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The New Lifecycle of Women's Employment: Disappearing Humps, Sagging Middles, Expanding Tops

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Abstract

A new lifecycle of women's employment emerged with cohorts born in the 1950s. For prior cohorts, lifecycle employment had a hump shape; it increased during the twenties and thirties, hit a peak and declined starting in the fifties. The new lifecycle of employment is initially high and flat, there is a dip in the middle and a phasing out that is more prolonged than for previous cohorts. The hump is gone, the middle is a bit sagging and the top has greatly expanded. We explore the increase in cumulative work experience for women from the 1930s to the 1970s birth cohorts using the SIPP and the HRS. We investigate the changing labor force impact of a birth event across cohorts and by education and also the impact of taking leave or quitting. We find greatly increased labor force experience across cohorts, far less time out after a birth and greater labor force recovery for those who take paid or unpaid leave. More work experience across the lifecycle is related to the increased employment of women in their older ages.

The new lifecycle of women's employment emerged with cohorts born in the mid-1950s. In the new lifecycle, female labor force participation is fairly high soon after schooling ends. Rates remain substantial during the next ten or so years, but decrease somewhat when women are in their thirties and early forties. That decrease is a feature we term the "sagging middle." Participation then increases a bit before phasing out when cohorts are in their sixties and beyond. We cannot yet observe the most recent cohorts in their older years, but for those we can, participation has greatly expanded for women in their sixties and seventies relative to previous cohorts. The full new lifecycle of employment, then, looks relatively high and fairly flat.

Things had once been different. Labor force involvement for cohorts of women born before the 1950s rose steeply from the time the women were in their twenties to when they were in their late forties. Participation rates then decreased from their early fifties. Lifecycle participation thus had once revealed a distinct inverted U shape—or what could be termed a "hump."

The hump is clearly a thing of the past. Our best guess for the future lifecycle of women's employment is that in its place there will be a high initial level, a somewhat sagging middle and then a slight increase. The final stage will be a more prolonged phasing out of work—that is, an expanding top relative to the past. Women's participation over their working lives will be more even than before and will look vaguely like that of men's, but with a somewhat lower level and a squishier middle.

A combination of the sagging middle and expanding top has produced a "twist" in the labor force rates of cohorts at the start, middle, and completion of their working lives. What we mean by a twist is the following. Historically, more recent cohorts have had the highest participation rates at each age and earlier cohorts the lowest. That is, each cohort line has been above the previous one. But a twist in the ordering has recently occurred.

Among women in their twenties and thirties the most recent birth cohorts have the highest participation levels, next the earlier cohorts and so on in almost perfect chronological order. Similar orderings are found for women older than around 55 years.

The most recent cohorts that can be followed to 55 years and above also have the highest levels and the earlier cohorts have lower levels in strict year of birth order. But for women in their middle years, the most recent cohorts have somewhat lower participation rates than some of the earlier ones. Thus there has been a twist in the ordering.

Both the sagging middle and the expanding top have attracted attention. The observations of a sagging middle led, around a decade ago, to speculation that young women were "opting out." The expanding top has recently led some to comment optimistically that older women are working in greater numbers than before because they are healthier and find greater enjoyment in their jobs. Others, expressing some pessimism, have noted that many women have insufficient financial resources to enjoy their older years and end their employment (see the papers in Goldin and Katz forthcoming).

The changes in employment in the middle and the top of the age range may appear to be opposite trends. We will argue that they are not.

Our description of changes in labor force participation relies on three customary effects: period (year), cohort (year of birth), and lifecycle (age). These three effects are linearly related (for example, the current year = year of birth + age). Yet despite the inherent inability to identify their separate influences, there are reasons to believe that different forces affect each. Period effects influence all individuals in particular year independent of their age. Wars or recessions, for example, could have such impacts leading individuals at all ages to increase or decrease their desired labor supply. Cohort effects determine the intercept of a lifecycle path shifting each cohort participation line up or down. Each cohort can have a similarly shaped lifecycle path but be above (or below) the other. The last effect is lifecycle. The shape of the lifecycle effect can be altered, for example, by changes in the age at marriage and at first birth. We will assume that period or year effects are negligible and that cohort and lifecycle effects are most important.

The sagging middle has emerged because cohort effect increases have slowed. Instead, we are now seeing the lifecycle or aging trend entirely. The lifecycle effect, moreover, changed with the 1950s and 1960s birth cohorts. Those cohorts began to marry

later and have their children at older ages than did previous cohorts. Most of their members participated in the labor force early on and delayed childbearing. Some withdrew for a while in their middle years and later returned. A large fraction will (most probably) have a less steep decline in employment in their later years than did previous cohorts. But since no cohorts with a sagging middle have yet to reach the older years the last part of the lifecycle story is not yet certain.

The female population has been distinctly heterogeneous for some time (Goldin 1989; Heckman and Willis 1977). Labor force heterogeneity means that women who are in the labor force remain in for a long time and those who are out of the labor force enter as the cohort rate increases. As they enter, they, too, remain in. That is, heterogeneity means that there is considerable persistence among those currently in the labor force. In contrast, a homogeneous labor force means all women work an equal fraction of the year. An increase in labor force participation involves an increase in the fraction of weeks worked during the year for all women. A homogeneous labor force involves significant churning of workers over the year. We first explore the general labor force trends and then examine the heterogeneity of the population as the old lifecycle of women's employment has morphed into the new.

We first map out the general trends using synthetic, rather than actual longitudinal, cohorts from the Current Population Survey Annual Social and Economic Supplement (CPS ASEC).[1] We then move to using true longitudinal data from the Survey of Income Program and Participation (SIPP) and the Health and Retirement Study (HRS), both linked to the Social Security Administration (SSA) earnings data (from 1957 for the SIPP and from 1951 for the HRS) and income tax (W-2) records (from 1978 for the SIPP and 1980 for the HRS). We estimate the distribution of years in the labor force and examine the heterogeneity of labor force participants. We then turn to the impact of births on employment using an event study analysis and also consider the role of leave policy. We end with a discussion of the reasons why change occurred and the future of US female employment.

[1] The CPS ASEC was formally known as the March CPS.

Evolving Lifecycle of Women's Employment

Synthetic cohort labor force participation rates can be created by linking data by birth cohort using the annual figures from the CPS ASEC surveys. We do this for all women and also by education level for college graduates and all others (Figure 1). Our focus is on cohorts born from 1930 to 1974 for consistency with our longitudinal administrative and survey data from the HRS and SIPP. We begin the analysis with age 25 to avoid confusing increased education with decreased labor force participation. Because the CPS micro-data starts with 1962 we cannot include information for some of the early cohorts in their younger years.

The central features of the synthetic cohort labor force data are the well-known facts that participation has generally increased with each cohort (cohort effects that look like an increase in the intercept) and participation has often increased within cohorts (lifecycle changes). But labor force participation among the most recent cohorts has not uniformly increased for each subsequent cohort and has also not increased within each cohort. These features have produced the appearance of a sagging middle among those in their thirties and forties and a twist in terms of the ordering of the cohorts.

Relative to other birth cohorts, the most recent ones have the highest participation rates in their mid- to late-twenties, but they no longer do when in their middle years. For the cohorts we can observe in their older years the ordering returns to one that is more strictly chronological. Because the lines for the most recent cohorts are bunched together, we provide enlarged inserts to show the twist for all women in Figure 1.A and for the college graduate group in Figure 1.B. Non-college graduates are in Figure 1.C.

The fraction of women born in the late 1980s who will be college graduates by the time they are 35 years old is almost 45 percent.[2] Therefore, the new lifecycle labor force participation of women will look more like the insert in Figure 2.B, beginning high, dipping

[2] The fraction is about 40 percent for native-born women from the 1980 cohort who were 35 years old and extrapolations suggest that 44 percent will graduate by 35 years old for the 1987 cohort. Calculations use the CPS ASEC.

down a bit in the mid to late-thirties and then increasing again. Because the earlier cohorts did not start out as high and did not later dip, the ordering of the lines twists. The chronology generally begins ordered (an exception is the most recent cohort among the college graduates), then reverses somewhat with some earlier cohorts having higher participation. The ordering will likely reverse again, with older women in the more recent cohorts having high participation relative to the previous cohorts.

In the new lifecycle (for all education groups) rather than a hump shape, participation rates for the average woman do not change much until older ages with the phasing out of employment. An important distinction can be made between the aging or lifecycle effect and the cohort effect. Participation rates for recent cohorts (1950s onwards) in their twenties are high and in consequence there is little or no cohort effect.

The cohort effect was once large but it has now become swamped by the lifecycle effect. For pre-1950s cohorts, the reverse was the case and the cohort effect swamped the lifecycle effect thereby producing the inverted U or hump shape. With a diminished cohort effect, the lifecycle effect of decreased participation in child-rearing years has appeared. Because the child bearing and child rearing years now occur later in women's lives, the sagging middle has been the result. We will show this using longitudinal information on birth events by mothers' cohort.

