

After 50 years of progress, how prepared are women for retirement?

Title IX of the Education Amendments of 1972 prohibits sex discrimination (including pregnancy, sexual orientation, and gender identity) in any education program or activity receiving federal financial assistance.

In the 50 years since the enactment of Title IX, women have made enormous strides in terms of educational attainment, work, and earnings. Although a wage gap by gender persists, women's progress in the workforce has clearly enhanced their economic status as individuals. On the other hand, women have chosen to spend less of their adult life married, and the decision to eschew the potential support of a spouse could have put them more at risk economically.

This study uses the *Health and Retirement Study* to document the economic gains and the changing demographic profiles of women and then assesses the extent to which they are prepared for retirement. Since the trends in both economic gains and marriage have differed for Black and White women, the results are reported by race as well as for all women.

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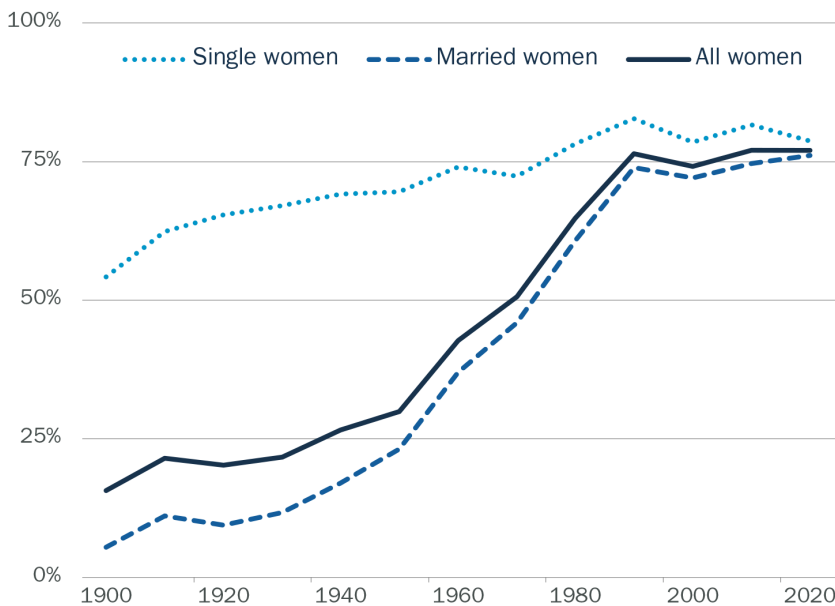
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This review shows that women have gained in educational attainment, work force activity, and earnings, and this progress has translated into wealth. Moreover, women do not appear to have undone their economic gains since Title IX's passage by opting to spend more time on their own—those who spend the majority of their adult life single are as well prepared for retirement as married couples.

Overview

The short story is that single women have always worked, but married women have not (see Figure 1). As time passed, some married women started to work and some did not, and this variability made the labor supply of married women the subject of an enormous body of research.

Figure 1. Labor force participation of single, married, and all women, ages 35–44, 1900–2020



Source: U.S. Census Bureau, *American Community Survey* (1900–2020).

Although this study focuses on changes in the half century since Title IX, it is helpful to take a step back and start the discussion with a look at the work habits of married women over a longer period. Claudia Goldin divides the history of women and their labor force activity into four periods.¹

Late 19th Century to the 1920s. Some young and non-married women worked as piece workers in manufacturing or as maids. However, virtually no married women were in the labor force. Because work was generally very unpleasant, a huge stigma was attached to wives working outside the home. Only the poor needed their wives to work at physically demanding jobs that involved long hours. Economists have estimated income and substitution effects associated with women's labor force activity over time. That is, how responsive is the wife's labor supply to the household's income,

typically the husband's earnings, and to the wage she can earn in the labor market. During this period, as the husband's income increased above fairly modest levels, the likelihood that a married woman would work declined substantially. At the same time, an increase in the wage was unlikely to coax additional work activity on the part of women.

1930s to 1950. During these two decades, the labor force activity of prime-age married women rose from 10 percent to 25 percent. One reason is that jobs got less physically demanding and more appealing—office jobs rather than manufacturing jobs. New technologies, such as in-home appliances also made housework less

1 Goldin (2006).

time-consuming. And the possibility of working part-time arose in the 1940s and became widespread in the 1950s, which was attractive to women who were primarily responsible for home and children.

