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Wages and Labor Market Slack: Making the Dual Mandate Operational

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Abstract

In this paper we examine the impact of rises in inactivity on wages in the US economy and find evidence of a statistically significant negative effect. These nonparticipants exert additional downward pressure on wages over and above the impact of the unemployment rate itself. This pattern holds across recent decades in the US data, and the relationship strengthens in recent years when variation in participation increases. We also examine the impact of long-term unemployment on wages and find it has no different effect from that of short-term unemployment. Our analysis provides strong empirical support, we argue, for the assessment that continuing labor market slack is a key reason for the persistent shortfall in inflation relative to the Federal Open Market Committee's (FOMC) 2 percent inflation goal. Further, we suggest our results point towards using wage inflation as an additional intermediate target for monetary policy by the FOMC.

JEL codes: J01, J11, J21, J23, J38, J64

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In a speech in Chicago on March 31, 2014, entitled "What is the Fed doing to promote stronger job growth?" Federal Reserve Chair Janet Yellen made clear that she believed there was considerable slack in the labor market[1] and clarified what "additional measures of labor market conditions" beyond the unemployment rate that the Federal Open Market Committee (FOMC) is monitoring. These include

1) the number of part-time workers who want full-time jobs,
2) levels of job turnover,
3) voluntary quits,
4) long-term unemployment rate,
5) wage growth, and
6) movement in the participation rate.

As a guide to policy, both within and outside the FOMC, this gives a lot of room for interpretation. While we agree with Chair Yellen that on almost all of these measures there is clear evidence of labor slack *at present*, such a panoply of indicators has its problems. So stating forgoes the possibility of the Fed offering a clear target for stabilization of the real side of the economy, as it does for inflation (i.e., the forecast level of the personal consumption expenditure [PCE] deflator). So doing also overlooks an important relationship between several of those variables, notably between participation and wages.

We offer new analyses in this working paper of the impact of changes in the US labor force participation rate (LFPR). Right now, many observers of the US economy are attributing much of the historically huge decline in LFPR to demographic factors—despite the fact that the drop in participation is unprecedentedly rapid and coincident with the severe 2008–10 recession. If this attribution were correct, there would be little labor market slack left in the US economy, and the standard unemployment rate (minus the best-guess nonaccelerating inflation rate of unemployment [NAIRU]) would be a nearly sufficient target for that slack. The stakes are high for this assessment, not only because it will be a primary determinant of the timing of Federal Reserve policy tightening; the more one believes that current high long-term unemployment is cyclically (demand) driven rather than structurally (mismatch and demographic) driven, the more one believes workers can be brought back into employment through monetary (or other) stimulus.

To address this question, we undertake the first econometric analysis of the impact of rises in inactivity (one minus LFPR) on wages in the US economy. To the degree that the rise in unemployment in the United States is structural, movements in participation should have *no* impact on the wages of those employed; by definition, such individuals are unemployed because they cannot or do not want to compete for jobs. If anything, in a world where there is a sudden sharp rise in structural unemployment, wages should *increase* because of the negative shock to labor supply, all else equal. In contrast, if the rise in inactivity is largely cyclical, labor markets will

[1] See speech at http://www.federalreserve.gov/newsevents/speech/yellen20140331a.htm and then on April 16 in New York with even more labor market detail, http://www.federalreserve.gov/newsevents/speech/yellen20140416a.htm.

see downward pressure on wages, because of the possibility of reentry by these idled workers.

To summarize our results, we find evidence of a statistically significant negative effect of inactivity on wages. These inactives exert additional downward pressure on wages over and above the unemployment rate itself and other factors (such as the fear of unemployment) (Blanchflower 1991, Blanchflower and Shadforth 2009). This pattern holds across recent decades in the US data, and the relationship strengthens in recent years when variation in participation increases. Our analysis is based on observations by state and year and therefore is robust to the local impact on employment of, say, fracking in North Dakota or ongoing real estate overhang in Nevada. Additionally, we make analogous investigation with UK data. For reasons that remain unclear, the United Kingdom did not see the decline in participation that the United States did. Instead, part-time and self employment increased markedly alongside a sharp rise in underemployment following the global financial crisis (Bell and Blanchflower 2014). We find similar downward pressures on UK wages from underemployed workers (see Posen 2011b).

The implication for Federal Reserve policy is twofold. First, low participation is indeed an additional measure of labor market slack, pushing down on US wages. A substantial portion of those American workers who became inactive should not be treated as gone forever but should be expected to spring back into the labor market if demand rises to create jobs. Labor market slack in the US economy remains substantial, and subject to partial control by monetary stimulus (Posen 2011a). Second, wage inflation should be considered as the primary target of FOMC policy with respect to the employment stabilization side of the Fed's dual mandate, at least for now. Unlike unemployment, the rate of wage inflation requires less judgment and is subject to less distortion by such factors as inactivity. At least four of the labor markets measures that Yellen cites as worth monitoring—unemployment, underemployment of part-timers, long-term unemployment, and participation rate—reveal their nonstructural component by their influence on wage growth. And that is what the Fed should be trying to stabilize along with prices.

1. Facts about participation by US workers

Chair Yellen has made clear that she is carefully watching movements in the participation rate.

> When the recession began, 66 percent of the working-age population was part of the labor force. Participation dropped, as it normally does in a recession, but then kept dropping in the recovery. It now stands at 63 percent, the same level as in 1978, when a much smaller share of women were in the workforce. Lower participation could mean that the 6.7 percent unemployment rate is overstating the progress in the labor market…. If demographics were the only or overwhelming reason for falling participation, then declining participation would not be a sign of labor market slack. But some "retirements" are not voluntary, and some of these workers may rejoin the labor force in a stronger economy. Participation rates have been falling broadly for workers of

> different ages, including many in the prime of their working lives. Based on the evidence, my own view is that a significant amount of the decline in participation during the recovery is due to slack, another sign that help from the Fed can still be effective. (March 31, 2014, op cit)

During the initially slow recovery, as unemployment ticked down only slowly in 2013, the FOMC spoke about having an unemployment target, following the proposal of Charles Evans. With inflation quiescent, the unemployment rate seemed to be a reasonable variable for the Fed to focus on as its main target for forward guidance (The Bank of England announced a similar focus for its forward guidance in summer 2013.) Shortly thereafter, both in the United States and the United Kingdom, unemployment unexpectedly fell sharply. In the United States the unemployment rate fell from 7.5 percent in April 2013 to 6.6 percent in January 2014, very close to the Fed's trigger point of 6.5 percent. In the United Kingdom it fell from 7.8 percent in May 2013 to 7.1 percent in October 2013. Subsequently in both countries the rate has risen slightly recently, to 6.7 percent in the United States and 7.2 percent in the United Kingdom. Both central banks broadened their labor market focus; the Fed to include changes in the participation rate; the Monetary Policy Committee (MPC) to increases in underemployment. In both cases, the concern was that a strict focus on the measured unemployment rate would understate labor market slack and lead markets to believe in an early rate rise (thus defeating the purpose of forward guidance).

A major factor that distinguishes the United States from the United Kingdom and from several other OECD countries is the fact that from May 2013 there was a sharp fall in the participation rate (Kirkegaard 2014). That is to say that the unemployment rate fell in part because of a fall in the participation rate for both men and women across almost all age groups and so is not limited to early retirees or underskilled youngsters, or child-bearing age women. To get a sense of the most recent falls in the participation rate that occurred in 2013, table 1 shows that for men ages 16 and over the participation rate fell from a high of 73.1 percent in March 2008 to 70.3 percent in March 2012 and continued to fall through March 2014 to 69.6 percent. In the case of women the 16+ rate fell from 59.5 percent in March 2008 to 57.8 percent in March 2012 to 57.2 percent in the latest data for March 2014. The same pattern is also observed for 25-54-year-olds for both men and women. In the case of 16-24-year-olds participation rates fell from 2008–12 but then picked up recently. In the case of the 55+ participation rates rose through 2012 and then fell back recently. It turns out that these trends have been going on for some years and are quite different from most other major OECD countries that have seen quite different patterns (see also Kirkegaard 2014).

Figure 1 presents a long time-series on participation rates for those 16 and over for both US men and women and shows a steady decline in the male participation rate since 1948 alongside a steady rise in the female rate from 2000 through 2008. It then declines with the onset of recession. Figure 2 plots the overall male and female participation rate against the unemployment rate. As a result of the rapid rise in the female participation rate, the overall rate rises through a peak in 2000 and then subsequently declines. There do not appear to be any previous instances

when the participation rate fell as the unemployment rate fell, as happened since 2010. During the US recessions of the 1970s, 80s, and 90s, when unemployment went up, the participation rate actually rose. Figure 3 plots the participation rates for men and women aged 16-24 and 25+. Both male rates decline. The female 25+ rate rises through 2010 and turns as described above. The female 16-24 rate rises through 1978, remains broadly flat through 2000, and then declines steadily through 2014. Figure 4 presents the participation rate for those 25-54, which also shows a decline in the male rate and a rise in the female rate to around 2000; the rate remains broadly flat through 2010 and then declines. There is nothing here to suggest that a change in child-rearing patterns has driven this movement.

Figure 5 shows participation rates for US workers aged 55+, which decline through the mid-1990s and rise steadily after that until 2010, when there is a slight fall. So the recent fall in participation appears to have relatively little to do with older workers specifically. Figure 6 has participation rates for men by education category since 1992. All decline except for the least educated, whose participation rate rises through around 2000 and then falls. Figure 7 has participation rates for females by education group since 1992; the highest education groups decline whereas the least educated groups rise through 2010 and then fall. This does not appear to be consistent with a story of rising skill mismatch either. So the three major structural explanations for the rise in US inactivity—women leaving workforce to raise children; older people going into early retirement; skills mismatch for workers with current opportunities—do not appear to fit the wide increase of inactivity across gender, age, and educational groups.