Longitudinal Data from the HRS-SSA and SIPP-SSA

Aggregate synthetic cohort data from the CPS ASEC repeated cross sections on labor force participation demonstrate the evolution of a new lifecycle of women's employment. But these data cannot reveal the degree to which women persisted in the labor force and whether those in the labor force earlier in their lives remained in with a greater likelihood than others. Furthermore, the synthetic cohort data cannot show how women's employment has changed by cohort over time in response to important lifecycle events, such as births. The data, moreover, cannot allow us to distinguish among women within a cohort to see the fractions of their post-schooling lives that are spent in the labor force and how that distribution changed within and across cohorts.

To make better sense of the evolution of the new lifecycle of work we turn to longitudinal data from the HRS and SIPP, both linked to the Social Security Administration (SSA) Earnings Records and W-2 forms. The linkage to the SSA records provides extensive longitudinal information on the earnings of large numbers of individuals across cohorts born from the early 1930s to the mid-1970s.

These two data sets offer rich and complementary information. Because they are each complicated in their construction, we will summarize only those aspects pertinent to this article.[3] The HRS began in 1992 with 51 to 61 year olds who were then interviewed biennially. Additional cohorts were added in 1998, 2004 and 2010 for respondents who were then 51 to 56 years old. Together with the spouses of the respondents who became age eligible at some later date, these are the main birth cohorts we use from the HRS and they span birth years from 1931 to 1959. Respondents were given the option of having their Social Security earnings records linked to their HRS surveys. Because this was done during each interview, the earlier cohorts have a higher fraction linked. Linkage rates are 80 percent on average and about 88 percent for those born before 1943.

The Survey of Program Participation (SIPP) was begun in 1984 with new panels added in 1996, 2001, 2004 and 2008. Each panel begins with individuals who are between 30 and 60 years old and are interviewed for four consecutive years. We use the Survey of Program Participation (SIPP) Gold Standard File, which is a harmonized set of SIPP panels linked to longitudinal earnings records.[4] Our analysis uses SIPP panels 1996, 2001, 2004, and 2008 and integrates information from the fertility history topical modules. Our overall sample begins with women who range from around 30 to 60 years old at the time of their fertility history interview.

Our primary interest is in the work history information. Each of the two data sets has a survey component and an administrative portion from the SSA earnings records. Although the administrative component is identical, the data sets differ in their coverage of

[3] See Appendix for more information.
[4] Data from the SIPP Gold Standard File are confidential. All results have been formally reviewed to ensure that no confidential Census Bureau data have been disclosed.

retrospective information that bears on the work history. For example, the HRS provides the respondent's longest occupation and also the years when the individual worked for a government agency for upwards of two periods. The SIPP contains information that bears on whether the woman took job protected or paid leave after having a birth, whether she returned to the same employer after that leave, and whether she quit her current job around the time of the birth event. Both the HRS and the SIPP contain variables that are (reasonably) time invariant (e.g., education beyond age 35; children ever born by age 40) and both have time-variant longitudinal information for the duration of the surveys.

The work history information from the SSA earnings records, W-2 forms and the survey data provide annual labor earnings, but not participation, hours and weeks except for the survey years. We generate an estimate of "participation" for the years we have the SSA and W-2 records by assuming that individuals are labor force participants if they earned more than some minimum amount—equivalent to 10 hours a week for 52 weeks at the federal minimum wage—in that year.[5] Our estimated participation rates are almost identical to those from the CPS-ASEC for the overlapping years (see Appendix).

Individuals in occupations that were exempt from Social Security tax, such as most teachers and other government employees, can be included after 1977 when W-2 data are available for the SIPP (availability is after 1979 for the HRS). These workers can also be folded in for HRS respondents in the years the respondent listed retrospective information on government employment. Our point is that we cobble together the cohort participation data by using each of our longitudinal data sets when it seems the most complete. Because we will generally use these data sets together with the Social Security earnings data, we refer to them as HRS-SSA and SIPP-SSA.

Our choice of which data set to use is a function of the birth cohort and the age of the individual. Because we employ ten-year age intervals, our decision depends on the

[5] The CPS labor force estimate comes from a question about whether the individual was working for pay or profit during at least one hour in the survey week or was actively searching for work. The SSA data are annual and there is no obvious amount of annual income that would be equivalent to the CPS labor force question. Because most labor force respondents are working a reasonable number of hours during a survey week, we chose our definition of ten hours at the minimum wage.

youngest age in the interval (see notes to Figure 2). The exempt worker issue is far less of a problem for the non-college graduate group since they would not have been teachers and are less likely to have been government employees in general. The SIPP and HRS longitudinal labor force data that we generate from the SSA records closely match each other for overlapping birth cohorts.

Evidence on New and Old Lifecycles from Administrative Data

Labor Force Experience

Longitudinal data from the SIPP-SSA and HRS-SSA allow us to estimate labor market experience for women born from 1935 to 1974 by age and by education. The aggregate data are given in Figure 2 for three groups—all women, college graduates, and non-college graduates. The data are shown for the full 25 to 54 year old group, then for the youngest group 25 to 34 years old, and finally for all women in three ten-year age groups using more high frequency birth cohorts.[6]

The entire 25 to 54 year old group (see Figure 2.A) can be observed for birth cohorts up to 1959. For those cohorts mean years of work experience in that 30-year interval increased from 15.6 to 22.2. For the most recent of the cohorts in our data, the average woman was employed for 74 percent of the 30-year period. For college graduates in the most recent cohorts the figure is 82 percent.

Much of the total increase occurred in the youngest of the age groups. In fact, almost half of the total change (3.2 of the 6.7 years) for all women 25 to 54 years old born from 1935 to 1959 occurred in the 25 to 34 year group (see Figure 2.B). The increase for the 25 to 34 year old group from the 1955-59 to the 1970-74 birth cohorts, moreover, is just under an additional year, thus most of the increase for the youngest age group occurred for cohorts born before 1959.

[6] Note that only longitudinal data can be used to construct work experience since the CPS, for example, did not ask respondents how long they had been employed. Attanasio, Low and Sánchez-Marcos (2008) use the PSID and analyze the different lifecycle employment among three cohorts of women, those born at the end of the 1930s, 1940s and 1950s.

For the 25 to 34 year old group average work experience in that interval reached around 8.5 years for college graduates and around 7 years for the non-college group. The change for all women, it should be noted, was greater than for the two separate educational components—the college and non-college groups—because of a relative increase in the college graduate group. But the main findings are not much different for each separately.

Total experience for the 25 to 34 year old group, as seen in Figure 2.C, more than doubled from around 3.6 years for the late 1930s cohorts to 7.8 years for the early 1970s cohorts. The other two age groups show increases until around the early 1950s cohorts, and for the most recent ones the fraction of years in the labor force for the youngest group now exceeds that for the other two. Delay of childbirth, we will soon show, led to increased participation for the youngest group but also caused slower increases for the middle group—yet another way of understanding the appearance of a sagging middle.

Distribution of Work Years

Work experience clearly increased for women across birth cohorts from the 1930s to the 1970s. But the aggregate numbers do not reveal the distribution of work years in the interval. A 60 percent labor force participation rate could mean that all women work 60 percent of the time or that 40 percent are never at work and 60 percent work all the time. In terms of our definitions, it would mean that all women were in the labor force for 60 percent of each ten year interval (that is, six years) or that 60 percent are in the labor force for all ten years and 40 percent are never in the labor force during that ten year period. The former scenario is termed "homogeneous" (since all women are the same) and the latter "heterogeneous" (since women in that scenario greatly differ). Most estimates have found considerably more heterogeneity than homogeneity and our data will reveal the same. But as participation rates rise there is less room for labor force participation heterogeneity.

To explore heterogeneity among labor force participants we provide the distribution of years in the labor force for each birth cohort by age interval. Because of the well-known heterogeneity of women's labor force experiences, we provide the fractions at the two tails of the distribution: the fraction working more than 80 percent of the period

and the fraction working less than 20 percent.

For the most recent cohorts that can be observed (born 1957-58), 53.3 percent of women were employed for more than 80 percent of the 30-year period from 25 to 54 years and just 9 percent were employed for less than 20 percent (Figure 3.A). For the earlier cohorts, born in the 1930s, the distribution of employment across the lifecycle is far different. It is almost uniform with around 20 percent employed less than 20 percent of the entire period and 20 percent employed for more than 80 percent.[7]

Similar to the aggregate findings, the largest changes are for the 25 to 34 year old group (Figure 3.B). For the most recent cohorts shown more than 60 percent are employed more than 80 percent of the ten years, whereas only about 16 percent had been for the earliest cohorts shown, those born in the 1930s.

To further explore heterogeneity, we examine the labor force participation of those who worked a considerable amount (more than 60 percent) of the period they were 25 to 34 years old. Among women who worked more than 60 percent of those years, 76 percent in the 1950s birth cohorts worked more than 80 percent from 35 to 44 and 76 percent did from 45 to 54 years old. Conversely, just 32 percent of those who worked no more than five years of the 25 to 34 year old period were employed more than 80 percent of the next decade and 50 percent of the following one. The point is that there has been considerable heterogeneity and persistence in participation among women. Those who work more when young, also continue in the labor force when older.

