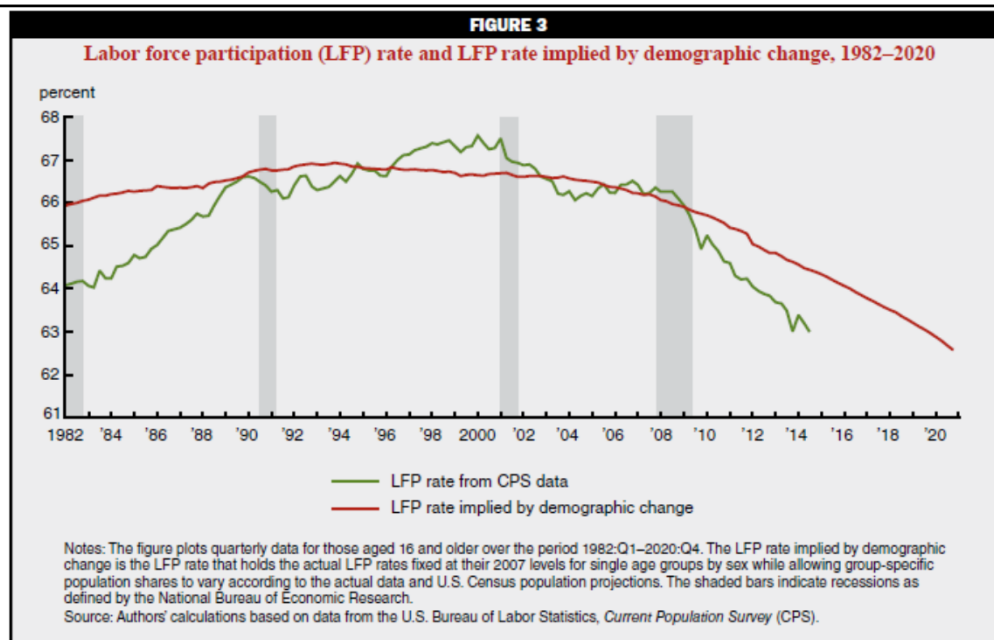# Notes on Labor Force Trends and Projections

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Sources of future change in labor force participation

- Demographic changes
  - Aging of the population will reduce aggregate participation in years ahead
- Long-term changes in social and economic factors affecting rates for specific demographic sub-groups
  - Recent participation rates have been steady or falling for teens and prime age workers but rising for older workers
  - Relevant dimensions for defining groups may include not only age and sex, but also marital status, presence of children, and level of education
  - Cohort effects have proven to be important for modeling history
- Cyclical conditions
  - Current participation below trend level; considerable disagreement over extent and time frame for potential rebound

FIGURE 3

Labor force participation (LFP) rate and LFP rate implied by demographic change, 1982–2020

percent

[Chart showing two lines from 1982 to 2020. Y-axis ranges from 61 to 68 percent. Green line: LFP rate from CPS data. Red line: LFP rate implied by demographic change. Shaded vertical bars indicate recessions.]

— LFP rate from CPS data
— LFP rate implied by demographic change

Notes: The figure plots quarterly data for those aged 16 and older over the period 1982:Q1–2020:Q4. The LFP rate implied by demographic change is the LFP rate that holds the actual LFP rates fixed at their 2007 levels for single age groups by sex while allowing group-specific population shares to vary according to the actual data and U.S. Census population projections. The shaded bars indicate recessions as defined by the National Bureau of Economic Research.
Source: Authors' calculations based on data from the U.S. Bureau of Labor Statistics, *Current Population Survey* (CPS).