Table 2 reports participation rates for men and women for 16 countries including the United States for the four years 2009–2012. We include the major OECD countries of Australia, Canada, France, Germany, Japan, and the United Kingdom along with Spain, which has seen its unemployment rate rise to over 25 percent, plus three developing countries—Korea, Mexico, and South Africa. Between 2009 and 2012 male rates fell in the United States and most other countries but did rise in Germany, Korea, and Sweden. However, in contrast to the United States, where female participation rates fell, they rose in half of the countries—France, Germany, Italy, Korea, Mexico, New Zealand, Spain, Sweden, Turkey, and the United Kingdom. It remains unclear why, though given the aging population in many of these countries, it seems there is no simple demographic driver of these outcomes. Table 3 reports participation rates by age for seven countries including the United States from 2009 through 2012. In every country except New Zealand, which had a rise between 2009 and 2012 for 20-24-year-olds, participation rates for the two younger age groups fell. For the 25+ group, they rose in Germany, New Zealand, Spain, and the United Kingdom.

To summarize, the labor force participation rate continued to fall sharply in the United States in 2013, despite recovery but appears to have picked up again a little in 2014. There is little evidence that the main driver behind the fall was older workers retiring; the evidence is primarily that the prime movers were middle aged workers under the age of 55. The downward trend for the youngest age group 18-24 started around 1980 and continues. The decline for men ages 25-54 continues a trend that has been going on for 50 years. For women ages 25-54 the upward trend stopped

around 2000; since then there has been a steady decline. These steady long-run trends explain neither the sudden jump in inactivity in the United States in the recession nor the broad composition of that jump. This opens the door to attributing the jump to demand factors, but direct evidence is needed to do so.

2. Impact of unemployment rates and participation rates on US wages

We now turn to examine the evidence of the impact of falling participation rates and hence rising inactivity rates (which are simply 100 minus participation rate) on wages. The bigger the inactivity rate, the larger is the pool of available labor. The question is whether they are ready to spring back into the labor market when jobs present themselves, hence they would have an impact on wages, or not. Of interest though is that in both countries there has been little evidence of any rise in nominal wage growth. In the US average weekly earnings in the private sector over the last year are up 2.1 percent, March 2013 vs. 2012, while in the United Kingdom they were up 1.7 percent.[2]

At a recent conference, Erceg and Levin (2013) argued that "labor market slack may not be well summarized by the unemployment rate and consequently the monetary policy rule developed for the Great Moderation may have to be adapted to account for broader measures of slack." They suggested that the participation rate should enter into a wage equation, meaning the higher the participation rate the higher are wages, but did so without any empirical evidence. We present that supporting evidence here.

For simplicity we focus on one minus the participation rate, the *inactivity rate*. In what follows we explore the impact of the participation rate on log wages, by estimating a wage curve following the work of Blanchflower and Oswald (1994, 1995). Our analysis indicates that the inactivity rate lowers wages in a similar way to the unemployment rate, but is orthogonal to it. This suggests there is much more slack, and hence greater downward pressure on wages, in the US labor market than previously thought.

Table 4 estimates a series of balanced panel wage equations where the unit of observation is the state*year cell and all relevant variables are in logs. The dependent variable is, as is conventional in the literature, the log of wages is defined in turn as 1) weekly and 2) hourly. We assume that the relationship runs from unemployment to wages rather than the reverse. Data are obtained from the Bureau of Labor Statistics (BLS) on unemployment and inactivity rates while the wage data and variables including age, gender, schooling, and race are generated by aggregating the microdata to a state*year cell. The data are taken from the individual Merged Outgoing Rotation Group (MORG) files of the Current Population Survey, as in Blanchflower and Oswald (2005).[3] Separate estimates are provided from both weekly and hourly

[2] The Employment Situation, March 2014, Table B-3, Bureau of Labor Statistics, http://www.bls.gov/news.release/pdf/empsit.pdf and
Labor Market Statistics, March 2014, ONS Table 15 3-month average on 3-month average, http://www.ons.gov.uk/ons/dcp171778_354442.pdf.

[3] The data and manuals are available for download at www.nber.org/morg/annual. An explanation of the state level participation and unemployment rates is available at www.bls.gov/lau/rdscnp16.htm#data with the data available here http://www.bls.gov/lau/staadata.txt.

earnings and all equations include the full set of year and state fixed effects. We are unable to deflate by state-level price index as one is not available but the year dummies will pick up annual inflation. We estimated for the period 1980–2013 and relevant subperiods.

Each equation includes a lagged dependent wage variable, which has a coefficient well below one, and strikingly so when the sample is divided into two separate time periods. This suggests that this is not a Phillips curve, but a *wage curve* (Blanchflower and Oswald 2005). The reason for this is the fact that the lagged dependent variable is everywhere significantly different from one (Card 1995). We also include estimates of the long-run wage-unemployment elasticity, which for illustration is calculated in column 2 for weekly wages as –.0419/(1 – .7161) = –.15. The 12 estimates reported in table 4 average –.13, which is close to Blanchflower and Oswald's claim that the unemployment elasticity of wages is approximately -.1.[4] That is to say when unemployment doubles, say from 5 to 10 percent, real wages fall by 10 percent (Nijkamp and Poot 2005).

What is new here is the inclusion of the 16+ inactivity rate variable in columns 2 to 5, which enters negatively *and* significantly into both weekly and hourly wage equations. It also appears that the size of the effect of inactivity is greater in the later subperiod, 2002–13, than it is in the earlier subperiod. So the inactivity rate is pushing down on wage growth, and the larger that rate is, the greater the downward pressure. Thus, the decline in the participation rate is connected to the lack of wage growth as it represents an additional pool of labor pushing down on US wages, over and above the unemployment rate.

It makes sense to try to determine the relative impact of the changes in unemployment on wages compared to the impact of changes in the participation rate given these estimates. Starting with weekly wages we use the estimated coefficients on the natural log of unemployment (–.0440) and the natural log of the participation rate (–.1016) terms in the first part of table 4 in column 2. If we then estimate log(37.2) – log(33.6) times –.1016 = – .0103. The unemployment rate went from a low of 4.4 percent in October 2006 and March 2007 to a high of 10.0 percent in October 2009. So we can compare the participation rate impact to that from the unemployment rate, i.e., with log(10) – log(4.4) times – .0439 = – .0360.[5] Hence the effect of the rise in unemployment is approximately three and a half times the impact of the fall in the participation rate. If we use estimates for hourly wages based on the estimates in the second column, once again we get a broadly similar answer that the impact of unemployment is three times that of the participation rate. Both effects are substantial. Unemployment doubles, real weekly wages fall by 15 percent; the participation rate falls by 10 percent, real weekly wages fall by 4.3 percent.

[4] On page 357 of Blanchflower and Oswald (1994) it was argued that "future work will have to begin to test for statistically significant differences among numbers that lie in a rough band from -.05 to -0.20. It would probably be unwise to treat the minus-point-one rule as more than one of thumb."

[5] To solve out for long-run elasticities, both estimates would be divided by (1-.7161), setting $w_{t-1}=w_t$ giving -.036 for participation and -.127 for unemployment.

3. Long-term unemployment

In a recent paper that has gained a lot of attention recently, Krueger, Kramer, and Cho (2014) examined whether the long-term unemployed were on the margins of the labor market. They found that the long-term unemployed have about a one in ten chance of moving into employment in any given month and also tend to withdraw from the labor force at higher rates than the short-term unemployed, although they do note that labor force withdrawal rates collapse in a recession. They did warn that "some may wish to draw macroeconomic policy implications from our findings, only time will tell if inflation and real wage growth are more dependent on the short-term unemployment rate than total unemployment rate." They did not examine whether indeed that was the case, but we are able to do that here.

To place this in context figure 8 plots the time-series of the proportion of the unemployed who are long-term using data on five countries—Canada, France, Germany, the United Kingdom, and the United States—from the OECD, based on the convention that this is defined based on the proportion continuously unemployed for at least a year. The United States had the lowest rate of the five until 2002 when the series crossed; the rise in the US rate is notable through 2011 and since then there has been a marked decline. Figure 9 presents data for 2013Q2 and shows that, despite the fact that the long-term unemployment rate has risen sharply in the United States, it is well below the majority of OECD countries in general and the euro area in particular.

We should note that this issue isn't new, as there was a major debate on exactly this point in Europe in the 1980s and 1990s, which did have lots of long-term unemployment while the United States did not. Layard and Nickell (1987), for example, argued that the long-term unemployed imposed much less wage pressure than the short-term unemployed. In a series of annual time-series regressions they found evidence that a long-term unemployment term, defined as the number of those who had been unemployed expressed as a proportion of total unemployment, entered positively in a wage equation. Blanchflower and Oswald (1990) showed using microdata for the United Kingdom that this was not the case and long-term unemployment *did not* play an independent role in wage determination. The problem was that high long-term unemployment is highly correlated with high unemployment. They concluded that "the British evidence does not support the view that long-term unemployment is an important element in the wage determination process."

The data we have available means that we can test this for the United States. The BLS provided us with data on unemployment durations by state and year from 1990–2012. It is possible to construct the proportion of the unemployed who had been continuously unemployed for (a) 15 weeks and more, (b) 27 weeks and over, (c) 52 weeks, and (d) mean duration of unemployment. In table 5 we include these variables in turn using both weekly and hourly earnings and include these various long-term unemployment terms in turn. If the long-term unemployed exerted less wage pressure than the unemployed, these variables would be positive and significant. We never find that to be the case, and in one instance we find the variable is negative and significant. Including these variables has no impact on the sign or the significance of either the unemployment rate or the inactivity rate.

