



**THE LABOR FORCE
PARTICIPATION RATE
SINCE 2007:
CAUSES AND POLICY IMPLICATIONS**

July 2014



Introduction and Executive Summary

In 2008, the U.S. economy collided with two historic forces. The first force was the Great Recession, the most severe economic crisis in a generation. While the economy has recovered considerably over the last five years, there is little doubt that more work remains to address some of the challenges left in the wake of the Great Recession. The turmoil of 2008 inflicted tremendous pain on millions of families, overshadowing the fact that 2008 also marked a unique milestone in U.S. economic history. That year, the first baby boomers (those born in 1946) turned 62 and became eligible for Social Security early retirement benefits. This second force—the demographic inflection point stemming from the retirement of the baby boomers—was felt far less acutely than the Great Recession, but will continue to have a profound influence on the economy for years to come, well after the business cycle recovery from the Great Recession is considered complete.

In addition to these inflection points in 2008, a number of longer-term trends had been playing out in the U.S. labor force prior to 2008—and have continued since then. These include the nearly continuous decline in labor force participation rates for prime-age males (i.e., age 25-54) since the mid-1950s and the dramatic rise in labor force participation rates for prime-age females in the 1970s and 1980s followed by a stalling and slight trend decline after the late 1990s.

Many dimensions of the economy's performance over the last several years can only be properly evaluated when the effects of the Great Recession, the retirement boom, and the longer-term labor force trends are taken into account. One of the clearest illustrations of this point is the labor force participation rate, which represents the fraction of the adult population either working or looking for work. Changes in labor force participation reflect not just current economic conditions like job availability and workers' assessments of job-finding prospects, but also more structural factors like the age distribution of the population and other aspects of society that impact people's decisions to participate in the labor force.

This report analyzes the evolution of the labor force participation rate since late 2007 and attempts to quantify the effects of these various forces. We examine the period since 2007 to focus on how each of the two largest forces, the Great Recession and the retirement of the baby boomers, has impacted labor force participation in recent years. We find that the combination of demographic changes and the drop in labor force participation that would have been expected based on historical business cycle patterns explain most but not all of the recent drop in labor force participation. This implies that other factors, likely including both a continuation of pre-existing trends in labor force participation by certain groups and the unique effects of the Great Recession have also been important. This report also discusses the labor force participation rates for different groups, discusses potential future scenarios for the participation rate, and lays out policies that would help to boost participation in the years to come.

Summary of the Main Results

Since the final quarter of 2007, the labor force participation rate has fallen from 65.9 percent to 62.8 percent in the second quarter of 2014, a decline of 3.1 percentage points. In this report, the Council of Economic Advisers estimates that this 3.1 percentage point decline can be attributed to three main sources:

About half of the decline (1.6 percentage point) is due to the aging of the population.

Because older individuals participate in the labor force at lower rates than younger workers, the aging of the population exerts downward pressure on the overall labor force participation rate. While older workers today are participating in the labor force at higher rates than older workers of previous generations, there is still a very large drop-off in participation when workers enter their early 60s.

About a sixth of the decline in the overall participation rate (0.5 percentage point) is a cyclical decline in line with historical patterns in previous recessions.

While the unemployment rate has come down from a peak of 10.0 percent in October 2009 to 6.1 percent in June 2014, it has remained elevated for the last several years. Historically, elevation in the unemployment rate is associated with a decline in labor force participation, as potential workers may decide to defer looking for a job until the economy improves. A portion of the most recent decline in the participation rate reflects this historical pattern, which this report refers to as the “cyclical” effect.

About a third of the decline (1.0 percentage point) arises from other factors, which may include trends that pre-date the Great Recession and consequences of the unique severity of the Great Recession.

In particular the two elements of this “residual” not explained by the standard factors are:

- The fact that participation rates conditional on age were declining for many groups in the run-up to 2008, including for prime-age men from the 1950s and for prime-age women from the late 1990s, may also have contributed to the decline in participation. This would have been expected to result in a decline in the participation rate above and beyond the pure aging effect even in the absence of a recession. Note, these effects were partly offset by other pre-existing trends, like a rise in the participation rate for older workers.
- The severity of the Great Recession, which has resulted in an unusual pattern of a very large share of long-term unemployed relative to total unemployment, may have lowered the participation rate more than would have been expected through normal channels. In fact, we find that a declining participation rate is historically correlated with the elevation of long-term unemployment, suggesting that both issues have a common cause or cause each other.

In the last few years the aging of the population has been an increasingly important source of the decline in the participation rate. From the beginning of 2011 to the second quarter of 2014, the participation rate fell by 1.4 percentage points. Around 70 percent of that decline (1.0 percentage point) can be directly attributed to the aging of the population and increased retirements.

Overview of the Report

Section I of this report provides historical context with a broad look at the participation rate since 1948. Then Section II surveys the literature on the participation rate in the Great Recession and subsequent recovery. Most researchers have found that long-term trends including the aging of the population explain a majority of the recent decline in participation, and that cyclical effects explain about a quarter of the decline. Section III explains CEA's decomposition of movements in the participation rate into the aging of the population, the business cycle, and other factors.

Section IV takes a deeper look at the trends in participation for several demographic groups: young men and women, older workers, prime-age women, prime-age men, and black men. Participation among young men and women has decreased steadily over the past decade, largely reflecting decreased participation among students and increased enrollment. Meanwhile, older workers have been participating at increasing rates over the last few decades. Black male participation has been on a troubling downward trend since the mid-1970s, falling about 10 percentage points over that time, while a similar, albeit slightly more muted decline has been seen among all men.

Section V lays out potential scenarios for the participation rate going forward assuming no policy changes are made. The aging of the population will likely continue to exert downward pressure on the overall participation rate. At the same time, continued recovery of the economy from the Great Recession would put upward pressure on participation. Assuming no change in policy we estimate that the recovery in the participation rate from cyclical factors will be roughly offset by the aging effect, leading to a mostly unchanged participation rate on net. However, it is difficult to know how much recovery in the residual will occur as the economy improves, and participation may rise as those additional workers are pulled back into the labor force. Once the cyclical rebound fades, however, assuming no policy or other structural changes, the participation rate will resume its downward trend driven mainly by aging. This discussion lays out a baseline for what might happen in the absence of policy steps to promote participation in the workforce.

Section VI lays out policy measures that can boost participation and in so doing, expand the economy's long-run growth potential. First, immigration reform would raise the size of the labor force as well as boost participation rates and could largely offset further declines in participation due to aging. Second, adopting family-friendly workplace policies can boost female labor force participation. For instance, many states are currently considering adopting paid leave policies, and evidence suggests that the availability of paid leave and other family-friendly policies could increase the participation of women by about 7 percentage points (Blau and Kahn, 2013). Third, the long-run decline in participation among men, especially minority men, is unsustainable, and

the Obama Administration is aggressively pursuing policies aimed at stemming these declines. Finally, in the near-term, the recovery from the Great Recession remains incomplete, and steps to strengthen the economy and encourage best practices for hiring the long-term unemployed can still make a major difference. These types of steps are critical for combating the portion of the decline in the participation rate that reflects the unique severity of the Great Recession and the major challenges left in its wake.

I. The Labor Force Participation Rate Over the Past 50 Years

The labor force participation rate is the share of the civilian population over age 15 that is either working or searching for work (i.e., unemployed). Increases in the participation rate reflect individuals joining the workforce, either by looking for a job or taking one, while decreases in the participation rate can reflect an increase in retirements, people taking time out of the labor force for a variety of reasons (e.g., to go to school, care for a young child, etc.), or unemployed individuals who become discouraged and stop looking for a job. Decreased labor force participation may or may not be desirable, depending on the reason. Achieving a labor force participation rate of 100 percent is not the goal, since many people who leave the labor force are engaged in important nonmarket activities, such as schooling, raising children, or retirement. However, discouraged workers dropping out of the labor force would be a cause for concern and would motivate enacting policies to return these workers to the labor force. In the long run, the growth rate of the labor force underpins the growth rate of employment, which, along with productivity growth, is a key determinant of the growth rate of potential GDP.

Figure 1: Total Civilian Labor Force Participation Rate



The labor force participation rate in the United States since 1948 has three key features, as shown in Figure 1. The first is the striking inverted U-shaped trend in the participation rate: while just under 59 percent of civilian adults were in the labor force in 1963, this rose to approximately 66 percent in 1990 and peaked at 67 percent in 2000, but since 2000 the participation rate has generally fallen. As discussed in more detail below, this inverted U-shaped pattern can be more fully understood by looking at the separate trends for men and women. In general, the left (rising) side of the inverted U-shape reflects a historic surge of women into the labor force in the second half of the twentieth century, as well as the baby boomers reaching their prime working years. The right (falling) side reflects the plateauing of female participation, combined with the retirement of the baby-boom generation and the massive shock of the Great Recession.

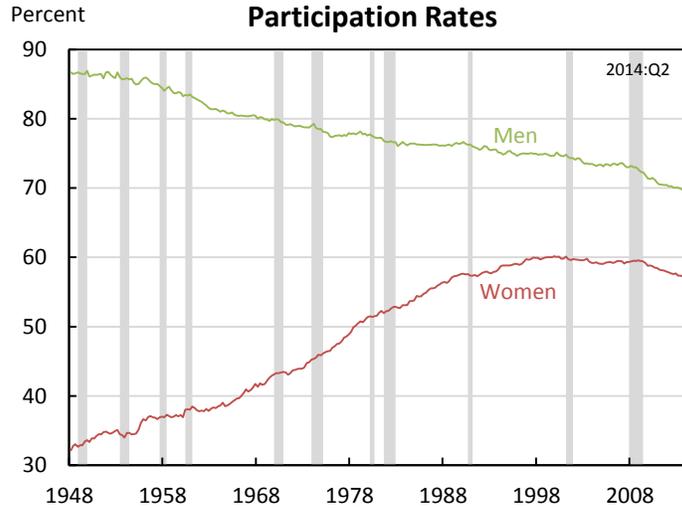
The second key feature of the participation rate visible in Figure 1 is the procyclical pattern. In other words, participation rises during an expansion and falls during a recession. For example, these cyclical patterns, which occur with a lag, are clearly visible in the 1990 recession. During the strong labor force growth of the 1970s and 1980s, the procyclical movements do not produce distinct declines in the participation rate, but instead produce temporary plateaus, as the cyclical decline was mitigated by an upward underlying trend that resumed after the recovery was under way. Similarly, because the participation rate was on a downward trajectory during the first half of the 2000s, the cyclical decline during and after the 2007 recession combined with the underlying demographic trend to produce a particularly sharp drop.

The third feature of the participation rate visible in Figure 1 is that the series exhibits considerable volatility around the long-term trends and cyclical movements. For example, during the recovery from the 1990 recession, the participation rate rose more than half a percentage point in the first half of 1992, only to subsequently fall by nearly the same amount. Much of this volatility stems from factors like the normal statistical noise that exists in any data series based on a limited sample and seasonally adjusted.

As noted earlier, the inverted U-shaped trend in the overall participation rate can be better understood by considering the separate trends for male and female labor force participation. The male labor force participation rate has been falling since data collection began in 1948, as shown in Figure 2. Some of this decline reflects the increasing longevity of men over time and the resulting lengthening of their retirement. However, the rate of participation among prime-age men has also fallen over this time period, although to a lesser extent.

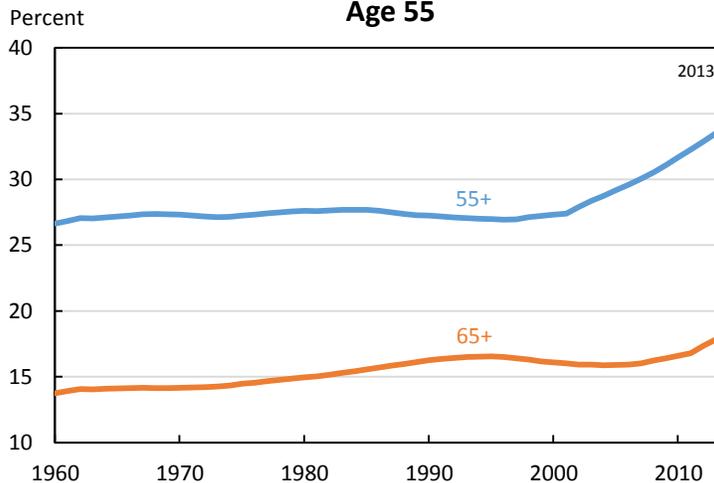
In contrast, women's labor force participation rose through much of that period, with a surge from the mid-1960s through the 1990s. This profound shift in America's economy and society reflected changes in social norms and access to education, including the legalization of oral contraceptives in the early 1960s, reductions in discrimination through legislation like Title VII of the Equal Rights Act and Title IX of the Educational Amendments to the Equal Rights Act, and developments in labor-saving household technology. The rise in women's labor force participation exceeds the decline in men's participation so that overall adult participation increased during this interval.

Figure 2: Male and Female Labor Force Participation Rates



Since 2000, the participation rates of men and women have both declined, although the rate of decline has been slower for women than for men. Participation rates have long been influenced by an aging population, however its impact became more pronounced starting in 2008 when the first cohort of baby boomers (those born in 1946) turned 62 and became eligible for early Social Security benefits. Starting in 2008, the share of the working age population over age 55 began to rise rapidly (Figure 3). Also, while the share of the population over age 65 has risen gradually since 1960 due to increased longevity, the increase accelerated in 2008 and is now rising faster than at any point since 1960. This sharp and predictable retirement of a large cohort coincided with the start of the Great Recession, making it difficult to separate the effects of the economy and normal demographic patterns on participation. Even though these baby boomers are more likely to work at older ages than their predecessors, the employment rates at older ages are still much lower than for younger workers.

