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Demographic versus Cyclical Influences on US Labor Force Participation

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Abstract

This paper applies time series analysis to distinguish between cyclical and demographic causes of the decline of the labor force participation rate. Some public discussions suggest that the decline of US unemployment from its 2009 peak of 10 percent to about 6 percent by mid-2014 grossly exaggerates recovery because most of the decline reflects the exit of discouraged workers from the labor force. This study finds instead that one-half to two-thirds of the decline in labor force participation by about 3 percentage points from late 2007 to early 2014 is attributable to aging of the population. Although about one-third is found attributable to the lagged influence of high, and especially long-term, unemployment, going forward the potential rebound in the participation rate from recovery is projected to be approximately offset by further aging of the population.

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INTRODUCTION

How much is US unemployment currently understated because of worker discouragement and exit from the labor force? Correspondingly, what portion of the decline in labor force participation should be considered structural/demographic as opposed to cyclical? Much of the recent public policy discourse seems to assume that there is enormous hidden unemployment disguised by the decline in participation. Thus, a recent *New York Times* editorial questions whether the June 2014 unemployment rate of 6.1 percent was meaningful, because "the jobless rate would be 9.6 percent, if it counted nearly six million people who would be looking for work or working if the economy were stronger."[1] The urgency of further fiscal and monetary stimulus would of course be much greater if the true unemployment rate were 9.6 percent instead of 6.1 percent. However, although the labor force participation rate has indeed fallen substantially, this study finds that about one-half to two-thirds of the decline is attributable to aging of the labor force rather than worker discouragement in the Great Recession and its aftermath. Correspondingly, the unemployment rate is only about 1.5 percentage points lower than it would be if there had been no worker discouragement from recent high unemployment and poor conditions in job markets. "True" unemployment of 7.6 percent would still be uncomfortably high, but would be more consistent with the Federal Reserve's tapering of quantitative easing toward expected completion of asset purchases by October 2014 (Federal Reserve 2014, 10).

AGING AND LABOR FORCE PARTICIPATION

The aging of the baby boom generation has contributed to a decline of the labor force participation rate beginning in about 2000, following its long upward climb in earlier decades. For all workers aged 16 years or older, the labor force participation rate rose from 59 percent in the mid-1960s to about 67 percent in 1999, before falling back to about 63 percent in 2013 (BLS 2014c). For its part, the high unemployment during the Great Recession further contributed to falling participation by discouraging potential workers.

The share of persons 55 years and older in the population of persons 16 years and older has risen from 27.1 percent in 2000 to 33.6 percent in 2013 (BLS 2014c). Labor force participation is lower for the older persons. Thus, in 2002 the labor force participation rate was 34.5 percent for persons 55 and older, compared to 78.8 percent for persons aged 16 to 54.[2] If the age-specific participation rates had remained the same, the aging of the population from 2000 to 2013 should have caused a reduction in the total labor force participation rate (age 16 and older) by 2.88 percentage points.[3] Considering that the

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1. *New York Times*, "Jobs Rebound, Prosperity Lags," July 4, 2014, p. A16.

2. Calculated from BLS (2014b, 2014c).

3. Thus: (0.336 – 0.271) x 34.5 + (0.664 – 0.729) x 78.8 = –2.88. If 2006 is used instead as the base for participation rates, on grounds that 2002 was close to the recession year 2001, the estimate is not much changed (at –2.57 percentage points instead of

adult population share of the 55 and older group rose by 6.5 percentage points from 2000 to 2013, the implication is that each percentage point rise in this group's share in adult population reduces the labor force participation rate by 0.44 percentage points.

Figure 1 shows the path of the labor force participation rate over this period (P) on the left-hand scale, and the percent of the adult population in the 55 and older group on the right-hand scale. Visual inspection of the two trends strongly suggests that population aging has reduced the participation rate over the past 14 years. However, it also suggests that there was a temporary increase in participation associated with the housing boom (2006), followed by an acceleration in the longer-term decline associated with the Great Recession. The estimates below seek to identify what portion of the total decline has been attributable to aging, and what portion is attributable to exit from the labor force as a consequence of discouragement by adverse labor market conditions.