Source: Aaronson, Hu, Seifoddini and Sullivan (2014)


Trends for prime age men

- Participation rates for prime age men have trended downwards since the 1950s
- Possible explanations for participation decline:
  - Declining real wages at the bottom of the skill distribution
  - Increasing job polarization
  - Changes in safety net programs, especially SSDI and SSI

Trends for prime age women

- Participation rates for prime-age women rose through the late 1990s, but have leveled off and perhaps begun to trend downwards
- Possible explanations for previous participation increase:
  - Reductions in discrimination
  - Availability of more effective birth control
  - Greater educational gains among women
  - Advent of labor-saving household technology
  - Expansion of EITC and shift from AFDC to TANF
- Possible explanations for more recent participation stagnation/decline:
  - Lack of paid parental leave, access to day care and support for part-time work
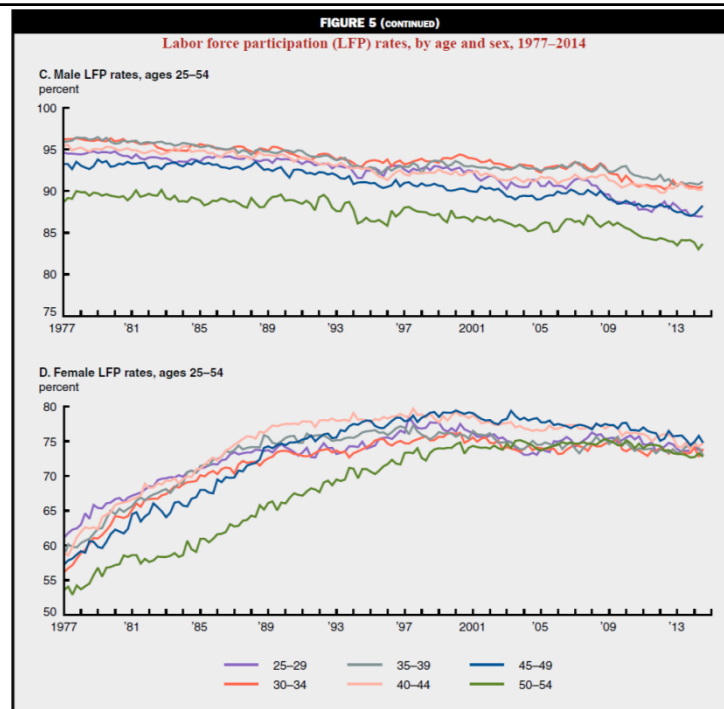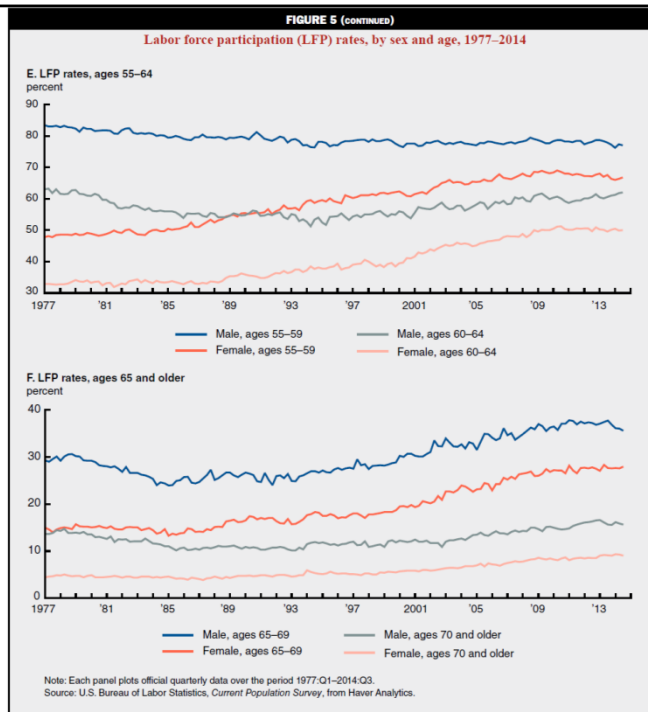

Source: Aaronson, Hu, Seifoddini and Sullivan (2014)