1950s to 1970s. In this period, the labor force participation of prime-age married women rose from 25 percent to almost 50 percent. The demand for women’s labor was strong. Many entered the labor force as secretaries, teachers, and nurses. While they came fully trained to these positions, many did not expect advancement, and treated their work as a job not as an element of their identity. Yet they ended up spending a substantial portion of their life employed.²

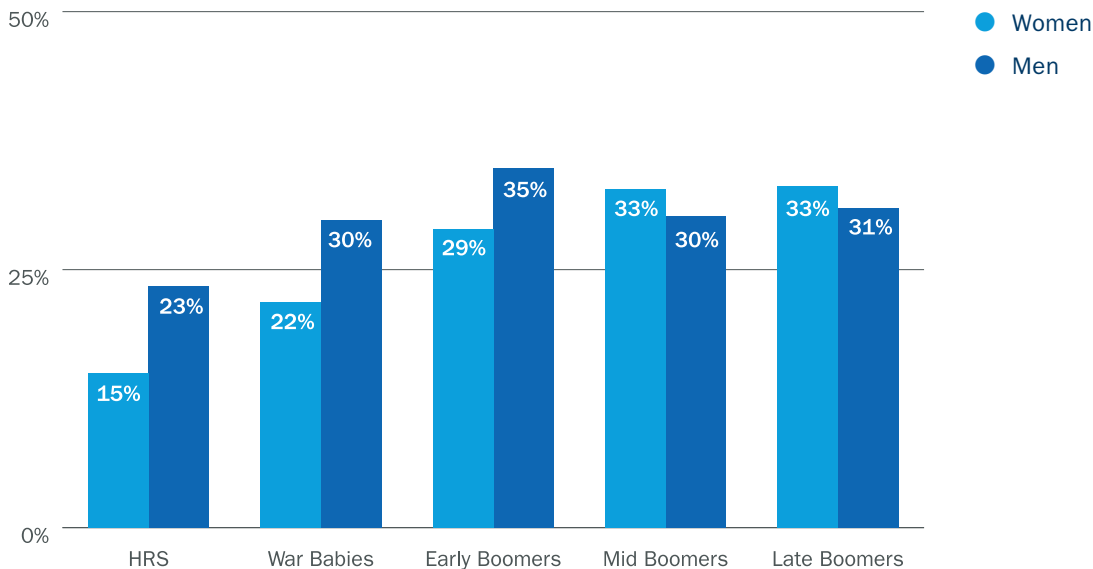
1970s to the Present. Young women growing up in the 1960s could see that it was feasible to spend most of their lives employed. One way they responded was to invest in their education. They went to college in increasing numbers, majored in career-oriented subjects, and were more likely to continue their education in professional and graduate schools. The advent of the contraceptive pill allowed many to postpone marriage and establish themselves professionally. As many placed their career on equal footing with their marriage, the labor supply of married women became even less responsive than before to their husband’s earnings.

Progress from the 1970s to the present

Since this study focuses on the 50th anniversary of Title IX, the analysis looks at the achievements of women in terms of education, work, and earnings since the enactment of that legislation. The data come from the *Health and Retirement Study* (HRS), a longitudinal nationally representative survey that has interviewed people over age 50 every two years since 1992 (most recently 2020). The survey contains information on five cohorts of respondents. The original HRS cohort (born 1931-41) and the War Babies (1942-47), who reached age 20 in the 1950s and the 1960s, can serve as a base of comparison. The Early Boomers (1948-53), Mid Boomers (1954-59), and Late Boomers (1960-1965), who reached age 20 in the 1970s and 1980s, show the economic gains since the passage of Title IX.

To provide a sense of progress on the educational front, Figure 2 shows the percentage of women and men who ended up with a college degree. Two facts stand out. First, the share of women with a degree has increased enormously, from 15 percent for those born in the 1930s to one third for Late Boomers, born in the early 1960s. Second, for recent cohorts, a greater percentage of women than men ended up with a college degree.

Figure 2. Percentage of women and men with a college degree, by cohort



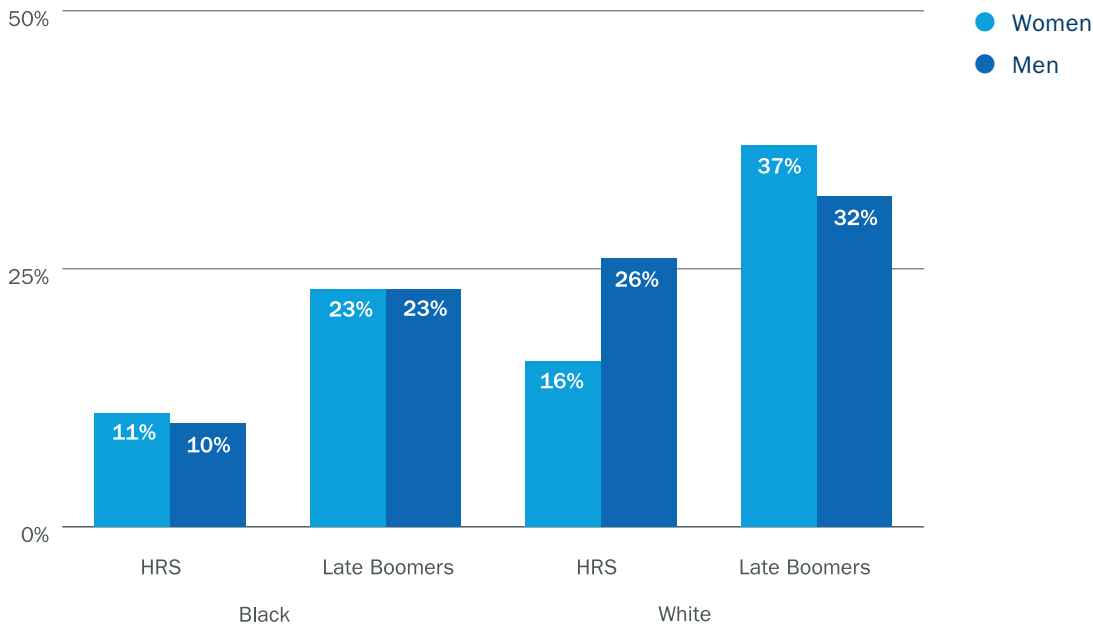
Source: Authors’ calculations from the University of Michigan, *Health and Retirement Study* (HRS) (1992-2020).

