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Wages and Labor Market Slack: Making the Dual Mandate Operational

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In a speech in Chicago on March 31st 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 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 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 policy brief of the impact of changes in the US labor force participation rate [LFPR]. Right now, many observers of the US economy are

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

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 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 (1-LFPR) on wages in the US economy. To the degree that the rise in unemployment in the US 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 see downward pressure on wages, because of the possibility of re-entry 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, 1994)). 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 UK did not see the decline in participation that the US did. Instead, part-time and self-employment increased markedly alongside a sharp rise in underemployment following the global financial crisis. We find similar downward pressures on UK wages from under-employed workers. (See Posen 2011b).

The implication for Federal Reserve policy is two-fold. 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, under-

employment of part-timers, long-term unemployment, and participation rate- reveal their non-structural component by their influence on wage growth. And that is what the Fed should be trying to stabilize along with prices.

1. The 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 US and the UK, unemployment unexpectedly fell sharply. In the US the unemployment rate fell from 7.5% in April 2013 to 6.6% in January 2014, very close to the Fed's trigger point of 6.5%. In the UK it fell from 7.8% in May 2013 to 7.1% in October 2013. Subsequently in both countries the rate has risen slightly recently, to 6.7% in the US and 7.2% in the UK. Both central banks broadened their labor market focus; the Fed to include changes in the participation rate; the 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 US from the UK and from several other OECD countries is the fact that from May 2013 there was a sharp fall in the participation rate. (See 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 under-skilled 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 sixteen and over the participation rate fell from a high of 73.1 in March 2008 to 69.6 in March 2012; and continued to fall through March 2014 to 69.6.. In the case of women the 16+ rate fell, from 59.5 in March 2008 to 57.8 in March 2012 to 63.2 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 2008-2012 but the 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 who have seen quite different patterns. (See also Kirkegaard (2014)).

Figure 1 presents a long time series on participation rates for those sixteen 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 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 for those ages 16-24 & 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 present 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 those US workers age 55+ which decline through the mid 90s 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.

These patterns in the US participation rate are not repeated in other countries. Figure 8 reports participation rates for the UK for men and women for those age 16+ and of working age 16-64. Male rates fall slowly whereas female rates fall, with no sign of any marked post 2008 recession effects. Table 2 reports participation rates for men and women for sixteen 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 UK along with Spain that has seen its unemployment rate rise to over 25% 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 USA where female participation rates fell, they rose in half of the countries - France, Germany, Italy, Korea, Mexico, New Zealand, Spain, Sweden, Turkey, and the UK. It remains unclear why, though given the aging population in many of these countries, but youth booms in Mexico and Turkey, it seems there is no simple demographic driver of these outcomes. Table 3 reports participation rates by age for seven countries including the US 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 UK.

To summarize, the labor force participation rate continued to fall sharply in the US 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 fifty years. For women ages 25-54 the upward trend stopped around 2000, since when there has been a steady decline. These steady long-run trends neither explain the sudden jump in inactivity in the US 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. The 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-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%, March 2013 vs. 2012, while in the UK they were up 1.7%.[2]

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

At a recent conference, Erceg and Levin (2013) argued that 'labour 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 BLS on unemployment and inactivity rates while the wage data and variables including age, gender, schooling and race are generated by aggregating the micro data 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 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 1980-2011, and relevant sub-periods.

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)). We also include estimates of the long-run wage-unemployment elasticity, which for illustration is calculated as -.0316/(1-.7888)=-.15. The twelve estimates reported in Table 4 average -.11 which is close to Blanchflower and Oswald's claim that the unemployment elasticity of wages is -.1. That is to say when unemployment doubles, say from 5% to 10%, real wages fall by ten percent (Nijkamp and Poot, 2005)

What is new here is the inclusion of the 16+ inactivity rate variable in columns 2-5, which enters negatively *and* significantly into both weekly and hourly wage

[3] The data and manuals are available for download here http://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

equations. It also appears that the size of the effect of inactivity is greater in the later sub-period, 2002-2011 than it is in the earlier sub-period. 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 changes in the participation rate given these estimates. At the national level unemployment went from a low of 5% to a high of 10% while inactivity rose from a low of 33.6% in January 2007 to a high of 37.2% in December 2013. Starting with weekly wages we use the estimate coefficients on the natural log of unemployment (-.0423) and the natural log of the participation rate (-.1138) terms in the first part of the table in column 2. If we then estimate log(37.2)-log(33.6) times -.1138=-.01158. The unemployment rate went from a low of 4.4% in October 2006 and March 2007 to a high of 10.0% 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 -.0423=-.03473. To solve out for long-run elasticities then both estimates would be divided by (1-.7156), setting $w_{t-1}=w_t$ giving -.04 for participation and -.12 for unemployment. Hence the effect of the rise in unemployment is almost exactly three 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 2.84 times that from the participation rate. Both effects are substantial. Unemployment doubles real weekly wages fall by 15%; participation falls by 10%, real weekly wages fall by 5%.

3. The impact of unemployment rates and underemployment on UK wages

As we noted above, the UK the participation rate has hardly moved at all in recent years. Where as in the case of the US, the participation rate has fallen and is now approximately the same in the two countries. (See also Miles (2013)) In the case of the UK, there is evidence that workers are hours constrained. Indeed, the Bank of England's MPC has now made it explicit that it is concerned about underemployment. "Unemployment is certainly not a perfect guide to slack in the labour market. For instance, the recent increase in the number of workers wanting to work more hours suggests it understates the absolute level of slack," (Bean 2013).

Bell and Blanchflower (2011, 2013a, 2013b) developed an Underemployment Index for the UK using data from the Labour Force Survey, that is used to calculate the unemployment rate. The survey which contains questions on whether an individual would like to work more or fewer hours *at the going wage*, and if so how many more or fewer hours they would like to work. They find that in the United Kingdom, over time, the total number of hours of (mostly older) workers who say they would like to work fewer hours, has fallen, but the number of workers saying they would like more hours has risen rapidly. Approximately three quarters of the extra desired hours

comes from part-timers, many of whom say they would like a full-time job; a quarter comes from full-timers who say they want more hours.[4]

Figure 9 plots the seasonally adjusted aggregated increases and reductions in desired hours using these data, in millions of hours per week.[5] The gap between the two series has risen sharply since 2008, but prior to that the two series were extremely close. Total hours of those wanting more hours rose from 26.7 million in 2008Q1 to 41.7 million in 2013Q3. Total hours of those who want fewer hours fell slightly from 24.4 million to 24.2 million over the same time period. Thus, the *net* quantity of additional hours required was 17.5 million weekly hours. Assuming average weekly hours of 32.1, as reported in the latest ONS data release from July 2013 for March–May 2013, this amounts to approximately 545,000 additional jobs.[6] This suggests there is more slack in the UK economy than previously thought, that is that the size of the output gap is higher and extremely large, implying little upward wage pressure.

Table 5 explores the extent to which the demand for more hours by those who are hours constrained has an impact on wages. We make use of data from the UK Labour Force Surveys from July 2010 to June 2013. The dependent variable is the log of hourly wages. We construct an underutilization variable at the level of the *individual*, which is zero if the worker does not want to change their hours and is whatever positive number they report if they want more hours and whatever negative number if they want less hours. The variable has a mean of .57hrs for the 134,265 for whom we have wage observations.