Complementary findings can be observed in a regression context. Using the HRS we find (not shown) that higher labor force participation when 25 to 34 years old is correlated with higher participation when 35 to 44 years old, controlling for cohort, education and number of children. In related work Goldin and Katz (2016) find that greater employment early in one's life is related to employment between ages 59 to 63, given education and

[7] About 20 percent of the 1930s cohort is employed in each of the quintiles. Because lifecycle participation for these cohorts is around 20 percent for the 25 to 29 year group and then rises as the cohort ages to around 60 percent for those 50 to 54 years old, the distribution of employment findings are consistent with a heterogeneous model of participation and not a homogeneous one.

birth cohort. But we also find using the HRS that an increase in the age at which the first child is born, say from 25 years old to 30 years old, is correlated with increased participation in the 25 to 34 year interval but decreased participation in the 35 to 44 year interval, even holding the number of children born constant.[8] What this means is that the later age at first birth is an important factor in the twist in lifecycle participation. It is still the case, however, that later births mean greater participation from 25 to 44 years. We turn now to an analysis of the role of childbirth and labor force participation across cohorts.

Childbirth and Lifecycle Participation

The changed timing and number of children are important parts of the transition to the new lifecycle of women's employment. Not only are children in more recent cohorts being born to older mothers but also there are fewer children in these families than in the earlier cohorts. The previous norm was one in which women often remained employed until they had their first child, then left the labor force and reentered employment somewhat later. In the current era women have their children when older, take less time off and reestablish their employment and careers faster.

Both the SIPP and the HRS contain information on the year of birth for the first child and the number of subsequent births. We use the data to create event studies for all women who had a first birth. The event study is given in Figure 4 for all women and separately for those with a four-year college degree. Table 1.A contains the mean age at first birth and the numbers of children eventually born to women in the HRS and SIPP. We use the HRS for the 1935 to 1949 birth cohorts and the SIPP for the 1950 to 1969 birth cohorts for reasons mentioned previously.[9] The data on the mean age at first birth and the number of eventual children are consistent with data for the same cohorts using the CPS June Fertility Supplements as given in Table 1.B.

[8] The regressions are estimated for the fraction of the 25-34 year and 35-44 year intervals in the labor force across birth cohorts from 1931 to 1954 for women with at least one birth. Cohort, number of children, education and race dummies are included. Age of the mother at the first birth is entered as a quadratic.

[9] The reason to use the HRS and the SIPP for different cohorts concerns the existence of Social Security exempt workers. The HRS is better at identifying them in the pre-1978 period.

Looking first at all women (Figure 4.A), the cohorts born from 1935 to 1944 had initial participation rates around 0.5 before the first birth. These rates plummet to around 0.23 to 0.27 just after the birth and never recover to pre-birth levels in the ten subsequent years. Because these are "baby boom" mothers, for whom the number of children (conditional on having one) is 3.34 for the 1935-1939 cohort and 2.98 for the 1940-1944 cohort, we also hold the number of children ever born constant (not shown). Even for women with just one or two births until they are in their forties, participation rates never reach pre-birth levels in the next ten years. Mothers in the 1935-44 birth cohorts retreated from the labor force for a long time.

That is not the case for mothers born in the 1945-49 cohort and subsequently. Labor force recovery for these cohorts is complete by ten years after the first birth even though the initial participation rates are much higher. Participation rates for the cohorts born from 1950-54 to the early 1960s begin around 0.6 to 0.7 and for those that can be observed ten years out, rates equal or exceed those before the birth. The number of eventual births was 2.57 in the 1945-49 cohort and 2.42 for the 1955-59 cohort.[10]

The data for the college group (Figure 4.B) is similar but noisier due to the smaller number of observations. The levels are considerably higher than for the total (all education levels) group. As with the total group, there is a sharp break with the 1945-49 cohort. Whereas participation rates of previous cohorts did not fully recover, the 1945-49 and 1950-54 cohorts did so after ten years. Subsequent cohorts, however, have pre-birth labor force rates around 0.83 to 0.87, and those that we can observe ten years after the birth do not fully recover. In fact, the rates for the 1960-64 cohorts are lower than for the 1955-59 cohorts. The sagging middle, mentioned before, is apparent here for birth cohorts starting around the mid-1950s. These facts are consistent with the crossing of the synthetic cohort participation lines for college graduates born from 1955-59 and 1960-64 (Figure 1.B).

[10] These means are conditional on having one birth. Similar findings are given in Attanasio, Low and Sánchez-Marcos (2008, figure 7) although they present data on employment only 12 months before and 12 months after the birth.

Because some births occur while the mother is still in school or several years after school completion, labor force participation increases in the three years preceding the first birth in both Figure 1 graphs. When we focus only on first births occurring after age 24, labor force participation no longer increases in the pre-birth years.

The impact of children on the employment of women in their twenties and early thirties has consequences for later employment. Thus the decrease in years out of the labor force by mothers in more recent cohorts, as seen in Figures 4.A and 4.B, is predictive of greater employment later in their lives.

The SIPP modules contain valuable information on the use of paid and unpaid leave during the year a woman's first child is born as well as whether the woman quit her current job in that interval. Rather than presenting the information by mother's birth cohort, as we did for the labor force data, a more meaningful arrangement is by the birth year of the first child. All of the women in our analysis sample had a birth in one of three periods—1980-1989, 1990-1999 and 2000-2007—and all reported employment in the SIPP at some point in their pregnancy.[11] Because we begin with 1980s births, the mothers are part of cohorts born since 1955 and are, therefore, part of the group exhibiting the new lifecycle of work.

The fraction of women who reported that they quit their jobs around the time of the birth decreased from 30 percent for those having their first child in the 1980s to 22 percent in the early 2000s.[12] The fraction taking paid leave increased from 40 percent to almost 50 percent and the fraction on unpaid leave stayed fairly constant at 36 percent in the 1980s to 39 percent in the 2000s.[13] It should be noted that there is overlap between leaves and quits (e.g., a woman can take paid leave and also some unpaid leave and she can also later quit, although it is more usual for women to do only one). During the 32-year period observed (1980 to 2012), new mothers did not change their behavior much in terms of

[11] We begin the analysis with the 1980s to get around the problem of exempt workers.
[12] The changes regarding leave type are much greater if we extend the analysis to births in the 1960s and 1970s. Paid leave was taken by just 16 percent of the 1960s group and by 29 percent of the 1970s group. We are less comfortable presenting the complete analysis with these early groups because of the exemption issue that would affect many government workers and we cannot substitute the HRS data for those cohorts.
[13] Paid and unpaid leave include sick, vacation, disability, maternity and other.

employment after their first birth, at least conditional on leave-taking. This, combined with only a three-percentage point increase in unpaid leave-taking, is a surprising finding given the passage of the Family and Medical Leave Act in 1993.

We estimate the labor force participation of first-time mothers depending upon their leave or quit status during the pregnancy and track their post-birth participation for ten years and their pre-birth participation for three years.[14] Recall that the sample is defined in terms of mothers who reported in the SIPP that they worked at some point during pregnancy and that employment is measured as having administrative earnings above a minimum threshold. Because many mothers have low annual incomes due to unpaid leaves or quits and because the leaves can be staggered for the group, the aggregate rates are less than 100 percent.

We show the data in Figure 5 only for women who were first mothers in the 1990s because the results for the other years are similar. Those on paid leave have the highest employment rates before, during and after pregnancy, followed by those on unpaid leave. The lowest rates are for those who quit during the pregnancy although ten years after the first birth their participation rate is 64 percent. Those on paid leave have a participation rate of 82 percent after ten years, considerably higher. Without an analysis of what determines who falls in each of these different categories it is impossible to infer the impact that paid-leave, or longer protected-leave, policies would have on women's employment. But it would appear that taking leave and staving off quits increases participation after a birth.[15]

[14] Recall that since these participation rates are derived from annual earnings data, we are not precisely identifying the period of the pregnancy.

[15] Olivetti and Petrongolo (*this issue*) have an extensive discussion of the family leave literature. Their own empirical work shows that guaranteed and paid leave increase women's employment to a point but can reduce it for extensive leave policies. Only a few states in the US have paid leave, and protected leave is generally limited to that covered by FMLA. Recent research on the US shows that California's paid leave policy (which took effect in 2004) expanded leave use and had no negative employment effects and possibly positive ones (Rossin-Slater, Ruhm and Waldfogel 2013).

Discussion and Conclusions

A new lifecycle of women's employment emerged with cohorts born in the 1950s. It is flatter and higher with no hump, but with a dip in the middle and a phasing out that is later than for previous cohorts. High levels of female employment early in life are predictive of working longer at older ages, although no cohorts with the new lifecycle characteristics are yet old enough to observe in their sixties and seventies.

What brought about the new lifecycle of work? Critical parts of the story are the changing nature of work, the rise of careers, the increased education of women, particularly college graduation, and the older age at marriage and first birth. The trends do not seem to have led to a great backpedaling in female employment and the "opting out" scare of the early 2000s misinterpreted changes in the lifecycle of work. The sagging middle may be due to the short-term nature of protected leave in the US. Yet many college graduates who have paid leave or more weeks of protected leave than guaranteed by the 1993 Family and Medical Leave Act (FMLA), also demonstrate a sagging middle.

