

# The importance of locking in full employment for the long haul

**Report** • By Josh Bivens and Ben Zipperer • August 21, 2018

Conventional wisdom is coalescing around the assertion that the U.S. economy in mid-2018 is unambiguously at full employment and that the prudent course for monetary policymakers in coming months will be to step up the pace of interest rate increases to forestall economic overheating that could lead to excess inflation. This conclusion, however, is premature for a couple of reasons. First, the U.S. economy is not unambiguously at full employment. Second, even if it has reached genuine full employment, this by itself does not argue for increasing interest rates. As long as inflation remains in line with the Federal Reserve’s long-run targets, there is no reason to raise interest rates and pull the economy back from full employment.

An extended period of low unemployment—sometimes called a “high-pressure labor market”—could deliver large benefits by boosting wages and healing the economic damage done by the Great Recession and the slow recovery following it. While such an extended period of high-pressure labor markets could be achieved without threatening the Fed’s ability to keep inflation expectations anchored at its preferred 2 percent, if the Fed raised their long-run inflation target (which Bivens [2017] notes would be a wise move), then the period of time they could tolerate extremely low unemployment would be even longer.

This report highlights how important extended periods of labor market tightness are for the wage growth of low- and middle-wage workers generally. It also highlights how extended periods of labor market tightness can have powerful effects in reducing disparities in labor market outcomes between workers of different races. As the Fed considers the proper path of interest rate increases going forward, it needs to internalize these substantial benefits for workers who have largely not enjoyed a proportionate share of economic growth in recent decades. Too often it is asserted that there is little the Fed can do to help push back against the problem of rising inequality (either by income class or race); this is not true. What is true is that pushing back against this inequality does require them to take on a small bit of risk—the risk that by keeping labor markets tight for an extended period of time they may find inflation temporarily surpassing their target. But this risk is small, and the costs of a short period of time running the economy “too hot” and spurring excess inflation is dwarfed

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by the potential benefits stemming from faster and more equal wage growth and from reducing race-based disparities in labor market outcomes.

**Key findings of this report are:**

- **High unemployment is linked with rising inequality.** Excessively high unemployment likely explains a large part of the growing gap between economywide productivity and hourly pay for the typical American worker—and the resulting rise in income inequality—that has emerged since the late 1970s.
- **Equitable wage growth is linked with extended low unemployment.** Since 1979, the only period of strong across-the-board wage growth occurred in the late 1990s and early 2000s, which was also the only period of extended low unemployment in recent decades. This coincidence of extended labor market tightness and healthy, equitable wage growth was not by chance.
- **Low- and moderate-wage workers benefit the most from decreases in the unemployment rate.** Using a panel data set of labor market outcomes by state each year since 1979, we reconfirm well-established findings that pay for low- and moderate-wage workers is more sensitive to changes in the unemployment rate than pay for higher-wage workers. Put simply, these workers need lower unemployment rates than their high-wage peers do in order to achieve decent wage growth.
- **Increasingly lower unemployment rates have been required for workers to reap these benefits.** National data confirm that pay for the median worker needed increasingly lower unemployment rates to see any growth at all between 1979 and 2007, before the Great Recession. This likely reflects the steady downward pressure on workers' bargaining power over those years.
- **During the Great Recession and its aftermath, the relationship between pay and unemployment has been weaker. It will likely become stronger again as the economy normalizes.** The statistical link between unemployment and growth in pay post-2008 is weaker and less robust, both in state-level and national data. This means that the very large increases in the unemployment rate due to the recession resulted in virtually *no* decline in nominal wages. While it may seem hard to believe that workers' pay has been better protected against excess unemployment since 2008 than before, this finding is consistent with the hypothesis of *downward nominal wage rigidity*, the phenomenon where even deep and long recessions rarely lead to cuts in nominal pay. The corollary has been true as well in the years since 2008: as unemployment has dropped, nominal wage growth has not accelerated as quickly as one might expect from historical trends. As the economy normalizes after the Great Recession and slow recovery, we expect historical statistical relationships between pay and unemployment to be re-established.
- **Tight labor markets can narrow racial employment gaps (specifically, for EPOPs and average hours worked).** Contrary to common assumptions, tight labor markets can narrow not just *absolute* racial employment gaps, but also *relative* racial employment gaps (or ratios). We find that tighter aggregate labor markets lead to disproportionate gains in African American employment (as measured by employment-to-population ratios, or EPOPs) and average hours worked for African

American households relative to white workers. Ingrained pessimism on this point assumes that while *absolute* gaps in racial employment outcomes may be reduced through an improving labor market, *relative* gaps will remain essentially constant. Our results on employment are more hopeful, with even relative gaps closing as labor markets tighten. However, we do not find evidence that relative unemployment or labor force participation gaps narrow between African American and white workers when these aggregate unemployment or labor force participation rates improve.

## Background

Between 2008 and the end of 2016, the broad consensus among macroeconomic observers was that the economy clearly suffered from too slow growth in aggregate demand (spending by households, businesses, and governments) and that the key task facing the Federal Reserve was to boost this demand growth. Since the end of 2016, however, there has been a growing belief that the U.S. economy is either at, or very near, full employment, and that the Fed can and should return to its pre–Great Recession task of guarding against outbreaks of above-target inflation rather than continuing to try to push unemployment lower. Essentially, this congealing conventional wisdom of the past 18 months constitutes a return to the pre-2008 view of how macroeconomic policy should be conducted.

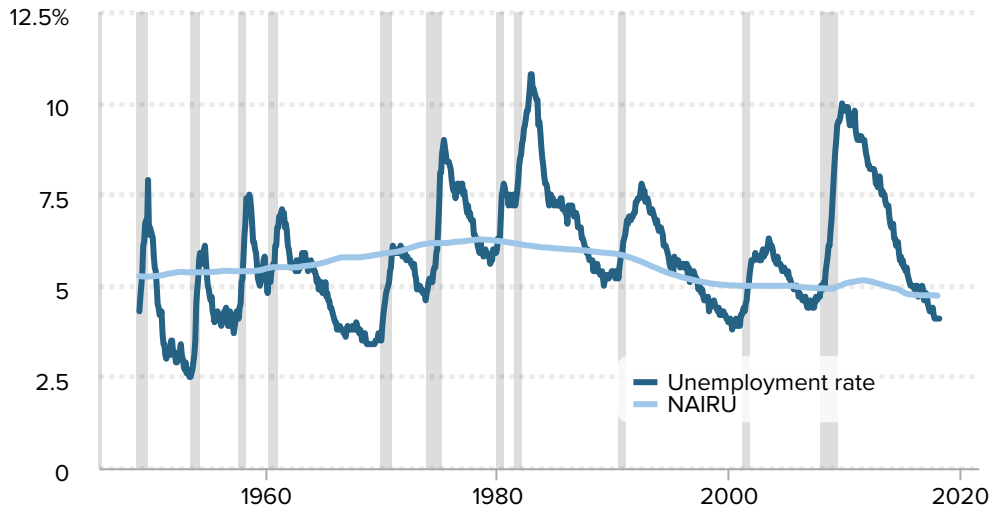
From roughly the late 1970s to just before the Great Recession, the predominant view among economists was that the hard part of the Fed’s job was restraining aggregate demand so that it did not continually run ahead of growth in the economy’s productive capacity and thereby cause inflation to accelerate. It was acknowledged that recessions did occasionally happen, and that during these recessions the Fed should lower interest rates to spur demand growth. But generally it was thought that recessions ended quickly (either on their own or prodded by Fed actions) and that within a year or two of the beginning of a recession, the Fed should focus once again on making sure that aggregate demand did not race ahead of productive capacity.

However, this pre-2008 view was likely wrong then and is even more likely to be wrong now. For far too many of the years between 1979 and 2007, the Fed tolerated levels of unemployment that were higher than necessary to keep inflation in check. **Figure A** shows estimates of the natural rate of unemployment (sometimes referred to as the nonaccelerating inflation rate of unemployment, or NAIRU) from the Congressional Budget Office over those years. The NAIRU is an estimate of the lowest unemployment rate consistent with nonaccelerating inflation. One could certainly argue that many estimates of the NAIRU are too conservative in that lower unemployment rates might not in fact have spurred accelerating inflation, but even judged by official NAIRU yardsticks the Fed’s monetary policy has been too contractionary in recent decades. Between 1949 and 1979, the cumulative difference between the actual unemployment rate and estimates of the NAIRU was *negative* 15.3 percentage points—meaning that on average actual unemployment sat *below* the estimated NAIRU. In contrast, between 1979 and 2017 the cumulative difference was positive 35.7 percentage points, meaning that actual

Figure A

## There has been insufficient vigilance in fighting unemployment since the late 1970s

Estimate of the natural rate of unemployment and actual unemployment, 1949–2018



**Note:** NAIUR refers to the nonaccelerating inflation rate of unemployment (another term for the natural rate of unemployment).

