

# Piecing Together the U.S. Wage Puzzle

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**E**conomists have been puzzled by the counterintuitive trend over the past several years in which the U.S. labor market has tightened but wage growth has been mediocre, at best. Normally, an economy experiencing a shrinking unemployment gap, defined as actual unemployment that is higher than the full employment rate, is expected to see an acceleration in wage growth. If an economy's unemployment rate is below the full employment rate, wage growth should be even stronger.

There are competing explanations for the lack of wage growth. First, either there is significantly more slack in the job market than implied by the unemployment rate or there are large and unexplained factors that determine wages.

A second possible explanation that has gained some traction recently is an idea referred to as pent-up wage deflation. Pent-up wage deflation is based on the assertion that during the recession businesses could not cut wages as much as they wanted, and so many are now reluctant to raise wages.<sup>1</sup> In other words, workers' wages should have been reduced more during the recession to achieve a market equilibrium wage rate.

This paper will present evidence that the first assertion is more correct, that the slack in the job market is not correctly indicated by the unemployment rate.

This paper first looks at the unemployment rate as a measure of labor market slack and finds that is not useful this cycle. Then the relationship between the unemployment gap and wage growth is discussed.

The second section of this paper uses state labor market slack and wage growth to determine whether the conditions of pent-up wage deflation are met, primarily testing the assumption that wage growth accelerates

appreciably only after the unemployment rate falls below the estimated full-employment unemployment rate.

The importance of wage growth for consumer spending, inflation, and labor force growth is then discussed.

Finally, the risks are reviewed regarding the possibility that policymakers could make a misstep if they put too much stock into the idea of pent-up wage deflation.

## Decomposing the unemployment rate

The U.S. employment rate has fallen to 5.9% as of September from its peak of 10% in October 2009. With the economy appearing to approach full employment, the debate about the risk of an unanticipated acceleration in wages and inflation has intensified. The debate boils down to the appropriate measure of labor market slack as neither wages nor inflation rises quickly when the economy is operating with the unemployment rate noticeably above the full-employment unemployment rate.

Some contend that the labor market today is tighter than the unemployment rate indicates, and thus inflation and wage pressures will soon pick up. Proponents of this view stress the distinction between workers who have been unemployed fewer than 26 weeks and those out of work longer, arguing that the latter may have lost necessary work skills and may not be considered employ-

able. Thus, as the labor market tightens there is no shadow workforce waiting to enter the labor market, which would relieve upward pressure on wages.

The argument makes intuitive sense and is consistent with the fact that the short-term unemployment rate is well below its long-term average and close to its lowest since early 2008. The short-term unemployment rate is on par with the average during the expansion from 2001 to 2007 and well below its long-term historical average of 4.9% (see Chart 1).

Therefore, the headline unemployment rate is high only because the number of long-term unemployed remains stubbornly large. The unemployment rate among those jobless for more than 27 weeks was 1.9% in September, nearly double its historical average of 1%. Of those who are jobless, nearly a third have been unemployed for more than 27 weeks. In a well-functioning economy, it should be below 20%.

While there is likely some truth to the idea that the long-term unemployed have lost their skills, a fair share of the long-term jobless remain employable and will fill jobs as they become available. One indication of this is that the recent reduction of long-term unemployment has been equally widespread across industries. Over the past year, the average unemployment duration declined significantly in the majority of industries.

<sup>1</sup> During a recession downward nominal wage rigidities prevent wages from falling more than they would if wages were fully flexible.

**Table 1: Long- and Short-Term Unemployment Matter**

Statistical significance of short- and long-term unemployed\* on wage growth\*\*

Business cycle, trough to peak	T-stat		Coefficient		R <sup>2</sup>	
	Short-term unemployment	Long-term unemployment	Short-term unemployment	Long-term unemployment	Short-term unemployment	Long-term unemployment
Current	-7.8	-12.2	-3.0	-2.3	0.50	0.71
01 to 07	-6.2	-12.7	-6.2	-7.1	0.35	0.69
91 to 01	-16.4	-10.9	-3.8	-4.8	0.69	0.50
82 to 90	-11.8	-9.6	-2.9	-3.4	0.60	0.50
80 to 81	-17.3	-1.0	-3.3	-5.3	0.96	0.09
75 to 79	-12.8	-9.9	-3.5	-6.2	0.75	0.64
70 to 73	-15.2	-5.6	-4.1	-9.1	0.87	0.47