In all equations controls include 10 age dummies, 23 region of work dummies, gender, 8 industry dummies, 3 year dummies, 8 schooling dummies and 10 size of workplace dummies. In column 2 controls are added to distinguish actual hours, whether part-time wanting a full-time job, permanent job, foreign born and years of tenure. Column 3 restricts the sample to workers who joined their employers since 2008, while column 4 adds a union status variable, which is only available in October through December, so the sample falls by two thirds. In each equation the underutilization variable enters negatively and highly significant, with T-statistics of around nine and higher. Controlling for a host of characteristics, worker's desire for more hours, on the net is pushing down on wages.

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[4] A recent release by Eurostat suggests that underemployment levels in the UK are especially high, even compared to countries with much higher unemployment rates. They estimate the number of part-timers ages 15-74 who wished to work more hours and were available to do so. As a proportion of total employment the UK ranked fourth (6.5%) out of the twenty-eight EU countries, behind only Spain (9.2%); Ireland (7.8%) and Cyprus (7.4%). The UK currently has an unemployment rate of 7.2% compared with 25.8% in Spain, 11.9% in Ireland and 16.8% in Cyprus.
http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/3-10042014-BP/EN/3-10042014-BP-EN.PDF
Further data on EU underemployment is available at
http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Underemployment_and_potential_additional_labour_force_statistics

[5] Data are available at www.bellblanchflowerunderemployment.com

[6] http://www.ons.gov.uk/ons/dcp171778_354442.pdf

So the evidence in the UK is that the rise in underemployment represents an additional amount of spare capacity that pushes down on wages, just as the inactivity rate does in the US. Pure unemployment or other quantity measures are misleading. Wage pressure in both the UK[7] and the US[8] has been minimal. The common theme in both US and the UK is that the central bank should focus on wage pressure as an indicator how close the labor market is to full-employment.

4. Making wage growth an intermediate target-

As noted in the FOMC minutes from the March 18-19th 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 US, 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% 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 two 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,

[7] Annual real wage growth in the UK averaged 2.9% in the 1970s and 1980s, then roughly halved to 1.5% in the 1990s. The rate slowed again to an average of 1.2% in the 2000s, and real wages fell by 2.2% per annum between Q1 2010 and Q2 2013. The recent episode is the longest sustained period of falling real wages in the UK on record http://www.ons.gov.uk/ons/dcp171766_351467.pdf

[8] Real weekly earnings in the US ($354.57) were up 0.2% on the year in February 2014 and up only 2.2% in total from their level at the start of the recession, as dated by the NBER, in December 2007 ($347.07). http://www.bls.gov/news.release/realer.t01.htm

> "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, Ch. 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, 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 indictors: 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. 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 US. 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 1999-2008 because of sustained very high wage growth in Greece, Ireland, and Spain (as opposed to in Germany) – the ECB'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.

Table 1. US participation rates by age 2008-2014

	Men			Women		
	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: BLS

Table 2. International 16-64 Labor Force Participation Rates

	2009			*2010*			*2011*			*2012*		
	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. http://www.bls.gov/fls/flscomparelf/lfcompendium.pdf

Table 3. International 16-64 Labor Force Participation Rates by Age

	2009			*2010*			*2011*			*2012*		
	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. http://www.bls.gov/fls/flscomparelf/lfcompendium.pdf

Table 4. Log Wage Equations USA, 1980-2011

1) Weekly

			1980-1991	**1992-2001**	**2001-2011**
Log $Wage_{t-1}$	.7413 (42.14)	.7156 (39.50)	.7417 (29.16)	.4098 (11.75)	.3463 (11.57)
Log Unemployment $rate_t$	-.0451 (10.49)	-.0423 (9.83)	-.0515 (8.44)	-.0322 (3.77)	-.0460 (6.15)
Log Inactivity $rate_t$		-.1138 (5.27)	-.1328 (3.39)	-.1047 (2.42)	-.1457 (2.19)
Constant	.6379	.8715	1.7362	3.0287	1.7171
N	1632	1632	612	510	510
Adjusted R^2	.9989	.9905	.9887	.9868	.9995
Wage-unemployment elasticity	-.17	-.15	-.20	-.05	-.07

2) Hourly

			1980-1991	**1992-2001**	**2001-2011**
Log $Wage_{t-1}$	.7888 (56.72)	.7673 (53.65)	.8307 (35.71)	.4384 (12.42)	.4426 (11.47)
Log Unemployment $rate_t$	-.0316 (6.25)	-.0290 (9.82)	-.0377 (7.94)	-.0119 (1.63)	-.0347 (4.55)
Log Inactivity $rate_t$		-.0825 (5.57)	-.1059 (3.49)	-.0779 (2.12)	-.1455 (3.76)
Constant	.9215	1.0320	.5597	1.9777	
N	1632	1632	612	510	510
Adjusted R^2	.9975	.9975	.9922	.9896	.9811
Wage-unemployment elasticity	-.15	-.12	-.22	-.02	-.06

Source: MORG files of the Current Population Survey
Notes: all equations include 50 state dummies, full set of year dummies, age, gender, 4 race and 15 schooling averages. Unemployment rate and inactivity rates in logs. T-statistics in parentheses.

Table 5. Log Hourly Wage Equations UK, 2010-2013

			Joined firm since 2008	
Underutilization	-.0045 (28.80)	-.0032 (19.57)	-.0024 (9.84)	-.0030 (8.87)
Male	.1557 (57.88)	.1377 (48.89)	.1114 (24.55)	.1351 (24.33)
Actual Hours		.0004 (3.85)	.0013 (7.53)	.0009 (4.08)
Part-time wants full-time		-.0796 (12.00)	-.0632 (7.36)	-.0837 (6.37)
Foreign born		-.0940 (23.41)	-.1040 (17.32)	-.0830 (10.39)
Permanent job		.0879 (15.51)	.0722 (10.83)	.0866 (7.73)
Years of job tenure		.0098 (59.29)	.0193 (11.39)	.0096 (28.80)
Private sector		-.0412 (10.90)	-.0544 (8.70)	-.0327 (4.27)
Union member				.0366 (5.75)
Constant	.9975	.9873	.8494	1.0172
Adjusted R^2	.4062	.4416	.4249	.4495
N	134,164	121,958	47,077	30,617

Source: LFS, July 2010-June 2013
Notes: equations also include 10 age dummies, 23 region of work dummies, 8 industry dummies, 8 schooling dummies, 3 year dummies (2 in column 4) and 10 size of workplace dummies. T-statistics in parentheses. Union status only available in October through January surveys.