**Source:** Data on the natural rate of unemployment from the Congressional Budget Office (2018); data on actual unemployment rate from the Bureau of Labor Statistics (2018). Shaded areas represent recessions.

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unemployment was persistently above the estimated NAIUR. This was not just driven by the crisis of the Great Recession. Between 1979 and 2007 the cumulative difference was positive 15.5 percentage points.

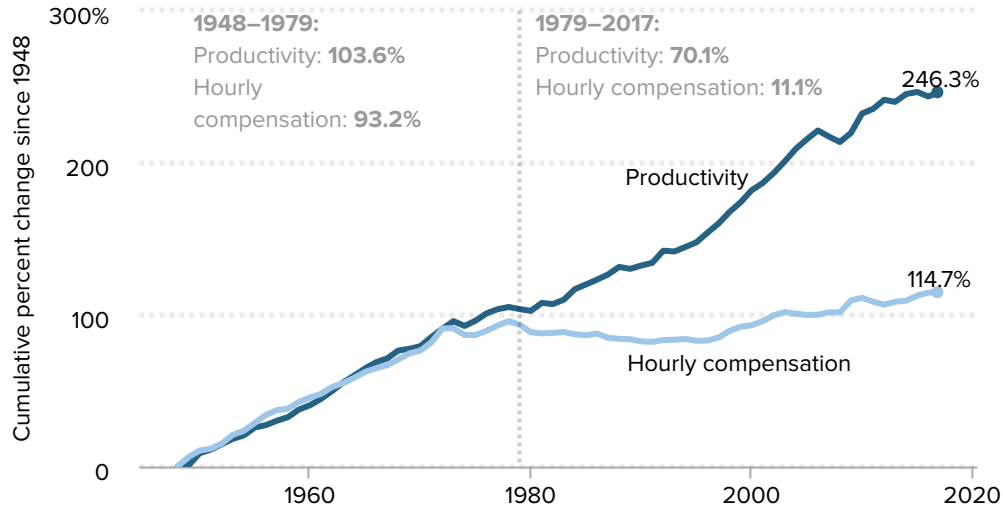
This excess unemployment since 1979 is a key reason why those years were characterized by a growing divergence between growth in economywide productivity (the average amount of income generated in an hour of work in the economy) and the hourly pay of typical workers. **Figure B** shows hourly pay growth (including benefits) for production and nonsupervisory workers (a group consisting of roughly 80 percent of the private-sector workforce) and economywide net productivity over two periods, 1948–1979 and 1979–2016. In the 1948–1979 period, when unemployment was kept consistently below the NAIUR, pay and productivity rose essentially in lockstep. In the latter period, as unemployment was kept consistently above the NAIUR, pay for typical workers flattened out significantly and began lagging far behind productivity, even as the growth rate of productivity slowed.

## The fruits of full employment: Fast and equal wage growth in the late

Figure B

## The gap between productivity and a typical worker's compensation has increased dramatically since 1979

Productivity growth and hourly compensation growth, 1948–2017



**Notes:** Data are for compensation (wages and benefits) of production/nonsupervisory workers in the private sector and net productivity of the total economy. “Net productivity” is the growth of output of goods and services less depreciation per hour worked.

**Source:** EPI analysis of unpublished Total Economy Productivity data from Bureau of Labor Statistics (BLS) Labor Productivity and Costs program, wage data from the BLS Current Employment Statistics, BLS Employment Cost Trends, BLS Consumer Price Index, and Bureau of Economic Analysis National Income and Product Accounts

Updated from Figure A in *Raising America's Pay: Why It's Our Central Economic Policy Challenge* (Bivens et al. 2014)

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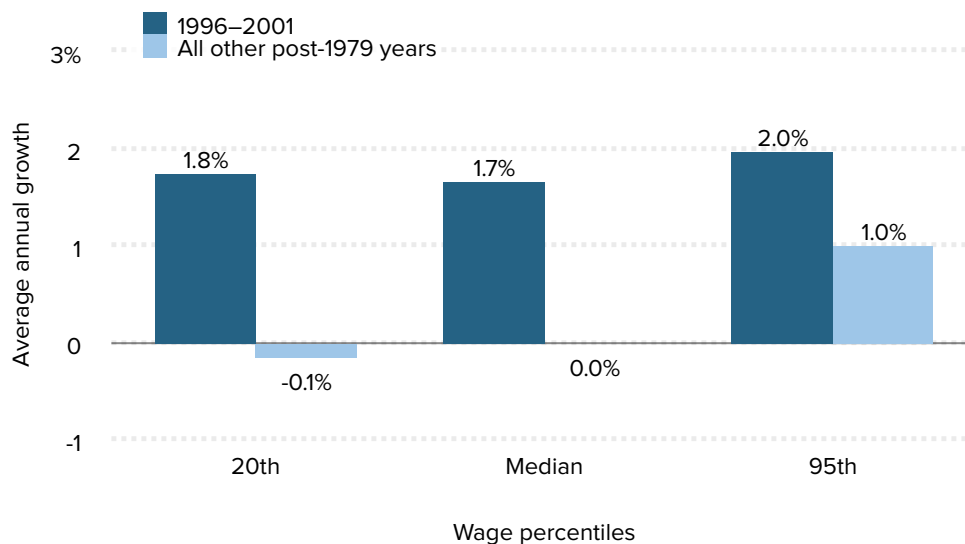
## 1990s

While the Fed and other macroeconomic policymakers tolerated too high unemployment for most the time between 1979 and 2007, there was in those years a brief experiment of tolerating very low rates of unemployment for an extended period of time. The unemployment rate fell rapidly in the late 1990s, far below the contemporaneous estimates of the NAIURU (which hovered around 5.3 percent in 1995). During these years, the Fed kept the effective federal funds rate (their main policy tool) roughly stable even as unemployment fell beneath these NAIURU estimates. By the end of 2000, the unemployment rate averaged 4.1 percent over two full years and actually sat beneath 4 percent for five months in that span of time. The result was not inflation rapidly accelerating out of the Fed's comfort zone; instead, it was the only period of strong and across-the-board wage growth in a generation. **Figure C** shows average annual wage growth for selected parts of the wage distribution between 1996 and 2001, compared with average annual wage growth for all other years between 1979 and 2017. Between 1996 and 2001, average annual wage growth for the 20th, 50th, and 95th percentiles of the wage distribution (corresponding to low-, middle- and high-wage workers) was 1.8, 1.7, and

Figure C

## The only period of high pressure in the labor market since 1979 led to rapid wage gains

Average annual wage growth from 1996–2001 vs. all other years between 1979 and 2017



**Note:** Wage growth is inflation-adjusted.

**Source:** Authors' calculations from data obtained from the State of Working America Data Library from the Economic Policy Institute (EPI 2018)

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2.0 percent, respectively. But in every other year between 1979 and 2017 aside from these high-pressure labor markets of 1996 to 2001, average annual wage growth for the 20th, 50th, and 95th percentiles was -0.2, zero, and 1.0 percent, respectively.

One key fact about the late 1990s and early 2000s expansion is that it did not end because accelerating inflation forced the Federal Reserve to raise interest rates. This specter of tolerating too low unemployment and thereby letting the inflation genie out of the bottle to damaging effect is a prime reason why the Fed today is being urged by many to raise interest rates. But this last historical experience with persistently tight labor markets did not end because its own inflationary momentum needed to be stopped; instead, it ended when the stock market bubble that characterized these years burst.

Some have claimed that the tight labor markets of the late 1990s were inherently unsustainable because they were driven by a bubble in the stock market that led to rapid growth in aggregate demand. However, this argument confuses an unsustainable *source* of aggregate demand growth with an unsustainable *pace* of growth. Because the late 1990s expansion did not end in response to an outbreak of inflation, we know that there was nothing unsustainable about the low unemployment or the pace of aggregate demand growth that characterized this period.

