8]

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[8] An important caveat of this analysis is that the composition of industries at the 90th percentile of wage gains may change from month to month due to measurement error and other idiosyncratic factors. Indeed, only about 20 percent of the industries currently in the top 10 percent of wage growth were also in the top 10 percent a year ago. That shifting composition makes it difficult to draw strong conclusions about the prevalence of industries facing supply constraints in the labor market, and therefore cannot rule out that supply constraints are more binding than the growth distribution suggests.

Chart 5: Distribution of Average Hourly Earnings Growth
(twelve-month change, 4-digit industry, earnings of production and nonsupervisory employees)

Percent change from previous year

Notes: Weighted by employment share. Thick black line is median industry; blue dashed lines are industries at 25th and 75th percentiles; thin red lines are industries at 10th and 90th percentiles.

Next, we look directly at sector-level data on employment, wages, and vacancies.[9] Conceptually, sectors experiencing labor shortages should, all else equal, exhibit a slowdown in employment growth, an acceleration in wages, and a decline in vacancy yields (hires per vacancy).[10]

In two of the six sectors for which we have data, there is suggestive evidence of labor shortages and hiring difficulties that may have contributed to some of the slowdown in employment growth this year. Chart 6 plots employment growth (the blue solid line, left axis, 12-month moving average) and the growth in average hourly earnings (the red dashed line, right axis, 12-month moving average), while chart 7 shows the vacancy yield (12-month moving average) for six sectors. In the construction, and the trade and transportation sectors, there have been declines in employment growth coincident with a pickup in wage growth this year. In these industries, vacancy yields have declined over the same time period. This combination of data is consistent with emerging supply constraints.

The same pattern of data is evident in the manufacturing sector. However, we believe that the slowdown in employment growth in this sector likely reflects adverse demand shocks due to the rising dollar and falling oil prices.

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[9] Abraham (2015) also looked at employment growth and average hourly earnings growth at the sectoral level from 2012-2013 and found little evidence of supply constraints for that period of time. See Katherine G. Abraham, (2015), "Is Skill Mismatch Impeding U.S. Economic Recovery?" *Industrial and Labor Relations Review*, vol. 68, no. 2, pp 291-313.

[10] We are constrained to only a few sectors by the level of disaggregation available in JOLTS published data.

Chart 6: Employment Growth and Average Hourly Earnings Growth
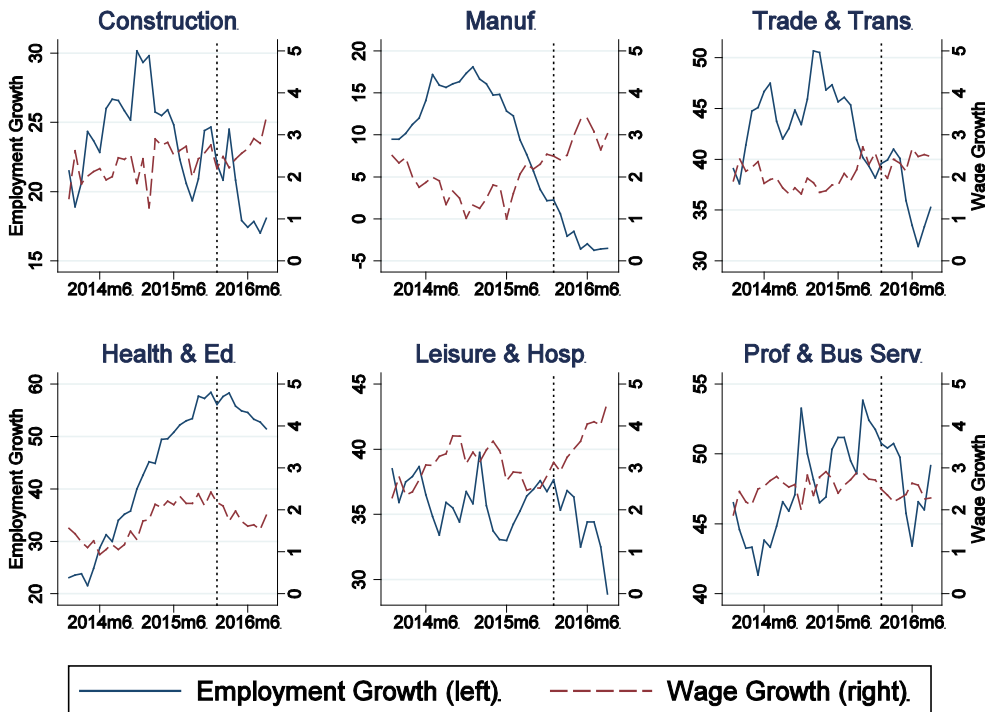
Note: Monthly CES payroll growth, 12 month moving average (blue line); annualized average hourly earnings growth for all employees, 12 month moving average (red line). Source: U.S. Department of Labor, Bureau of Labor Statistics.