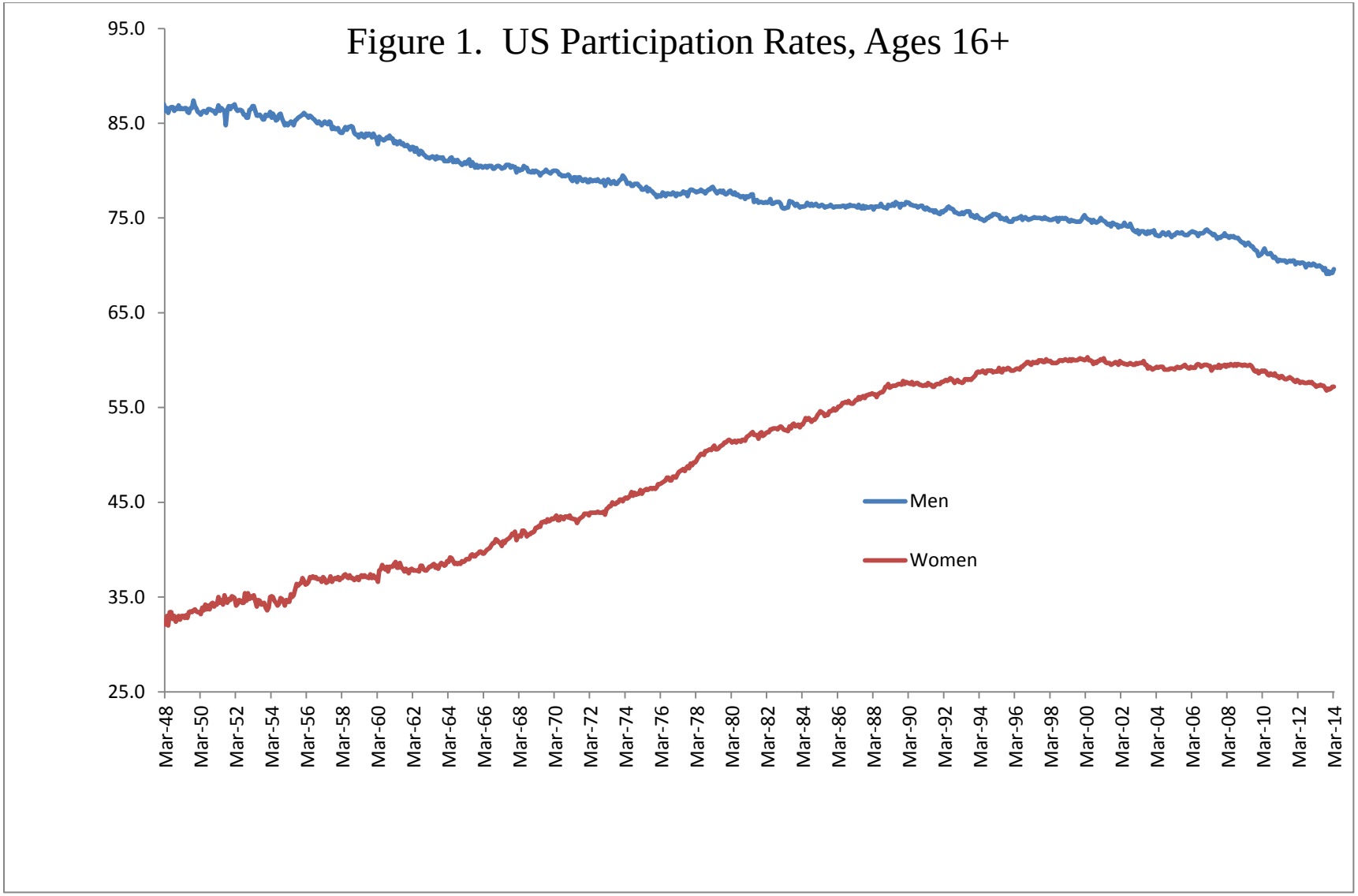


Figure 1. US Participation Rates, Ages 16+
95.0
85.0
75.0
65.0
55.0
45.0
35.0
25.0
Mar-48
Mar-50
Mar-52
Mar-54
Mar-56
Mar-58
Mar-60
Mar-62
Mar-64
Mar-66
Mar-68
Mar-70
Mar-72
Mar-74
Mar-76
Mar-78
Mar-80
Mar-82
Mar-84
Mar-86
Mar-88
Mar-90
Mar-92
Mar-94
Mar-96
Mar-98
Mar-00
Mar-02
Mar-04
Mar-06
Mar-08
Mar-10
Mar-12
Mar-14
Men
Women