3

Figure 20: Labor Force Participation Rate of Women Aged 25–54, 1991–2013
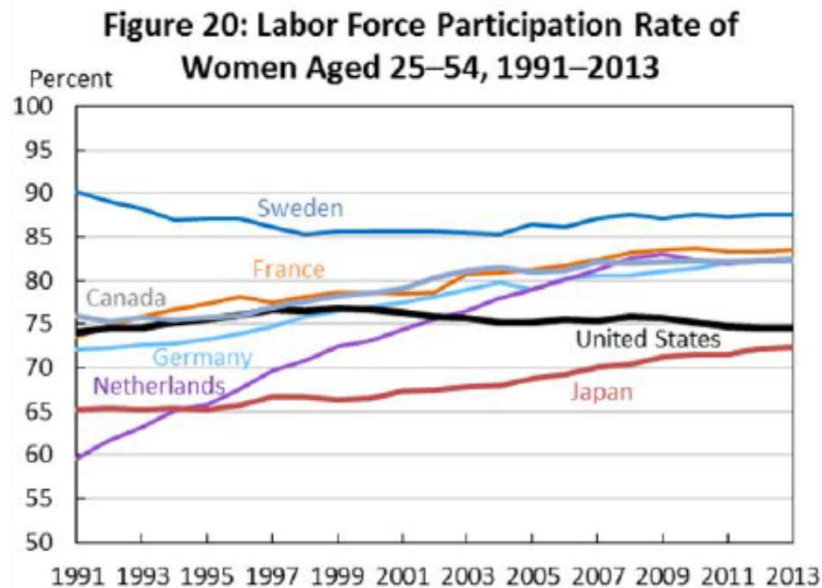
Source: Council of Economic Advisers (2014)

Trends for men and women age 55 plus

- After declining for many years, participation rates for older workers stabilized in the 1980s and more recently have begun to rise
- Possible explanations for participation increase:
  - Changes in Social Security (increases in normal retirement age, creation of delayed retirement credit)
  - Increases in participation of wives affecting husbands' participation through leisure complementarity
  - Rising education levels
  - Improvements in health and increases in life expectancy

FIGURE 5 (CONTINUED)
Labor force participation (LFP) rates, by sex and age, 1977–2014

E. LFP rates, ages 55–64

Male, ages 55–59 — Male, ages 60–64
Female, ages 55–59 — Female, ages 60–64

F. LFP rates, ages 65 and older

Male, ages 65–69 — Male, ages 70 and older
Female, ages 65–69 — Female, ages 70 and older

Note: Each panel plots official quarterly data over the period 1977:Q1–2014:Q3.
Source: U.S. Bureau of Labor Statistics, Current Population Survey, from Haver Analytics.

Source: Aaronson, Hu, Seifoddini and Sullivan (2014)

Age-specific labor force participation rates for both men and women have differed by cohort

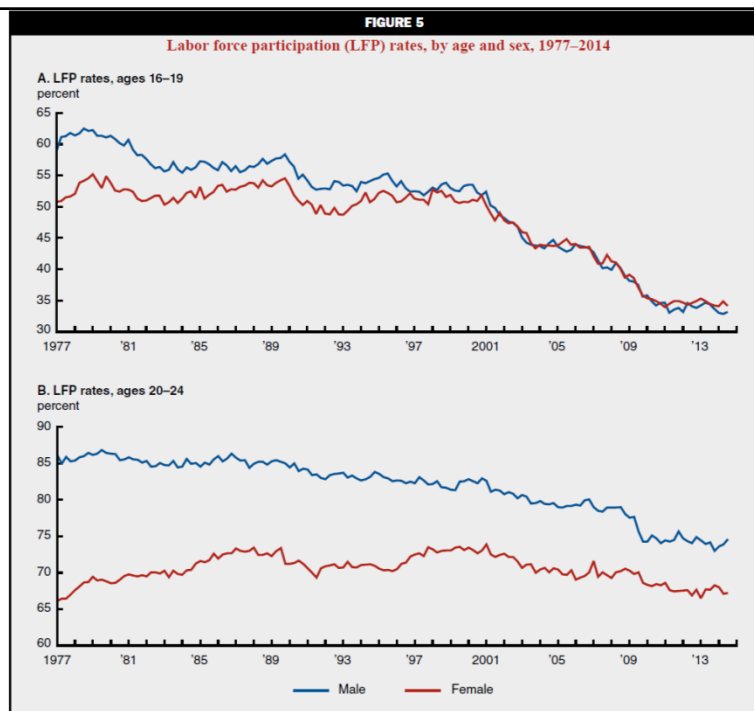Figure 4: Male Labor Force Participation by Age & Birth Year
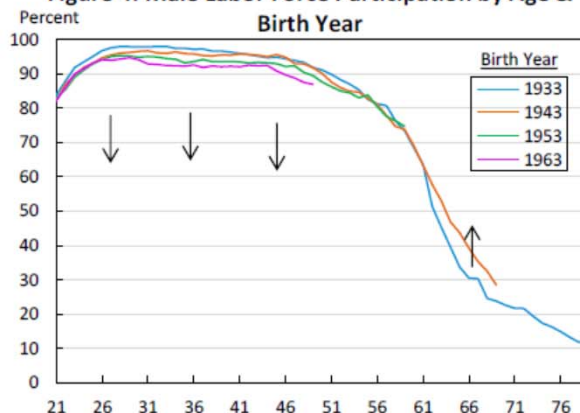
Figure 5: Female Labor Force Participation by Age & Birth Year