In the first column of table 5, for weekly pay in part 1 and for hourly pay in part 2 we include the unemployment rate, and a variable for the proportion of the unemployed whose spell was at least 15 weeks. This is not significant and remains insignificant when the inactivity rate variable is added. In columns 3 and 4 the long-term unemployment variable is changed to the proportion unemployed for at least 27 weeks (column 3) and both of these variables are insignificant. In column 4 the long-term unemployment variable is now switched to at least 52 weeks, which has a t-statistic of 1.7 for weekly wages and is significant with a t-statistic of 2.15 and in both cases this variable has the wrong sign being negative. Column 5 restricts the sample to the years from 2000 and the long-term unemployed 52 weeks and over is now highly significant for both weekly and hourly earnings with t-statistics of 2.8 for weekly earnings and 2.6 for hourly. In both cases the coefficients are negative, suggesting, just as with the inactivity variable generating additional downward pressure on wages, not less as some have suggested. It appears that the US evidence, just like the earlier British evidence, is consistent with the view that long-term unemployment adds nothing to our understanding of the wage determination process.[6]

Similar evidence indicating that long- and short-term unemployment have equivalent effects on inflation has been found using data on prices rather than wages. In a recent paper, Kiley (2014) considered this question using cross-section time-series data on 24 large metropolitan areas (rather than states, as in our analysis). The dependent variable is the consumer price index (CPI) in each metropolitan area by year. As in our estimation procedure, year and area fixed effects are included with long-term unemployment being defined as an unemployment spell of 27 weeks and over. Rather than including a variable for the long-term unemployment proportion as in our analysis, Kiley includes both short- and long-term unemployment rates, which is functionally similar.

It is notable that the coefficients in his price change equations on local unemployment rates are similar and precisely estimated; hence, the data do not reject the hypothesis that short- and long-term unemployment rates have identical effects on inflation. Kiley is thus able to conclude that "the results suggest that long-term unemployment has exerted similar downward pressure on inflation to that exerted by short-term unemployment in recent decades." This finding is consistent with our findings in table 5 using data on wages across states.

4. Experiments

We experimented further with various alternative specifications to determine the stability of the results presented here. The results are reported in table 6 in the first part for weekly wages and the second for hourly. First we change the specification to

[6] A similar result was obtained by Smith (2014) who finds no evidence that there is any difference in the impacts of the short-term and long-term unemployment rates. He also finds, as we do, that those who are out-of-the-labor-force (OLF) also push downwards on pay. He concludes his note "taken as a whole, these findings suggest that the LTU should not be strongly discounted from measures of slack, because they traditionally exert similar wage pressures as the STU. Moreover, because some segments of those not in the labor force also appear to generally apply downward pressure to wages as well, the unemployment rate may somewhat understate the degree of labor slack that matters for aggregate wage and price movements."

separate the effects of long- and short-term unemployment and create short- and long-term unemployment variables using 27 weeks and higher and 52 weeks and higher as two alternative definitions. The movements of these two variables, using the 27-week definition, are presented in figure 10, which shows the much bigger rise in the long-term rate since 2008, which rises from 0.9 percent in December 2008 to a high of 4.29 percent in June 2010 than in the short-term rate, which rose from 4.1 percent in December 2007 to 6.8 percent in May 2009. In the latest data for April 2014 the 6.3 percent unemployment rate is made up of a short-run rate of 4.1 percent and a long-run rate of 2.2 percent.

So, to be clear, if total unemployment is 10,000 made up of 4,000 long-term unemployed and 6,000 short-term unemployed and there are 90,000 employed, then the unemployment rate is the number of unemployed divided by the workforce = 10,000/(90,000+10,000) = 10 percent. Previously in table 5 we used a variable calculated as the proportion of the unemployed that were long term i.e., (4,000/10,000) = 40 percent and included that along with the log of the unemployment rate of 10 percent. Now we calculate the short-term rate = 6,000/100,000 = 6 percent, so the short-term rate = 6 percent and the long-term rate is 4,000/100,000 that is 4 percent and include them as separate variables. We use the "<52 weeks" definition in this table. The mean of the short-term (52-week) rate is 4.9 percent and for the long-term rate it is 0.7 percent. In column 1, for both hourly and weekly earnings we include the unemployment rate and the long-term rate. For both wage variables the long-term rate variable is close to significance and *negative*, suggesting that the higher the proportion of long-term unemployed the greater is the wage pressure. In column 2 we exclude the log unemployment rate variable and include both the short- and long-run rates. For both earnings variables the short- and long-term variables are not significantly different from each other.[7]

This confirms that the long-term unemployed do not have any different impact on wages than the short-term unemployed do. In fact, we find evidence supportive of the parallel result found by Kiley (2014) using data on price inflation that suggests the long-term unemployed have an even greater downward impact on wages than the short-term unemployed. Hence we conclude that the number of long-term unemployed is as important a factor as the short-term unemployed in wage determination in the United States.[8] There is no need to distinguish between them for inflation forecasting or monetary policy purposes (though of course the relevant labor policy response may be quite different).

We then turn in the remaining three columns to reestimating the equations but now instead of having a dependent variable as the log wage with a lagged dependent variable we redefine the dependent variable as a wage change ($\log W_t - \log W_{t-1}$), hence imposing the restriction that the lagged dependent variable is one and hence a Phillips curve. To be clear we are now imposing a missing variable bias on the equation, as we are excluding a variable that is clearly significantly different from 1, ranging from .41 to .85 in tables 4 and 5. Excluding the lagged dependent variable

[7] These findings are essentially identical if the level of the inactivity rate rather than the log is included. Results are as follows, for example, in the hourly equation - lagged $wage_{t-1}$ .6329 (30.08); Inactivity $rate_t$ -.0031 (5.18); short $rate_t$ -.0036 (3.62); long $rate_t$ -.0053 (3.06), with t-statistics in parentheses.

[8] As Blanchflower and Oswald (1990) established many years ago for the United Kingdom.

W_{t-1} now drives the inactivity variable to insignificance in all specifications. This means that lagged wages are correlated with inactivity rates, that is to say that higher lagged wages imply lower inactivity rates and vice versa. Omitting the lagged dependent variable thus causes downward bias to the coefficient on the inactivity rate variable. In our view modeling wage changes without the inclusion of the lagged dependent, as in table 6, is not the appropriate specification.

5. Making wage growth an intermediate target

As noted in the FOMC minutes from the March 18–19, 2014 meeting, a number of policymakers view the post-2007 decline in LFPR as largely reflecting demographic and structural factors. Our findings directly refute that hypothesis. Indeed, a demographically induced decline in LFPR would generally correspond to an adverse labor supply shock that would induce upward pressure on wages, whereas our results clearly demonstrate that a higher inactivity rate is linked to downward pressure on wages in the United States, and that effect is increasing as inactivity rises.

Our findings therefore argue against the growing sense of pessimism that the post-2007 decline in LFPR is largely irreversible. For example, the Congressional Budget Office (2014) projects that the LFPR will edge down only slightly over the next several years, falling to 62.5 percent by the end of 2017, compared to 62.9 percent in the fourth quarter of 2013. If that kind of sustained structural decline in participation were the case, one might have expected that the state-level data would exhibit little or no correlation between wages and inactivity rates. In fact, our analysis shows that the correlation is highly significant, bolstering the view that many individuals who are not actively searching for work under current labor slack conditions remain attached to the labor market.

Our analysis provides strong empirical support for the assessment (expressed in the recent speech by Fed Chair Yellen referenced earlier) that continuing labor market slack is a key reason for the persistent shortfall in inflation relative to the FOMC's 2 percent inflation goal. In other words, the inactivity rate is relevant for both parts of the dual mandate. Of course, there may be policy tradeoffs (to the extent that the inactivity rate and unemployment rate have quantitatively different effects on nominal wage inflation), but the first-order conclusion is that responding to labor market slack is crucial for fostering both of the goals of maximum employment and price stability.

As noted by Yellen,

> the decline in unemployment has not helped raise wages for workers as in past recoveries. Workers in a slack market have little leverage to demand raises. Labor compensation has increased an average of only a little more than 2 percent per year since the recession, which is very low by historical standards.[5] Wage growth for most workers was modest for a couple of decades before the recession due to globalization and other factors beyond the level of economic activity, and those forces are undoubtedly still relevant. But labor market slack has also surely been a factor in holding down compensation. The

> low rate of wage growth is, to me, another sign that the Fed's job is not yet done.

Our results also point towards using wage inflation as an additional intermediate target for monetary policy by the FOMC, paralleling on the real activity side the de facto inflation targets on the price stability side. Unemployment has long been known to have severe problems as a guide post to monetary policy, as discussed in Bernanke et al. (1999, chapter 1), although the Phillips curve is far from vertical for extended short runs of multiple years. Guessing the natural rate of unemployment is extremely difficult, is subject to variation, and ignores a lot of additional labor market information. This has all been amply illustrated by the developments of the last few months in the US economy.

By comparison, a general measure of the wage inflation rate encompasses most of the relevant indicators: If mismatch or demographic shifts limit the level of appropriate workers to below the level of demand, wages should be seen to be rising; if on the other hand, individuals are eager for more hours or to return to the workforce, wages should be falling on average for the whole economy.

Indeed, in testimony to the US Congress on Wednesday, May 7, Janet Yellen appeared to concur that wage growth was the most important labor market indicator:

> Even so, new research suggests there's an even more telling indicator of an incomplete recovery. The single best gauge of the economic recovery—better than the headline unemployment rate—may be wage growth. ...The most important number in the latest jobs report did not change at all. ...Average hourly wages for American workers held steady at $24.31 last month.

One has to be careful, as it is possible for wages to rise without generating overall inflation if labor's share of income rises—and the labor share in the economy is at near-historic lows for the United States. Yet, it is certainly easier and more transparent for the FOMC to assess whether a rebuild in labor share is out of line with historical norms, and/or can be traced to some structural changes in say bargaining power, than to make precise public guesses about the far slipperier NAIRU. And like unemployment, movements in wage growth can be used to predict future movements in inflation. So the FOMC should set its forward guidance for the real economy in terms of wage growth, allowing the economy to recover until wage inflation indicates that labor slack has been absorbed.[9]

[9] It is possible that such a wage growth target would be less appropriate in more normal times, when labor market slack is less of an issue and labor share of income is closer to usual levels. But consider how the euro area got into trouble in 1999–2008 because of sustained very high wage growth in Greece, Ireland, and Spain (as opposed to in Germany). The European Central Bank's monetary growth targets flashed no warning signals about such developments, but leaning against excessive wage growth might have limited the development of euro area imbalances.