It is true that the source of this demand growth (a stock market bubble) was unsustainable, but the lesson policymakers should glean from this is that future efforts to maintain tight

labor markets need to rest on firmer foundations. Aggregate demand growth fueled by consistent and equitable wage increases, or public investments, or a reduction in the nation's chronic trade deficit, would all provide a sustainable foundation for tight labor markets in the future if policymakers could achieve them.

## Being a full-employment hawk means looking beyond the unemployment rate

By far the most persuasive bit of evidence that the U.S. economy is presently near full employment is that unemployment has averaged 4.0 percent so far in 2018 (as of July). This is quite low by historical standards. But “quite low by historical standards” is a thin analytical reed to base policy decisions on. How do we know, for example, that 4.0 percent, or even 3.0 percent, defines the lower limit of unemployment simply because it's close to the lowest point unemployment has reached in recent decades? Couldn't it instead be the case that recent decades have simply seen persistently too high unemployment?

This second interpretation gains plausibility even just from examining other measures of the quantity side of the labor market, which indicate that substantially more slack may remain. Most notably, the share of “prime-age” (25- to 54-year-old) adults with a job remains stubbornly below pre-Great Recession peaks and well below the peaks reached during the tight labor markets of the late 1990s and early 2000s, as shown in **Figure D**.

But comparisons of quantity-side measures of the labor market are largely irrelevant to the central question of whether or not the economy is at genuine full employment. The *definition* of full employment is wage and price growth that are near the Fed's target levels and are not sustainably accelerating. The entire rationale for making monetary policy more contractionary when the economy hits full employment is to slow economic growth and to soften labor markets (raise unemployment) in order to keep wage and price inflation from accelerating. But as long as price inflation is running below the Fed's target rate, there is little rationale for raising interest rates to slow the economy. This is particularly true when inflation is below the Fed's target and shows little to no upward trend, as is the case in mid-2018.

The inability to make strong inferences about just where full employment lies is not new. In past work, for example, Staiger, Stock, and Watson (1997) have shown that, depending on the inflation indicator used, the natural rate of unemployment (essentially the NAIRU) could be anywhere from 2.9 to 8.3 percent. Their estimates are a little more precise using the core personal consumption expenditure (PCE) deflator, but still range from 4.1 to 6.7 percent in a given year. In more recent work, the Council of Economic Advisers (2016) could not even rule out *zero* as the natural rate of unemployment.

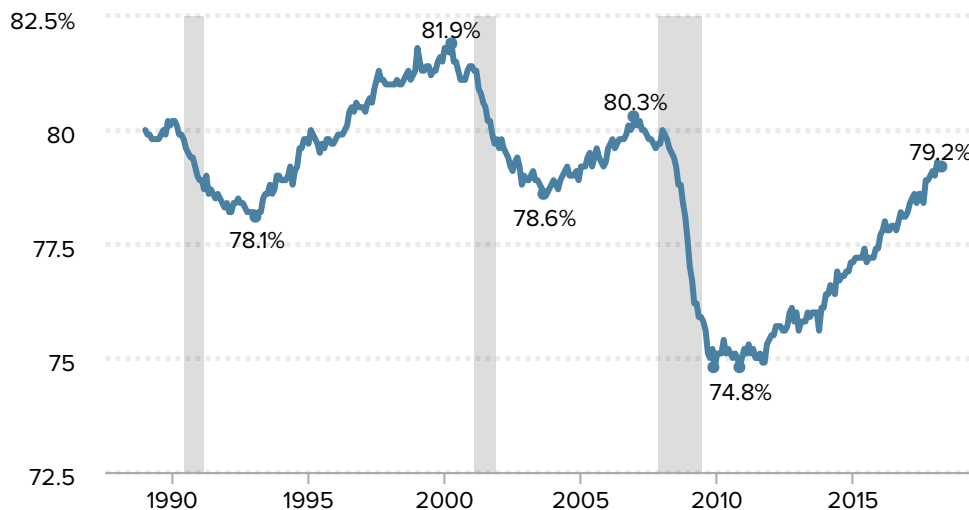
Crucially, the type of inflation the Fed is hoping to restrain by reducing the growth rate of



Figure D

## The prime-age EPOP remains below its pre-recession peak, suggesting that the labor market is not unambiguously healthy

Share of adults between the ages of 25 and 54 with a job, January 1989–April 2018



**Notes:** Shaded areas represent recessions. EPOP refers to the employment-to-population ratio; prime-age refers to adults ages 25–54.

**Source:** EPI analysis of Bureau of Labor Statistics Current Population Survey public aggregated data series

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aggregate demand is inflation that stems from excess wage growth. Inflation that results from, for example, a supply-side shock like rising oil prices should not generally be met with a contractionary monetary policy response. This makes the pace of wage growth crucial for determining whether the economy is clearly at (or rapidly approaching) full employment.

Bivens (2015b) notes that the pace of nominal wage growth consistent with the Fed’s price inflation target is simply the sum of trend potential productivity growth and the Fed’s inflation target. This means that if trend growth in potential productivity is 1.5 percent and the Fed is looking to hit a 2.0 percent price inflation target, then nominal wage growth should be 3.5 percent.<sup>1</sup>

Importantly, this nominal wage target is also consistent with a stable labor share of overall income. Should we desire to raise the labor share from its depressed state following a recession, a period of above-trend nominal wage growth would be necessary. The fact that the labor share of income remains quite depressed in mid-2018 relative to its pre–Great Recession level bolsters our case that the Fed should tolerate a period of above-target price inflation. In fact, nominal wage growth of nearly 4.0 percent might be needed for a number of years in order for the labor share of income to return to pre-recession levels.<sup>2</sup>

Recent years should have driven home the lesson that quantity-side measures of labor market slack need to be supplemented with wage measures. This is because of the breakdown of forecasts stemming from wage Phillips curves over this time. A wage Phillips curve plots the percentage change in nominal wages against the level of unemployment. It is commonly accepted that at very high levels of unemployment the wage Phillips curve may be nearly flat, meaning that a movement from, say, 10.0 to 9.0 percent unemployment may not lead to any detectable change in wage growth at all. One possible explanation for the failure of wage growth to respond to falling unemployment even in the past few years is that the economy remains on the flat portion of the wage Phillips curve. If this is the case—if the wage Phillips curve is indeed quite flat even at 4.1 percent unemployment—then the rate of unemployment consistent with a price inflation rate of 2.0 percent (the Fed’s target) is much lower than conventional estimates of the natural rate of unemployment would indicate.

An often-cited rough estimate of the Phillips curve slope (once unemployment rates go low enough to move off of the flat portion of the curve) is 0.5 percent.<sup>3</sup> The year-over-year change in the PCE deflator, a commonly watched measure of price inflation, was 1.5 percent in the first quarter of 2018. If the trend growth of potential productivity is 1.5 percent, then this implies that nominal wage growth consistent with stable price inflation would be 3.0 percent. Yet hourly wages for all employees had risen only 2.7 percent over the previous 12 months as of March 2018. This implies a cyclical drag on wages of roughly 0.3 percentage points. A 0.5 percent Phillips curve slope would imply that the rate of unemployment consistent with no cyclical drag on wage growth would be lower than 3.5 percent—far below any conventional estimate of the natural rate of unemployment.<sup>4</sup>

We can sum up this evidence as follows: It is not true that the U.S. economy has already unambiguously reached full employment. In fact, much data is consistent with the view that labor market slack remains. Further, this evidence indicates that even if the U.S. were at full employment, there is little to no evidence that the economy is “overheating,” that is, that we are seeing wage and price inflation accelerate above policymakers’ comfortable targets. Finally, full employment is not something that policymakers should see as needing to be stomped out by raising interest rates. Instead it should be seen as a target for where policymakers want the economy to remain, and it does not follow that hitting full employment automatically implies that macroeconomic policy should become substantially more contractionary.<sup>5</sup> This is especially true given the large potential benefits that the economy may be able to realize with an extended period of labor market tightness. We turn to these potential benefits in the next section.

# The benefits of extended labor market tightness

The above sections provide some analytical markers for when policymakers should start to worry about the potential costs of economic overheating leading to inflation. This section documents the benefits of avoiding premature contraction. Given how unequal economic outcomes in the United States are across racial and class lines, a crucial part of this story is how sharply progressive the benefits of extended tight labor markets are. In this section, we first look at benefits for growth across the distribution of hourly wages, and we then turn to measures of labor market disparities across racial groups.