Source: Council of Economic Advisers (2014)
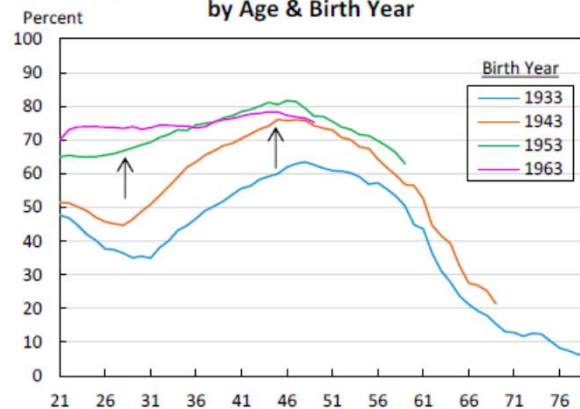
Trends for teens and young adults

- Labor force participation rates for teens have dropped sharply since about 2000; rates also have fallen, though less dramatically, for those age 20-24
- Possible explanations for participation decline:
  - Increase in school enrollment
  - Increase in schooling intensity
  - Crowding out as low-skilled older adults and immigrants compete for jobs previously filled by teenagers and young adults

FIGURE 5

Labor force participation (LFP) rates, by age and sex, 1977–2014

A. LFP rates, ages 16–19
percent

B. LFP rates, ages 20–24
percent

Male   Female

Source: Aaronson, Hu, Seifoddini and Sullivan (2014)

6

Approaches to modeling trends in labor force participation by demographic group

- Extrapolate pre-existing trends for disaggregated groups
  - Example: Bureau of Labor Statistics
  - Does not account explicitly for underlying drivers of observed trends
- Construct separate models for disaggregated groups
  - Example: Office of the Chief Actuary, Social Security Administration
  - Small number of observations for each group limits variables included directly in regression equations; effects for other factors developed separately, then applied
- Estimate pooled model that includes observations for multiple groups
  - Examples: Aaronson et al (2014) using group-level data, Aaronson, Hu, Seifoddini and Sullivan (2014) using individual-level data
  - Larger number of variables included directly in regression equations, but modelers still limited in what they can include by amount of variation in the data