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Table 1 US participation rates by age, 2008–14 (percent)

	Men			Women		
Age group	**March 2008**	**March 2012**	**March 2014**	**March 2008**	**March 2012**	**March 2014**
Age 16+	73.1	70.3	69.6	59.5	57.8	57.2
Age 16-24	60.9	56.0	57.4	55.8	53.5	53.8
Age 25-54	90.9	88.9	88.5	75.8	74.5	74.2
Age 55+	45.8	46.6	45.7	33.9	35.2	34.8

Source: Bureau of Labor Statistics.

Table 2. International 16-64 labor force participation rates, 2009–12 (percent)

	2009			2010			2011			2012		
Country	**Men**	**Women**	**Total**	**Men**	**Women**	**Total**	**Men**	**Women**	**Total**	**Men**	**Women**	**Total**
United States	72.0	59.2	65.4	71.2	58.6	64.7	70.5	58.1	64.1	70.2	57.7	63.7
Australia	73.3	60.1	66.7	73.2	59.8	66.4	73.1	60.0	66.5	72.6	59.9	66.2
Canada	72.0	62.5	67.2	71.8	62.4	67.0	71.7	62.2	66.8	71.4	62.1	66.7
France	61.1	50.9	55.8	61.0	51.0	55.8	60.7	50.9	55.6	61.1	51.2	55.9
Germany	65.3	52.1	58.5	65.1	52.4	58.6	65.6	53.2	59.2	65.5	53.2	59.2
Italy	59.4	38.2	48.4	59.0	38.2	48.1	58.7	38.4	48.1	59.2	39.7	49.0
Japan	71.3	48.1	59.3	70.9	48.1	59.1	70.5	47.7	58.7	69.8	47.7	58.4
Korea	73.1	49.2	60.8	73.0	49.4	61.0	73.1	49.7	61.1	73.3	49.9	61.3
Mexico	76.7	41.1	57.9	76.5	40.7	57.6	76.4	41.2	57.8	76.7	42.0	58.4
Netherlands	72.9	59.8	66.2	71.1	58.4	64.6	70.3	58.3	64.2	70.9	58.9	64.8
New Zealand	74.6	62.2	68.2	74.4	62.1	68.1	74.6	62.5	68.4	74.0	62.6	68.2
South Africa	63.7	49.0	56.1	61.8	47.4	54.3	61.2	47.9	54.3	61.7	48.3	54.8
Spain	68.4	51.4	59.7	67.8	52.1	59.8	67.2	52.8	59.8	66.7	53.2	59.8
Sweden	68.9	60.7	64.8	69.3	60.3	64.7	69.3	61.0	65.1	69.2	61.3	65.2
Turkey	69.1	24.1	46.2	69.6	25.6	47.2	70.6	26.7	48.3	70.0	27.2	48.3
United Kingdom	70.2	56.8	63.4	69.8	56.8	63.2	69.7	57.0	63.2	69.8	57.2	63.4

Source: Bureau of Labor Statistics, www.bls.gov/fls/flscomparelf/lfcompendium.pdf.

Table 3 International 16-64 labor force participation rates, by age, 2009–12 (percent)

	2009			2010			2011			2012		
Country	**15-19**	**20-24**	**25+**	**15-19**	**20-24**	**25+**	**15-19**	**20-24**	**25+**	**15-19**	**20-24**	**25+**
United States	37.5	72.9	67.0	34.9	71.4	66.5	34.1	71.3	65.8	34.3	70.9	65.4
Canada	58.6	76.7	66.9	57.2	76.2	66.9	57.2	76.1	66.6	55.4	75.2	66.6
Germany	31.3	70.3	59.6	30.3	69.5	59.7	30.3	70.3	60.3	28.4	68.9	60.5
Japan	14.9	68.3	61.4	14.5	68.1	61.3	14.0	68.0	60.8	14.2	67.5	60.5
New Zealand	51.0	73.4	69.7	47.8	73.2	69.8	45.6	74.6	70.2	44.3	75.0	70.0
Spain	24.3	65.9	61.1	21.2	64.0	61.5	19.2	62.6	61.7	17.3	60.6	61.9
United Kingdom	46.4	82.0	63.1	44.4	81.9	63.0	43.4	81.6	63.1	44.0	81.8	63.2

Source: Bureau of Labor Statistics, www.bls.gov/fls/flscomparelf/lfcompendium.pdf.

Table 4 Log wage equations, United States, 1980–2013

1) Weekly

			1980–1991	**1992–2001**	**2002–2013**
Log $Wage_{t-1}$	.7417 (53.37)	.7157 (49.77)	.7675 (32.30)	.4098 (11.75)	.4674 (13.67)
Log Unemployment $rate_t$	-.0473 (13.69)	-.0440 (12.72)	-.0535 (9.04)	-.0322 (3.77)	-.0508 (5.90)
Log Inactivity $rate_t$		-.1016 (6.17)	-.1216 (3.19)	-.1047 (2.42)	-.1692 (4.33)
Constant	1.0653	1.4257	.7371	3.0287	3.6427
N	1734	1734	612	510	612
Adjusted R^2	.9967	.9967	.9887	.9868	.9995
Wage-unemployment elasticity	-.18	-.15	-.23	-.05	-.10

2) Hourly

			1980–1991	**1992–2001**	**2002–2013**
Log $Wage_{t-1}$	.7883 (59.73)	.7661 (56.27)	.8498 (39.43)	.4384 (12.42)	.4726 (13.95)
Log Unemployment $rate_t$	-.0327 (11.47)	-.0294 (10.23)	-.0383 (8.36)	-.0119 (1.63)	-.0290 (4.07)
Log Inactivity $rate_t$		-.0791 (5.79)	-.0992 (4.86)	-.0779 (2.12)	-.1547 (4.67)
Constant	.5585	.7677	.9689	1.8703	1.8977
N	1734	1734	612	510	612
Adjusted R^2	.9976	.9976	.9922	.9896	.9821
Wage-unemployment elasticity	-.15	-.16	-.25	-.02	-.05

Notes: all equations include 50 state dummies, full set of year dummies, age, gender, 4 race and 15 schooling averages for 1992–2013 and years of schooling pre-1992. In columns 1 and 2 the schooling averages are set to zero for years <1992 and the years of schooling variable is set to zero for years post 1991. Unemployment rate and inactivity rates in logs. T-statistics in parentheses.

Source: MORG files of the Current Population Survey.

Table 5 Log wage equations, United States, 1990–2012

1) Weekly

					2000–2012
Log $Wage_{t-1}$	.6555 (32.45)	.6175 (31.20)	.6178 (29.39)	.6132 (28.99)	.4648 (13.93)
Log Unemployment $rate_t$	-.0422 (7.15)	-.0430 (7.39)	-.0453 (8.10)	-.0416 (7.99)	-.0502 (6.40)
Log Inactivity $rate_t$		-.1285 (5.61)	-.1354 (5.92)	-.1313 (5.74)	-.1447 (4.15)
% Unemployed 15+ weeks	-.0001 (1.30)	-.0001 (0.54)			
% Unemployed 27+ weeks			.00002 (0.08)		
% Unemployed 52+ weeks				-.00035 (1.52)	-.0008 (2.79)
Constant	.9892	1.5631	1.5752	1.4553	3.6780
N	1173	1173	1173	1173	663
Adjusted R^2	.9926	.9928	.9928	.9928	.9799

2) Hourly

Log $Wage_{t-1}$	.6692 (33.12)	.6351 (30.48)	.6344 (30.43)	.6304 (30.13)	.4644 (13.77)
Log Unemployment $rate_t$	-.0259 (5.26)	-.0258 (5.31)	-.0262 (5.60)	-.0236 (5.43)	-.0331 (5.03)
Log Inactivity $rate_t$		-.1071 (5.60)	-.1075 (5.63)	-.1039 (5.4)	-.1391 (4.73)
% Unemployed 15+ weeks	-.0002 (1.34)	-.00009 (0.59)			
% Unemployed 27+ weeks			-.0001 (0.52)		
% Unemployed 52+ weeks				-.0004 (1.98)	-.00067 (2.65)
Constant	-.2613	.0871	.0882	.0716	1.9759
N	1173	1173	1173	1173	663
Adjusted R^2	.9947	.9948	.9948	.9949	.9844