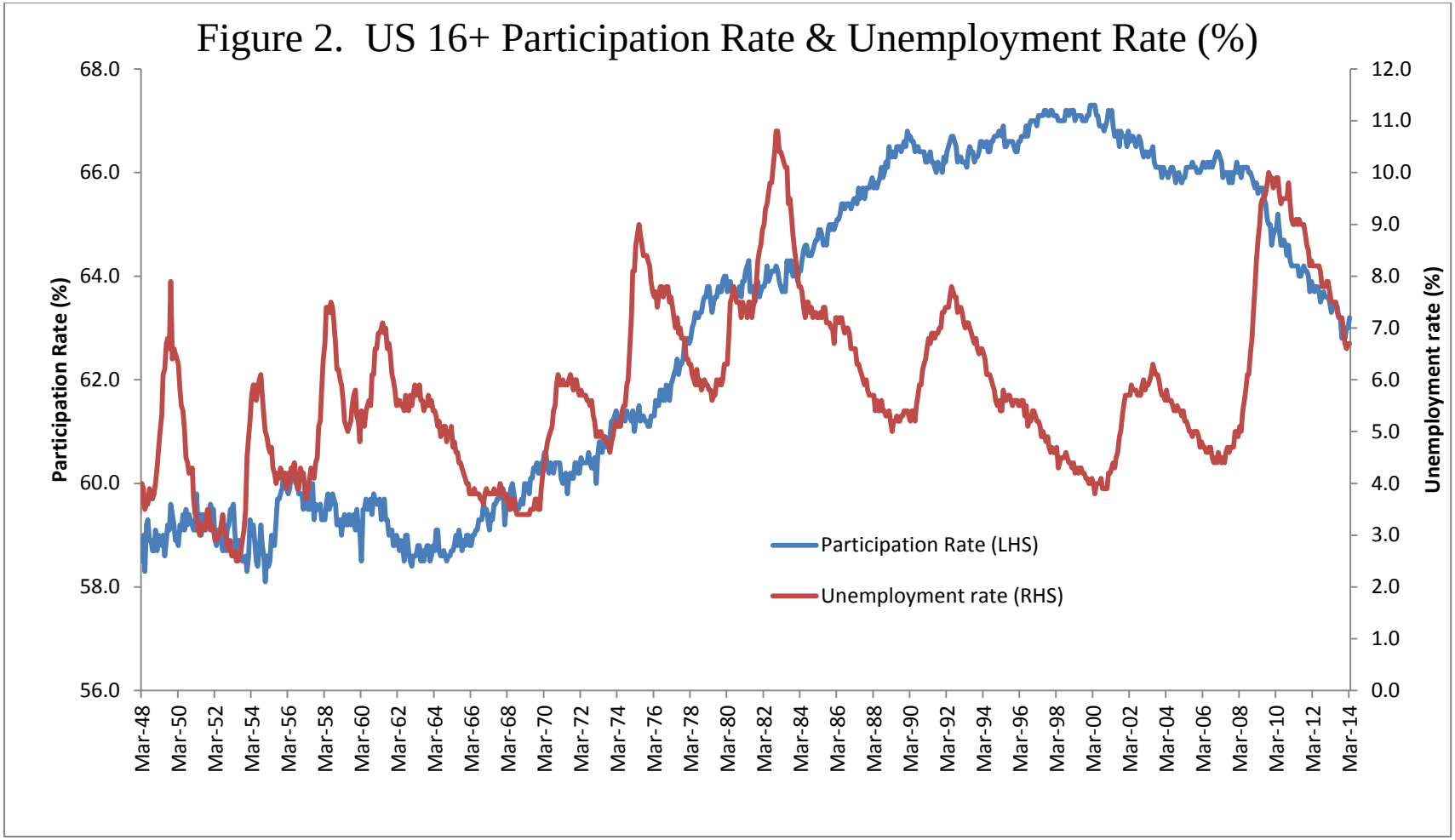


Figure 2. US 16+ Participation Rate & Unemployment Rate (%)
Participation Rate (%)
Unemployment rate (%)
68.0
66.0
64.0
62.0
60.0
58.0
56.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Mar-48
Mar-50
Mar-52
Mar-54
Mar-56
Mar-58
Mar-60
Mar-62
Mar-64
Mar-66
Mar-68
Mar-70
Mar-72
Mar-74
Mar-76
Mar-78
Mar-80
Mar-82
Mar-84
Mar-86
Mar-88
Mar-90
Mar-92
Mar-94
Mar-96
Mar-98
Mar-00
Mar-02
Mar-04
Mar-06
Mar-08
Mar-10
Mar-12
Mar-14
Participation Rate (LHS)
Unemployment rate (RHS)

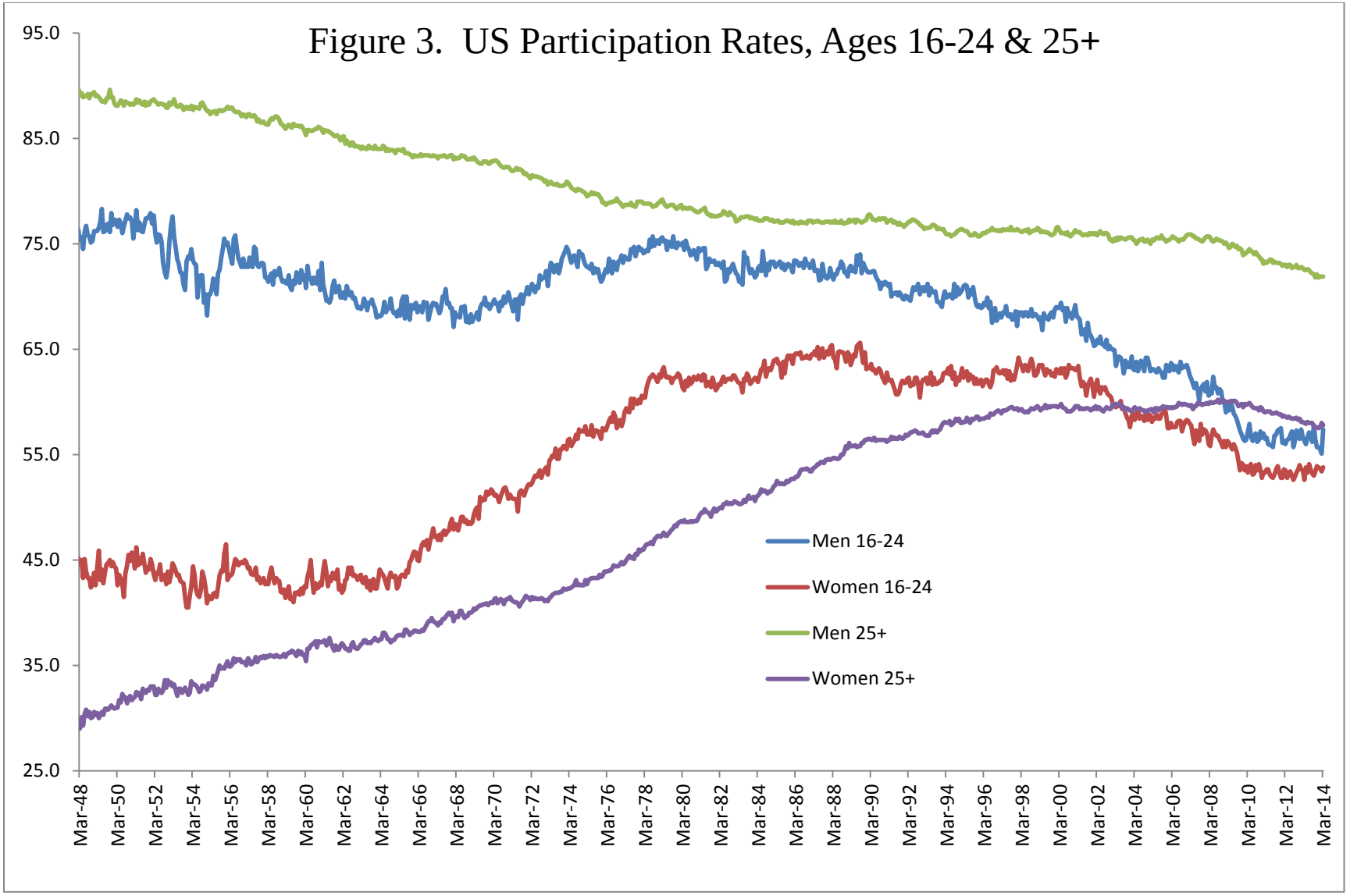


Figure 3. US Participation Rates, Ages 16-24 & 25+
95.0
85.0
75.0
65.0
55.0
45.0
35.0
25.0
Mar-48
Mar-50
Mar-52
Mar-54
Mar-56
Mar-58
Mar-60
Mar-62
Mar-64
Mar-66
Mar-68
Mar-70
Mar-72
Mar-74
Mar-76
Mar-78
Mar-80
Mar-82
Mar-84
Mar-86
Mar-88
Mar-90
Mar-92
Mar-94
Mar-96
Mar-98
Mar-00
Mar-02
Mar-04
Mar-06
Mar-08
Mar-10
Mar-12
Mar-14
Men 16-24
Women 16-24
Men 25+
Women 25+