Figure 3: Share of the Adult Population Over Age 55



II. Literature on the Labor Force Participation Rate in the Great Recession and Subsequent Recovery

There has been considerable research on the decline in the participation rate in recent years. Table 1 lists the findings of several recent studies of the participation rate, showing how much of the decline each study attributes to long-term trends and cyclical factors. The time periods covered by each of these analyses vary, so the results are not always directly comparable—although we provide CEA’s estimates to match the time periods of each of the studies. While some studies estimate either the trend or cycle component and then infer the other component indirectly, this table only shows direct estimates of these components.

Despite differences in data and methods, several broad conclusions are common across the literature. Taken together, the aging of the population and the business cycle account for the vast majority of the decline in the participation rate since 2007 in all of the studies. While there are some differences in the share attributed to the aging of the population, the median estimate is that half of the decline is due to aging.

Table 1: Comparison of Participation Rate Estimates

	Time Period	Shares of the Total Decline		CEA Estimated Shares of Total Decline Over Same Time Period	
		Trend	Cycle	Trend	Cycle
CEA (2014)	2007:Q4 - 2014:Q2	52%	16%	--	--
Beginning in 2007					
Erceg & Levin (2013)	2007 - 2012	25%	60%	55%	35%
Shierholz (2012)	2007 - 2011	30%	--	50%	52%
Van Zandweghe (2012)	2007 - 2011	42%	58%	50%	52%
CBO (2014)	2007:Q4 - 2013:Q4	50%	33%	49%	20%
Fallick & Pingle (2013)	2007:Q4 - 2013:Q2	75%	16%	55%	29%
Aaronson et al. (2006)	2007 - 2013	80%	--	49%	20%
Kudlyak (2013)	2007 - 2012	80%	20%	55%	35%
Other Time Periods					
Aaronson, Davis & Hu (2012)	2000 - 2011	40%	--	46%	38%
Fujita (2014)	2000:Q1 - 2013:Q4	65%	30%	42%	16%
CEA (2014)	2011:Q1 - 2014:Q2	69%	-34%	--	--

Note: This table only includes direct estimates of the trend and cyclical components. CEA-equivalent decompositions for time periods listed on an annual basis are computed from Q4 to Q4 of the corresponding years.

CEA estimates that the long-term trend of an aging population explains just over half of the decline in participation since the end of 2007, putting CEA’s estimate in the middle of the range of estimates. Across most of these studies, the effects of an aging population typically account for a third to half of the decline, and the other longer-term trends account for a varying proportion of the decline. The estimates of the trend component from Aaronson et al. (2006), Kudlyak (2013), and Fallick and Pingle (2013) also include notable effects from other long-term trends, and so are correspondingly about 25 to 30 percentage points larger than estimates of the aging effects alone.

In analyzing the effects of the business cycle on participation, the literature is split between a group of analyses that attribute about 25 percent of the decline to the Great Recession and its aftermath, and a few studies that estimate the cyclical component to be at least a majority of the decline. Each paper takes a different approach to estimating the cyclical portion. Both CEA's estimate and Van Zandweghe (2012) are based on time series evidence but arrive at different conclusions.

While some studies recognize an unexplained or residual component of the decline in participation, others hold that the full decline in participation can be explained by a combination of longer-term trends and cyclical effects. CEA estimates that about one quarter of the decline is not explained by either trend or historical estimates of cyclical movements, but there is some evidence that this residual may be related to the current recession through its unusually high long-term unemployment rate. The Congressional Budget Office (CBO) estimates a slightly smaller residual component and suggests that it may be due to elevated Social Security Disability Insurance (SSDI) rolls. Other possible explanations for the residual component include increased enrollment in school (Fujita 2014).

III. Explaining the Decline in the Participation Rate Since 2007

CEA's analysis of the decline in the labor force participation rate since the end of 2007 is based on a variety of methodologies, including direct measurement of the aging trend, panel data, and time series analysis—all of which produce generally similar results in disentangling three effects: the pure aging effect, the standard cyclical effect, and a residual which picks up a combination of pre-existing trends unrelated to aging and factors unique to the Great Recession.

The Aging of the Workforce

The largest single factor in the decline of the participation rate since the end of 2007 is the aging of the workforce—something that was predicted well before the Great Recession. Every year since 2000, the Economic Report of the President has mentioned the post-2008 decline in the labor force participation rate as a factor slowing growth of potential real GDP. In 2004, the first year in which their ten-year forecast included the 2007-2013 period, CBO predicted that participation would fall by 1 percentage point between 2007 and 2013 due to aging. Also, in 2006 researchers from the Federal Reserve predicted, based solely on aging and other trends, that the participation rate would fall to 63.3 percent in 2013—the exact value to which it fell (Aaronson et al. 2006).

Labor Force Participation over the Life Cycle

Labor force participation varies considerably over the course of a person's life, rising rapidly at early ages before flattening out through the working years and falling as workers retire. In order to understand how an aging population will affect overall labor force participation, it is helpful to look at how the participation rates of different age groups have changed over time. Figures 4 and 5 show the participation rates for men and women over the course of their lives for various birth cohorts. For both men and women, participation rises rapidly throughout the 20s as individuals leave full-time schooling and enter the workforce, then flattens out at a high level during prime working-age years, before falling to low levels of participation again as individuals enter their 60s. In the decade leading up to age 65, participation for both men and women falls by at least 40 percentage points, and continues to fall by nearly 20 percentage points over the subsequent decade of the life cycle.

Figure 4: Male Labor Force Participation by Age & Birth Year

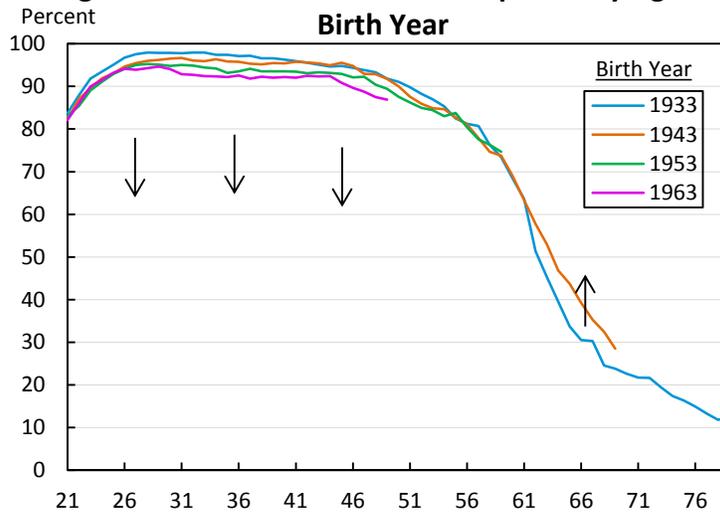
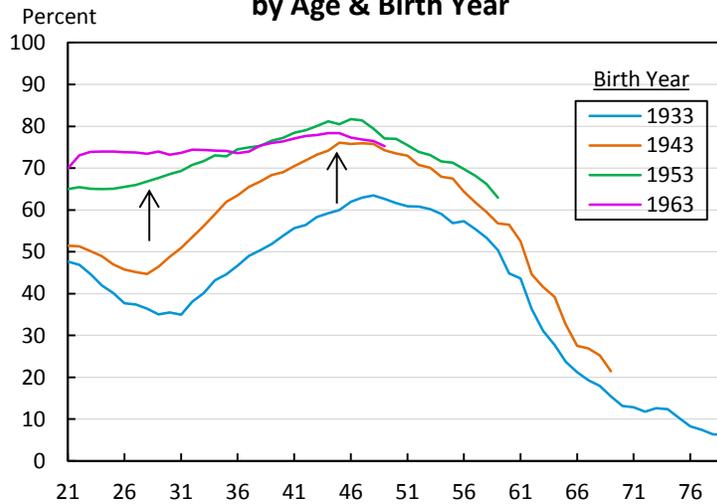


Figure 5: Female Labor Force Participation by Age & Birth Year



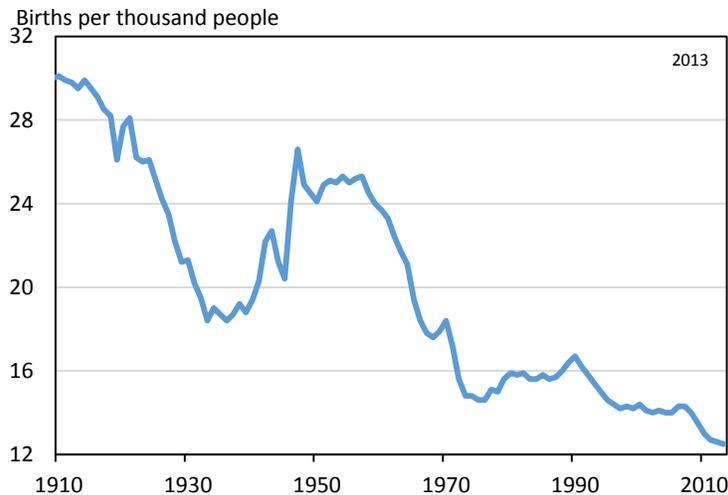
The pattern of participation among prime-age women has shifted dramatically over the past half century. Women born in 1933 decreased their participation over the course of their 20s—the ages of maternity and childrearing—before slowly increasing their participation in their 30s and 40s. The cohort of women born ten years later, in 1943, had much the same pattern of decreasing and increasing participation, but over the course of their lifetime participated at a rate about five to ten percentage points higher. In subsequent cohorts, women participated at much higher rates in their 20s and 30s, while participation rose only slightly in older years. Most of this increase is likely due to women in more recent cohorts returning to the labor force more quickly after bearing children than previous generations.

Male participation has shown less variation from cohort to cohort, but there are two notable changes. The first is that among prime working-age men, each successive cohort has participated slightly less on average, demonstrating that the long-run decline in male participation has been partially driven by the behavior of prime-age men. The second is that more recent cohorts of older men have increased their participation. Men born in 1943 participated at age 65 at a rate about five to ten percentage points higher than men born in 1933. It is also worth noting that men born in 1943 had a life expectancy roughly 5 years longer than those born in 1933. Despite this increase in participation relative to previous cohorts, there is still a very large drop off in participation at older ages, and so an aging population will, all else equal, reduce the economy-wide labor force participation rate. The substantial aging of the population that has begun to occur and will continue to unfold for years to come is discussed in the next subsection.

Aging and the Retirement of the Baby Boomers

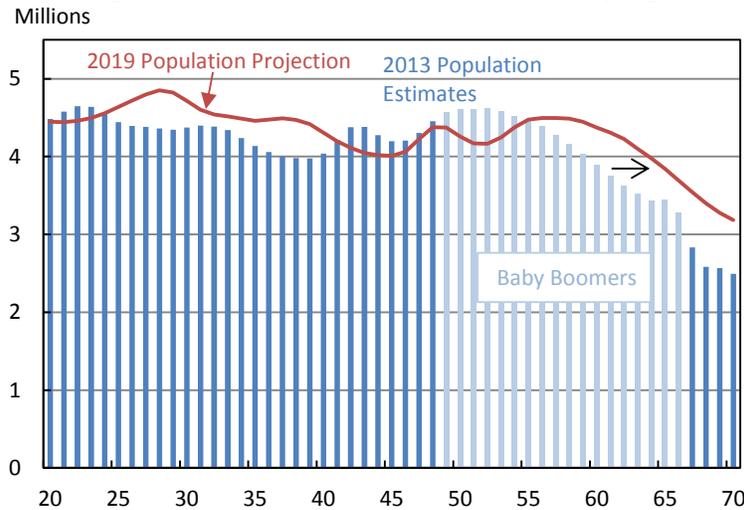
In the immediate aftermath of World War II, the U.S. birth rate spiked, as couples who were reunited following the war were able to settle down and have children, while others took advantage of the relative sense of peace and prosperity that emerged in the 1950s and 1960s to expand their families (Figure 6). The birth rate remained elevated into the mid-1960s before dropping sharply, and it has not since returned to anywhere close to what it was during the baby boom. Consequently, the baby boomers, who are currently between the ages of 49 and 67, are more numerous than any previous or subsequent cohort of Americans.

Figure 6: U.S. Birth Rate



As Figure 7 shows, the distribution of the population by age becomes more heavily tilted toward older ages as the baby boomers age. The first baby boomers reached retirement age in 2008, and over the next decade and a half, increasingly-large cohorts of baby boomers will follow suit. In 2009, 16 percent of the adult population was at or above the retirement age; the Social Security Administration projects this fraction will grow to 25 percent by 2029, increasing by half over two decades.

Figure 7: U.S. Population Distribution By Age



The retirement of the baby boom generation is particularly consequential for the participation rate, because the labor force participation rate falls sharply as workers grow older. Both men and women decrease their participation by at least 40 percentage points in the decade leading up to age 65, and participate at even lower rates afterwards. Because older individuals participate in the labor force at lower rates than other age groups, the shift in the age structure from aging baby boomers is responsible for a substantial portion of the decline in the participation rate.

Although the participation rate of those over age 60 has risen in recent years and the participation of older baby boomers is continuing to rise relative to previous cohorts, this effect is relatively small compared to the typical decline as people age and so does little to mitigate the substantial negative effect that aging of the population has on the overall participation rate. The participation rate for the male cohort born in 1943 fell more than 40 percentage points as they aged from 55 to 65, even though their participation was about 10 percentage points higher than those in the previous cohort at age 65. The pattern for women is largely similar, as the increase in participation at older ages from cohort-to-cohort is much smaller than the drop in participation over the lifecycle.