2 Goldin (2006).

That pattern by gender reflects the outcome for Whites, where the percentage with a college degree is five percentage points higher for women than for men (see Figure 3). For Blacks, the percentages for the two genders are equal. Figure 3 also shows that, while the

outcomes for both Black and White women have improved markedly, educational progress for Black women has lagged behind that of their White counterparts.

Figure 3. Percentage of women and men with a college degree for HRS and Late Boomer cohorts, by race



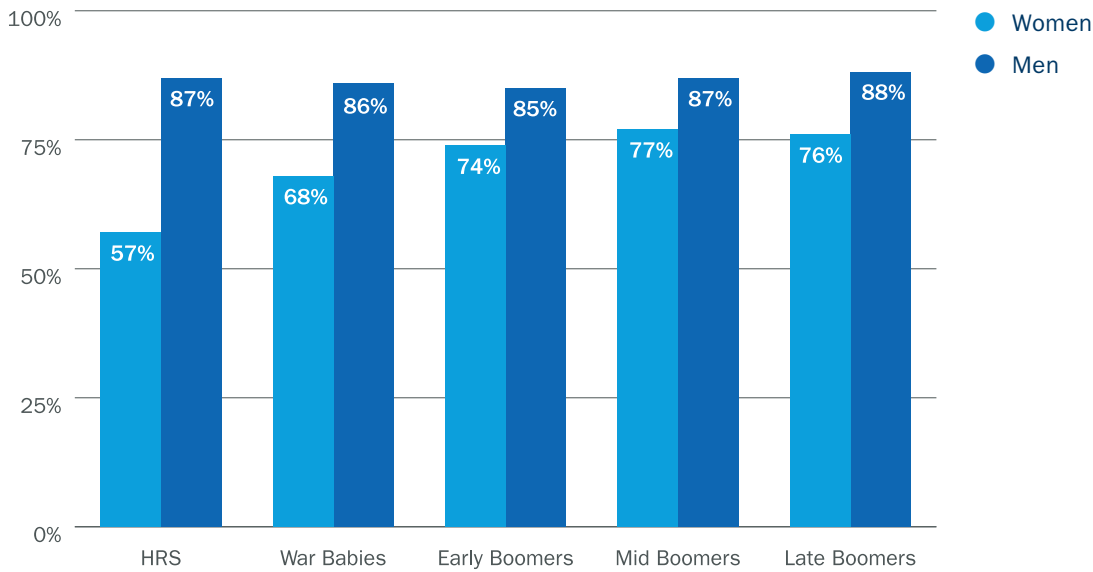
Source: Authors' calculations from the HRS (1992-2020).

The next two figures repeat the same exercise for labor force activity. Although the HRS does not interview people until age 50, administrative data on lifetime earnings is available for a large subsample.³ Figure 4 shows the labor force participation rate for women and men between ages 35-44 for the five cohorts. The percentage of prime-age women in the labor force increased from

57 percent for the earliest cohort to 76 percent for the Late Boomers. The increase has markedly reduced the differential between women and their male counterparts for whom labor force participation rates have remained relatively constant between 85 percent and 88 percent.

³ Around 60 percent of HRS respondents agree to link their survey data with administrative earnings records from the Social Security Administration.