## Extended labor market tightness leads to faster hourly wage growth for low- and moderate-wage workers

We note above that the period between 1979 and 2017 saw unemployment consistently above estimates of the NAIRU and that it also saw a pronounced decoupling of growth between economywide productivity and the wages of nonsupervisory workers in the United States. In other work it has been noted that this excess of growth of productivity over wages for typical American workers is the root cause of the large increase in income inequality in recent decades.<sup>6</sup> This excess productivity growth had to go somewhere if it was not showing up in the paychecks of the bottom 80 percent of American workers. Where it largely went was to the top 1 percent of American households, in the form of greater concentration of labor incomes (think of the rising ratio of CEO pay to the pay of typical workers<sup>7</sup>) and in the form of profits rising at the expense of wages. This pattern of evidence is consistent with a hypothesis that for wage growth of low- and middle-wage workers to approach the rates of productivity growth lower rates of unemployment than for equivalent wage growth for the top 10 (and 5 and 1) percent are required.

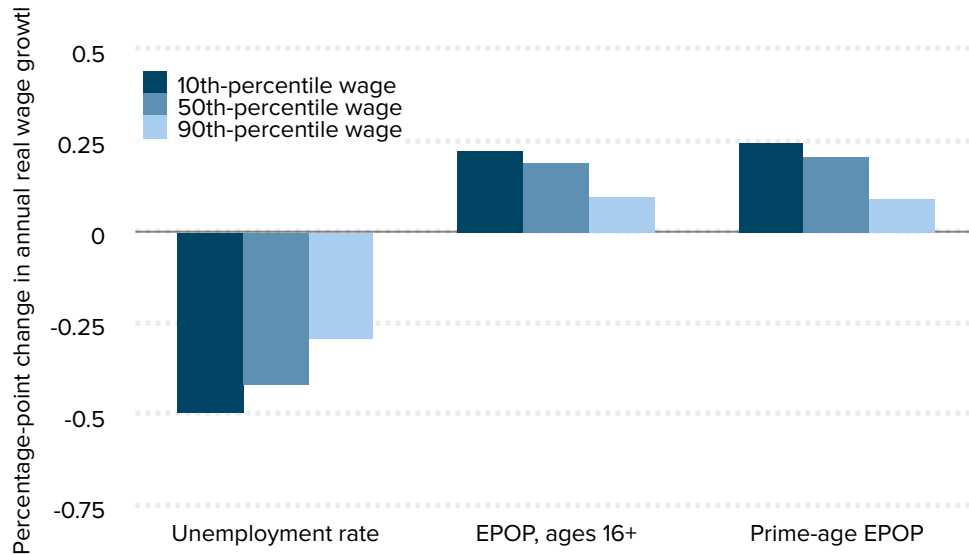
A range of authors have documented that hourly wages for low- and middle-income workers are more sensitive to changes in unemployment rates than are wages for higher-paid workers.<sup>8</sup> In this section, we extend and update this work using a panel of state-level data from 1979 to 2016 to look at the effect of labor market tightness on hourly wage changes for various wage deciles. Because measures of labor market tightness have varied substantially more across states in the past four decades than they have varied over time at the national level, this panel data set should provide more reliable and precise estimates of the effect of unemployment on wage growth. The regression specification is in the appendix.

Key findings are summarized in **Figure E**, which shows the percentage-point change in the growth rate of inflation-adjusted wages following a 1-percentage-point increase in the state-specific unemployment rate. The blocks of bars show results for the 10th, 50th, and

Figure E

## Low- and middle-wage workers' wages grow more quickly in response to an improving labor market than high-income workers' wages

Change in average annual real wage growth in response to a 1-percentage-point increase in unemployment or employment rates over the 1980–2016 period, by wage percentile



**Notes:** Each bar is the coefficient from the regression of the real annual percent change in a given percentile's wage on the measure of labor market tightness. Regressions include state and year fixed effects. Additional details and estimates are in the appendix. EPOP refers to the employment-to-population ratio; prime-age refers to adults ages 25–54.

**Source:** Authors' analysis of annual, state-level aggregations of Current Population Survey Outgoing Rotation Group microdata, 1979–2016

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90th percentiles of wages, corresponding to low-, middle-, and high-wage workers. Besides showing correlations between wage growth and unemployment, the figure also shows the wage changes associated with 1-percentage-point increases in the employment-to-population ratio (EPOP) for the population ages 16 and up and the EPOP for the population between the ages of 25 and 54 (the “prime-age” EPOP).

The results indicate that a 1-percentage-point drop in unemployment results in annual wage growth for workers at the 10th percentile of the wage distribution that is 0.5 percentage points faster. For example, if annual real wage growth is at 1.0 percent, then a 1-percentage-point fall in unemployment would result in annual real wage growth rising to 1.5 percent. For workers near the median of the wage distribution, wage growth is faster by 0.4 percentage points following a 1-percentage-point decline in the unemployment rate. For workers at the 90th percentile of the wage distribution, wage growth is faster by 0.3 percentage points following a 1-percentage-point decline in the unemployment rate.

(Note that the estimated changes are symmetric: an equal and opposite change in wage growth occurs in response to a 1-percentage-point *rise* in unemployment: at the 10th

percentile, workers see wage growth *slow* by 0.5 percentage points; wage growth slows by 0.4 percentage points at the median and by 0.3 percentage points at the 90th percentile.)

For a 1-percentage-point increase in the overall or prime-age EPOP, the results are similar (note that while a falling unemployment rate denotes a tightening labor market, a rising EPOP implies the same). Each percentage-point increase in the prime-age EPOP is associated with annual wage growth that is faster by about 0.2 percentage points for workers at the 10th and 50 percentiles, and wage growth that is about 0.1 percentage points faster for workers at the 90th percentile. In short, the well-established pattern seen in national time-series data—that low- and middle-wage workers see their wage growth respond more robustly than high-wage workers do to changes in the unemployment rate—is supported in our state-level panel data that examines a much wider range of unemployment experiences and with much more statistical power than the national data can provide. However, in our state-level data, the differences represented in this pattern are not uniformly statistically significant. That is, the coefficient representing (say) the effect of lower unemployment on wage growth for workers at the 10th percentile is higher than for workers at the 50th percentile, but the differences are not statistically significant. In the studies that use national data, these differences are often statistically significant.

To examine why the results from our state panel differ from prior studies focusing on national data, we look separately at the years before and after the Great Recession (using 2007 as our cutoff). The results of this split sample are shown in **Figure F**. There are large and significantly different values of the coefficient on unemployment for all three wage percentiles we examine. Essentially, the sensitivity of wage growth to unemployment was significantly larger (both economically and statistically) in the pre-2008 period for all percentiles, compared with the 2008–2016 period.

The sensitivity of wage growth to the prime-age EPOP is also larger in the pre-2008 period than in the 2008–2016 period, and these differences between periods are statistically different from zero at the 5 percent level for both the 10th percentile and the median.

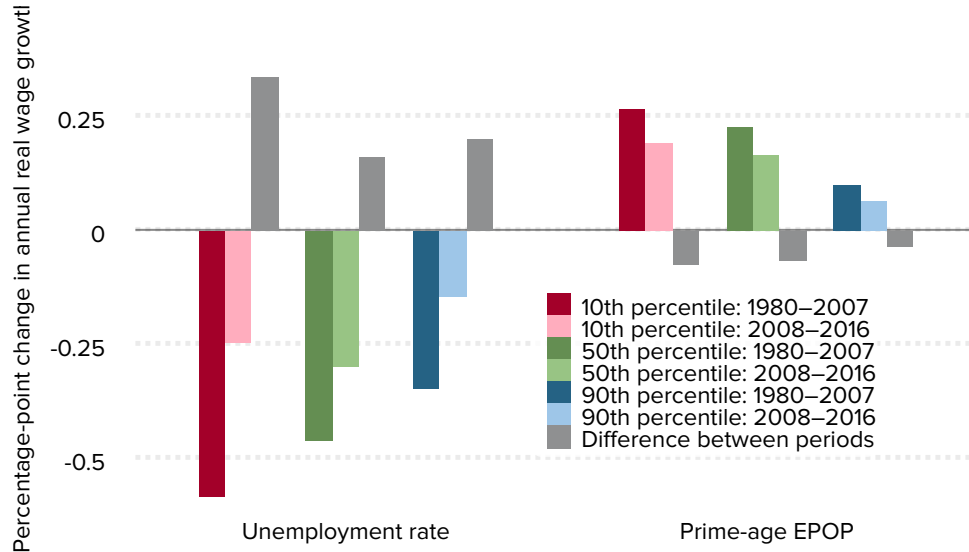
As seen in Figure F, a 1-percentage-point increase in unemployment during the 2008–2016 period led to smaller decrease in annual real wage growth relative to the pre-2008 period. This might strike some as a strange finding—was workers' wage growth really better insulated against rising unemployment during the Great Recession than before?