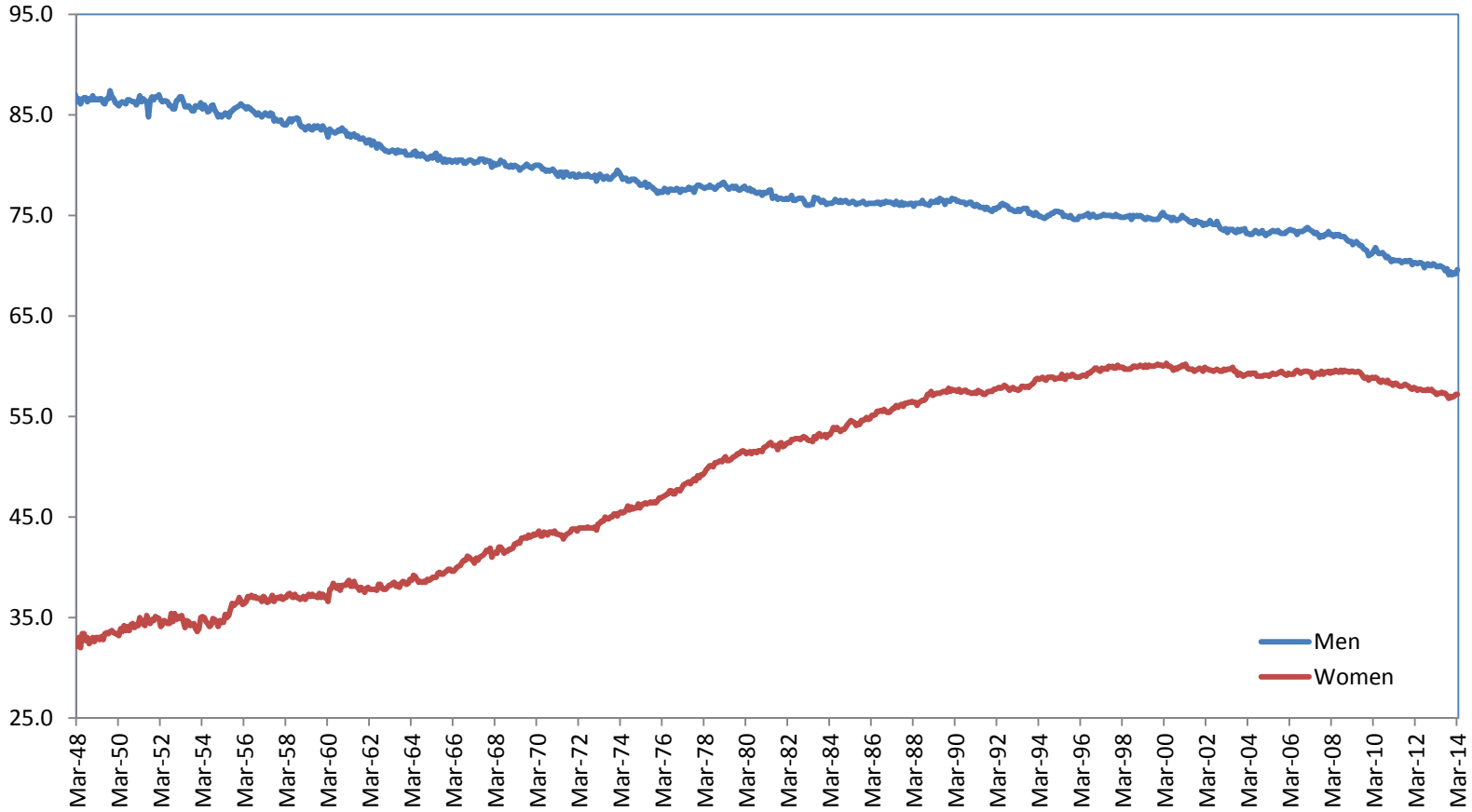
Notes: All equations include 50 state dummies, full set of year dummies, age, gender, 2 race and 15 schooling averages for 1992–2013 and years of schooling for 1990 and 1991. In columns 1 and 2 the schooling averages are set to zero for years <1992 and the years of schooling variable is set to zero for years post-1991. Unemployment rate and inactivity rates in logs. T-statistics in parentheses.
Source: MORG files of the Current Population Survey and Bureau of Labor Statistics for data on inactivity, unemployment, and long-term unemployment rates.

Table 6 Log wage equations specification checks, United States, 1990–2012

			Wage changes		
1) Weekly					
Log $Wage_{t-1}$	.6102 (28.86)	.6119 (28.58)			
Log Unemployment $rate_t$	-.0392 (7.07)		-.0294 (5.57)	-.0338 (5.33)	-.0318 (5.37)
Log Inactivity $rate_t$	-.1382 (6.09)	-.1369 (5.99)	-.0041 (0.17)	-.0081 (0.33)	-.0078 (0.31)
<52 week unemployment rate		-.0070 (5.98)			
>=52 week unemployment rate	-.0043 (1.95)	-.0072 (3.45)			
% Unemployed 27+ weeks				.0003 (1.24)	
% Unemployed 52+ weeks					.0002 (0.90)
Constant	1.5853	.0824	-.2865	-.2565	-.2679
N	1173	1173	1173	1173	1173
Adjusted R^2	.9928	.9933	.2307	.2311	.2306
2) Hourly					
Log $Wage_{t-1}$	.6272 (29.72)	.6272 (29.72)			
Log Unemployment $rate_t$	-.0225 (4.83)		-.0294 (5.57)	-.0338 (5.33)	-.0318 (5.37)
Log Inactivity $rate_t$	-.1070 (5.64)	-.1099(5.78)	-.0111 (0.54)	-.0081 (0.33)	-.0078 (0.31)
<52 week unemployment rate		-.0035 (3.57)			
>=52 week unemployment rate	-.0035 (1.92)	-.0056 (3.26)			
% Unemployed 27+ weeks				.0003 (1.24)	
% Unemployed 52+ weeks					.0002 (0.90)
Constant	.0824	.0407	-.2865	-.2565	-.2679
N	1173	1173	1173	1173	1173
Adjusted R^2	.9949	.9948	.2307	.2311	.2306

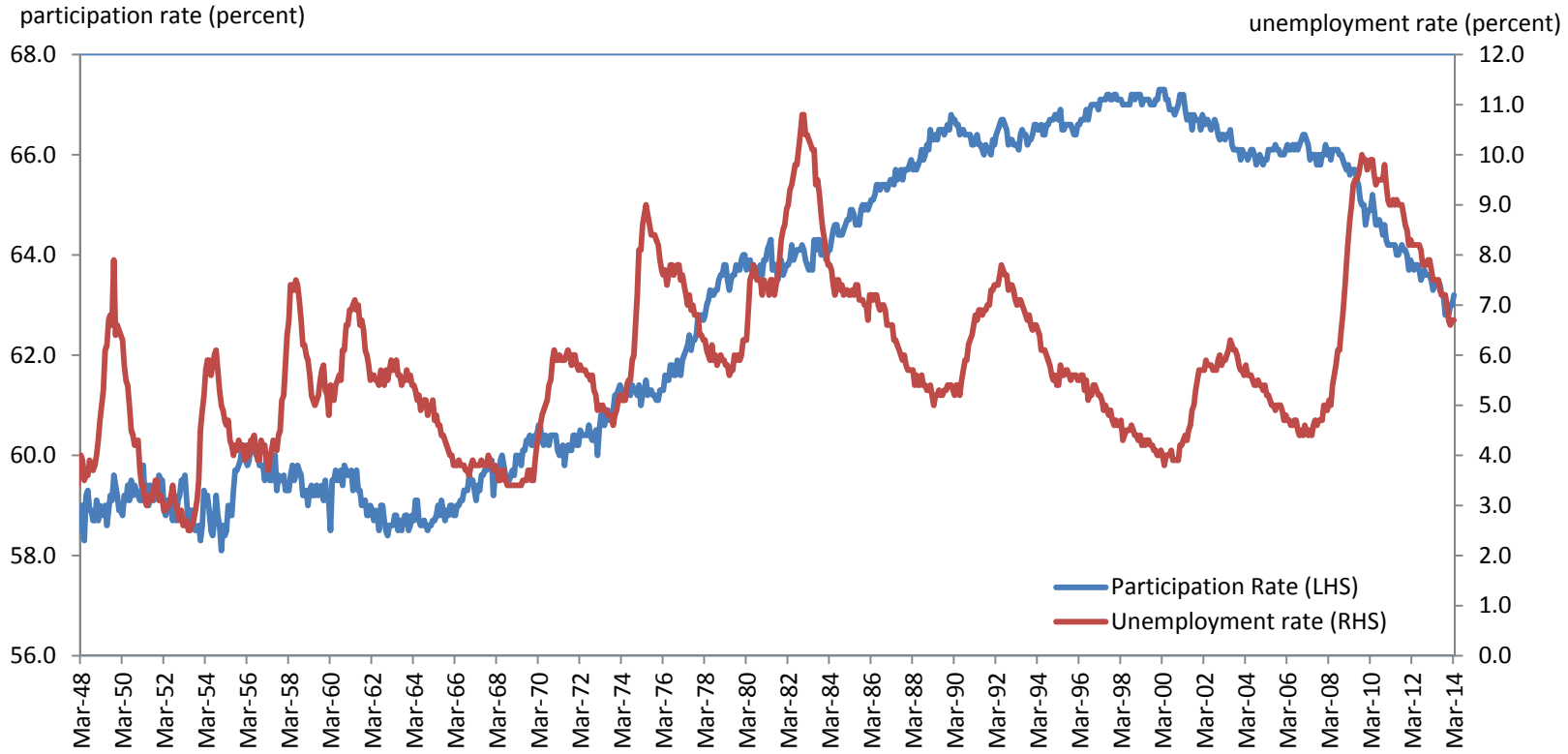
Note: Notes as in tables 4 and 5 above except wage changes = log w_t – log w_{t-1} and equations include all controls and state and year dummies.

Figure 1 US participation rates, ages 16+ (percent)