MODEL ESTIMATES

The estimates that follow use monthly data from January 2000 through May 2014, for males and females separately. The model specifies the labor force participation rate (P) to be a function of the fraction of the 16 years and older population that is in the 55 years and older group, the lagged unemployment rate, and the lagged rate of long-term unemployment (27 weeks and more). The unemployment rate peaked at 10 percent in October 2009. Long-term unemployment peaked at 4.4 percent in April 2010, far above its 2000–2007 average of 0.9 percent (BLS 2014a). The influence of past unemployment includes both a linear and quadratic term. All of the lags are specified at 12 months (so that the maximum influence of unemployment on participation arrives by October 2010, and the maximum influence of long-term unemployment, by April 2011). The model includes a dummy variable for 2008 and after to take account of any persistent shift caused by the Great Recession.

The estimation results are as follows. For males:

$$(1) \quad P = 89.91 - 0.5045\, \phi_{m55+} - 0.764\, u_L + 0.0445\, (u_L)^2 - 0.095\, D_{08+} - 0.183\, (LTU_L); \text{ adj. } R^2 = 0.977$$
$$ (132.1) \quad (-16.4) \qquad (-6.5) \qquad (4.6) \qquad (-1.0) \qquad (-2.2)$$

where ϕ_{m55+} is the share of the male population 55 years and older in the total adult male population (16 years and older), u_L is the lagged unemployment rate, D_{08+} has the value 0 before January 2008 and 1 thereafter, and LTU_L is the lagged long-term unemployment rate. T-statistics are in parentheses.

–2.88). Note further that the participation rate for the population 55 and over rose from about 40 percent in 2000 to about 46 percent in 2009 for males, and plateaued thereafter; for females there was a corresponding rise from 26 percent to 35 percent, again with a plateau after 2009 (BLS 2014a). The calculation here is thus analogous to constructing an index using base-period weights, and use of an index with end-period weights would show somewhat lower aging impact on the overall participation rate.

All of the variables are statistically significant except the 2008 and after dummy variable (which makes little difference given the small coefficient). The quadratic form of lagged unemployment has the effect of reducing the participation rate by 0.48 percentage points when lagged unemployment reaches 10 percent, in comparison with benchmark 5 percent unemployment.[4] The influence of long-term unemployment at its maximum is correspondingly to reduce the participation rate by about 0.64 percentage points.[5] For its part, the coefficient on the older population share (–0.5045) is close to the back-of-the-envelope estimate discussed above (–0.44).

For females:

$$(2) \quad P = 69.72 - 0.2812 \, \phi_{f55+} - 0.5063 \, u_L + 0.0492 \, (u_L)^2 + 0.4012 \, D_{08+} - 0.5788 \, (LTU_L); \text{ adj. } R^2 = 0.926$$
$$ (86.6) \quad (-9.1) \qquad\quad (-4.8) \qquad\quad (5.7) \qquad\qquad (4.6) \qquad\qquad (-8.0)$$

Once again T-statistics are in parentheses. The coefficients indicate that the share of workers 55 and older has a more moderate influence for females than males but still contributes to the declining participation rate. The influence of the shift for 2008 and after turns out not only to be significant but also to be positive. A possible implication is that the Great Recession put pressure on households to send wives into the labor force as second earners. Similarly, when evaluated at maximum unemployment of 10 percent as against benchmark unemployment of 5 percent, the quadratic formulation of the lagged unemployment turns out to cause an *increase* in the participation rate by 1.16 percentage points. However, high lagged long-term unemployment does have the expected participation-depressing effect, and is considerably more powerful than for males. Thus, applying the coefficients from equation (2) to the exercise just discussed for males, the peak minus benchmark long-term unemployment rate (4.4 percent versus 0.9 percent) would cause a negative impact of 2.0 percentage points on the female participation rate (= 3.5 x [–0.5788]).

Figure 2 shows the actual and equation-predicted path of male labor force participation for the population aged 16 years and older; figure 3 shows the same comparison for females.

IMPACT OF AGING VERSUS CYCLICAL DISCOURAGEMENT EFFECTS

For policy purposes, the principal question is whether and to what extent the influence of recent unemployment (and long-term unemployment) has depressed the participation rate below levels it would rebound to under more normal circumstances. The flip side of this question is whether the presently observed unemployment rate, 6.1 percent, is understating the "true" unemployment rate by failing to

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4. That is: $[-0.764 \times 10 + 0.0445 \times 10^2] - [-0.764 \times 5 + 0.0445 \times 5^2] = -0.48$.