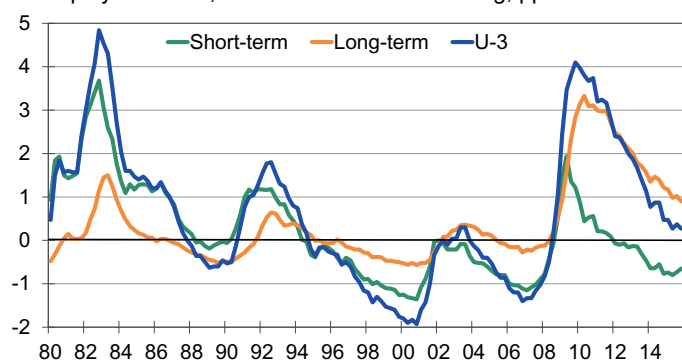
\* Yr-to-yr change, ppt

\*\*Labor income proxy for production workers, % change yr ago

Source: Moody's Analytics

**Chart 1: Parts of the Job Market Are Tight**

Unemployment rate, deviation from historical avg, ppt



Sources: BLS, Moody's Analytics

Additionally, statistical evidence illustrates that long-term unemployment has played a larger role in explaining fluctuations in wage growth this cycle. To show this, for each business cycle, a simple wage equation is estimated separately for both the short- and long-term unemployment rate (see Table 1).

Except for the long-term unemployment rate in the 1980 to 1981 recession, the regressions show that all variables are statistically significant, but they do vary from cycle to cycle. The results show that long-term unemployment matters, as the R<sup>2</sup> for long-term unemployment was 0.71 since the recession ended in mid-2009, which is higher than the historical average.

Fluctuations in the size of the coefficients are fairly modest, particularly for the short-term unemployment rate. The sign on the

coefficients is negative, implying an increase in either short- or long-term unemployed reduces nominal wage growth.

This exercise was done using a labor income proxy for production workers, calculated as the product of earnings and hours worked. It also was replicated using

other measures of wages, including the employment cost index.<sup>2</sup> Similarly, the long-term unemployment rate is more important in influencing changes in the employment cost index for wages this cycle.

Though this exercise shows that both the short- and long-term unemployed matter for wage growth, it does not answer why wage growth has been soft this cycle.

### Pent-up wage deflation

Whether one puts more stock in the short- or long-term unemployment rate, the lack of wage growth suggests that considerable slack remains. Nominal wage growth is

rising about 2% on average, barely keeping pace with inflation.

A weakening or complete breakdown of the relationship between wage growth and labor market slack would have significant implications for monetary policy. In her recent Jackson Hole address Fed Chair Janet Yellen raised the prospect that pent-up wage deflation<sup>3</sup> has weakened the relationship between wage growth and labor market slack.<sup>4</sup>

This theory arises from the observed nominal rigidity of wages—the tendency for employers not to cut wages.

In addition to nominal rigidity, businesses are likely hesitant to let their workers' pay rise by less than the rate of inflation. If wage growth does not beat inflation, then real wages fall. This would risk upsetting workers, undermine productivity, and contribute to increased turnover.

Further, if businesses lay off workers during a recession, they likely hold on to their best for as long as possible. Assuming the business survives the recession, it would not want to risk losing its remaining workers by not raising their pay, as the cost of losing these productive workers would likely outweigh the benefit of keeping salaries unchanged.

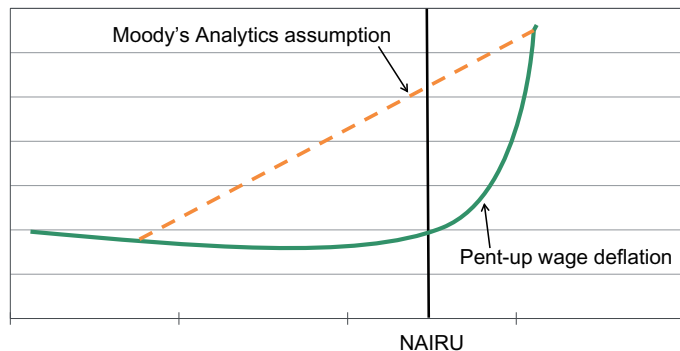
3 The term pent-up wage deflation originated with economists Mary Daly and Bart Hobijn of the San Francisco Fed. <http://www.frbsf.org/economic-research/files/wp2013-08.pdf>

4 Yellen, Janet. 2014. Speech at Jackson Hole, Wyoming. <http://www.federalreserve.gov/newsevents/speech/yellen20140822a.htm>

2 The ECI measures changes in the cost of compensation not only for wages and salaries, but also for an extensive list of benefits. As a fixed-weight, or Laspeyres, index, the ECI controls for changes occurring over time in the industrial-occupational composition of employment.