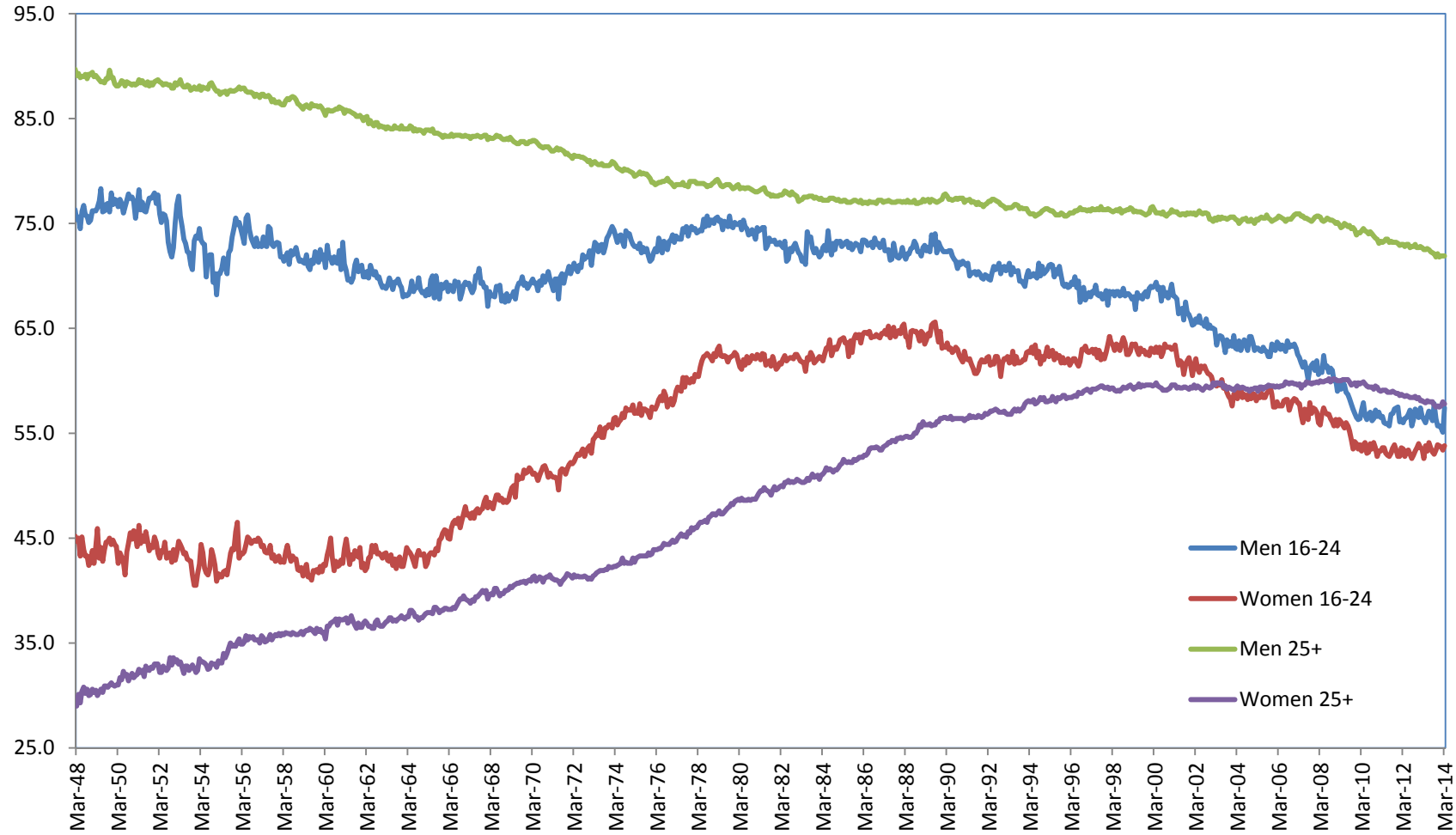
Source: Bureau of Labor Statistics.

Figure 2 US 16+ participation rate and unemployment rate

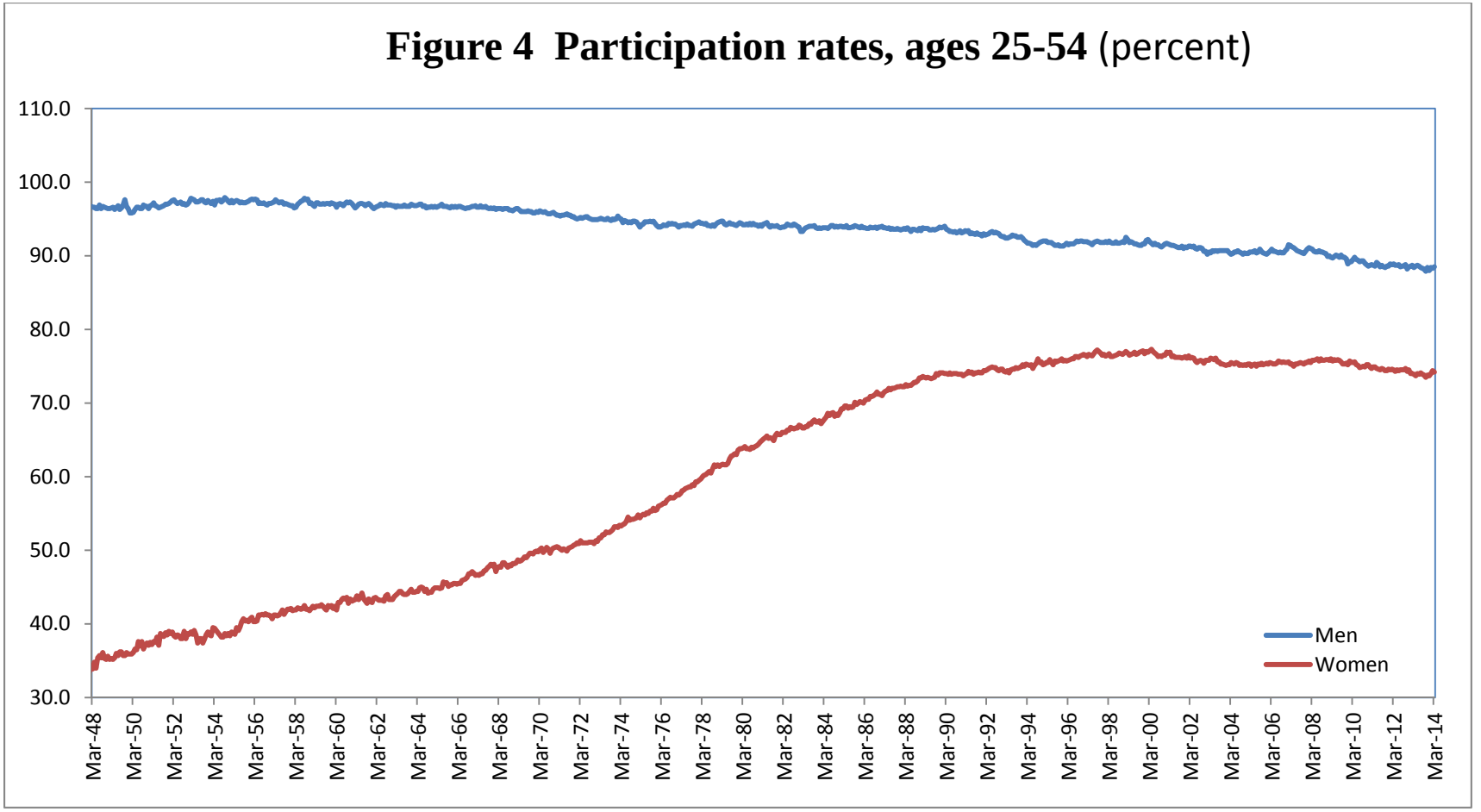


Source: Bureau of Labor Statistics.

Figure 3 US participation rates, ages 16-24 and 25+ (percent)

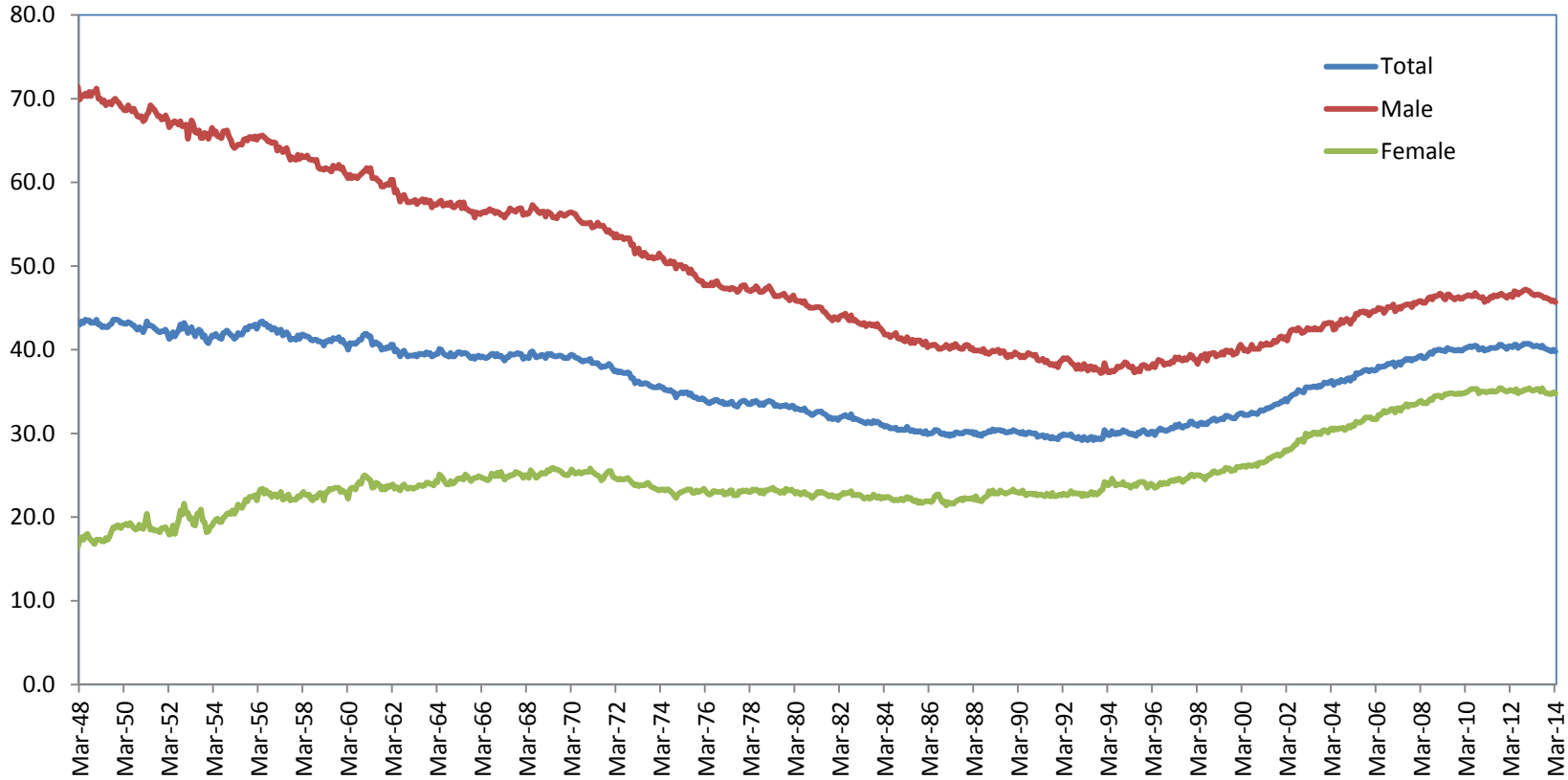


Source: Bureau of Labor Statistics.