Figure 4. Labor force participation rate of individuals ages 35–44 by cohort

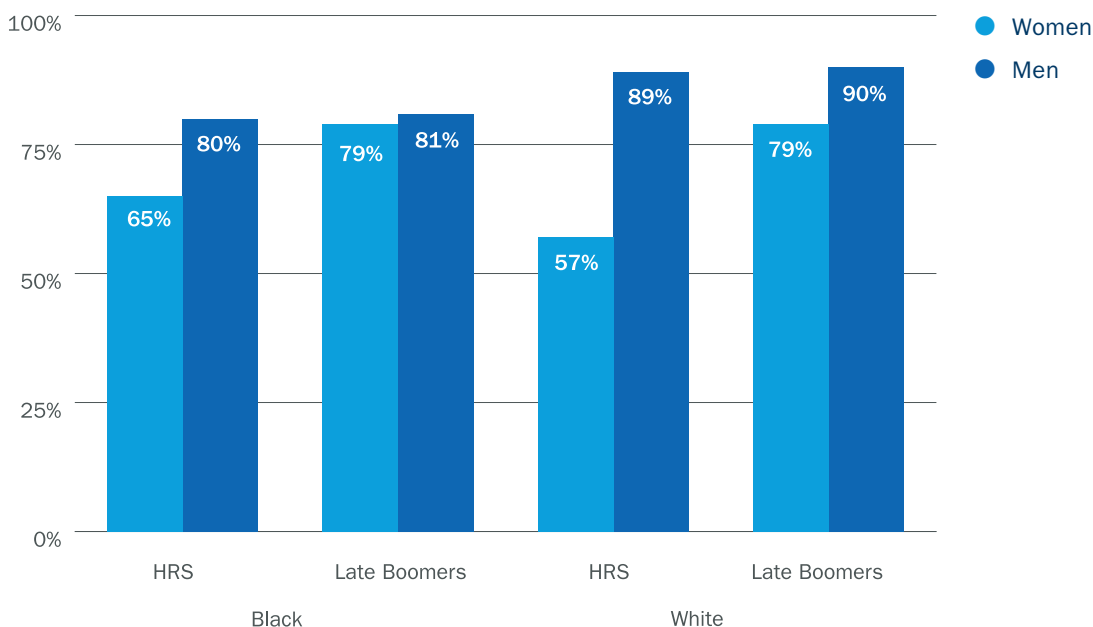


Source: Authors' calculations from the HRS (1992-2020).

The pattern by race is interesting. As expected, in both cases, women’s increased participation has narrowed the gender gap. But because historically more Black than White women worked—perhaps out of necessity—the increase in participation for White women has exceeded those for their Black counterparts (see Figure 5). This more rapid increase for White women, combined with a

lower starting point, has produced an equal labor force participation rate for prime-age Black and White women. Finally, because the participation rate for Black men is about 10 percentage points lower than for White men, the gender gap has virtually disappeared for Blacks but remains for Whites.

Figure 5. Labor force participation rate of individuals ages 35–44 for HRS and Late Boomer cohorts, by race

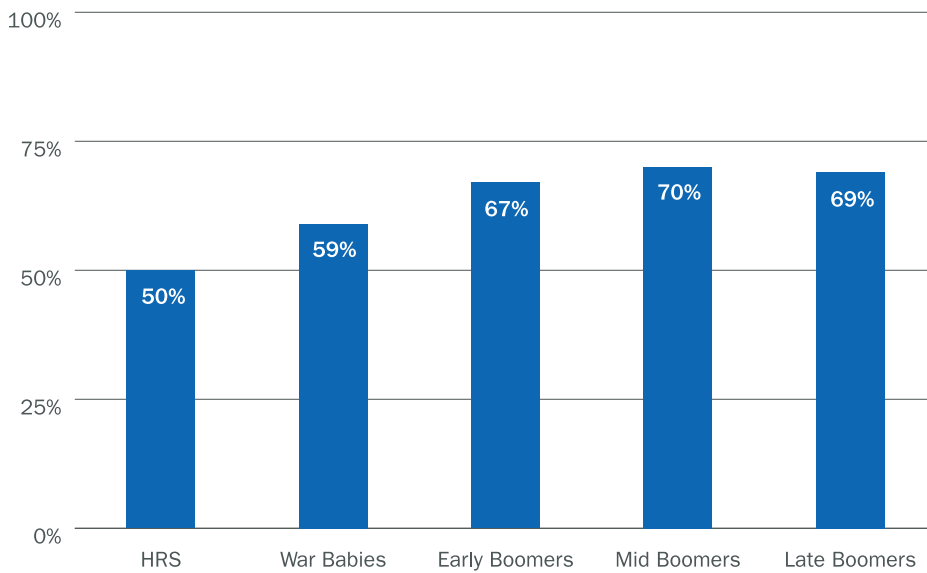


Source: Authors' calculations from the HRS (1992-2020).

Not surprisingly, the increased educational attainment and greater labor force activity of women have led to higher earnings. Unfortunately, the HRS administrative earnings data do not have information on hours worked, so in order to identify full-time workers it is necessary to turn to the *Current Population Survey*. For this exercise,

we assigned workers to cohorts based on their year of birth and then observed them at ages 35-44. The results, reported in Figure 6, show that women's earnings have increased from 50 percent of men's to about 70 percent for the Boomers.