### Chart 2: Potential Paths of Wage Growth

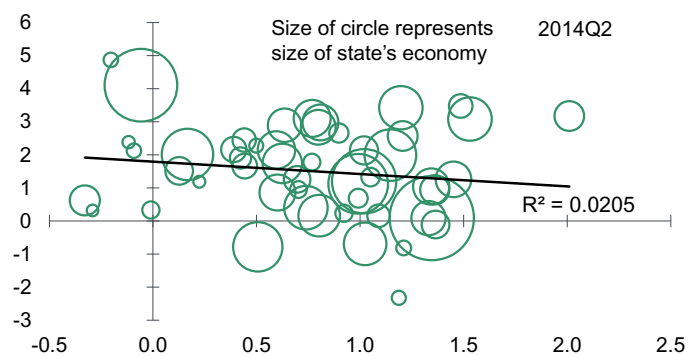
Path of wage growth; x-axis is time, y-axis is wage rate



Source: Moody's Analytics

### Chart 3: Weak Link, at Best

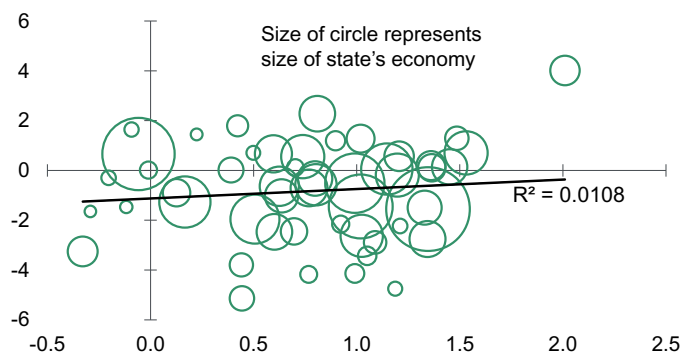
X-axis: unemp. gap, ppts; y-axis: avg hr earnings, % chg yr ago



Sources: BLS, Moody's Analytics

### Chart 4: Wages Not Accelerating Near NAIUR

X-axis: unemp. gap, ppts; y-axis: wage growth chg 2013Q2-2014Q2



Sources: BLS, Moody's Analytics

If these factors held wages above equilibrium during the 2007-2009 recession, businesses would now avoid raising wages. This could help explain why wages are not rising more quickly and would suggest that they could accelerate quickly once pent-up wage deflation is worked off and the economy surpasses full employment (see Chart 2).

#### Looking to states for evidence

Because state economic conditions varied during the recession, they provide a good test of whether the pent-up wage deflation hypothesis holds.

There are several challenges to the state analysis approach. First, high-frequency measures of state wages are lacking. This analysis primarily uses average hourly earnings for all private workers from the Bureau of Labor Statistics and nominal wages from the Bureau of Economic Analysis. The purpose of this paper is not to determine what

the best measure of wages is, but rather whether they accelerate as the economy approaches and eventually surpasses full employment.

To estimate the unemployment rate gap, each state's nonaccelerating-inflation rate of unemployment is estimated.<sup>5</sup> For

this paper, the unemployment gap is defined as the difference between the actual unemployment rate and NAIUR.

Based on our analysis, the average gap between each state's unemployment rate and its NAIUR was 0.75 percentage point in the second quarter of 2014. However, the states vary widely. There are six states with unemployment rates below their NAIUR, implying their wage growth should be strong.<sup>6</sup> Meanwhile, there are four states where the unemployment rate is at least 1.5 percentage

points above the NAIUR, implying that their wage growth should be weak (see Chart 3).

If the pent-up wage deflation theory is correct, this would imply that the states that are operating below full employment should be experiencing a noticeable acceleration in wage growth.

