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Where Have All the Workers Gone? An Inquiry into the Decline of the U.S. Labor Force Participation Rate

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Abstract

The labor force participation rate in the U.S. has declined since 2007 primarily because of population aging and ongoing trends that preceded the Great Recession. The participation rate has evolved differently, and for different reasons, across demographic groups. A rise in school enrollment has largely offset declining participation for young workers since the 1990s. Participation in the labor force has been declining for prime age men for decades, and about half of prime age men who are not in the labor force (NLF) may have a serious health condition that is a barrier to work. Nearly half of prime age NLF men take pain medication on a daily basis, and in nearly two-thirds of these cases they take prescription pain medication. Labor force participation has fallen more in areas where relatively more opioid pain medication is prescribed, causing the problem of depressed labor force participation and the opioid crisis to become intertwined. The labor force participation rate has stopped rising for cohorts of women born after 1960. Prime age men who are out of the labor force report that they experience notably low levels of emotional well-being throughout their days and that they derive relatively little meaning from their daily activities. Employed and NLF women, by contrast, report similar levels of subjective well-being, but NLF women who are not primarily taking care of home responsibilities report notably low levels of emotional well-being. Over the past decade retirements have increased by about the same amount as aggregate labor force participation has declined, and the retirement rate is expected to continue to rise. A meaningful rise in labor force participation will require a reversal in the secular trends affecting various demographic groups, and perhaps immigration reform.

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I. Introduction

The labor force participation rate in the United States peaked at 67.3 percent in early 2000, and has declined at a more or less continuous pace since then, reaching a near 40-year low of 62.4 percent in September 2015 (see Figure 1). Italy was the only O.E.C.D. country that had a lower labor force participation rate of prime age men than the U.S. in 2016. Although the participation rate has stabilized since the end of 2015, evidence on labor market flows – in particular, the continued decline in the rate of transition of those who are out of the labor force back into the labor force – suggests that this is likely to be a short-lived phenomenon. This paper examines cyclical movements and secular trends in labor force participation, with a particular focus on the role of pain and pain medication in the lives of prime age men who are not in the labor force and prime age women who are not in the labor force *and* not primarily taking care of household responsibilities, because these groups express the greatest degree of distress and dissatisfaction with their lives.

The paper is organized as follows. The next section summarizes evidence on trends in labor force participation overall and by various demographic groups. Careful attention is devoted to adjusting labor force and population data for the introduction of the 2000 and 2010 population controls in the Current Population Survey (CPS). The main finding of this analysis is that shifting demographic shares, mainly an increase in older workers, and trends that preceded the Great Recession (e.g., a secular decline in labor force participation of prime age men) can account for the lion share of the decline in the participation rate since the last business cycle peak.

Because most of the movement in the participation rate in the last decade reflects secular trends and shifting population shares, Section III examines trends in the participation rate separately for young workers, prime age men, and women, as well as the retirement rate. The role of physical and mental health limitations, which could pose a barrier to employment for around half of prime age men who are not in the labor force (NLF), is highlighted and explored. Survey evidence indicates that almost half of prime age NLF men take pain medication on a daily basis, and that as a group prime age men who are out of the labor force spend over half of their time feeling some pain. A follow-up survey finds that 40 percent of NLF prime age men report that pain prevents them from working on a full-time job for which they are qualified, and that nearly two thirds of the men who take pain medication report taking prescription medication. It is also shown that generational increases in labor force participation that have historically raised women's labor force participation over time have come to an end, and the U.S. can no longer count on succeeding cohorts of women to participate in the labor market at higher levels than the cohorts they are succeeding. The section also documents that an increase in the retirement rate after 2007 accounts for virtually all of the decline in participation since then, suggesting the persistence of labor force exits.

Section IV presents evidence on the subjective well-being of employed workers, unemployed workers, and those who are out of the labor force by demographic group. Two measures of subjective well-being are used: an evaluative measure of life in general and a measure of reported emotional experience throughout the day. Young workers who are not participating in the labor force seem remarkably content with their lives, and report relatively high levels of affect during their daily routines. Prime age men who are out of the labor force, however, report less happiness and more sadness during their days than do unemployed men, although they evaluate their lives in general more highly than unemployed men. Prime age and older women who are out of the labor force report emotional well-being and life evaluations in general that are about on par with employed women the same age, suggesting a degree of contentment that may make it unlikely to see many in this group rejoin the labor force.

Given the high use of pain medication by NLF prime age men and women, and the mushrooming opioid crisis in the U.S. since the early 2000s, Section V provides an analysis of the connection between the use of pain medication, opioid prescription rates, and labor force participation. Evidence is first presented suggesting that local opioid prescription practices influence the use of pain medication. Conditional on individuals' disability status, self-reported health, and demographic characteristics, pain medication is more widely used in counties where healthcare professionals prescribe more opioid medication. Next, regression analysis finds that labor force participation fell more in counties where more opioids were prescribed, controlling for the area's share of manufacturing employment and individual characteristics. Although it is unclear whether these correlations represent causal effects, these findings reinforce concerns from anecdotal evidence. For example, in his memoir *Hillbilly Elegy*, J.D. Vance (2016, pp. 18-19) writes about a recent visit with his second cousin, Rick, in Jackson, Kentucky: "We talked about how things had changed. 'Drugs have come in,' Rick told me. 'And nobody's interested in holding down a job.'" And the findings complement Case and Deaton's (2017) conclusion that "deaths of despair" for non-Hispanic whites "move in tandem with other social dysfunctions, including the decline of marriage, social isolation, and detachment from the labor force."

The conclusion highlights the role of physical, mental and emotional health challenges as a barrier to work for many prime age men and women who are out of the labor force. Since – apart from the unemployed – this group exhibits the lowest level of emotional well-being and life evaluation, there are potentially large gains to be had by identifying and implementing successful interventions to help NLF prime age men and women lead more productive and fulfilling lives.

II. Trends in Participation

Figure 1 shows the seasonally adjusted labor force participation rate as published by the Bureau of Labor Statistics (BLS). In addition, the graph shows alternative estimates of the participation rate using labor force and population data that were smoothed to adjust for the introduction of the 2000 and 2010 decennial Census population controls in the CPS in 2003 and 2012, respectively, and intercensal population adjustments introduced in January of each year.[2] These population adjustments undoubtedly occurred more gradually over preceding months and years. Compared to the published series, the adjusted series indicates that the labor force participation rate rose a bit less in the 1990s recovery, declined a bit more in the 2001-07 recovery, and fell a bit less in the current recovery, but overall the trends are similar. Henceforth, we focus on the adjusted labor force data.

The aggregate labor force participation rate series masks several disparate trends for subgroups. Figure 2 shows the participation rate separately for men age 25 and older, women age 25 and older, and young people age 16-24. The appendix figures show participation rate trends further disaggregated by age and sex. As is well known, the participation rate for adult men has been on a downward trajectory since the BLS began collecting labor force data in 1948. This trend has been a bit steeper since the late 1990s, but the decline in participation of prime age men in the labor force is not a new development and was not sharper after the Great Recession than it was before it (see Figures A4-A6).[3] Workers age 55 and older are the only age

[2] The population controls introduced in 2012, for example, caused an abrupt 0.3 percentage point drop in the labor force participation rate from December 2011 to January 2012, largely because the population of older individuals exceeded the figure that had been assumed in intercensal years. We closely follow the procedures outlined in http://www.bls.gov/cps/documentation.htm#pop to smooth out changes in population controls.

[3] Charles, Hurst and Notowodigdo (2016; 2017) provide evidence that the housing boom in the pre-recession period masked an even greater fall in the labor force participation of less educated prime age men from 2000 to 2006 due to the collapse of manufacturing.

group that has shown a notable rise in participation over the last two decades, albeit from a low base for the 65+ age group, and the long-running rise in participation for 55-64 year old women seems to have come to an end after the Great Recession.

The aggregate participation rate rose in the half century following World War II because women increasingly joined the labor force.[4] Beginning in the late 1990s, however, the labor force participation rate of women age 25 and over unexpectedly reached a decade-long plateau, and since 2007 women's labor force participation has edged down almost in parallel with men's. The plateau and then decline in women's labor force participation is responsible for the downward trajectory of the aggregate U.S. labor force participation rate. Although age, cohort and time effects cannot be separately identified, we later show that this appears more consistent with cohort developments than time effects.

Lastly, younger workers have exhibited episodic declines in labor force participation since the end of the 1970s. After falling sharply toward the end of the Great Recession, the participation rate for younger individuals has stabilized since then. The labor force participation rate of young workers probably responds more to the state of the business cycle than that of older workers because school is an alternative to work for many young workers in the short run.

A. Decomposing the Decline in the Participation Rate

At an annual frequency, after adjustments are made for the effects of changing population controls, the labor force participation rate reached a peak in 1997 (see Figure 3). From 1997 to 2017:H1, the aggregate participation rate fell by 4.2 percentage points, with most (2.8 points) of

[4] See Goldin (1991) for an analysis of women's post-World War II labor supply.

the decline occurring after 2007.[5] Several studies have shown that shifting demographics, mainly toward an older population, are responsible for around half of the decline in labor force participation.[6]

To see the effects of shifting demographics, write the aggregate labor force participation rate in year t, denoted ℓ_t, as:

$$(1) \quad \ell_t = \sum_i \ell_{it} \left(\frac{p_{it}}{\sum_i p_{it}}\right) = \sum \ell_{it} w_{it}$$

where ℓ_{it} is the participation rate for group i, p_{it} is the size of the population of group i in year t, and $w_{it}$is the population share of group i.

The change between year t-k and year t can be written as:

$$(2) \quad \Delta\ell = \sum \Delta\ell_{it} w_{it-k} + \sum \Delta w_i \ell_{it} \quad and \quad \Delta\ell = \sum \Delta\ell_{it} w_{it} + \sum \Delta w_i \ell_{it-k},$$

or a component due to the change in rates within groups (weighted by starting or ending period population shares), and a component due to changes in population shares (weighted by ending or staring period participation rates).

Table 1 reports the labor force participation rate and population shares for 16 age-by-sex groups.[7] There are notable declines in the participation rate for young workers, both male and female. The population shares have also shifted over time: the share of the population age 55 and over rose from 26.3 percent to 35.6 percent from 1997 to 2017, while the share age 25 to 54 fell from 57.5 percent to 49.3 percent. The bottom two rows report $\sum \ell_{it} w_{i0}$, where the

[5] Data for 2017 are only available for the first six months of the year as of this writing. Because the aggregate participation rate is not very different over the first six months and full year in the past, we do not make an adjustment for seasonality here.
[6] See CEA (2014) for an excellent survey of the literature. Fernald et al. (2017) further expand the shift-share analysis by disaggregating cells by education, race and marital status. They find that from 2010 to 2016, two thirds of the decline in labor force participation occurred within groups, and one third due to the shift across groups. It is possible that membership in some of the categories, such as marital status, is endogenously determined, however.
[7] We use annual data because seasonally adjusted smoothed population controls are not available for each group. Data for 2016 are the average of the first eight months of the year. In earlier years, the average of the first eight months of the year was close to the annual average, so no adjustment is made for seasonality.

population weights are for either 1997 or 2017. In general, the population has shifted toward groups with lower participation rates, and this accounts for well over half of the decline in the labor force participation rate. Using the decompositions in equation (2), the shift in the population shares can account for 65 percent (=[65.6-62.8]/ [67.1-62.8]) or 88 percent (=[67.1-63.3]/[67.1-62.8]) of the decline in labor force participation from 1997 to 2017, depending on whether 1997 or 2017 population shares are used to weight changes in each group's participation rate. Clearly, the changing age distribution of the population has had a major influence on the labor force participation rate. However, the decline in the participation rate of young workers, especially young men, is also quantitatively important. Regardless of which year's population shares are used as weights, the decline in participation of young men (age 16-24) from 1997 to 2017 accounts for almost one quarter of the decline in the overall participation rate, or about triple their current share of the population.

A limitation of these decompositions is that there is no counterfactual comparison and no other factors considered apart from demographics. Furthermore, changing population shares could affect participation of different groups. These calculations are just accounting identities that highlight the potential magnitudes of various shifts in population groups.

B. Continuation of Past Trends?

As mentioned, the decline in the participation rate was faster in the last decade than in the preceding one. We next examine the extent to which the 2.8 percentage point decline in the labor force participation since the start of the Great Recession represents a continuation of past trends that were already in motion, combined with shifts in population shares, or a new development. Specifically, for each of the 16 groups in Table 1 we estimated a linear trend from

1997 to 2006 by OLS.[8] This ten year period was chosen because it encompasses the pre-Great Recession downward trend in labor force participation.[9] We then extrapolate from the past decade's trend over the next decade. To the extent that secular trends were affecting participation trends for various groups before the Great Recession (e.g., education rising for some groups, and in turn affecting the trend in the participation rate) this approach would reflect those developments. The appendix figures show the trends for each subgroup, where the intercept has been adjusted so the fitted line matches the actual participation rate in 1997.

The group with the biggest negative forecast residual compared with the previous decade's trend is 55-64 year old women, who were predicted to experience a 9 percentage point rise in their participation rate but actually experienced little change from 2007 to 2017 (see Table 1 and Appendix Figure A-15). Younger workers saw a slower downward trend in the 2007-17 period than in the preceding decade. In general, there was a form of mean reversion, with the groups with the sharpest downward (or upward) trends from 1997-2006 experiencing more moderate downward (or upward) trends in the ensuing decade.

The green line in Figure 3 aggregates across the group specific trends using *fixed* 1997 population shares for each year. The red line uses the actual population shares each year to weight the group's predicted participation rate to derive an aggregate rate.[10] The difference between the red and the green lines highlights the importance of shifting population shares.

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[8] Although Tables 2 and 3 suggest a quadratic trend fits the aggregate data better than a linear one, in 7 of the 16 subgroups the quadratic term is insignificant in the period 1997-2016, and a linear trend does not do much injustice for describing the data for the other groups. Over such a short period, the linear extrapolation could be thought of as a first-order approximation to a more complicated trend.

[9] If a 7-year sample period is used the results are similar and if a 15-year period is used the trends are mostly flat.

[10] Formally, the predicted participation rate is the weighted sum of each group's predicted participation rate based on the linear trend for that group, where the weights are the group's actual share of the population in the year: $\hat{\ell}_t = \sum \hat{\ell}_{it}\, w_{it}$, where $\hat{\ell}_{it}$is based on an extrapolation from the OLS estimated linear trend.

Figure 3 makes clear that the lion's share of the decline in labor force participation since the start of the Great Recession is consistent with a continuation of past trends and shifting population shares. Extrapolating from the 1997-2006 trends for each group and weighting by 1997 population shares leads to a forecast that the labor force participation rate would have fallen by about one percentage point from 2007 to 2017 as a result of pre-existing trends, or around 40 percent of the actual decline. Shifting population demographics can account for almost all of the remaining gap. A similar conclusion holds if one looks at the period from 1997 to 2017 period: around 40 percent of the decline in labor force participation rate over the last two decades is predicted by applying the various demographic groups' linear trends, and almost all of the rest can be attributed to shifting population shares.

C. How Much of a Cyclical Recovery Should Be Expected?

A key question for economic policymakers is the extent to which labor force participation can recover from its two-decade long decline. As emphasized so far, most of the decline in the participation rate since 2007 is the (anticipated) result of an aging population *and* group-specific participation trends that were in motion before the Great Recession.[11] These trends could strengthen or reverse, but an aging workforce is likely to put downward pressure on labor force participation for the next two decades. To the extent there was a cyclical negative shock to participation, however, one might expect some recovery in the near term.

The 0.6 percentage point rise in the (seasonally adjusted) participation rate from September 2015 to March 2016 gave some hope that a cyclical recovery might be taking place. Three considerations lead me to suspect that there will be only a limited and short-lived cyclical

[11] CEA (2007; Table 1-2 and Box 1-2), for example, predicted a 0.2 to 0.3 percentage point annual decline in the labor force participation rate from 2007 to 2012 because of the aging of the baby boom cohort. See also Aaronson, et al. (2006).

recovery in participation, however. First, Fernald et al. (2017) find that by 2016, the cyclical component of the fall in labor force participation was essentially dissipated, regardless of the lag structure they allow for. Second, the seasonally adjusted labor force participation rate has displayed no trend since March 2016, suggesting that the cyclical recovery may already be over, consistent with Fernald et al.'s conclusion.

Third, throughout the recovery there has been *no* rise in the rate of transition of those who are out of the labor force joining the labor force. The likelihood of transitioning into the labor force from out of the labor force edged down throughout the recovery, including in late 2015 and early 2016 when the participation rate retraced 0.6 percentage point (figure available on request). Nonparticipants are increasingly a group with a lower likelihood of moving into the labor force. Thus, the idea that many labor force dropouts are returning to the labor market is unsupported by the data. Instead, the labor force participation rate rose in late 2015 and early 2016 because unemployed workers stayed unemployed longer, especially long-term unemployed workers. Historically, there is no tendency for transitions from out of the labor force into the labor force to behave cyclically (see Krueger, Cho and Cramer, 2014).

Given the pre-existing downward trend in participation for most demographic groups and the aging of the U.S. population, stabilization in the labor force participation rate for a time may represent the best one could expect for a cyclical recovery. If a cyclical recovery in labor force participation is unlikely, then a reversal of secular trends toward declining labor force is the only way to achieve an increase in labor force participation. The next section focuses on secular trends toward nonparticipation for key demographic groups.

III. Secular Trends for Specific Groups

A. Young Workers

Young people have exhibited the largest decline in labor force participation in the past two decades. This is to a considerable extent offset by their increased school enrollment, however. Figure 4 displays trends in the nonparticipation rate separately for young men and young women (age 16-24) from 1985 to 2016. The share of young workers who were neither employed nor looking for a job increased significantly from 1994 to 2016. In 1994, 29.7 percent of young men were not participating in the labor force, and in 2016 this figure was 43.0 percent.

Nonparticipation in the labor force also rose for young women. However, if we remove individuals who were enrolled in school in the survey reference week, the story is quite different. The bottom two lines in Figure 4 show the percent of men and women in this age group who were idle, defined as neither enrolled in school nor participating in the labor force. Young men still display an upward trend, but the share who were idle only rose from 7.3 percent to 8.9 percent from 2004 to 2016, while the trend for women is downward (from 15.8 percent to 12.1 percent).

A rise in school enrollment has therefore helped to offset much of the decline in participation. Given the significant increase in the monetary return to education that began in the early 1980s, this development could be viewed as a delayed and overdue reaction to economic incentives.

Working Age Young Men (21-30)

Aguiar, et al. (2016) highlight the rise in non-work and non-school time by young men age 21-30, especially those with less than a college education. The share of noncollege educated young men who did not work at all over the entire year rose from 10 percent in 1994 to more than 20 percent in 2015. They propose the intriguing hypothesis that the improvement in video game technology raised the utility from leisure for young men, contributing to a downward shift in labor supply and a more elastic response to wages.[12] While Aguiar and his coauthors are clear to point out that demand-side factors may also have contributed to the decline in work hours of young men, and that their estimates of the shift in the labor supply curve due to changes in leisure technology for video and computer games only account for 20 to 45 percent of the observed decline in market work hours of less educated young men, their hypothesis has generated keen interest. Here we briefly examine their video game hypothesis by comparing the self-reported emotional experience during video game playing, television watching, and all activities, as well as more standard labor force, school enrollment and time use data.

Preliminarily, we note that the CPS data indicate that from October 1994 to October 2014, the labor force participation rate of men age 21-30 fell by 7.6 points, from 89.9 percent to 82.3 percent, and this was partially offset by an increase in school enrollment. Idleness – defined as neither being enrolled in school, employed, nor looking for work – rose by 3.5 percentage points over this period.

Table 2 reports the amount of time that 21-30 year old men spent engaged in selected activities per week in 2004-07, 2008-11, and 2012-15.[13] Market work hours declined by 3.1 hours per week (9 percent) from 2004-07 to 2012-15. An increase in time devoted to education (1.3 hours), playing games (1.7 hours), and computers (0.6 hours) over this period more than offset the decline in time spent working. If we limit the sample to young men who were out of the labor force (not shown), time spent on education increased by an impressive 5.3 hours, or 38 percent. Time devoted to education activities did not increase for NLF young men with a high

[12] Technically, their time use measure pertains to all game playing. We follow their precedent of referring to the game playing activity in the ATUS as video game playing, as the increase in time devoted to this activity most likely is overwhelmingly the result of video game playing.

[13] The total amount of time per week spent in the listed activities does not add up to 168 hours because some categories, such as travel, are omitted.

school education or less, but conditioning on low education would downwardly bias any increase in school enrollment in this age group over time. Time spent playing video games by NLF young men rose from 3.6 hours per week in 2004-07 to 6.7 hours per week 2012-15, while time spent watching television fell from 23.7 to 21.7 hours over this period. As Aguiar, et al. conclude, video gaming is clearly drawing more attention from this group over time.

The 2010, 2012, and 2013 ATUS's included a supplement on subjective well-being modeled on the Princeton Affect and Time Survey (see Krueger, et al., 2009). Specifically, for three randomly selected episodes of each day, respondents were asked to report on a scale from 0 to 6, where a 0 means they did not experience the feeling at all and a 6 means the feeling was very strong, how happy, sad, tired, and stressed they felt at that time. In addition, they were asked how much pain, if any, they felt at that time, and how "meaningful" they considered what they were doing. Since television is a leisure activity that is probably a close substitute for video games, we explore the self-reported emotional experience during time spent playing video games, watching TV, and during all activities for young men.