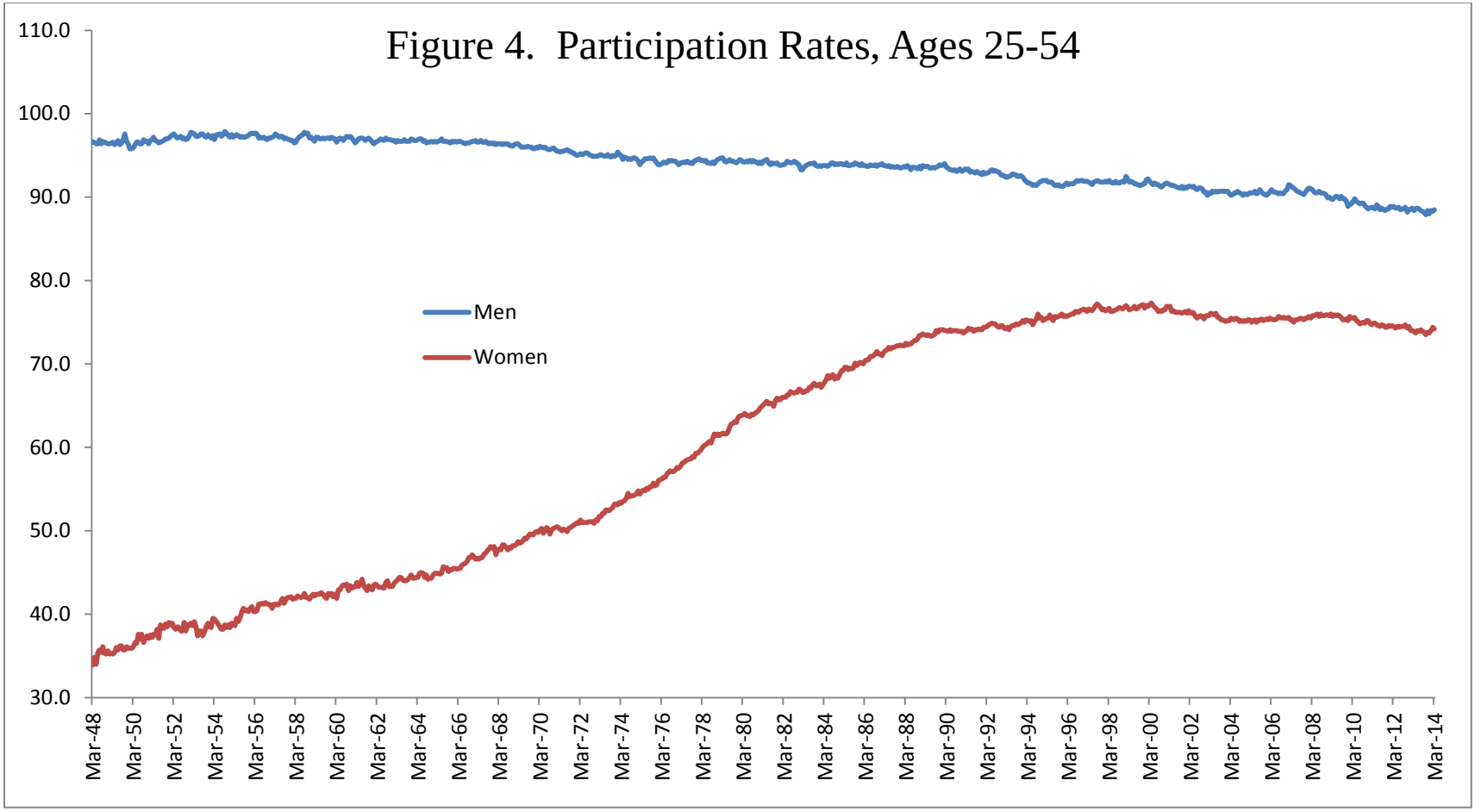


Figure 4. Participation Rates, Ages 25-54
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
Men
Women
Mar-48
Mar-50
Mar-52
Mar-54
Mar-56
Mar-58
Mar-60
Mar-62
Mar-64
Mar-66
Mar-68
Mar-70
Mar-72
Mar-74
Mar-76
Mar-78
Mar-80
Mar-82
Mar-84
Mar-86
Mar-88
Mar-90
Mar-92
Mar-94
Mar-96
Mar-98
Mar-00
Mar-02
Mar-04
Mar-06
Mar-08
Mar-10
Mar-12
Mar-14

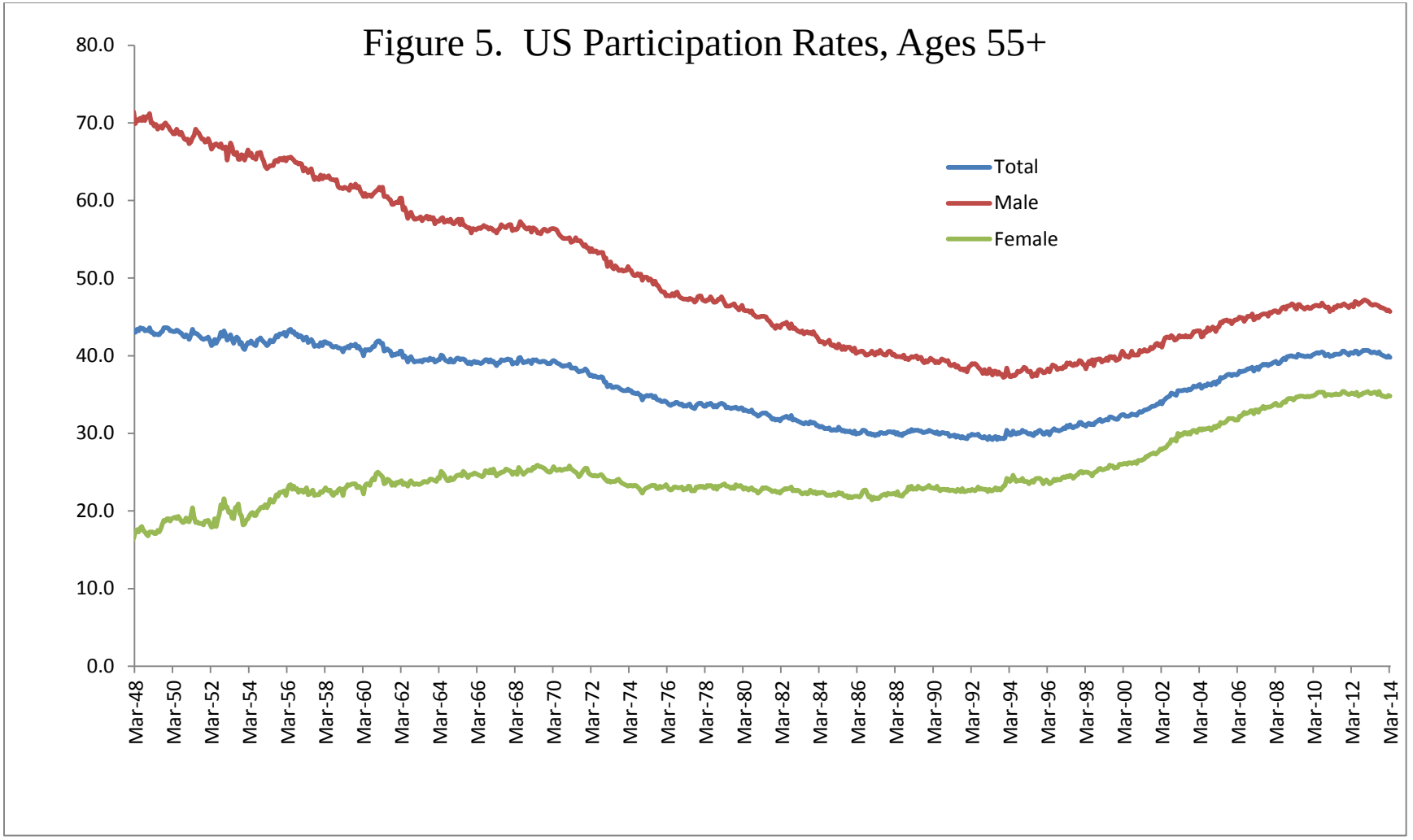


Figure 5. US Participation Rates, Ages 55+
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Total
Male
Female
Mar-48
Mar-50
Mar-52
Mar-54
Mar-56
Mar-58
Mar-60
Mar-62
Mar-64
Mar-66
Mar-68
Mar-70
Mar-72
Mar-74
Mar-76
Mar-78
Mar-80
Mar-82
Mar-84
Mar-86
Mar-88
Mar-90
Mar-92
Mar-94
Mar-96
Mar-98
Mar-00
Mar-02
Mar-04
Mar-06
Mar-08
Mar-10
Mar-12
Mar-14