Looking at individual states one can find examples where low unemployment is accompanied by fast wage growth. Texas, for example, has a negative unemployment gap and wage growth of 4.1%. However, Idaho also is at full employment but is experiencing wage growth of only 0.3%. Alabama has both a high unemployment gap and fast wage growth.

Only a weak relationship exists between the overall pattern of wage growth and the unemployment rate gap across the states (see Chart 4). A regression coefficient of -0.4 indicates that a 1-percentage point decline in the unemployment gap is associated with a 0.4-percentage point increase in year-over-year growth in average hourly earnings (see Table 2).

The current U.S. unemployment rate of 5.9% implies an unemployment gap of 0.4 based on NAIUR equaling 5.5%.<sup>7</sup> This would indicate room for an increase in year-over-year wage growth of less than 0.5%, bringing wage growth up to only about 2.4% from its 1.9% rate in September.

More telling, if the U.S. unemployment rate was 1 percentage point below NAIUR it would translate into average hourly wage

<sup>5</sup> NAIUR is the unemployment rate consistent with steady inflation in the near term, say, over the next 12 months. State NAIUR estimates were backed out of regression residuals and then smoothed using an HP-filter as structural unemployment is assumed to change very little between quarters. These NAIUR estimates display far more cyclicity than the national NAIUR rate.

<sup>6</sup> The six states with an unemployment rate below their NAIUR are Alaska, Louisiana, Montana, North Dakota, Texas and Wyoming. The four states with an unemployment rate above their NAIUR are Alabama, Michigan, Missouri and Nevada.

<sup>7</sup> Moody's Analytics estimate of NAIUR is 5.5%. The Federal Reserve estimates the full-employment unemployment rate is 5.4% based on its central tendency forecast.

**Table 2: Modeling the Relationship Between Wage Growth and Unemployment**

**Dependent variable: % change in avg hourly earnings, 2013Q2 to 2014Q2**

Sample (adjusted): All U.S. states and D.C.

Included observations: 51

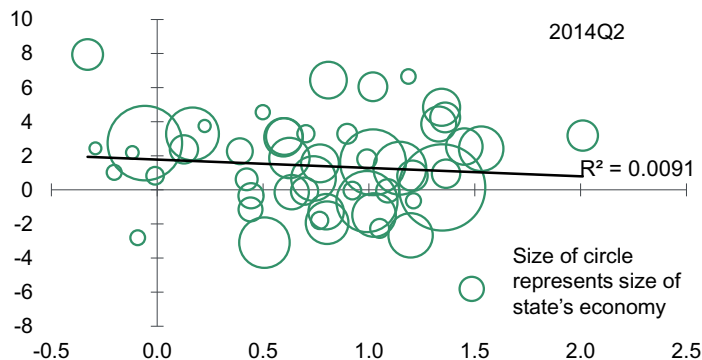
R-squared 0.0200  
Adjusted R-squared 0.0005

Variable	Coefficient	Std. Error	t-Statistic
Constant	1.793	0.341	5.260
Unemployment Gap	-0.373	0.369	-1.010

Sources: BLS, Moody's Analytics

**Chart 5: Quality Adjustments Confirm Little Link**

X-axis: unemp. gap, ppt; y-axis: avg hr earnings, % chg yr ago



Sources: BLS, Moody's Analytics

growth of 2.7%, which also is historically weak. This exercise suggests that a significant amount of wage growth is unexplained and that wage growth is determined largely by factors other than the unemployment gap.

This does not quite reject the hypothesis that pent-up wage deflation exists. For pent-up wage deflation to exist wage growth must be nonlinear and accelerate as the economy approaches full employment, and quickly rise after.

To test this, state unemployment gaps for the second quarter of 2014 were used along with changes in year-over-year growth of average hourly earnings between the second quarter of 2013 and the second quarter of 2014.<sup>8</sup> The change in wage growth is used to test whether wage growth accelerates.

<sup>8</sup> Year-over-year wage growth in the second quarter of 2014 minus year-over-year wage growth in the second quarter of 2013.

wage growth as the state economies surpass full employment, arguing against the idea of pent-up wage deflation.

This approach, however, could be capturing some statistical noise because of the short-term time horizon. Extending the time horizon raises the potential of other measurement issues, however. For example, wage growth early in a period of economic recovery may appear artificially high in states that were hit hardest by the recession as wages were rising from a low base.