What about employment levels? Labor market participation rates of US women are low compared with those of other OECD nations. Moreover, the US rank has deteriorated in the last 25 years. For the 25 to 54 year old group among 21 OECD countries, the US was sixth highest in 1990, ninth in 2000, and seventeenth in 2014. The US does much better when full-time rates are considered since part-time work is more common in other OECD countries, particularly for women. Using the OECD common definition of full-time employment (30 hours per week in the usual job), the US was fourth (out of 18) in 1990, fifth (out of 20) in 2000, and eighth in 2014.[16]

The roles played by public and private leave policies in accounting for these cross-national differences are complicated.[17] By definition, labor force participation will be

[16] The 21 countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Greece, Ireland, Italy, Japan, Luxemburg, Netherlands, Norway, New Zealand, Portugal, Spain, Sweden and the US. The full-time measure is not always available.
[17] Blau and Kahn (2013) find a positive relationship between leave policies and participation but also emphasize that low-hours jobs women often have in these nations generally preclude careers.

higher in nations with more generous leave policy. The more fundamental question is whether new mothers who want to spend more weeks at home than allowed quit their job and then have difficulty finding another position. As mandated leaves are greatly extended another issue is whether firms reduce demand for women who might use long protected leaves. These issues are confronted in the Olivetti and Petrongolo paper in this issue.

Paid and protected leaves mean higher labor force participation rates by definition because individuals on leave are counted in the labor force. That factor can account for 4 to 4.5 percentage points (for the 25 to 54 year old group) of the higher labor force participation among women 25 to 54 years old in Austria, Denmark, Norway and Sweden, nations with very generous leave policies relative to the US, with the least generous (see Olivetti and Petrongolo *this issue*). The actual differences in labor force participation between women 25 to 54 years old in the US and in these countries are 10 to 14 percentage points in 2014. That is, measurement can explain around 30 to 40 percent of the difference. But there is more to explain.

An implication of the new lifecycle is that cohorts entering their older years have more work experience, often have careers not jobs, have invested more in their vocations, have more of their identity bound up in their work and have more steeply sloped earnings trajectories. It is no wonder that employment has greatly increased at older ages and there is reason to believe that it will continue to do so.

And so, goodbye humps and hello expanding tops with more level lifecycle participation. The sagging middle and low rates in the US compared with other OECD nations are aspects of employment that may be influenced by differences in protected (and paid) family leave, among other factors.

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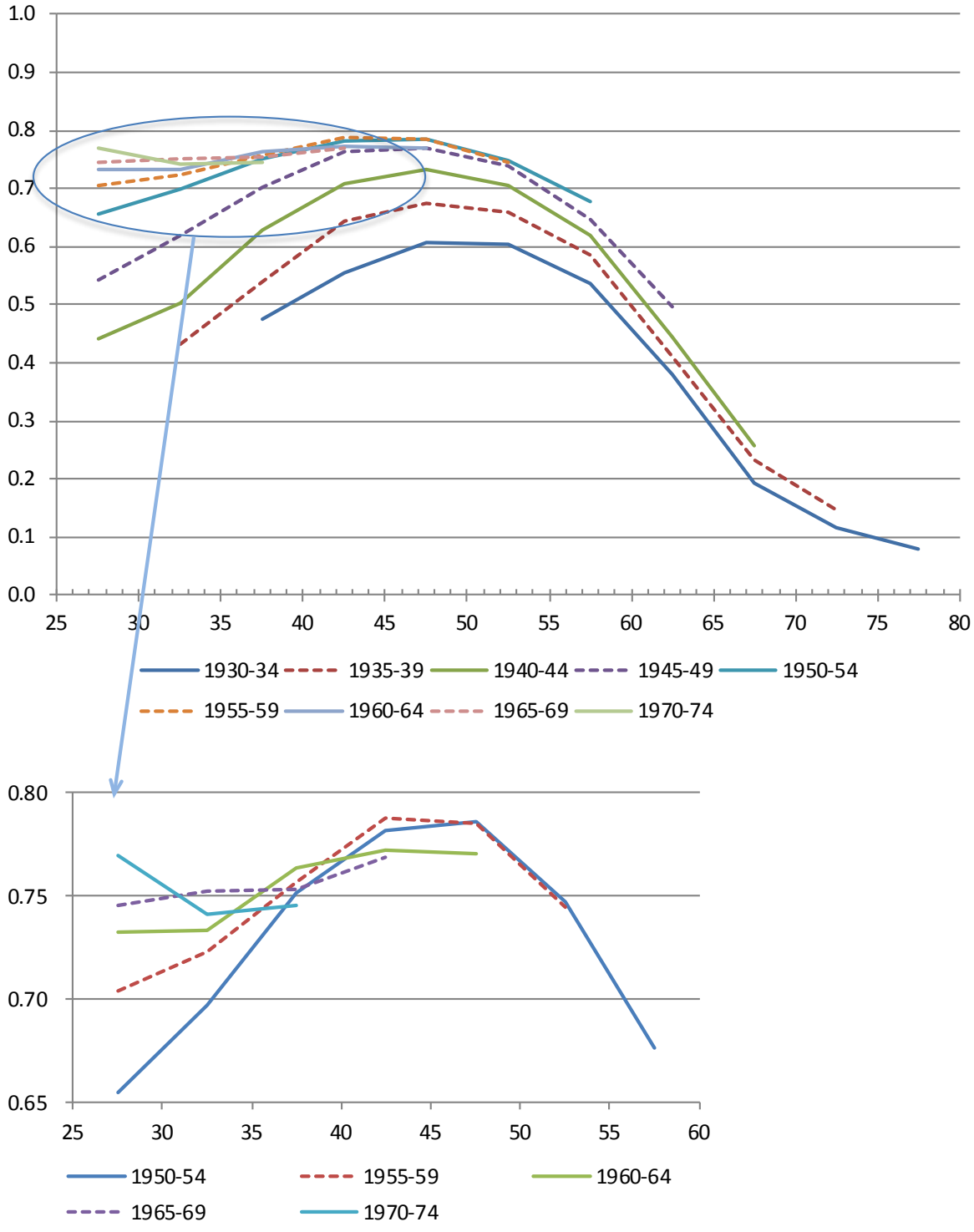
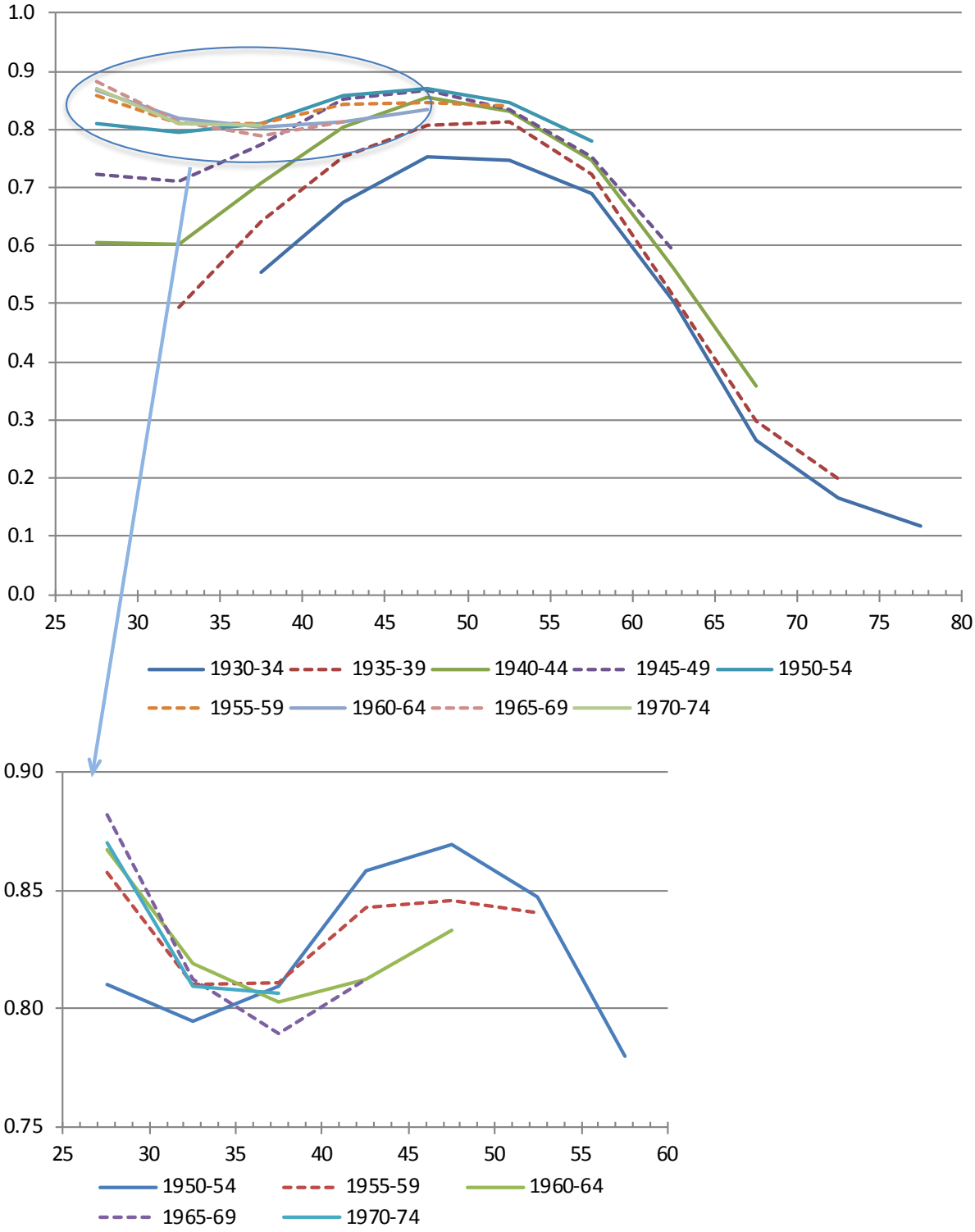
Figure 1: Female Labor Force Participation Rates by Cohorts Born from 1930 to 1974 by Five-Year Age Groups and Five-Year Birth Cohorts