5. The peak for long-term unemployment at 4.4 percent, minus a benchmark of about 0.9 percent, means that high long-term unemployment reached a maximum influence on participation equivalent to about this: $-0.183 \times 3.5 = -0.64$ percentage points.

include as unemployed those workers who have left the labor force but would return to it under more normal conditions.

Equations (1) and (2) can be used to investigate this question. From December 2007 to May 2014, the fraction of the 16 years and older population that was 55 years or older rose from 28.9 percent to 32.6 percent for males and from 31.6 percent to 35.5 percent for females (BLS 2014c). Applying the respective coefficients from equations (1) and (2), population aging contributed a predicted reduction of 2.3 percentage points for the male labor force participation rate and 1.1 percentage points for the female rate.[6] The decline in the total predicted participation rates was 3.5 percentage points for males and 1.66 percentage points for females (applying equations [1] and [2] to the relevant variable values for the periods December 2007 and May 2014). So *population aging contributed 66 percent of the decline in predicted labor force participation for both males and females.*

As indicated in figures 2 and 3, however, by the end of the period there was some shortfall of the actual from predicted participation rates. The declines in the actual participation rates over the same period were by 4.0 percentage points for males and 2.4 percentage points for females. So the predicted influence of population aging contributed 57.5 percent of the total observed decline for males and 45.8 percent for females.[7] Considering that in December 2007 the share of males in the population of 16 years and older amounted to 48.5 percent, and weighting by population shares, the overall result is that the *predicted impact of aging contributed 51.5 percent of the total actual decline in labor force participation.*[8] On this basis and considering the results for the fraction of the predicted change, it can be said that *at least half and perhaps as much as two-thirds of the decline in labor force participation from end-2007 to May 2014 was attributable to aging of the population.*

The total decline in the labor force participation rate was from 66.0 percent in December 2007 to 62.8 percent in May 2014 (BLS 2014a). The range just discussed indicates that *of the 3.2 percentage point drop in the participation rate* over this period, *between 1.7 and 2.1 percentage points were attributable to the aging population.*

The model estimates place the portion of falling participation explained by aging at two-thirds and the portion explained by high unemployment and high long-term unemployment (and less importantly, the postcrisis dummy) at one-third. On this basis, a drop of about 1 percentage point in the total participation rate from the end of 2007 to the present can be attributed to the adverse employment conditions in the aftermath of the Great Recession. Considering that 1 percent of the adult population is equivalent to about 1.5 percent of the labor force, the corresponding implication is *that*

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6. That is: (32.6 – 28.0) x (–0.5063) = –2.3 and (35.5 – 31.6) x (–0.2812) = –1.1.

7. That is: 2.3 percent / 4.0 percent and 1.1 percent / 2.4 percent, respectively.

8. That is: 0.485 x 57.5 + 0.515 x 45.8 = 51.5.

the observed unemployment rate is about 1.5 percent lower than the rate would have been if there had been no discouragement effect from the Great Recession. Viewed from another standpoint, the amount of success to date in reducing unemployment from its peak of 10 percent might be better gauged against achieving a reduction to 7.6 percent, where the rate would stand without exit from the labor force by those discouraged, than by the full decline to the observed 6.1 percent level.

The diagnosis that the "true" unemployment rate is on the order of 7.5 percent rather than 6 percent is consistent with the IMF (2014) estimate that for 2014 US GDP will average 3.3 percent below potential output. That is: If a benchmark of 5.5 percent is used for the "natural" or "full employment" unemployment rate, then "true" excess unemployment is on the order of 2 percentage points. By Okun's law, according to which the process of labor hoarding means that firms are slow to fire even as output falls and thus have capacity to increase output more than their proportionate increase in the number of workers during recovery, each percentage point reduction in unemployment generates a 2 percentage point increase in output. So the output gap would be 4 percent (2 percent for excess true unemployment, times 2), which is close to the IMF estimate of 3.3 percent.

COMPARISON TO OTHER ESTIMATES

The central estimates here are that a 1.7 to 2.1 percentage point reduction in the labor force participation rate from 2007 to the present can be explained by aging of the population, and another 1 percentage point can be statistically associated with lagged unemployment and long-term unemployment. These findings are broadly consistent with recent estimates by the Council of Economic Advisers (CEA) as well as the Congressional Budget Office (CBO).