If video game technology did indeed improve to make engaging in the activity more enjoyable, one would expect to see better emotional states (e.g., higher rating of happiness) during time spent playing video games than during time spent watching TV. Moreover, with three observations per person, it is possible to control for individual fixed effects and compare young men's reported experiences as they engage in different activities throughout the day. Table 3 shows estimates of fixed effects regressions of the various affect measures on a dummy indicating time spent playing games, watching television, and using a computer. The omitted group is all other activities. To increase the sample size, the sample consists of males age 16 to 35. The results show some evidence that episodes that involve game playing are associated with greater happiness, less sadness, and less fatigue than episodes of TV watching, although stress is higher during game playing. Game playing also appears to be a more pleasant experience than using the computer for this group. Game playing, however, is not reported as a particularly meaningful activity by participants; indeed, it is reported as less meaningful than other activities.

The ATUS also reveals that game playing is a social activity. A little over half the time that young men play video games they report that they were with someone while engaging in the activity, most commonly a friend. Furthermore, during 70 percent of the time that they were playing games they report they were interacting with someone (presumably online when they were not present). As a whole, these findings suggest that it is possible that, as Aguiar, et al. argue, improvements in video games have improved the enjoyment young men derive from leisure in a consequential way.

B. Prime Age Men

Although the participation rate of prime age men has trended down in the U.S. and other economically advanced countries for many decades, by international standards the participation rate of prime age men in the U.S. is notably low. Because prime age men have the highest labor force participation rate of any demographic group, and have traditionally been the main breadwinner for their families, much attention has been devoted to the decline in labor force participation of prime age men in the U.S.[14] Evidence in Juhn, Murphy and Topel (1991, 2002) and Abraham and Kearney (2017) suggests that the secular decline in real wages of less skilled workers is a major contributor to the secular decline in their participation rate. CEA (2016) reaches a similar conclusion, as the decline in labor force participation has been steeper for less

[14] Eberstadt (2016), for example, calls the increase in jobless men who are not looking for work "America's invisible crisis."

educated prime-age men. Figure 5 shows that participation rate of prime age men fell for men at all education levels, but by substantially more for those with a high school degree or less.

Here we highlight a significant supply-side barrier to the employment prospects of prime age men: namely, health-related problems.[15] Table 4 reports the distribution of men and women reporting their health as excellent, very good, good, fair or poor based on the 2010, 2012 and 2013 American Time Use Survey Well-being Supplement (ATUS-WB).[16] Forty-three percent of prime age men who are out of the labor force reported their health as fair or poor, compared with just 12 percent of employed men and 16 percent of unemployed men. Women who are out of the labor force are also more likely to report being in only fair or poor health compared with employed women, but the gap is smaller: 31 percent versus 11 percent. Thus, health appears to be a more significant issue for prime age men's participation in the labor force than for prime age women's, and we focus on documenting the nature, and probing the veracity, of their health-related problems in this section. While it is certainly possible that extended joblessness and despair induced by weak labor demand could have caused or exacerbated many of the physical, emotional and mental health-related problems that currently afflict many prime age men who are out of the labor force, the evidence in this section nonetheless suggests that these problems are a substantial barrier to work that would have to be addressed to significantly reverse their downward trend in participation.

Beginning in 2008, the BLS has regularly included a series of six functional disability questions in the monthly CPS. For example, the survey asks, "Is anyone [in the household] blind

[15] Coglianese (2016) finds that about half of the decline in prime age male labor force participation is due to permanent exits, and that only 20 to 30 percent of the decline is due to reduced labor demand, suggesting a major role for supply side factors.

[16] The exact question was: "Would you say your health in general is excellent, very good, good, fair or poor?" Self-reported subjective health questions have been found to correlate reasonably well with objective health outcomes in the past.

or does anyone have serious difficulty seeing even when wearing glasses?"[17] Pooling all of the data from 2008-2016, results of these questions are reported in Table 5 by labor force status for prime age men. At least one disability was reported for 34 percent of prime age men who are out of the labor force, and this figure rises to 42 percent for the subset of men age 40 to 54.[18] Perhaps surprisingly, white prime age men were more likely to report having at least one of the six conditions (35.8 percent) than were prime age African American (32.3 percent) or Hispanic (29.3 percent) men. At least one disability condition was reported for 40 percent of nonparticipating prime age men with a high school education or less. The most commonly reported disabilities were "difficulty walking or climbing stairs" and "difficulty concentrating, remembering, or making decisions"; about half reported multiple disabilities. Only 2.6 percent of employed men and 5.8 percent of unemployed men in this age group reported a disability.

Figure 6a shows the probability of being out of the labor force conditional on having a disability each year from 2008 to 2017. The probability of being out of the labor force conditional on having a disability has trended up over the last nine years, which suggests that the improvement in the job market over this period is not drawing disabled individuals back to work. Pooling all of the data together from 2008 to 2017, Figure 6b shows the probability of being out of the labor force for each of the six conditions, and for those who indicate having any of the six

[17] One could question whether this measure results in an underestimate or overestimate of the "true" disability rate. On the one hand, the list is restricted to just six conditions (for example, speech and language disorders are omitted). In addition, there could be a stigma attached to reporting physical, emotional and mental health conditions for household members. On the other hand, a disability could be self-reported because it is a more socially acceptable reason for joblessness than the alternative.

[18] A natural question is whether an increase in the number of disabled military veterans returning to civilian life has contributed to the decline in the participation rate. The short answer is that this does not appear to be the case. The share of out-of-the-labor-force prime-age men who are veterans has declined, from 11.4 percent in 2008 to 9.7 percent in 2016. Moreover, the proportion of prime age men who are veterans has trended down over the last two decades as the large cohort of Vietnam-era veterans has aged out of the prime-age category. Nevertheless, about 40 percent of veterans who are out of the labor force report a significant disability, so any strategy to assist veterans to return to the labor force would need to address disability issues.

conditions and the subset with multiple conditions. Those who have difficulty dressing, running errands, walking or concentrating have a much lower participation rate than those who are blind or have difficulty seeing or hearing.

Prevalence of Pain and Pain Medication: ATUS and CDC

For randomly selected episodes of the day, the ATUS-WB module asked respondents, “From 0 to 6, where a 0 means you did not feel any pain at all and a 6 means you were in severe pain, how much pain did you feel during this time if any?” The first row of Table 6 reports the average pain rating by labor force status (weighted by episode duration), and the second row reports the fraction of time respondents reported with a pain rating above 0, indicating the presence of some pain. The results indicate that individuals who are out of the labor force report experiencing a greater prevalence and intensity of pain in their daily lives. As a group, workers who are out of the labor force report feeling pain during about half of their time. And for those who report a disability, the prevalence and intensity of pain are higher – disabled prime age men who are out of the labor force report spending 71 percent of their time in some pain and an average pain rating of 2.8 throughout the survey day.

Comparing the daily pain ratings of employed and NLF men who report a disability indicates that the average pain rating is 89 percent higher for those who are out of the labor force. Moreover, in five of the six disability categories, reported pain is more prevalent and more intense for those who are out of the labor force than for those who are employed. These results suggest that the disabilities reported for prime age men who are out of the labor force are more severe than those reported for employed men, on average.

The ATUS-WB also asked respondents, “Did you take any pain medication yesterday, such as Aspirin, Ibuprofen or prescription pain medication?” Fully 44 percent of prime age men who were out of the labor force acknowledged taking pain medication on the previous day, although this encompasses a wide range of medications. This rate was more than double that of employed and unemployed men. (The gap was not as great for prime age women: 25.7 percent of employed women reported taking pain medication on the reference day compared with 34.7 percent of out-of-the-labor-force women.) And if we limit the comparison to men who report a disability, those who were out of the labor force were more likely to report having taken pain medication (58 percent) than were those who were employed (32 percent), again suggesting the disabilities are more severe, on average, for those who are out of the labor force. The high rate of utilization of pain medication for NLF men is possibly related to Case and Deaton's (2015; 2017) finding of a rise in mortality for middle age whites due to accidental drug poisonings, especially from opioid overdoses, from 1999 to 2013. We return to this issue below.

Since 1997, the Centers for Disease Control and Prevention's (CDC's) National Health Interview Survey (NHIS) has asked cross sections over 300,000 individuals annually whether they experienced pain in the last three months. Specifically, respondents are instructed, "Please refer to pain that LASTED A WHOLE DAY OR MORE. Do not report aches and pains that are fleeting or minor." Figure 7 displays trends in the percent of prime age men reporting pain in the last three months by labor force status.[19] (Beginning in 2005 the unemployed can be distinguished from other non-employed workers.) Although the data are volatile from year to year, there is a slight upward trend in the proportion of NLF and unemployed prime age men who report experiencing pain in the last three months. Despite the extraordinary rise in the use of opioid pain medication over this period, there is certainly no evidence of a decline in the proportion of people who report feeling pain.

[19] Any individual who reported lower back pain, neck pain, leg pain, or jaw pain is coded as having experienced pain. For details of the survey see https://www.cdc.gov/nchs/nhis/.

The NHIS data also suggest that the employment consequences of feeling pain have increased. In 1997, prime age men who reported experiencing pain in the past three months were 6 percentage point less likely to work than were those who reported that they did not experience pain; by 2015 this difference had increased to 10 percentage points.

Prescription Pain Medication, Disability and Labor Force Dropouts: Princeton Pain Survey

To better understand the role of pain and pain medication in the life of prime age men who are neither working nor looking for work, I conducted a short online panel survey of 571 NLF prime men age 25-54 using an internet panel provided by Survey Sampling Inc, henceforth called the Princeton Pain Survey (PPS).[20] The first wave of the survey was conducted over the period September 30-October 2, 2016. The results of this survey underscore the role of pain in the lives of nonworking men, and the widespread use of prescription pain medication. Fully 47 percent of NLF prime age men responded that they took pain medication on the previous day, slightly higher than but not significantly different from the corresponding figure from ATUS sample. Nearly two-thirds of those who took pain medication indicated that they took *prescription* pain medication (in 36 percent of these cases, the men reported that they also took over-the-counter pain medication); see Figure 8. Thus, on any given day, 31 percent of NLF prime age men take pain medication, most likely an opioid-based medication. And these figures likely understate the actual proportion of men taking prescription pain medication given the stigma and legal risk associated with reporting taking narcotics.

[20] We screened for men age 25-54 who did not work in the previous week, were not absent from a job, and did not search for a job in the previous week. Because the BLS definition of out of the labor force requires that individuals did not search for a job in the past four weeks, our definition is a bit less restrictive. Weights were developed to match the 2016 CPS ASEC by age group (25-40, 41-54), race and Hispanic ethnicity. Weighed percentages are reported in the text. The survey was conducted with Qualtrics software.

Forty percent of this sample of prime age men responded "Yes" when asked directly, "Does pain prevent you from working on a full-time job for which you are qualified?" Two-thirds of the men in the PPS reported that they had a disability, which is about double the rate in the CPS for NLF prime age men. The higher disability rate partly resulted because respondents could write "Other" in addition to the BLS's six conditions, and 16 percent filled out other.[21] It is also possible that men who are drawn to participate in Internet surveys are more likely to suffer a disability, or that the CPS understates the number of prime age men with a disability.

A follow-up online survey conducted July 7-14, 2017 attempted to interview the 376 respondents who continued in the SSI panel, a little over 9 months after the initial survey. A total of 156 prime age men responded to the follow-up survey, or 41 percent of those who were eligible. Six of the respondents said that they had a steady, full-time job and were dropped from the sample, so the resulting analysis sample has 150 observations. Table 7 reports a cross-tab indicating the proportion who took prescription pain medication in the preceding day in wave 1 and 2 of the survey. The cross-tab indicates the persistence of taking pain medication, which is consistent with studies that find high rates of addiction to opioid medication (add citation). Nearly 80 percent of those who took prescription pain medication in the initial survey reported taking it in the follow-up survey.

Individuals in the follow up survey were asked, "About how often would you say that you take prescription pain medication?" Almost a quarter (24 percent) responded every day, and another 18 percent said more than once a week and 3 percent said once a week. A minority, 41 percent, responded never. All respondents except those who said they never take prescription pain medication were asked, "How do you usually pay for prescription pain medication? (Mark

[21] Common write-in responses for those who marked "other" included: anxiety disorder; back pain; cancer; chronic pain; epilepsy; heart condition; and sleep disorder.

all that apply.)" Results are tabulated in Table 8. It is clear that government health insurance programs (Medicaid, Medicare, VA) play a major role in providing pain medication to this group. Two-thirds of respondents used at least one of these government programs to purchase prescription pain medication, with the largest group relying on Medicaid.

Respondents were asked, "What is the source of pain that typically causes you to take pain medication?" Overwhelmingly they selected non-work related injury over a work-related one: 88 percent to 12 percent.

In the first wave of the PPS respondents were asked about participation in various income-support programs. Table 9 provides a tabulation of responses. Half of the NLF prime age men report participating in at least one program. Thirty-five percent of NLF prime age men indicated that they were on Social Security Disability Insurance (SSDI), compared to 25 percent in the May 2012 CPS supplement. The difference is likely a result of the PPS sample being nonrepresentative, under reporting in CPS, and an increase in SSDI participation from May 2012 to July 2017. Workers' compensation insurance is a much less frequent source of income support than SSDI, consistent with work-related injuries being reported as a source of pain in only a small percentage of cases.

In the PPS follow-up survey, respondents who were not currently on SSDI were asked if they ever applied to SSDI in the past. Fully 30 percent of those asked indicated that they had previously applied to SSDI.[22] Many of these individuals could be in the process of applying to SSDI or appealing a decision, which could influence their current labor supply incentives.[23] *If*

[22] Among the subset of individuals who were not on any income-support program, 20 percent reported that they had previously applied for SSDI.
[23] The Social Security Administration advises applicants for SSDI: "If you're working and your earnings average more than a certain amount each month, we generally won't consider you to be disabled." Von Wachter, Song and Manchester (2011) find that a substantial number of male applicants age 30-44 who are rejected from SSDI tend to work post application, while relatively few rejected applicants age 45-64 are employed post application.

the fraction of NLF prime age men on SSDI is between 25 percent and 35 percent, then around half of all NLF prime age men could have applied to SSDI at some point. This suggests that the program's reach is substantially larger than previously appreciated.

The role of SSDI in reducing male labor force participation has long been debated by economists (see, e.g., Parsons, 1980 and Bound, 1989). CEA (2014) reports that the fraction of prime age men on DI rose from 1 to 3 percent between 1967 and 2014, while the labor force participation rate of this group fell by 7.5 percentage points, which suggests that DI could at most account for a quarter of the decline in participation over this period, and estimates of the causal effect of DI suggest that the availability of benefits is responsible for even less of the decline in participation. The evidence reported here on the high incidence of pain experienced by the disabled, especially those who are out of the labor force, suggests that physical and mental health ailments are a barrier to participating in many activities.[24]

C. Women

As mentioned, the aggregate labor force participation in the U.S. stopped rising after 2000 because the participation rate of women stopped rising. Starting in 2007 the participation rate began to fall for women overall, although the rate had already been declining for younger women over the previous decade. America's relative standing among economically advanced countries in terms of the participation rate of women also slipped. A particularly interesting comparison is with Canada. The participation rate of women in Canada was roughly equal to that in the U.S. in the late 1990s, but it continued to grow for another decade in Canada while it plateaued and then declined in the U.S. For prime age women, from 1997 to 2015 the

[24] See Krueger and Stone (2008) on the relationship between pain and time use.

participation rate rose from 76 percent to 81 percent in Canada while it fell from 77 percent to 74 percent in the U.S. Drolet, et al. (2016) find that participation rate of women in the U.S. declined at all education levels since the 1990s, but it declined more for women with a high school education or less, especially those age 25-44. In Canada, by contrast, the participation rate rose for all education groups.

Blau and Kahn (2013) conclude that "the expansion of 'family-friendly' policies, including parental leave and part-time work entitlements," explains 29 percent of the decrease in women's labor force participation in the U.S. relative to other O.E.C.D. countries.[25] Given that the biggest gap between women's labor force participation in Canada and the U.S. opened up among less educated women of childbearing age, who are unlikely to receive paid maternity leave and other family benefits, it is plausible that family leave policies, along with the rise in the education-income gradient in the U.S., account for a significant share of the rising gap in participation between women in the U.S. and Canada as well.[26]

There is also evidence that generational shifts, which drew increasing numbers of women into the workforce, have come to an end in the U.S.[27] This implies that the historic gains in women's labor force participation that came about by the entry of new birth cohorts and exit of older ones will no longer lead to rising participation. Figure 9 displays the labor force participation rate of five cohorts of women based on ten year-of-birth intervals over the lifecycle from age 16 to age 79 using data from the 1962 through 2016 ASEC. The age displayed along the horizontal axis refers to the age of the middle birth year of the cohort. So the 1941 birth

[25] Dahl, et al. (2016), however, find that the extension of maternity benefits from 18 to 35 weeks in Norway had little effect on labor force participation.

[26] Moffitt (2012) highlights the puzzling fact that the employment rate declined for unmarried women without children, and for higher educated women as well.

[27] See Juhn and Potter (2006) for an early discussion of this issue. Goldin and Mitchell (2017) highlight that the lifecycle labor force participation profile of women evolved from an inverted-U-shape for cohorts born before the 1950s to a fairly flat shape with a sagging middle for those born after the mid 1950s.

cohort includes women born from 1937 to 1946, the 1951 cohort includes women born 1947 to 1956, and so on. The cross cohort pattern makes clear that at all ages women in the 1951 cohort were more likely to participate in the labor force than were women who were born a decade earlier when they were the same age. The increase in participation across succeeding cohorts was particularly evident for women age 21-45. But the cohort lifecycle profiles essentially stopped rising after the 1961 cohort, and women born in the five years surrounding 1981 were actually less likely to work at a given age than were women born a decade earlier. And while it is impossible to separate out calendar time, age and birth year effects, these generational developments are unlikely to represent time effects because they have been occurring over several years, and because participation is not very sensitive to the business cycle.

The cohort pattern in Figure 9 also helps explain another anomaly: Why it is that women age 55 to 64 exhibited the biggest break from trend over the last decade, as shown in Appendix Figure A15. The answer appears to be that as women born in the late 1940s and early 1950s aged out of the 55-64 year old bracket, they were replaced by a succeeding generation of women who had about the same level of participation as the 1947-56 birth cohort when they were both in their late 40s and early 50s. An implication of this pattern is that a continuation of the sharp rise in participation over recent decades for women age 65 and over evident in Figure A16 is likely in jeopardy, as the 1950s birth cohort gives way to the 1960's birth cohort that had roughly the same labor force participation rate in midlife.

The finding that the cohort participation profiles stopped rising for younger women age 21 to 40, who are much more likely to be engaged in raising a family, highlights the potential for workplace flexibility and family friendly policies to raise participation in the future. Clearly, the

U.S. can no longer rely on the past tendency of succeeding generations of women to enter the labor force at earlier ages to lift the aggregate participation rate in the future.

NLF and Not Mainly Taking Care of Home Responsibilities

An important distinction for women non-labor force participants involves those who say they are not working primarily because they are taking care of home responsibilities, and those who are not working for other reasons. In 1991, 77 percent of NLF prime age women were not working because of home responsibilities, and in 2015 that figure had declined to 60 percent according to CPS and ASEC data. (Note that these questions on labor force participation relate to the calendar year, as opposed to the survey reference week.) Among those who cited a reason *other than* home responsibilities as the main reason for not working, the rise in nonparticipation for women parallels that of men (see Figure 10).[28] Excluding those who cite home responsibilities, the distribution of reasons for not working for women roughly equals that of men as well, with disability/illness representing the largest category. As we shall see below, the distinction between home responsibilities and other reasons also has a meaningful effect on subjective wellbeing for NLF women.

D. Retirees

As emphasized in Section II, a major reason for the decline in labor force participation after 2007 is that the large baby boom cohort started to reach retirement age, as had long been expected. Those born in 1946, at the beginning of the baby boom, would have qualified for Social Security retirement benefits starting in 2008.

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[28] Steve Hipple of BLS generously shared these tabulations with me. Also see Frank Lysy's blog post for an analysis of these data: https://aneconomicsense.org/2016/10/14/the-structural-factors-behind-the-steady-fall-in-labor-force-participation-rates-of-prime-age-workers/.

Further evidence of the profound effect of retirements on the U.S. workforce is in Figure 11, which shows the percentage of individuals age 16 and older who are classified as retired in the CPS.[29] The share of the 16+ population that was retired hovered around 15 percent from 1994 to 2007, and then rose from 15.4 percent to 17.6 percent from 2007 to 2017. The 2.2 percentage point rise in the retirement rate over this period almost matches the 2.8 percentage point drop in the labor force participation rate. By gender, the retirement rate increased by 2.2 percentage points for men and 2.1 percentage points for women since 2007. Since retirements tend to be permanent exits from the labor force, and the main reason for the decline in labor force participation over the past decade is the increasing number of retirements due to the aging of the baby boom generation, this is another reason to expect relatively little cyclical recovery in labor force participation in the near term.

IV. Subjective Well-Being

This section evaluates the self-reported subjective well-being (SWB) of various demographic groups by labor force status. A comparison of SWB across labor force groups is of interest for two reasons. First, low levels of SWB can point to social problems for particular groups and potentially large welfare gains from successful interventions. Second, if a group that is out of the labor force exhibits a high degree of SWB it is probably unlikely that they are severely discontent with their situation, and eager to change labor force status. Of course, SWB is difficult to measure and compare across individuals, so the usual caveats when using SWB measures apply.

[29] This is based on the EMPSTAT variable in the IPUMS data.

Two types of measures of SWB are available from the ATUS-WB module. The first is the Cantril Ladder, a self-anchoring scale which asks respondents to evaluate their life in general, and was included in the 2012 and 2013 waves of the survey.[30] The exact question wording was:

> Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you.
>
> If the top step is 10 and the bottom step is 0, on which step of the ladder do you feel you personally stand at the present time?

The second measure is the affective rating of randomly selected episodes of the day. This includes ratings of happiness, sadness, stress, pain, meaningfulness and tiredness on a 0 to 6 scale. We compute the duration-weighted average of these affect measures as well as the U-index. The U-index is defined here as the percent of time in which the rating of sadness or stress exceeds the rating of happiness. Kahneman and Krueger (2006) emphasize that the U-index is robust if respondents interpret the scales differently, as long as they apply the same monotonic transformation to positive and negative emotions.