Office of the Chief Actuary labor force model

- Separate models for each of 153 groups defined based on age, sex, and (in some cases) marital status and presence of children under the age of six
- First step for most groups a regression of the deviation of quarterly LFPRs from their peak-to-peak trend on current and five lags of the unemployment rate gap
  - For teenagers, model different out-of-labor-force categories (disability, keeping house, school or other) rather than labor force participation
  - Models fit periodically using data through a complete business cycle (last fit through 2008)
  - Projections assume that as currently elevated unemployment rate returns to normal level, participation will rebound
  - Consistent with standard practice, do not attempt to predict future business cycles
- Account for effects of disability benefit receipt
  - For men and women ages 16-61, calculate disability prevalence rate (DI beneficiaries divided by disability insured population) and set effect on overall participation equal to historical LFPR for group times disability prevalence rate
  - For men and women ages 62-74, because regular benefits become available at age 62 and no one receives disability benefits after normal retirement age, somewhat different procedures employed
  - Disability benefit receipt rates projected for all future years

Office of the Chief Actuary labor force model (continued)

- Account for effects of changes in educational attainment
  - For men age 55-74 and women age 45-74, shift-share formula used to calculate how changes in distribution of educational attainment for those of given age and sex affect change in participation from one year to the next
  - Five educational groups are less than high school, high school diploma, some college but less than a bachelor's degree, bachelor's degree and graduate degree
  - Projections assume no effect of education on participation at younger ages and no further changes in educational attainment beyond those that can be observed in data for those currently age 35 or older
- Account for effects of marital status
  - For those age 20-54, married, single but previously married and never married groups are modeled separately
  - For those age 55-74, shift-share formula used to calculate how changes in distribution of marital status at given age affect change in participation from one year to the next
  - Projections use marital status proportions from the demographics group within the Office of the Chief Actuary

Office of the Chief Actuary labor force model (continued)

- Adjust for effects of number or presence of children
  - For female teens, handled as part of not-in-labor-force regressions
  - For women age 20-24 who are married with spouse absent and child under six, calculate predicted participation based on earlier model components; regress difference between actual and predicted participation on number of children; use estimated coefficient for adjustment
  - For other groups of married women from age 20 through age 54, use adjustment factors for number or presence of children, as appropriate, based on examination of available historical data
  - For men age 50-54, calculate predicted participation based on earlier model components; regress difference between actual and predicted participation on presence of children; use estimated coefficient for adjustment
- Adjust for effects of changes in replacement rates and imposition of earning test as normal retirement age increases
  - Former adjustment affects those age 62 to 69; latter affects only those age 66
  - Adjustment factors based on examination of available historical data
 - Projections assume current law increase in normal retirement age

Office of the Chief Actuary labor force model (continued)

- Adjust for impact of higher female participation on participation of older males
  - For men age 60-74, calculate predicted values based on earlier model components; regress difference between actual and predicted male participation rates on participation rates for women two years younger; use estimated coefficient for adjustment
  - Projected female labor force participation used as input to participation projection for older men
- Birth cohort effects for women
  - For women born through 1948, cohort variable defined to increase by one each year; for women born after 1948, value same as for 1948 cohort
  - To calculate age-specific cohort effect, pool data for women of a given age across years; calculate predicted participation based on earlier model components; regress difference between actual and predicted participation on cohort variable; use estimated coefficient for adjustment

Office of the Chief Actuary labor force model (continued)

- Lagged cohort effects for those age 75 and older
  - Projected participation for those in these age groups treated as a function of participation for those one year younger (0.92 fraction for men and 0.90 fraction for women)
- Life expectancy add factor
  - For age-sex specific projections without life expectancy add factor, determine age in base year at which life expectancy same as for person of target age in projection year
  - Calculate participation rate difference in projection year between those two ages and add 40% of the difference to the participation rate for the older age group
- Simple time trends not identified for most groups and phased out in projections where they are