Using both direct compositional calculations and time-series econometric estimates, the CEA (2014, 3–4) finds that of the 3.1 percentage points decline in the participation rate from the final quarter of 2007 to the second quarter of 2014:

> About half of the decline (1.6 percentage point) is due to aging of the population. … About a sixth … (0.5 percentage point) is a cyclical decline in line with historical patterns in previous recessions. .. About a third … (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 … [especially] the elevation of long-term unemployment. … 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.

The CEA report (2014, 40) calculates that if the age-specific participation rates remained fixed at 2013 levels, the changing population shares would subtract about 0.2 percentage points per year from the participation rate through 2024. Its alternative projection scenarios indicate that cyclical recovery is likely

to hold the participation rate roughly stable in the near term, but that the rate will continue the decline associated with aging after the economy returns to full employment. Compared to the 62.8 percent participation rate in the second quarter of 2014, the field of projections ranges from 63.5 to 61.5 percent by 2018 and 61.0 to 59.8 percent by 2024 (CEA 2014, 41).

For its part, the CBO (2014, 1) similarly finds that:

Of the roughly 3 percentage-point net decline in the labor force participation rate between the end of 2007 and the end of 2013, about 1½ percentage points was the result of long-term trends (primarily the aging of the population), about 1 percentage point was the result of temporary weakness in employment prospects and wages, and about one-half of a percentage point was attributable to unusual aspects of the slow recovery that led workers to become discouraged and permanently drop out of the labor force.

The CBO does not report statistical modeling underlying its conclusion, however, so the equations estimated here may shed further light on this issue and serve as a basis for projections of future labor force participation below.

In an earlier study at the Chicago Fed, Daniel Aaronson, Jonathan Davis, and Luojia Hu (2012, 1) estimate a model separately for each of 44 combinations of age, gender, and educational attainment, and find that "… just under half of the post-1999 decline in the U.S. labor force participation rate, or LFPR … can be explained by long-running demographic patterns, such as retirement of the baby boomers. These patterns are expected to continue, offsetting LFPR improvement due to economic recovery."

The study also projects that by 2020 the participation rate would be down to 62.4 percent, or 2.7 percentage points below the level in December 2011.

Robert E. Hall (2014, 4–5) places the estimate for the influence of aging of the labor force lower, at just 1 percentage point out of the 3 percentage point drop in participation from 2007 to 2013. His estimate seems on the low side. A simple accounting exercise using age-sex (55 and older versus 16 to 54 years) group-specific participation rates in December 2007, as applied to the change in group populations from December 2007 to December 2013, yields 1.54 percentage points as the expected decline in the participation rate (calculated from BLS 2014c). Hall further attributes a 0.5 percentage point drop to classification of persons as being out of the labor force even though they were still searching for jobs; 0.5 percentage points to rising dependency on disability benefits; and some portion of the remaining 1 percentage point to disincentives from high effective marginal tax rates on beneficiaries of food stamps and Medicaid.

Alan B. Krueger, Judd Cramer, and David Cho (2014) examine the role of long-term unemployment in the Great Recession. They find that whereas the total unemployment rate has been so high that the usual expectations-based Phillips curve relating the change in inflation to the

unemployment rate would have predicted steeper disinflation than has occurred, and similarly the Beveridge curve relating the job vacancy rate to the unemployment rate has been displaced to a less efficient frontier, both curves behave much more as expected when the unemployment rate used excludes long-term unemployment. Correspondingly, they conclude that as of early 2014, "further declines in short-term unemployment would be expected to be associated with rising inflation and stronger real wage growth" (2014, 5). For the participation rate, the main implication of their study is that high long-term unemployment leads indirectly to lower participation because there is a relatively high exit rate of the long-term unemployed. They find that since the beginning of the Great Recession, of those already unemployed 27 weeks or more in a given month, by 15 months later 30 percent have exited from the labor force, while 34 percent remain unemployed and 36 percent have found jobs (albeit of below-par permanency) (2014, 37). Their exit impact estimate is broadly consistent with the coefficients on long-term unemployment found in equations (1) and (2).[9]