Figure 6. Women's earnings as a percentage of men's, full-time individuals ages 35-44

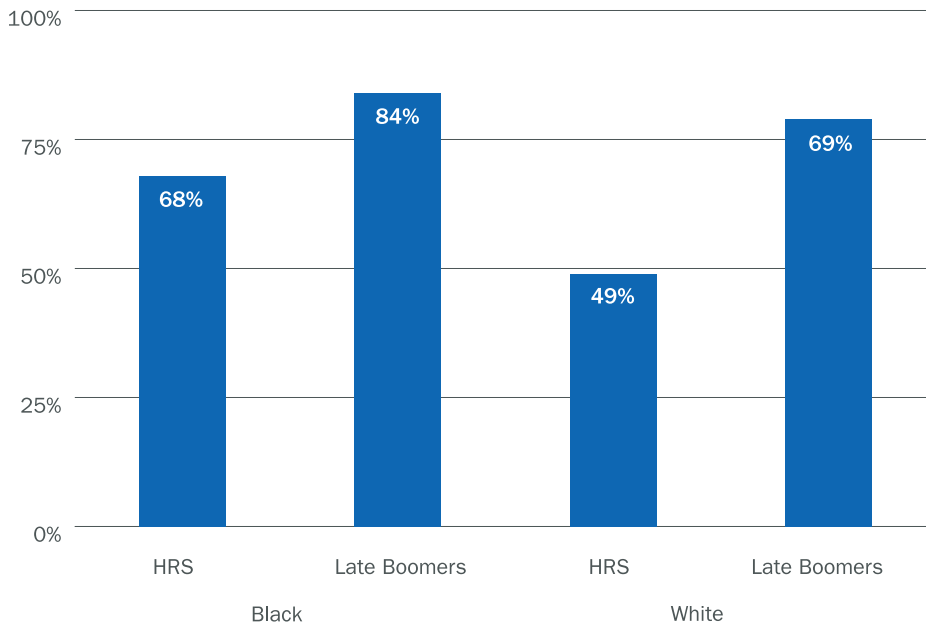


Source: Authors' calculations from the U.S. Census Bureau, *Current Population Survey (CPS)* (1967-2009).

Repeating the exercise by race shows that Black women, too, have gained relative to men (see Figure 7). Interestingly, both historic and current ratios are higher for Black than for White women. This pattern, however,

says more about the low earnings of Black men, as the earnings of full-time Black women are quite similar to those for their White counterparts.

Figure 7. Women’s earnings as a percentage of men’s, full-time individuals ages 35–44, by race for HRS and Late Boomer cohorts



Source: Authors’ calculations from the CPS (1967-2009).

In summary, the economic life of women has changed dramatically. More have graduated from college, more participate in the labor force, and they earn more relative to men. Women’s progress in the workforce has clearly enhanced their economic status as individuals. The question for this report, however, is the extent to which women are prepared for retirement. That answer depends not only on the economics of women as individuals, but also their living arrangements. To the extent that women have moved away from marriage and eschewed the potential support of a spouse—who is more likely to have a better job and higher earnings—both during their working life and in retirement, they could have put themselves more at risk economically.

The decline of marriage

To quantify the extent to which marriage patterns have changed, we once again turn to the HRS to calculate the percentage of each woman’s adult life (ages 20+) spent in marriage. For comparisons across cohorts, one would like to include in the calculation all years between age 20 and the death of the respondent. Such a broad span is not possible, however, because women added to the sample in recent years are still quite young. For example, the Late Boomers were added in 2016, so as of 2020 this group includes women who were only in

their mid-to-late 50s. As a result, estimates need to be made for these later cohorts. Three sets of calculations are presented to illustrate that the assessment is not particularly sensitive to the approach taken.

To establish a baseline requiring no estimates, the starting point is marriage patterns between age 20 and the most recent interview. The number of years over this span is totaled for each woman and then added across all women to get “total women years.” The number of years married during this span is then totaled for each woman and added over all women to get “years married.” Dividing “total years married” by “total woman years” yields the percentage of years married for each cohort.

One concern with using age 20 to the last interview is that the Late Boomers in 2020 were 54-60, while the original HRS cohort in 2020 were 79-89. Therefore, the “last-interview” results could understate the decline because the most recent cohorts have spent virtually no years as widows. To address this concern, a second approach uses a standard age for each cohort. Of course, excluding information at older ages when women are more likely to be widowed increases the percentage of years married throughout, but most likely provides a better picture of decline over time.

The final approach takes advantage of all the available data and makes an estimate for potential widowhood for younger women. This estimate starts with the ratio of the percentage of years spent married for the HRS cohort as of last interview (79-89) to the percentage for this same cohort at ages 54-60 ($71/77 = .92$). This ratio, which shows how the percentage of years married is reduced

when more years are included, is applied to the reported percentages at ages 54-60 for the younger cohorts.