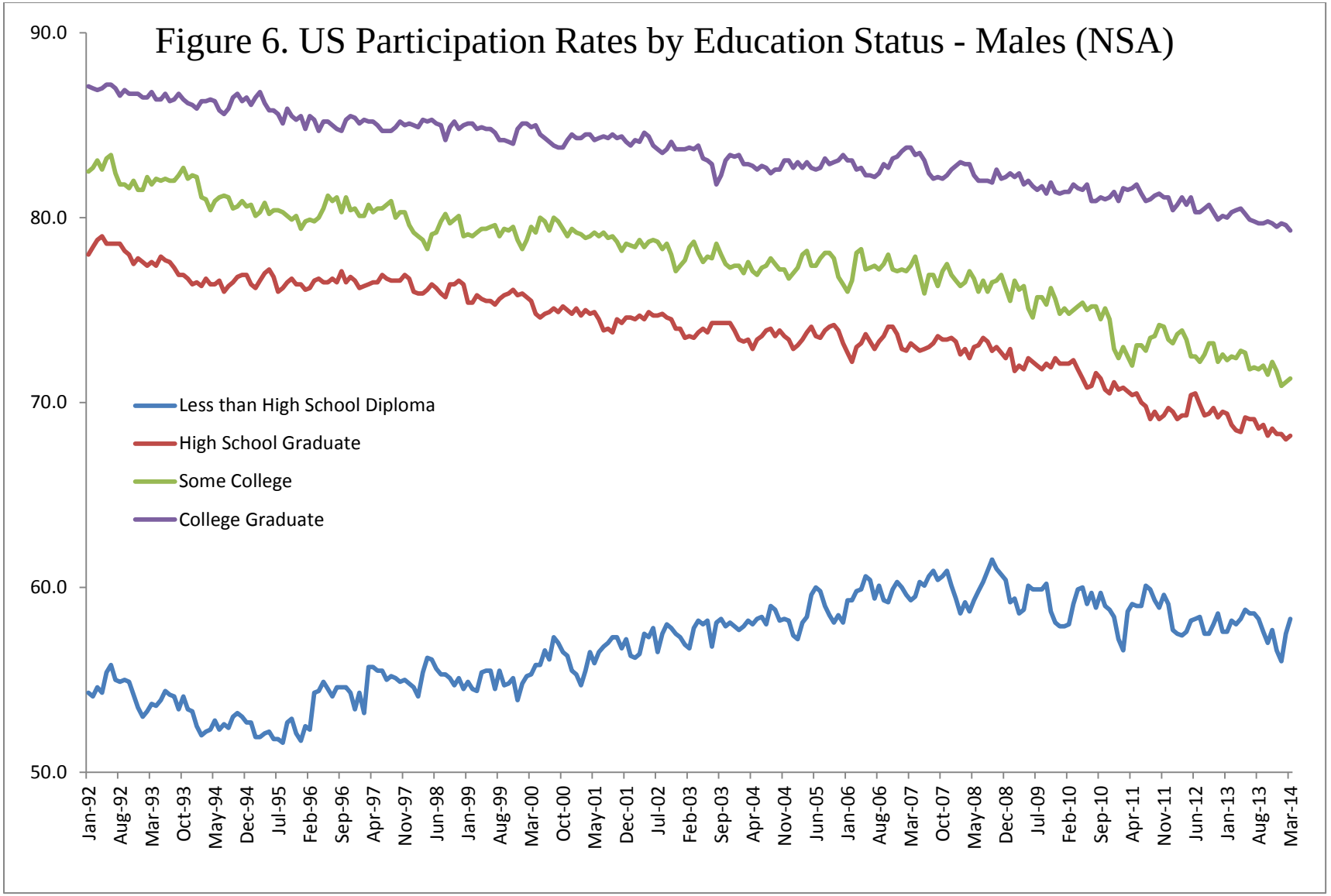


Figure 6. US Participation Rates by Education Status - Males (NSA)
90.0
80.0
70.0
60.0
50.0
Less than High School Diploma
High School Graduate
Some College
College Graduate
Jan-92
Aug-92
Mar-93
Oct-93
May-94
Dec-94
Jul-95
Feb-96
Sep-96
Apr-97
Nov-97
Jun-98
Jan-99
Aug-99
Mar-00
Oct-00
May-01
Dec-01
Jul-02
Feb-03
Sep-03
Apr-04
Nov-04
Jun-05
Jan-06
Aug-06
Mar-07
Oct-07
May-08
Dec-08
Jul-09
Feb-10
Sep-10
Apr-11
Nov-11
Jun-12
Jan-13
Aug-13
Mar-14