The measures are summarized in Tables 10a-10d for men and 11a-11d for women. The second to last row of the tables reports the mean Cantril ladder rating for each group. Figures 12a-12d further show cumulative distributions of the Cantril ladder for each group, where the horizontal axis is arrayed in reverse numerical order (from 10 to 1) so that distributions that lie above lower ones totally dominate in terms of the ladder of life.

A few findings are noteworthy. First, young men and women who are out of the labor force seem remarkably content with their lives. As a group, young people who are not participating in the labor force report that their lives are on a higher step of the Cantril ladder of

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[30] See Deaton and Kahneman (2010) for a comparison of the correlates of the Cantril ladder and daily emotional well-being. They find that the Cantril ladder is more strongly correlated with education and income, while daily emotional well-being is more closely correlated with loneliness and health.

the best possible life than do similarly aged individuals who are employed. On a moment-to-moment basis, there are only small and typically statistically insignificant differences in the duration-weighted average reported emotions across the employed, unemployed and out of the labor force youth. The only statistically significant difference related to sadness: unemployed youth reported being sadder over the course of the day than the employed or NLF youth.

Second, unlike youth, prime age men who are employed are considerably more satisfied with their lives in general than are men who are out of the labor force or unemployed. Prime age men who are out of the labor force report themselves between employed men and unemployed men on the Cantril ladder of life, but closer to the unemployed men. The emotional experiences over the course of the day, however, indicate that NLF men are less happy, more sad, and more stressed than unemployed men, reversing the ranking from the Cantril ladder. Moreover, the U-index (which measures unpleasant time but omits pain) is considerably higher for NLF men than for unemployed men. This reversal suggests that there may be more adaptation in terms of overall quality of life expectations for NLF men than there is in terms of their moment-to-moment experience. In other words, prime age men who are out of the labor force, who often have a significant disability, may have lowered their views of the best possible life they could expect, and reported their step on the Cantril ladder in relation to this compressed ladder, while their reporting of emotional experience was not recalibrated with respect to expectations. If this is the case, then the low subjective well-being of prime age NLF men should be an even bigger social concern based on the emotional data than on the ladder of life data.[31]

[31] For the sample of 21-30 year old men who were out of the labor force we found that the Cantril ladder was closer to employed men than to unemployed men, but the U-index indicated that they had much lower emotional experience than employed and unemployed men.

One factor that likely contributes to the low level of emotional well-being of NLF prime age men is the relatively high amount of time they spend alone. Prime age NLF men spend nearly 30 percent of their time alone, compared with 18 percent for employed prime age men, 17 percent for prime age employed women, and 19 percent for prime age NLF men. Deaton and Kahneman (2010) found that alone time correlated more strongly with daily emotional well-being, while income and education correlated more strongly with evaluative well-being.

Third, unlike men, the SWB of prime age women who are out of the labor force is closer to that of employed women than it is of unemployed women. In fact, the U-index is lower for prime age NLF women than for employed prime age women. NLF women report higher levels of happiness and sadness but less stress than employed women. Unlike men, women who are out of the labor force report deriving considerable meaning from their activities. These results do not paint a picture where women as a group who are out of the labor force, as a group, are discontent with their lives or daily routines, and therefore eager to return to work.

Fourth, NLF prime age women who are not working for reasons other than taking care of home responsibilities report notably lower levels of subjective wellbeing than other NLF women and employed women. The U-index for NLF women who are not employed for a reason other than taking care of home responsibilities is 0.19, as compared to 0.09 for NLF women who are not employed because they are taking care of home responsibilities, and 0.17 for employed and unemployed women. Additionally, NLF prime age women who are not employed for a reason other than home responsibilities report a much lower average step on the Cantril ladder (6.4) and much greater incidence of pain and use of pain medication (49 percent took pain medication in the preceding day compared to 21 percent of other NLF women). Thus, NLF women are a bifurcated group, with those who cite home responsibilities as the reason they are not employed reporting high levels of SWB and meaning in their lives, and those who are NLF for other reasons expressing high levels of distress and discomfort.

Lastly, women age 55-70 appear to be similar to prime age women in that the NLF group reports about equal contentment with their lives as a whole and daily emotional experiences as employed women. Unemployed 55-70 year old women, however, appear quite unhappy and dissatisfied with their lives. Men in the 55-70 year old group who are unemployed also appear to be quite dissatisfied and unhappy with their lives compared with employed men the same age, while NLF men appear midway between employed and unemployed men in terms of the Cantril ladder. Men who are out of the labor force express relatively low levels of meaning in their daily activities, but their U-index indicates less time spent in an unpleasant state than employed or unemployed men.

V. Pain Medication, Opioid Proliferation, and Labor Force Participation

J.D. Vance (2016) warns that, "An epidemic of prescription drug addiction has taken root." Many alarming statistics bear out his fear. According to the CDC, sales of prescription opioid medication per capita increased by 356 percent from 1999 to 2015.[32] More than one in five individuals insured by Blue Cross and Blue Shield received an opioid prescription in 2015.[33] Enough opioid medication is dispensed annually to keep every man, woman and child on painkillers for a month (Doctor and Menchine, 2017). The number of deaths from opioid overdoses quadrupled from 1999 to 2015. In 2015, more than 33,000 Americans died from opioid overdose, more than double the number murdered in homicides. An estimated one in

[32] See https://www.cdc.gov/vitalsigns/opioids/images/graphic-a-1185px.png.

[33] See http://www.nbcnews.com/storyline/americas-heroin-epidemic/lots-americans-prescribed-opioids-insurance-survey-shows-n777906.

every 550 patients who started on opioid therapy died from an opioid-related cause, with the median fatality occurring within 2.6 years of the initial prescription (Frieden and Houry, 2016). Fully 44 percent of Medicare recipients under age 65 were prescribed opioid medication in 2011 (Morden, et al., 2014). And despite the rapid diffusion of opioid medication in the U.S., there is little evidence showing that opioid treatment is efficacious in reducing pain or improving functionality. In fact, Frieden and Houry (2016; pp. 1501-02) note that "several studies have showed that use of opioids for chronic pain may actually worsen pain and functioning, possibly by potentiating pain perception."

The opioid crisis preceded the Great Recession -- indeed, opioid prescriptions fell from 2010 to 2015 -- and varying prescription rates are probably rooted in changing medical practices and norms, and more aggressive pharmaceutical companies' marketing strategies (Doctor and Menchine, 2017; Satel, 2017). Doctor training also seems to affect opioid prescription rates. Schnell and Currie (2017), for example, find that doctors from the lowest ranked medical schools write 33 times more opioid prescriptions per year than do doctors from the highest ranked schools, holding constant county and type of medical practice fixed effects. Krause and Sawhill (2017) find that, "The ten counties with the highest prime-age male mortality rates due to these 'deaths of despair' [alcohol, suicide, and accidental poisonings] in the CDC database had an average prime-age male participation rate of 73 percent in 2014, compared to 88 percent for the prime-age male population across the country." Although the direction of causality is unclear, Mericle (2017) notes, "The opioid epidemic is intertwined with the story of declining prime-age participation, especially for men, and this reinforces our doubts about a rebound in the participation rate."

There is a clear regional pattern to opioid prescription rates and drug overdoses. The average quantity of opioids prescribed per capita varies by a factor of 31 to one in the top 10 percent of counties relative to the bottom ten percent of counties, according to CDC data. Across states, per capita prescription rates vary by a factor of three to one. The CDC argues that, "Health issues that cause people pain do not vary much from place to place, and do not explain this variability in prescribing."[34] This section probes the connection between the use of pain medication and local opioid prescription rates, controlling for individual health conditions and other characteristics. Consistent with the CDC's assertion, evidence suggests that local opioid prescription practices influence the use of pain medication, conditional on individuals' disability status, self-reported health, and demographic characteristics. Leveraging local differences in prescription rates, labor force regressions indicate that the participation rate is lower and fell more in counties where more opioids were prescribed, controlling for the area's share of manufacturing employment and individual characteristics.

Use of Pain Medication and Opioid Prescription Practices

To explore the relationship between local medical practices and the use of pain medication, county-level data on the volume of opioid prescriptions per capita in 2015 from CDC were merged to the ATUS-WB supplements, which include data on whether individuals took any pain medication in the preceding day.[35] Opioid prescriptions are measured by Morphine Milligram Equivalent (MME) units prescribed per capita, which is a standard way of

[34] See https://www.cdc.gov/drugoverdose/data/prescribing.html.

[35] Specifically, CDC data on MME per capita were merged to the ATUS based on county FIPS codes. If the FIPS code was missing for a metropolitan area in the ATUS, the average MME for the counties that comprised that metro area was matched to the ATUS, and if an individual was not residing in a metro area and lacked a FIPS code in ATUS he or she was linked to the average MME per capita in non-metro areas in the balance of the state.

aggregating different opioid medications. To ease the interpretation, we take the logarithm of MME units per capita in the county.[36]

Table 12 summarizes results of linear probability models predicting whether an individual took pain medication in the preceding day as a function of opioid prescription rates in the area, functional disability status, self-reported overall health, and personal characteristics. Not surprisingly, in areas where more opioids are prescribed, individuals are more likely to report that they took pain medication on the preceding day. In column 1, a 10 percent increase in the amount of opioids prescribed per capita is associated with a 0.6 percentage point, or 2 percent, increase in the share of individuals who report taking a pain medication on any given day.[37] This effect is cut roughly in half but remains highly statistically significant when controls are added for functional disabilities, self-reported health and demographic characteristics (column 5). Even within detailed regions, the area-wide prescription rate is a significant predictor of whether individuals took pain medication in the preceding day (column 6). These findings support the CDC's view that differences in health conditions do not vary enough across areas to explain the large cross county differences in the use of pain medication.

Opioid Prescription Rates and Labor Force Participation

Next we link 2015 county-level opioid prescription rates (MME per capita) to individual-level labor force data from the CPS in 1999-2001 and 2014-16.[38] Table 13a reports estimates of

[36] Although one might expect a one-to-one correspondence between opioid prescription rates and the use of pain medication absent other controls, there are two important reasons why such a direct relationship does not hold in these data: first, the dependent variables includes many forms of pain medication in addition to opioids; second, the independent variable reflects dosage as well as usage, whereas the dependent variable only reflects usage.

[37] If separate regressions are estimated for men and women, the coefficient on log opioids per capita is larger for men than for women, but the differences are not statistically significant.

[38] To be more precise, in 41 percent of observations opioid prescriptions per capita could be matched directly at the county level; in 34 percent of observations we had to aggregate over counties to match at the metropolitan or central city level; and in the remainder of cases we used the average of counties in the balance of the state. For simplicity, we refer to these areas as counties.

linear probability models for prime age men where the dependent variable is 1 if an individual participates in the labor force and 0 if he does not. Table 13b has comparable estimates for prime age women. A dummy variable indicates the 2014-16 time period.

Consider first the results for men. Column 1 indicates that the labor force participation rate fell by 3.2 percentage points for men from 1999-2001 to 2014-16. Column 2 adds the opioid prescription rate for 2015 and column 3 adds an interaction between the opioid prescription rate and the 2014-16 time period dummy variable. Both of these additional variables are negative and significant, indicating that labor force participation is lower in areas of the U.S. with a high rate of opioid prescriptions, and labor force participation fell more over this 15 year period in areas with a high rate of opioid prescriptions. These conclusions continue to hold when additional variables are included in the model, including demographics, eight Census region indicators, the share of employment in the county employed in manufacturing in 1999-2001, and the manufacturing share interacted with the 2014-16 time period dummy.[39] We continue to find a negative and statistically significant interaction between the 2014-16 time period and opioid prescriptions when unrestricted county/area dummies are included in column 7 to absorb persistent area effects. The fact that the coefficients on the opioid prescription variables are unchanged when the manufacturing variables are included in the regression in column (6) suggests that the opioid crisis is occurring in areas outside of traditional manufacturing strongholds. And we find similar results (in regression not shown here) if we use the Autor, Dorn and Hanson (2013) China import exposure variables in place of the share in manufacturing.

[39] The manufacturing share of employment in 1999-2001 was calculated with the CPS, and merged on based on country (where available), metropolitan area (where country was not available) or state (where county and metropolitan area were not available).

These regressions are difficult to interpret for a number of reasons, but if cross-county differences in opioid prescription rates can be taken as an exogenous result of differences in medical practices and norms conditional on personal characteristics and broad region dummies, the effect of the growth in opioid prescriptions on labor force can be estimated. In particular, I assume that the based opioid prescription rate coefficient reflects inherent differences across regions, and the interaction between prescriptions and time captures the effect of changes in prescriptions on labor force participation over time. This is a big leap, and ideally I would have preferred to have a baseline measure of prescriptions (country-level MME data are unavailable before 2010), so this calculation is at best considered illustrative. These caveats aside, opioid prescriptions per capita increased by a factor of 3.5 nationwide between 1999 and 2015, which is the equivalent of 0.55 log units. Multiplying 0.55 by the coefficient on the interaction between opioids and the second period (.011), suggests that the increase in opioid prescriptions could account for perhaps a 0.6 percentage point decline in male labor force participation, which is 20 percent of the observed decline in this period.

The results for women indicate a similar coefficient for the interaction term between time and county-level opioid prescription rates, but the base opioid prescription rate is positive. If the preceding calculation is conducted for women, about one quarter of the decline in labor force participation can be accounted for by the growth in opioid prescriptions.

An obvious concern about the labor force regressions is that omitted variables, such as workers' health conditions that cause pain and demand for pain medication, are correlated with county-level opioid prescription rates. Although the basic monthly CPS does not include information on health, the CPS ASEC surveys do include information on self-reported health. If we estimate the labor force regressions pooling together men and women using this (smaller) sample and control for self-reported health, the county-level opioid prescription rate has a similar effect as in the larger basic monthly CPS data. It is also worth noting that Laird and Nielsen (2017), using arguably exogenous variation in physicians' practices stemming from geographic mobility across municipalities, find a significant and sizable negative effect of the opioid prescription rate – but not other medications – on labor force participation in Denmark.[40]

These findings are preliminary and highly speculative. A useful extension of this analysis would be to determine whether higher prescription rates are associated with depressed flows of workers from outside the labor force back into the labor force, or with greater labor force exit rates. In addition, future work could seek to identify sources of exogenous variability in prescription rates, or in treatment for opioid addiction, to estimate the causal effect of opioid medication on labor force participation.

VI. Conclusion

The decline in labor force participation in the U.S. over the past two decades is a macroeconomic problem and a social concern. Along with several other studies, this study finds that declining labor force participation since 2007 is largely a result of an aging population and ongoing trends that preceded the Great Recession, such as increased school enrollment.

Given ongoing downward pressure on labor force participation from an expected wave of retirements among members of the baby boom generation, and the fact that a substantial cyclical rebound in labor force participation is unlikely, a reversal in the slide in participation will require

[40] Although it is difficult to compare the magnitudes that Laird and Nielson find with those reported here because Laird and Nielsen focus on opioid prescription rates (rather than amount prescribed per capita), their estimates imply large labor force effects that appear substantially larger than those reported here. They find that a 10 percentage point increase in a doctor's prescription rate, which is roughly a 50 percent increase from the current U.S. average, is associated with a 1.5 percentage point decline in the labor force participation rate.

a change in secular trends affecting various demographic groups, and perhaps a major reform in immigration policy. There are a few demographic groups that may be more susceptible to a rise in labor force participation than others. First, older workers may increasingly delay retirement, bolstering their rise in labor force participation that has occurred over the past two decades. This trend may not continue for older women, however, as a cross cohort analysis shows that labor force participation stopped rising for cohorts that are about to enter their late 50s and 60s.

Second, labor force participation of women age 25 to 44 has been edging down for two decades, unlike their counterparts in Canada. While NLF women who report that their primary activity is taking care of home responsibilities appear satisfied with their lives, the group of women who are out of the labor force for other reasons report low levels of life satisfaction and high levels of emotional distress. More generous leave time and workplace flexibility provided by private company policies and supported by government policies could possibly help reverse the decline in labor force participation by prime age women. Corporate and government policies that promote equal pay and the advancement of working women to supervisory and managerial positions, as well as a more robust economic recovery, may also facilitate such a reversal.

Third, addressing the decades-long slide in labor force participation by prime age men should be a national priority. This group expresses low levels of SWB and reports finding relatively little meaning in their daily activities. Because nearly half of this group reported being in poor health, it may be possible for expanded health insurance coverage and preventative care under the Affordable Care Act to positively affect the health of prime age men going forward. The finding that nearly half of NLF prime age men take pain medication on a daily basis and that 40 percent report that pain prevents them from accepting a job suggests that pain management interventions could potentially be helpful.

Evidence presented here suggests that much of the regional variation in opioid prescription rates across the U.S. is due to differences in medical practices, rather than varying health conditions that generate pain. Furthermore, labor force participation is lower and fell more in the 2000s in areas of the U.S. that have a higher volume of opioid medication prescribed per capita than in other areas. Although some obvious suspects can be ruled out – for example, areas with high opioid prescription rates do not appear to be only masking historical manufacturing strongholds that subsequently fell on hard times – it is unclear whether other factors underlying low labor force participation could have caused the high prescription rates of opioids in certain counties. Regardless of the direction of causality, the opioid crisis and depressed labor force participation are now intertwined in many parts of the U.S. And despite the massive rise in opioid prescriptions in the 2000s, there is no evidence that the incidence of pain has declined; in fact, the results presented here suggest a small upward trend in the incidence of pain for prime age NLF and unemployed men. Addressing the opioid crisis could help support efforts to raise labor force participation and prevent it from falling further.

Lastly, several studies have found that the rise in inequality and shift in demand against less skilled workers in the U.S. are linked to the decline in labor force participation. Although labor market shifts that have lowered demand and wages for less skilled workers have not been a focus of this study, policies that raise after-tax wages for low-wage workers, such as an increase in the minimum wage or expansion of the Earned Income Tax Credit, would also likely help raise labor force participation. And the enormous rise in incarceration from the 1980s to the midd-2000s and rise in males with criminal records are also likely factors that contributed to the decline in male labor force participation and that could be addressed to reverse the trend.

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Table 1: Labor Force Participation Rates and Population Shares for Selected Demographic Groups

	Labor Force Participation Rate (%)			Share of Population (%)		
	1997	2007	2017:H1	1997	2007	2017:H1
Total	67.1	65.6	62.8	100.0	100.0	100.0
Men						
16-17 Years	41.3	28.7	22.9	2.0	2.1	1.8
18-19 Years	63.9	55.2	47.5	1.9	1.8	1.6
20-24 Years	82.5	78.5	73.6	4.3	4.5	4.2
25-34 Years	92.9	92.2	88.9	9.6	8.2	8.5
35-44 Years	92.5	92.2	90.8	10.7	8.8	7.7
45-54 Years	89.4	88.2	86.2	8.0	9.1	8.1
55-64 Years	67.6	69.6	70.4	5.1	6.8	7.9
65 Years & Over	17.1	20.5	23.9	6.6	6.9	8.6
Women						
16-17 Years	41.0	30.7	24.8	1.9	2.0	1.8
18-19 Years	61.2	53.7	47.5	1.8	1.7	1.5
20-24 Years	72.6	70.0	68.2	4.3	4.4	4.2
25-34 Years	76.0	74.4	75.3	9.9	8.5	8.7
35-44 Years	77.7	75.5	74.8	10.9	9.2	8.0
45-54 Years	76.0	76.0	74.4	8.4	9.6	8.4
55-64 Years	50.9	58.3	58.9	5.5	7.4	8.5
65 Years & Over	8.6	12.6	15.8	9.1	9.1	10.7
Aggregate of Demographic Groups						
$\Sigma_i \ \ell_{i,t} \times w_{i,1997}$	67.1	66.5	65.6	—	—	—
$\Sigma_i \ \ell_{i,t} \times w_{i,2017:H1}$	63.3	63.4	62.8	—	—	—

Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June.

Source: Bureau of Labor Statistics; author's calculations.

Table 2: Time Spent in Selected Activities by Men Ages 21-30

	Average Number of Hours Spent Per Week			
Activity	**2004-2007**	**2008-2011**	**2012-2015**	**Change From 2004-2007 to 2012-2015**
Sleeping	60.62	60.54	61.40	0.78
Work (Including Commuting)	34.02	33.02	30.89	-3.13
Watching TV	17.20	16.71	16.99	-0.21
Eating and Drinking	7.42	7.48	7.39	-0.03
Grooming	3.91	4.07	4.05	0.14
Socializing	4.66	4.71	5.16	0.50
Food/Drink Preparation	1.13	1.42	1.64	0.51
Cleaning	1.41	1.57	1.37	-0.05
Reading	0.85	0.74	0.95	0.10
Shopping	2.04	1.85	1.79	-0.25
Laundry	0.40	0.45	0.56	0.16
Relaxing/Thinking	1.44	1.38	1.51	0.07
Gardening	0.67	0.72	0.74	0.08
Child Care	2.25	2.39	1.95	-0.30
Education	3.35	3.79	4.66	1.32
Adult Care	0.78	0.67	0.63	-0.14
Computer Use	1.25	1.56	1.86	0.60
Playing Games	2.05	3.28	3.72	1.67
Number of Respondents	2,705	2,638	2,308	

Note: Sample is pooled from 2004 to 2015. Data are weighted using final weights. Averages include respondents who reported no time spent on an activity.

Source: Bureau of Labor Statistics (American Time Use Survey).