The results for all three calculations are shown in Table 1. Regardless of the approach taken, the percentage of women’s adult years spent married has declined sharply from over 70 percent for the HRS cohort to an estimated 44 percent for the Late Boomers.

Table 1. Percentage of years that women spend married by cohort, 2020

Age span	HRS Cohort	War Babies	Early Boomers	Mid Boomers	Late Boomers
Ages 20 to last interview	71.0%	71.2%	59.3%	54.5%	48.1%
Ages 20 to 54–60	77.1	73.2	60.0	54.0	48.1
Ages 20 to 79–89 (est.)	71.0	67.5	55.3	49.7	44.3

Source: Authors’ calculations from the HRS (1992-2020).

How did this dramatic change come about? First, the average age of first marriage rose by about 4 years between the HRS cohort and the Late Boomers (see Table 2).⁴ Second, a greater proportion of women never

marry, rising from 4 percent in the HRS cohort to 15 percent for Late Boomers. And third, more women get divorced.⁵

Table 2. Women’s marriage patterns by cohort, 2020

Marriage pattern	HRS Cohort	War Babies	Early Boomers	Mid Boomers	Late Boomers
Avg. age of first marriage	21.4	21.6	22.8	24.3	25.3
% never married	3.9%	4.2%	8.7%	11.9%	14.6%
% divorced*	34.1	38.7	49.2	48.3	49.7

*Includes any woman who was ever divorced.

Source: Authors’ calculations from the HRS (1992-2014).

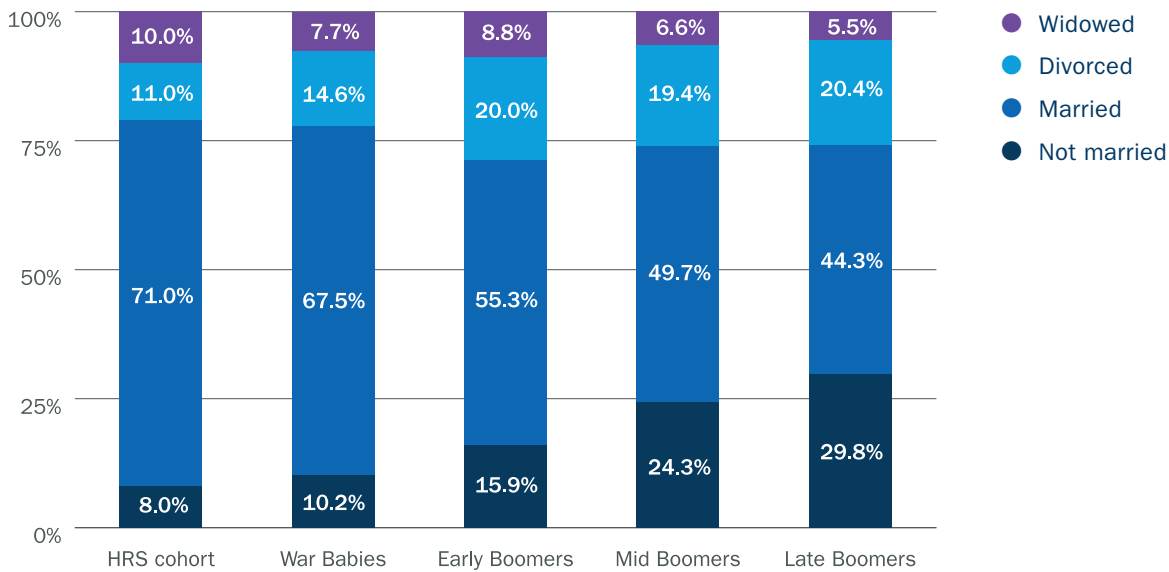
4 Haines (1996) documents an increase in the age at first marriage for women that began in 1950 and continued through 1990. Loughran (2002) attributes some of this increase to rising male wage inequality over the same time period. Goldin and Katz (2002) attribute some of the increase to the introduction of the birth control pill in the 1960s.

5 As Stevenson and Wolfers (2007) note, divorce rates actually peaked in the early 1980s and have fallen slightly since. In this context, the sharp increase in the share of women divorced between the HRS cohort and Early Boomers (who would have been in their 30s around the time of the peak) makes sense, followed by the slight decline seen for the Mid Boomers.

The impact of these changing patterns on the percentage of “woman years” married is shown in Figure 8. The substantial increase in years spent either divorced or

“not married” (i.e., prior to a first marriage or because the individual never got married) has reduced the percentage of years married.

Figure 8. Percentage of years widowed, divorced, married, and not married, by cohort



Source: Authors' calculations from the HRS (1992-2020).