Shigeru Fujita (2014, 3, 10) uses the reasons given in the Current Population Survey for not participating in the labor force as a basis for decomposing the decline in the participation rate. He estimates that retirement accounted for an approximately 1.5 percentage point reduction in the labor force participation rate from the fourth quarter of 2008 to the fourth quarter of 2013, and for almost all of the decline in the rate after the first quarter of 2012. He emphasizes the timing of the baby boom generation in the increased incidence of retirement. From the end of 2008 to the end of 2013 increased incidence in disability accounted for a reduction in labor force participation by an additional 0.7 percentage points. He calculates that discouraged workers, defined as those who did not look for a job even though they wanted one, accounted for about 30 percent of the decline in the participation rate from the end of 2007 to the fourth quarter of 2011, but no additional decline thereafter (2014, 2). The principal finding emphasizing a large role for retirement is similar to the major influence of aging of the labor force identified here.

Christopher J. Erceg and Andrew T. Levin (2013) use cross-state data on unemployment and prime-age (25 to 54 years) labor force participation to examine the decline in participation from 2007 to 2012. Contrary to most of the other studies just cited, they conclude that "cyclical factors account for the bulk of the post-2007 decline in the U.S. labor force participation rate" (2013, 1). However, the CEA study also notes that the influence of the aging factor accelerated after 2010, indicating a greater relative

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9. With a peak of 4.4 percent long-term unemployment in April 2010 and the labor force at about two-thirds of the adult population, the Krueger, Cramer, and Cho (2014) subsequent exit rate of 30 percent implies the induced exits amounted to 0.88 percent of the adult population and thus a drop in the participation rate by that much. Weighting by shares in adult population (48.5 percent males, 51.5 percent females), the coefficients on lagged long-term unemployment in equations (1) and (2) have a weighted average of –0.39. Applied to the increase in long-term unemployment from the base of about 1 percent to the peak 4.4 percent, the corresponding partial impact is also about 1 percentage point (3.4 x 0.39 = 1.3).

cyclical influence in the period considered by Erceg and Levin, which ends six quarters before the period examined by the CEA.[10] Moreover, it is not clear that the cross-section state data provide as meaningful a basis for the analysis as the compositional and time series data used by the CEA and other studies.[11]

The broad thrust of these various studies is that approximately half of the decline in the participation rate from the end of 2007 to early 2014 is attributable to long-term structural trends, mainly the aging of the population. The findings of the present study suggest that the typical share of about one-half found in the various technical studies may be on the low side for the influence of aging.

PROJECTING PARTICIPATION RATES

Equations (1) and (2) can be used to project labor force participation rates. Projections of the share of the population 16 years and older that is in the 55 and older age group are available for the period 2012–22 as a whole in BLS (2014d). This share for males is projected to rise from 31.3 percent in 2012 to 36.3 percent by 2022; for females, the share rises from 34.4 percent in 2012 to 39.4 percent by 2022. Applying equal monthly increments and beginning from the May 2014 actual base, the result is to boost the male 55 and older share to 33.8 percent and that of the female share to 38.8 percent by December 2016, the period considered here for projections. Applying the coefficients from equations (1) and (2), these changes would be expected by themselves to reduce the labor force participation rates by 0.65 percentage points for males and by 0.37 percentage points for females.

Projections for the other variables are as follows. Unemployment rates through December 2015 (and hence the lagged value for December 2016) are based on the IMF (2014) projection that US unemployment will stand at 5.9 percent by December 2015, again with steady monthly decreases from the May 2014 level of 6.3 percent. For long-term unemployment, it is assumed that by December 2015 (and hence the lagged variable for December 2016) the rate is back down to 1.0 percent, the range prior to the Great Recession. (In comparison, the rate in May 2014 stood at 2.17 percent.)

Figure 4 shows the resulting projected paths of male and female labor participation rates going forward through December 2016, as well as the actual and model-predicted paths for January 2010 through May 2014. It turns out that the effects of an improving labor market (with falling unemployment and especially falling long-term unemployment) exactly cancel out the effects of aging of the population,

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10. The CEA (2014, 16) finds that the "counterfactual" age-specific participation analysis accounts for only a 0.6 percentage point decline in the participation rate from the end of 2007 to the end of 2010, but thereafter contributes an additional decline of 1 percentage point by the first quarter of 2014.

