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Women Working Longer: Facts and Some Explanations

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Women have been working longer for a long time in U.S. history. That is an old story. The new story is that they are working longer past their sixties and even into their seventies. The increase in their participation at older ages started in the late 1980s before the turnaround in older men's labor force participation and before the economic downturns of the 2000s. Another important part of the increase in women's employment at older ages is that a disproportionate share of the change has been in full-time jobs, not part-time. Why have women increased their participation at older ages?

Increased labor force participation of women in their older ages, we will point out, has largely been a continuation of the higher participation of successive cohorts at younger ages. These so-called cohort effects are considerably dampened when education, marital status, work continuity and prior occupations are considered. That is the case for most cohorts and most subgroups. But more recently cohort effects for college graduate women have not been diminished by these observable factors. Something else must be operating to keep women in the labor force at older ages.

Labor force participation rates of women in their early sixties can be observed today only for cohorts born up to around 1950. A central question for those interested in forecasting the employment of older workers is what will be in store for future cohorts.[1]

Participation rates of forty and fifty year old women born in the late 1950s and early 1960s have not increased relative to those of prior cohorts and have even decreased for some. Therefore their lifecycle labor force participation rates will not increase by much compared with prior cohorts. But the finding that college graduate women currently in their early sixties have cohort effects that are not reduced by their lifecycle participation rates suggests that today's younger women will likely retire later than one might have predicted based on their educational attainment and lifecycle participation rates. The

[1] Hurd and Rohwedder (2014) use questions in the Health and Retirement Study on subjective probabilities of employment to predict future labor force participation rates. See also Maestas and Zissimopoulos (2010) for participation forecasts at older ages to 2030 and for an excellent summary of the issues.

finding is particularly noteworthy since college graduates are a much larger fraction of the total for cohorts born in the 1960s.

A. Labor Force Participation Rates

1. By Age, Sex and Education Level

The central facts concerning the labor force participation of women by age are shown in Figure 1, giving rates for women by five-year age groups since 1962. Throughout almost the entire period shown, participation rates have increased for women in the 35 to 54 year group. But these rates were fairly flat for women 55 years and older until the 1980s, when an almost continuous increase ensued, even for the 70 to 74 year old group. Since schooling attainment will be of importance in understanding the change, it is useful to observe trends by education level.

The trends for college graduates are given in Figure 2. The series is restricted to the currently married group because a large fraction of the older cohorts of college graduate women, born from the 1890s to the 1910s, never married (Goldin 1997). These women, in consequence, had higher labor force participation rates when younger and older in relative to others in their cohort. But because many in these early cohorts who eventually married did so when they were older and because they often had no children, participation rates are still high for the earliest cohorts shown and decline a bit over time. If one ignores cohorts born before around 1920, the series for the older age groups are first constant and then increase over time.[2]

Therefore the series for all women and that for college graduate women increase over time, particularly after the mid- to late-1980s. The percentage point increase during the past 25 years, shown in Table 1, is not much different between the aggregate group of women and the college graduates. But because college graduate women have had considerably higher participation rates than lesser-educated women, the shift of women to

[2] For the 60 to 64 year old group, participation rates after around 1980 refer to individuals born after about 1920.

college has increased participation rates for older women and increased the growth of their employment at older ages.

Also demonstrated in Table 1 is that the increases for older women have often greatly exceeded those for older men both absolutely and relative to the base levels. For 60 to 64 year olds, for example, female participation increased by 17 percentage points on a base of 34 percent but by just 6 percentage points for males on a base of 55 percent. The percentage point increase for 65 to 69 year olds males and females was more similar in absolute magnitude, but the initial base for women was far lower (15 versus 26 percent). The relative increase for older women has meant that the gender gap in participation at older ages has greatly decreased, as can be seen in Figure 3.

The gender gap in participation has, of course, decreased more generally. But the absolute percentage point difference at some of the older ages is now smaller than at the younger age groups whereas it was once just as large. For 60 to 64 year olds, for example, the difference in participation rates between men and women was about 50 percentage points in 1962. In 2013 the difference was just 9 percentage points, when that for males and females in their thirties to mid-forties was around 16 percentage points. Men and women are doing more of the same things throughout their lives and this is even truer at older ages. But is that also true within couples? The answer is that during the past two decades the same fraction are engaged in similar general activities but far more couples are now working together rather than being retired together. Increases in women's labor force participation in their early sixties are larger for those with currently employed husbands than for the currently married with husbands not employed and those not currently married.[3]

For couples in which the wife was born from 1931 to 1939, 23.0 percent were both employed when the wife was around age 62, whereas for couples in which the wife was born from 1940 to 1951, 31.6 percent were both employed. But for the earlier cohort 38.4 percent of couples had no member in the labor force and for the later cohort just 28.8

[3] See Appendix Figure 1.

percent had none. Therefore, the same fractions of couples were both doing the same overall activity (around 61 percent), either working or retired but they have shifted from both being retired to both being in the labor force.[4]

Interestingly, for both cohorts not that many more had a husband working but not a wife versus having a wife working but not the husband. In the earlier cohort 21.5 percent did versus 17.2 percent who had the opposite and in the later cohort 22.0 percent did and 17.6 percent had the opposite. The point is that the big change for couples is that a greater fraction of currently married or partnered couples are both in the labor force. The two cohorts had approximately the same fraction currently married (66.2 percent for the earlier and 64.4 percent for the later), although there were more divorced women in the earlier cohort and more widows in the later cohort.

Even though husbands and wives generally have complementary leisure, the timing of the recent increase in participation rates differs between older men and women. Whereas the increase for women began around the late 1980s, that for men is not discernable until around 1998 or even later. That is, there is a decade difference between the increase for men and that for women. Neither corresponds with the dating of the Great Recession. The increase for women precedes some of the more important changes in Social Security, although that for men may be related to the change in the Social Security earnings test.[5]

2. Full-time versus Part-time Employment at Older Ages

During the recent period of increased labor force participation among older women, the fraction in the labor force working full time and full year has greatly increased. The increase is especially evident for the group older than 64 years. As seen in Figure 4, the fraction of 65 to 69 year old women in the labor force who worked full-time and full-year

[4] These findings are consistent with the complementarity of the leisure time of older husbands and wives. See Schirle (2008) for a summary of the literature on complementarity and Blau (1998) in particular. The Schirle (2008) article demonstrates, for three countries, that the increase in women's labor force participation at older ages has led to increased men's participation.
[5] The impact of recent Social Security changes on retirement trends is discussed in Gustman and Steinmeier (2009) and Mastrobuoni (2009), among others.

increased from 40 percent to 55 percent with most of the increase occurred after 2000. Although the timing could indicate the impact of changes in the Social Security earnings test, the increase occurs earlier for both the younger and the older age groups of women. Note, as well, that before the increase participation of older women, the fraction working full-time and full-year actually decreased.

3. Cohort Trends

Increased employment among older women would appear to be related to their increased participation earlier in their lives. This conclusion can be deduced from the fact that all cohorts in Figure 5.A that have increased participation in their sixties, relative to older cohorts, also had increased participation relative to older cohorts earlier in their lives. These cohorts had higher participation rates throughout their lifecycles than did previous cohorts. Although the graph begins with the cohort born in 1929, the pattern is evident as well for some of the earlier birth cohorts not shown. Only with cohorts born in the early 1920s is there no discernible increase in participation among women in their sixties despite modest increases earlier in their lives.[6] The data for college graduates given in Figure 5.B reveal similar findings but the participation levels are higher.

As will be emphasized later, regressions of the labor force rate at older ages on various factors including birth cohort indicate that cohort effects are greatly muted by some of the underlying factors including increased education and changes in women's occupation mix earlier in their careers. That is, cohort effects that are revealed later in life are largely, but not entirely, a function of earlier changes in human capital accumulation. These human capital advances occurred to a great extent because women perceived that their investments would pay off in the labor market and that their employment would be higher and more continuous than in previous cohorts.

Note the interesting "twist" in participation for the most recent cohorts in Figures 5.A and even more so in 5.B. for only college graduate women. Participation rates for

[6] These general trends are also apparent in Figure 1. For example, the participation line for those 65 to 69 years begins to increase around 1987, therefore for women born in the early 1920s.

women in their thirties and forties have in recent years levelled off and have even decreased relative to older cohorts. One clear way to see the change is to observe that slicing the cohort graphs at around ages 35 and 55 yields the usual cohort progression. Younger cohorts have higher participation rates than older cohorts. But slicing the cohort graphs between those ages does not yield higher rates for the younger recent cohorts, such as those from 1959 to 1973. These lines appear to have twisted.

Does this mean that participation rates for these women in their fifties, sixties and beyond will also be lower? Their increased education and lifecycle labor force participation would argue the opposite. Why they have decreased participation is still an on-going question. Although the decrease is not very great the disruption in the increasing trend is clear and could argue for a break in the increase in women's working longer.

The bottom line for the cohort change is that the increase at older ages has occurred for cohorts that increased their attachment to the labor force throughout their lives. The large increases are for cohorts that had far larger increases than previous cohorts in mid-life. Thus, the upshot is that the more one has been attached to the labor force, the longer one works. But why is that the case? And what does it say about the recent cohorts that have had small negative changes in participation during their middle-ages?

B. Exploring the Role of Cohort Effects

Cohorts born later in the period have higher labor force participation rates at older ages than do those born earlier. But are these cohort effects for older ages largely due to alterations across cohorts in factors that are determined largely prior to any retirement option? These variables can include educational attainment, number and ages of children and lifecycle labor force participation. We will also consider the degree to which the individual had relatively high earnings when employed, which we term the "career" condition. These largely predetermined characteristics will be given in our empirical work prior to around age 54.

Alternatively, the retirement decision may be largely determined by factors that are contemporaneous. These factors may have changed to increase in participation at older years among the younger cohorts. These factors can include current marital status, financial shocks, type of pension and Social Security system incentives, and current health.