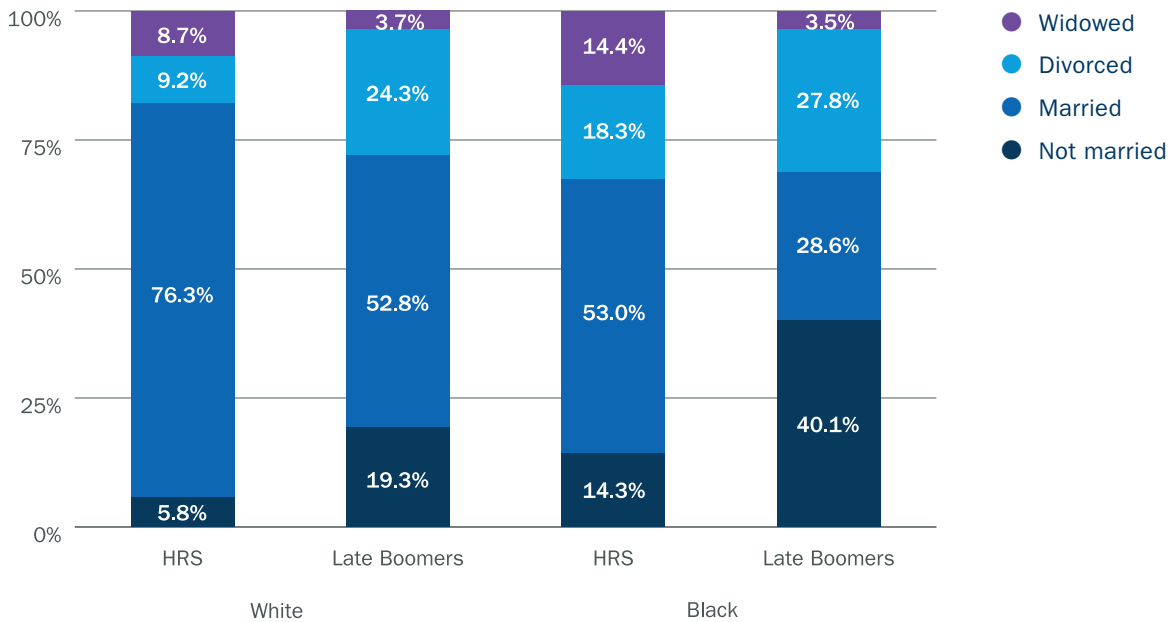
While women in the aggregate are spending less and less time in marriage, the question is whether this decline is similar across socioeconomic groups. To examine this issue, we replicate the exercise for Whites versus Blacks and for those with a college degree versus those with less than college. For simplicity, we compare only the HRS cohort with the Late Boomers.

While the percentage of years married declined significantly for both White and Black women, three differences are worth noting (see Figure 9). First, Black

women have always spent a smaller percentage of years married than White women have. Second, the decline in the percentage of years married is greater for Black women than White women.⁶ Third, the reasons for the decline are different. Whereas White women saw a more than doubling of years spent divorced, Black women did not. In contrast, Black women experienced a much larger increase in the percentage of years not married, making it the single largest category for them.

⁶ Both the lower level of marriage among Blacks and the widening marriage gap have been documented elsewhere, for example in Raley, Sweeney, and Wondra (2015).

Figure 9. Percentage of years widowed, divorced, married, and not married, by cohort and race



Source: Authors' calculations from the HRS (1992-2020).

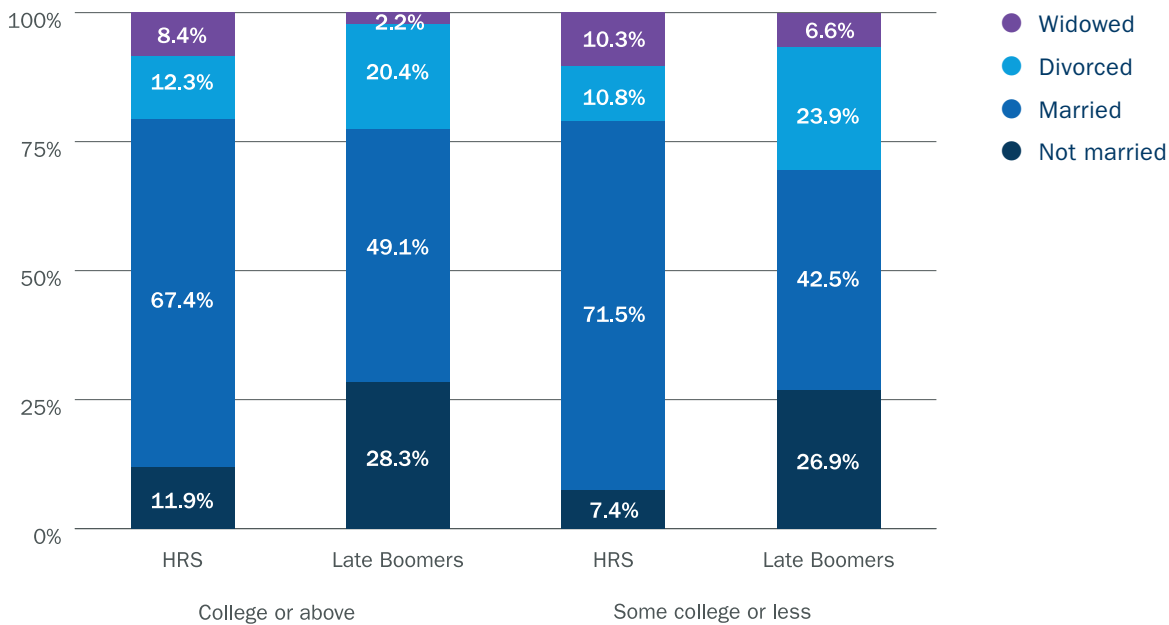
In contrast to the enormous difference in marital patterns by race, the pattern by educational attainment looks very similar (see Figure 10).⁷ For both those with a college education and those with less than college, the percentage of years spent married declined from about