Projected male labor force participation rates, by age, 2013, 2023 and 2088
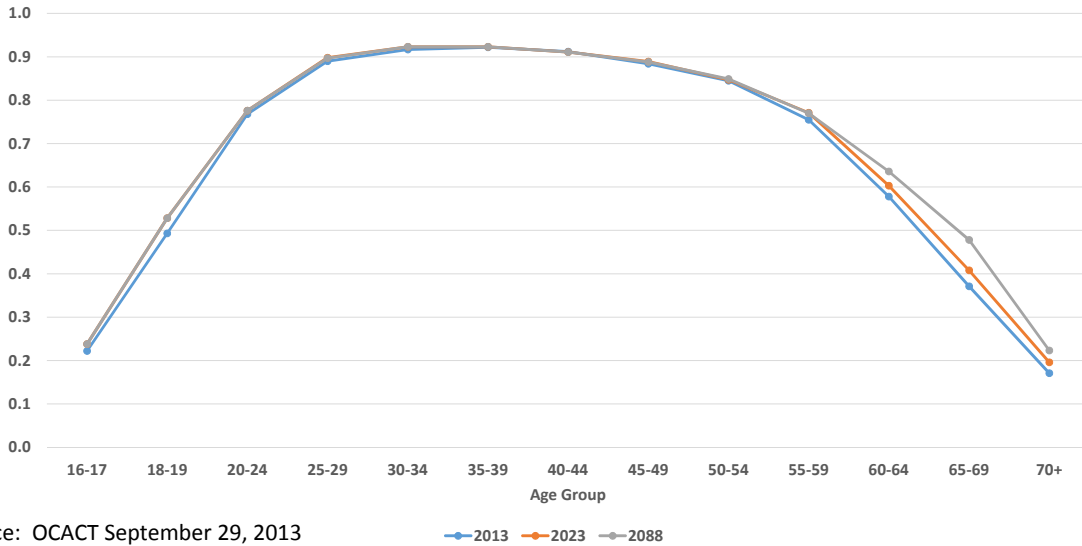
Source: OCACT September 29, 2013

Projected female labor force participation rates, by age, 2013, 2023 and 2088

Source: OCACT September 29, 2014
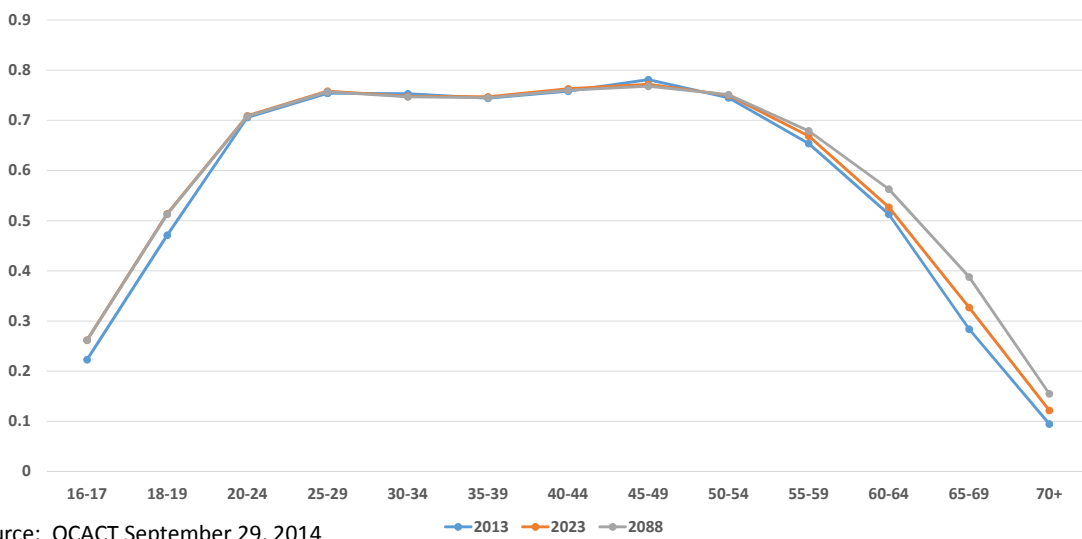
FRB and Chicago Fed labor force models

FRB Model

- Fit using seasonally adjusted single-year-age-by-sex quarterly LFPRs from 1976 through 2014

- Model includes age-and-sex-specific dummies (age effects) and birth-year-and-sex-specific dummies (cohort effects)
- For projections, set cohort effects for incoming cohorts at value estimated for most recent cohort