Strangely, the answer might be (a heavily qualified) “yes.” Essentially, given the rise in unemployment during the Great Recession, pre-2008 statistical relationships between unemployment and wage growth would have predicted even worse wage growth in the face of high unemployment than what has actually been seen in the past 10 years. This actually jibes well with another key finding about labor markets during and after the Great Recession: they were characterized by clear evidence of *downward nominal wage rigidity* (DNWR). DNWR essentially means that workers strongly prefer not having their nominal pay cut, and (perhaps the real puzzle) employers tend to respect this preference, even

Figure F

## The link between labor market tightness and wage changes has weakened since the Great Recession

Change in average annual real wage growth in response to a 1-percentage-point increase in unemployment or employment rates, by wage percentile, 1980–2007 vs. 2008–2016



**Notes:** Each bar is the coefficient from the regression of the real annual percent change in a given percentile’s wage on the labor market tightness outcome interacted with a time period indicator. Regressions include state and year fixed effects. Additional details and estimates are in the appendix. EPOP refers to the employment-to-population ratio; prime-age refers to adults ages 25–54.

**Source:** Authors’ analysis of annual, state-level aggregations of Current Population Survey data, 1980–2016

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during steep recessions.

For example, research has shown that both workers and employers prefer layoffs to nominal wage cuts as a strategy for absorbing reductions in labor demand.<sup>9</sup> As unemployment rose sharply post-2008, statistical models were predicting that nominal wage growth would indeed become negative for most of the American workforce. But numerous authors have shown that instead of widespread nominal wage cuts, there was a large piling up of nominal wage changes at exactly zero year-to-year (which, combined with low inflation, explains the minimal losses to real wage growth).<sup>10</sup> For example, Daly and Hobijn (2014) show that in 2006 just 12 percent of workers saw zero nominal wage growth, but in the recession-damaged labor markets of 2011, this share rose to 16 percent.

Further, there was a pronounced decline in economywide productivity following the onset of the Great Recession (and, indeed, perhaps this decline began a few years prior to the recession). In a limited number of years in the post-2008 period, precisely separating out the effect of falling productivity from rising unemployment on nominal wage growth is asking a lot of our model. As the economy and labor spends a number of years in more normal states, we would not be surprised if pre-2008 statistical relationships between

wage growth and unemployment reasserted themselves, in part because we anticipate a rebound of productivity growth to more normal ranges.<sup>11</sup>

## The unemployment rate consistent with zero real wage growth

Turning briefly to national data on median wage growth and unemployment allows us to examine a concept first identified by Katz and Krueger (1999)—the unemployment rate consistent with zero expected real wage growth (URCZWG). Essentially, this is the unemployment rate required for median-wage earners to see their nominal wage growth just keep up with price inflation. In their work, Katz and Krueger identify a small decline in this measure after 1988. One way to interpret this finding is that influences pushing down on wages besides unemployment intensified after 1988 in their data (or, alternatively, influences pushing up on wages got weaker).

Using national data, we examine the relationship between unemployment and wage growth using Katz and Krueger's (1999) regression specification. **Figure G** shows the unemployment rate consistent with zero wage growth for four time periods: 1973–1978, 1979–1988, 1989–2000, and 2001–2007. Our results show a large decline in this measure in the 1989–2000 period and then again in the 2001–2007 period. Our interpretation of this finding is that median-wage workers needed lower and lower unemployment (that is, increasingly higher-pressure labor markets) just to *not* see declines in the purchasing power of their hourly wages.

This finding is consistent with a theory that structural and institutional supports for workers' bargaining power have been dismantled over time without seeing new supports put into place. Obvious examples include the decline of unions and collective bargaining and an erosion of the purchasing power of the federal minimum wage. This suggests two parallel policy tracks for those wanting to boost wage growth: (1) restoring these structural and institutional supports for workers' bargaining power and (2) readjusting the targeted unemployment rate downward over time, as needed, so that it continues to be low enough to promote adequate wage growth.<sup>12</sup>

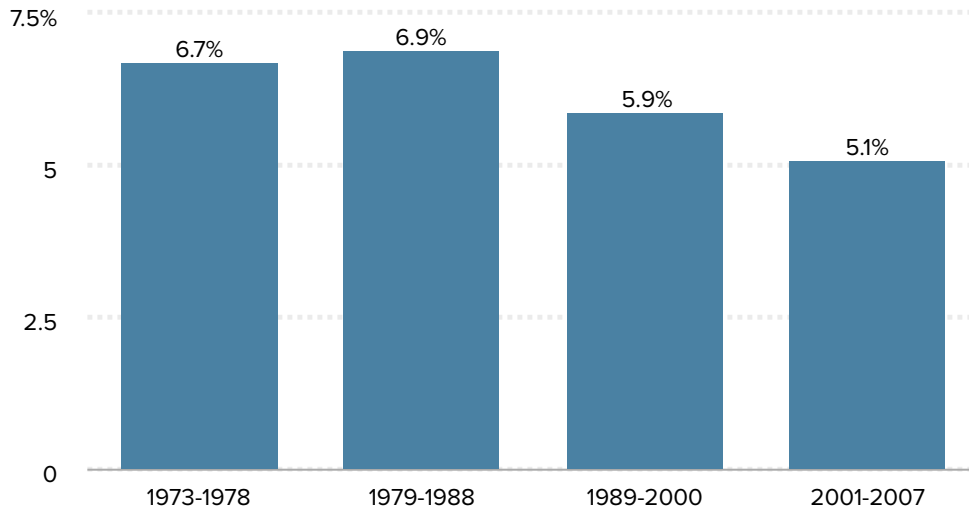
## High-pressure labor markets disproportionately benefit African American workers

It has become conventional wisdom that the ratio of unemployment rates for African Americans to whites is 2:1, in good times or bad. This conventional wisdom, even if true, has often led to overly pessimistic policy conclusions. For example, the implicit claim has been made that this constant 2:1 ratio of unemployment rates means that there's little the Federal Reserve (or other macroeconomic policymakers) can do about race-based disparities in the economy (Appelbaum 2015). But the opposite is actually true: a constant 2:1 ratio means that African Americans are hurt worse by aggregate economic slumps but benefit more from reductions in overall unemployment (Bivens 2015a). So any actions that

Figure G

## American workers have needed ever-tighter labor markets since the 1970s to achieve decent wage growth

Estimates of the unemployment rate consistent with zero real wage growth (URCZWG) over the 1973–1978, 1979–1988, 1989–2000, and 2001–2007 periods



**Notes:** Estimates stem from regression using percent wage change as the dependent variable and the unemployment rate as the independent variable, along with dummy variables for the time periods shown. The estimated URCZWG is the constant from this regression divided by the coefficient on unemployment.

**Source:** Authors' replication and extension of results from Katz and Krueger (1999)

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improve unemployment overall will disproportionately benefit African American workers.

Given the inherent uncertainty about the overall unemployment rate that constitutes genuine full employment, and given the racist history of the United States, this disproportionate benefit to low unemployment accruing to African Americans should be weighed heavily indeed by policymakers. Remember, the central job of the Federal Reserve is to balance the benefits of lower unemployment against the risk that this lower unemployment will spark inflation as empowered workers demand and receive excessive wage gains. If policymakers knew with certainty what specific unemployment rate would spark accelerating inflation, their jobs would be easy. But recent decades have highlighted with great force that policymakers do *not* know this “natural” rate of unemployment *ex ante*. In fact, the uncertainty is so large that in 2016 the *Economic Report of the President* highlighted that, in statistical terms, a NAIRU of zero could not be ruled out (CEA 2016).

So policymakers are making decisions regarding this tradeoff between lower unemployment and potentially accelerating inflation in an environment of uncertainty. Their choice about whether to aggressively probe how low the unemployment rate can go depends in large part on their estimation of the benefits of low unemployment. The most obvious benefit is that more people are working when unemployment is lower. Another



benefit is the faster wage growth that stems from lower unemployment, as we have documented above.