Table 3: Regressions of Various Affect Measures on Activity Indicator Variables and Person Fixed Effects for Men Ages 16-35

	Dependent Variable: Affect Measure					
	Happy (1)	**Sad (2)**	**Stress (3)**	**Tired (4)**	**Pain (5)**	**Meaning (6)**
Constant	4.168	0.523	1.540	2.208	0.582	4.209
	(0.021) ***	(0.017) ***	(0.023) ***	(0.024) ***	(0.013) ***	(0.027) ***
Gaming Indicator Variable	0.567	-0.215	-0.235	-0.022	0.014	-0.860
	(0.104) ***	(0.109) **	(0.123) *	(0.209)	(0.052)	(0.231) ***
TV Indicator Variable	0.085	-0.100	-0.627	0.359	-0.052	-0.921
	(0.070)	(0.064)	(0.086) ***	(0.084) ***	(0.047)	(0.095) ***
Computer Indicator Variable	-0.413	0.016	-0.321	0.218	-0.252	-1.112
	(0.154) ***	(0.078)	(0.152) **	(0.181)	(0.120) **	(0.225) ***
Person Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	12,603	12,618	12,621	12,618	12,621	12,594
Test of Equality of Indicator Variables:						
p-value: Gaming = TV	0.000	0.297	0.005	0.075	0.255	0.809
p-value: Gaming = Computer	0.000	0.067	0.651	0.365	0.030	0.421

Levels of significance: *** = 0.01, ** = 0.05, * = 0.10.

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013. Regressions are weighted using Well-Being Module adjusted annual activity weights.

Source: Bureau of Labor Statistics (American Time Use Survey); author's calculations.

Table 4: Self-Reported Health Status for Workers Ages 25-54 by Labor Force Status

	Employed (%)	Unemployed (%)	Not in Labor Force (%)
Men			
Excellent	20.0	19.5	12.3
Very Good	36.3	29.2	20.6
Good	31.9	35.1	24.4
Fair	10.7	13.9	25.4
Poor	1.2	2.3	17.3
Number of Respondents	7,277	468	683
Women			
Excellent	20.9	16.3	16.6
Very Good	37.0	25.6	24.0
Good	30.9	36.3	28.0
Fair	10.0	18.1	19.3
Poor	1.1	3.7	12.1
Number of Respondents	7,453	637	2,265

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013 for individuals ages 25-54. Data are weighted using Well-Being Module final weights.

Source: Bureau of Labor Statistics (American Time Use Survey); author's calculations.

Table 5: Disability Rate for Men Ages 25-54 Conditional on Labor Force Status

	Employed (%)	Unemployed (%)	Not in Labor Force (%)
Specific Disability:			
Difficulty Dressing or Bathing	0.2	0.4	7.4
Deaf or Difficulty Hearing	0.9	1.5	4.0
Blind or Difficulty Seeing	0.4	1.0	4.0
Difficulty Doing Errands Such as Shopping	0.3	0.9	14.9
Difficulty Walking or Climbing Stairs	0.8	2.1	19.6
Difficulty Concentrating, Remembering, or Making Decisions	0.8	2.6	16.5
Any Disability	2.6	6.0	33.7
Multiple Disabilities	0.5	1.6	18.6
Number of Respondents	2,130,004	143,446	280,772

Note: Sample is monthly Current Population Survey data pooled from January 2009 to May 2017 for men ages 25-54. Specific disabilities are not mutually exclusive.

Source: Bureau of Labor Statistics (Current Population Survey).

Table 6: Prevalence of Pain and Pain Medication for Men Ages 25-54 by Labor Force Status

	Employed	Unemployed	Not in Labor Force
All Men Ages 25-54			
Average Pain Rating (0-6)	0.76	0.82	1.92
Time Spent With Pain > 0	29.6 %	26.3 %	51.6 %
Took Pain Medication Yesterday	20.2 %	18.9 %	43.5 %
Number of Respondents	7,277	468	683
Disabled Men Ages 25-54			
Average Pain Rating (0-6)	1.49	1.25	2.81
Time Spent With Pain > 0	52.3 %	42.1 %	70.9 %
Took Pain Medication Yesterday	32.4 %	12.4 %	57.7 %
Number of Respondents	191	25	276

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013 for men ages 25-54. Data are weighted using Well-Being Module adjusted annual activity weights.

Source: Bureau of Labor Statistics (American Time Use Survey).

Table 7: Share of Men Ages 25-54 Taking Prescription Pain Medication

	Survey Wave 2	
Survey Wave 1	**No**	**Yes**
No	64.9 %	8.1 %
Yes	6.1 %	20.9 %

Note: Sample is 150 respondents. Data are weighted using survey weights that have been adjusted to match age, race, and ethnicity figures from the March 2016 Annual Social and Economic Supplement to the Current Population Survey.

Source: Princeton Pain Survey.

Table 8: Shares of Men Ages 25-54 Taking Prescription Pain Medication by Methods of Payment

Pay by Myself, Out of Pocket	24.7 %
Private Health Insurance	13.0 %
Medicaid	37.7 %
Medicare	29.2 %
Veterans Affairs / Tricare	9.6 %
Other	10.3 %

Note: Sample is 94 respondents. Veterans Affairs and Tricare were not explicit categories, but were often listed if the respondent selected "Other"; so they were moved from "Other" to a separate category. Data are weighted using survey weights that have been adjusted to match age, race, and ethnicity figures from the March 2016 Annual Social and Economic Supplement to the Current Population Survey.

Source: Princeton Pain Survey.

Table 9: Shares of Men Ages 25-54 by Participation in Income Support Programs

Workers' Compensation	1.8 %
Social Security Disability Insurance	35.0 %
Supplemental Security Income	10.1 %
Veterans Disability Compensation	6.0 %
Disability Insurance	5.2 %
Other	2.4 %
None	49.6 %

Note: Sample is 571 respondents. The order of response categories, except for "Other" and "None," were randomized across respondents. Data are weighted using survey weights that have been adjusted to match age, race, and ethnicity figures from the March 2016 Annual Social and Economic Supplement to the Current Population Survey.

Source: Princeton Pain Survey (September 30, 2016-October 2, 2016).

Table 10(a): Subjective Well-Being for Men Ages 16-70

	All	Employed	Unemployed	Not in Labor Force	p-value
Happy	4.22	4.23	4.23	4.17	0.429
Tired	2.17	2.20	1.87	2.19	0.000
Stressed	1.43	1.49	1.39	1.27	0.000
Sad	0.60	0.54	0.68	0.75	0.000
Pain	0.87	0.73	0.86	1.31	0.000
Meaningful	4.17	4.24	4.04	3.96	0.000
U-Index	0.13	0.13	0.13	0.13	0.799
Cantril Ladder	6.98	7.08	6.29	6.89	0.000
Total Number of Activities	41,136	29,818	2,815	8,503	

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013. Emotional affects and U-Index weighted using Well-Being Module adjusted annual activity weights. Cantril Ladder question was asked in 2012 and 2013 and was weighted using Well-Being Module final weights. Each respondent was asked about three activities in Well-Being Module. p-value is from an F-test that the means for all three labor force statuses are equal.

Source: Bureau of Labor Statistics (American Time Use Survey).

Table 10(b): Subjective Well-Being for Men Ages 16-24

	All	Employed	Unemployed	Not in Labor Force	p-value
Happy	4.23	4.25	4.30	4.16	0.570
Tired	2.24	2.23	2.23	2.27	0.935
Stressed	1.19	1.24	1.18	1.12	0.492
Sad	0.42	0.39	0.59	0.38	0.087
Pain	0.46	0.44	0.58	0.43	0.303
Meaningful	3.75	3.85	3.69	3.60	0.155
U-Index	0.11	0.12	0.09	0.10	0.314
Cantril Ladder	7.06	6.94	6.81	7.36	0.028
Total Number of Activities	4,723	2,294	842	1,587	

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013. Emotional affects and U-Index weighted using Well-Being Module adjusted annual activity weights. Cantril Ladder question was asked in 2012 and 2013 and was weighted using Well-Being Module final weights. Each respondent was asked about three activities in Well-Being Module. p-value is from an F-test that the means for all three labor force statuses are equal.

Source: Bureau of Labor Statistics (American Time Use Survey).

Table 10(c): Subjective Well-Being for Men Ages 25-54

	All	Employed	Unemployed	Not in Labor Force	p-value
Happy	4.18	4.20	4.25	3.95	0.010
Tired	2.23	2.25	1.51	2.52	0.000
Stressed	1.59	1.57	1.56	1.81	0.038
Sad	0.62	0.55	0.74	1.15	0.000
Pain	0.87	0.76	0.82	1.92	0.000
Meaningful	4.24	4.27	4.23	3.92	0.002
U-Index	0.15	0.14	0.17	0.22	0.002
Cantril Ladder	6.87	7.03	5.69	6.08	0.000
Total Number of Activities	25,079	21,661	1,393	2,025	

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013. Emotional affects and U-Index weighted using Well-Being Module adjusted annual activity weights. Cantril Ladder question was asked in 2012 and 2013 and was weighted using Well-Being Module final weights. Each respondent was asked about three activities in Well-Being Module. p-value is from an F-test that the means for all three labor force statuses are equal.

Source: Bureau of Labor Statistics (American Time Use Survey).

Table 10(d): Subjective Well-Being for Men Ages 55-70

	All	Employed	Unemployed	Not in Labor Force	p-value
Happy	4.31	4.36	4.06	4.27	0.086
Tired	1.95	1.99	1.78	1.92	0.373
Stressed	1.27	1.37	1.38	1.12	0.002
Sad	0.70	0.60	0.81	0.83	0.001
Pain	1.19	0.85	1.81	1.60	0.000
Meaningful	4.41	4.50	4.57	4.26	0.001
U-Index	0.11	0.12	0.14	0.10	0.348
Cantril Ladder	6.84	6.98	5.55	6.19	0.000
Total Number of Activities	10,796	5,812	538	4,446	

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013. Emotional affects and U-Index weighted using Well-Being Module adjusted annual activity weights. Cantril Ladder question was asked in 2012 and 2013 and was weighted using Well-Being Module final weights. Each respondent was asked about three activities in Well-Being Module. p-value is from an F-test that the means for all three labor force statuses are equal.

Source: Bureau of Labor Statistics (American Time Use Survey).

Table 11(a): Subjective Well-Being for Women Ages 16-70

	All	Employed	Unemployed	Not in Labor Force	p-value
Happy	4.35	4.31	4.34	4.43	0.002
Tired	2.50	2.53	2.25	2.48	0.009
Stressed	1.61	1.68	1.61	1.46	0.000
Sad	0.65	0.58	0.77	0.76	0.000
Pain	1.00	0.82	0.99	1.35	0.000
Meaningful	4.38	4.38	4.38	4.39	0.900
U-Index	0.15	0.16	0.16	0.14	0.002
Cantril Ladder	6.98	7.08	6.29	6.89	0.000
Total Number of Activities	49,408	31,022	3,130	15,256	

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013. Emotional affects and U-Index weighted using Well-Being Module adjusted annual activity weights. Cantril Ladder question was asked in 2012 and 2013 and was weighted using Well-Being Module final weights. Each respondent was asked about three activities in Well-Being Module. p-value is from an F-test that the means for all three labor force statuses are equal.
Source: Bureau of Labor Statistics (American Time Use Survey).

Table 11(b): Subjective Well-Being for Women Ages 16-24

	All	Employed	Unemployed	Not in Labor Force	p-value
Happy	4.37	4.29	4.52	4.40	0.211
Tired	2.63	2.80	2.28	2.57	0.017
Stressed	1.48	1.50	1.52	1.45	0.897
Sad	0.45	0.38	0.63	0.47	0.047
Pain	0.62	0.56	0.91	0.55	0.255
Meaningful	3.97	3.88	4.17	4.00	0.271
U-Index	0.13	0.14	0.13	0.13	0.876
Cantril Ladder	7.06	6.97	6.92	7.29	0.116
Total Number of Activities	4,672	2,283	780	1,609	

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013. Emotional affects and U-Index weighted using Well-Being Module adjusted annual activity weights. Cantril Ladder question was asked in 2012 and 2013 and was weighted using Well-Being Module final weights. Each respondent was asked about three activities in Well-Being Module. p-value is from an F-test that the means for all three labor force statuses are equal.
Source: Bureau of Labor Statistics (American Time Use Survey).

Table 11(c): Subjective Well-Being for Women Ages 25-54

	All	Employed	Unemployed	Not in Labor Force	p-value
Happy	4.31	4.28	4.30	4.40	0.037
Tired	2.57	2.58	2.32	2.60	0.028
Stressed	1.72	1.77	1.69	1.57	0.001
Sad	0.66	0.60	0.85	0.78	0.000
Pain	0.98	0.83	1.05	1.43	0.000
Meaningful	4.43	4.40	4.64	4.49	0.007
U-Index	0.16	0.17	0.17	0.14	0.028
Cantril Ladder	7.13	7.24	6.23	7.03	0.000
Total Number of Activities	30,825	22,192	1,897	6,736	

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013. Emotional affects and U-Index weighted using Well-Being Module adjusted annual activity weights. Cantril Ladder question was asked in 2012 and 2013 and was weighted using Well-Being Module final weights. Each respondent was asked about three activities in Well-Being Module. p-value is from an F-test that the means for all three labor force statuses are equal.

Source: Bureau of Labor Statistics (American Time Use Survey).

Table 11(d): Subjective Well-Being for Women Ages 55-70

	All	Employed	Unemployed	Not in Labor Force	p-value
Happy	4.44	4.45	3.75	4.46	0.003
Tired	2.19	2.15	1.53	2.26	0.000
Stressed	1.42	1.49	1.62	1.34	0.067
Sad	0.79	0.68	1.06	0.88	0.001
Pain	1.36	0.95	1.13	1.76	0.000
Meaningful	4.61	4.70	4.15	4.54	0.004
U-Index	0.14	0.15	0.23	0.13	0.019
Cantril Ladder	7.16	7.20	6.20	7.35	0.017
Total Number of Activities	13,370	6,486	422	6,462	

Note: Sample is Well-Being Module pooled over 2010, 2012, and 2013. Emotional affects and U-Index weighted using Well-Being Module adjusted annual activity weights. Cantril Ladder question was asked in 2012 and 2013 and was weighted using Well-Being Module final weights. Each respondent was asked about three activities in Well-Being Module. p-value is from an F-test that the means for all three labor force statuses are equal.

Source: Bureau of Labor Statistics (American Time Use Survey).

Table 12: Linear Probability Models for Likelihood of Taking Pain Medication (1=Yes), Men and Women Age 16-70

	Means	(1)	(2)	(3)	(4)	(5)	(6)
Log Opioids Prescribed per Capita	6.389	0.060***	0.047***	0.050***	0.036***	0.028***	0.026***
	[0.396]	(0.010)	(0.010)	(0.011)	(0.010)	(0.010)	(0.009)
Difficulty Dressing/Bathing	0.014		0.086**			0.067*	0.069*
	[0.117]		(0.041)			(0.038)	(0.037)
Vision Impairment	0.013		0.057*			-0.000	0.001
	[0.111]		(0.033)			(0.030)	(0.029)
Difficulty Hearing	0.017		0.093***			0.043*	0.041
	[0.128]		(0.028)			(0.026)	(0.026)
Difficulty Doing Errands	0.025		0.104***			0.066**	0.065**
	[0.157]		(0.036)			(0.032)	(0.031)
Difficulty Walking	0.057		0.333***			0.160***	0.160***
	[0.231]		(0.019)			(0.020)	(0.020)
Difficulty Remembering	0.029		0.067***			0.032	0.031
	[0.167]		(0.023)			(0.021)	(0.021)
Excellent Health	0.192			-0.294***		-0.240***	-0.241***
	[0.394]			(0.012)		(0.012)	(0.012)
Very Good Health	0.341			-0.229***		-0.187***	-0.189***
	[0.474]			(0.011)		(0.011)	(0.011)
Good Health	0.297			-0.152***		-0.118***	-0.119***
	[0.457]			(0.011)		(0.011)	(0.011)
Fair Health	0.130			0.000		0.000	0.000
	[0.336]			(0.000)		(0.000)	(0.000)
Poor Health	0.040			0.231***		0.146***	0.144***
	[0.195]			(0.022)		(0.023)	(0.023)
White	0.784				0.067***	0.080***	0.073***
	[0.412]				(0.010)	(0.010)	(0.010)
Black	0.153				0.039***	0.041***	0.031**
	[0.360]				(0.015)	(0.014)	(0.013)
Male	0.454				-0.054***	-0.047***	-0.046***
	[0.498]				(0.007)	(0.006)	(0.006)
Age	43.761				0.007***	0.002	0.002
	[14.407]				(0.001)	(0.001)	(0.001)
Age Squared /1000	2.123				-0.003	0.032**	0.032**
	[1.267]				(0.016)	(0.016)	(0.016)
Years of Schooling	13.899				-0.008***	0.001	0.002
	[3.125]				(0.001)	(0.001)	(0.001)
Married	0.512				-0.026***	0.003	0.002
	[0.500]				(0.006)	(0.007)	(0.007)
Mid Atlantic	0.119						-0.034
	[0.323]						(0.034)
East North Central	0.159						-0.004
	[0.366]						(0.034)
West North Central	0.081						0.000
	[0.273]						(0.034)
South Atlantic	0.192						-0.015
	[0.394]						(0.034)
East South Central	0.061						0.000
	[0.240]						(0.036)
West South Central	0.114						0.002
	[0.317]						(0.034)
Mountain	0.075						-0.029
	[0.263]						(0.034)
Pacific	0.151						-0.039
	[0.358]						(0.034)
R Squared		0.003	0.044	0.073	0.060	0.119	0.120

Note: Sample is ATUS Well Being Supplement for years 2010, 2012, and 2013. Sample size is 30,073 and mean of dependent variable is .282. Regressions are weighted using the ATUS supplement weights. Standard errors are robust and are clustered at the county level, when available, and the state level otherwise. New England is the omitted region category. Levels of Significance ***= .01, **= .05, *= .1

Table 13A: Linear Probability Models for Labor Force Participation of Prime Age Males, 1999-2001 and 2014-2016

	Mean	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period 2 Dummy (2014-2016)	0.511	-0.032***		0.067***	0.038*	0.037*	0.039*	0.049*
	[0.500]	(0.002)		(0.026)	(0.022)	(0.022)	(0.022)	(0.026)
Log Opioids per Capita by County	6.345		-0.023***	-0.015***	-0.010***	-0.009**	-0.009***	
	[0.429]		(0.005)	(0.005)	(0.003)	(0.004)	(0.003)	
Log Opioids X Period 2	3.244			-0.016***	-0.010***	-0.010***	-0.011***	-0.013***
	[3.188]			(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
Married	0.597				0.086***	0.086***	0.086***	0.085***
	[0.491]				(0.002)	(0.002)	(0.002)	(0.002)
White	0.805				0.037***	0.034***	0.033***	0.034***
	[0.397]				(0.003)	(0.003)	(0.003)	(0.003)
Black	0.118				-0.024***	-0.025***	-0.026***	-0.022***
	[0.323]				(0.004)	(0.005)	(0.005)	(0.004)
Hispanic	0.160				0.035***	0.038***	0.038***	0.042***
	[0.367]				(0.003)	(0.003)	(0.003)	(0.003)
Age	39.395				0.012***	0.012***	0.012***	0.012***
	[8.558]				(0.001)	(0.001)	(0.001)	(0.001)
Age Squared /1000	1.625				-0.186***	-0.186***	-0.187***	-0.184***
	[0.678]				(0.009)	(0.009)	(0.009)	(0.009)
Years of Education	13.567				0.013***	0.013***	0.013***	0.012***
	[3.079]				(0.001)	(0.001)	(0.001)	(0.001)
Share Manufacturing (1999-2001)	0.140						0.090***	
	[0.048]						(0.033)	
Share Manufacturing X Period 2	0.070						-0.008	0.010
	[0.077]						(0.031)	(0.037)
Mid Atlantic	0.133					-0.009	-0.006	
	[0.340]					(0.006)	(0.005)	
East North Central	0.153					0.007	0.003	
	[0.360]					(0.004)	(0.004)	
West North Central	0.067					0.018***	0.018***	
	[0.250]					(0.004)	(0.004)	
South Atlantic	0.188					0.000	0.003	
	[0.391]					(0.005)	(0.004)	
East South Central	0.057					-0.019*	-0.021**	
	[0.233]					(0.010)	(0.010)	
West South Central	0.116					-0.001	0.002	
	[0.320]					(0.006)	(0.006)	
Mountain	0.069					0.003	0.009	
	[0.254]					(0.006)	(0.005)	
Pacific	0.168					-0.008*	-0.007	
	[0.374]					(0.004)	(0.004)	
County/Area Fixed Effects		No	No	No	No	No	No	Yes
Observations	1,824,890	1,824,890	1,824,890	1,824,890	1,810,246	1,810,246	1,788,508	1,788,508
R Squared		0.003	0.001	0.004	0.055	0.056	0.056	0.063

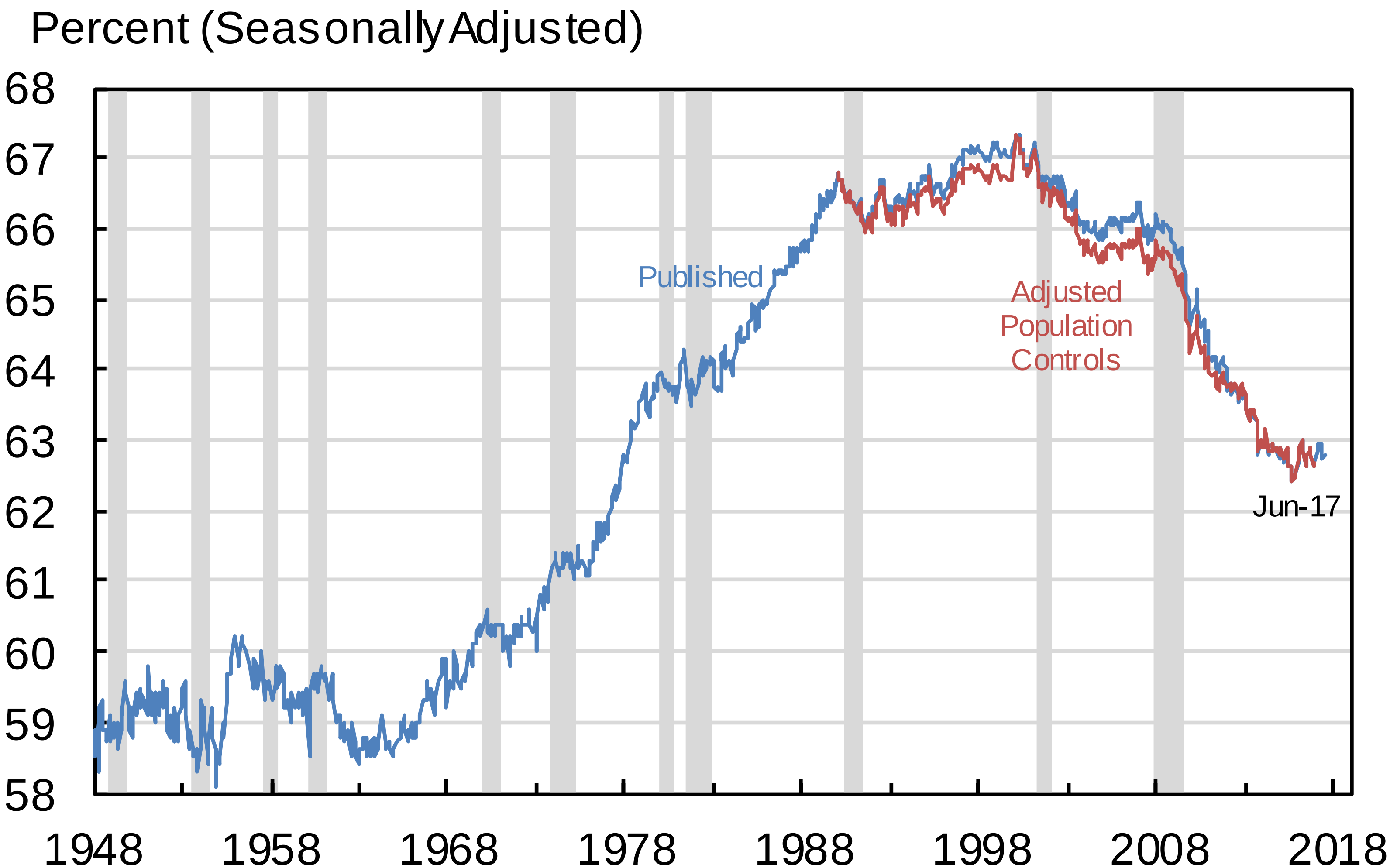
Note: Sample is Full CPS Monthly, prime age (25-54) men, pooling years 1999-2001 and 2014-2016. Mean labor force participation is 0.891. Regressions are weighted using the CPS final weights. Standard errors are robust and are clustered at the county level, when available, and the state level. Levels of Significance: ***= 0.01, **= 0.05, *= 0.10.