11. In particular, if the response of active workers to becoming unemployed in a high-unemployment state is to move to a low-unemployment state and find new employment there, then even if there are no other changes the high-unemployment state will show a higher share of inactive population than before (and the receiving state a lower inactive share than before) even though there has been no change in the national participation rate. The correlations at the state level will essentially raise a fallacy of composition problem when interpreted as meaningful for the national level.

for male participation, and slightly overpower the effects of aging for female participation. Thus, the model predicts that male participation remains virtually unchanged from May 2014 (model estimate: 69.65 percent) to December 2016 (model projection: 69.60 percent). For females, the model prediction rises slightly, from 57.48 percent participation in May 2014 to 57.91 percent by December 2016.

The broad picture, therefore, is that *no major rebound in participation rates can be expected*. Applying the May 2014 weights in the population of 16 and over, at 0.483 for males and 0.517 for females, the weighted average of the participation rates would evolve from 63.36 percent for May 2014 (model prediction) to 63.56, a rise of only 0.2 percentage points. A key paradox then is that whereas the current level of labor force participation may be about 1 percentage point lower than it would have been in the absence of the Great Recession (as discussed above), going forward the ongoing aging of the population will cancel out the improvement in the pipeline from improving labor market conditions. The net effect is that almost no future increase can be expected in the participation rate. This prospect of a flat participation rate over the next two or three years, because cyclical recovery approximately offsets the aging trend, is the central view expressed in CEA (2014). Federal Reserve governor Janet Yellen has also noted this outcome as a likely possibility in recent testimony.[12]

STATISTICAL ISSUES

The results presented here are subject to caveats about potentially misleading results from time series analysis. The participation rate has a downward trend, and the share of older workers, an upward trend. It turns out that each series is nonstationary, meaning that it cannot be statistically rejected that the series has a random walk structure involving a unit root such that each observation equals the previous observation plus a random error.[13] However, if two nonstationary series are such that a linear combination of them is stationary, then they are cointegrated, and the usual ordinary-least-squares results hold (Verbeek 2008, 328). A test finds that the two series are at least weakly cointegrated, implying that the results in equations (1) and (2) should be broadly valid.[14]

Another way to examine the robustness of the results is to take advantage of the strong likely value of a Bayesian prior for the coefficient on the older worker share. As noted at the outset, the simple differential participation rates for the population 16 to 54 years old and the population 55 and over

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12. "It may be … that as the labor market strengthens … labor force participation will remain flat instead of the demographic trend continuing to pull it down …" Quoted in Craig Torres, "Yellen Watches American Paycheck for Signals on Shadow Slack," *Bloomberg*, July 16, 2014.

13. The Dickey-Fuller tests performed on first differences of the participation rate, or first differences after including a time trend, for the share of older workers, show the respective coefficients are not significantly different from zero, indicating unit roots.

14. Specifically, the male participation rate was first regressed on a constant, a time trend, and the older-worker share variable. Second, the series of residuals obtained by subtracting the fitted estimates from the actual participation rates was tested to see whether it contained serial correlation with lagged residuals. That correlation was rejected at approximately the 10 percent level using the (higher-than-usual) Dickey-Fuller t-statistic thresholds.

amounted to 44.3 percentage points in 2002. The a priori value for the coefficient on the share of older workers in equation (1) would thus be –0.443. The robustness of the coefficients on the other variables can then be examined by conducting a regression in which the dependent variable is the participation rate minus the Bayesian coefficient times the older worker share variable, the right side comprises a constant, and the rest of the right side comprises variables of equation (1) (excluding the older worker share). This exercise yields results that are relatively close to the coefficients estimated in equation (1).[15]

CONCLUSION

Two watershed economic events occurred in 2008: the worst financial crisis since the 1930s, and the arrival of the leading edge of the baby boom generation to the age of 62. In explaining the decline of the labor force participation rate since late 2007, the findings of this note suggest that the latter phenomenon has been more important than the former. The perception that demographics have mattered more than the Great Recession in reducing labor force participation is not widespread. On the contrary, most policy discussions among the informed public seem to emphasize that the decline in the participation rate has caused an illusory decline in unemployment, and by implication, that there would be a large rebound in the participation rate if successful recovery were achieved. Most technical studies, in contrast, attribute about one half of the decline in participation to aging of the population. Even that share may be understated, however.