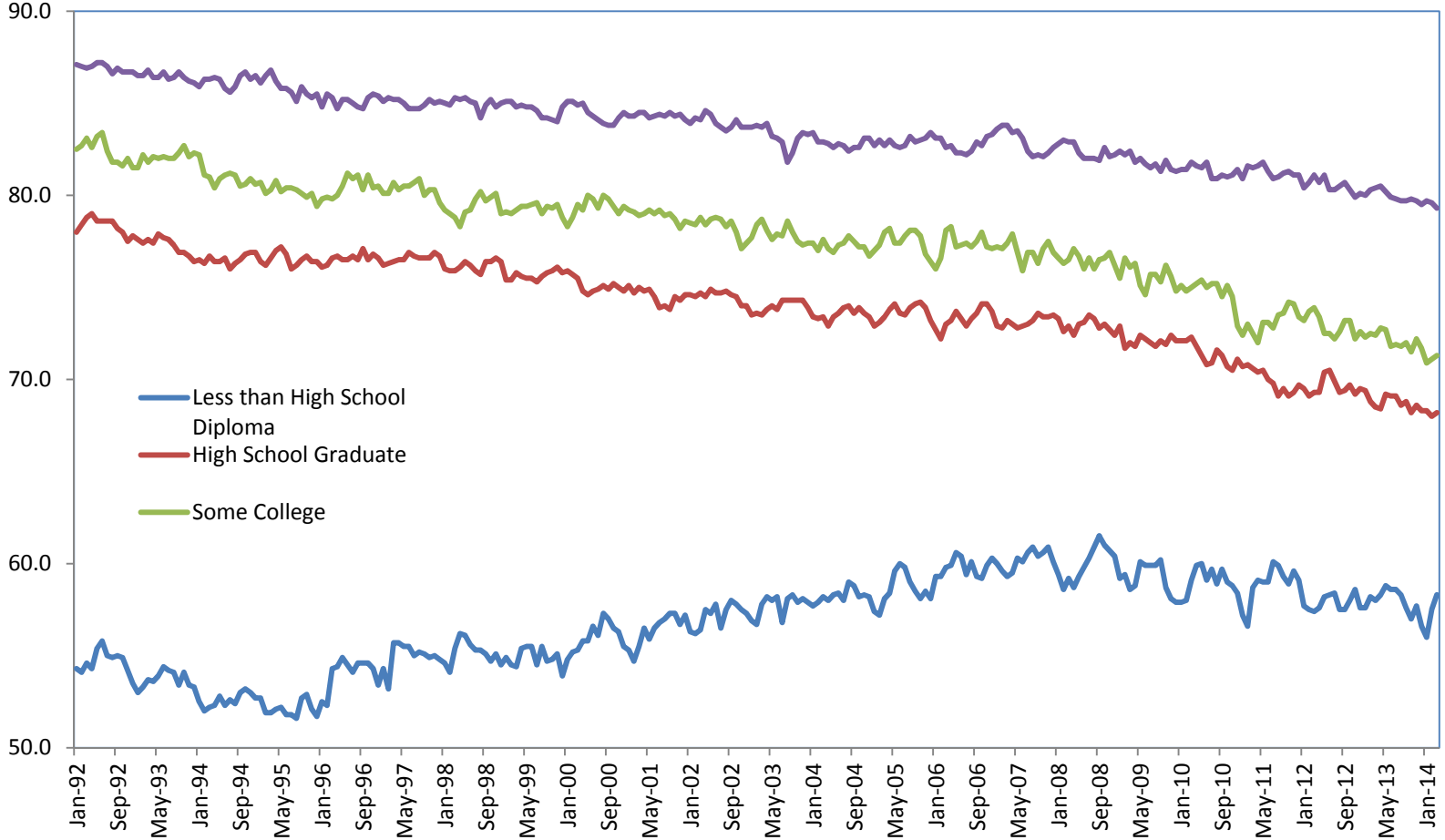
Source: Bureau of Labor Statistics.

Figure 5 US participation rates, ages 55+ (percent)



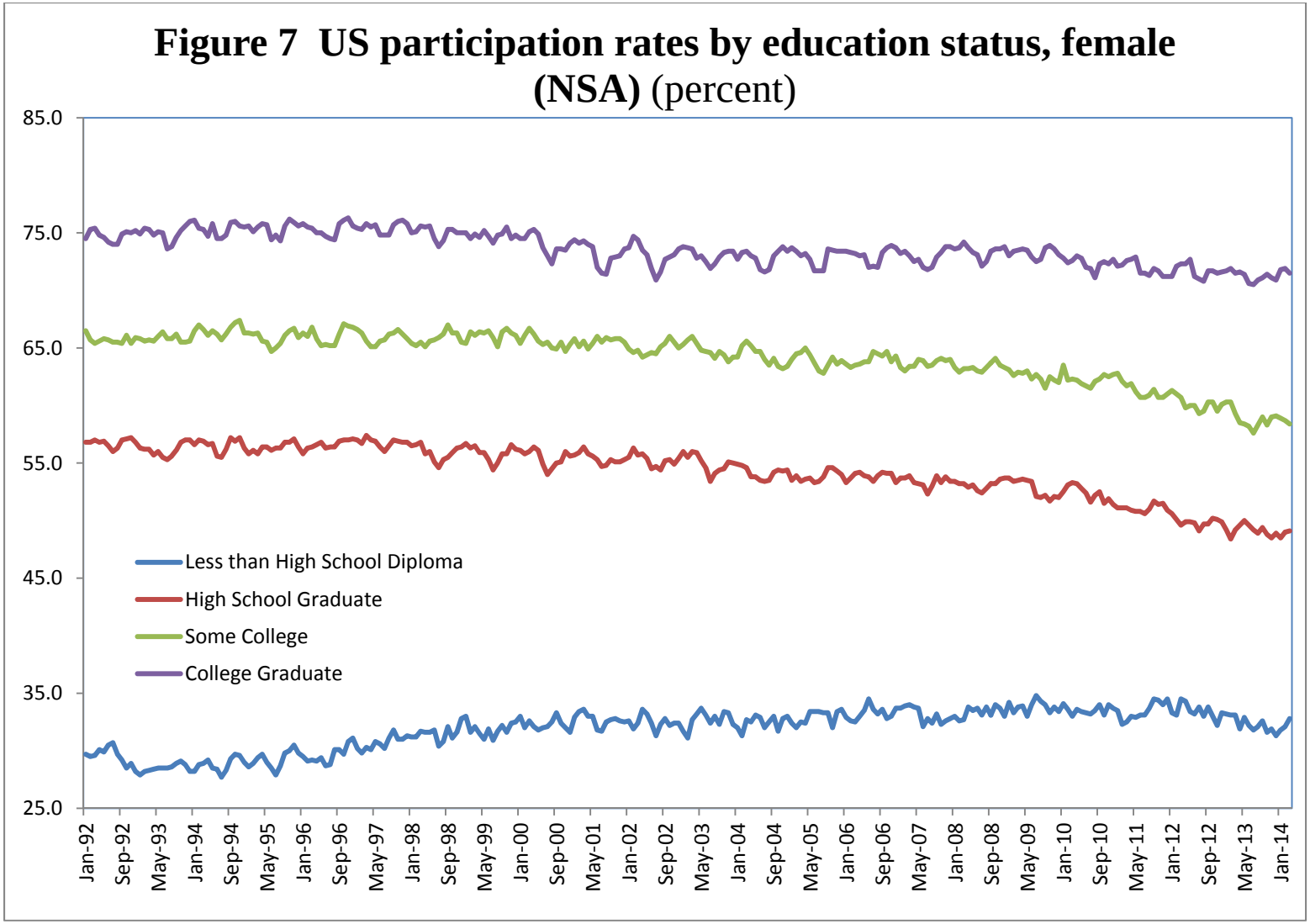
Source: Bureau of Labor Statistics.

Figure 6 US participation rates by education status, male (NSA) (percent)



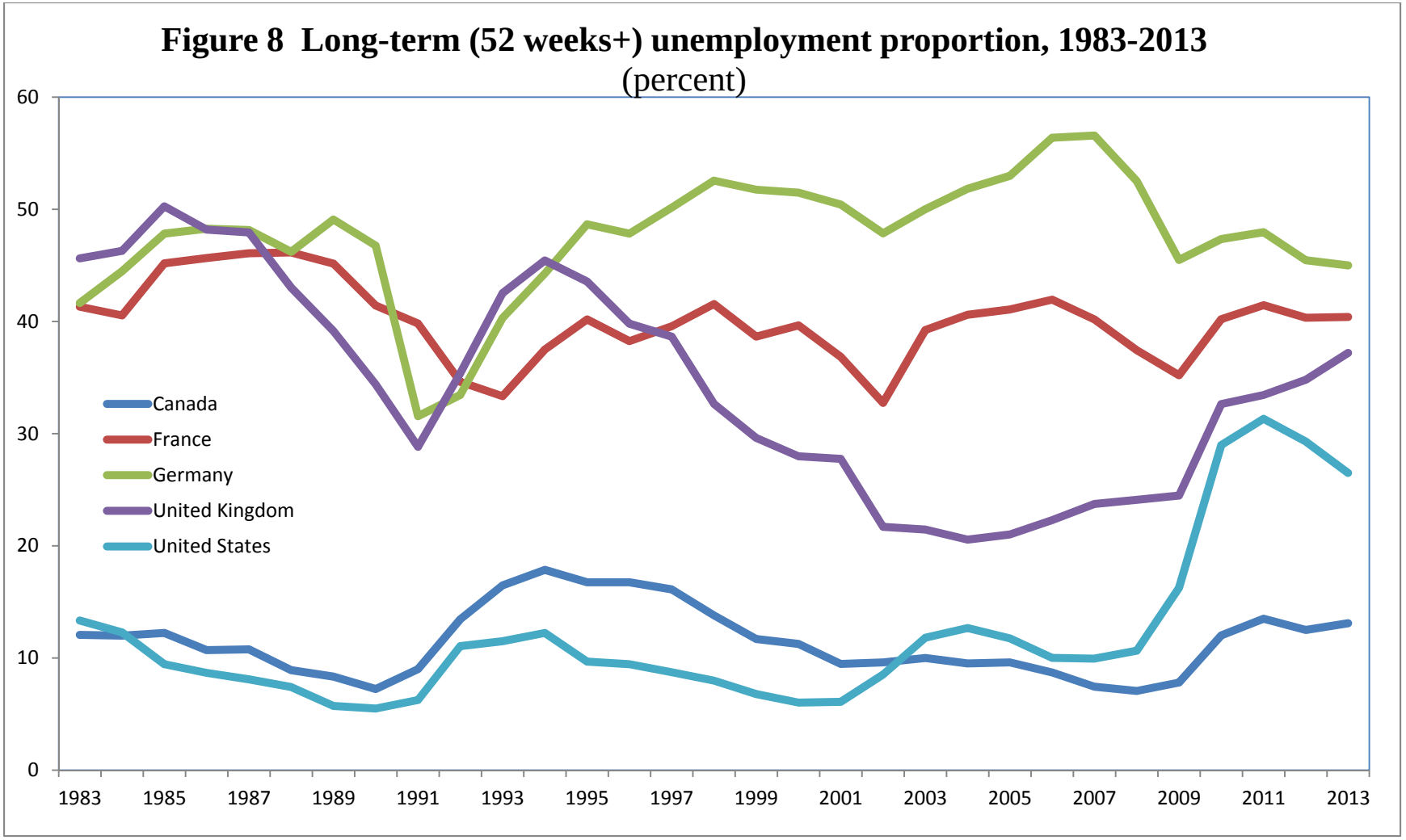
NSA = not seasonally adjusted
Source: Bureau of Labor Statistics.