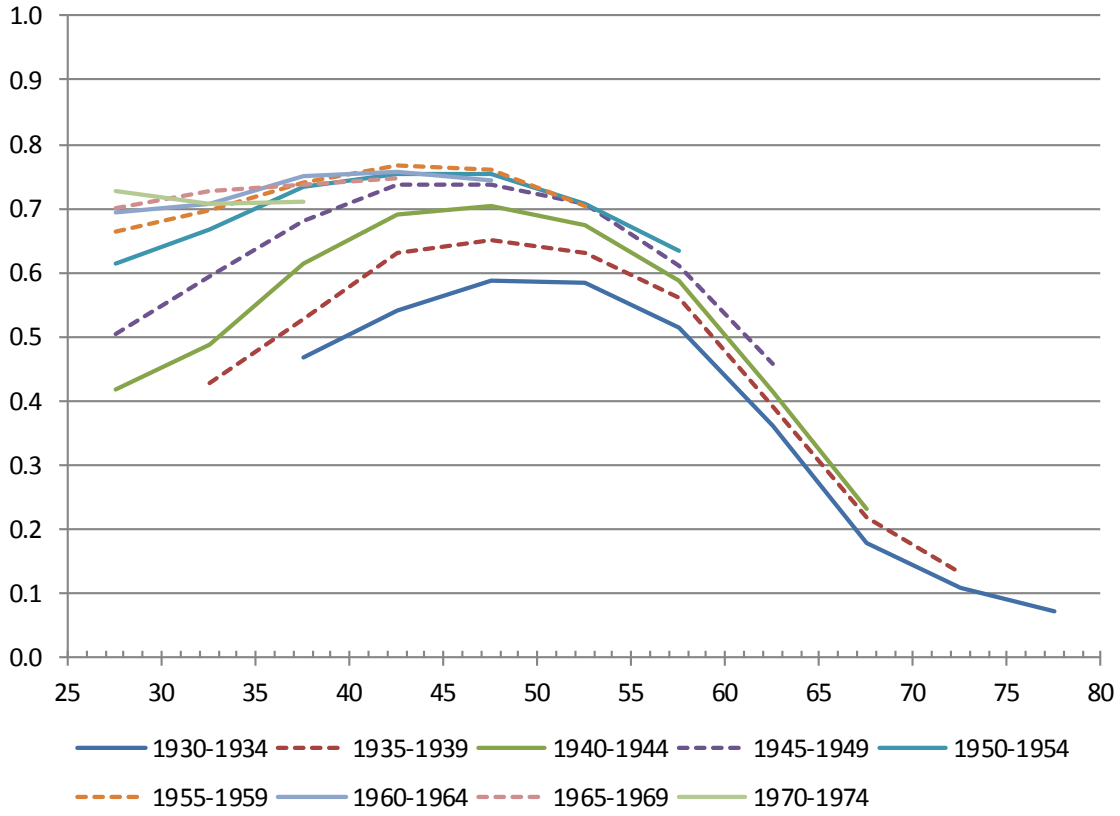
A. All Education Groups



B. College Graduates



C. Some College, High School Graduates and Below

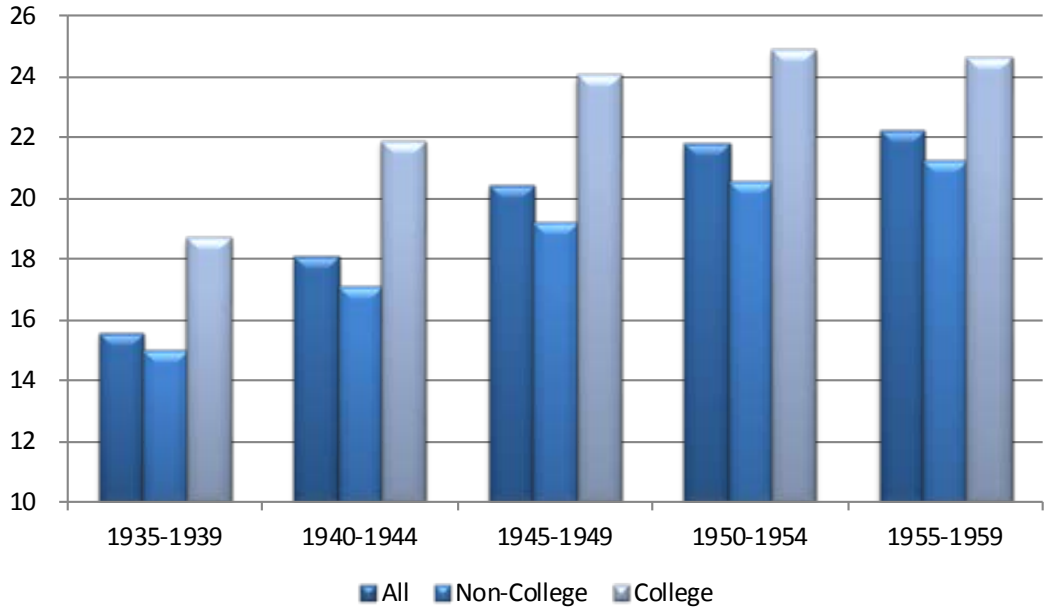


Source: CPS ASEC micro-data, 1962 to 2014.

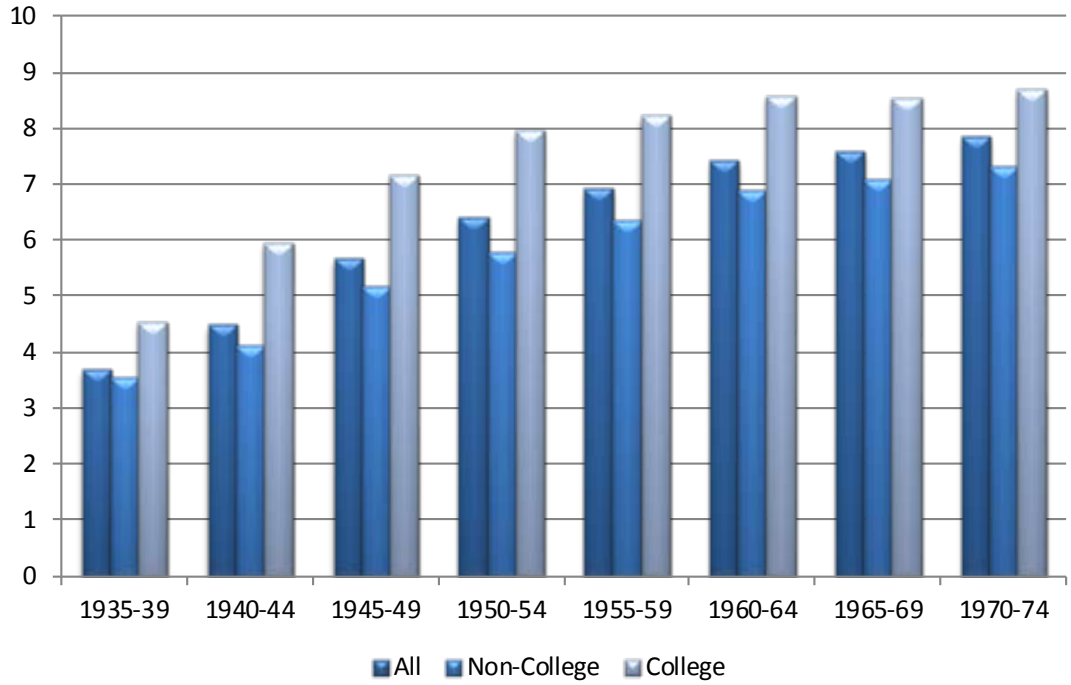
Notes: Every point on the graphs is the average of 25 cells (5 single year of age groups and 5 single year of birth cohorts).