The estimates here suggest that a decline of between 1.7 and 2.1 percentage points in the participation rate since late 2007 can be explained by the higher share of older cohorts in the population, combined with the characteristically lower labor force participation rates of the older population. Even so, as much as a 1 percentage point drop in the participation rate is found to be attributable to the discouragement impact of high unemployment (and high long-term unemployment). As a consequence, the progress in reducing US unemployment from its 2009 peak of 10 percent to 6.1 percent now might be seen as disguising the fact that the rate could still be as high as 7.6 percent if discouraging labor market conditions had not reduced the participation rate. Nonetheless, looking forward, little if any rebound can be expected in the labor force participation rate. The reason is that ongoing further reductions in participation from an aging population will almost exactly cancel out the rise in participation that can be expected from putting the Great Recession more fully in the past.

15. In the Bayesian test, the coefficients corresponding to those on the right side of equation (1), with t-statistics in parentheses, are as follows: 88.7 (278.7) for the constant, –0.89 (–9.0) for lagged unemployment, 0.057 (7.7) for the square of lagged unemployment, –0.30 (–5.1) for lagged long-term unemployment, and –0.25 (–4.3) for the 2008 and after dummy variable. The constant is virtually unchanged from equation (1). The impact of going from 5 percent unemployment to 10 percent is modestly smaller in the Bayesian results (–0.17 percentage point change in participation) than in equation (1) (–0.48 percentage points). The impact of going from long-term unemployment of 1 percent to 4.4 percent has a somewhat larger impact in the Bayesian result (–1.0 percentage point change in participation) than in equation (1) (–0.62 percentage points). The 2008 and after dummy is modestly stronger: –0.25 percentage points, Bayesian, versus –0.095 percentage points in equation (1).

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Figure 1   Labor force participation rate (left) and share of persons 55 and older in adult population (right)

(percent)   (percent)
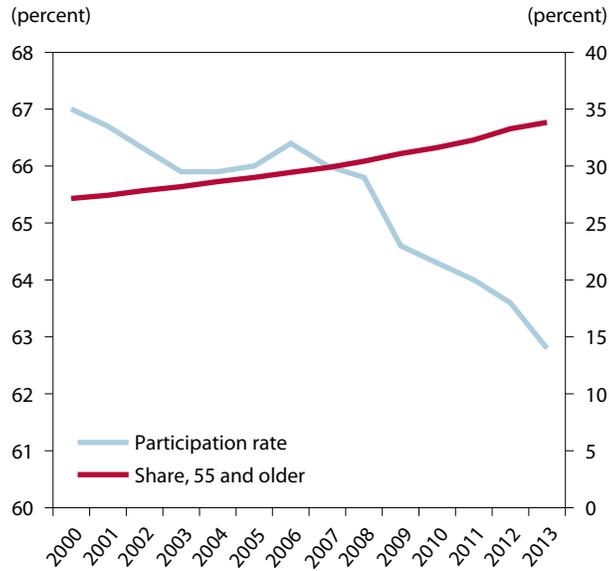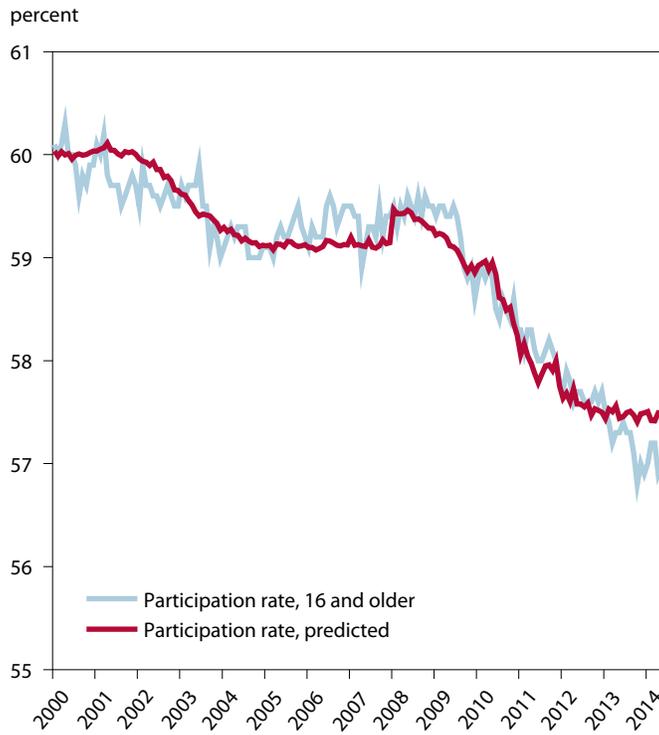
Source: BLS (2014c).