Modeling the Effect of Aging on the Participation Rate

Two longer-term trends contribute to movements in the participation rate: first, the effect of an aging population, and second, ongoing trends in participation within age groups that are unrelated to aging. The magnitude of the trend can be estimated in several ways, each of which captures long-term movements in participation differently, with some capturing only the effects of aging and others including both aging and non-aging-related trends. We employ three different methods of modeling the participation rate trend and find that they provide similar estimates, with approximately half of the decline in participation since 2007 attributable to aging and a negligible fraction of the decline attributable to trends within age groups.

Projecting Forward the 2007 Participation Rate Profile With Changing Age Structure

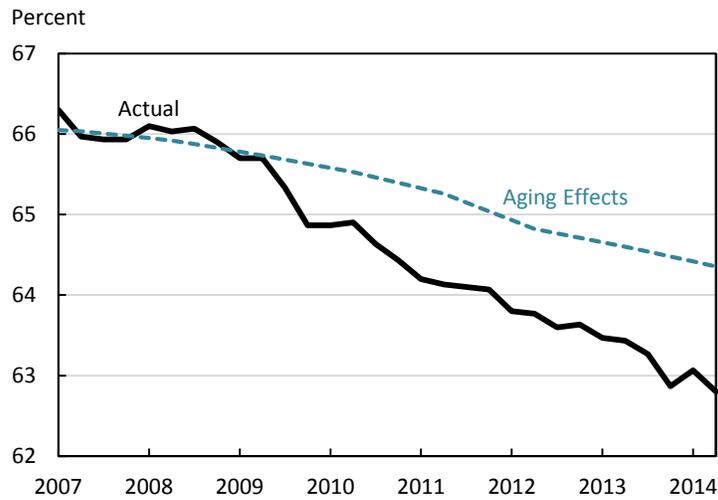
A straightforward way to estimate the effect of the aging of the population on labor force participation is to hold constant the participation rates by age in a given year, and observe how the participation rate evolves if only the age distribution of the population is allowed to vary. For example, this allows computing the effect of an increasing share of 65 year olds, under the assumption that 65 year olds retire in the future at the same rate that they did in 2007. This approach is implemented using the age-based participation profile as of 2007. The advantage of fixing participation rates in 2007 is that it predated the recession, and thus avoids confounding the analysis by introducing the further effect of a sharp cyclical movement. However, the results are essentially the same if we instead hold the current (2014) participation rates by age group constant, as discussed later.

To estimate the effect of aging, we constructed data on participation rates for single-year age categories by gender, combining unpublished participation rates for those over 55 with participation for single-year age categories below age 55 obtained by interpolating from the published rates for ten-year age categories. For individuals above age 55, data on annual participation by single-year age category were provided to us by the Bureau of Labor Statistics (BLS), using unperturbed data from the Current Population Survey (CPS). These data are less noisy than estimates from the CPS microdata but are not very different on average (Appendix Figures 1 and 2).

Figure 8 shows the counterfactual participation rate between 2007 and 2014, under the assumption that only the age distribution of the population changed over this time. Over this period, the counterfactual participation rate fell by 1.6 percentage points, accounting for slightly more than half of the actual observed decline.¹ Thus, the aging of the population alone can explain about half the decline in the participation rate since late 2007.

¹ Fixing the participation rate in 2013 and projecting it backwards using the actual demographic data yields a very similar estimate that 1.4 percentage point of the decline in the participation rate was due to aging. This estimate is slightly lower than the estimate using 2007 data because the Great Recession narrowed the gap in participation between prime-age and older workers.

Figure 8: Effect of Aging on Labor Force Participation



The aging portion of the trend has been more rapidly declining since 2011. Between the end of 2007 and the end of 2010, the counterfactual participation rate fell only 0.6 percentage point, but it subsequently fell 1.0 percentage points from the beginning of 2011 through the first quarter of 2014—explaining the majority of the reduction in participation over that period. In 2011, the first baby boomers reached age 65, which is the point of steepest decline in participation over the lifecycle. Baby boomers will continue to turn 65 until 2029 and the aging portion of the trend in the participation rate will correspondingly continue to decline, possibly at an even more rapid pace in the coming years.

Casselmann (2014) conducts a similar calculation using the publicly available data on participation published by BLS and concludes that aging is responsible for about a third of the decline. However, the seasonally adjusted statistics published by BLS categorize all adults over 55 into the same group, which obscures significant differences in participation at older ages. Participation falls by about 40 percentage points between age 55 and 65, so compositional shifts within the 55+ age group can have a large effect on the overall participation rate; using the coarse age-bracket data will not capture this effect. In contrast, the analysis here enables an estimate of a more detailed, year-by-year aging effect.

Time Series Trend

Econometric analysis of time series data can also be used to estimate the long-run trend in the participation rate. Unlike the previous approach that was designed to isolate the effect of population aging, this approach identifies a single unified trend in the participation time series and so does not separate aging and non-aging forces driving the trend. Although the theory of time series trend estimation is well-developed, this application is challenging because the deep recession and prolonged recovery serve to conflate the cyclical and trend behavior beginning in late 2007. For this reason, the time series trend used here is estimated using a standard time series smoother (biweighted kernel), modified to be cyclically adjusted using a partially linear semiparametric model; more detail is given in Appendix A. The resulting estimate shows that the

trend component of the participation rate peaked in the late 1990s, and has been falling since, declining at a more rapid rate in recent years (Appendix Figure 3). According to the time series estimate of the trend, the long-run trend in the participation time series fell by 1.6 percentage points between the end of 2007 and the second quarter of 2014.

The 1.6 percentage point decline in the time series trend happens to equal the estimated decline in the previous section that focused on the aging-based trend. Since the time series model includes trends within age groups while the aging-based trend does not, by itself this estimate would suggest that non-aging trends within age groups have had little net effect on participation. However, in the presence of a break in the series—which we know occurred around 2008 with the retirement boom—time series methods will tend to understate the trend. As a result, the residual between the time series and aging methods will tend to understate the consequences of pre-2008 trends unrelated to aging.

Structural Micro-Data Models of Participation

Another approach to estimating the trend in participation involves estimating a structural model of participation decisions using individual-level data. This approach was originally developed by Aaronson et al. (2006), who extend the model with age and cohort effects to include covariates representing human capital, the ability to finance nonparticipation spells, and family structure. By including a measure of life expectancy, for example, the authors control for longer lives requiring greater retirement savings, which in turn would increase participation. In contrast to the previous two methods, this approach attempts to ascertain the separate effect of various factors driving differences in participation across individuals and across cohorts. Aaronson et al.'s projections, which assumed full employment, were consistent with a decline in the participation rate from 2007:Q4 through 2014:Q2 of 2.5 percentage points. If this is correct, then most of the decline in participation since the end of 2007 would have been foreseeable—and in fact was almost precisely foreseen—based on pre-existing trends in aging and other demographic factors.

Fallick and Pingle (2007) propose a more detailed structural model of participation. They use several covariates to estimate the trend in participation, including educational attainment, life expectancy, marriage and fertility variables for women, minimum wages and school enrollment measures for teenagers, and Social Security rule changes. In a recent update of their model using data collected in the years following publication, they estimate that the participation rate trend decreased 2.0 percentage points between the end of 2007 and the second quarter of 2014. Fallick and Pingle's model includes some portion of what we estimate as cyclical rather than trend components, however, because several of the covariates they include exhibit cyclical variation (in particular the return to education and the level of private wealth). To the extent that their estimated trend component is based on variables that fluctuate cyclically, their estimate arguably overstates the portion of the decline attributable to long-term trends.

Standard Business Cycle Effects

The decline in the labor force participation rate since 2007 is partially due to the standard effects associated with an economy operating below its full potential. However, because the shock of the Great Recession was so large, the standard cyclical effects on participation were also quite large relative to previous cycles. When the economy is booming, the labor force participation rate rises and often exceeds the predicted long-term trend, and during downturns the participation rate falls below trend. Economic contractions historically result in both greater unemployment and lower labor force participation, as nonparticipants become less likely to enter the labor force and the unemployed (who always exhibit a higher tendency to exit the labor force) become more numerous relative to the employed (Elsby, Hobijn, and Sahin 2013). While movements in the participation rate over decades are driven largely by the long-term trends, in the short- and medium-term the variation in the participation rate is driven by these cyclical factors.

Figure 9: Detrended Participation Rate and (Inverted) Unemployment Gap

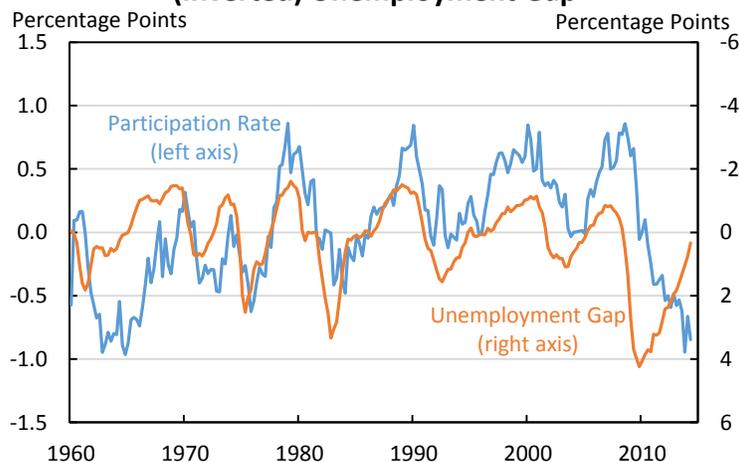


Figure 9 shows the cyclicity of the participation rate by comparing the detrended participation rate and the detrended unemployment gap, defined as the difference between the actual unemployment rate and the natural unemployment rate (to simplify comparison, the unemployment gap is plotted inverted)². For example, in the expansion of the 1990s, the detrended participation rate rose, and during the Great Recession, the detrended participation rate declined. Visual inspection suggests that movements in the participation rate lag, by perhaps a year or so, movements in the unemployment rate, a phenomenon discussed in more detail below. The cyclical pattern of the participation rate is also evident when looking at state-level data, where the states with the largest increases in unemployment tended to have larger declines in labor force participation (Figure 10). Roughly speaking, for every percentage point increase in

² The trend component of the participation rate was constructed using a semiparametric procedure described in Appendix A. Quarterly averages of monthly participation were used to reduce the noise in the series.

the unemployment rate, the participation rate falls by about 0.2 percentage point, a pattern that has roughly held over the last four recessions (Figure 11).

Figure 10: Labor Force Participation and Unemployment by State

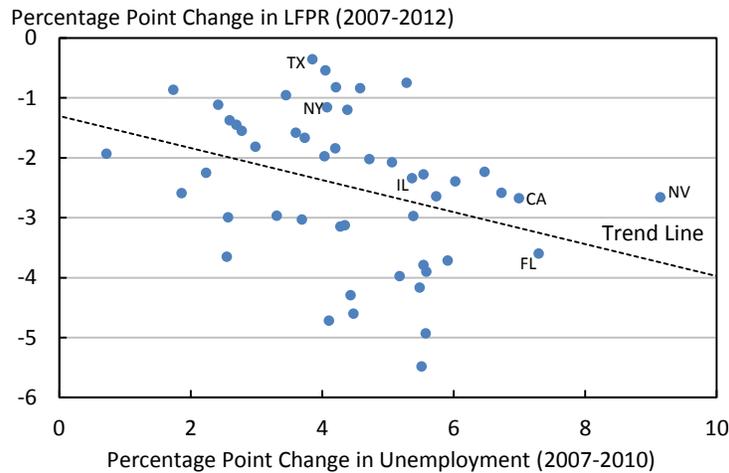
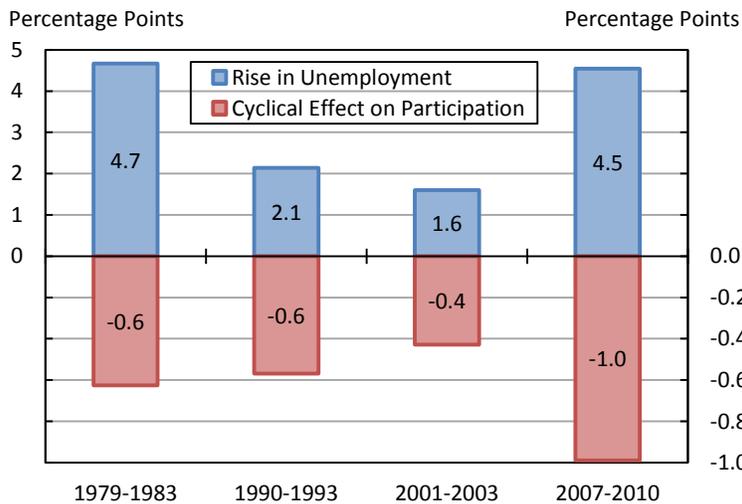


Figure 11: Cyclical Declines In Labor Force Participation



While it is possible to estimate a cyclical effect on participation using microdata, the studies in the literature that have tried this approach have produced cyclical estimates that do not comport with the dynamics evident in the total participation time series (Bengali, Daly, and Valletta 2013; Erceg and Levin 2013). The cyclical nature of participation varies significantly across the population, with participation among younger workers being highly cyclical and participation among prime-age workers hardly responding to the business cycle. Alternatively, one can estimate the cyclical component indirectly by subtracting the trend component from the observed participation rate and treating this entire residual as the cyclical component (Van Zandweghe 2012). However, this

approach does not distinguish between the typical cyclical response from a severe recession and the decline in participation coming from challenges unique to the Great Recession and its aftermath.