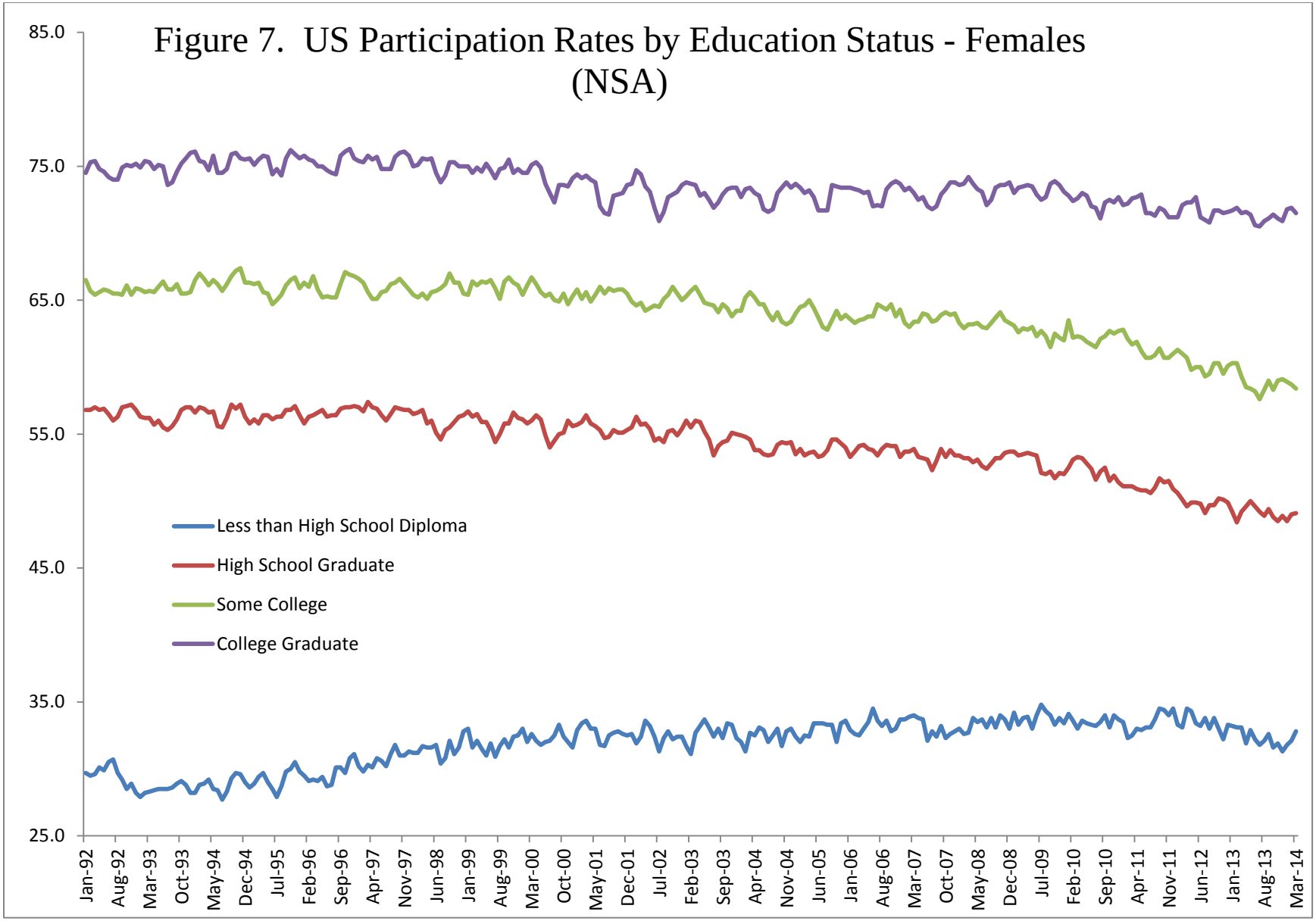


Figure 7. US Participation Rates by Education Status - Females (NSA)
85.0
75.0
65.0
55.0
45.0
35.0
25.0
Less than High School Diploma
High School Graduate
Some College
College Graduate
Jan-92
Aug-92
Mar-93
Oct-93
May-94
Dec-94
Jul-95
Feb-96
Sep-96
Apr-97
Nov-97
Jun-98
Jan-99
Aug-99
Mar-00
Oct-00
May-01
Dec-01
Jul-02
Feb-03
Sep-03
Apr-04
Nov-04
Jun-05
Jan-06
Aug-06
Mar-07
Oct-07
May-08
Dec-08
Jul-09
Feb-10
Sep-10
Apr-11
Nov-11
Jun-12
Jan-13
Aug-13
Mar-14

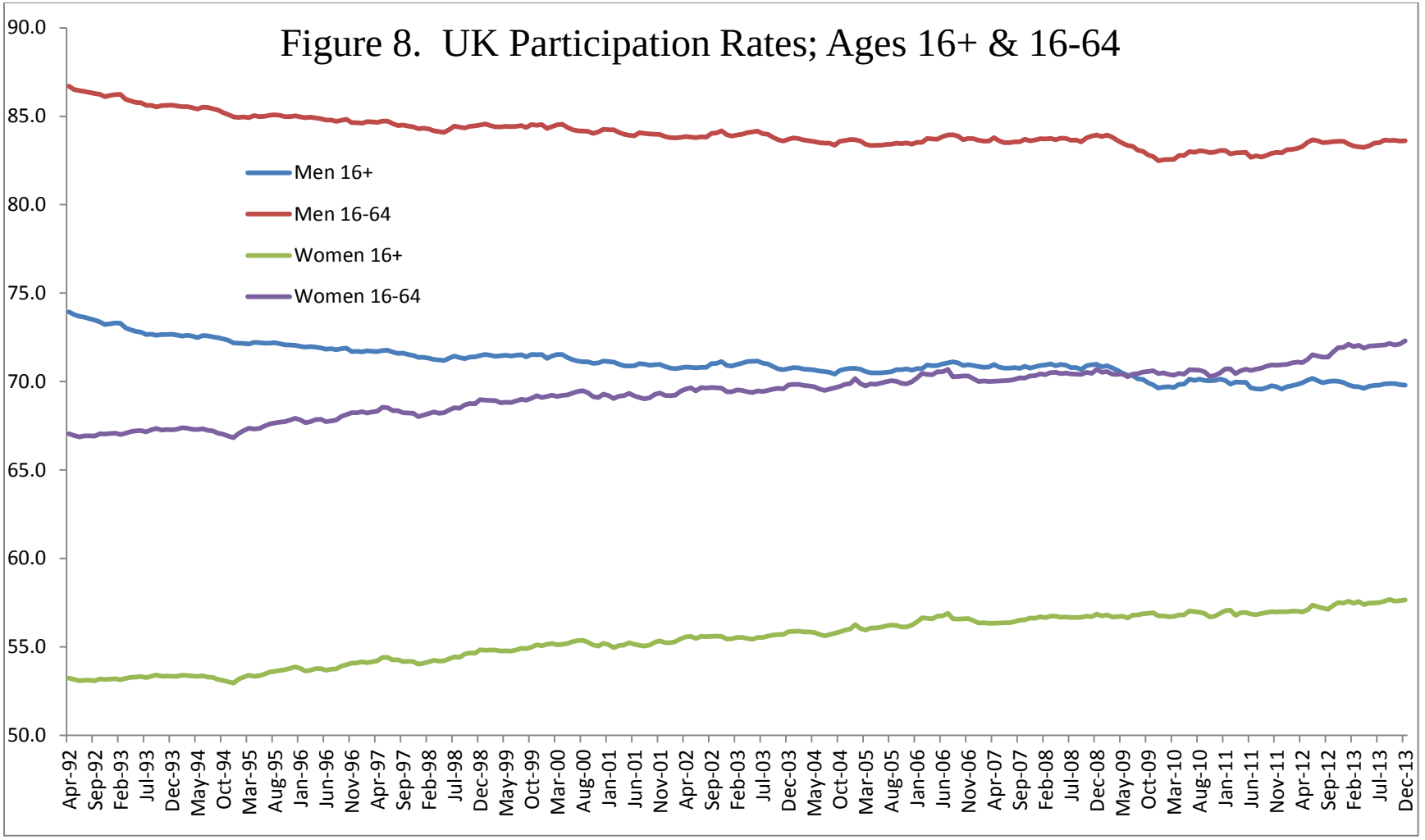


Figure 8. UK Participation Rates; Ages 16+ & 16-64
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
Men 16+
Men 16-64
Women 16+
Women 16-64
Apr-92
Sep-92
Feb-93
Jul-93
Dec-93
May-94
Oct-94
Mar-95
Aug-95
Jan-96
Jun-96
Nov-96
Apr-97
Sep-97
Feb-98
Jul-98
Dec-98
May-99
Oct-99
Mar-00
Aug-00
Jan-01
Jun-01
Nov-01
Apr-02
Sep-02
Feb-03
Jul-03
Dec-03
May-04
Oct-04
Mar-05
Aug-05
Jan-06
Jun-06
Nov-06
Apr-07
Sep-07
Feb-08
Jul-08
Dec-08
May-09
Oct-09
Mar-10
Aug-10
Jan-11
Jun-11
Nov-11
Apr-12
Sep-12
Feb-13
Jul-13
Dec-13