The disproportionate benefit to communities of color stemming from low overall unemployment should also be something that policymakers explicitly consider when evaluating the tradeoffs. Loury (2007) frames a series of questions around this precise subject:

Would it be legitimate to tolerate a somewhat greater chance of inflation while maintaining a strong demand for labor because doing so also manages to hold the unemployment rate of black youth at humane levels for the first time in a half-century? Can we reckon that this is a good policy because it contributes to overcoming racial stigma, draws blacks more fully into the mainstream of society, and permits them to earn the respect of their fellow citizens? (Here I mean to suggest that, but for this racial benefit, a different decision might be taken.) In other words, can we explicitly count as a benefit to society what we calculate to be the racially progressive consequences (reducing black economic marginality) of what is a race-blind action (electing to take a greater risk of inflation)?

It seems to us that the answer is clearly “yes”; in an environment of uncertainty, where potential benefits and costs are being weighed, ignoring potential benefits stemming from reducing race-based economic disparities seems wrong.

## **High-pressure labor markets narrow employment (EPOP) gaps, even while the black–white unemployment ratio remains stubbornly at 2:1**

While the rationale for taking racial employment gaps into account when making decisions regarding monetary policy seems strong to us even in the context of an unchanging ratio of African American to white unemployment rates, it would unquestionably be even stronger if high-pressure labor markets managed to reduce these ratios.

The hope that high-pressure labor markets might reduce the ratio of African American to white unemployment rates does not seem ridiculous on its face. Tight labor markets have been shown to erode other unemployment gaps likely caused by employer discrimination. Consider discrimination against the long-term unemployed. Starting in 2010, the long-term unemployment rate became elevated relative to its historic relationship with other labor force indicators. Suggestive studies argue that part of this elevated long-term unemployment rate was the result of employers engaging in discrimination against workers who had been out of work for long stretches, with these employers using the fallacious reasoning that long-term unemployment status is a marker of low productivity. Overall job growth during this time was constrained by weak demand, so there were more workers than job openings. This weak overall growth, combined with employers’ discriminatory practices, too often meant that long-term unemployed workers were sent to

the back of the job queue. However, as the labor market recovery continued into 2012 and beyond, the long-term unemployment rate actually began falling faster than other labor market indicators would have suggested. The need to hire began to override employers' dysfunctional strategy of prioritizing whom to hire.

This claim that labor market tightness can stop employers from discriminating against the long-term unemployed has a good pedigree: Olivier Blanchard (former chief economist of the International Monetary Fund [IMF]) notes in a 1996 paper that models predict that “in tight labor markets, firms will not discriminate against the long term unemployed. But in more depressed labor markets, they will” (Blanchard 1996). This prediction is largely borne out in empirical work by Ghayad (2013) and Kroft, Lange, and Notowidigdo (2013).

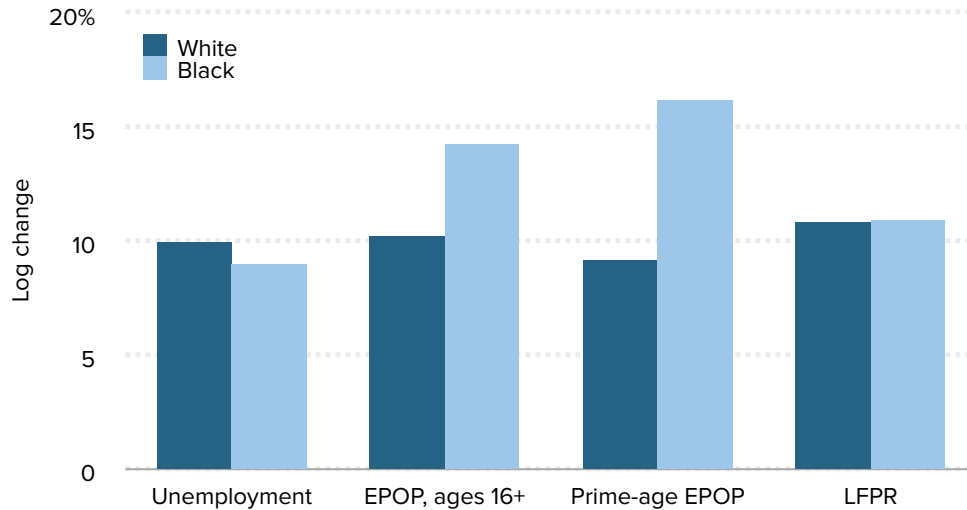
**Figure H** probes the question of racial (un)employment gaps and labor market tightness using our state-by-year panel data. The first set of bars shows the change in group-specific unemployment accompanying a given change in the overall unemployment rate. The standard finding that the percentage change in unemployment for African American and white workers is very similar for a given change in overall unemployment is confirmed. For example, the results show that if the overall unemployment rate rises by 10 percent (say, from 5.0 to 5.5 percent), then white unemployment rises by 10 percent, while African American unemployment rises by 9.1 percent. Because each group-specific unemployment rate changes by nearly the same amount in response to overall changes, pre-existing gaps are not closed by tighter labor markets. In fact, if there is any difference at all, it seems that African American unemployment rates respond slightly less (though not to a statistically significant degree) to changing overall unemployment, implying that the racial unemployment gap should be expected to rise slightly during economic booms (as white unemployment drops at a slightly faster rate than black unemployment). We also find no change in labor force participation gaps when the overall labor force participation rate changes.

However, when we turn to looking at the EPOPs, something interesting appears in the data. When we look at the EPOPs for ages 16 and up and at the prime-age EPOPs (for adults ages 25–54), we find that the African American rates respond much more strongly than the white rates (and to a statistically significant degree) to changes in the respective overall rates. For each 10-percent increase in the overall age-16+ EPOP (say, from 60 to 66 percent), the white age-16+ EPOP rises by 10.2 percent, but the African American age-16+ EPOP rises by 14.3 percent. For prime-age EPOPs, the changes in response to a 10-percent rise in the overall prime-age EPOP are 9.2 percent for the white prime-age EPOP and 16.2 percent for the African American prime-age EPOP. This means that for prime-age adults, the response of the African American EPOP is about 1.7 times as large as for whites. This implies that during tight labor markets as (say) the overall prime-age EPOP rises, the gap between the African American and white prime-age EPOPs should close rapidly.

Figure H

## High-pressure labor markets erode race-based gaps in employment-to-population ratios

Changes in race-specific labor market indicators stemming from a 10-percent change in the overall indicator



**Notes:** Each bar shows the coefficient from the regression of the log of a group-specific labor market outcome on the log of the overall labor market outcome. Regressions include state and year fixed effects. Additional details and estimates are in the appendix. EPOP refers to the employment-to-population ratio; prime-age refers to adults ages 25–54; and LFPR refers to the labor force participation rate of people ages 16 and older.

**Source:** Authors' analysis of annual, state-level aggregations of Current Population Survey data, 1979–2016

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## Extended labor market tightness reduces racial hours gaps

The implications of labor market outcomes for living standards does not hinge solely on whether an individual works; they also hinge on *how many hours* that individual works over the course of a year. Similar to our employment-based results, we also find that tighter labor markets are associated with narrowing racial gaps in total hours worked per year by households.<sup>13</sup>