In this report, we estimate the cyclical component using econometric analysis of time series data, where the cycle is defined by the unemployment gap. We consider two alternative distributed lag specifications, one in which the detrended overall participation rate is regressed on the level of the detrended unemployment gap and its lags, and a second in which the quarterly first difference of the detrended overall participation rate is regressed on the four-quarter difference of the detrended unemployment gap and its lags. The regression results for the two methods are summarized in Tables 2 and 3, respectively.

Table 2: Levels on Levels Regressions using the Unemployment Gap

VARIABLES	Detrended Participation Rate, 16+			
	(1)	(2)	(3)	(4)
Unemp. Gap	-0.0142 (0.0615)	-0.120** (0.0530)	0.165 (0.121)	0.140 (0.126)
Unemp. Gap (t-1)			-0.216** (0.0957)	-0.191* (0.102)
Unemp. Gap (t-2)			0.0184 (0.0607)	0.0298 (0.0649)
Unemp. Gap (t-3)			-3.71e-05 (0.0889)	-0.110 (0.0798)
Unemp. Gap (t-4)	-0.140*** (0.0428)		-0.138 (0.0853)	0.0451 (0.0686)
Unemp. Gap (t-5)				-0.0773 (0.0729)
Unemp. Gap (t-6)				0.0652 (0.0622)
Unemp. Gap (t-7)				-0.0858 (0.0884)
Unemp. Gap (t-8)	-0.0462 (0.0378)			-0.00831 (0.0854)
Constant	0.0840 (0.0870)	0.0619 (0.0902)	0.0761 (0.0863)	0.0821 (0.0878)
Observations	210	218	214	210
F-test of Included Coefficients	8.530	5.143	6.075	4.006
Prob > F	2.29e-05	0.0243	2.84e-05	9.99e-05
F-test of Restricted Coefficients	1.919	3.551	2.248	
Prob > F	0.0793	0.000719	0.0652	
Predicted Cyclical Decline (2007:Q4 - 2014:Q2)	-0.477	-0.113	-0.465	-0.486

Note: Regressions are estimated using data from 1960:Q1 to 2014:Q2. Newey-West standard errors using a maximum lag of 12 are reported in parentheses. Participation rate and unemployment gap are detrended using the procedure described in Appendix A. F-tests of restricted coefficients are the joint significance test of the omitted coefficients all equaling zero in a regression with all eight lags (i.e. in regression (3), it tests the hypothesis that the coefficients on the unemployment gap in t-5 through t-8 are all equal to zero).

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Differences on Differences Regressions using the Unemployment Gap

VARIABLES	Quarter-to-Quarter Difference of Detrended Participation Rate, 16+			
	(5)	(6)	(7)	(8)
Year-over-Year Difference of Unemp. Gap	-0.0340*** (0.00891)	-0.0355*** (0.00783)	0.0105 (0.0239)	0.0259 (0.0292)
Year-over-Year Difference of Unemp. Gap (t-1)			-0.0689 (0.0500)	-0.107* (0.0551)
Year-over-Year Difference of Unemp. Gap (t-2)			-0.00142 (0.0578)	0.0459 (0.0573)
Year-over-Year Difference of Unemp. Gap (t-3)			0.0545 (0.0468)	-0.00622 (0.0536)
Year-over-Year Difference of Unemp. Gap (t-4)	-0.0187** (0.00740)		-0.0473** (0.0204)	0.0630 (0.0514)
Year-over-Year Difference of Unemp. Gap (t-5)				-0.131** (0.0637)
Year-over-Year Difference of Unemp. Gap (t-6)				0.0899* (0.0531)
Year-over-Year Difference of Unemp. Gap (t-7)				-0.0491 (0.0508)
Year-over-Year Difference of Unemp. Gap (t-8)	-0.00563 (0.00751)			0.0179 (0.0393)
Constant	-0.00141 (0.00731)	-0.00289 (0.00836)	-0.00371 (0.00807)	-0.00162 (0.00754)
Observations	210	218	214	210
F-test of Included Coefficients	11.74	20.52	9.623	6.686
Prob > F	3.90e-07	9.74e-06	2.81e-08	2.34e-08
F-test of Restricted Coefficients	1.872	2.590	2.422	
Prob > F	0.0873	0.0103	0.0496	
Predicted Cyclical Decline (2007:Q4 - 2014:Q2)	-0.507	-0.303	-0.544	-0.474

Note: Regressions are estimated using data from 1960:Q1 to 2014:Q2. Newey-West standard errors using a maximum lag of 12 are reported in parentheses. Participation rate and unemployment gap are detrended using the procedure described in Appendix A. F-tests of restricted coefficients are the joint significance test of the omitted coefficients all equaling zero in a regression with all eight lags (i.e. in regression (3), it tests the hypothesis that the coefficients on the unemployment gap in t-5 through t-8 are all equal to zero).

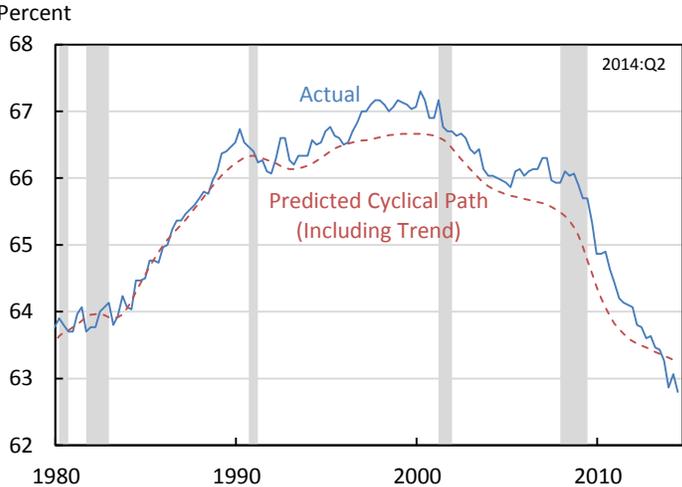
*** p<0.01, ** p<0.05, * p<0.1

Several results are evident in Tables 2 and 3. First, in the specifications with the full set of eight lags, many of the coefficients are individually statistically insignificant. However, restricting the lag structure to allow only the contemporaneous unemployment rate to enter (regressions (2) and (6)) is rejected at the 5 percent significance level. But once lags are introduced, some restrictions are consistent with the data: one of the specifications with shorter lags (3) and both specifications with the contemporaneous, fourth, and eighth lag ((1) and (5)) are not rejected at the 5 percent level. Moreover, the predicted values from regressions (1), (4), (5), and (8) are largely the same (Appendix Figure 4). Thus, the predicted results are largely robust across the non-rejected specifications.

An important distinction between the first-difference and levels specification is that the levels specification imposes the restriction that the long-term forecast of the labor force participation rate reverts to its long-term trend, whereas the differences specification permits a persistent gap between the long-term trend line and the participation rate (so that in effect the trend shifts up or down to match permanent shifts in the level of the participation rate). In the current situation, this distinction corresponds to whether the gap between the labor force participation rate and its cyclical component (the residual) will entirely disappear, or whether that gap might persist because of the labor market disruptions of the Great Recession. We view this as an empirical question, and to avoid imposing the additional mean-reverting structure on the cyclical component, we adopt the first-difference specification. Further, to reduce estimation noise we adopt the restricted-lag specification; this reasoning leads us to choose (5) as our preferred specification. Note, however, that the decomposition results are not particularly sensitive to these choices because varying them yields similar estimates of the cyclical components.

The predicted path for the participation rate, combining our estimate of the time series trend with our preferred specification (regression (5) in Table 3), is shown below in Figure 12. We estimate that between 2007 and 2014:Q2, business cycle effects alone explain 0.5 percentage point (about one sixth) of the total fall in the participation rate.

Figure 12: Estimated Trend Plus Cyclical Component of the Labor Force Participation Rate, 1980 - 2014



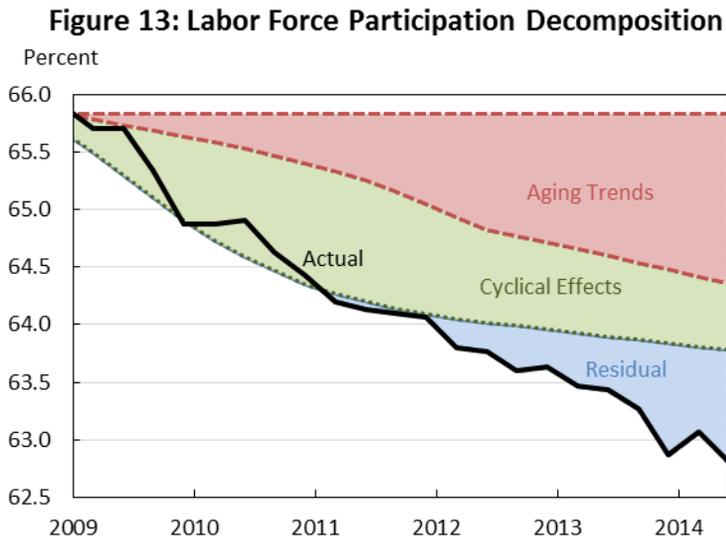
With the improvement of the labor market, the usual cyclical drag on participation due to elevated unemployment is declining. We estimate that, as of 2011, the participation rate was 0.9 percentage point lower because of cyclical factors. By 2014:Q2, however, the cyclical portion had shrunk to 0.5 percentage point because the unemployment rate has fallen. The drop in the cyclical contribution corresponds to nearly 1 million workers returning to the labor force because of cyclical reasons since 2011.³

³ Due to other simultaneous flows of workers into and out of the labor force, this return of workers to the labor force can be difficult to identify in the aggregated data.

Other Effects on Participation: Non-Aging Trends and Factors Unique to the Great Recession

Most of the decline in participation since the end of 2007 is accounted for by the aging of the population and the standard cyclical effects associated with the elevated unemployment rate. The remaining reduction in the participation rate—a 1.0 percentage point reduction in the participation rate since the end of 2007—is not explained by either of these two previously discussed factors.

This residual is a relatively recent phenomenon in this recovery. Up until the beginning of 2012 the participation rate was generally slightly higher than would have been predicted based on the aging trend and the standard business cycle effects. But in the last two years, the participation rate has continued to fall at about the same rate even though the unemployment rate has been declining rapidly. This means that the standard cyclical effect has been giving way to a growing unexplained residual (Figure 13).



The literature has put forward several possible explanations for this residual component which fall mainly into two categories: long-term trends within age groups and factors unique to the Great Recession. We cannot precisely break down these two factors. At least some of the residual appears to be these pre-existing trends, many of which are discussed in the next section about different demographic groups, although some of these pre-existing trends are partially offsetting (e.g., prime-age male labor force participation was already falling while older workers were seeing a rising participation rate).

The fact that the residual only emerged later in the recovery suggests that much of it might be the result of factors specific to the Great Recession and its aftermath. We focus here on testing three unique factors of the Great Recession that may be linked to the residual component, but other forces may also explain the residual decline.

Significantly Elevated Long-Term Unemployment

The Great Recession has led to an unprecedented increase in long-term unemployment, with the number of individuals unemployed for 27 weeks or more rising from 1.3 million at the end of 2007 to more than 6 million at the end of 2010. Even though the rate of short-term unemployment (26 weeks or less) has since returned to its 2001-07 average, the long-term unemployment rate remains more than double what it averaged during the previous expansion.

The emergence of a large residual in our participation rate model coincides with a sustained elevation of the long-term unemployment rate, suggesting that these two phenomena could be different manifestations of the same underlying challenge, or that one is causing the other. To test the plausibility of this hypothesis, we look at the historical relationship between the residual (unexplained component) and the extent of long-term unemployment. Specifically, we ran several regressions using the detrended mean duration of unemployment as a regressor in addition to the detrended unemployment gap that was used in the standard cyclical estimates above.⁴ As Tables 4 (levels on levels) and 5 (differences on differences) show, the mean duration of unemployment was highly statistically significant in the differences specification but only marginally significant in the levels specification. These tables also show the effects of disability insurance and school enrollments, which will be discussed below.

⁴ The Current Population Survey was changed at the beginning of 2011 to permit respondents to report longer durations of unemployment. This change may have led to a break in the level of the series, which might influence our regressions in levels. The change is not likely to affect our regression in differences, which is where we find that mean duration is significant. Using the median duration of unemployment (which was not affected by the change), we find that unemployment duration is significant in the levels specifications, but not the differences specifications, providing further evidence that long-term unemployment accounts for the residual component.