The evidence points to a large impact of changes in the predetermined factors. Educational differences across cohorts reduce cohort differences in labor force participation from ages 59 to 63 by about a half. Lifecycle labor force participation prior to age 54 produces an overshooting of the cohort effects. The measure of serious career earnings does not perform better, and generally performs worse, than a simpler measure of life cycle participation. Once these variables are considered, adding information on the number and birth years of children has no impact. Children serve to reduce participation in the 25 to 34 year range but have no separate effect.

The one interesting anomaly concerns the most recent of the cohorts of college graduate women that can be followed to their sixties. Those born from 1949 to 1951 have higher participation at ages 59 to 63 even given estimates of their lifecycle participation prior to age 54. That is, the cohort effects remain significant even give the various predetermined factors, in particular lifecycle participation.

The finding that later cohorts have higher participation given their earlier lifecycle participation may be useful in forecasting what even younger cohorts will be doing when they reach their sixties. Recall that the labor force participation rates have become flat from ages 25 to 45 and the younger cohorts do not necessarily have increased participation at all ages. In fact, the most recent data indicate a backtracking of younger cohorts of women in the forties. For the college graduate group and others participation rates have not increased relative to prior cohorts and have even decreased in various age groups.

The finding about those born between 1949 and 1951 may indicate that participation rates for even younger cohorts may be higher still in their sixties and seventies than prior generations at least for college educated women.

To explore the role of cohort and predetermined variables, data from the Health and Retirement Study are used together with information on the earnings history of the respondents from Social Security earnings data and W-2 forms (after 1977).[7] Each of the respondents to the HRS, beginning with the first cohort in 1992, was asked whether their Social Security earnings history could be linked. If the individual agreed to the linkage, then all past records were linked.[8] If the individual did not, then the individual was asked again in the next biennial survey. Therefore, the older cohorts had more chances to agree to a linkage than the younger cohorts and the linkage rates will be higher in consequence.

In each of our estimations for labor force participation in the early sixties, when we use information on earlier lifecycle labor force participation, the data set must be restricted to individuals who gave permission to have their Social Security earnings (and W-2 forms after 1977) linked. Otherwise the full HRS sample is used, given age and other restrictions that may apply. Across all cohorts about 80 percent agreed to the linkage with Social Security (and W-2) records, but it is smaller for younger cohorts for the reasons just given.

In all cases we examine labor force participation rates of women 59 to 63 years old and include three-year birth cohort dummies. We begin in Table 2, cols. (1) to (5) by including characteristics largely determined prior to age 54, such as educational attainment and lifecycle participation during various intervals. We add in col. (6) current marital status and a summary measure of current health status. Table 3 divides the group into two education levels, college graduates and those who did not graduate college. Cols. (1) to (4) of Table 3 include the predetermined characteristics and cols. (5) and (6) add current marital status and health status. Table 4 includes only college graduate women. In

[7] Appendix Figure 2 shows the close relationship between labor force participation rates in the HRS and those in the CPS for women in their fifties and sixties. For women in their seventies the HRS has higher participation rates probably because it excludes those in nursing homes and similar care units.

[8] A curious aspect of the HRS is that until 2006 individuals were asked every year if they would continue the linkage to the Social Security earnings data. If at any point they decided not to, the prior data were allowed but the contemporaneous and future data were not. For most HRS respondents, the break in the linkage will not matter since the HRS itself collected information on labor supply and earnings. But the break will matter for a spouse who entered the HRS at a younger age and who was folded when the individual's birth cohort relevant HRS cohort was added. See Appendix for details.

addition to the previous variables, we add information on whether the individual was ever a teacher since a large fraction of college graduate women in the older cohorts were teachers for much of their working lifetimes.

The use of the HRS linked to the Social Security earnings records reduces the size of the sample, less so for the older cohorts than for the younger cohorts. In Tables 2 and 4 we explore the sensitivity of the results to using the "full" sample and the "linked" sample. Because the HRS is a longitudinal sample, many of the respondents are in the sample more than once between the ages of 59 and 63 and thus we cluster the standard errors at the individual level. We also include dummy variables for the single-year ages.

In Table 2, col. (1) the baseline regression is provided for the full sample and in col. (2) when estimated for the smaller linked sample. The variables of interest are those giving the effect of cohort birth years, given in three-year bins from 1931 to 1951 (where 1931-33 is the omitted cohort group).[9] The effects are very similar between the two samples and both demonstrate the increase in participation at older ages for birth cohorts after 1943 and especially after 1949. The most recent of the cohorts that can be analyzed here, born from 1949-51, has a participation rate that is around 10 percentage points higher for the full sample and 9 percentage points higher for the linked sample than that for cohorts born in the 1930s. The only additional covariates included in the first two columns are single year of age and race dummies.

Educational attainment is added in col. (3) and lifecycle participation between ages 35 and 44 in col. (4). The lifecycle labor force variables give the fraction of years in the interval that the woman was in the labor force. These have been computed from restricted-access information on HRS participants from Social Security earnings data (since 1951) and W-2 forms (since 1978). Additional information was used from the HRS to add those exempt from Social Security taxes, in particular government employees such as teachers, using responses to the question asked concerning two periods prior to the start of HRS interviews in which the respondent was a government employee. When HRS survey

[9] The last year of the HRS is currently 2012 and the 1952-54 cohort is incomplete and omitted.

responses are available regarding participation, they are used in place of Social Security earnings and W-2 data. (For more details, see Appendix: Lifecycle Participation and Career Condition.) Various life cycle employment variables were created for each of the three decades from age 25 to 54 and for the entire period.

The addition of educational attainment eliminates the economic and statistical significance of the cohort coefficients for all but possibly the latest of the birth cohorts. Although the linked sample coefficients are given, those for the full sample change in the same manner. The addition of the lifecycle participation in col. (4) further reduces the coefficient for the latest birth cohort. It also produces some modest reduction of the impact of education since the more educated have greater continuity in employment.

Instead of a variable that measures lifecycle participation, one that measures the degree to which a woman reaches some career level may be even more important in determining future participation. Since women with greater prior employment when first beginning their careers have greater attachment to the labor force even much later in the lives, perhaps those with higher earnings during their employment periods would have even greater attachment.

To test whether employment per se or years of better earning performance matter we create a variable giving the fraction of an age interval that a "career condition" was met. The condition used here is achieving an earnings level that is some fraction (50 percent in this case) of the median earnings of a full-time, year-round male worker for the ten-year age group considered and for the relevant period.[10] That is, the career condition for a woman when she was in an age group is judged relative to the earnings of the median male in the same age group during the identical years. Women who were never in the labor force in the age interval get 0 as do those who never earned more than the condition but were in the labor force. We find that the variable giving the career condition, in col. (5), is

[10] The earnings of the median male, in the same age group and year, are used because the data are available in published documents (U.S. Census Bureau P-60 reports) prior to the micro-data for the CPS, which begins in 1962. The calculation of all the career conditions considered requires data from 1956 (1931 + 25 years). A fraction of the male median is used because the median is too high a bar for employed women during much of the period considered.

less strongly related to later employment than is the simpler measure of the fraction of the interval a woman was employed.

Col. (6) adds two contemporaneous variables: current marital status and current health status. Because the birth cohort coefficients were already extinguished with controls for education and earlier lifecycle participation, the contemporaneous variables actually lead to overshooting. The addition of health status reduces the impact of education, and in most instances halves the coefficients in col. (4). The more highly educated are also the healthiest or, at least, they consider themselves to be healthy. The coefficient on earlier lifecycle participation remains about the same order of magnitude.

It is useful to explore the impact of current marital status even if it does little to change the birth cohort coefficients. Being currently married decreases participation for older women but the effect is reduced if the woman's spouse is employed and the total impact is about equal to that of the omitted group (never married) and to widowed women. Divorced women have participation rates about 9 percentage points higher than the base group of never married women.

Disaggregating by education, as in Table 3, reveals substantial differences between the higher (college graduate) and lower (below a college graduate) educated groups in the correlates of their later employment. Note that within the college graduate group, dummy variables are added for degrees above the bachelors (MA and the various graduate and professional degrees) and within the non-college group dummy variables are added for high school diploma and having some college.

The regressions in cols. (1) and (2) of Table 3 include only cohort effects (plus age, race and education dummies). Cohort effects for the college graduates are substantial but the group that did not graduate from college does not reveal a gradient with respect to birth year. For college graduates, however, the latest cohort has participation rates about 11 percentage points higher than for those born in the 1930s.

In cols. (3) and (4) we add lifecycle participation variables including one indicating whether the woman was never in the labor force during the interval. The addition of the lifecycle measures has little impact on the cohort effect for the college graduate women born most recently. Earlier labor force participation matters more for the less educated group than for the college educated. For college graduates what matters a lot is whether the women did not work at all in the interval, even though that is a fairly small group. The large unexplained higher labor force participation rate at older ages for the 1949-51 cohort of college graduate women remains even with controls for current marital and health status as seen in col. (6).

Lastly, Table 4 looks in more depth at college graduates in part because their participation rates are the highest at all ages, particularly among those in their sixties. In addition, the fraction of older women who are college graduates has greatly expanded and will continue to do so for some time given the increase of college graduates at younger ages. Both the increase of college graduation for future cohorts and their higher participation at older ages would imply an increase in the future employment of older women.

Table 4 includes the predetermined (lifecycle participation and education) and contemporaneous (marital and health status) variables. In addition, we are able to include whether the woman was ever a teacher.

Similar to the findings for college graduate women in Table 3, cohort effects are large for the latest of those shown. The coefficient remains large and statistically significant despite the inclusion of current marital status and lifecycle participation variables. Only in col. (5) with the inclusion of the fraction of all years from 25 to 54 that the woman was in the labor force does the coefficient greatly decline.

Teaching was the single most important occupation for college graduate women for many of HRS cohorts. Around 45 percent of the college graduate women in the cohorts born from 1931 to 1941 were teachers at some point in their working lives, as seen in Figure 6. A much smaller fraction of women (around 30 percent) for the later cohorts

considered here, 1945 to 1951, were teachers. And an even smaller fraction (around 20 percent) were for cohort born in the late 1950s, a group who are still too young to observe in their sixties.