Figure 2: Labor Force Experience for Women Born 1935 to 1974 and by Education Level

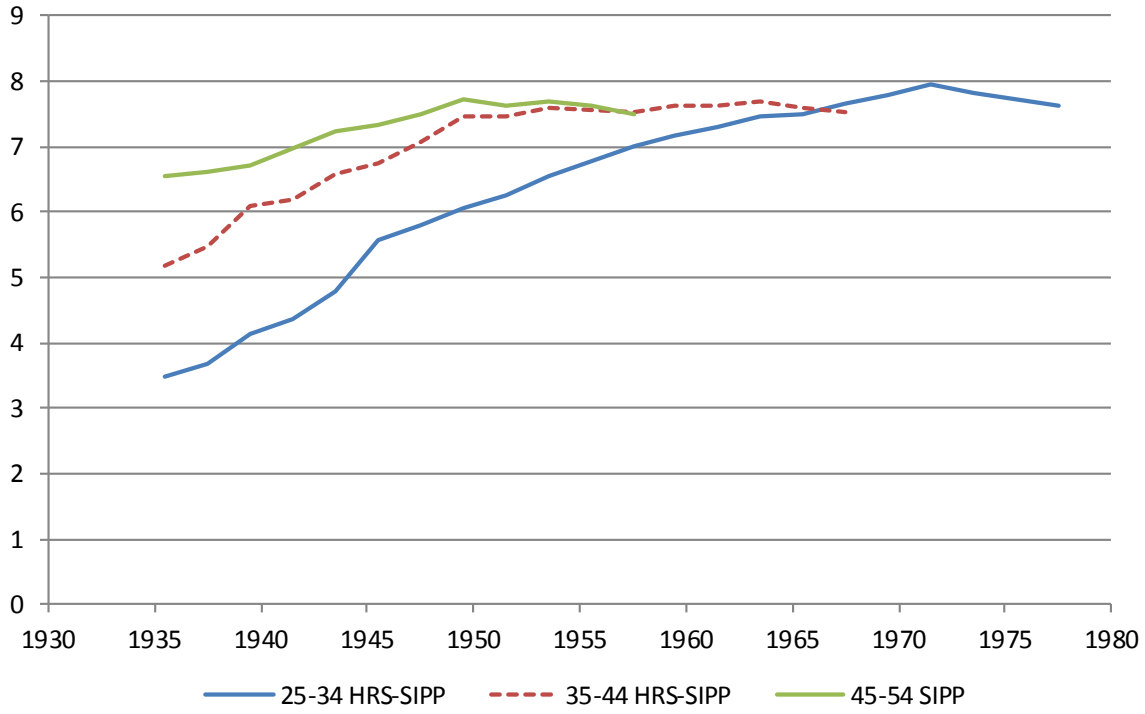
A. Cumulative Experience from 25 to 54 Years



B. Cumulative Experience from 25 to 34 Years



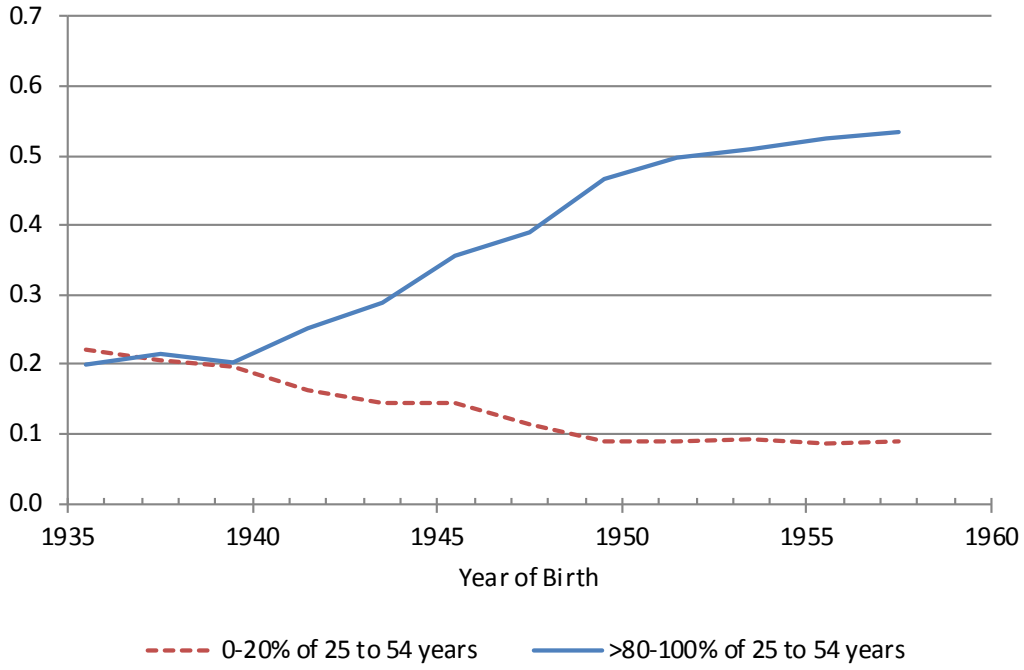
C. Labor Force Experience of All Women by Ten-Year Age Groups



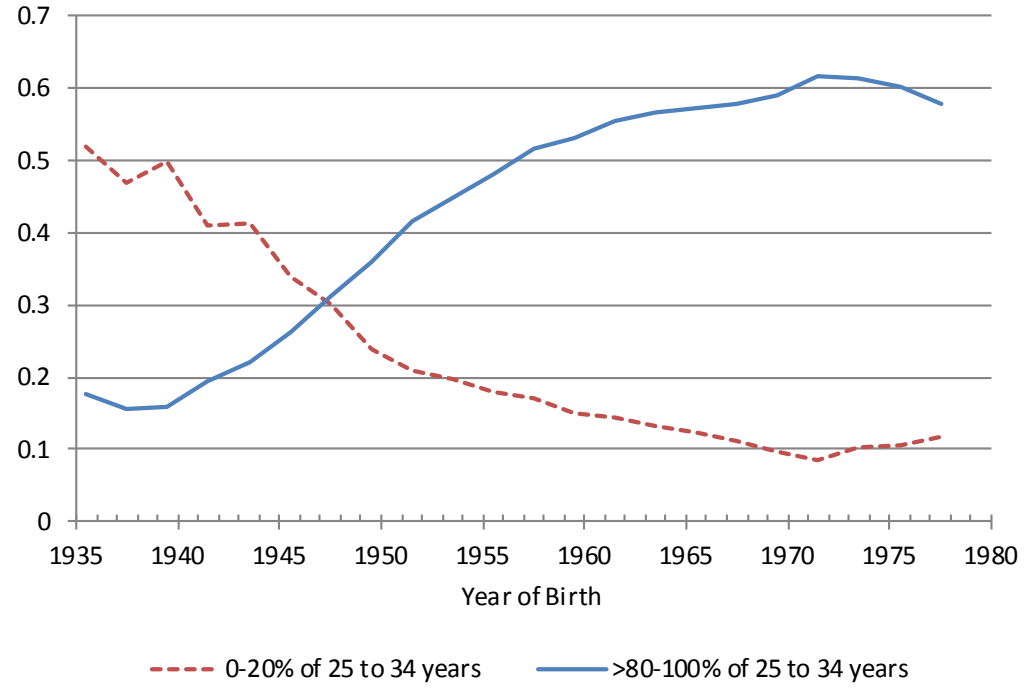
Sources and Notes: Labor force experience for an age group and birth cohort is computed from our estimates of participation rates (see Appendix) from the HRS-SSA and SIPP-SSA. We use HRS-SSA data for 25 to 34 year olds for birth cohorts from 1935 to 1954 and for those 35 to 44 years old for the 1935 to 1944 birth cohorts. For all other cohorts we use the data from the SIPP-SSA. To compute the totals for the 25 to 54 year span we sum the separate ten-year age groups independent of the source. The data for overlapping cohorts between the HRS-SSA and SIPP-SSA are very close. Our reason for using the HRS-SSA rather than the SIPP-SSA concerns the issue of exempt workers. See text.