Table 4: Levels on Levels Regressions using Disability Claims, Duration of Unemployment, and Enrollment Rate

VARIABLES	Detrended Participation Rate, 16+					
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment Gap	-0.0142 (0.0723)	-0.0712 (0.0805)	-0.0130 (0.0574)	-0.0154 (0.0597)	-0.00373 (0.0619)	0.0153 (0.0640)
Unemp. Gap (t-4)	-0.140*** (0.0525)	-0.169** (0.0654)	-0.142*** (0.0417)	-0.137*** (0.0455)	-0.137*** (0.0431)	-0.135*** (0.0404)
Unemp. Gap (t-8)	-0.0462 (0.0609)	0.0249 (0.0569)	-0.0512 (0.0425)	-0.0499 (0.0453)	-0.0332 (0.0402)	-0.0453 (0.0468)
Mean Duration of Unemp.	-8.35e-06 (0.0224)	0.0400 (0.0279)				
Mean Duration of Unemp. (t-4)		-0.0356 (0.0296)				
Mean Duration of Unemp. (t-8)		-0.0119 (0.0242)				
SSDI Claims			0.000933** (0.000468)	0.000615 (0.00115)		
SSDI Claims (t-4)				0.000272 (0.00188)		
SSDI Claims (t-8)				0.000121 (0.00124)		
Enrollment Rate					-22.92 (19.18)	-41.04 (32.51)
Enrollment Rate (t-4)						5.962 (27.62)
Enrollment Rate (t-8)						26.26 (39.03)
Constant	0.0840 (0.0892)	0.0842 (0.0900)	0.0860 (0.0881)	0.0859 (0.0881)	0.0997 (0.0799)	0.0892 (0.0792)
Observations	210	210	204	204	210	210
F-test	1.38e-07	2.624	3.974	0.157	1.429	0.379
Prob > F	1.000	0.0750	0.0476	0.855	0.233	0.685

Note: Regressions are estimated using data from 1960:Q1 to 2014:Q2. Newey-West standard errors using a maximum lag of 12 are reported in parentheses. Participation rate and unemployment gap are detrended using the procedure described in Appendix A. F-tests are joint significance tests of the disability insurance, mean duration, and schooling variables.

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Differences on Differences Regressions using Disability Claims, Duration of Unemployment, and Enrollment Rate

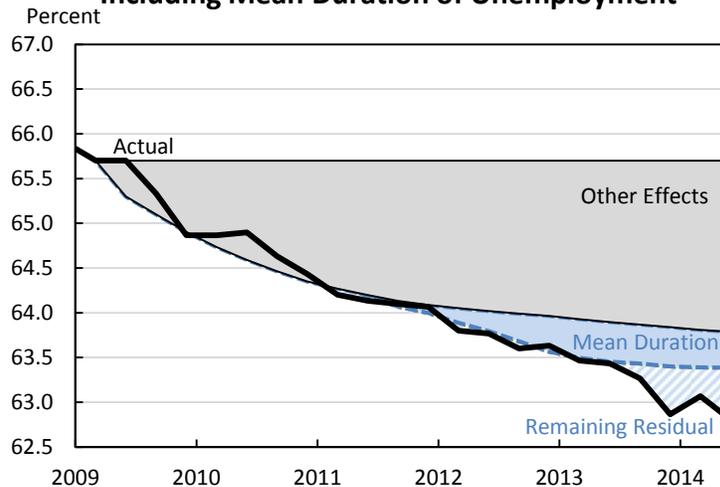
VARIABLES	Quarter-to-Quarter Difference of Detrended Participation Rate, 16+					
	(7)	(8)	(9)	(10)	(11)	(12)
Year-over-Year Difference of Unemp. Gap	-0.0297*** (0.00890)	-0.0330*** (0.00914)	-0.0322*** (0.00989)	-0.0321*** (0.00992)	-0.0330*** (0.00884)	-0.0328*** (0.00877)
Year-over-Year Difference of Unemp. Gap (t-4)	-0.0130 (0.0103)	0.00429 (0.0146)	-0.0228** (0.00943)	-0.0149 (0.0111)	-0.0181** (0.00724)	-0.0190** (0.00737)
Year-over-Year Difference of Unemp. Gap (t-8)	-0.00350 (0.00776)	0.0151 (0.0114)	-0.0117 (0.00916)	-0.0170* (0.00901)	-0.00481 (0.00786)	-0.00569 (0.00744)
Year-over-Year Difference of Mean Duration	-0.00387 (0.00436)	-0.00406 (0.00534)				
Year-over-Year Difference of Mean Duration (t-4)		-0.0142*** (0.00524)				
Year-over-Year Difference of Mean Duration (t-8)		0.00222 (0.00527)				
Year-over-Year Difference of SSDI Claims			0.000546 (0.000614)	-0.000610 (0.000874)		
Year-over-Year Difference of SSDI Claims (t-4)				0.00120 (0.00117)		
Year-over-Year Difference of SSDI Claims (t-8)				-0.000719 (0.000756)		
Year-over-Year Difference of Enrollment Rate					-2.510 (4.275)	-2.910 (4.702)
Year-over-Year Difference of Enrollment Rate (t-4)						2.876 (4.415)
Year-over-Year Difference of Enrollment Rate (t-8)						0.444 (3.391)
Constant	-0.000523 (0.00743)	0.00247 (0.00676)	0.00154 (0.00658)	-0.00225 (0.00698)	-0.00124 (0.00732)	-0.00147 (0.00719)
Observations	210	210	145	137	210	210
F-test	0.789	3.529	0.788	0.373	0.345	0.161
Prob > F	0.376	0.0159	0.376	0.773	0.558	0.923

Note: Regressions are estimated using data from 1960:Q1 to 2014:Q2. Newey-West standard errors using a maximum lag of 12 are reported in parentheses. Participation rate and unemployment gap are detrended using the procedure described in Appendix A. F-tests are joint significance tests of the disability insurance, mean duration, and schooling variables.

*** p<0.01, ** p<0.05, * p<0.1

Using these regression results, we can predict the path of the participation rate given the large increase in the mean duration of unemployment since 2007. Estimating this new set of additional factors explains much of the previously unexplained decline in participation since 2009, as seen in Figure 14. This suggests that the unusually high rate of long-term unemployment may be exerting downward pressure on the participation rate—or that these two developments are manifestations of a common underlying cause.

Figure 14: Labor Force Participation Decomposition Including Mean Duration of Unemployment



One theory put forward to explain the rise in long-term unemployment during the most recent recession is that the long-term unemployed are less productive workers on average and will take longer to find new jobs (Cowen and Lemke 2011). However, the long-term unemployed appear similar to the short-term unemployed in many dimensions, including gender, educational attainment, and previous industry and occupation (Mitchell 2013; Krueger, Cramer, and Cho 2014). Lower productivity among the long-term unemployed could be related to unobservable characteristics, but it is not clear whether the differences among unobservable traits are large enough to explain the rise in long-term unemployment.

A more plausible explanation for the rise in long-term unemployment is that firms are screening out applicants based on duration of unemployment. Long-term unemployed workers are about half as likely to get a callback for an interview as equally-qualified short-term unemployed workers (Kroft, Lange, and Notowidigdo 2013). Short-term unemployed applicants with no relevant work experience for a particular job are more likely to be interviewed for the job than long-term applicants with relevant work experience (Ghayad 2013). Workers who are not lucky enough to find a job within the first few months of unemployment will face disadvantages in the hiring process, further lengthening their unemployment spells on average and raising the rate of long-term unemployment.

Recent research finds that the period of elevated long-term unemployment that we are experiencing is consistent with historical patterns after adjusting for the deeper decline and slower recovery from the latest recession (Kroft, Lange, Notowidigdo, and Katz 2014). Consistent with the fact that the long-term unemployed are observably similar to the short-term unemployed, Kroft et al. find that demographics, occupations, industries, regions or reasons for unemployment do little to explain the variation in unemployment spell length. Instead, they attribute a large share of the rise in long-term unemployment to negative duration dependence, meaning that as a spell of unemployment persists, it becomes more likely to persist even longer. They further find that changes the flows between unemployment and non-participation in the

labor force account for another large share. They allow that the long-term unemployed may be unobservably less productive, but their two favored explanations leave little unexplained.

Disability Insurance

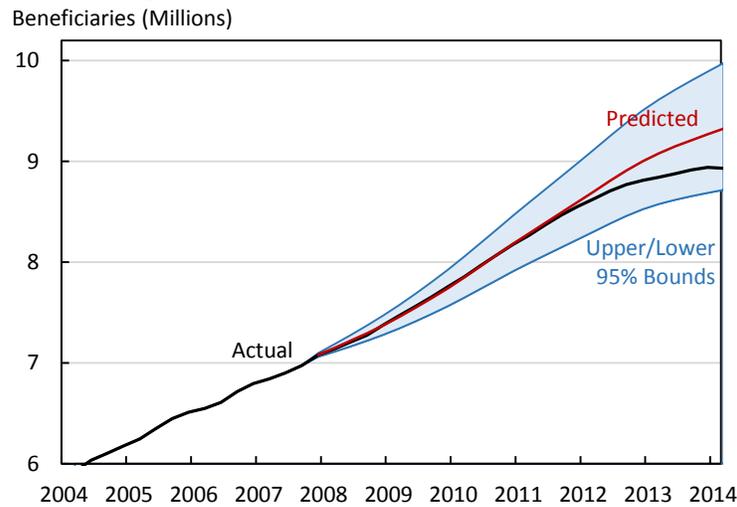
Since the end of 2007, the number of disabled workers receiving benefits through the Social Security Disability Insurance (SSDI) program has increased by nearly 2 million. Some have argued that changes in Disability Insurance are causing an unusual decline in the participation rate. However, we find little evidence that the increase in Disability Insurance beneficiaries explains the residual component of the decline in participation. We estimated a series of regressions using the detrended time series of Disability Insurance disabled worker beneficiaries as an additional explanatory variable. Tests of the coefficients were mostly statistically insignificant and only barely significant in one specification (regression (3) in Table 4). Looking at the predicted values from these regressions, the estimated path of participation accounting for Disability Insurance did not fit the historical series substantially better than our preferred specification using only the unemployment gap.

Disability Insurance generally increases when the unemployment rate increases. As such, the increase in Disability Insurance beneficiaries is captured in our estimate of the cyclical effect and does not appear to have had a disproportionate effect in recent years. In terms of this decomposition, Disability Insurance does not appear to explain the residual component of the decline in the participation rate.⁵

In fact, if anything, the increase in disability rolls since 2009 have been somewhat *lower* than one would have predicted given the predicted cyclical and demographic effects, although it is still within a 95 percent confidence interval (Figure 15).

⁵ Figure 15 shows the predicted level of SSDI beneficiaries using the same approach for doing time series decomposition as our analysis of the participation rate. We regressed first differences in the detrended log of SSDI beneficiaries at a quarterly level on four quarter differences in the detrended unemployment gap. Using the actual number of beneficiaries at the end of 2007 as an initial point, we then cumulated the differences and the estimated confidence interval using Newey-West standard errors to produce an estimated range for the number of disabled worker beneficiaries.

Figure 15: Predicted SSDI Beneficiaries



Schooling

Young men and women are increasingly enrolling in school full-time instead of entering the labor force. The effects of the Great Recession have further encouraged young workers to enroll in school and delay entering the labor force. However, school enrollment tends to be counter-cyclical and therefore any effect of a typical increase in schooling during a recession is already included in our estimate of the cyclical component. If the increase in school enrollment between 2007 and 2014 is larger than the typical increase during a recession, though, it may explain some of the residual decline in participation.

We estimate several regression specifications in both levels and differences using the percent of the population enrolled in high school or college as an additional explanatory variable. As Tables 4 and 5 show, the enrollment rate is not statistically significant in any of the specifications we estimate. Analyzing the cyclical patterns in the enrollment rate itself reveals that the dynamics of enrollment between 2007 and 2014 are largely in line with the expected path given the counter-cyclical nature of enrollment in the past.

It is important to note that this analysis only captures the effect of changes in enrollment decisions, and not changing participation conditional on enrollment. Students enrolling in school participate at lower rates than their non-enrolled peers, so a higher enrollment rate leads to lower participation on average. However, the participation of students enrolled in school has been on a downward trend since 2000, which accounts for a portion of the decline in participation among younger workers. This implies that the participation decisions of young workers may have changed in ways that are not fully captured in the enrollment rate. However, when looking at the overall participation rate, this change is part of the other offsetting trends discussed in greater detail below.

IV. Changes in Labor Force Participation for Different Demographic Groups

Overall, the major *aggregate* trend affecting the participation rate in the recession and recovery is the aging of the population. But there are a number of important trends and developments for different subgroups of the population. For example, we have seen declining participation by younger Americans as they stay in school longer, increasing participation by older Americans, a plateauing of, and subsequent slight decline in, female labor force participation in the last fifteen years following earlier increases, and the continuation of a 65-year trend of declining male labor force participation (which is especially stark for young minority men).

Table 6 shows the trends for a wide range of groups and the remainder of this section discusses trends for some of the specific groups.