Chart 7: Vacancy Yield
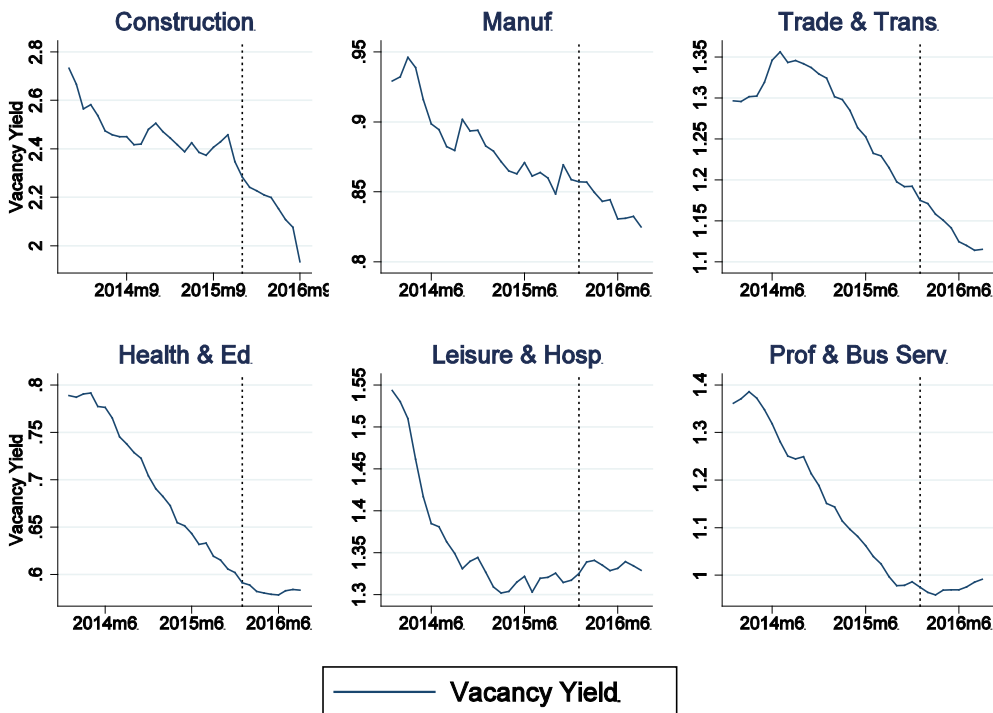
Note: Vacancy yield is hires per vacancy from the Job Openings and Labor Turnover Survey, 12 month moving average. Source: U.S. Department of Labor, Bureau of Labor Statistics.

The concurrent acceleration of wages in manufacturing likely reflects, to some extent, a changing mix of jobs *within* manufacturing that has raised average wages. Indeed, the ECI for manufacturing, which controls for such compositional changes, shows far less acceleration of wages in this sector compared to the average hourly earnings data.

In the leisure and hospitality sector, the data are more ambiguous. Employment growth has declined while wage growth has stepped up sharply since the end of last year, consistent with supply constraints; however vacancy yields has not fallen since the end of last year. Nonetheless, vacancy yields have been quite low since the middle of 2015, which might indicate that hiring conditions in this sector were already quite tight.[11]

On the other hand, wage gains have slowed in the health and education sector and the professional and business services sector, suggesting that supply constraints are not binding in these sectors.[12]

4   Summary

In this memo, we addressed the question of whether emerging supply constraints held back employment growth and labor market improvement in 2016. Since the unemployment rate reached our estimate of its natural rate at the beginning of this year, we started by asking if such an event typically triggers a slowdown in the labor market recovery. In the last three recoveries, we did not find evidence that payroll growth, the unemployment rate gap, or the employment-population ratio gap slows after the unemployment rate crosses the natural rate.

Next, we looked for direct evidence of supply constraints in the current labor market. At the aggregate level, measures of hiring difficulties—such as vacancy durations and businesses with hard-to-fill jobs—are quite elevated. But, we have not observed enough of an acceleration in wages or compensation in the aggregate data to suggest that supply constraints are binding.

We do find some suggestive evidence—as shown by the combination of accelerating wages, decelerating employment, and falling vacancy-filling rates—that a few sectors are experiencing binding labor supply constraints. However, we would caution that until supply constraints show up in the aggregate data, especially for wages and compensation, they are unlikely to be prevalent enough to have been an important factor restraining the pace of labor market improvement.

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[11] For instance, there could be a lagging relationship between vacancy yields and the degree of hiring constraints in an industry such that low vacancy yields in the past might signal slower employment growth and faster wage growth in the near future.

[12] To make this analysis slightly more concrete, we also estimated a three-variable VAR (payroll gains, vacancy yield, and wage growth) at the industry level for the sample period from March 2006 (when the all-employees series starts) to September 2016. We looked for unusually large, positive residuals in wages or unusually large, negative residuals in payroll gains to determine if a sector has been experiencing labor shortages. Such a pattern of residuals from our linear VAR model could be indicative of nonlinearities in the labor supply curve. Consistent with the graphical evidence, we observe positive residuals in wages and negative residuals in payroll gains, especially for construction, and trade and transportation. However, the residuals are in normal ranges, suggesting no sudden nonlinearities emerged recently in these sectors given the historical relationship among the three variables.