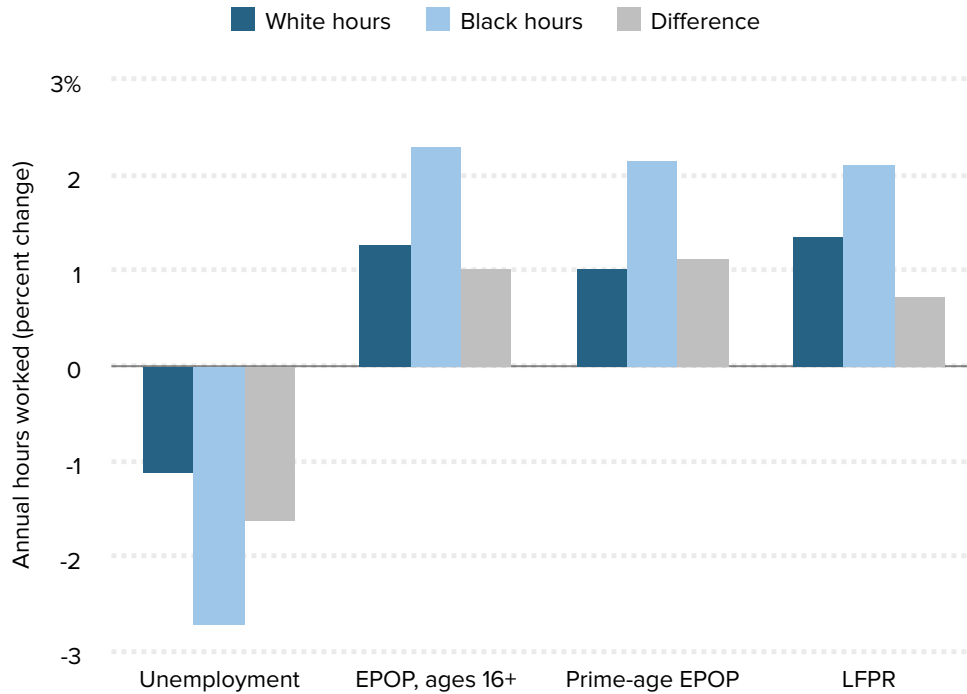
**Figure I** shows the effect of a 1-percentage-point change in an employment indicator (unemployment, employment, or labor force participation) on the average number of hours worked by households over the course of a year. The results are again presented by race, where we define the race of the household to be the race of the head of household. Here we find clear evidence that high-pressure labor markets boost average hours worked and that the responsiveness of African American households is greater than it is for white households.

The results in the figure indicate that a 1-percentage-point decline in the overall

Figure I

## High-pressure labor markets narrow race-based gaps in hours worked

Changes in annual household hours worked in response to a 1-percentage-point increase in the specified labor market indicator, by race



**Notes:** Each bar is the coefficient of the regression of the race-specific log of average annual household-level hours worked on the overall labor market tightness outcome. Regressions include state and year fixed effects. Additional details and estimates are provided in the appendix. EPOP refers to the employment-to-population ratio; prime-age refers to adults ages 25–54; and LFPR refers to the labor force participation rate of people ages 16 and older.

**Source:** Authors' analysis of annual, state-level aggregations of Current Population Survey data, 1979–2016

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unemployment rate is associated with a 1.1 percent increase in average hours worked by white workers and a 2.7 percent increase in hours worked by African American workers. For EPOPs, each 1-percentage-point increase in the overall age-16+ EPOP is associated with a 1.3 percent increase in hours worked by white workers and a 2.3 percent increase in hours worked by African American workers; each 1-percentage-point increase in the overall prime-age EPOP is associated with a 1.0 percent increase in hours worked by white workers and a 2.2 percent increase in hours worked by African American workers. For labor force participation, each 1-percentage-point increase in the overall rate is associated with a 1.4 percent increase in white hours worked and a 2.1 percent increase in African American hours worked. All of these increases are statistically different from zero at the 1 percent level.

The gray bars in Figure I show the percentage-point differences between changes in

annual hours worked for African American households compared with changes for white households for each employment indicator. These differences are statistically significant at the 1 percent level for unemployment, the overall EPOP, and the prime-age EPOP. In the case of labor force participation, the difference is statistically significant only at the 10 percent level. As shown in detail in Appendix Table 4, these results are robust to additional controls for state-specific trends over the sample time period.

In Appendix Table 5, we show the results of running similar specifications for average weekly hours worked by individual workers (rather than average total household hours over an entire year), this time conditional on the individual workers having worked a positive number of hours. The differential responses across races for these outcomes are not always statistically different from each other. When controlling for state-specific linear trends, the differences are in a similar direction as above and are statistically significant at the 10 percent level. Because we cannot be positive that including linear state-specific trends is the best way to control for state-specific developments, we consider these results using average weekly hours worked to be suggestive rather than dispositive. One possible reason for the difference in results between total annual hours worked by households and weekly hours worked by individuals (conditional on those individuals having worked) is that much of the differential hours gains of tighter labor markets are attributable to people newly entering or re-entering the labor market. Further probing of these results is a potential future research endeavor.

## Conclusion

The benefits of an extended period of high pressure in the labor market are large and progressive. The failure to aggressively pursue high-pressure labor markets in most years since the late 1970s seems highly implicated in the rise of inequality and the radical slowdown in wage growth for typical workers since then. The econometric evidence strongly suggests that low- and moderate-wage workers are more in need of tight labor markets to see any wage gains at all than their peers higher up the wage scale.

Further, economic observers have become too pessimistic about the benefits of high-pressure labor markets for reducing racial disparities in labor market performance. The relatively stubborn and consistently high ratio of African American to white unemployment has led too many to give up on tight labor markets as a plausible solution to easing racial disparities in the job market. In this report, we use a panel data set of U.S. states since 1979 to examine a broader set of measures—including employment-to-population ratios, labor force participation rates, and average hours worked. Many of these broader measures of labor market performance demonstrate that high-pressure labor markets can narrow gaps in some employment outcomes between African American and white workers.

The fact that the aggressive pursuit of full employment attacks both class-based inequalities and racial disparities in labor market outcomes means that it should be a high-priority agenda item for economic progressives. Further, it means that macroeconomic policymakers—particularly the Federal Reserve—should place a very high weight on the

benefits of full employment when weighing the costs and benefits of policies aimed at aggressively pushing toward high-pressure labor markets.

## Appendix

The tables in this appendix contain the full regression results from the figures in the text based on state-level, annual data from the Current Population Survey (CPS).

**Appendix Table 1** is from a regression of log of a race-specific labor market outcome on the log of the same overall labor market outcome (for all races), for the 1979–2016 period. The labor market outcomes are the annual, state-level unemployment rate, employment-to-population ratio, prime-age employment-to-population ratio, and labor force participation rate. The regressions also include state and year fixed effects and are weighted by state-level overall annual population estimates from the CPS. Standard errors are clustered at the state level.

**Appendix Table 2** is a regression of the annual percent change of the 10th, 50th, or 90th real wage percentile on the annual mean of a labor market outcome, for the 1980–2016 period. Here, labor market outcomes are scaled so that a 1.0-unit change is a 1-percentage-point change. For example, a 1-percentage-point increase in unemployment is associated with a -0.49-percent decline in the annual rate of growth of the 10th-percentile real wage. The regressions also include state and year fixed effects, control for the annual percent change in the real minimum wage, and are weighted by state-level overall annual population estimates from the CPS. Standard errors are clustered at the state level.

The coefficients in **Appendix Table 3** are from the same regression as in Appendix Table 2 except that we interact the annual mean of the labor market outcome with an indicator for the 1980–2007 period. The table shows the coefficients from the interacted terms as well as the difference between these two coefficients.

In **Appendix Table 4**, the “White” and “Black” columns contain the results of a regression of the log of the race-specific annual mean of annual household hours worked on the annual mean of a labor market outcome. Under the column “Difference,” the dependent variable is the log of the ratio of black-to-white hours worked. Here, the labor market outcomes are scaled so that a 1.0-unit change is a 1-percentage-point change and, additionally, the coefficients are multiplied by 100 to approximate percent changes. For example, a 1-percentage-point increase in unemployment is associated with about 1.1 to 1.2 percent increase in white weekly hours worked, depending on the specification. The top panel includes state and year fixed effects and the bottom panel additionally includes state-specific linear trends. The regressions are weighted by state-level overall annual population estimates from the CPS. Standard errors are clustered at the state level.

**Appendix Table 5** is the same as the previous table, except that the outcome is individual weekly hours worked, conditional on having worked positive hours.

Appendix  
Table 1

## Relationship between race-specific employment outcomes and overall employment outcomes

	log(unemployment rate)		log(EPOP 16+)		log(prime-age EPOP)		log(LFPR)	
	White	Black	White	Black	White	Black	White	Black
<i>log(overall unemployment rate)</i>	0.998***	0.906***						
	(0.017)	(0.034)						
<i>log(overall EPOP 16+)</i>			1.025***	1.432***				
			(0.022)	(0.115)				
<i>log(overall prime-age EPOP)</i>					0.923***	1.622***		
					(0.020)	(0.112)		
<i>log(overall LFPR)</i>							1.086***	1.094***
							(0.023)	(0.139)

\*p < 0.10; \*\*p < 0.05; \*\*\*p < 0.01

**Notes:** Each column is a separate regression of a log of a race-specific employment outcome on log of the overall employment outcome for annual, state-level data from 1979–2016. All regressions include state and year fixed effects and standard errors are clustered at the state level.