Figure 3: Heterogeneity in Lifecycle Labor Force Participation by Age Group and Birth Year

A. All Women, 25 to 54 Years



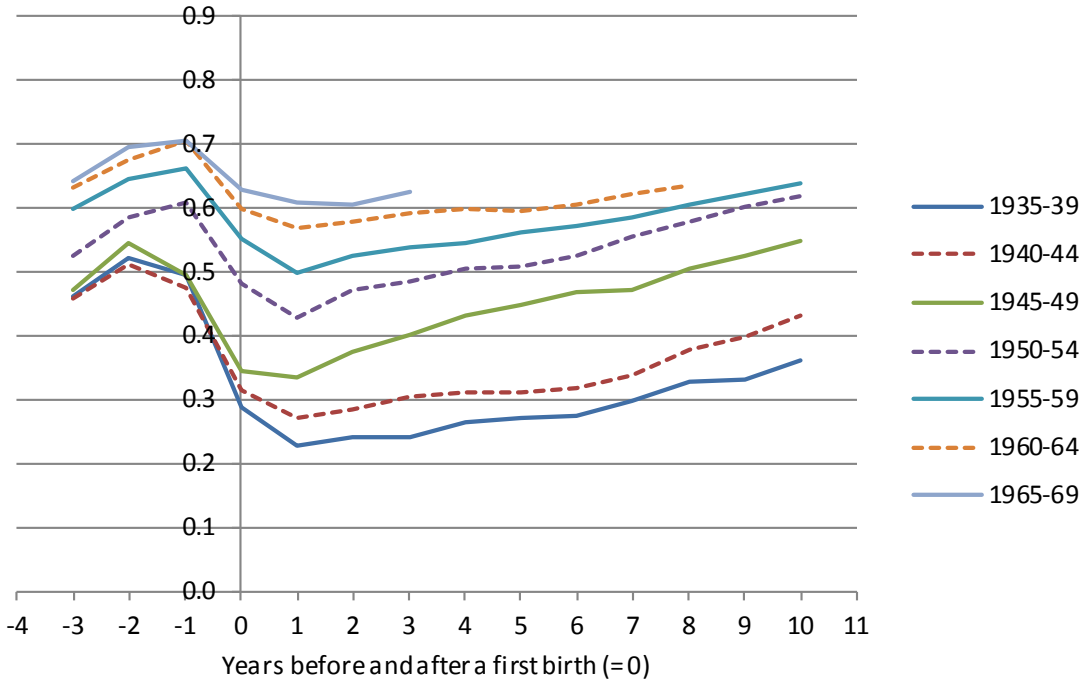
B. All Women, 25 to 34 Years



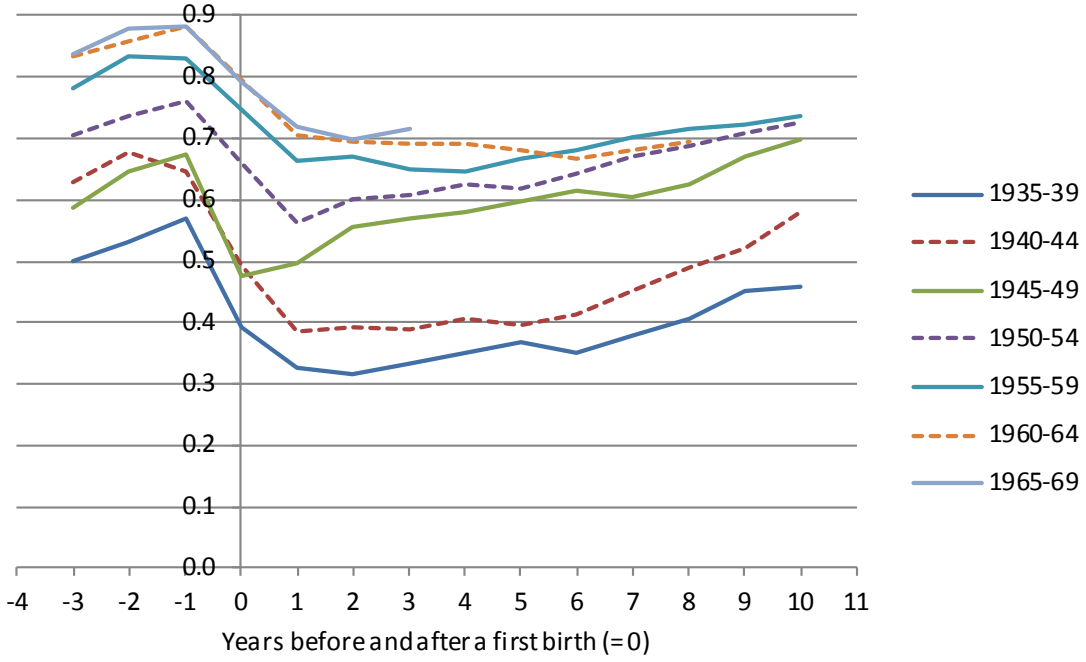
Sources and Notes: SIPP-SSA data. HRS-SSA gives somewhat higher fractions in the lowest and highest groups in the earlier period. Because the fraction of college graduate women in these cohorts is not very large, we chose to use a consistent series for the distribution even though some workers in exempt occupations will be excluded prior to 1978.

Figure 4: Labor Force Participation Before and After a First Birth, 1935 to 1969 Cohorts

A. All Women

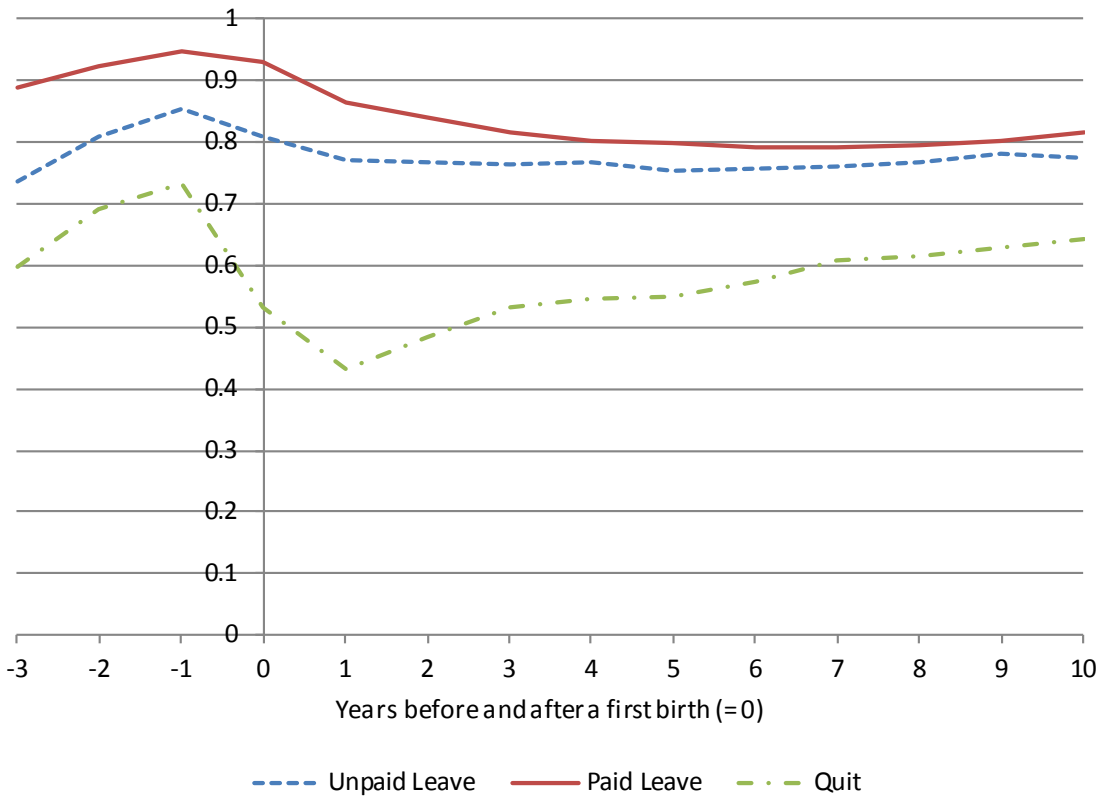


B. College Graduate Women



Sources and Notes: HRS-SSA is used for the 1935 to 1949 birth cohorts; SIPP-SSA is used for 1950 to 1969 birth cohorts. See text.

Figure 5: Labor Force Participation Pre- and Post-Birth Years of First Child by SIPP Leave Status, 1990s



Source: SIPP-SSA and SIPP Fertility History Topical Modules

Notes: All women had their first child from 1990 to 1999. Because the earnings data, from which the labor force data are derived, are for the calendar year, the precise moment of the birth cannot be linked to the earnings information. The SIPP Fertility History Topical Module lists whether the woman said she had unpaid leave, paid leave and if she quit just before or after the birth. Some women listed more than one type and are included in more than one group.

Table 1: Age at First Birth and Number of Children among Ever-Moms

A. Using HRS and SIPP

Year of Birth Group, Source	All Ever-Moms		Fraction with Zero Births, All Women	Ever-Mom College Graduates		Fraction with Zero Births, College Grads
	Age at First Birth	Number Children		Age at First Birth	Number Children	
1935-39, HRS	22.57	3.09	0.0782	25.36	2.78	0.142
1940-44, HRS	22.96	2.65	0.105	25.76	2.35	0.234
1945-49, HRS	23.67	2.25	0.132	26.80	2.26	0.217
1950-54, SIPP	23.86	2.33	0.190	27.53	2.07	0.300
1955-59, SIPP	24.22	2.36	0.200	28.48	2.16	0.320
1960-64, SIPP	24.61	2.33	0.191	28.50	2.18	0.310
1965-69, SIPP	24.84	2.38	0.200	28.22	2.26	0.230

B. Using CPS June Fertility Supplement

Year of Birth Group	All Ever-Moms		Fraction with Zero Births, All Women	Ever-Mom College Graduates		Fraction with Zero Births, College Grads
	Age at First Birth	Number Children		Age at First Birth	Number Children	
1935-1939	n.a.	3.26	0.101	n.a.	2.68	0.172
1940-1944	n.a.	2.85	0.112	n.a.	2.42	0.192
1945-1949	n.a.	2.48	0.151	n.a.	2.23	0.243
1950-1954	n.a.	2.36	0.172	n.a.	2.16	0.272
1955-1959	n.a.	2.33	0.184	n.a.	2.19	0.260
1960-1964	n.a.	2.33	0.195	n.a.	2.19	0.249
1965-1969	25.40	2.32	0.180	28.11	2.17	0.216

Sources: HRS for 1935 to 1949 and SIPP for 1950 to 1969. Part B: Micro-data for the CPS June Fertility Supplement, 1973 to 2014 (annually to 1988 except 1978 and then biennially except for 1995 rather than 1996). See Goldin (2016) for description of the source; see especially the discussion of possible biases due to a change in the CPS imputation algorithm for missing information concerning births.