Figure 7 US participation rates by education status, female (NSA) (percent)



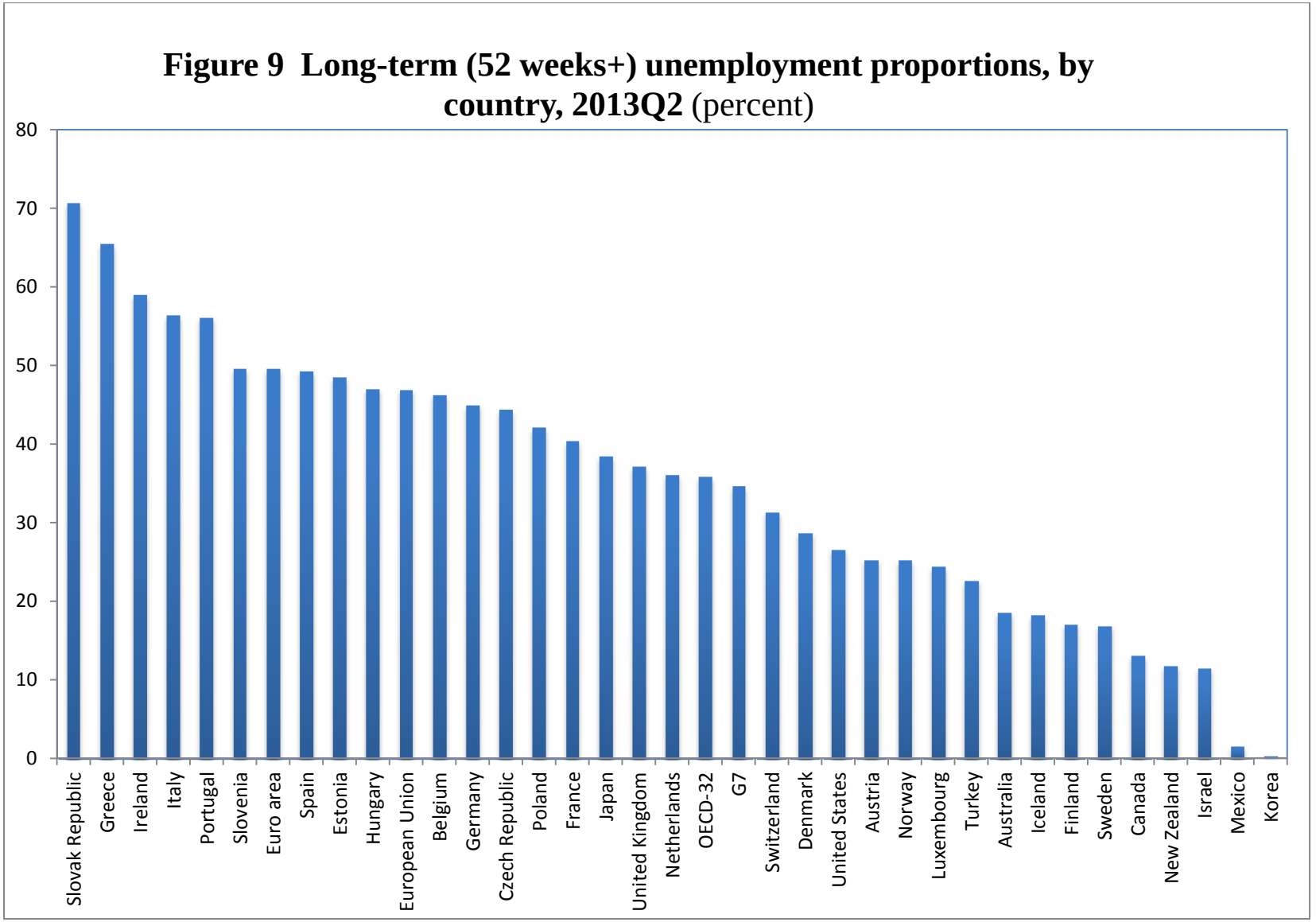
NSA = not seasonally adjusted
Source: Bureau of Labor Statistics.

Figure 8 Long-term (52 weeks+) unemployment proportion, 1983-2013
(percent)



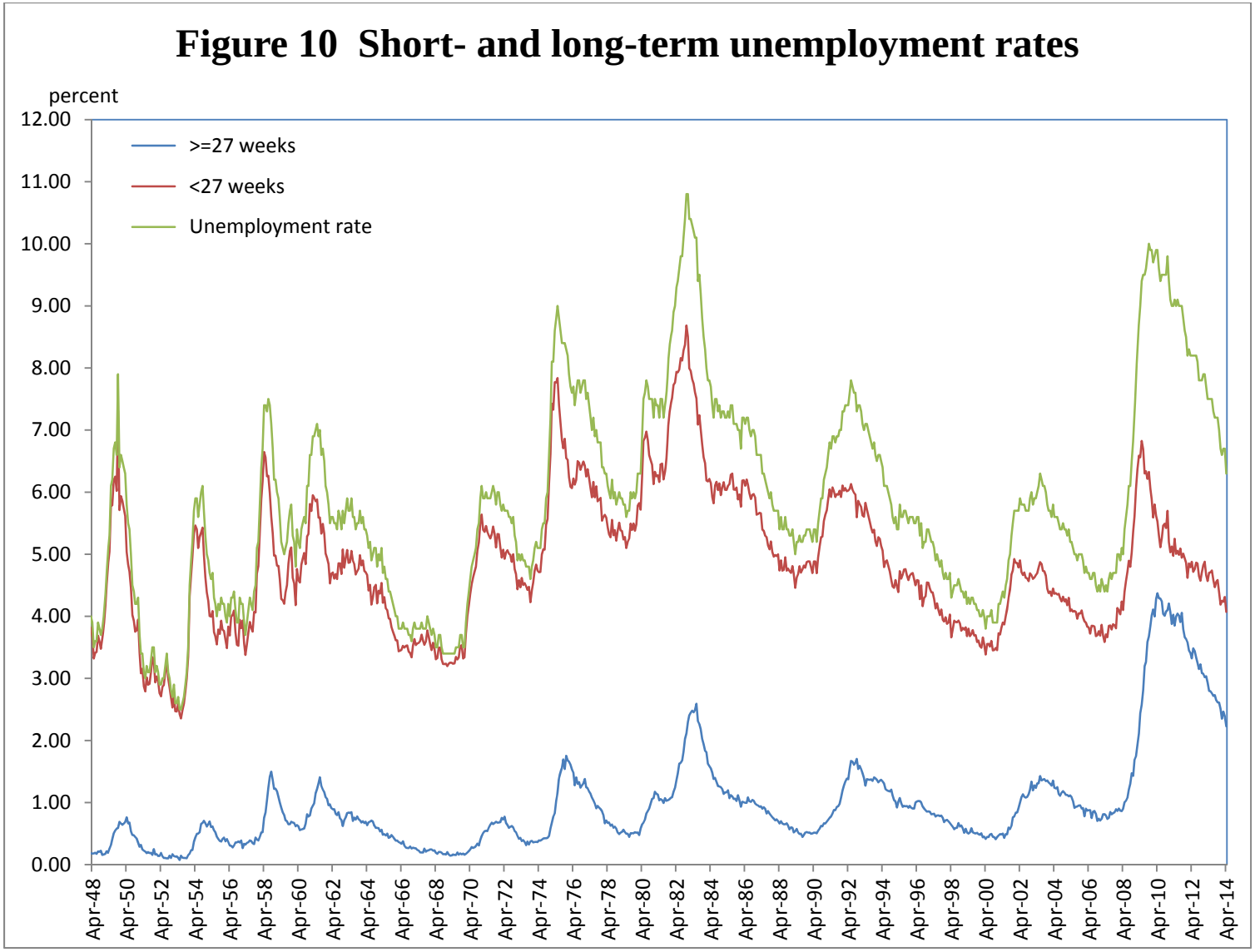
Source: Organization for Economic Cooperation and Development.

Figure 9 Long-term (52 weeks+) unemployment proportions, by country, 2013Q2 (percent)



Source: Organization for Economic Cooperation and Development.

Figure 10 Short- and long-term unemployment rates



Source: Bureau of Labor Statistics.