Those who were ever a teacher had participation rates when they were in the 59 to 63 age range that were about 5 percentage points lower than other college graduate women. But controlling for whether a woman was ever a teacher does not knock out the cohort trend. In addition, the impact of ever being a teacher increases controlling for lifecycle participation, implying that teachers work more earlier in their lives and are then less likely to work later. Their earlier work would have made one think they would be more likely to work later but they are, in fact, less likely.[11]

The Table 4 analysis reinforces the findings from Table 3 that the cohort effect for the latest cohort is not extinguished by the other covariates even when the lifecycle participation rate variable is included, as in cols. (3), (4) and (5). The coefficients are slightly smaller than in Table 3 because of the inclusion of the "ever a teacher" variable.

Another important finding for forecasting women's future participation at older ages is that employment in the 45 to 54 year old range is the best predictor of whether an individual will remain employed into her early sixties. Therefore, even though participation rates have "twisted," as noted in the discussion of Figure 5, the fact that participation is still higher for the younger cohorts in their 50s suggests that these college graduate women will remain in the labor force to a greater extent through their sixties and seventies. The same is not true for the non-college graduate group.

The summary finding is that older women have had substantial increases in labor force participation. But for the college graduate group the increases for the latest cohorts that can be observed in their sixties are not reduced by the inclusion of various covariates, especially those measuring lifecycle labor force participation. The most recent cohorts

[11] The reason for the decrease in employment among teachers at older ages is explored in the *Women Working Longer* preconference paper by Maria Fitzpatrick.

with less than college completion have had smaller increases and these do get extinguished with the expanded group of covariates.

C. Further Exploration of Lifecycle Labor Force Participation

Given the importance of lifecycle labor force participation for later work, we now explore how this changed across cohorts born from 1931 to 1954 in five quintiles. Figure 6, part A, shows the percentage in the labor force in the five quintiles from 25 to 54 years old for all women and part B gives these figures for the group when it was 25 to 34 years old. Figure 7 provides the same data for the earliest of the birth cohorts shown (born 1931 to 1938) and for the most recent of the birth cohorts (born 1948 to 1954).

The fraction who were in the labor force 80 to 100 percent of the time they were 25 to 54 years old expanded from 20 percent to more than 50 percent across these cohorts (see part A). The flip side of that increase is the sharp decrease of those in the labor force fewer than 20 percent of the thirty year period shown. The middle three groups change little.

One gets a clearer picture in Figure 7 that cohorts born from 1931 to 1938 had lifecycle participation rates that were uniformly distributed across the quintiles. But by the 1947 to 1954 cohorts almost 50 percent were in the labor force for the entire period and very few were in the lowest quintile.

Even more extreme changes occurred for women in the 25 to 34 year old group (see Figure 6, part B). Once again, the middle three quintiles show little change and all of the increase in the top quintile comes about because of a decrease in the lowest quintile.

In sum, until the cohorts born in the late 1930s, as seen in Figure 7, there was little change in lifecycle labor force participation. But by the cohorts born in the early 1950s the majority of women were employed more than 80 percent of their years from 25 to 54.

D. Concluding Remarks

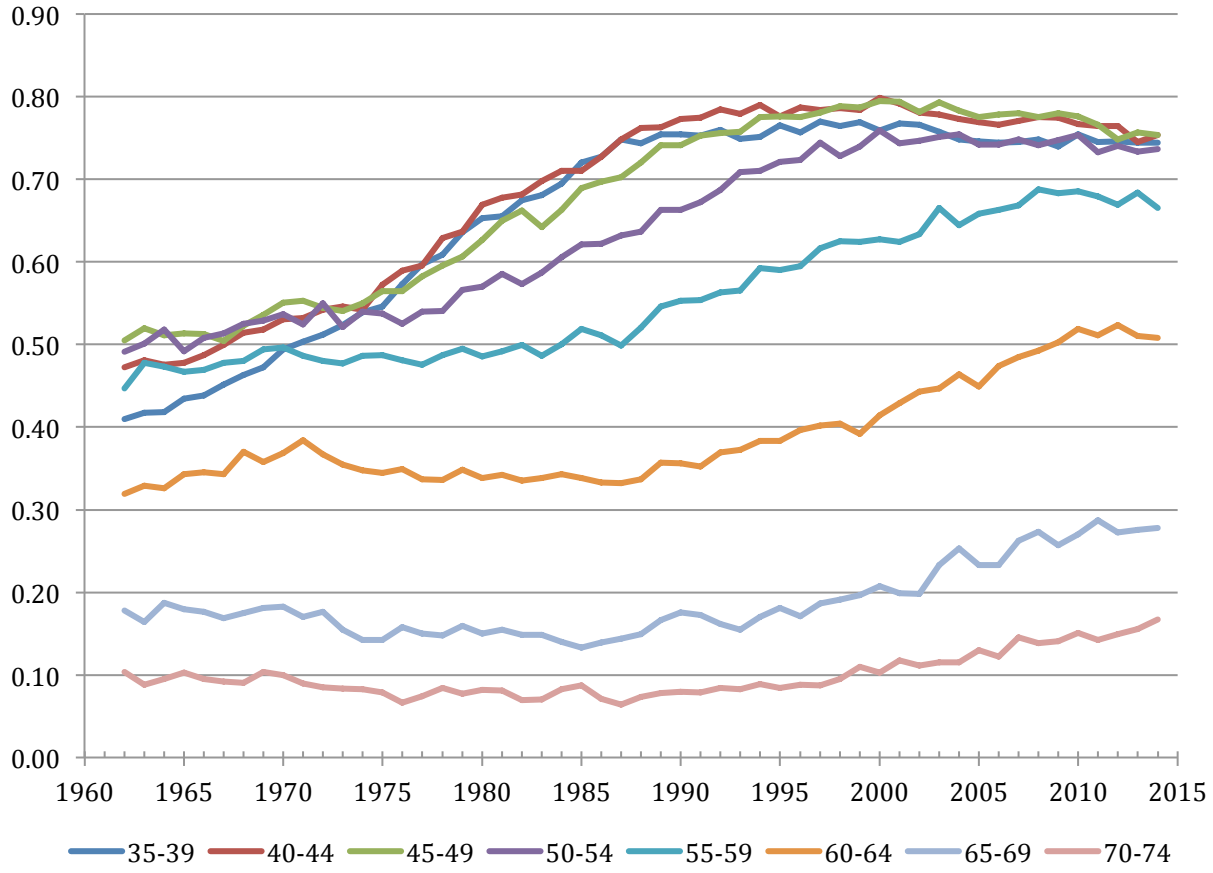
We have explored the increase in the labor force participation of older women that began around the late 1980s. Using CPS data, we have noted that the increase in participation was disproportionately in full-time, year-round jobs, rather than part-time positions.

We have begun an investigation into why participation increased by using the HRS and related Social Security earnings records to analyze the participation of women 59 to 63 years old across cohorts born from 1931 to 1951. We first observe the effect of characteristics largely determined prior to labor market entry and then those determined before a woman is in her late fifties. For the aggregate sample, participation rates increase most for cohorts born after around 1943 and the increase in participation is greater for the more highly educated. Most important is that the cohort effects, noticed in the aggregate data, are greatly reduced when education is included in the regression.

Although the rising cohort effects for all women are virtually extinguished by the inclusion of education, the college graduate group is different. The cohort effect for the most recent birth cohort that can be explored, that from 1949 to 1951, remains large and statistically significant. The only variable in our analysis that reduces the coefficient is the fraction of the previous ten years (45 to 54 years) spent in the labor force and that is somewhat tautological.

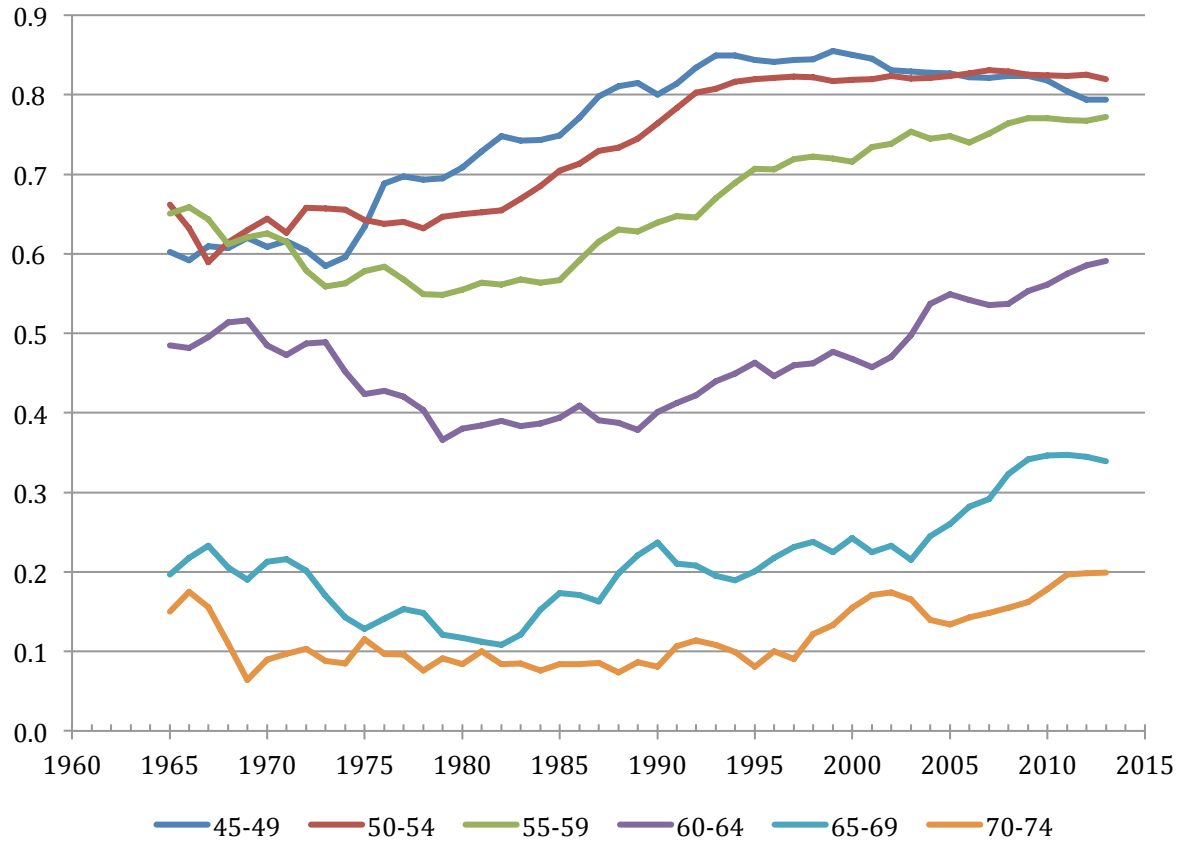
Whereas the increased participation rates of older women with birth cohorts in the early 1940s seem explicable due to their higher levels of education, that for the most recent cohort that can be explored appears to be due to some other factors. Our current challenge is to understand what these factors are and how they impact the labor force participation at older ages of future cohorts.