Chicago Fed Model

- Fit using individual-level data on participation/non-participation from 1982 through 2014
- Separate models for persons aged 16-24, 25-54 and 55-79 by sex by education (28 groups)
- Models include single-year-age dummies (age effects) and year of birth dummies (cohort effects), all specific to age-sex-education group
- For projections, missing cohort effects forecast using time trend in coefficients for prior ten birth years

FRB and Chicago Fed labor force models (continued)

FRB Model

- Effects estimated by age-sex group include:
  - Percent with college degree (age 27 and older)
  - Remaining life expectancy (age 55-79)
  - SS payout rate (age 62-79)
  - Marital status by presence of young child interactions (women age 18-61)
  - Ratio of minimum wage to average hourly earnings (age 16-19)
  - Ratio of teen to adult wage (age 16-19)
  - Ratio of summer to non-summer school enrollment (age 16-19)
  - Number of SSDI recipients as share of population (age 30-64)

Chicago Fed Model

- Effects estimated by age-sex-education group include:
  - Race
  - Real minimum wage (age 16-24)
  - Ratio of youth to adult wage (age 16-24)
  - Marital status by presence of young child interactions (age 25-54)
  - Gender-specific life expectancy (age 55-79)

FRB and Chicago Fed labor force models (continued)

FRB Model

- Economic conditions measured using current and lagged aggregate unemployment, aggregate personal bankruptcy rate

Chicago Fed Model

- Economic conditions measured using current and lagged aggregate and state level unemployment gaps

Table 7: Comparisons of Projected Labor Force Participation Rates

Year	Authors' Model	Congressional Budget Office	Bureau of Labor Statistics	Social Security Administration	International Monetary Fund
	Labor force participation rate (percent)				
2012	63.7	63.7	63.7	63.7	63.7
2013	63.4	63.3	63.5	63.3	63.3
2014	63.1	62.9	63.3	63.1	63.0
2015	63.0	62.7	63.1	63.2	63.0
2016	62.7	62.5	63.0	63.2	62.9
2017	62.3	62.4	62.7	63.2	62.8
2018	62.1	62.2	62.5	63.3	62.6
2019	61.8	62.0	62.3	63.3	62.3
2020	61.5	61.8	62.0	63.3	-
2021	61.2	61.5	61.8	63.1	-
2022	61.0	61.3	61.6	62.9	-

Sources: Authors' calculations; Congressional Budget Office (2014); Toossi (2013); Social Security Administration (2014, unpublished data), International Monetary Fund (2014).
Note: Author's projections are for the annual average participation rate, as are those from the CBO, the SSA, and the International Monetary Fund. BLS projections are for the annual average trend participation rate.

Source: Aaronson et al (2014)

Some questions relevant to projecting within-group labor force participation rates in coming decades

- To what extent will labor force participation rebound from the below-trend levels of recent years?
- Will the United States adopt more "family friendly" employment policies?
  - Could lead to increased participation among prime age women
- Will the forces that have put downward pressure on the participation of lower- and perhaps middle-skilled men (declining relative wages, polarization, increasing availability of DI benefits) continue?
- How will increasing longevity and improving health affect participation at older ages?
- Will education levels continue to increase and, if so, how will this affect labor force participation rates?
  - Some question about what accounts for cross-sectional relationship between education and participation and whether that relationship can be used to predict the effects of changes in the overall level of education over time

References

- Daniel Aaronson, Luojia Hu, Arian Seifoddini and Daniel G. Sullivan. 2014. "Declining labor force participation and its implications for unemployment and employment growth," *Economic Perspective*, 4th Quarter, 100-138.

- Stephanie Aaronson, Tomaz Cajner, Bruce Fallick, Felix Galbis-Reig, Christopher Smith, and William Wascher. 2014. "Labor Force Participation: Recent Developments and Future Prospects," *Brookings Papers on Economic Activity*, forthcoming.

- Council of Economic Advisers. 2014. *The Labor Force Participation Rate Since 2007: Causes and Policy Implications.*