Table 13B: Linear Probability Models for Labor Force Participation of Prime Age Women, 1999-2001 and 2014-16

	Mean	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period 2 Dummy (2014-2016)	0.510	-0.025***		0.087**	0.055*	0.047	0.048	0.058*
	[0.500]	(0.003)		(0.037)	(0.030)	(0.031)	(0.031)	(0.035)
Log Opioids per Capita by County	6.348		0.002	0.011	0.006	0.011**	0.010*	
	[0.430]		(0.010)	(0.011)	(0.007)	(0.006)	(0.005)	
Log Opioids X Period 2	3.239			-0.018***	-0.016***	-0.014***	-0.014***	-0.015***
	[3.190]			(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Married	0.601				-0.086***	-0.086***	-0.086***	-0.087***
	[0.490]				(0.005)	(0.005)	(0.005)	(0.005)
White	0.781				0.067***	0.061***	0.061***	0.061***
	[0.414]				(0.007)	(0.007)	(0.007)	(0.006)
Black	0.137				0.070***	0.069***	0.070***	0.077***
	[0.344]				(0.007)	(0.008)	(0.008)	(0.008)
Hispanic	0.149				-0.033***	-0.024***	-0.024***	-0.015***
	[0.356]				(0.005)	(0.004)	(0.004)	(0.004)
Age	39.478				0.012***	0.012***	0.012***	0.012***
	[8.552]				(0.001)	(0.001)	(0.001)	(0.001)
Age Squared /1000	1.632				-0.149***	-0.149***	-0.148***	-0.148***
	[0.679]				(0.014)	(0.014)	(0.014)	(0.015)
Years of Education	13.742				0.028***	0.028***	0.028***	0.028***
	[2.984]				(0.001)	(0.001)	(0.001)	(0.001)
Share Manufacturing (1999-2001)	0.139						0.059	
	[0.048]						(0.053)	
Share Manufacturing X Period 2	0.070						-0.043	-0.044
	[0.077]						(0.054)	(0.051)
Mid Atlantic	0.136					-0.039***	-0.038***	
	[0.343]					(0.007)	(0.007)	
East North Central	0.151					-0.007	-0.009	
	[0.358]					(0.008)	(0.008)	
West North Central	0.065					0.043***	0.043***	
	[0.246]					(0.008)	(0.008)	
South Atlantic	0.193					-0.021***	-0.020***	
	[0.394]					(0.005)	(0.006)	
East South Central	0.059					-0.055***	-0.055***	
	[0.236]					(0.006)	(0.006)	
West South Central	0.115					-0.035***	-0.033***	
	[0.319]					(0.007)	(0.007)	
Mountain	0.067					-0.026***	-0.023***	
	[0.250]					(0.008)	(0.008)	
Pacific	0.165					-0.032***	-0.032***	
	[0.371]					(0.006)	(0.006)	
County/Area Fixed Effects		No	No	No	No	No	No	Yes
Observations	1,962,822	1,962,822	1,962,822	1,962,822	1,947,471	1,947,471	1,924,732	1,924,732
R Squared		0.001	0.000	0.001	0.049	0.051	0.052	0.058

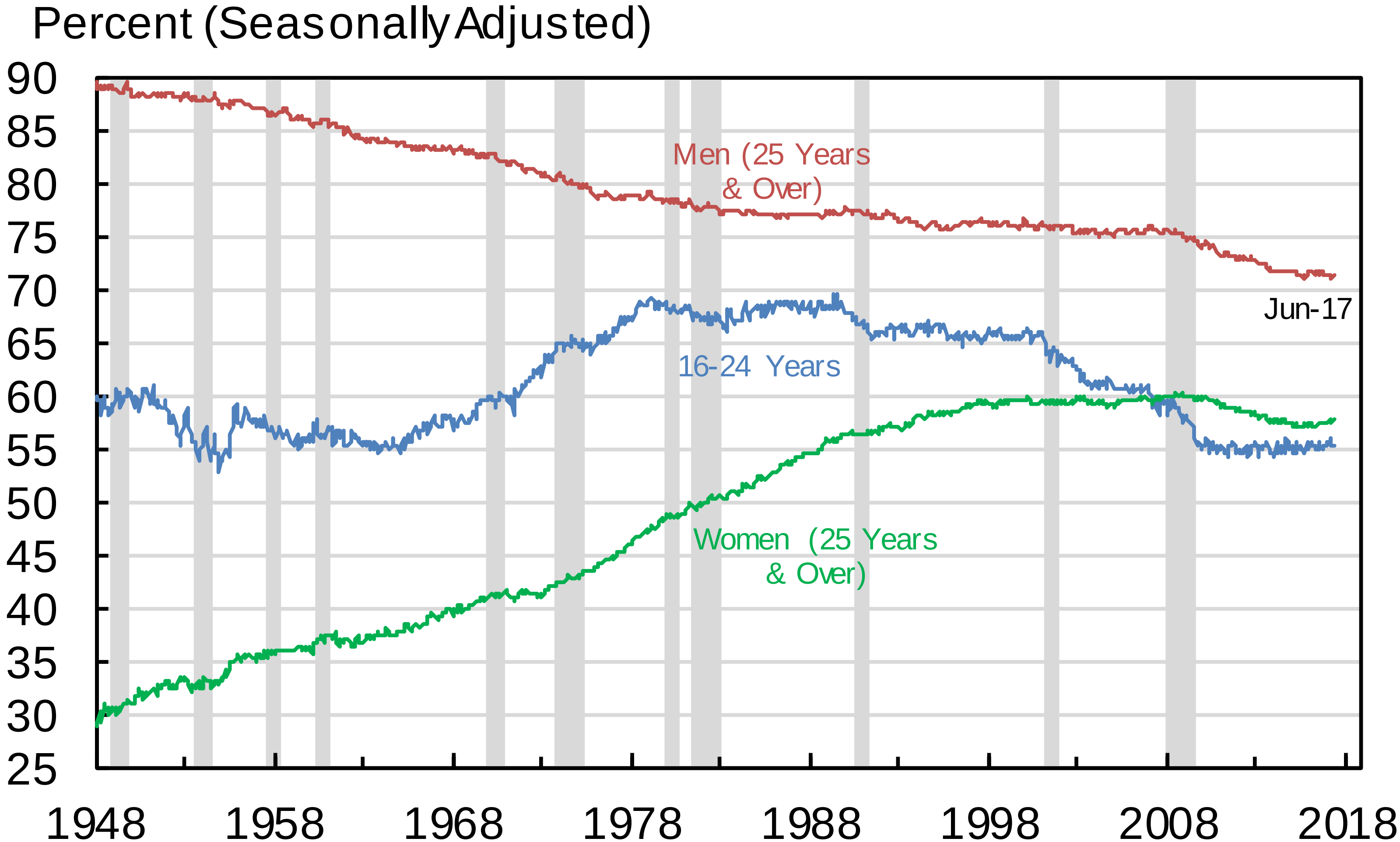
Note: Sample is Full CPS Monthly, prime age (25-54) women, pooling years 1999-2001 and 2014-2016. Mean labor force participation is 0.761. Regressions are weighted using the CPS final weights. Standard errors are robust and are clustered at the county level, when available, and the state level. Levels of Significance: ***= 0.01, **= 0.05, *= 0.10.

Figure 1: Labor Force Participation Rate



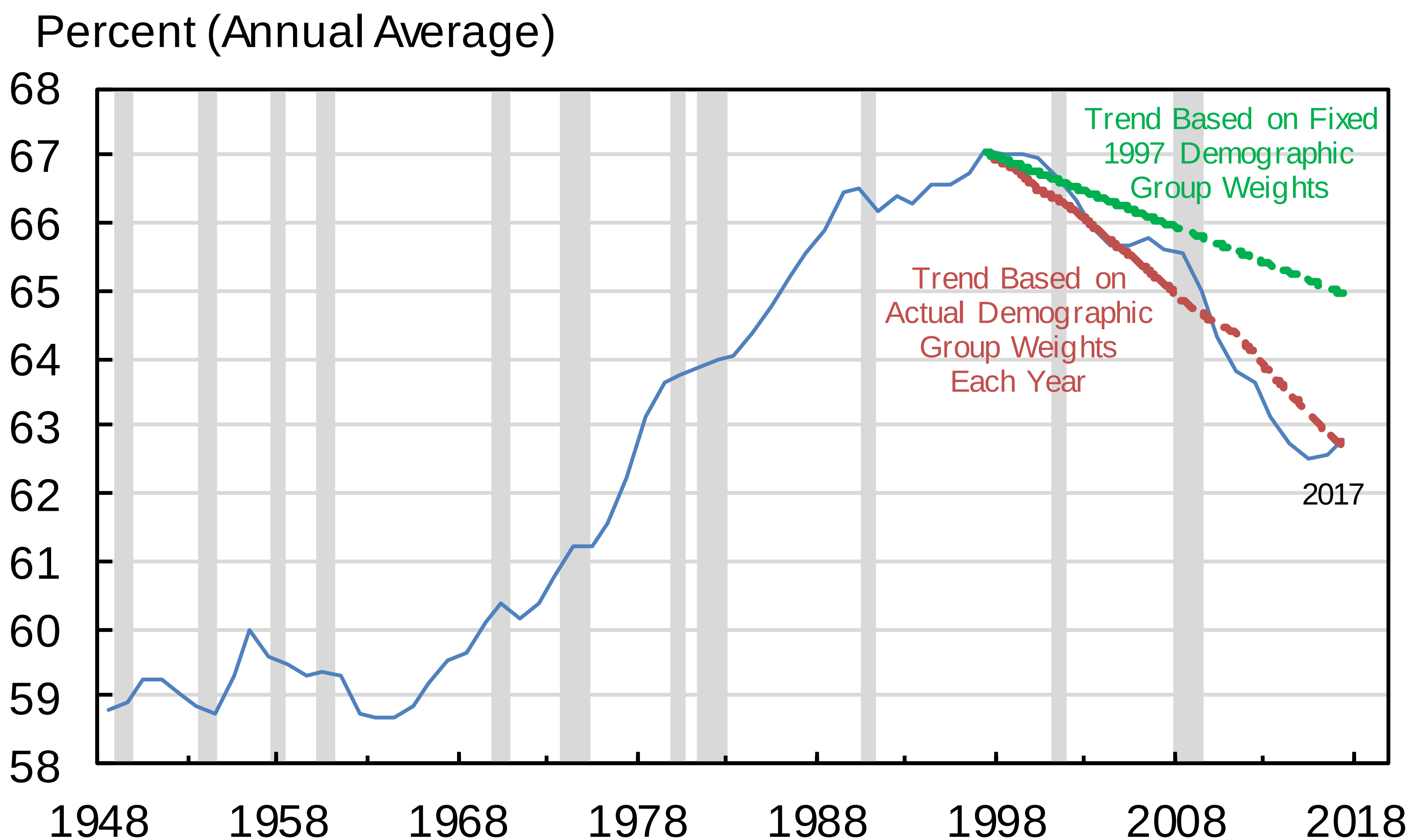
Note: Data for January 1990 to December 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Figure 2: Labor Force Participation Rates by Age & Gender



Note: Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research.

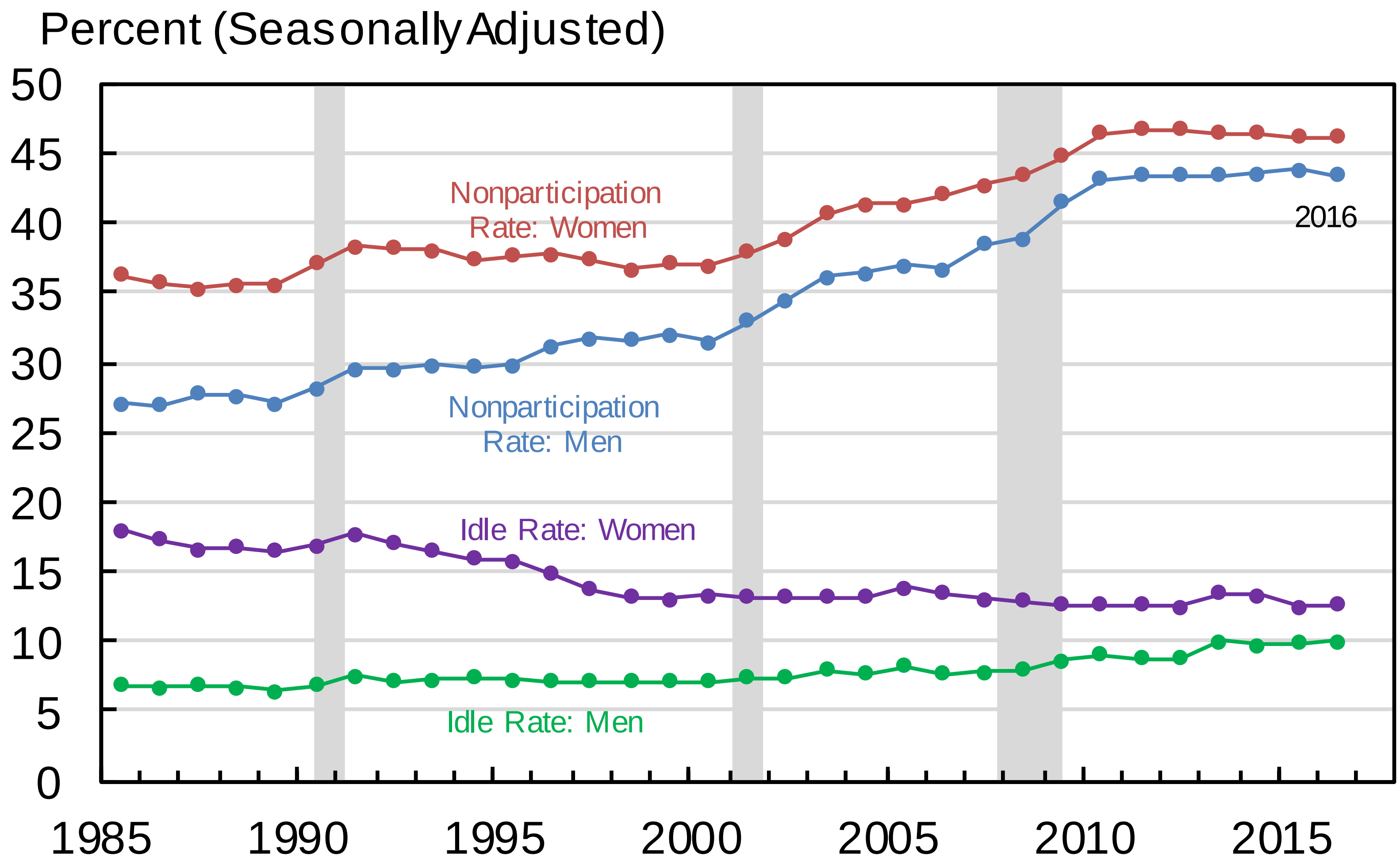
Figure 3: Labor Force Participation Rate



Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.

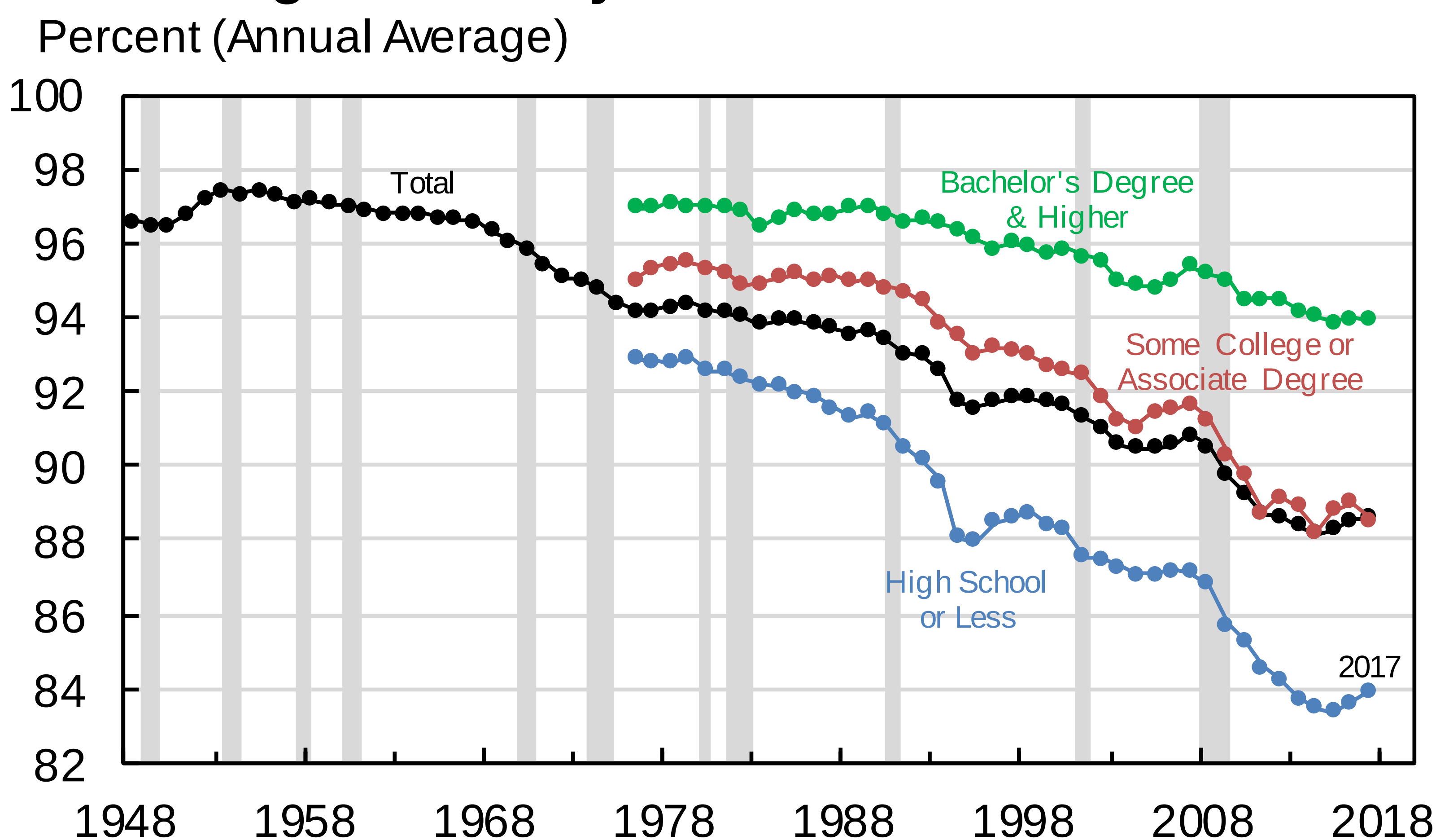
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Figure 4: Nonparticipation & Idle Rates by Gender for Ages 16-24