Figure 1: Female Labor Force Participation by Five-Year Age Groups, 1962 to 2014



Source: CPS March.

Figure 2: Female Labor Force Participation by Five-Year Age Groups for Currently Married College Graduates, 1965 to 2013 (three-year centered moving averages)



Source: CPS March.

Figure 3: Gender Gap in Labor Force Participation at Older Ages: 1962 to 2013

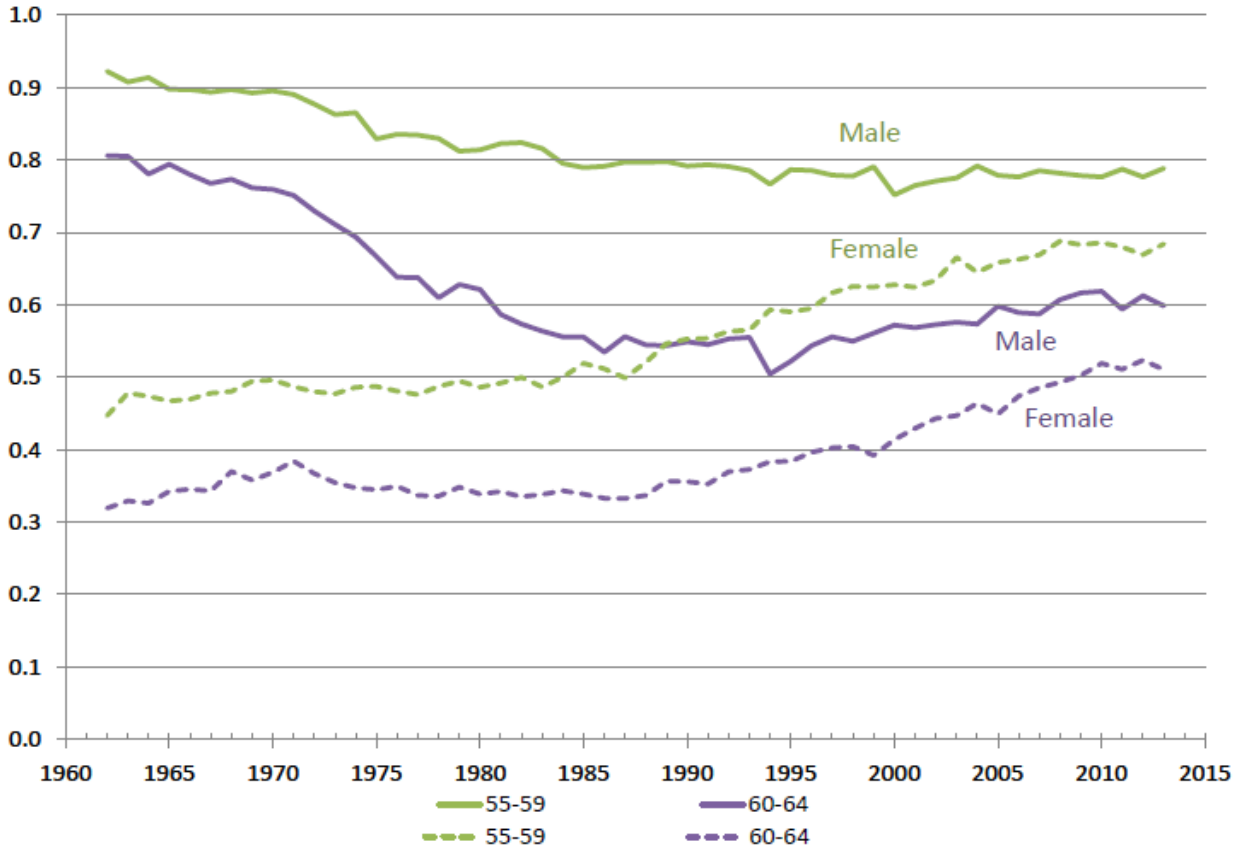
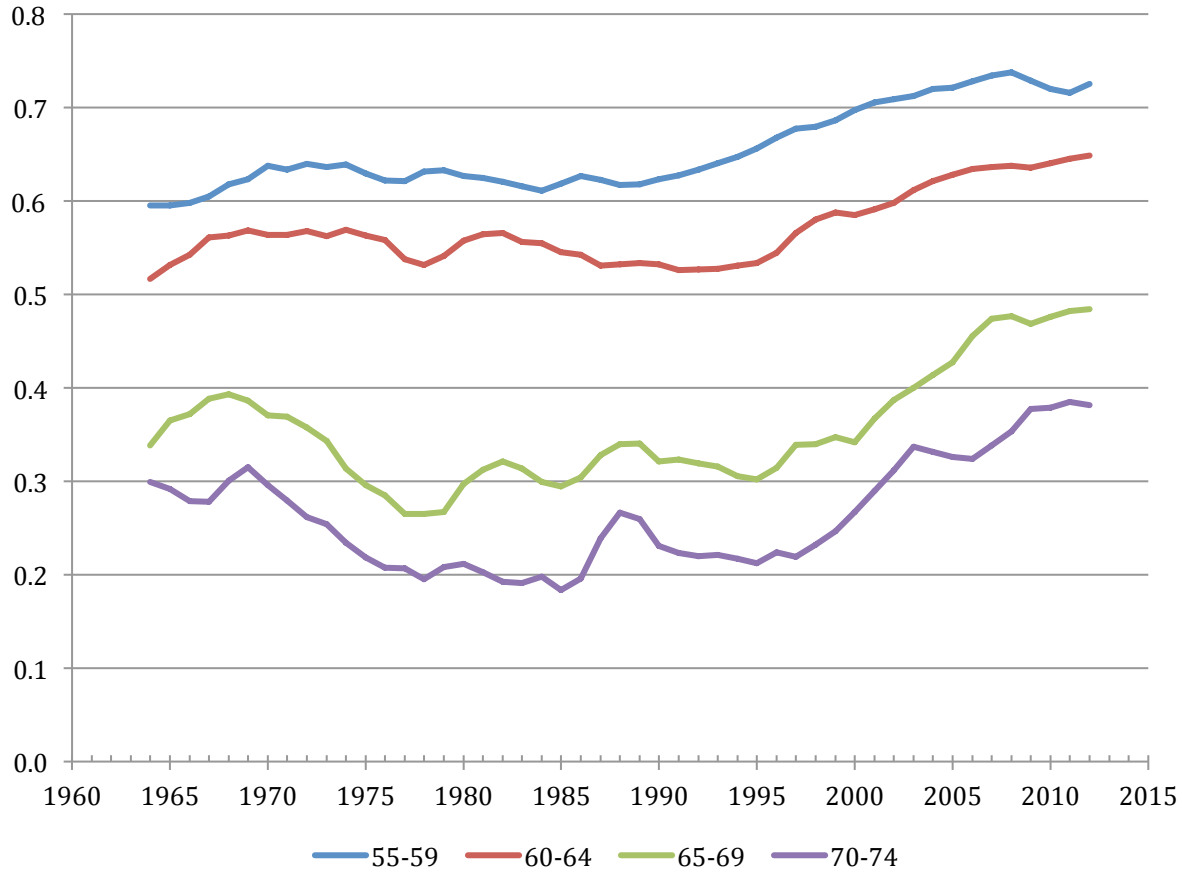


Figure 4: Women Employed Full-Time, Full-Year among Labor Force Participants during the Year