**The changing labor workforce**

We also adjusted for how changes in the composition of the workforce could affect average hourly earnings. For example, if more low-skilled workers are being hired, average hourly earnings would tend to fall or the average rate of wage growth would appear to weaken.

While Texas has experienced accelerating wage growth, other states with full employment have experienced slower wage growth, including Louisiana and Wyoming.

These results show there is little evidence yet of an acceleration in

To account for this, the Current Population Survey micro data were used to calculate quality-adjusted earnings growth. This was done by regressing weekly earnings on a variety of individual and job specific characteristics, including age and hours worked.<sup>9</sup> The latter was used to capture the mix of full- versus part-time employment. Also, industry dummy variables were included to control for differences in pay by industry. By making these adjustments, fluctuations in state wages can be isolated from changes in the workforce and occupation mix.

Wage growth in the first six months of this year was compared with that in the same period in 2013. The results show that quality adjusted changes in state-by-state earnings exhibit no evidence of an acceleration, arguing against pent-up wage deflation (see Chart 5).<sup>10</sup>

**Symptom of the Great Recession?**

Another question is whether there has been a change in the relationship between state unemployment and wages as the business cycle has progressed. To explore this, BEA wage and salary disbursements are divided by the total employment to create an average wage. The unemployment gap is based on Moody's Analytics estimates of state NAIRU's between the first quarter of 1976 and the first quarter of 2014.

State-level unemployment gaps were regressed on state wage growth. The change in the resulting coefficient over time shows how the relationship has evolved (see Chart 6).

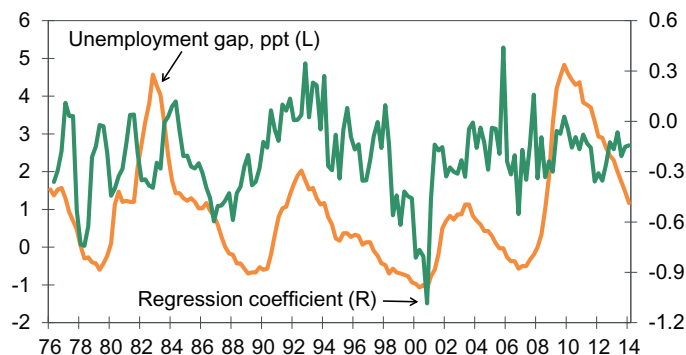
The relationships do vary. After the mid-1970s the link between state wage growth and the unemployment gap differed from that for the U.S. During recoveries, the link typically strengthened, save after the Great Recession.

While concerns about the timing of an acceleration in wages have intensified, the relationship has actually weakened significantly (see Chart 7).

<sup>9</sup> For this analysis weekly earnings were used because hourly was not available for everyone.

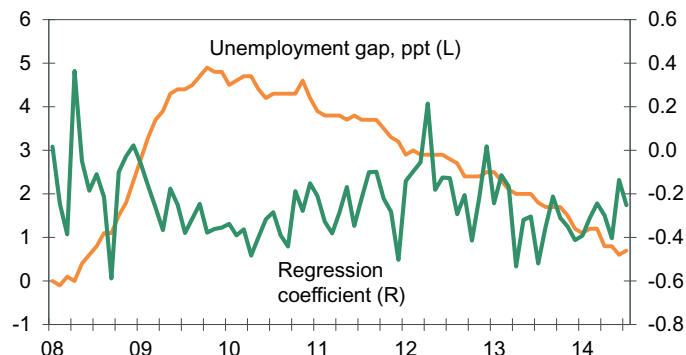
<sup>10</sup> Confidence intervals around the state dummies are large, but that does not change the results.

Chart 6: Other Factors Explain Wage Growth



Sources: BEA, BLS, Moody's Analytics

Chart 7: Relationship Continues to Weaken



Sources: BLS, BEA, CBO, Moody's Analytics

**Ignoring unemployment**

The preceding analysis suggests the relationship between the unemployment gap and wages has broken down. Therefore, other factors must be determining wage growth.

By our calculation, the labor market still has considerable slack, equal to just under 2% of the labor force. This includes the large number of long-term unemployed workers, those who left the workforce but will return once job opportunities appear, and part-timers who would prefer to work full time.

Because these workers are slowly joining the ranks of the employed, they are putting downward pressure on wages. Many of the long-term unemployed have experienced a deterioration in their skill set and are less productive than an average worker when they return, so they cannot command relatively high wages even as the unemployment rate declines.