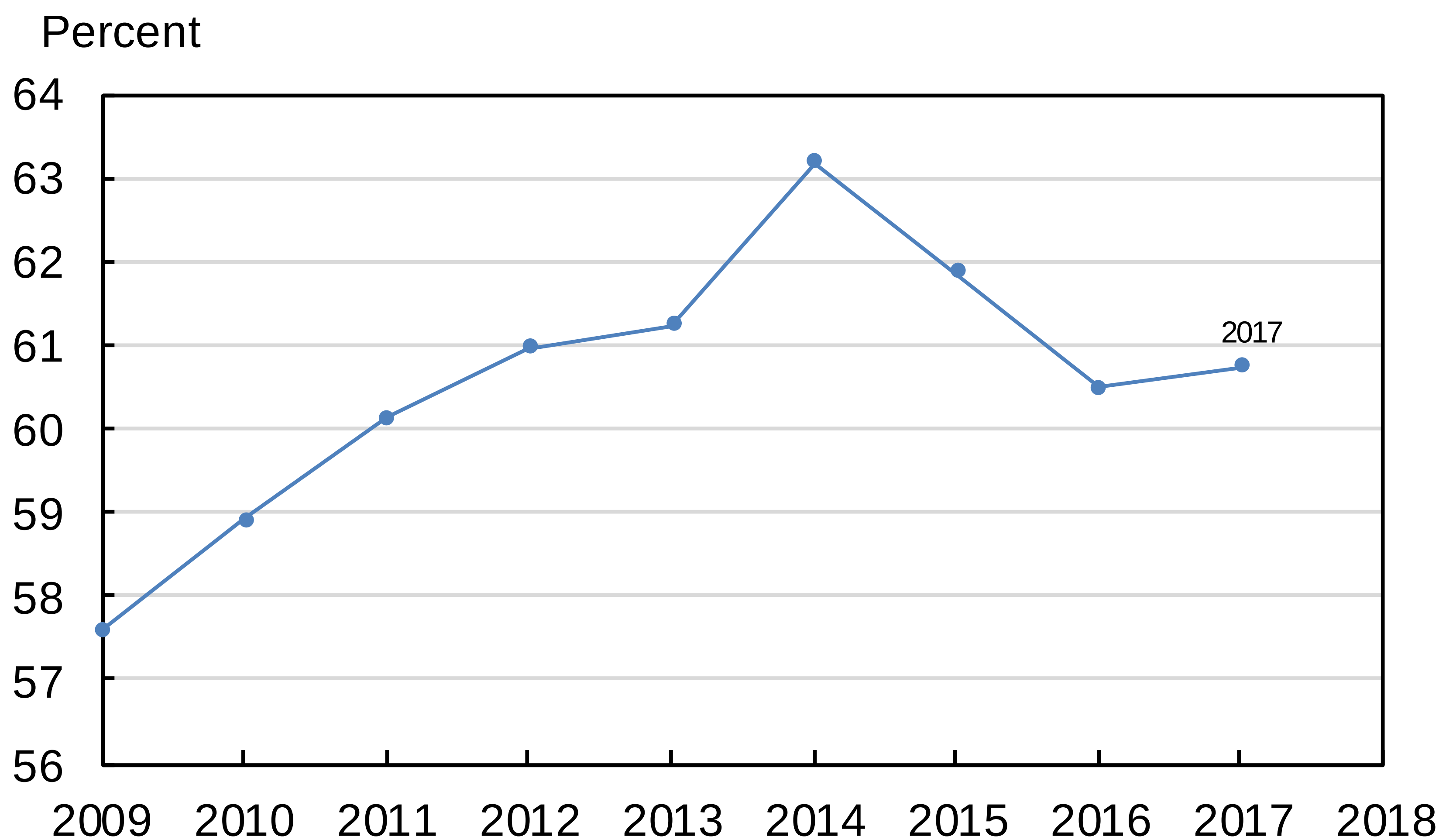
Note: Idle refers to neither enrolled in school nor participating in labor force. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research.

Figure 5: Labor Force Participation Rate for Men Ages 25-54 by Educational Attainment



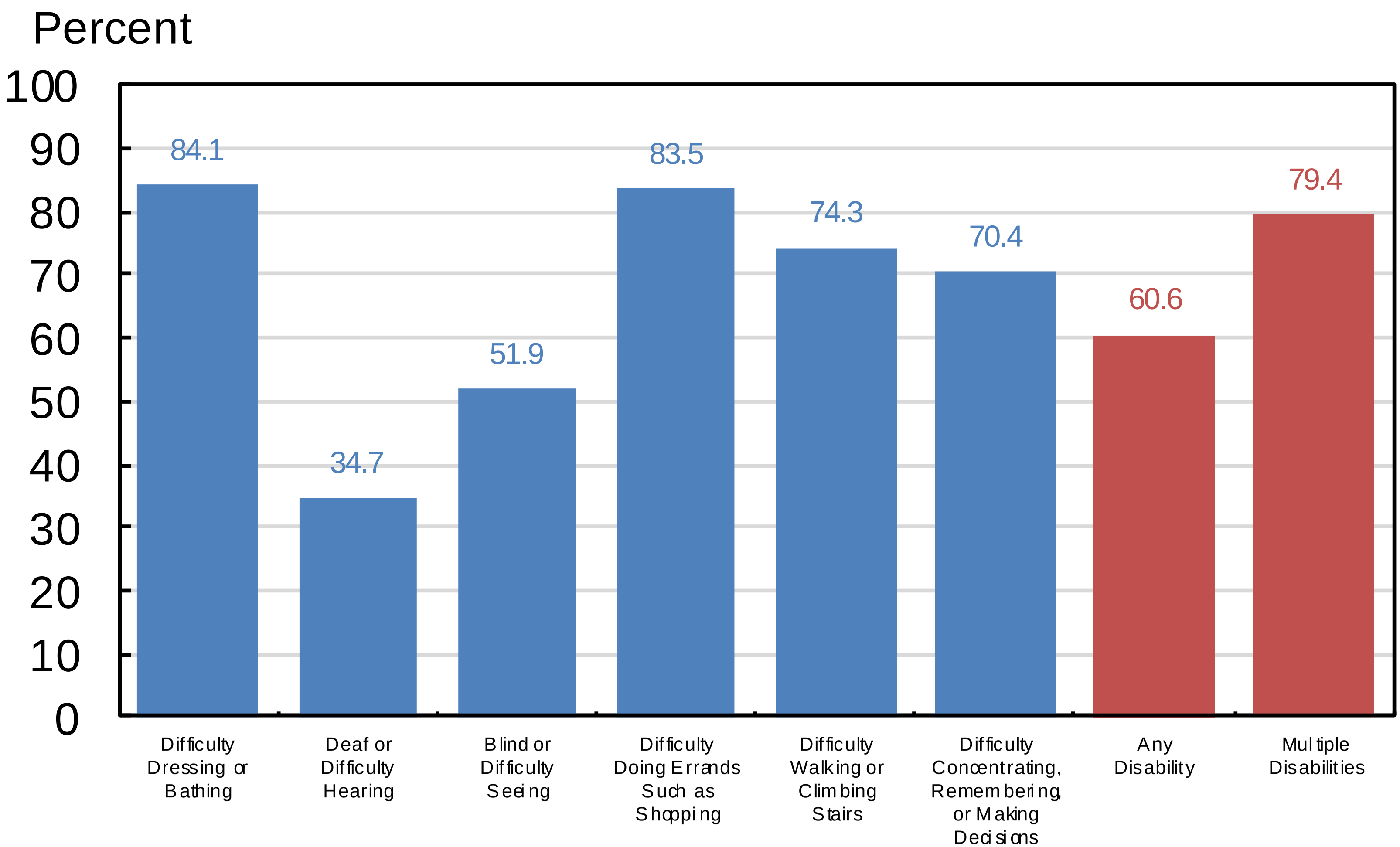
Note: Annual averages of monthly data from the Current Population Survey. 2017 represents the average of data from January through May. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Figure 6(a): Probability of Men Ages 25-54 Not Being in Labor Force Conditional on Having a Disability



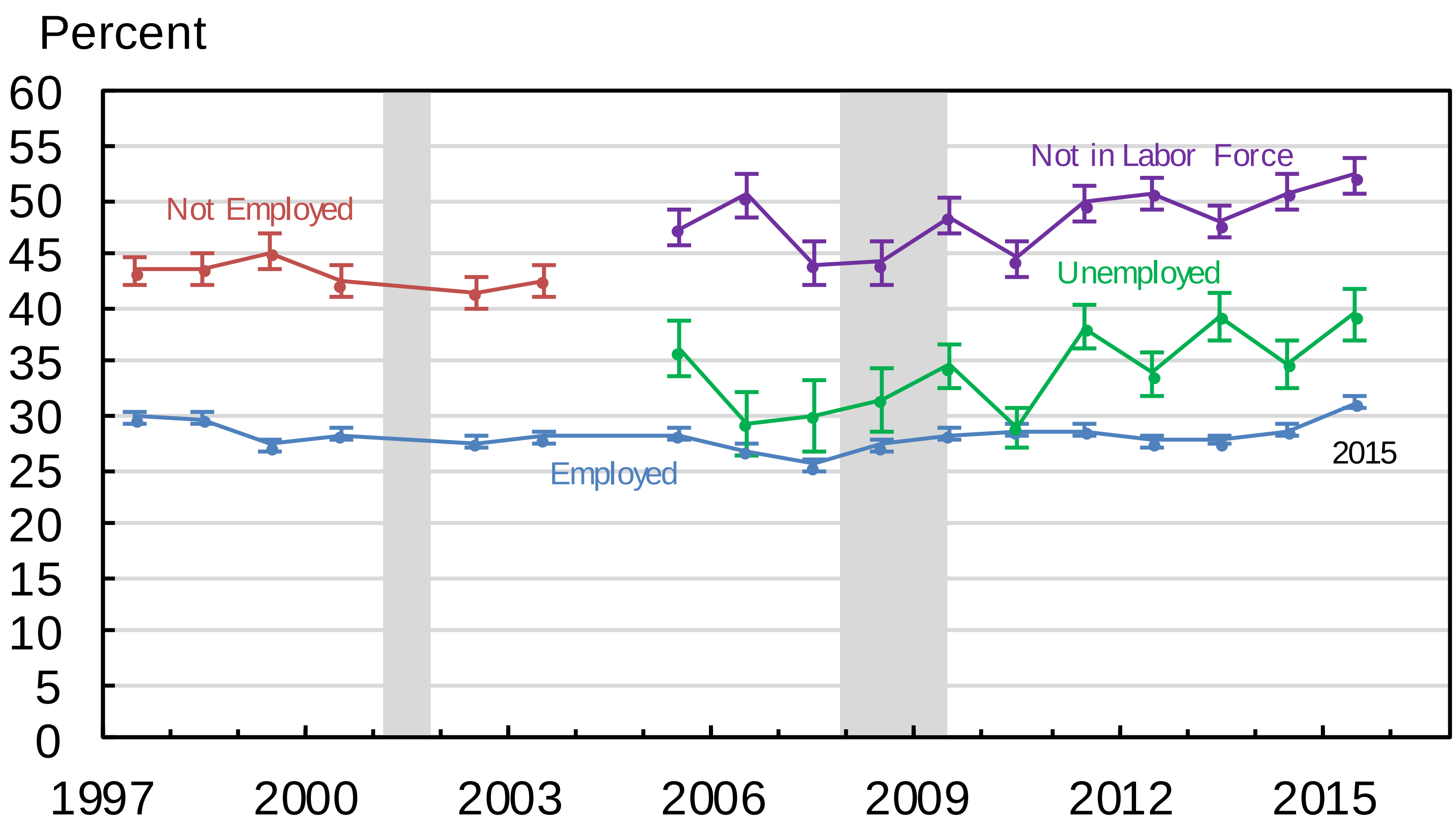
Note: 2017 represents average of data from January through May.
Source: Current Population Survey; author's calculations.

Figure 6(b): Probability of Men Ages 25-54 Not Being in Labor Force Conditional by Type of Disability



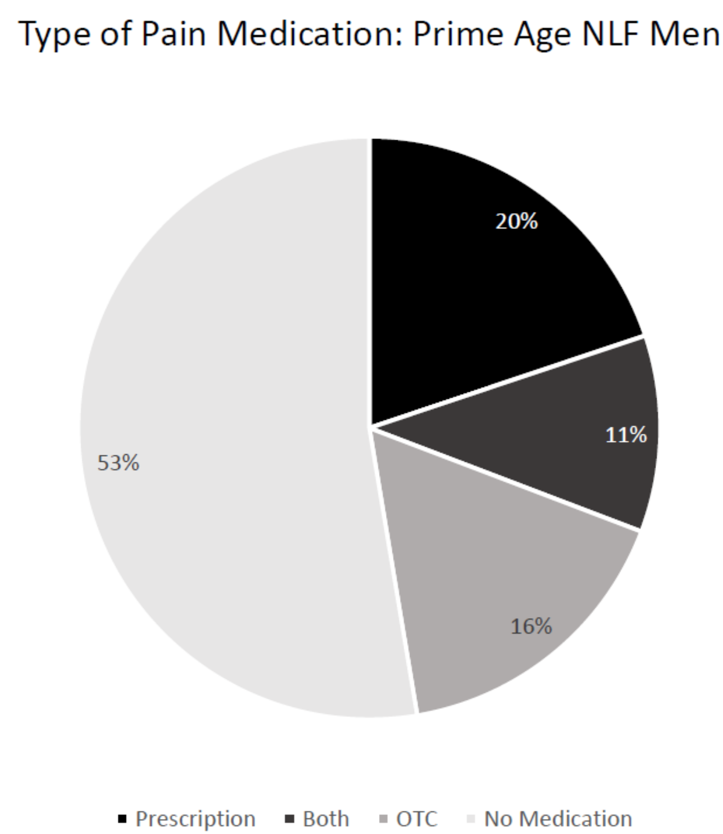
Note: Average of data from January 2009 through May 2017.
Source: Current Population Survey; author's calculations.

Figure 7: Share of Men Ages 25-54 Reporting Experience of Pain in Past 30 Days



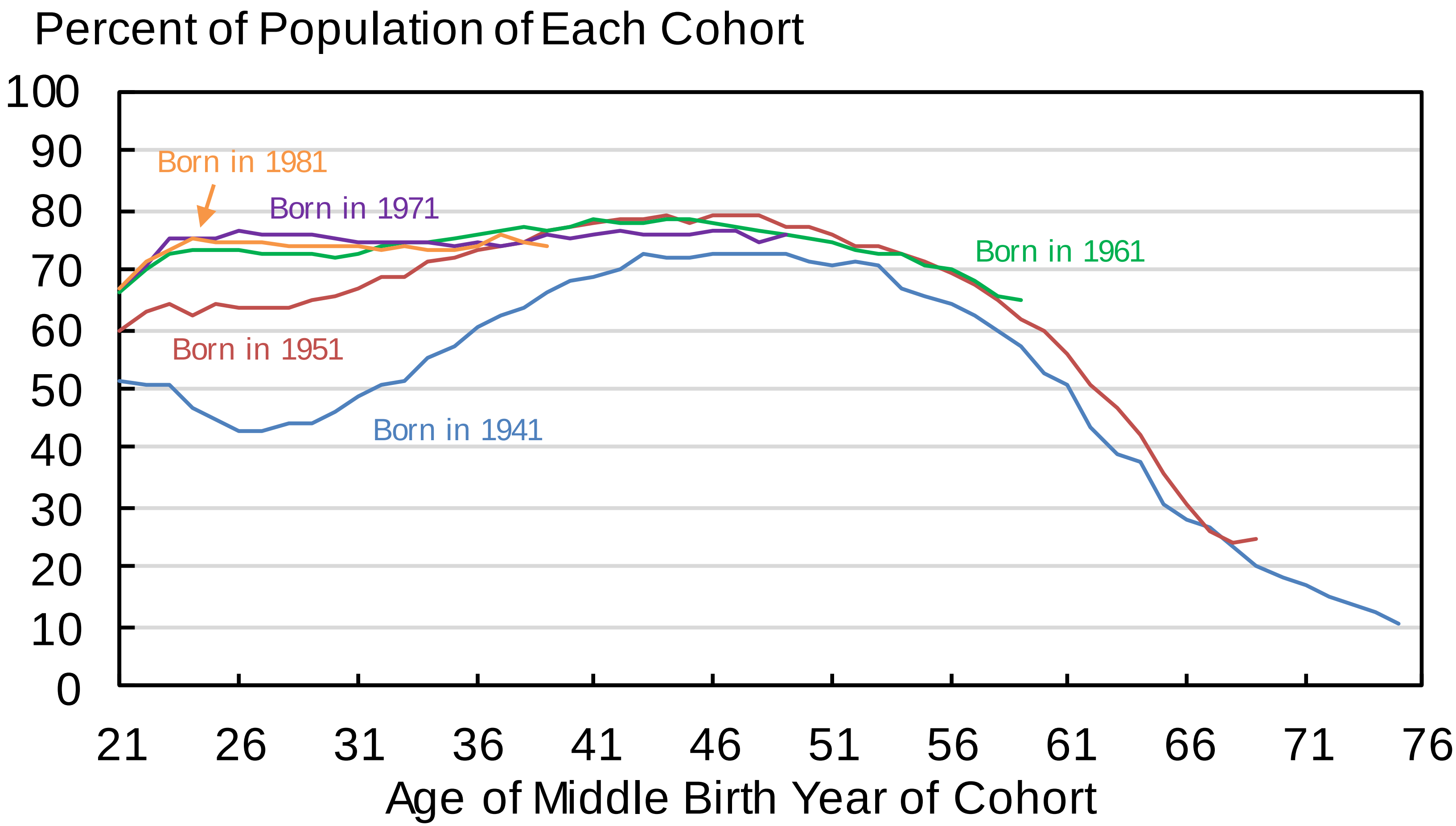
Note: Includes back pain, neck pain, leg pain, jaw pain, or a severe headache or migraine. Bars represent one standard error intervals for each year. Shading denotes recession.
Source: Centers for Disease Control and Prevention (National Health Interview Survey); National Bureau of Economic Research; author's calculations.

Figure 8: Percent of NLF Men Age 25-54 Taking Pain Medication



Notes: Sample size is 571 respondents from Princeton Pain Survey; author's calculations

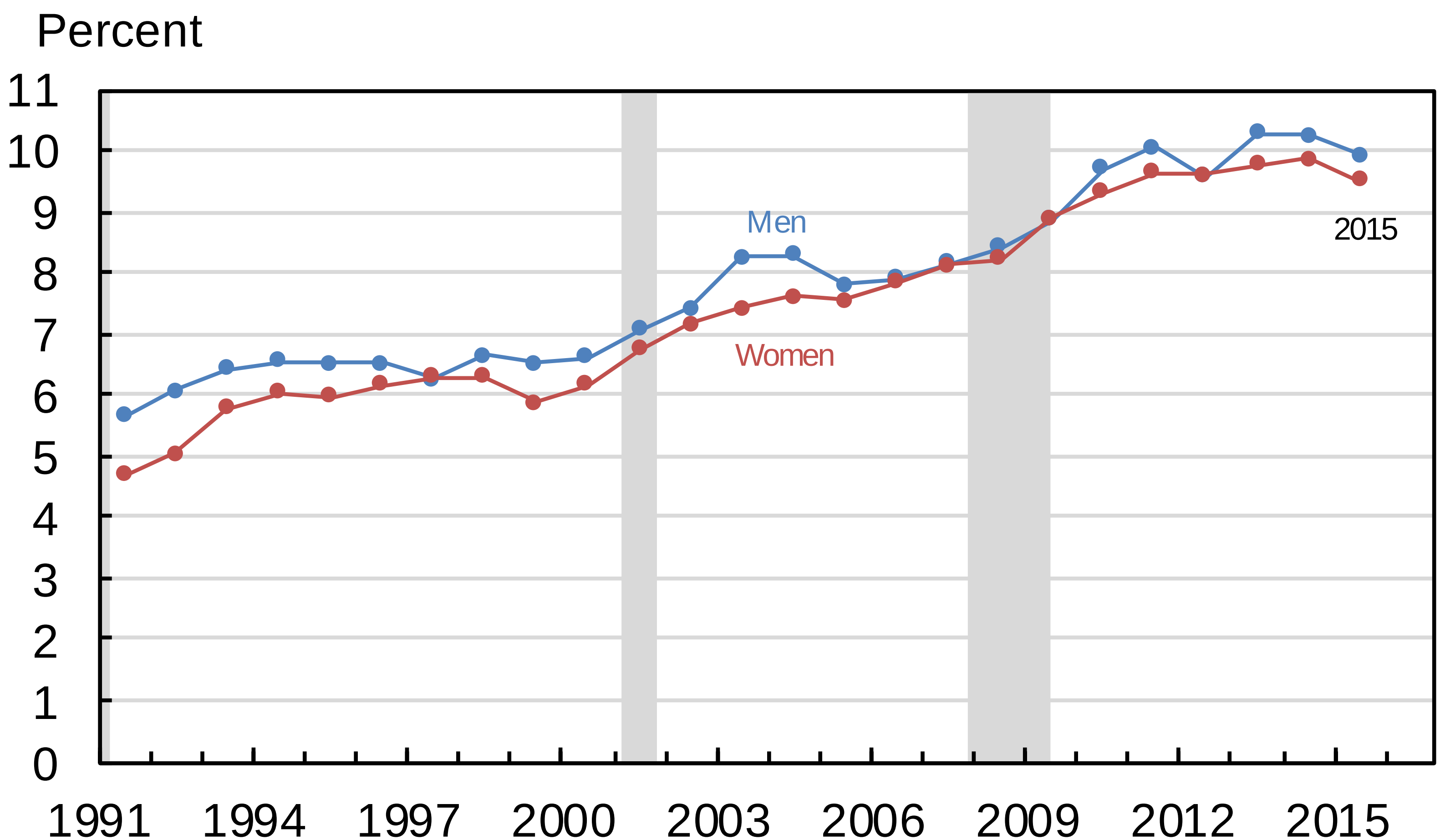
Figure 9: Female Labor Force Participation Rates by Birth Year and Age



Note: Data are from 1962 to 2016. Figure shows the labor force participation rates of five cohorts of women based on ten year-of-birth intervals over the lifecycle from age 21 to age 75.