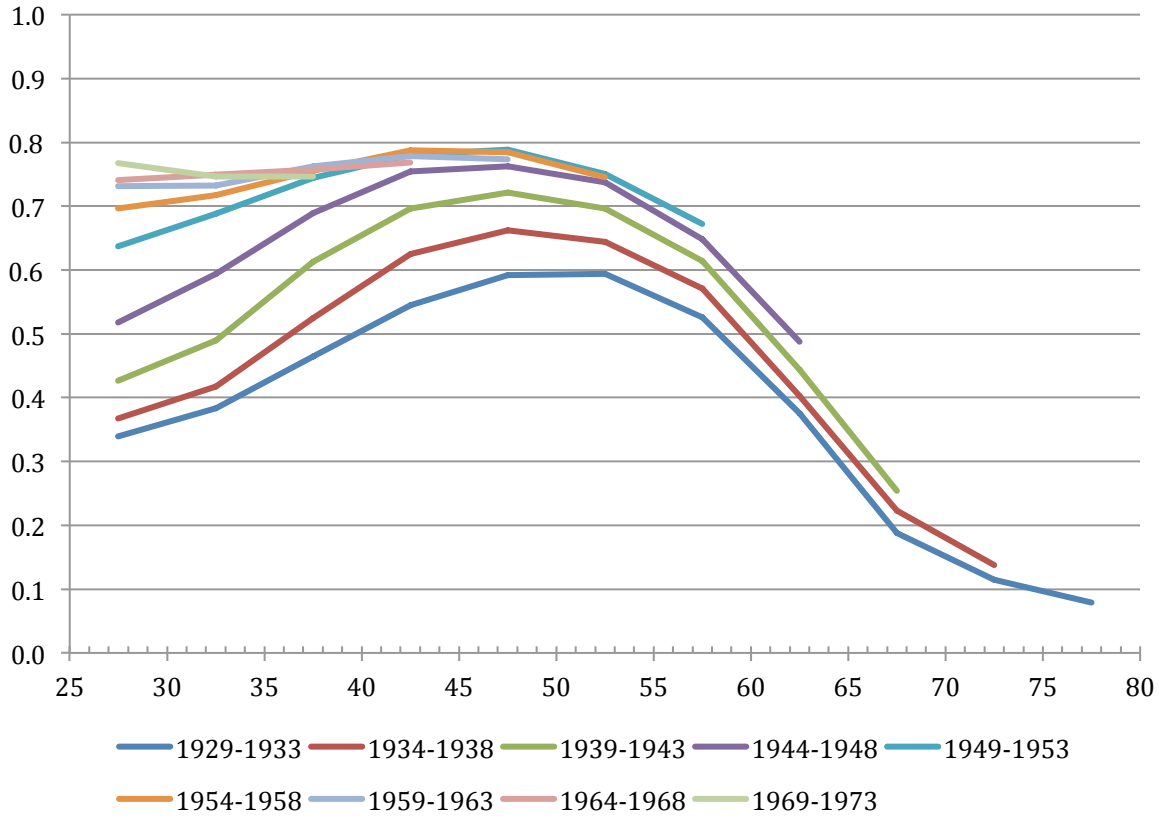


Source: CPS March.

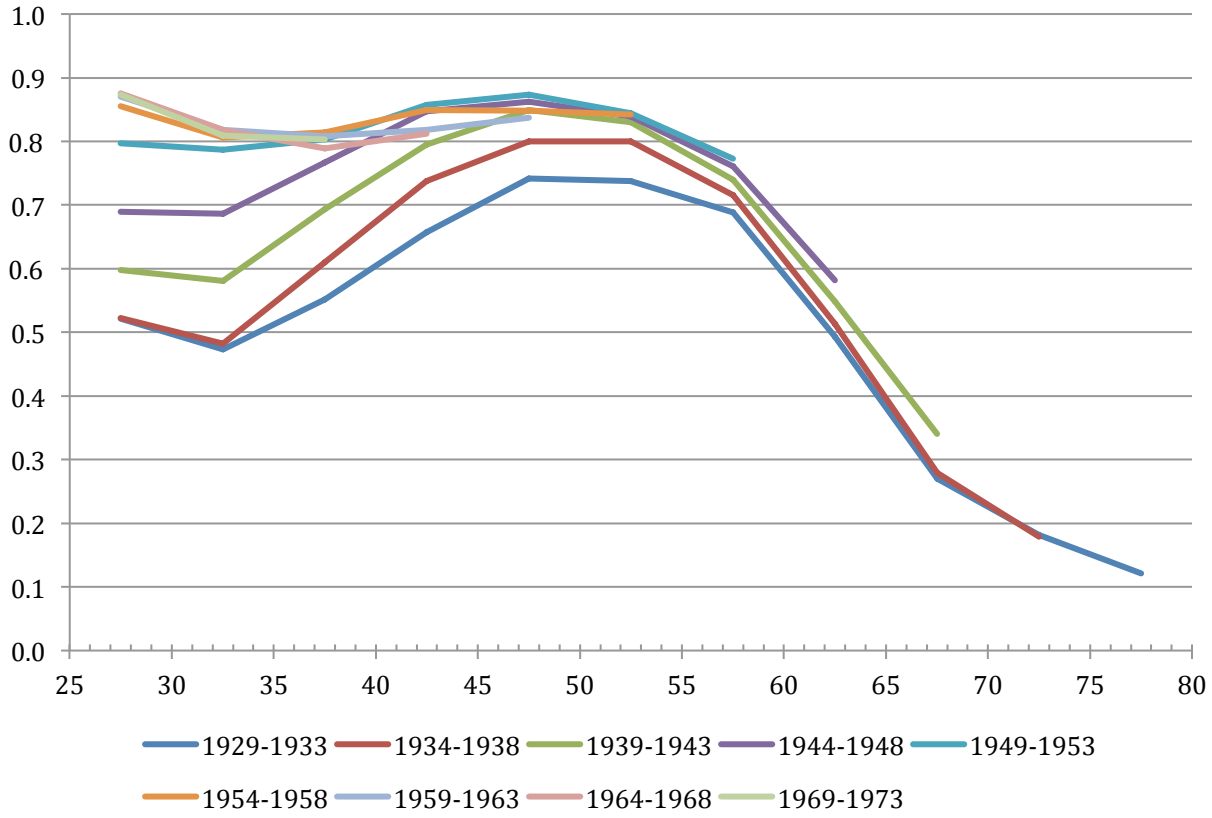
Notes: Both numerator and denominator refer to the calendar year. By a "labor force participant during the year" is meant anyone who worked during the year. Three year centered moving averages. Full-time, full-year workers are those who worked 40 or more weeks and 35 or more hours per week.

Figure 5: Labor Force Participation Rates for Women by Five-Year Birth Cohorts (1929-33 to 1969-73) and Five-Year Age Groups (25-29 to 74-79 years)

A. All Education Groups



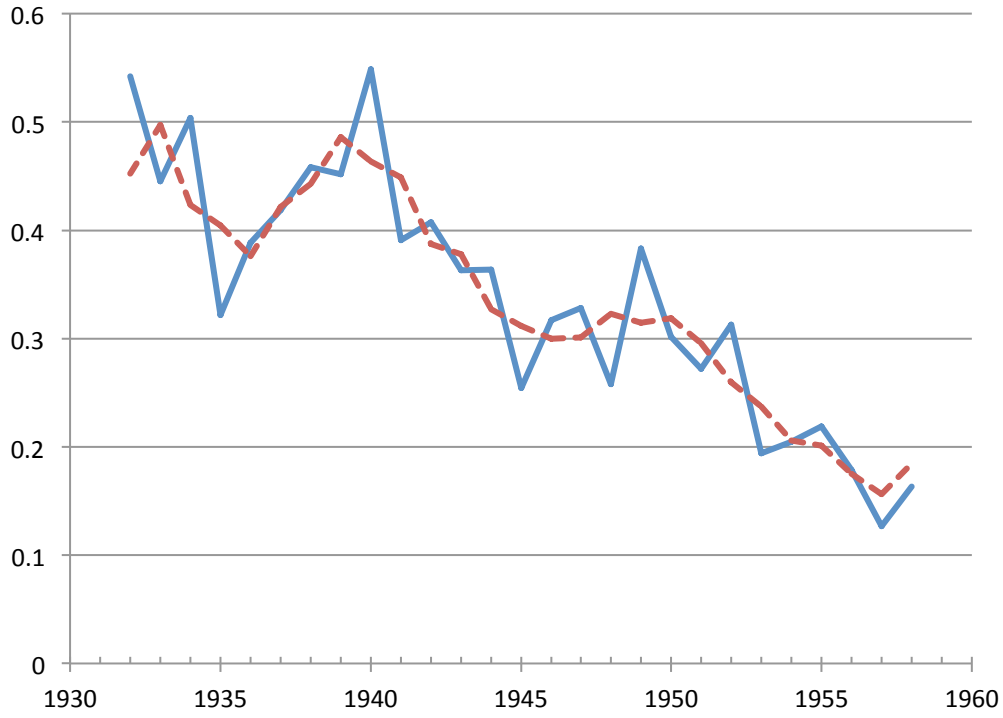
B. College Graduates



Source: CPS March.

Notes: Every data point in each graph contains 25 birth years and ages.

Figure 6: Fraction of College Graduate Women Ever Employed in Teaching, for 1931 to 1959 Birth Cohorts

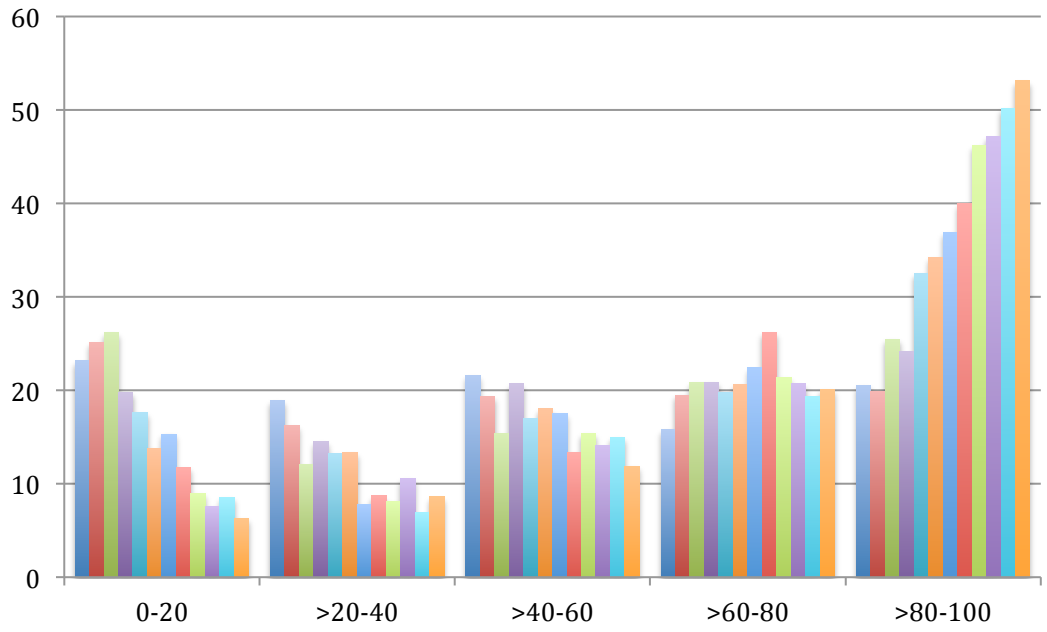


Source: HRS, restricted access data.