Table 6: Participation Rate by Selected Groups

	2014-Q2	Change (per year in p.p.)		
		1948-1990	1990-2007	2007-2014
All	62.8	0.2	0.0	-0.5
Men	69.1	-0.2	-0.2	-0.6
Women	56.9	0.6	0.1	-0.3
16-24	54.7	0.2	-0.4	-0.8
25-54	80.8	0.5	0.0	-0.3
55+	40.0	-0.3	0.5	0.2
Men 25-54	88.0	-0.1	-0.1	-0.5
Women 25-54	73.9	1.0	0.1	-0.2
White*	63.1	0.2	0.0	-0.5
Black**	60.9	0.3	0.0	-0.5
Hispanic***	65.8	0.5	0.1	-0.5
Black Men**	63.3	-0.1	-0.2	-0.5
Black Women**	58.9	0.6	0.1	-0.4

* Series begins in 1954

** Series begins in 1972

*** Series begins in 1973

Young Men and Women

Labor force participation among young workers (16-24 year olds) is at its lowest level in more than 50 years, having fallen steadily since its peak in the late 1980s, and is now 15 percentage points lower than it was 30 years ago, as seen in Figure 16. However, given the relatively small size of this group, this trend has had a much smaller impact on the overall labor force participation rate. Since 2007, participation among young people has fallen by about 0.8 percentage point per year, while school enrollment has increased. Enrollment has risen since the 1980s with larger increases in enrollment among lower-income households, as shown in Figure

17. As a result, the share of young people who are either in the labor force or in school has largely been unchanged.

Figure 16: Labor Force Participation Rate of 16-24 Year Olds

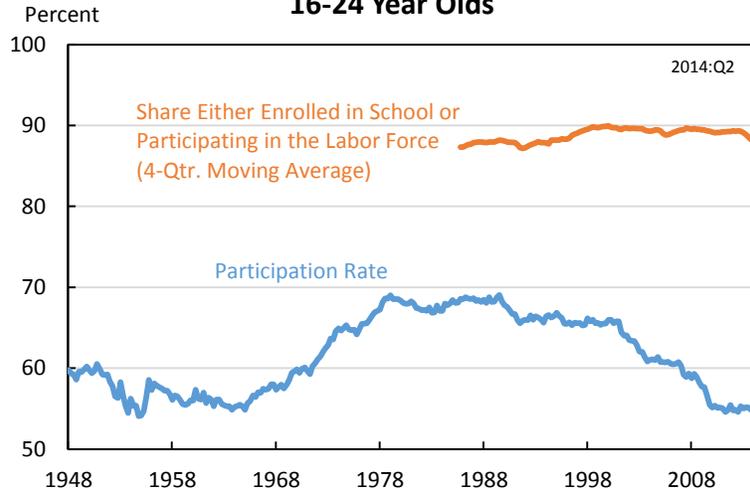
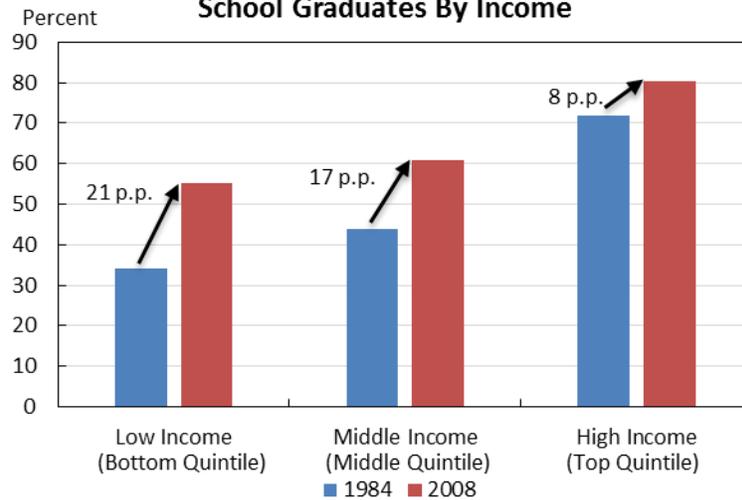


Figure 17: Postsecondary Enrollment of High School Graduates By Income



Aaronson, Park, and Sullivan (2006) examine the secular decline in teen (16-19 year olds) employment dating back to the mid-1980s and hypothesize that teens are responding to the rise in returns to college by enrolling in school. They find that most of the decline in employment between 1987 and 1997 was due to a rise in school enrollment, but since then most of the decline is due to reduced participation among young people enrolled in school. Over the last two decades, the share of 16-24 year olds neither enrolled in school nor participating in the labor force has not changed significantly, ticking down slightly from 11.9 percent in 1993 to 11.7 percent in 2013. The lack of any increase in the share neither enrolled nor participating implies

that the decline in the 16-24 year old participation rate since 1993 has come from a reduction in participation among 16-24 year olds enrolled in school. Indeed, the participation rate of 16-24 year olds enrolled in school has declined more than 10 percentage points over the past two decades.

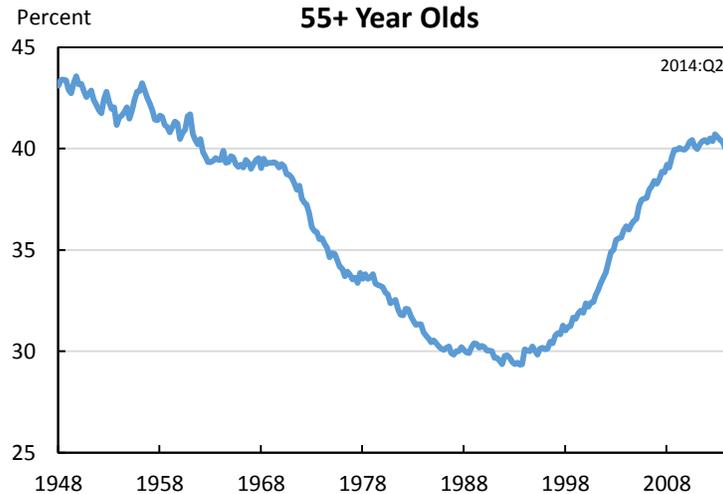
Two main factors have likely played a role in the increase in enrollment since 1980, which accounted for much of the decrease in participation among the young between 1980 and the mid-1990s. First, increased subsidies for college combined with higher returns to staying in school have changed the economic calculus around schooling decisions. Second, a reduction in middle-skilled jobs (which economists have referred to as job “polarization”) has led less-skilled adult workers to push teenage workers out of the labor force.

Smith (2011) examines the decline in the teen (16-19 year olds) employment-population ratio which has been trending down since the mid-1980s, steepening in the recent period since early 2000s. Using cross-state analysis, the author finds a significant negative relationship between changes in teen employment and the fraction of adults in jobs that often employ teens such as low-wage service sector jobs. Job polarization—declining middle-skilled jobs and growing low-wage jobs—may have resulted in increased competition between less-skilled adult workers and teenage workers. The author finds that such explanations can account for over half of the cyclically-adjusted decline in teen employment since the mid-1980s. It is plausible that these forces have grown over the recent recession as youth, particularly teens, faced greater competition for jobs from more experienced adults who were laid-off (Fogg and Harrington 2011).

Older Workers

After many decades of decline, labor force participation rates among older workers have stabilized since the 1980s and have started to increase in recent years (Figure 18). Participation among older women was largely flat for several decades before experiencing an unprecedented increase over the last two decades, rising more than 10 percentage points. This rise in the labor force participation for older workers has been attributed to several factors. Maestas and Zissimopoulos (2010) and Blau and Goodstein (2010) identify rising education levels, labor force participation of wives, and changes in Social Security as the most important factors leading to the reversal in the trend. While there is less direct evidence available, it seems likely that improvements in health and increases in life expectancy have also played a role.

Figure 18: Labor Force Participation Rate of 55+ Year Olds



The increase in participation by older workers is partially due to differences in the skills that they acquired when they were younger. Between 1876 and 1950, the average years of schooling for each birth-year cohort increased steadily every year, according to Goldin and Katz (2007). The increased education among each successive cohort meant that retirees in more recent years have had more income and better quality, less physically demanding jobs over the course of their lives (Maestas and Zissimopoulos 2010). Blau and Goodstein (2010) estimate that at least 15 percent of the increase in labor force participation since 1988 can be attributed to the rising education levels in each successive cohort, but their robustness checks indicate that this may be an underestimate and rising education might in fact explain the entire increase in participation among older workers since 1988.

Another portion of the recent rise in participation among married men has come from the increased labor force participation of their wives. The rise in female labor force participation since the late 1980s explains about a quarter of the rise among older men (Blau and Goodstein 2010, Schirle 2008). This effect is likely due to complementarity of leisure time between husbands and wives, where retirement is more appealing if one's spouse is also retired. Couples tend to retire at similar times and men's retirement decisions are very responsive to the incentives faced by their wives (Coile 2004).

Additionally, there have been a number of policy changes to the Social Security program since 1980, and these policies may have had an effect on the retirement decisions of older workers. In particular, research in this area has centered around two types of policies: changing the level of full benefits and changing the timing of when full benefits are paid out. Changes in the generosity of benefits appear to have had little effect on the labor supply of older workers, while changes in the timing of full benefits account for much of the increase in participation at older ages (Blau and Goodstein 2010, Gustman and Steinmeier 2008). In particular, the increase in the Normal Retirement Age and the creation of the Delayed Retirement Credit (that is, the increase in benefits from working past the normal retirement age) together can explain between a quarter

and half of the increase in labor force participation among older workers since 1988 (Blau and Goodstein 2010).

There appears to be, as yet, little in the way of rigorous empirical studies examining two factors which likely contributed to the recent rise in participation among older workers: improvements in health and technology. Improvements in health can enable workers to continue to work later in life and the corresponding increase in longevity will raise the amount of saving needed for retirement. Additionally, technological improvements can also help accommodate older workers in the workplace.

As older workers have delayed retirement and increased their participation in the labor force, there has been a rise in partial retirement as a means of shifting gradually from the lifestyle of prime working years to retirement (Maestas 2007). According to Maestas, most of these retirees anticipated working in retirement, and retirees who unexpectedly return to the labor force typically do so because they find leisure less enjoyable than they expected. Additionally, older workers are increasingly likely to be self-employed (Maestas and Zissimopoulos 2004). About 25 percent of all 65 year old workers are self-employed, and of these workers more than 40 percent have employees working for them (Maestas and Zissimopoulos 2010).

Between 1990 and 2007, participation among workers over 55 grew by an average of 0.5 percentage point per year, but this slowed to 0.2 percentage point per year since 2007 (Table 6). Our analysis of the over 55 participation rate suggests that the increase since 2007 was not driven by the Great Recession, and in fact we estimate that the cyclical downturn actually slightly decreased the participation of older workers relative to what it would have otherwise been. Research on the effects of the Great Recession is largely in line with this result, finding that wealth shocks were concentrated in wealthier households, and as a result did not substantially alter retirement decisions in recent cohorts (Gustman, Steinmeier, and Tabatabai 2011).

Prime-Age Women

The labor force participation rate for prime-age women rose rapidly from around 1970 through 2000. This rapid rise was driven by many factors coming together: reductions in discrimination facilitated by Title VII of the Civil Rights Act and Title IX of the Educational Amendments to the Civil Rights Act, the availability of more effective birth control through the invention and subsequent legalization of the birth control pill, and changes in economic forces stemming from the greater educational gains of women, the advent of labor-saving household technology, and increased international trade. While these changes drove participation in the 1970s and 1980s, further increases in the 1990s stemmed from the incentives provided by the expansion of the Earned Income Tax Credit (EITC), the replacement of Aid to Families with Dependent Children (AFDC) with the work-centered Temporary Assistance for Needy Families (TANF), and reforms to divorce laws. But the participation rate has since levelled out, as seen in Figure 19. As a result, the United States has gone from leading many other European countries in prime-age female labor force participation to lagging them (Figure 20).

Figure 19: Labor Force Participation Rate of 25-54 Year Old Women

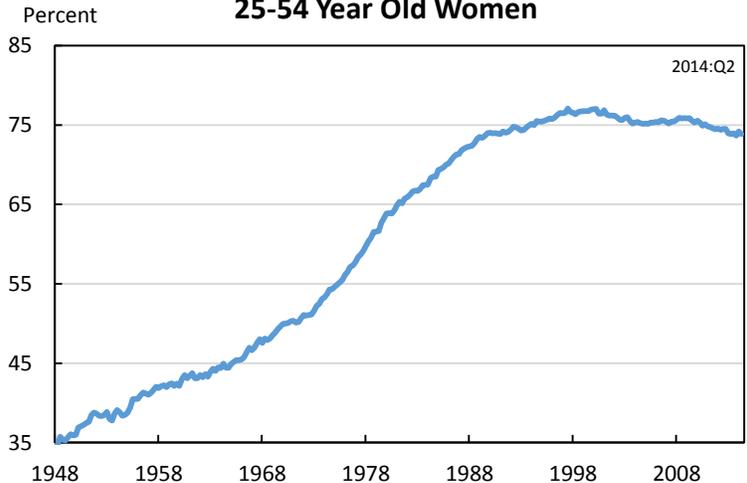
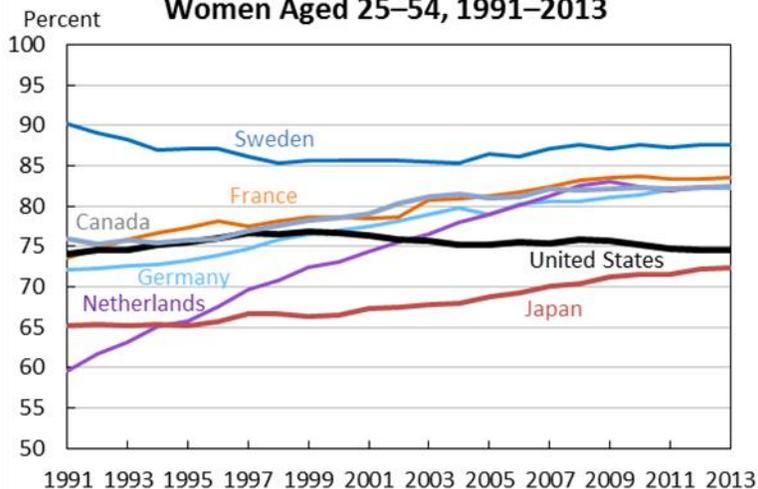


Figure 20: Labor Force Participation Rate of Women Aged 25–54, 1991–2013



Research has found that family-friendly policies are partially responsible for the rise in participation in other advanced countries, and the lack of these policies explains why the United States has lost ground. Policies such as paid parental and sick leave, high quality available daycare, and support for part-time work have been enacted in other advanced countries, enabling mothers to more easily balance work and family obligations. Blau and Kahn (2013) investigated data on participation across developed countries and found that the lack of family-friendly policies in the United States can explain roughly a quarter of the relative decline in women’s participation between 1990 and 2010.