Source: Current Population Survey (Annual Social and Economic Supplement); author's calculations.

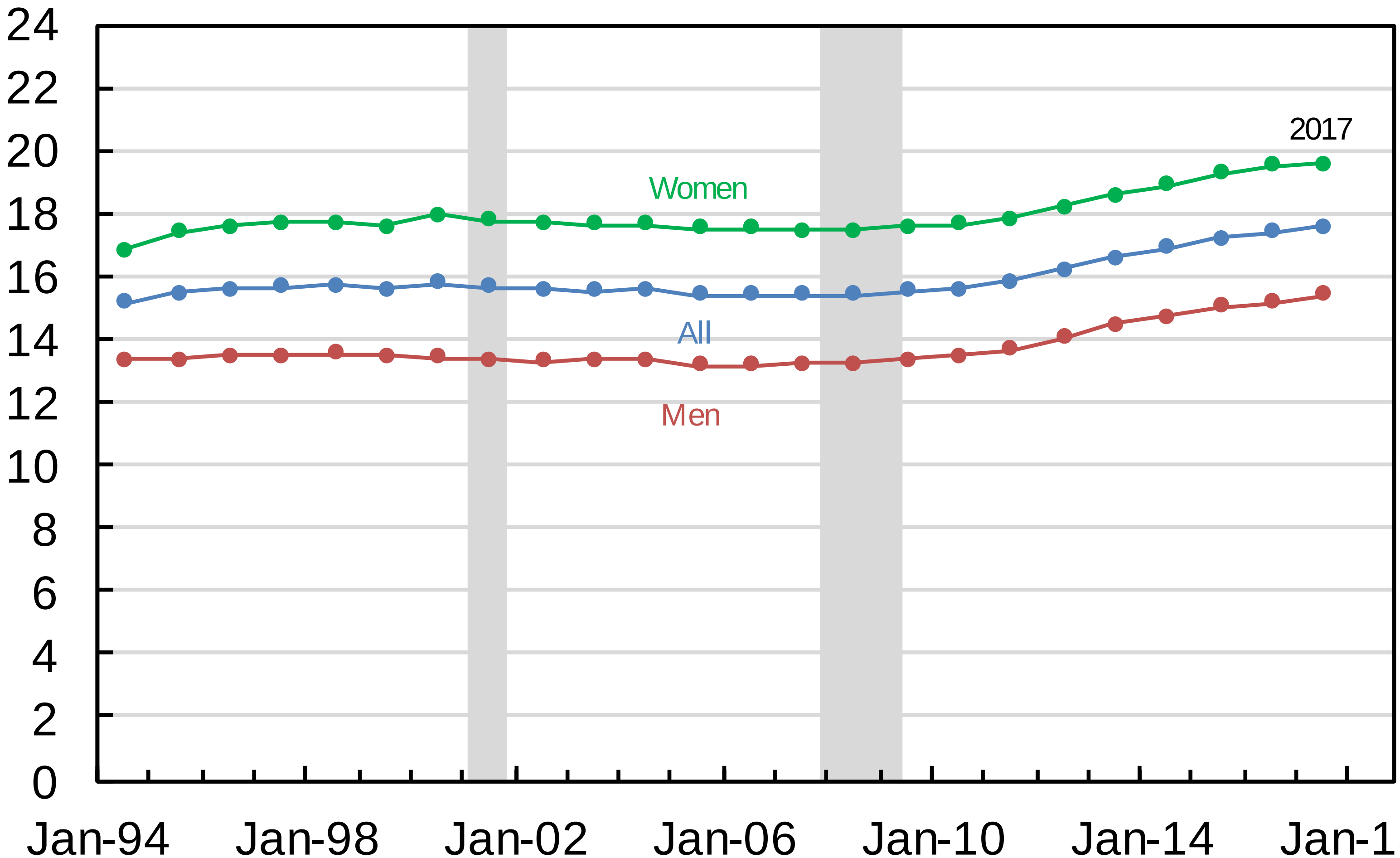
Figure 10: Ages 25-54 Not Looking for Work in Past Year for Reasons Other Than Taking Care of Home



Note: Shading denotes recession.
Source: Current Population Survey (Annual Social and Economic Supplement); National Bureau of Economic Research; author's calculations.

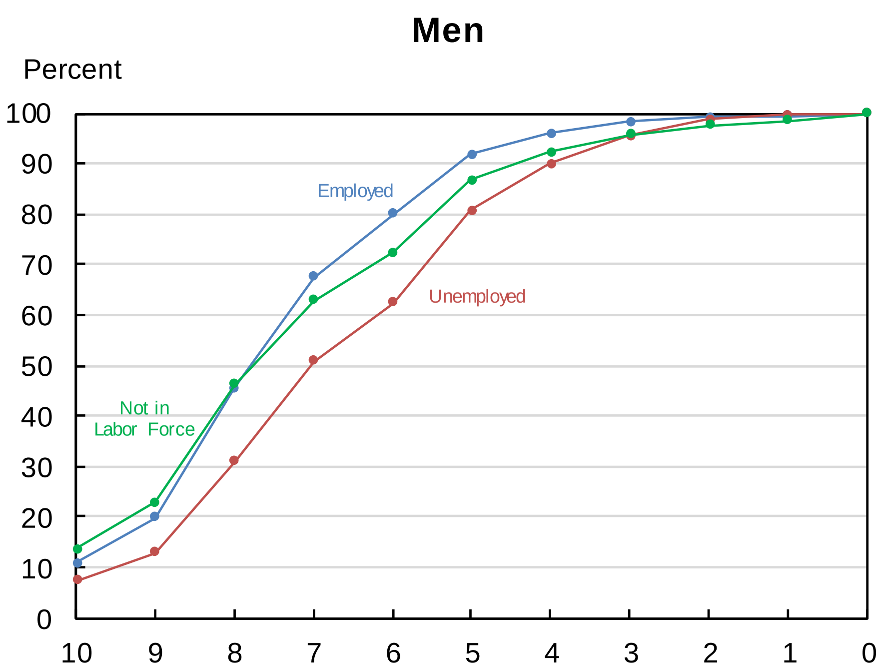
Figure 11: Retirement Rates by Gender for Ages 16+

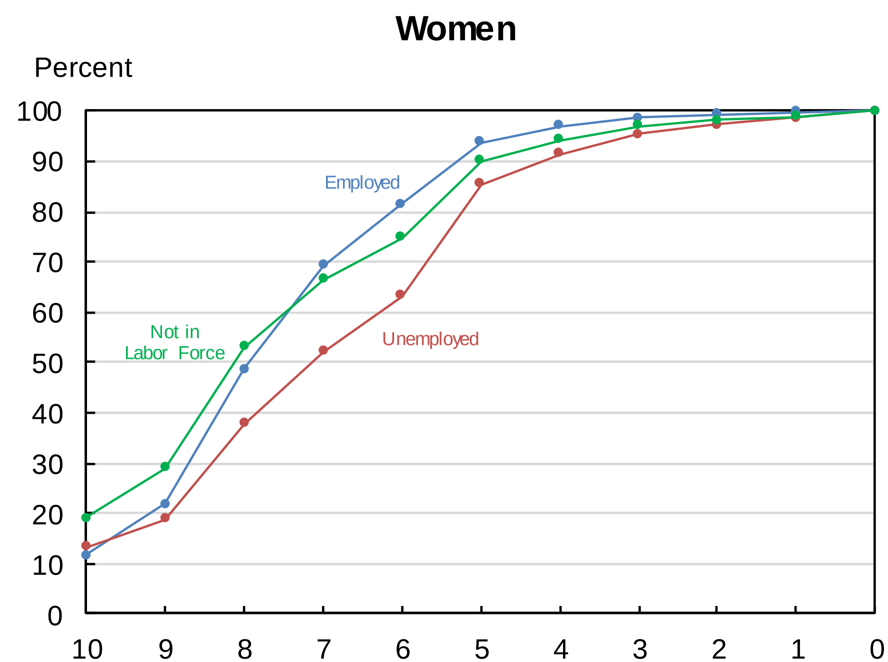
Percent of Each Population



Note: 2017 represents the average of data from January through May. Shading denotes recession.
Source: Current Population Survey; National Bureau of Economic Research; author's calculations.

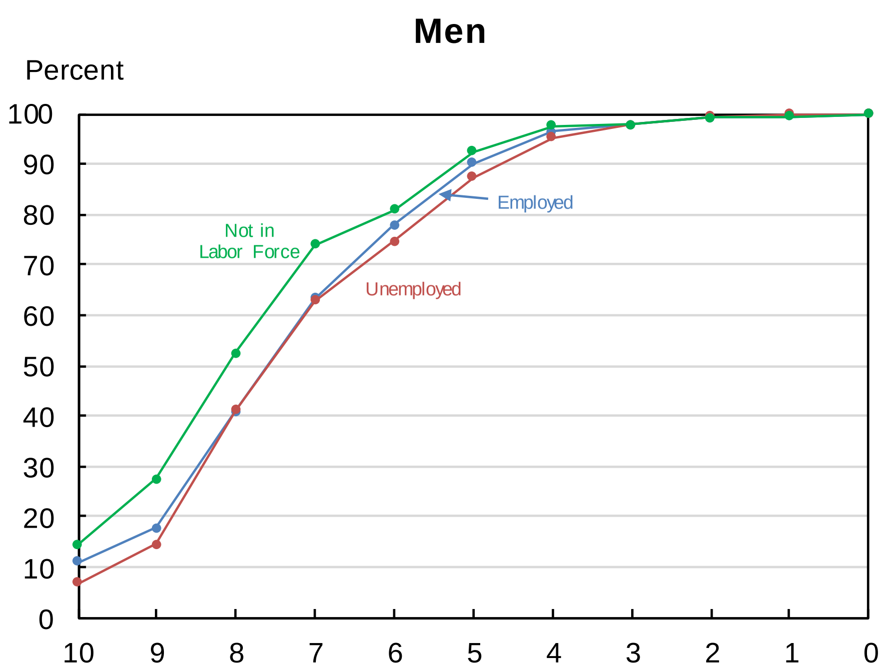
Figure 12(a): Cantril Ladder by Gender for Ages 16-70

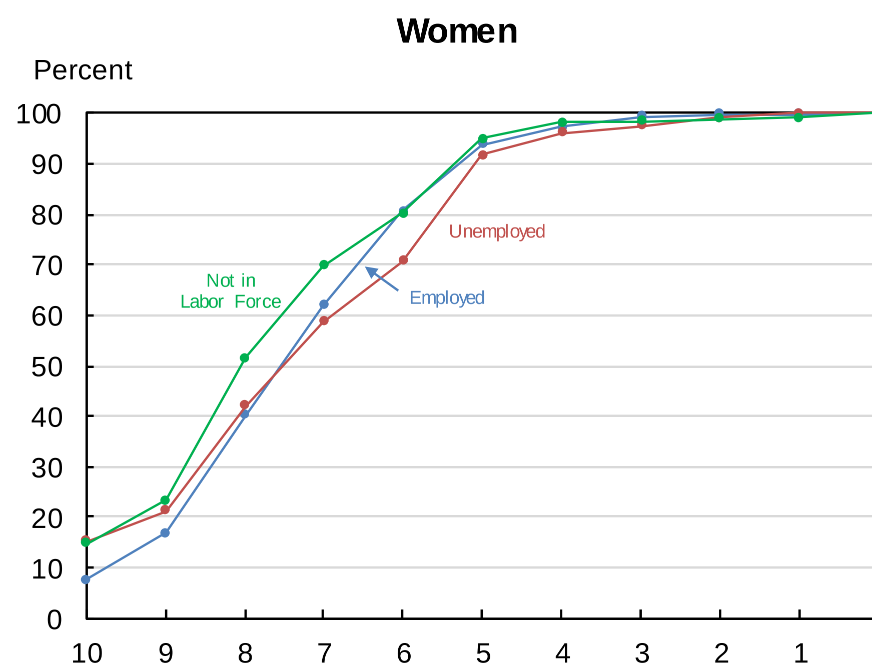




Note: Sample is Well-Being Module pooled over 2012 and 2013.
Source: Bureau of Labor Statistics (American Time Use Survey); author's calculations.

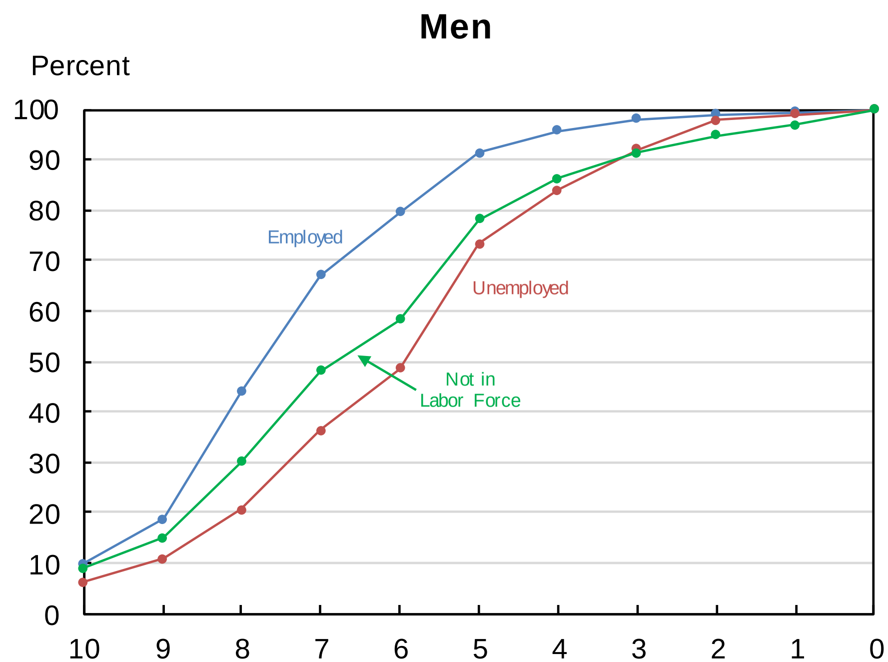
Figure 12(b): Cantril Ladder by Gender for Ages 16-24

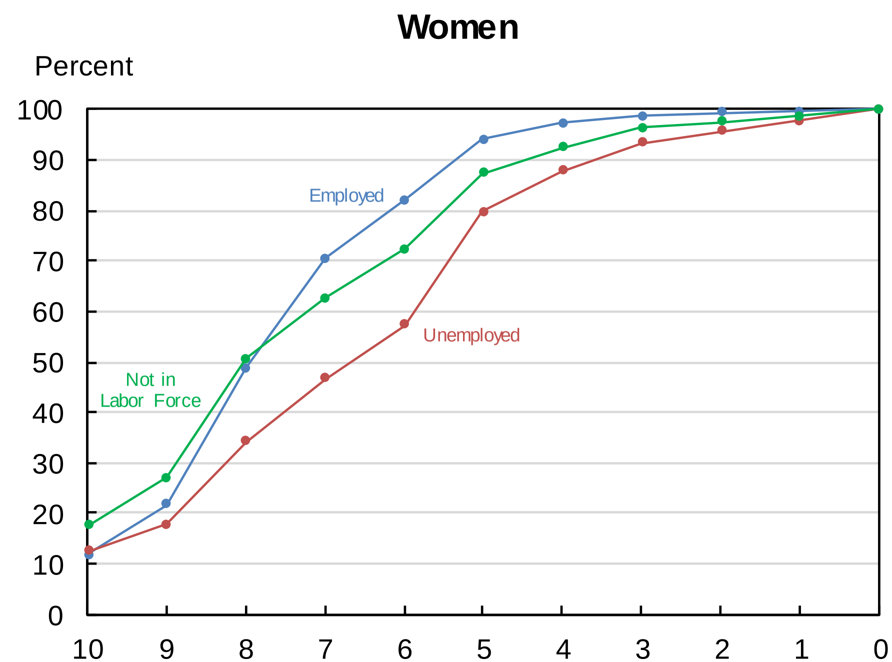




Note: Sample is Well-Being Module pooled over 2012 and 2013.
Source: Bureau of Labor Statistics (American Time Use Survey); author's calculations.

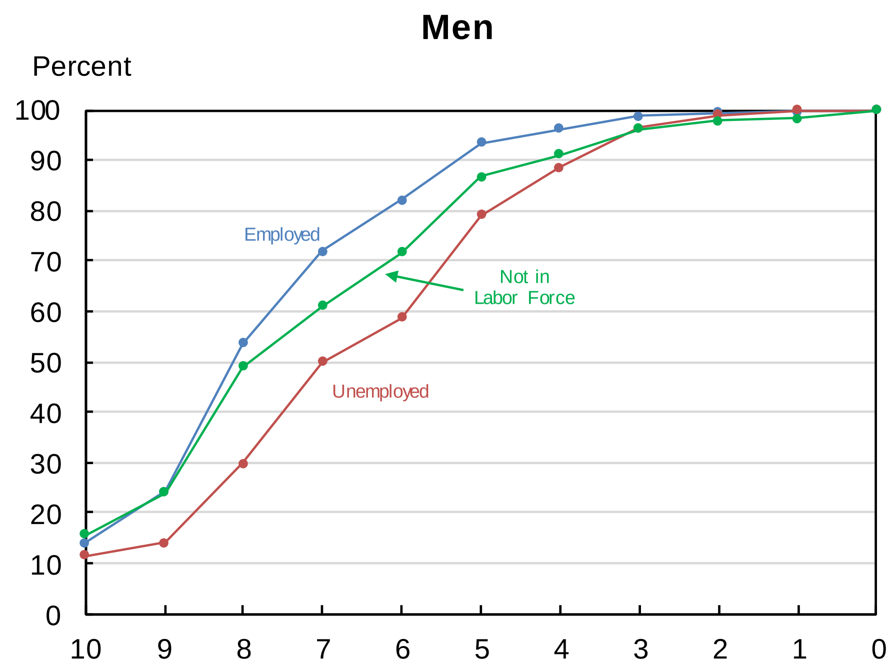
Figure 12(c): Cantril Ladder by Gender for Ages 25-54

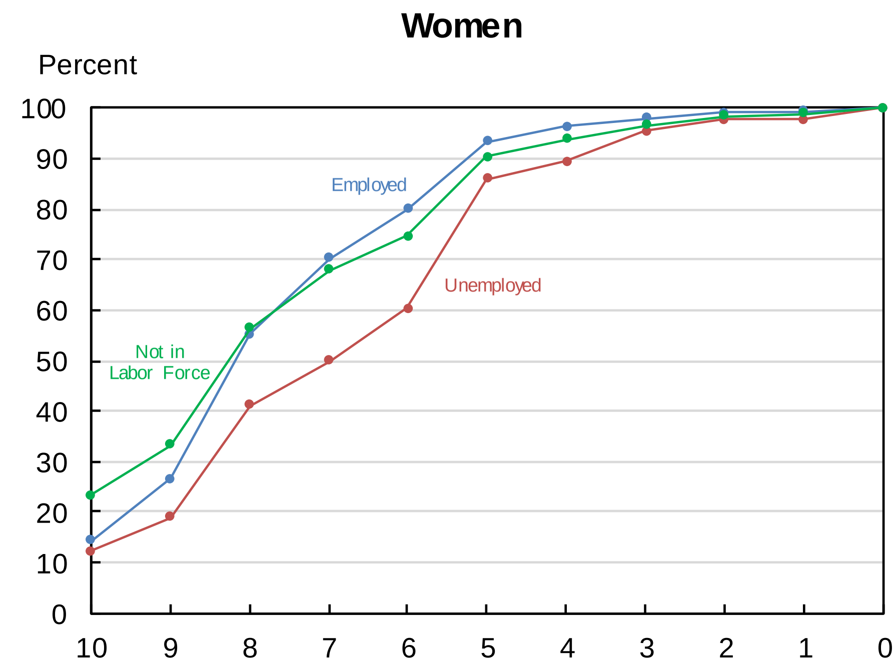




Note: Sample is Well-Being Module pooled over 2012 and 2013.
Source: Bureau of Labor Statistics (American Time Use Survey); author's calculations.

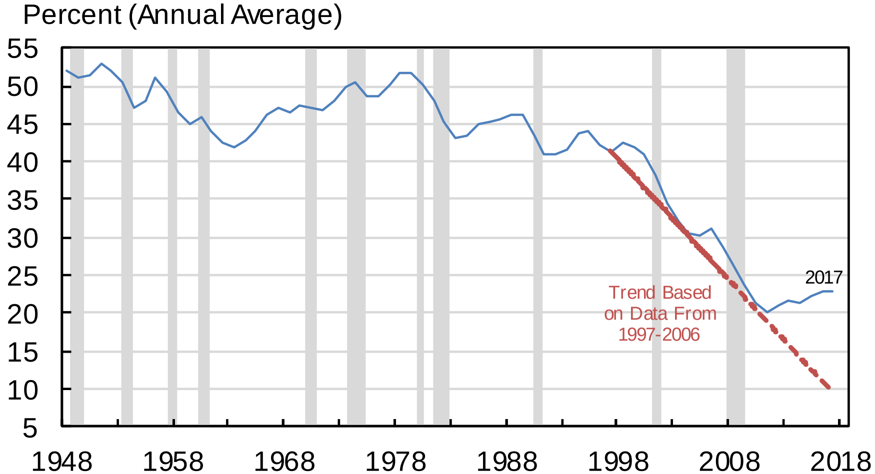
Figure 12(d): Cantril Ladder by Gender for Ages 55-70





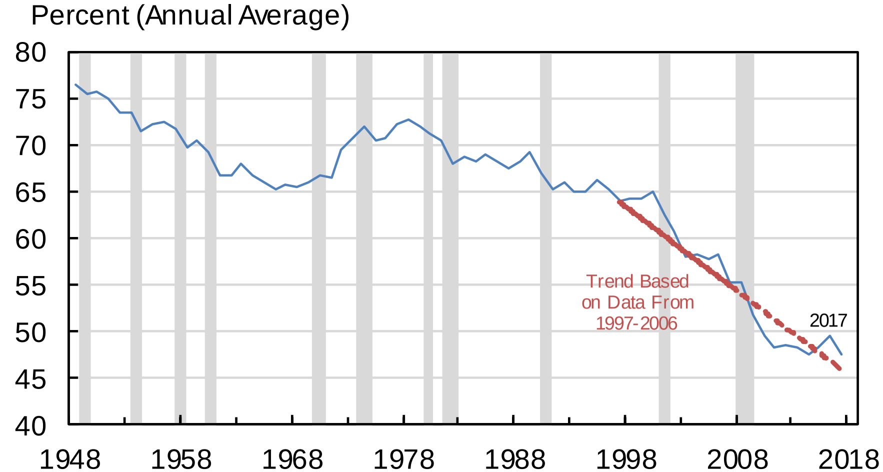
Note: Sample is Well-Being Module pooled over 2012 and 2013.
Source: Bureau of Labor Statistics (American Time Use Survey); author's calculations.