Notes: "Ever employed in teaching" is calculated using the detailed occupational codes for occupations prior to the first HRS interview. We thank Maria Fitzpatrick for providing her code to produce this variable. The dashed line is the three-year centered moving average.

Figure 7: Lifecycle Labor Force Participation in the HRS and Social Security Earnings Data

A. All Women, 25 to 54 Years



B. All Women, 25 to 34 Years

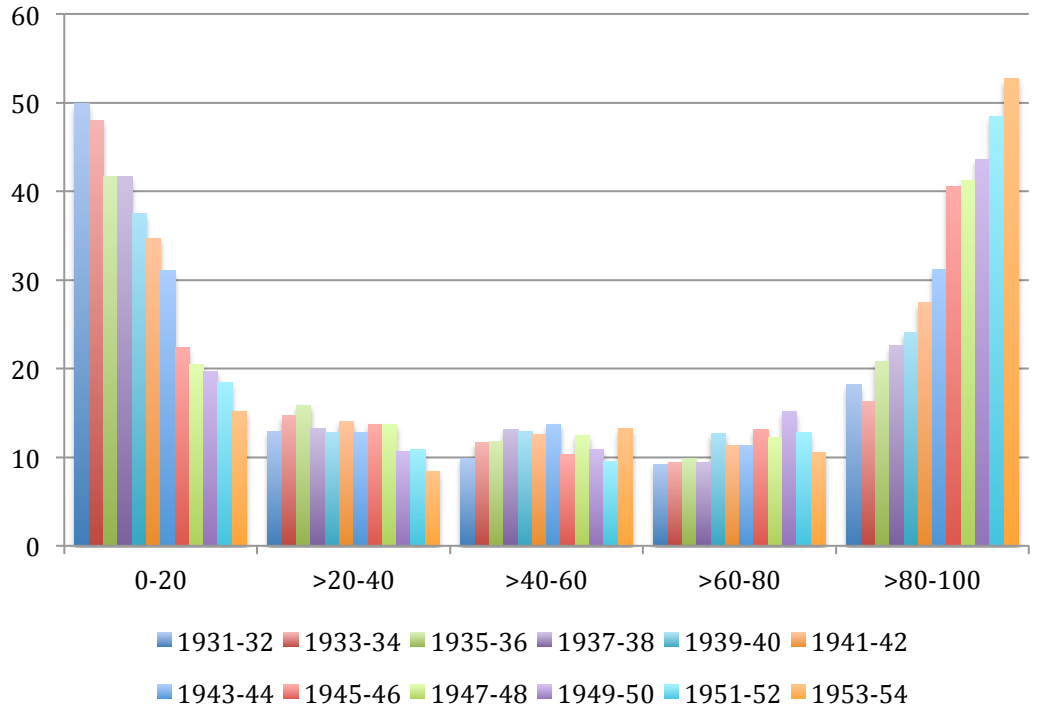
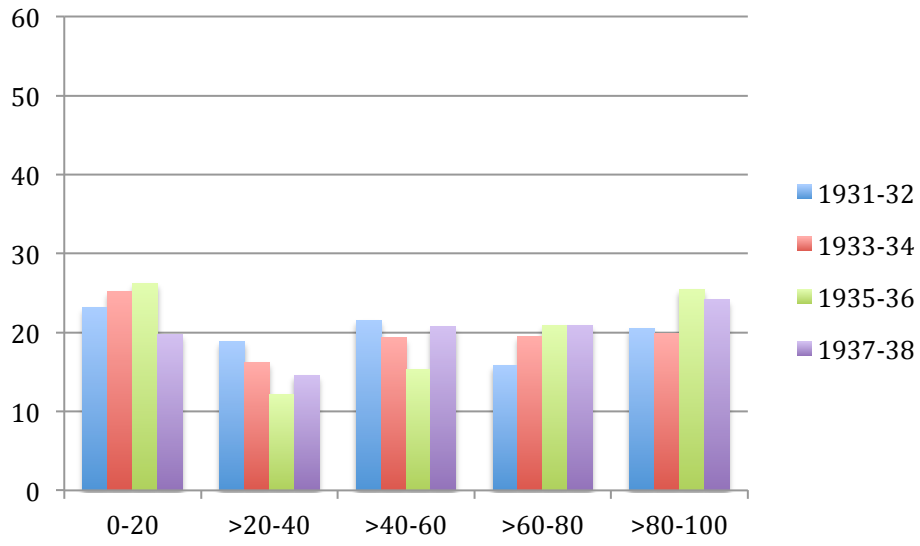


Figure 8: Lifecycle Labor Force Participation by Birth Cohorts, 25 to 54 Years Old

A. Birth Cohorts from 1931 to 1938



B. Birth Cohorts from 1947 to 1954

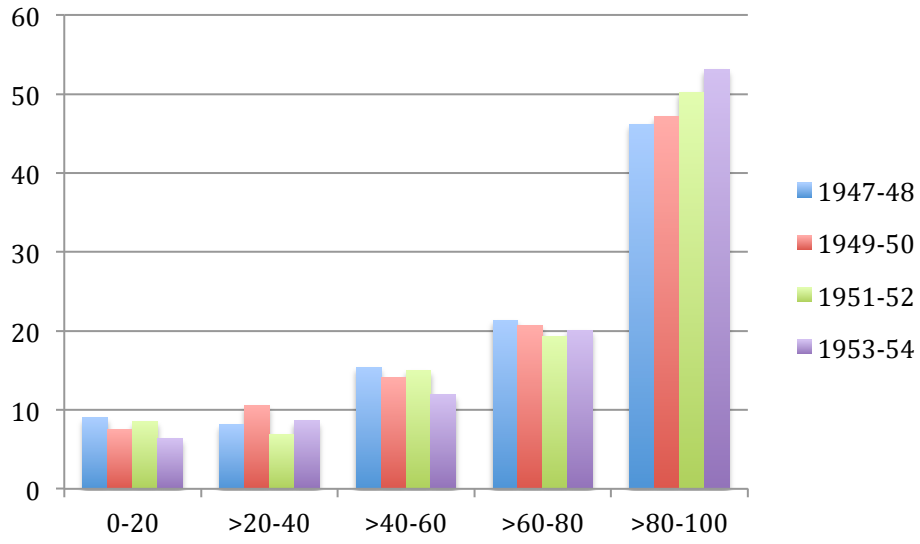


Table 1: Labor Force Participation Rates for Males and Females 60-74 Years Old, 1988 and 2013

Age Group	Educational Group	Labor Force Participation Rate in		Percentage Point Increase from c.1988 to c.2013
		1987-89	2012-14	
Women				
60-64	All	0.34	0.51	17
	College graduates	0.45	0.61	16
65-69	All	0.15	0.28	12
	College graduates	0.24	0.37	13
70-74	All	0.07	0.16	9
	College graduates	0.13	0.21	8
Men				
60-64	All	0.55	0.61	6
	College graduates	0.68	0.73	5
65-69	All	0.26	0.38	12
	College graduates	0.40	0.49	9
70-74	All	0.16	0.23	8
	College graduates	0.25	0.32	7

Source: CPS March.

Table 2: Female Labor Force Participation at Age 59-63 Years, All Education Groups

	Labor Force Participation at Ages 59 to 63 Years					
	Full Sample	Linked Sample				
	(1)	(2)	(3)	(4)	(5)	(6)
Year of birth						
1934-36	-0.00810	-0.0117	-0.0144	-0.0165	-0.0134	-0.0151
	(0.0192)	(0.0207)	(0.0203)	(0.0197)	(0.0201)	(0.0186)
1937-39	0.0141	0.00418	0.000505	-0.0151	-0.00400	-0.00585
	(0.0191)	(0.0206)	(0.0202)	(0.0199)	(0.0202)	(0.0186)
1940-42	0.0163	0.0129	-0.00795	-0.0354	-0.0179	-0.0322
	(0.0203)	(0.0218)	(0.0211)	(0.0205)	(0.0209)	(0.0194)
1943-45	0.0464*	0.0330	-0.00191	-0.0390	-0.0164	-0.0326
	(0.0229)	(0.0247)	(0.0240)	(0.0235)	(0.0238)	(0.0223)
1946-48	0.0635**	0.0558*	0.00758	-0.0363	-0.0107	-0.0236
	(0.0217)	(0.0242)	(0.0240)	(0.0237)	(0.0240)	(0.0221)
1949-51	0.0973***	0.0897***	0.0320	-0.0117	0.0145	0.000859
	(0.0217)	(0.0250)	(0.0246)	(0.0243)	(0.0246)	(0.0231)
High school grad.			0.156***	0.117***	0.136***	0.0582***
			(0.0174)	(0.0170)	(0.0173)	(0.0166)
Some college			0.238***	0.189***	0.206***	0.102***
			(0.0198)	(0.0196)	(0.0200)	(0.0190)
College graduate			0.288***	0.231***	0.243***	0.114***
			(0.0247)	(0.0247)	(0.0253)	(0.0244)
MA			0.335***	0.270***	0.280***	0.154***
			(0.0275)	(0.0274)	(0.0285)	(0.0264)
PhD, MD, JD, etc.			0.465***	0.361***	0.395***	0.228***
			(0.0442)	(0.0441)	(0.0444)	(0.0440)
Lifecycle LFP 35-44				0.236***		0.219***
				(0.0168)		(0.0158)
Career cond. 35-44					0.131***	
					(0.0187)	
Currently married						-0.167***
						(0.0303)
Divorced						0.0785*
						(0.0313)
Widow						0.00653
						(0.0322)
Spouse in LF						0.189***
						(0.0141)
Health status	no	no	no	no	no	yes
Age dummies	Yes	yes	yes	yes	yes	yes

Race dummies	yes	yes	yes	yes	yes	yes
Constant	0.456***	0.428***	0.325***	0.257***	0.321***	0.167***
	(0.0331)	(0.0369)	(0.0344)	(0.0346)	(0.0347)	(0.0427)
N	18,383	15,431	15,431	15,431	15,431	15,431
R-squared	0.028	0.028	0.069	0.101	0.079	0.179

Sources: Health and Retirement Study (HRS) 1992 to 2012, RAND version with added variables from original HRS files. Social Security Administration earnings (and W-2) data are used to calculate life cycle labor force participation (Lifecycle LFP <ages>) and the career condition (Career cond. <ages>).