Therefore, the unemployment rate is not the most accurate measure of labor force slack right now. Rather, it is a combination of other measures of labor market slack. Future research will focus on identifying the appropriate combination of measures of labor market slack.

**Why wages matter**

Determining when wage growth will strengthen is critical to the forecast. Wage growth is an important factor that drives inflation, labor force participation, and consumer spending.

The correlation between year-over-year growth in the labor income proxy for private

production workers and both retail sales and nominal consumption is strong in this cycle (see Chart 8).

Correlation does not mean causation. However, a Granger causality test finds evidence that growth in labor income does cause changes in consumer spending, including retail sales and nominal consumption.

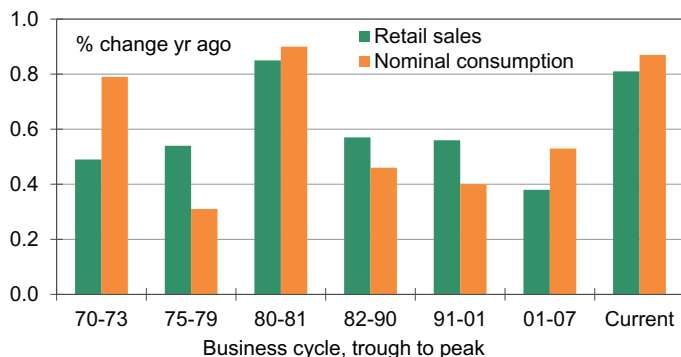
Therefore, weak wage growth helps explain why spending growth has been soft relative to that in past recoveries.

Wages can also explain why labor force growth is mediocre. Since the mid-1960s, changes in labor income have had a strong relationship with labor force expansion. Workers normally have a minimum wage they will accept—also known as a reservation wage—to take a job. That reservation wage can be affected by a variety of factors, such as family and homeownership status, available jobless benefits, or household wealth.

Some employers have told surveyors they have trouble finding qualified workers at current wage rates, but this has not translated to faster wage growth. Thus it is likely that the current market wage is below the reservation level for many marginally detached workers to return to the labor force.

Chart 8: More Wages Will Cure Many Problems

Correlation between labor income proxy\* and...



Sources: BLS, Moody's Analytics

\*For private production workers

Further, even faster wage growth might not increase labor force participation if the structural relationship between the two has weakened. Some evidence of this can be seen in the weakened correlation between year-over-year growth in the labor force and the labor income proxy; the correlation is weaker in the current business cycle than at any time since the 1980s.<sup>11</sup>

Although the relationship between wages and labor force participation is not as strong today as in the past, the correlation remains positive, suggesting that a significant pickup in wages will boost the size of the labor force.

<sup>11</sup> The relationship between wages and labor force participation also was weak during the 1980s, but the factors driving the weakness at that time were different from today. Inflation then was falling quickly, which provided a significant boost to real wages, even if nominal wages were rising only slowly. Further, the share of women in the workforce was rising sharply from a much lower base, which added to the labor force and held wages in check.

### Policy implications

The idea of pent-up wage deflation would appeal to the Fed's inflation hawks, as it downplays the importance of wages in assessing labor market slack. This would support their views that the central bank needs to begin normalizing monetary policy sooner rather than later.

The hawks are concerned that wages could begin to rise rapidly once pent-up wage deflation has been absorbed. This could put the Fed behind the curve and risk above-target inflation, which would have serious consequences if it dislodged long-term inflation expectations.

The absence of pent-up wage deflation gives the Fed's doves more ammunition to keep monetary policy loose for longer. They fear a premature tightening in monetary policy would permanently raise the level of unemployment.

The baseline forecast is for the Fed to begin normalizing interest rates in the fall of 2015. By then, wage growth will be accelerating, signaling that the economy is nearing full employment.

### Conclusion

This paper finds little evidence of pent-up wage deflation, and it would be a policy error

to tighten monetary policy in anticipation of stronger wage growth. This would undermine growth and risk a permanently higher level of unemployment.

The results do not imply that wages are not an accurate measure of labor market slack. Rather, the relationship between the unemployment rate and wage growth is broken. Therefore, policymakers should not put significant stock in the unemployment gap but rather focus on wages.

The next area of research should be on creating a timely and accurate measure of labor market slack.



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