Appendix Figure A1: Labor Force Participation Rate for Men Ages 16-17



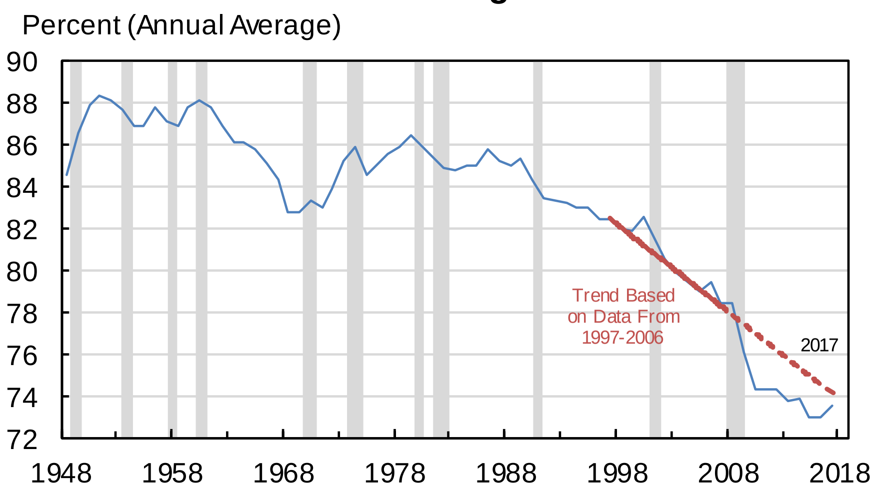
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A2: Labor Force Participation Rate for Men Ages 18-19



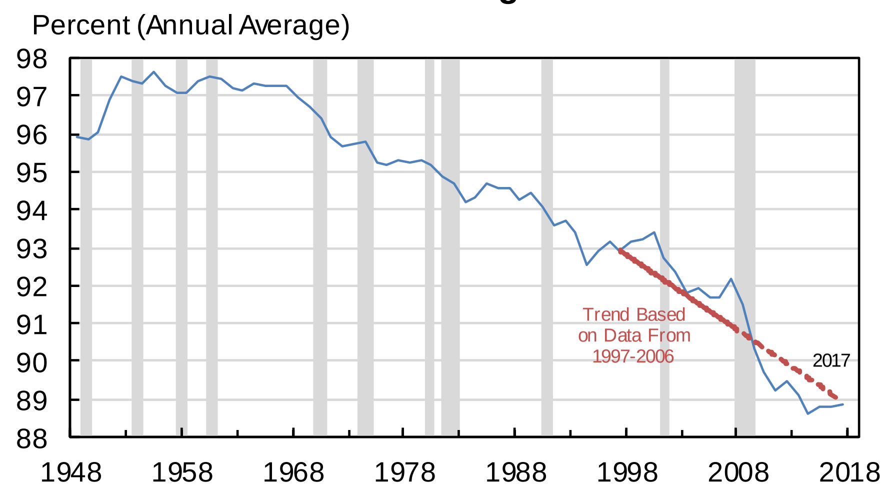
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A3: Labor Force Participation Rate for Men Ages 20-24



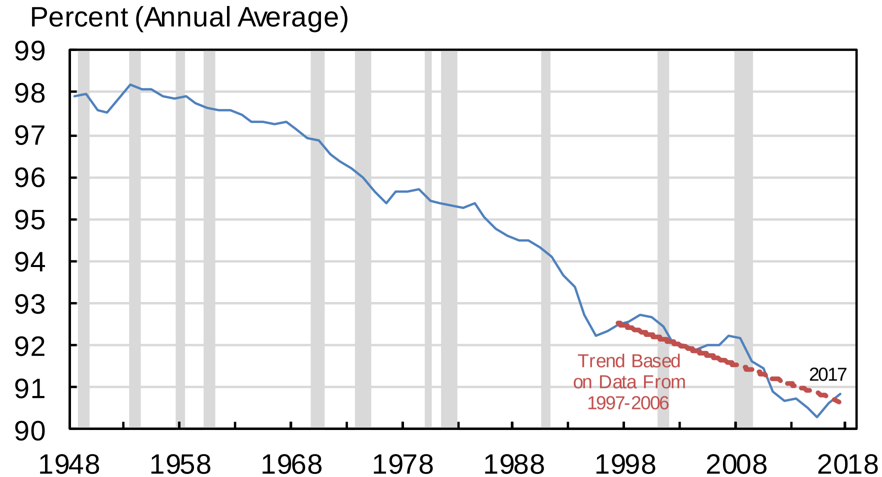
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A4: Labor Force Participation Rate for Men Ages 25-34



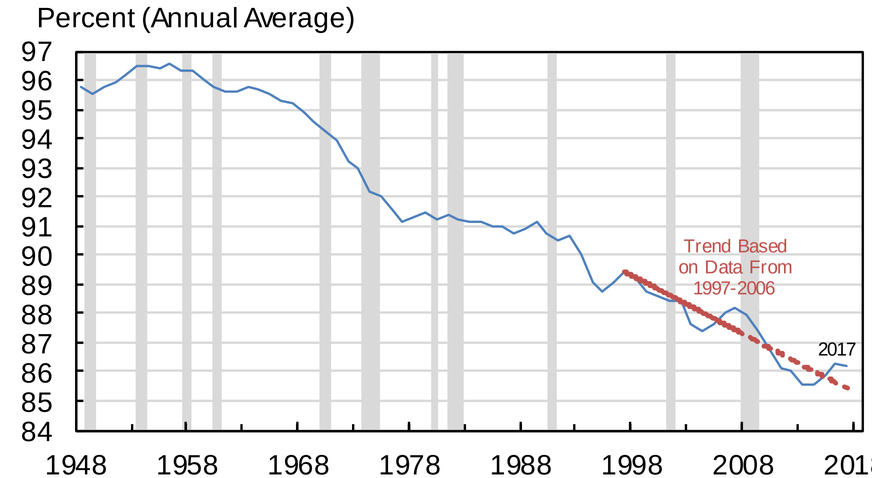
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A5: Labor Force Participation Rate for Men Ages 35-44



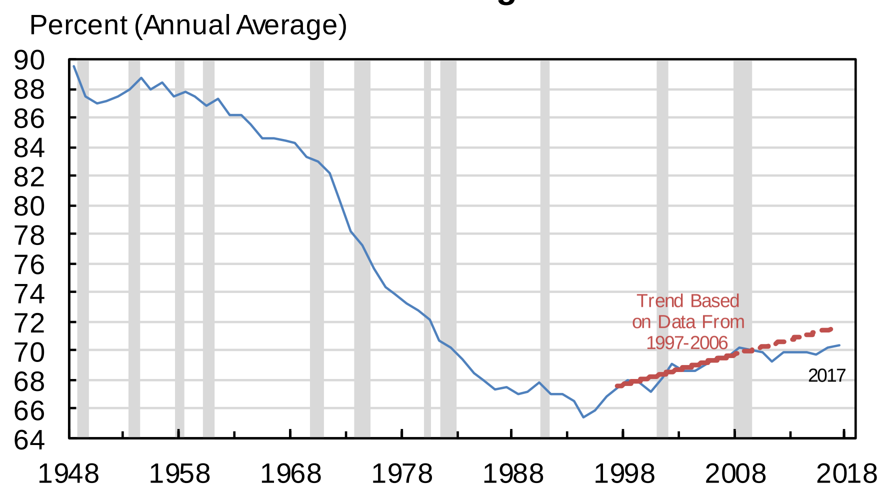
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A6: Labor Force Participation Rate for Men Ages 45-54



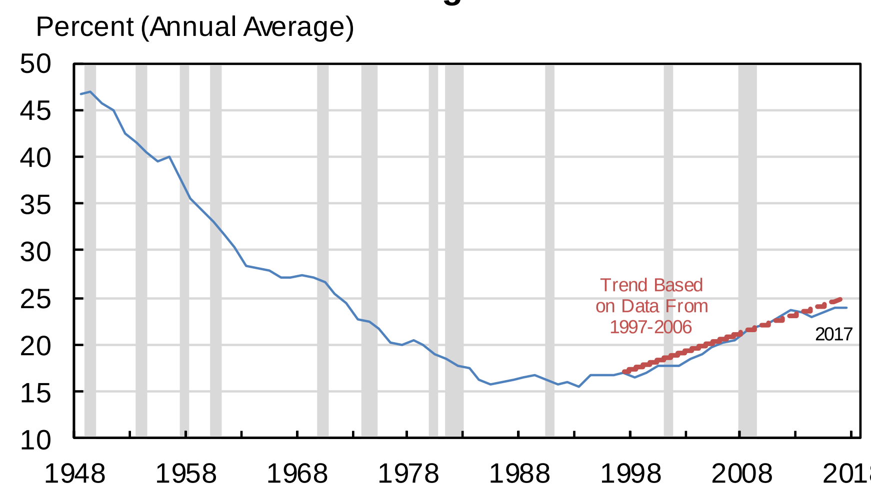
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A7: Labor Force Participation Rate for Men Ages 55-64



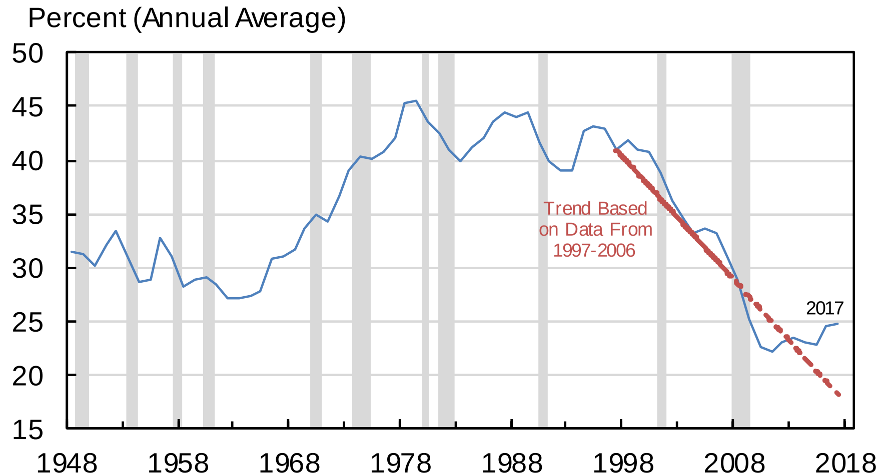
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A8: Labor Force Participation Rate for Men Ages 65 and Older



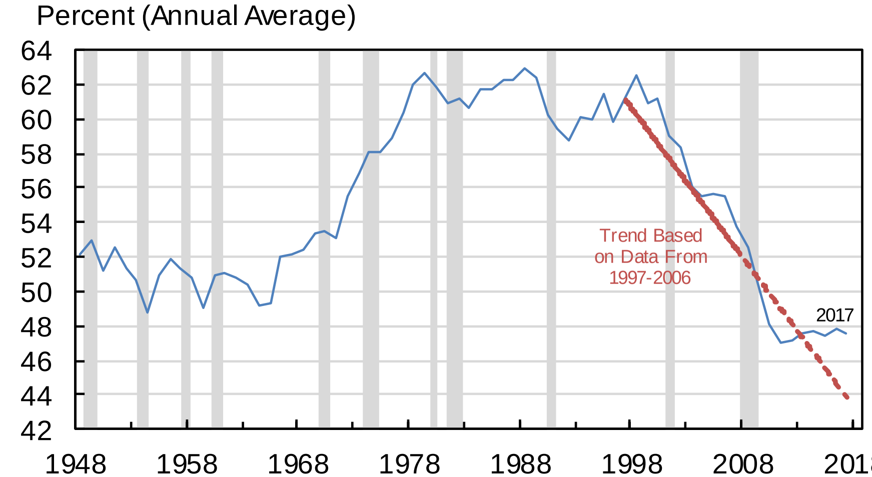
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A9: Labor Force Participation Rate for Women Ages 16-17



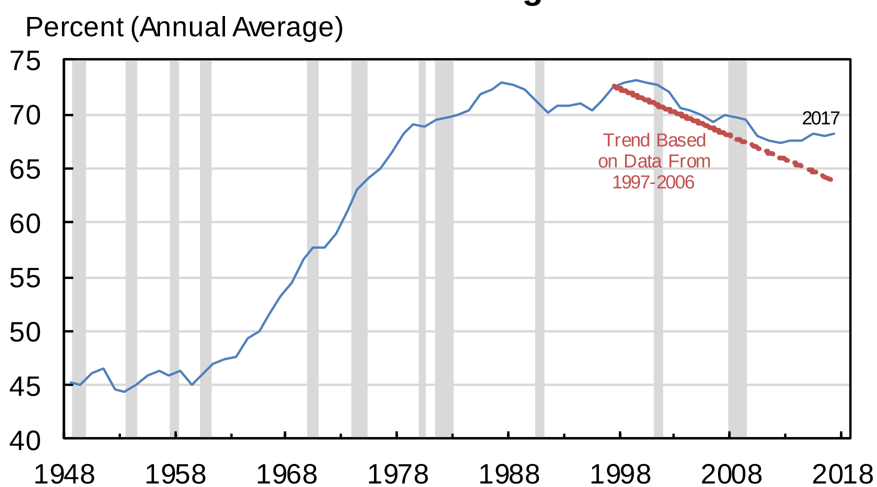
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A10: Labor Force Participation Rate for Women Ages 18-19



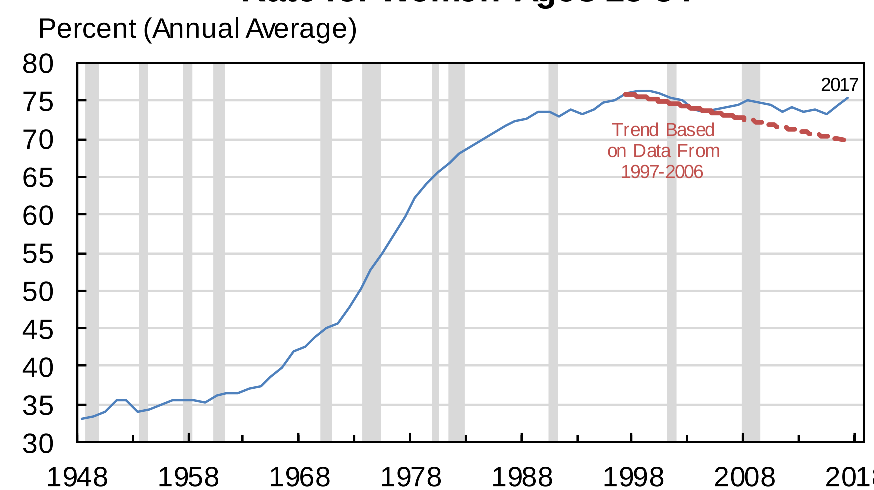
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A11: Labor Force Participation Rate for Women Ages 20-24



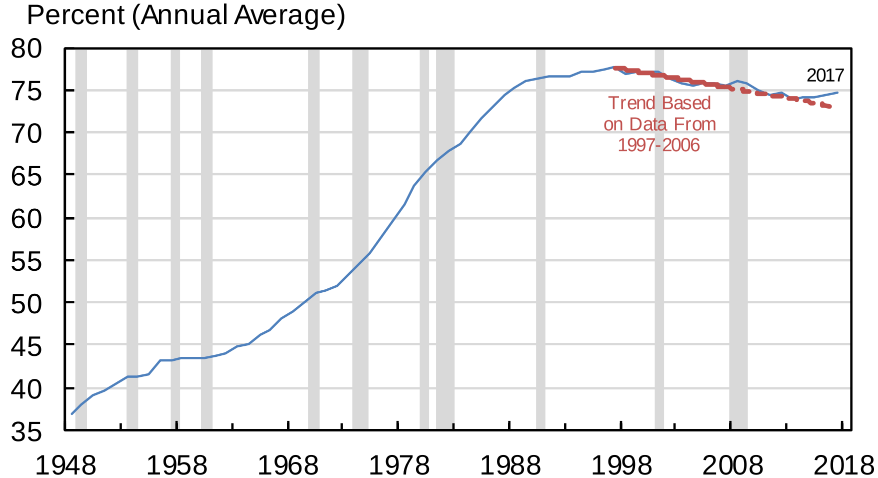
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A12: Labor Force Participation Rate for Women Ages 25-34



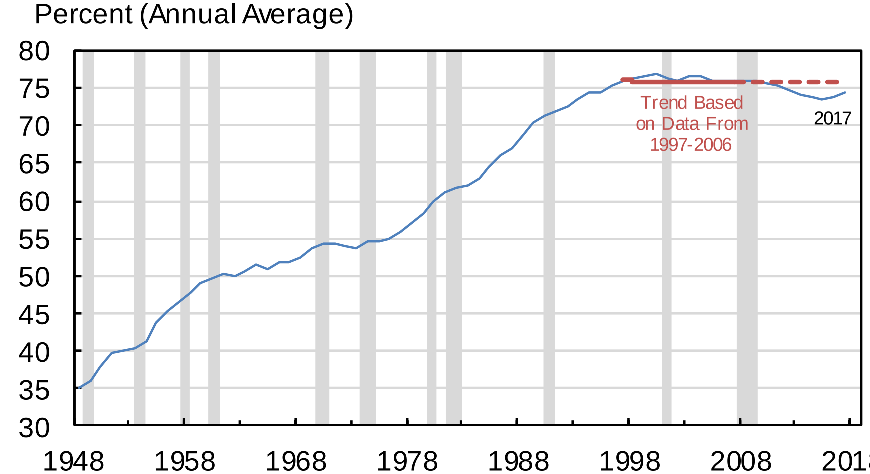
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A13: Labor Force Participation Rate for Women Ages 35-44



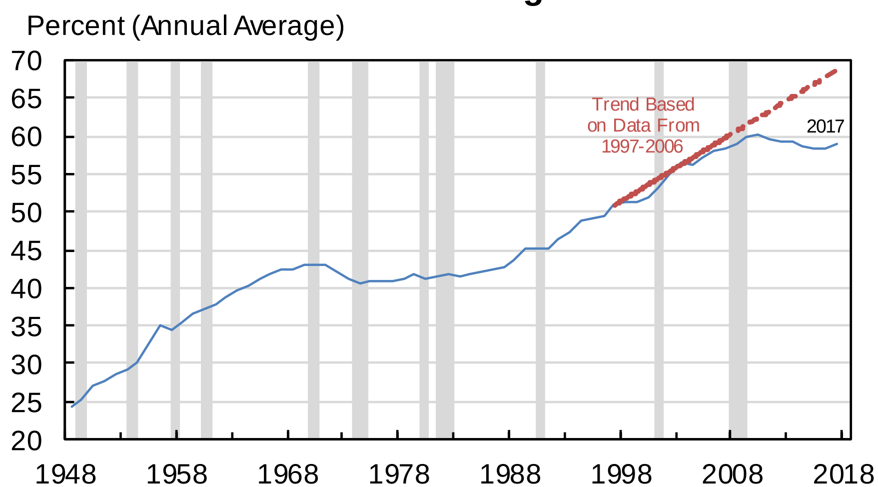
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A14: Labor Force Participation Rate for Women Ages 45-54



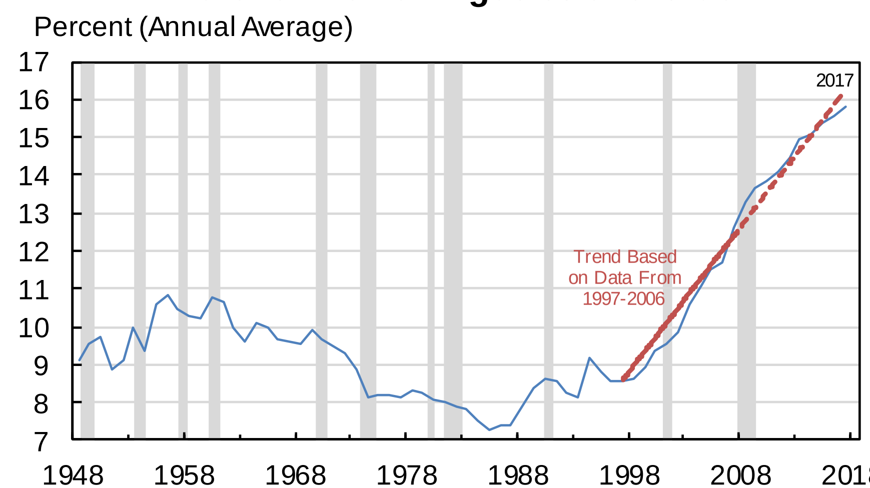
Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A15: Labor Force Participation Rate for Women Ages 55-64



Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.

Appendix Figure A16: Labor Force Participation Rate for Women Ages 65 and Older



Note: Data for 1990 to 2016 have been adjusted to account for the effects of the annual population control adjustments to the Current Population Survey. 2017 represents the average of data from January through June. Shading denotes recession.
Source: Bureau of Labor Statistics; National Bureau of Economic Research; author's calculations.