Notes: The dependent variable is 1 if the woman is in the labor force and 0 otherwise. The HRS asks respondents their labor force status and a woman is in the labor force if she reported being employed or unemployed and searching for work.
Health status is self-reported and is coded as 1 if "good" or better and 0 otherwise.
Marital status variables refer to current status.
"Lifecycle LFP <ages>" is the fraction of the interval the woman was in the labor force as determined by a combination of the data sources described in the Appendix.
The "linked sample" indicates that the individual gave permission for Social Security earnings data to be linked.
Omitted base group variables are: 1931-33 birth cohort; below high school graduate (overall or for the less than college graduate group); BA only for the college graduate group; never married; other race and age 63. Omitted from the table are dummy variables for missing variables regarding spouse in labor force, career condition 35-44, and health status.
HRS person weights have been used.

Standard errors in parentheses have been clustered at the individual level.
* p<0.05, ** p<0.01, *** p<0.001

Table 3: Female Labor Force Participation at Ages 59 to 63, by Education

	Labor Force Participation at Ages 59 to 63 Years					
	Not College Graduate	College Graduate	Not College Graduate	College Graduate	Not College Graduate	College Graduate
	(1)	(2)	(3)	(4)	(5)	(6)
Year of birth						
1934-36	-0.0238	0.0297	-0.0269	0.0327	-0.0254	0.0372
	(0.0219)	(0.0525)	(0.0212)	(0.0509)	(0.0200)	(0.0473)
1937-39	-0.00217	0.0170	-0.0225	0.0221	-0.0110	0.0165
	(0.0217)	(0.0545)	(0.0212)	(0.0548)	(0.0197)	(0.0522)
1940-42	-0.0139	0.0374	-0.0452*	0.0205	-0.0407	0.0169
	(0.0231)	(0.0515)	(0.0223)	(0.0506)	(0.0211)	(0.0473)
1943-45	-0.00774	0.0521	-0.0460	0.0213	-0.0380	0.0198
	(0.0268)	(0.0538)	(0.0261)	(0.0537)	(0.0246)	(0.0521)
1946-48	0.00184	0.0591	-0.0436	0.0226	-0.0309	0.0340
	(0.0271)	(0.0524)	(0.0266)	(0.0528)	(0.0250)	(0.0484)
1949-51	0.00297	0.135**	-0.0461	0.110*	-0.0270	0.104*
	(0.0287)	(0.0497)	(0.0282)	(0.0505)	(0.0268)	(0.0486)
High school grad.	0.154***		0.113***		0.0530**	
	(0.0174)		(0.0171)		(0.0167)	
Some college	0.237***		0.184***		0.0982***	
	(0.0198)		(0.0197)		(0.0192)	
MA		0.0471		0.0392		0.0348
		(0.0311)		(0.0307)		(0.0289)
PhD, MD, JD, etc.		0.172***		0.141**		0.114*
		(0.0472)		(0.0483)		(0.0481)
Lifecycle LFP 35-44			0.209***	0.0774	0.193***	0.0779
			(0.0267)	(0.0558)	(0.0249)	(0.0559)
Never in LF 35-44			-0.0592*	-0.151*	-0.0567*	-0.142*
			(0.0248)	(0.0700)	(0.0232)	(0.0679)
Currently married					-0.152***	-0.254***
					(0.0345)	(0.0625)
Divorced					0.0622	0.117
					(0.0359)	(0.0608)
Widow					0.00372	-0.0112
					(0.0363)	(0.0695)
Spouse in LF					0.180***	0.229***
					(0.0155)	(0.0345)
Health status	no	no	no	no	yes	yes
Age dummies	yes	yes	yes	yes	yes	yes
Race dummies	yes	yes	yes	yes	yes	yes

Constant	0.284***	0.850***	0.256***	0.830***	0.169***	0.628***
	(0.0365)	(0.0640)	(0.0415)	(0.0754)	(0.0509)	(0.0993)
N	12,789	2,642	12,789	2,642	12,789	2,642
R-squared	0.056	0.041	0.094	0.059	0.173	0.142

Sources: Health and Retirement Study (HRS) 1992 to 2012, RAND version with added variables from original HRS files. Social Security Administration earnings (and W-2) data are used to calculate life cycle labor force participation (Lifecycle LFP <ages>).

Notes: The dependent variable is 1 if the woman is in the labor force and 0 otherwise. The HRS asks respondents their labor force status and a woman is in the labor force if she reported being employed or unemployed and searching for work.
Health status is self-reported and is coded as 1 if "good" or better and 0 otherwise.
Marital status variables refer to current status.
"Lifecycle LFP <ages>" is the fraction of the interval the woman was in the labor force as determined by a combination of the data sources described in the Appendix. "Never in LF" is 1 if the individual was recorded as having no years in the labor force during those years.
All columns use the "linked sample."
Omitted base group variables are: 1931-33 birth cohort; below high school graduate (overall or for the less than college graduate group); BA only for the college graduate group; never married; other race and age 63. Omitted from the table are dummy variables for missing variables regarding spouse in labor force and health status.
Regressions are estimated separately for college graduates and those who did not graduate from college. For the college graduates degrees beyond a bachelors are added (MA, PhD, etc.), where MA includes all masters and PhD, MD, JD, etc. includes all graduate and professional degrees. For non-college graduates dummy variables are added for those with a high school diploma and some college.
HRS person weights have been used.

Standard errors in parentheses have been clustered at the individual level.
* p<0.05, ** p<0.01, *** p<0.001

Table 4: Labor Force Participation among College Graduate Women, 59 to 63 years old

	Labor Force Participation at Ages 59 to 63 Years				
	Full Sample	Linked Sample			
	(1)	(2)	(3)	(4)	(5)
Year of birth					
1934-36	0.00774	0.0261	0.0287	0.0438	0.0270
	(0.0497)	(0.0527)	(0.0510)	(0.0473)	(0.0511)
1937-39	0.00217	0.0155	0.0207	0.0193	0.00826
	(0.0503)	(0.0545)	(0.0547)	(0.0510)	(0.0540)
1940-42	0.0389	0.0342	0.0167	0.0195	0.00219
	(0.0484)	(0.0518)	(0.0508)	(0.0471)	(0.0508)
1943-45	0.0370	0.0412	0.00886	0.0115	-0.0214
	(0.0503)	(0.0542)	(0.0539)	(0.0520)	(0.0543)
1946-48	0.0465	0.0482	0.00996	0.00406	-0.0314
	(0.0475)	(0.0528)	(0.0529)	(0.0496)	(0.0539)
1949-51	0.0957*	0.127*	0.101*	0.113*	0.0593
	(0.0452)	(0.0500)	(0.0508)	(0.0465)	(0.0511)
Ever a teacher	-0.0477	-0.0494	-0.0561	-0.0920**	-0.0616*
	(0.0288)	(0.0311)	(0.0306)	(0.0289)	(0.0301)
MA	0.0538	0.0554	0.0486	0.0386	0.0402
	(0.0296)	(0.0321)	(0.0316)	(0.0295)	(0.0312)
PhD, MD, JD, etc.	0.160***	0.169***	0.137**	0.111**	0.112*
	(0.0447)	(0.0460)	(0.0470)	(0.0406)	(0.0456)
Lifecycle LFP 35-44			0.0714		
			(0.0559)		
Never in LF 35-44			-0.162*		
			(0.0703)		
Lifecycle LFP 45-54				0.384***	
				(0.0706)	
Never in LF 45-54				-0.214*	
				(0.0875)	
Lifecycle LFP 25-54					0.368***
					(0.0607)
Health status	no	no	no	no	no
Age dummies	yes	yes	yes	yes	yes
Race dummies	yes	yes	yes	yes	yes
Marital status dummies	yes	yes	yes	yes	yes
Job status of husband	yes	yes	yes	yes	yes
Constant	0.855***	0.868***	0.856***	0.572***	0.667***
	(0.0591)	(0.0645)	(0.0762)	(0.0861)	(0.0712)

N	3,137	2,642	2,642	2,642	2,642
R-squared	0.040	0.044	0.062	0.149	0.081

Sources: Health and Retirement Study (HRS) 1992 to 2012, RAND version with added variables from original HRS files. Social Security Administration earnings (and W-2) data are used to calculate life cycle labor force participation (Lifecycle LFP <ages>) and the career condition (Career cond. <ages>).

Notes: The dependent variable is 1 if the woman is in the labor force and 0 otherwise. The HRS asks respondents their labor force status and a woman is in the labor force if she reported being employed or unemployed and searching for work.
*Health status is self-reported and is coded as 1 if "good" or better and 0 otherwise.
Marital status variables refer to current status.
"Lifecycle LFP <ages>" is the fraction of the interval the woman was in the labor force as determined by a combination of the data sources described in the Appendix. "Never in LF" is 1 if the individual was recorded as having no years in the labor force during those years.
The "linked sample" indicates that the individual gave permission for Social Security earnings data to be linked.
Omitted base group variables are: 1931-33 birth cohort; BA only for the college graduate group; never married; and other race and age 63. Omitted from the table are dummy variables for missing variables regarding spouse in labor force and health status.
HRS person weights have been used.

Standard errors in parentheses have been clustered at the individual level.
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

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Appendix [incomplete]

Health and Retirement Study

The Health and Retirement Study (known as the HRS and also as the University of Michigan Health and Retirement Study) is a widely used data set. More information can be found at: http://hrsonline.isr.umich.edu/. This brief Appendix will discuss certain details of importance to this paper.