Access to paid family leave is a particularly important factor for mothers considering whether or not to remain in the labor force, since it enables mothers to continue working for an employer after giving birth. In 2004, California became the first State to implement a paid family leave

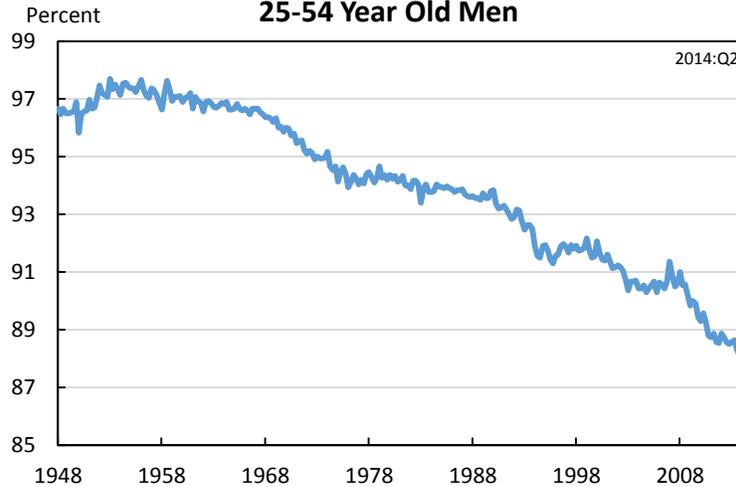
program. Rossin-Slater, Ruhm, and Waldfogel (2013) examined the decisions of mothers before and after the program's implementation, finding that it significantly boosted the number of hours that mothers worked two to three years after giving birth. They also find that the program reduced the number of mothers without jobs, although this effect was not quite statistically significant. Other research on paid leave programs has shown that access to paid leave increases the likelihood that a recent mother will return to her employer in the United States, the United Kingdom, and Japan (Waldfogel, Higuchi, and Abe 1999), although a study of paid leave in Norway found no effect on labor force participation, perhaps reflecting stronger pre-existing work supports (Dahl et al. 2013).

At the same time as the participation rate for women has stagnated, the role of women in the workforce has continued to grow in importance. More and more women are working in traditionally male-dominated occupations and becoming breadwinners for their families: married women now contribute almost half of family earnings. This is in part because young women are now more likely than young men to have graduated from college, and the share of female students enrolling in MD, JD, and MBA programs has grown to nearly 50 percent for each of these degrees.

Prime-Age Men

There has been a steady decline in the labor force participation of prime-age men since the 1950s (Figure 21). In 1950, 92 percent of prime-age men were employed, while the most recent data show that the percentage has fallen to 83 percent, in other words a decline of nearly 10 percent. This decline in part reflects the fact that prime-age men have historically been more concentrated in jobs that can be replaced by technology or sent overseas. As described in Goldin and Katz (1998) and Autor, Katz, and Kearney (2008), skill-biased technological change has long exerted an influence on the wage structure by depressing wages for occupations with manual or routine labor. As Autor, Dorn, and Hanson (2013) note, these effects are concentrated among industries exposed to foreign competition and international trade.

Figure 21: Labor Force Participation Rate of 25-54 Year Old Men



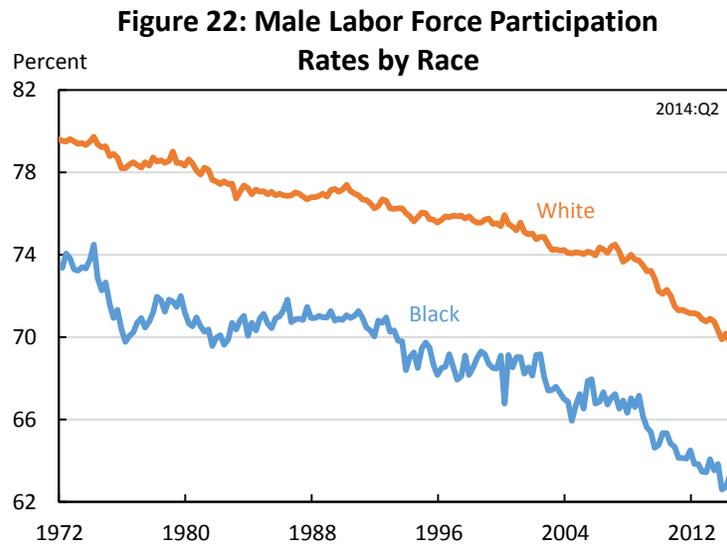
There is some disagreement in the literature on whether SSDI accounts for a part of the participation decline, particularly for lower-skilled male workers. Wage stagnation for less-educated workers have made Social Security benefits increasingly valuable compared to low-wage workers' earnings, and reforms passed in 1984 increased SSDI receipt, although this increase may have reflected the fact that the level of SSDI receipt was temporarily depressed before 1983 and subsequently returned to its normal level after reforms were enacted (Autor and Duggan 2003, Pattison and Waldron 2013). As discussed above, more recent growth in the program has been driven mostly by demographics and the recession.

Regardless of the source, the prolonged decline in participation among prime-age men is worrying because this group has historically comprised the largest share of the workforce. Even seemingly modest declines in their participation cumulate over long periods of time and result in large changes in the numbers of Americans available for work, and this in turn has predictable negative effects on growth.

Black Men

Black male labor force participation has fallen steadily since the mid-1970s, dropping more than 10 percentage points over that time. In part, this reflects lower education levels among black men, only 47 percent of whom today have at least some college education (compared with 57 percent for white men). For both black and white men, labor force participation has fallen more for those with lower education levels. At the same time, however, the decline in participation has been greater for black men across the education spectrum. Participation among black workers with just a high school degree has declined nearly 10 percentage points over the last decade, while the participation rate among black college graduates has declined by 3.5 percentage points; this compares with 4.6 percentage points and 2.7 percentage points declines for white men, respectively. This troubling trend of reduced participation has continued in the

latest business cycle, with the participation rate for black men down 0.5 percentage point per year since the end of 2007 (Figure 22).



The decline in black male participation, which has persisted through both recessions and recoveries, has long been the subject of research (Moynihan 1965, Bound and Freeman 1992). The decline has also been particularly pronounced among the young: while the participation rate of older black men is also below average, theirs is higher than that of young black men, who have a lower labor force participation rate than young white and Hispanic men. This persistent gap between black men and their peers in participation and employment opportunities more generally is likely due to a range of factors such as disparities in family life and education, as well as employer attitudes and the structure of the labor market (Danziger and Gottschalk 1995, Bound et al 1995, Juhn 1992, 2003, Chandra 2003, Bertrand and Mullainathan 2003).

Over the last decade or so, labor force participation among black men has deteriorated even further. One of the leading explanations for this development is the steep rise in incarceration of young black males. Freeman (2003) estimated that roughly 20 percent of the black male population is incarcerated. In addition to the obvious incapacitating effect of current incarceration, even previous incarceration can have a negative effect on labor force activity. For one, incarceration tends to weaken employment networks (Travis, Solomon, and Waul 2001). Moreover, an audit study of employers in Milwaukee by Pager (2003) suggests that employers seem much more averse to hiring black males with criminal records than comparable white men, and that this deterrence extends even to those without criminal records (Holzer, Raphael, and Stoll 2002, 2006). These demand-side factors serve to reinforce supply-side factors that keep black men out of the labor market.

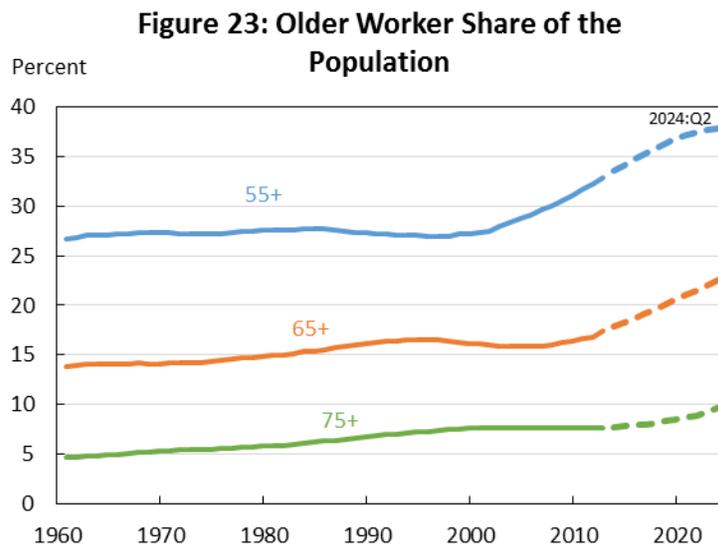
Holzer, Offner, and Sorenson (2005) test this hypothesis in their analysis of black males ages 16-34 with a high school education or less in the 1980s and 1990s. They find that previous incarceration can account for a quarter or more of the decline in participation among black males

ages 16-24 and at least half of the decline among black males ages 25-34. These estimates of the effects of incarceration are corroborated by work by Western and Pettit (2000).

V. The Outlook for the Participation Rate

Assuming a continuation of current policies, over the longer term the participation rate will continue to trend down as the aging of the population continues. Over the next few years, however, it is likely that the continued recovery of the economy will tend to push in the other direction from the aging trend. The evolution of the residual component of participation is harder to predict given the uncertainty about its exact cause. All told, over the next few years, the participation rate could rise or fall slightly—followed by a resumption of its longer-term decline due to the continued aging of the population. Policy has the ability to affect these trends as we discuss in Section VI.

While the first baby boomers became eligible for early Social Security benefits in 2008, the last baby boomers will not reach this point of their lives until 2026. The share of the population over the age of 55 will continue to grow rapidly during the coming decade, and most of this growth will be in the share of the population over the age of 65 (Figure 23). While the share of the population over age 65 has risen gradually in the past due to increased longevity, the retirement of baby boomers accelerated this growth and it is now rising faster than at any point since 1960. If the participation profile by age were fixed at 2013 levels, the changing population share would subtract about 0.2 percentage point per year from the participation rate through 2024.

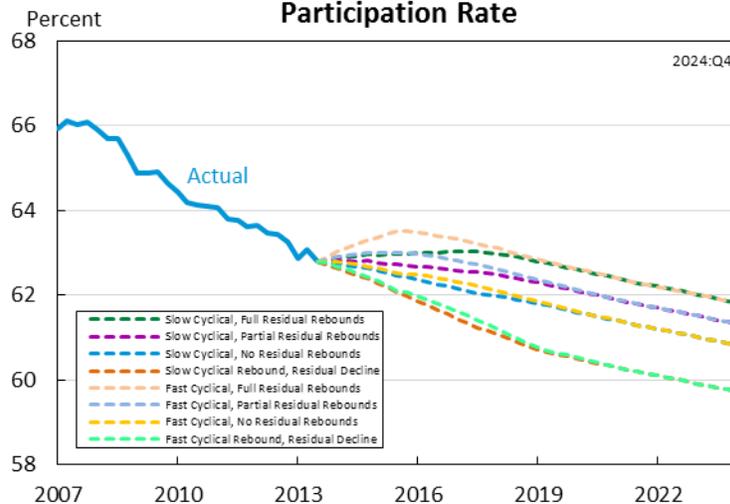


As the economy has recovered from the Great Recession, the cyclical drag on the participation rate has lessened to about 0.5 percentage point in the second quarter of 2014. As the economy continues to return to full employment, this cyclical factor will continue to dissipate. If this gap were to be closed over about two years, then the dissolution of the cyclical drag on participation would add about 0.2 percentage point per year to the participation rate for the next two years—roughly offsetting the aging trend.

The residual component of the decline in participation represents the greatest source of uncertainty about the participation rate going forward, in part reflecting the uncertainty about its causes. This component may shrink to zero, reflecting temporary factors dissipating as the economy recovers. On the other hand, to the degree it represents trends that pre-date the Great Recession, then absent policy shifts or other unexpected developments it could persist or even grow larger—Aaronson et. al (2006) projected that it would reduce the participation rate by 0.2 percentage point per year above and beyond the normal aging trend. Moreover, while long-term unemployment and other indicators of labor market challenges have been steadily improving, there is always a danger that without policy changes some individuals would permanently drop out of the labor force, resulting in a participation rate that would be permanently lower as a result. It also remains possible that the residual could grow over the next few years, as it has grown considerably over the past few years and may continue to do so in the near future.

Ultimately, absent changes in policies, a meaningful increase in the participation rate from current rates appears unlikely. Figure 24 shows several scenarios for the participation rate under current policies, with a common assumption about the aging trend but varying assumptions about the evolution of the cyclical and residual components discussed above. These scenarios are not projections and do not represent the full range of possibilities, but they do indicate that the participation rate is likely to be roughly stable in the near term and will decrease more rapidly after the economy returns to full employment and the aging effects once again dominate.

Figure 24: Alternative Scenarios for the Participation Rate



VI. The President's Agenda and the Labor Force Participation Rate

The outlook for the participation rate, however, ultimately depends, at least in part, on policy choices that we make and the practices adopted by companies and individuals. We discuss some of the major policies the Administration is pursuing to improve the trajectory of the participation rate here.

Aging of the Population

It is important to put the aging trend in perspective. That older workers are able to retire is in many ways a positive development. But it also creates challenges, especially for overall fiscal policy and in particular for programs like Social Security and Medicare.