Notes: In all cases, number of children ever born is truncated at nine. Completed births are measured at 40 years old and above for the CPS and at 44 years and above for the HRS and SIPP. Age at first birth was only asked in 2012 and 2014 for the CPS and applies only to

women born in 1968 and 1969. n.a. = not available. It should be noted that the CPS data has from 10K and 20K observations per five-year birth interval for all women. The SIPP contains about 400 respondents and the HRS from 1.2K to 2.3K per relevant five-year cohort. The HRS no-birth fractions are too low, but the reason is unclear. One possibility that that the fraction of women who claim to be college graduates is somewhat overstated for cohorts born before around 1940. The most likely reason is that they were interviewed at older ages and inflated their education level.

Appendix

A. HRS and SIPP

Both the Health and Retirement Study (known as the HRS) and the Survey of Income Program and Participation (known as the SIPP) are widely used data sets. Our analyses use restricted access versions of the data. Information on and public use data for the HRS can be found at http://hrsonline.isr.umich.edu/ The U.S. Census Bureau supports external researchers' use of the SIPP through the Research Data Center network www.census.gov/ces and public-use data can be accessed through www.sipp.census.gov/sipp/ (click "Access SIPP Synthetic Data"). This brief Appendix discusses certain details of the data relevant to this paper.

The HRS, supported by the National Institute on Aging and the Social Security Administration, was begun in 1992 with a random sample of households in which at least 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, is also termed the "Intermezzo" cohort. In households containing a married or partnered couple, the "spouse" and "respondent" categories were randomly assigned to age-eligible individuals. "Spouses" were not given positive sample weights until 1998, if born from 1931 to 1941. If they were born from 1942 to 1947, they are not given positive sample weights until the "War Baby" (WB) cohort was added. The "War Baby" (WB) cohort was born 1942 to 1947. The "Early Baby Boomer" (EBB) cohort, born 1948 to 1953, was added in 2004. The Mid-Boomer (MBB) cohort, 1954 to 1959 was added in 2010. The WB, EBB, and MBB cohorts were between 51 and 56 years old at the start of the survey.

The cohorts mentioned have been surveyed every two years. Additional cohorts born before 1931 are also part of the HRS, but the HRS, WB and EBB are the primary ones we use here. At the time of this writing, the HRS data are available to 2012. Individuals were asked at each interview if they would agree to have their Social Security earnings records linked, therefore the fraction with a linkage increases with the number of interviews. Among the 1931 to 1942 birth cohort the linkage rate is 89 percent. It is 85 percent for the 1943 to 1945 cohort, 79 percent for the 1946 to 1948 cohort and 71 percent for the 1949 to 1951 group.

The Survey of Program Participation (SIPP) Gold Standard File consists of a harmonized set of SIPP panels linked to longitudinal earnings records. Our analysis uses SIPP panels 1996, 2001, 2004, and 2008 and integrates information from the fertility history topical modules conducted in Wave 2 of each panel. We combine basic demographic information from the Gold Standard File with information from the topical modules on the number of children, year the first child is born and mothers' use of leave-taking. The

variables we use from each SIPP survey are cross-sectional, not longitudinal. The panel dimension of the data comes exclusively from the linked earnings records. Linkage rates vary by SIPP panel but are typically around 85 percent.

We restrict our overall sample to women approximately 30 to 60 years old when first interviewed (among those with a valid Social Security number [SSN] assigned). We estimate a logit regression for each panel using demographic characteristics to predict SSN assignment and multiply the survey weights by the inverse of the estimated propensity score. SSN assignment rates vary by panel but are typically around 85 percent.

The Social Security earnings records that both the HRS and SIPP respondent data are linked to also contain W-2 forms from 1978. But the HRS was not originally linked to the full group of W-2 forms. Therefore we use the W-2 forms for the HRS only after 1980 when the linkage is complete.

B. HRS-SSA, SIPP-SSA and CPS ASEC Labor Force Participation Rates

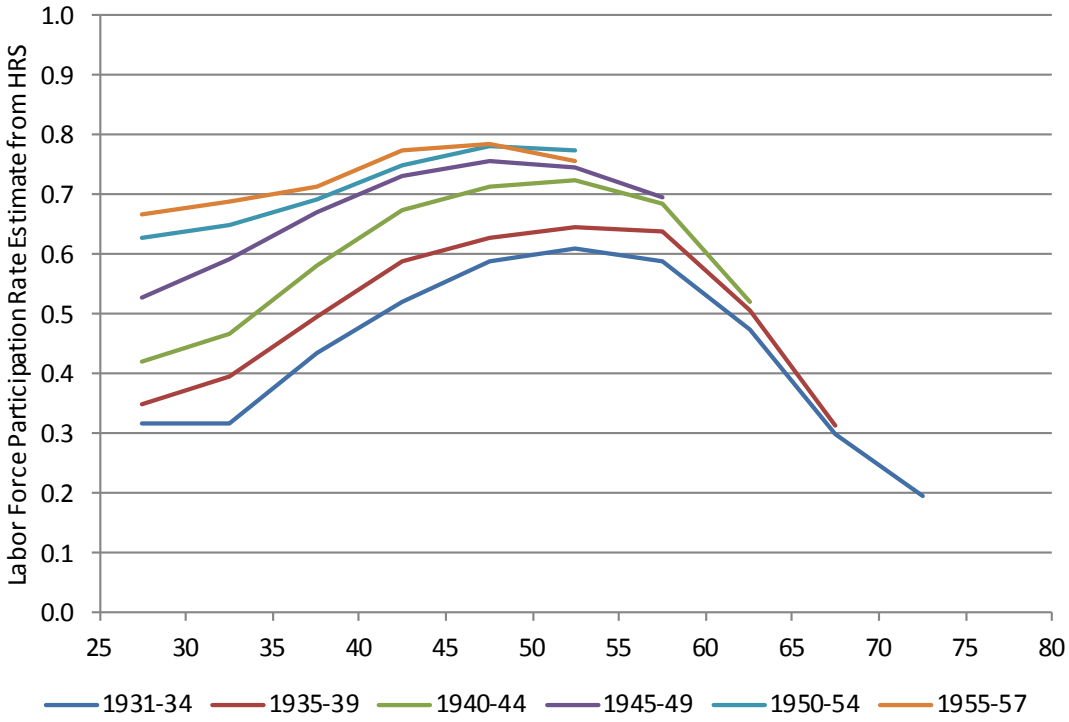
The definition of labor force participation in the CPS ASEC concerns whether the individual was working for pay or profit (or actively searching for work) during the census week. In using both the HRS-SSA and the SIPP-SSA we have annual income data and not a variable that corresponds to the one in the CPS ASEC. Both the HRS and SIPP have contemporaneous questions about labor force participation but that does not exist going back in time.

Our labor force participation variable treats individuals as being a labor force participant if they earned (reported as SS or W-2 earnings) at least the equivalent of ten hours per week at the existing federal minimum wage for 52 weeks per year. The HRS respondents are included in the labor force if they stated they were "in the labor force" once the survey began or if they were working for a state, federal or municipal government in particular years prior to the HRS survey even if they had no SS earnings. Because the HRS is biennial, we averaged the two years when we used the HRS respondent information and some, therefore, have the value of 0.5 (the ages for these entries would older than 50 years). All others are non-participants.

But how close is that definition to the one in the CPS ASEC? The answer is that it is very close. Appendix Figure 1 gives the participation rates for all women estimated from the HRS for cohorts born from 1931 to 1957. It can be compared with Figure 1 from the CPS-ASEC. Out of the 36 entries (five-year birth cohorts from 1930 to 1959 and five-year age groups from 25 to 54), just 14 are not within 5 percentage points (0.95 to 1.05 for the ratio HRS estimate/CPS ASEC) and just one is not within 10 percentage points. For the 55 to 59 year old group the estimates are within 10 percentage points. For reasons that are not yet clear, the HRS overstates participation for those older than 60 years relative to the

CPS. See also Goldin and Katz (2016) for other comparisons of the HRS and the CPS labor force data.

Appendix Figure 1:



Source and Notes: HRS restricted access version. Labor force participation rate estimates are computed using the algorithm described in the Appendix.