The Health and Retirement Study, supported by the National Institute on Aging and the Social Security Administration, was begun in 1992 with a random sample of households in which one member was born between 1931 and 1941 and thus between 51 and 61 years old. This initial sample is known as the HRS cohort, also as the "Intermezzo" cohort. In households containing a married or partnered couple, the "spouse" and "respondent" were randomly assigned. "Spouses" were not given positive sample weights until 1998 if born from 1931 to 1941 or if born from 1942 to 1947, when the "War Baby" (WB) cohort was added. The "Early Baby Boomer" (EBB) cohort was added in 2004. The WB and EBB cohorts were between 51 and 56 years old. The three cohorts mentioned (HRS, WB and EBB) have been surveyed every two years. Additional cohorts are part of the HRS, but these are the primary ones we have used in our research. At the time of this writing, the HRS data are available to 2012.

Construction of the Lifecycle Labor Force Participation Variable

Lifecycle labor force participation is intended to measure the fraction of a period during which the individual was in the labor force. The time period we consider is from 25 to 54 years and we subdivide that into three decades. We primarily use the information from the Social Security earnings records (and the W-2 forms after 1977) to figure out whether an individual was employed during a year. We can do this only for individuals who gave permission to the HRS to link their survey to their Social Security earnings records. On average 80 percent of the sample agree to this linkage.

In general, we define someone as a labor force participant if during a year their annual earnings were at least equal to the federal minimum wage in that year times 10 hours times 52 weeks. Complications arise because some individuals were exempt from the Social Security earnings tax. These exempt employees were generally government workers and for our sample of women, teachers would have been an important exempt category. During the initial interview the HRS asked whether the individual had been employed by the government (including municipal, state and federal government positions) and if that was the case, the person could list two periods of employment. We

count the individual in the labor force if the person did not pay the Social Security earnings tax in some year but stated that their employment was in the government for that period. It should be noted that after 1977 when the W-2 forms become available, there is no problem with exempt status since the forms include all W-2 income. In addition, some HRS respondents were surveyed when they were in their early fifties and we use the HRS survey data when it exists. Thus we determine labor force status on the basis of various pieces of information including the HRS survey, the Social Security earnings records and the W-2 forms.

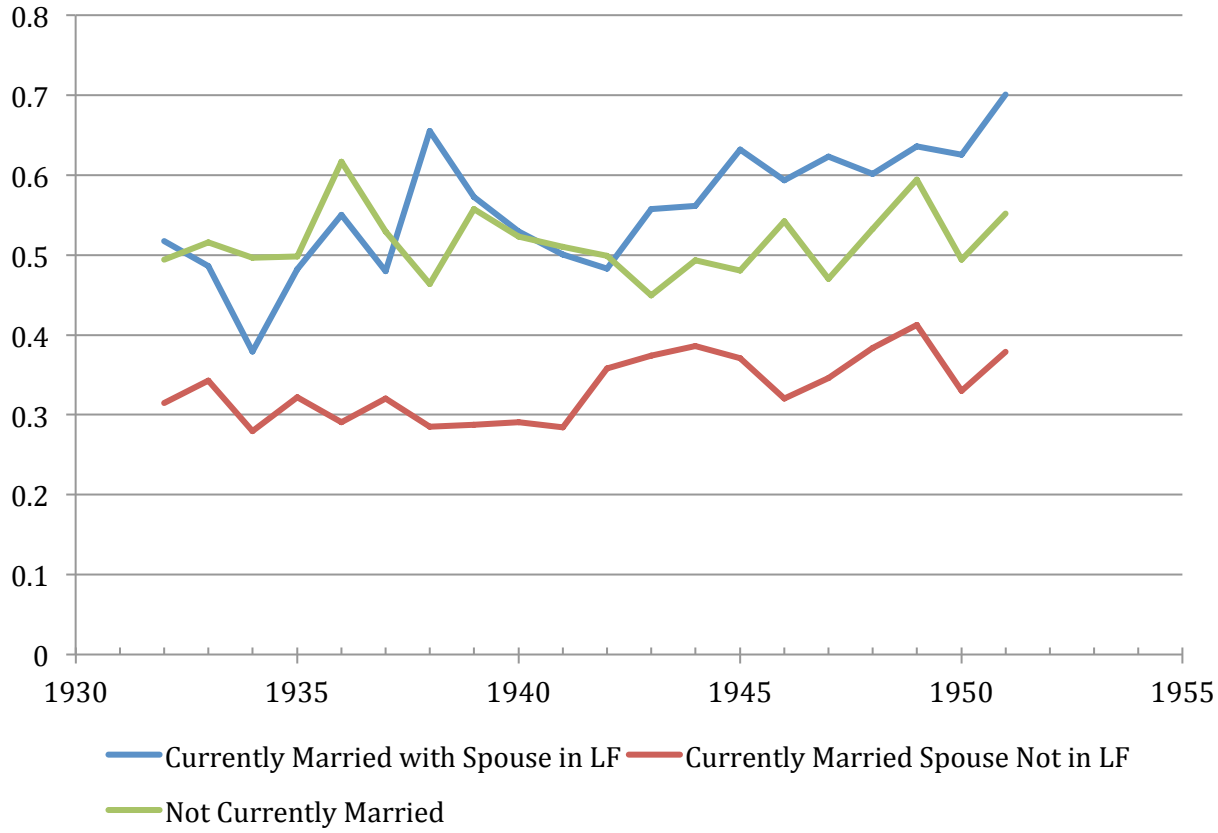
Construction of the Career Condition Variable

Similar to the construction of the lifecycle labor force variable, we create a "career condition" variable that assesses whether individual who were in the labor force earned above some amount. The amount is given by some fraction (we have used both 0.5 and 0.75) of the median annual wage of a (full-time, full-year) male worker in the given year. Because the period we are considering predates the micro-data for the CPS, we use the published surveys for the male median annual wage. In our empirical work we define "Career cond. 35-44" as the fraction of years in the age interval the individual exceeded 50 percent of the earnings of the median male full-time, full-year worker.

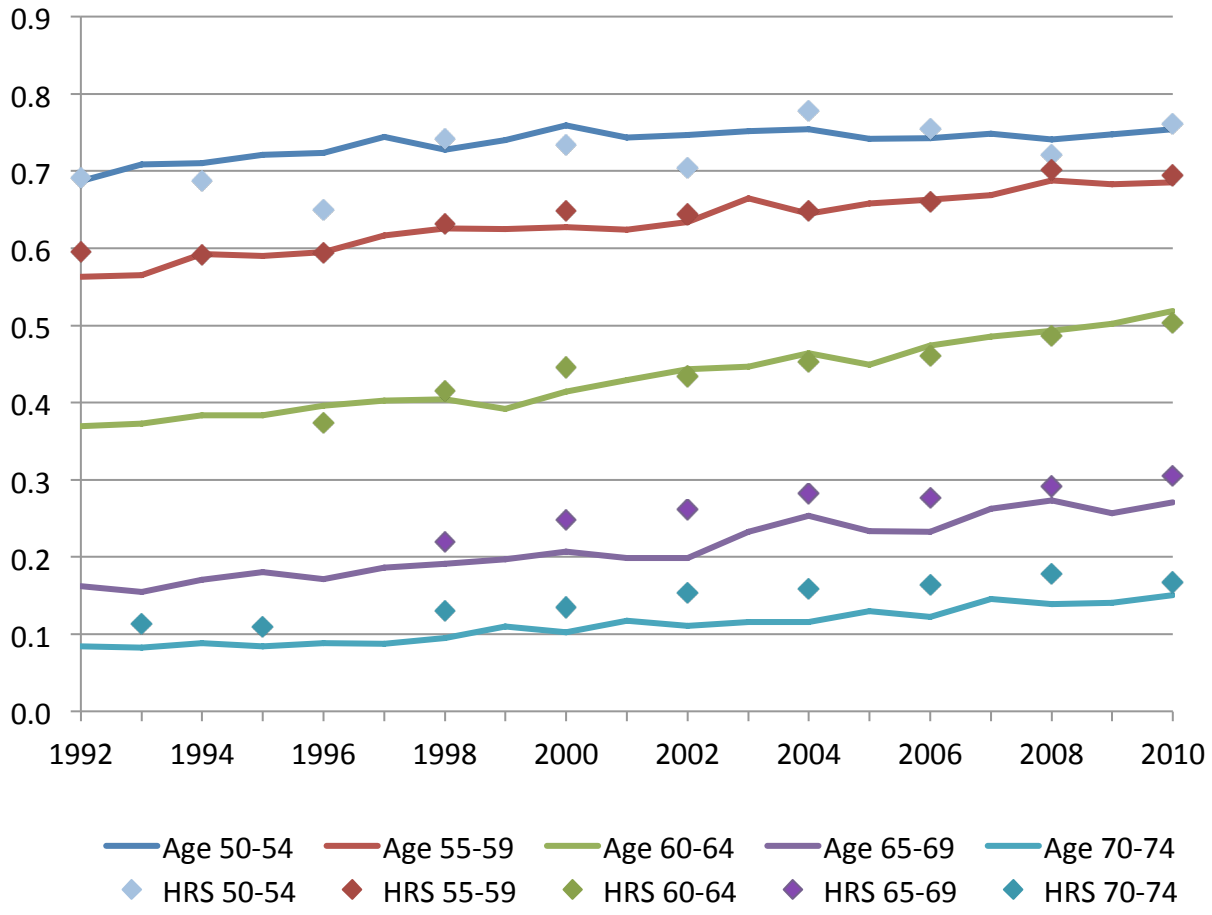
Earnings data for this calculation are obtained primarily from the Social Security earnings records, the W-2 forms when available, and the HRS earnings data when it exists for the individual. If the individual was in a tax exempt employment, we assume that the income was sufficient to exceed the "career condition."

[add table with the fraction of birth cohort linked to SS records]

Appendix Figure 1: Female Labor Force Participation around Age 62 by Year of Birth, Current Marital Status and Husband's Employment [done July 26, 2015]



Appendix Figure 2: Comparing Labor Force Participation Data for the HRS and the CPS



Sources: March CPS; HRS.

Notes: The HRS is done biennially. Some age groups are not shown for the HRS because group is incomplete and would be biased if it included only the younger ages.