**Source:** Authors' analysis of state-level annual aggregations of Current Population Survey microdata

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Appendix  
Table 2

## Relationship between wage growth and overall employment outcomes

	Hourly wage percentiles		
	10th	50th	90th
<i>Unemployment rate</i>	-0.490***	-0.415***	-0.292***
	(0.057)	(0.055)	(0.053)
<i>EPOP, ages 16+</i>	0.227***	0.190***	0.099***
	(0.036)	(0.027)	(0.027)
<i>Prime-age EPOP</i>	0.246***	0.212***	0.092***
	(0.040)	(0.029)	(0.032)

\*p < 0.10; \*\*p < 0.05; \*\*\*p < 0.01

**Notes:** Each column is a separate regression of the percent change in the 10th-, 50th-, or 90th-percentile wage on the level of the unemployment rate, EPOP (ages 16+), or prime-age EPOP (ranging from 0 to 100) for annual data 1980–2016. All regressions include state and year fixed effects and standard errors are clustered at the state level.

**Source:** Authors' analysis of state-level annual aggregations of Current Population Survey microdata

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Appendix  
Table 3

## Relationship between wage growth and overall employment outcomes, by time period

	Unemployment			EPOP, ages 16+			Prime-age EPOP		
	10th	50th	90th	10th	50th	90th	10th	50th	90th
<b>1980–2007</b>	-0.582***	-0.459***	-0.346***	0.236***	0.192***	0.098***	0.267***	0.230***	0.101***
	(0.070)	(0.058)	(0.070)	(0.038)	(0.029)	(0.028)	(0.043)	(0.028)	(0.035)
<b>2008–2016</b>	-0.243***	-0.296***	-0.145***	0.197***	0.185***	0.101***	0.194***	0.165***	0.069*
	(0.066)	(0.069)	(0.051)	(0.034)	(0.037)	(0.036)	(0.038)	(0.033)	(0.035)
<b>Difference</b>	0.339***	0.163***	0.202**	-0.039	-0.007	0.002	-0.073**	-0.065***	-0.032
	(0.088)	(0.060)	(0.084)	(0.027)	(0.035)	(0.033)	(0.030)	(0.019)	(0.028)

\*p < 0.10; \*\*p < 0.05; \*\*\*p < 0.01

**Note:** Each column is a separate regression of the percent change in the 10th-, 50th-, or 90th-percentile wage on the level of the unemployment rate, EPOP (ages 16+), or prime-age EPOP (ranging from 0 to 100) for annual data 1980–2016 interacted with an indicator for the 1980–2007 period.

**Source:** Authors' analysis of state-level annual aggregations of Current Population Survey microdata

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Appendix  
Table 4

## Relationship between race-specific annual household hours worked and employment outcomes

	Without state-specific trends		
	White	Black	Difference
<b>Unemployment rate</b>	-1.105***	-2.712***	-1.608***
	(0.179)	(0.475)	(0.525)
<b>EPOP, ages 16+</b>	1.283***	2.315***	1.030***
	(0.161)	(0.291)	(0.367)
<b>Prime-age EPOP</b>	1.022***	2.151***	1.125***
	(0.164)	(0.263)	(0.313)
<b>LFPR</b>	1.372***	2.111***	0.735*
	(0.151)	(0.382)	(0.423)
<b>Unemployment rate</b>	-1.150***	-2.181***	-1.033**
	(0.102)	(0.439)	(0.458)
<b>EPOP, ages 16+</b>	1.266***	2.402***	1.133***
	(0.093)	(0.300)	(0.291)
<b>Prime-age EPOP</b>	1.036***	1.934***	0.896***
	(0.114)	(0.289)	(0.284)
<b>LFPR</b>	1.282***	2.410***	1.125***
	(0.106)	(0.370)	(0.355)

\*p < 0.10; \*\*p < 0.05; \*\*\*p < 0.01

**Notes:** Each coefficient is from a separate regression of the race-specific log of state-level average household annual hours worked, or the black–white log difference, on the overall labor market tightness outcome measured in percentage points (e.g., an unemployment rate of 6.0 is 6.0% percent). Regressions include state and year fixed effects and standard errors are clustered at the state level.

**Source:** Authors' analysis of annual, state-level aggregations of Current Population Survey data, 1979–2016

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## Relationship between race-specific weekly individual hours worked and employment outcomes

	Without state-specific trends		
	White	Black	Difference
<b>Unemployment rate</b>	-0.237***	-0.363***	-0.126
	(0.045)	(0.084)	(0.099)
<b>EPOP, ages 16+</b>	0.192***	0.246***	0.053
	(0.043)	(0.079)	(0.083)
<b>Prime-age EPOP</b>	0.184***	0.177**	(0.007
	(0.045)	(0.078)	(0.084)
<b>Unemployment rate</b>	-0.298***	-0.319***	-0.021
	(0.054)	(0.071)	(0.083)
<b>EPOP, ages 16+</b>	0.183***	0.306***	0.123*
	(0.042)	(0.061)	(0.065)
<b>Prime-age EPOP</b>	0.171***	0.284***	0.112*
	(0.048)	(0.066)	(0.067)

\*p < 0.10; \*\*p < 0.05; \*\*\*p < 0.01

**Notes:** Each coefficient is from a separate regression of the race-specific log of state-level average household hours worked conditional on working positive hours, or the black–white log difference, on the overall labor market tightness outcome measured in percentage points (e.g., an unemployment rate of 6.0 is 6.0% percent). Regressions include state and year fixed effects and standard errors are clustered at the state level.

**Source:** Authors' analysis of annual, state-level aggregations of Current Population Survey data, 1979–2016

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# Endnotes

1. While productivity growth has been below 1 percent in several recent years, there remains little reason to believe that the long-run trend growth for potential productivity has dropped much below 1.5 percent. Key forecasters—both private and public—continue to use 1.5 percent as their estimate of potential productivity growth. These forecasts, as well as evidence indicating that productivity would likely rebound if wage growth picked up, can be found in Bivens 2017.
2. Bivens 2015b provides a number of scenarios for how fast wage growth in excess of nominal wage targets would claw back the loss in labor's share over the post-2009 recovery.
3. See Leduc and Wilson 2017 for an overview of estimates of the wage Phillips curve. They find that this 0.5 estimate describes the pre-2008 period well, but (consistent with our argument) that it may well have declined post-2008.
4. When this calculation was done in Bivens 2015b, the implied natural rate of unemployment was lower. However, since then, other potential margins of labor market slack—like depressed labor force participation—have firmed up. This means future labor market tightening is more likely to show up as reduced unemployment than as increased labor force participation.
5. Indeed, much of the current pressure being put on the Fed to raise rates stems explicitly from strong claims that the U.S. economy today is clearly operating at more than full employment, and that interest rate increases are needed to slow the economy and move it on a glide-path back to the slightly higher unemployment rates that constitute the sustainable natural rate of unemployment. Needless to say, if the evidence that today's unemployment rate unambiguously represents full employment is lacking (as we think it is), evidence that today's unemployment rate unambiguously represents overfull employment is even more lacking.
6. See Bivens et al. 2014 for documentation of this claim.
7. See Mishel and Schieder 2018.
8. See, for example, Katz and Krueger 1999, Mishel et al. 2012, and Wilson 2015.
9. See Bewley 2002 for research on employer and worker attitudes toward nominal wage cuts.
10. It is important to note that one reason why employers may respect this preference against nominal wage cuts is that there are other margins along which these employers can cut compensation. For example, reducing contributions to retirement benefits, or increasing co-pays or employee contributions for health insurance, are effectively compensation cuts, but allow workers to not face cuts in nominal wages.
11. See Bivens 2017 for the case that productivity growth is likely to rebound in coming years.
12. When we tested the inclusion of the post-2008 period, the estimated URCZWG actually increased. This could in theory imply that these structural pressures relented during and after the Great Recession. But the much more plausible theory is one related to our regression findings above: downward nominal wage rigidity likely led to a breakdown in the correlation between wage growth and unemployment as the latter reached historically high levels. It will be interesting to see what happens to the estimated URCZWG when the full business cycle following the Great Recession has run its course.

13. Because a tighter labor market reduces the actual gap in average hours worked between white and African American households, this means (by definition) that the ratio of these hours is also decreasing.

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