Part of the answer to these challenges is enabling older workers who want to continue to work to do so. Workplace flexibility policies that allow employees to work part-time or flexible hours can help older workers tailor their jobs to their specific needs and can create roles that are less demanding than full-time employment. In this year's State of the Union, the President called on employers to expand access to flexible workplace policies. For similar reasons, many older workers choose self-employment, opting to retire partially or set their own hours. Many other older workers would like to be self-employed, but have medical conditions that make health insurance a necessity. Although in the past these workers would have had to seek work at a large employer offering health insurance coverage, the Affordable Care Act enables these workers to become self-employed by providing access to quality, affordable health insurance (Fairlie, Kapur, and Gates 2011) until they are eligible for Medicare.

Probably the most significant policy response to falling labor force participation rates is immigration reform, which would counteract the labor force effects of an aging population and spur economic growth. On average, immigrants are younger and participate in the labor force at higher rates than native-born Americans. The Congressional Budget Office (2013) estimates that the immigration reform bill passed by the Senate would increase the labor force by 6 million people, or five percent, by 2023, and raise the labor force participation rate by 0.7 percentage point. This trend would continue over time, providing a range of other economic benefits such as increasing GDP, lowering budget deficits, and improving Social Security solvency.

Trends Within Demographic Groups

Policies can also help address the long-term trends in participation within age groups. The participation rates for prime-age men and women have declined steadily over the past decade, continuing a decades-long trend among men and reversing a decades-long trend among women. Among younger workers, participation rates have fallen more rapidly. The fall in participation among young black men has been particularly drastic. The President's agenda addresses these trends and lays out a series of policies that could help encourage individuals to remain in the labor force.

To encourage more women to participate in the labor force, the Administration has a robust policy agenda around working families, which was further developed at the White House Working Families Summit in June 2014. The summit brought together government, private-sector, labor, and academic leaders to discuss how to help workers balance their personal and professional lives. Policies such as paid family leave, flexible work schedules, and affordable childcare are vital for families, and mothers in particular. Such policies not only encourage participation in the labor force, but they also help people find the jobs best suited to their skills and excel in those positions. Given that women often take on well over half of family obligations, such policies are particularly helpful in raising women's labor force participation (Blau and Kahn 2013). As women now make up nearly half of the labor force and earn 59 percent of all higher education degrees, policies that facilitate their participation in the labor force can have a large impact on the labor force participation rate and overall economic growth.

Another very successful policy tool to encourage labor force participation among low-income workers has been to raise the returns to work through the EITC, with the 1980s and 1990s EITC expansions pulling more than half a million people into the labor force. But the EITC available to workers without children and non-custodial parents (the "childless worker" EITC) is very small, and the current rules prevent workers younger than 25 and older than 64 from claiming the credit at all. The President has proposed to double the EITC available to workers without children and non-custodial parents and to make it available to younger and older workers. This policy would target a number of groups with falling or low labor force participation rates, including minority men, young adults not enrolled in school, workers with disabilities, and older workers.

In addition, to specifically support young men of color, the President launched the My Brother's Keeper Initiative in February 2014. This initiative created a Federal Task Force charged with assessing which public and private efforts are most effective at helping young men of color succeed academically, in their communities, and in the workplace. So far, eleven leading philanthropic foundations have committed to investing \$200 million to study which programs keep these young men on track and bring these programs to scale.

Finally, building labor force attachment among young people can raise their labor force participation throughout life and offset the long-term declining trend. Earlier this year, the President announced \$100 million in funding for American Apprenticeship Grants, which will use existing funds to expand apprenticeships, training young people for high-demand jobs, and helping them build relationships with employers. Additionally, the Administration will award \$500 million to community colleges to implement job training programs based on the skills and credentials in demand among businesses. The President has similarly committed to redesigning high school curricula to focus more on industry-relevant skills. All of these initiatives aim to give young people labor market skills and connect them with employment opportunities, raising their labor force participation over the long-term.

The Cyclical Component of Participation

While the sections above highlight policies that can alter long-term labor force participation trends, a number of policies could noticeably reduce the cyclical drag on the participation rate by strengthening our economic recovery and increasing aggregate demand. For example, increasing investment in infrastructure would provide an immediate boost to employment and demand, as well as the long-term benefits of improved transportation systems. The President recently proposed a \$302 billion four-year transportation reauthorization plan that would support hundreds of thousands of jobs.

Likewise, the President's proposal to increase investments in research, education, infrastructure, security, and other critical areas through the Budget's Opportunity, Growth, and Security Initiative would both speed the return to full employment and help lay the groundwork for stronger long-run growth. By strengthening the economy, this proposal could raise the cyclical portion of the labor force participation rate.

Extending Emergency Unemployment Compensation (EUC) would also boost economic activity and aggregate demand by supporting job-seekers' incomes while they are unemployed. Moreover, research shows that EUC helps long-term unemployed workers stay connected to the labor force and keep looking for work.

Other steps would also help, like reauthorizing the Export-Import Bank. In the absence of action from Congress, President Obama will press forward by using his executive authority to speed the permitting of infrastructure projects, launch new hubs of manufacturing innovation, and attract foreign investment.

The Administration is also taking action on its own to strengthen the recovery of the housing market. In May, the Federal Housing Administration (FHA) embarked on a program to address concerns about accessibility of mortgage credit, and acting independently, Federal Housing Finance Agency (FHFA) Director Mel Watt has also undertaken steps to provide clarity on so-called put-back risk and thereby ease credit constraints in the mortgage market. Also, the Administration has extended the Making Home Affordable program to continue to help struggling homeowners facing foreclosure or whose mortgages are underwater.

Factors Unique to the Great Recession: Long-term Unemployment

A complete recovery from the Great Recession will also require addressing the problem of long-term unemployment. Policies are needed to help the long-term unemployed find jobs and prevent them from leaving the labor force; the same policies may also help encourage some of those who have left the labor force over the last few years to re-enter it. One issue that researchers have identified is discrimination against the long-term unemployed by employers who often use computer programs or policies to screen out the long-term unemployed from job applicants. Long-term unemployed job seekers have to send out 3.5 times as many applications as short-term unemployed seekers to get an interview (Ghayad 2013). To address this and other issues facing the long-term unemployed, the President convened private sector leaders to discuss

how the government and private industry can work together on this challenge. More than 300 CEOs signed on to best practices for recruiting and hiring the long-term unemployed, including 80 of the nation's largest businesses and over 20 from the Fortune 50. The Administration is continuing to work with employers to learn and build on what works in helping the long-term unemployed return to work.

To further this cause, the Administration will use \$150 million in existing funds to scale up partnerships between employers and non-profits that help get the long-term unemployed back to work through work-based training, job placement assistance, and employer outreach. The Administration also recognizes the value of extending EUC benefits in keeping the long-term unemployed workers attached to the labor force. Bringing down the rate of long-term unemployment through policies such as these, and strengthening the recovery overall, may help resolve the residual effect on labor force participation.

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Sources

Figure 1: Bureau of Labor Statistics.
Figure 2: Bureau of Labor Statistics.
Figure 3: Census Bureau; CEA calculations.
Figure 4: Bureau of Labor Statistics; CEA calculations.
Figure 5: Bureau of Labor Statistics; CEA calculations.
Figure 6: National Center for Health Statistics.
Figure 7: Social Security Administration.
Figure 8: Bureau of Labor Statistics; Social Security Administration; CEA calculations.
Figure 9: Bureau of Labor Statistics; CEA calculations.
Figure 10: Bureau of Labor Statistics; CEA calculations.
Figure 11: Bureau of Labor Statistics; CEA calculations.
Figure 12: Bureau of Labor Statistics; CEA calculations.
Figure 13: Bureau of Labor Statistics; CEA calculations.
Figure 14: Bureau of Labor Statistics; CEA calculations.
Figure 15: Social Security Administration; CEA calculations.
Figure 16: Bureau of Labor Statistics.
Figure 17: National Center for Education Statistics.
Figure 18: Bureau of Labor Statistics.
Figure 19: Bureau of Labor Statistics.
Figure 20: International Labour Organization.
Figure 21: Bureau of Labor Statistics.
Figure 22: Bureau of Labor Statistics.
Figure 23: Census Bureau; CEA calculations.
Figure 24: Bureau of Labor Statistics; Social Security Administration; CEA calculations.
Table 1: Various Sources; CEA calculations.
Table 2: Bureau of Labor Statistics; CEA calculations.
Table 3: Bureau of Labor Statistics; CEA calculations.
Table 4: Bureau of Labor Statistics; Social Security Administration; CEA calculations.
Table 5: Bureau of Labor Statistics; Social Security Administration; CEA calculations.
Table 6: Bureau of Labor Statistics; CEA calculations.
Appendix Figure 1: Bureau of Labor Statistics; CEA calculations.
Appendix Figure 2: Bureau of Labor Statistics; CEA calculations.
Appendix Figure 3: Bureau of Labor Statistics; CEA calculations.
Appendix Figure 4: Bureau of Labor Statistics; CEA calculations.

Appendix A – Time Series Analysis Specifications

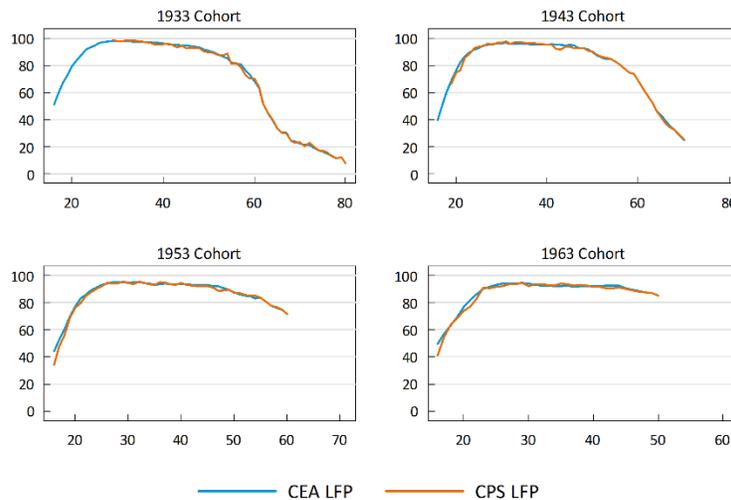
Construction of a Cyclically-Adjusted Trend Component

A cyclically-adjusted trend component of the participation rate was estimated using a semiparametric procedure for a partially linear model (Robinson 1988, Stock 1989), combining a nonparametric biweight filter with a parametric cyclical adjustment step using leads and lags of the unemployment gap. The biweight filter (using a window width of 40 quarters) was applied to the first difference of the participation rate and the trend component was constructed by cumulating the trend in first differences. First differences in the detrended participation were then regressed on two leads, two lags, and the present value of the unemployment gap.

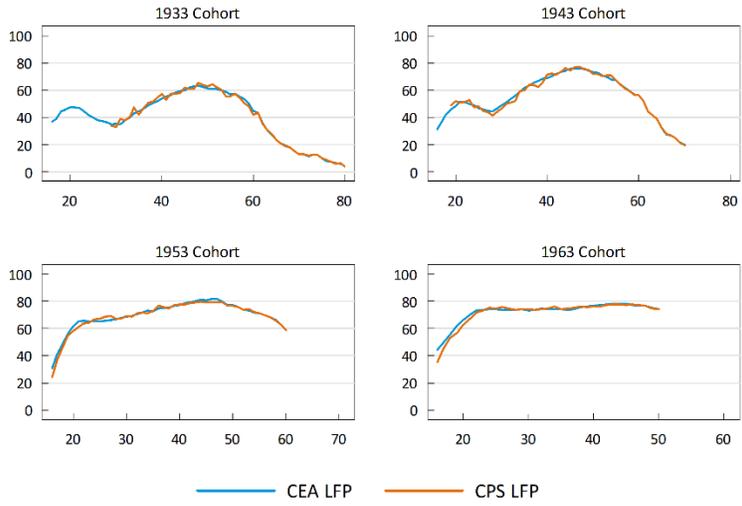
The predicted values from this regression were cumulated to produce the estimated cyclical component, which was subtracted from the participation rate to adjust for the business cycle. The cyclically adjusted series was then run through the biweight filter in first differences again and the estimates were cumulated to produce the estimated trend component of the participation rate (Appendix Figure 3).

Looking at the period since the end of 2007, the estimated time series trend was very similar to the estimated aging effect, indicating that changes in participation within age groups may have offset and produced only a small reduction in total participation.

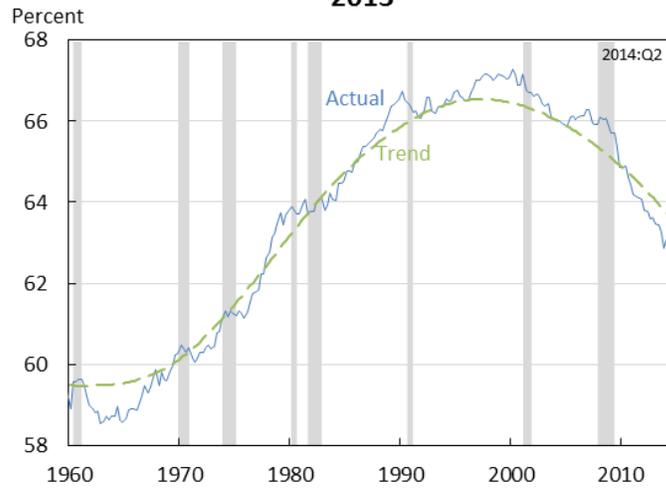
Appendix Figure 1: Male Participation Rates



Appendix Figure 2: Female Participation Rates



Appendix Figure 3: Estimated Time Series Trend, 1960 - 2013



Appendix Figure 4: Estimated Cyclical Components from Regressions 1, 4, 5, and 8, 1980-2014