Figure 2   Actual and predicted labor force participation rate for males, 16 years and older

percent
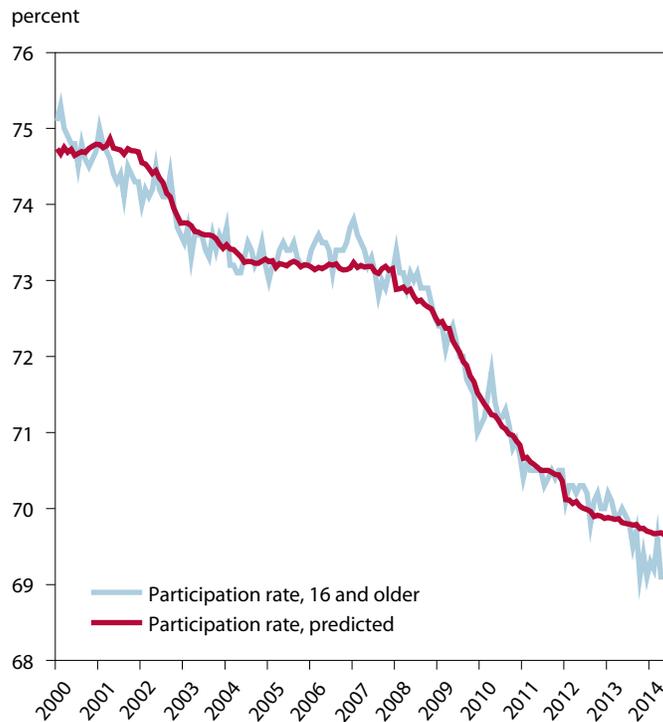
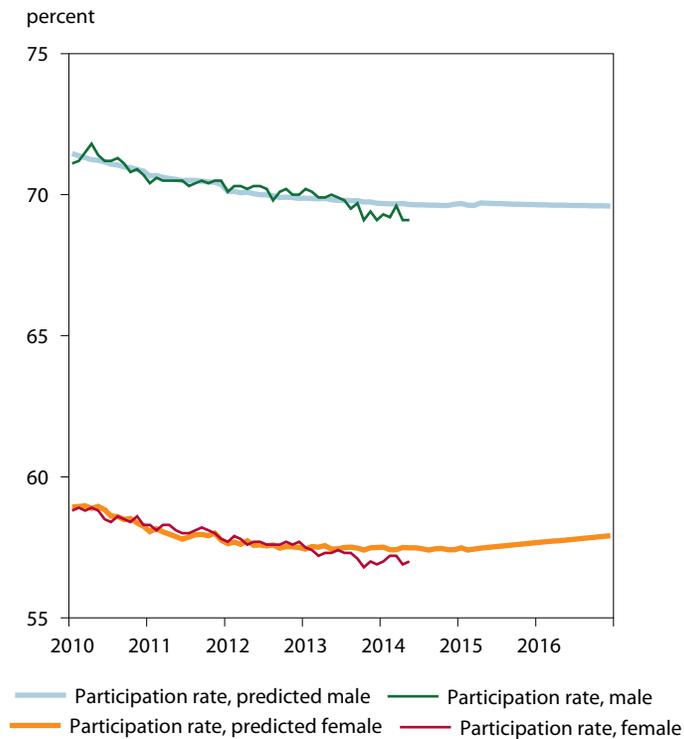*Source:* BLS (2014c); authors' calculations.

Figure 3   Actual and predicted labor force participation rate for females, 16 years and older

percent

Legend:
- Participation rate, 16 and older
- Participation rate, predicted

Source: BLS (2014c); authors' calculations.

Figure 4   Actual and projected labor force participation rates, males and females, 16 years and older

percent

Legend:
- Participation rate, predicted male
- Participation rate, male
- Participation rate, predicted female
- Participation rate, female

Sources: BLS (2014d); authors' calculations.