Figure 9. UK Underemployment

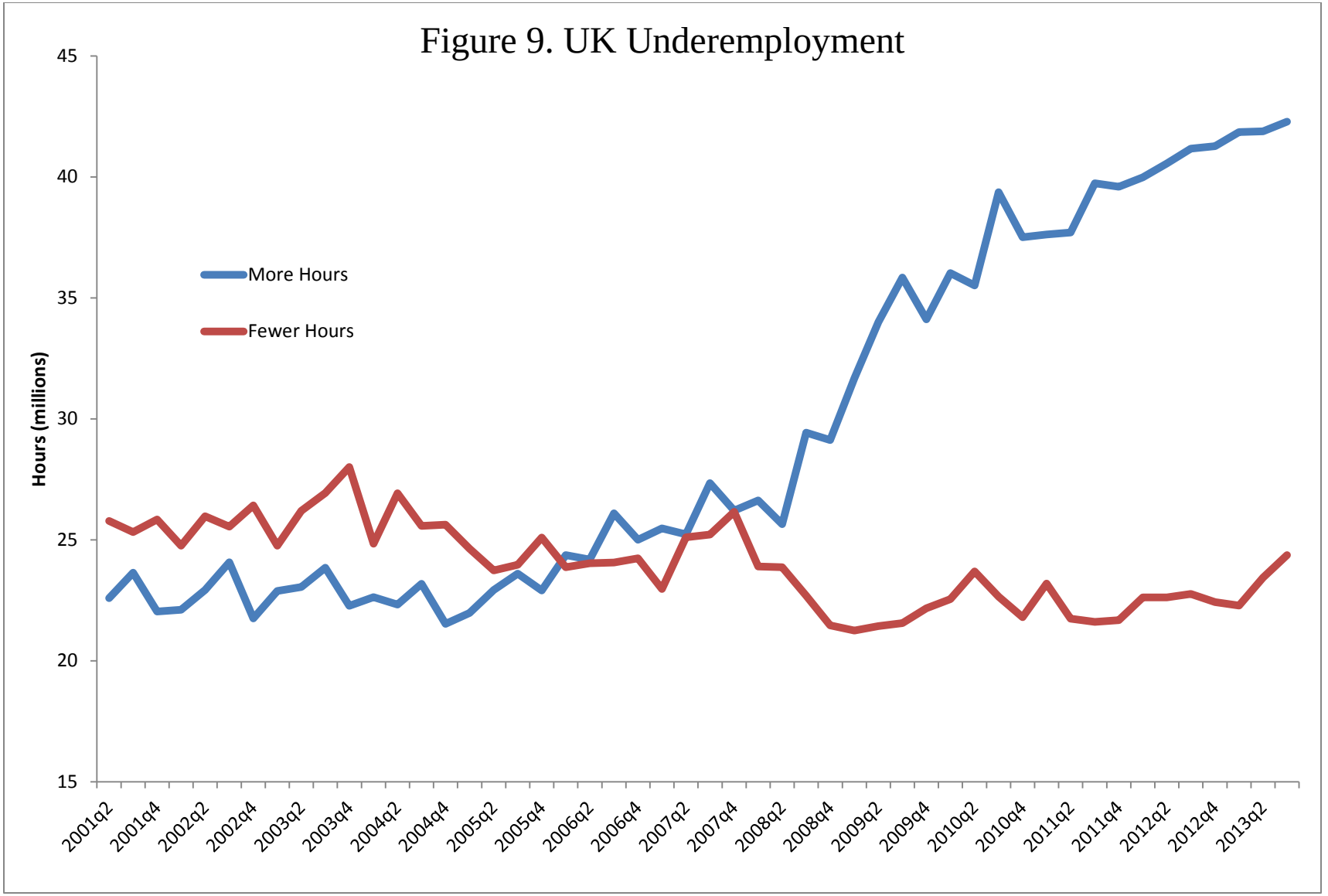
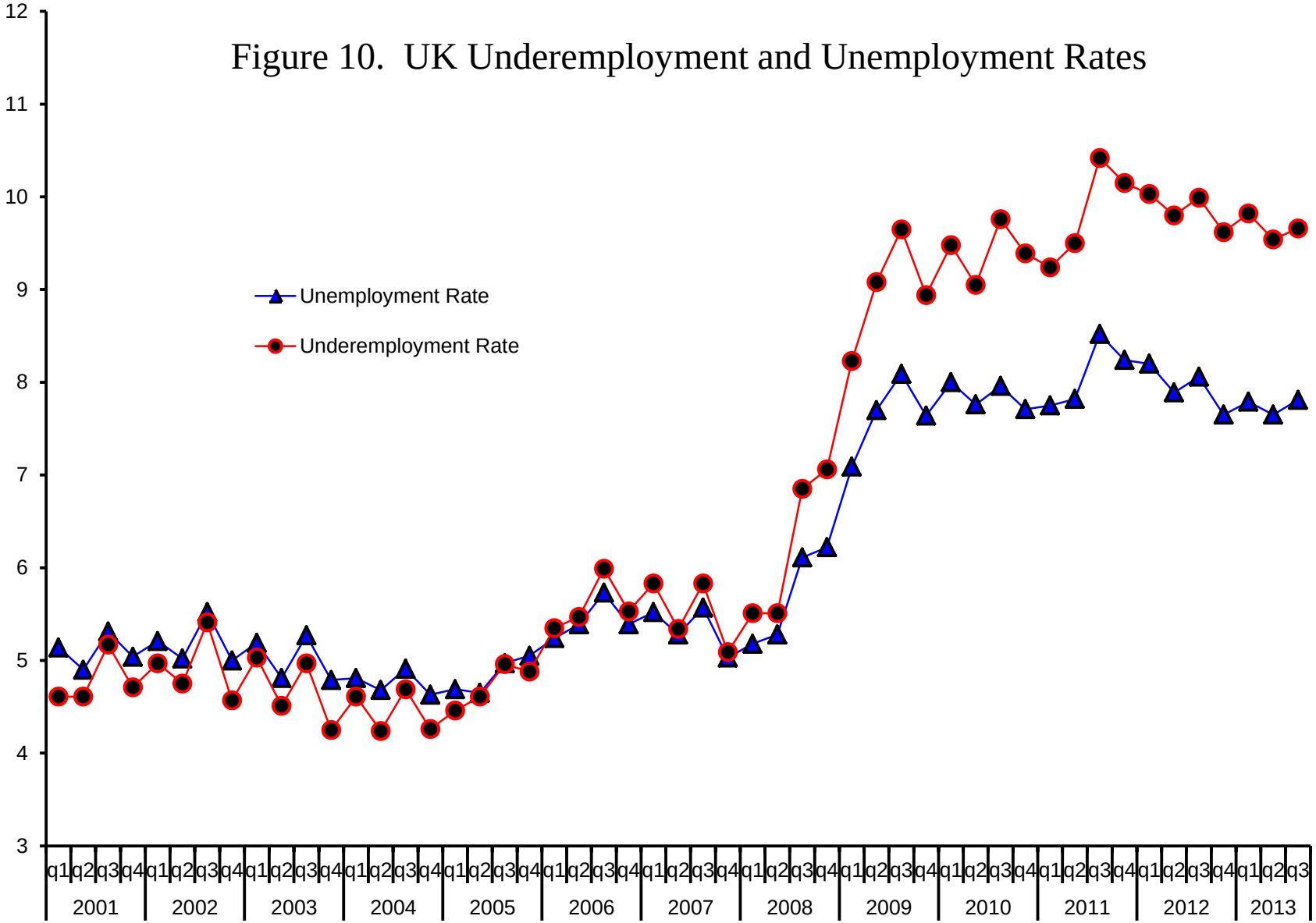


Figure 10. UK Underemployment and Unemployment Rates



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