70 percent to about 45 percent between the HRS and Late Boomer cohorts. The increase in the percentage of years not married or divorced was also consistent across educational groups.⁸

⁷ Statistics are restricted to females who enter the HRS survey before age 60. Observations are selected at the last wave in which the individual falls within ages 52-58, inclusive.

⁸ Although recent evidence has suggested that these numbers may diverge for future birth cohorts of women, at least through the Mid Boomer cohort, the trends look similar. For example, Lundberg, Pollak, and Stearns (2016) find that the marriage rates of 30- to 44-year-olds between those with and without a college education were very similar through the mid-1980s (when the Mid Boomers would have been in their 30s) and have been diverging ever since.

Figure 10. Percentage of years widowed, divorced, married, and not married, by cohort and education



Source: Authors' calculations from the HRS (1992-2020).

The bottom line is that women as a group have moved from a situation where they spend most of their adult life married to one where they spend less than half of their adult life as part of a couple. Thus, to assess retirement preparedness of women, it is necessary to consider both changes in family structure as well as patterns of wealth accumulation by cohort.

Changes in wealth accumulation and retirement preparedness of women

The ultimate goal of the analysis is to determine the extent to which women are prepared for retirement and how their situation may have changed over time.⁹ Preparation for retirement is measured in two ways. (Details of both calculations are presented in the Appendix.)

The first is household wealth, which includes: 1) Social Security wealth as measured by the expected discounted value of future benefits; 2) wealth in employer-sponsored retirement plans, including both 401(k)-type and IRA balances and the present discounted value of expected benefits from a defined benefit plan; 3) financial assets less any outstanding debt; and 4) the value of the primary residence less any outstanding mortgage debt.

While wealth measures provide useful insights into trends across cohorts, the ultimate purpose of that wealth is to allow households to maintain their standard of living in retirement. Therefore, preparation for retirement is also measured in terms of replacement rates—the ratio of the retirement income that could be generated by a household’s retirement resources divided by its pre-retirement income.

Table 3 shows how wealth has changed across cohorts for women and men. One decision is how to characterize the wealth of one member of a married household. This analysis assigns the couple’s full value to the woman and to the man. Although this approach clearly overstates the holdings of married people, it provides a clear benchmark against which to compare trends over time. The numbers are presented in 2020 dollars and represent the average for the middle quintile of the wealth distribution.

⁹ This stage of the analysis will expand on Hou and Sanzenbacher (2021), who assess retirement preparedness for households in the HRS by race and ethnicity. The analysis will compare retirement readiness when the head of household is ages 58-61 (age will vary depending on birth cohort and the timing of HRS survey interviews).

Two patterns are evident in Table 3. First, wealth has been declining across cohorts for both men and women. This decline is largely due to two factors: 1) lower Social Security wealth as the increase in the Full Retirement Age reduced benefits for all; and 2) fewer assets in retirement plans because of adverse labor market experiences during the Great Recession. The second, and for the purpose of this study, more interesting result is the

ratio of women’s wealth to men’s wealth. For the earlier cohorts, the women’s wealth equaled 82-85 percent of men’s; for the later cohorts, the comparable figures were 90-93 percent. Boomer men, who did not enjoy gains in education or earnings over time, appear to have been hit much harder than their female counterparts by the Great Recession.

Table 3. Median retirement wealth at ages 59–60 for households by gender and cohort, 2020 dollars

Gender	Cohort				
	HRS Cohort	War Babies	Early Boomers	Mid Boomers	Late Boomers
All women	\$480,600	\$543,500	\$445,000	\$379,800	\$335,400
All men	588,700	638,900	479,600	419,800	373,300
Women's wealth as a % of men's	82%	85%	93%	90%	90%

Note: Median is measured as the average for the middle quintile of the wealth distribution.
Source: Authors’ calculations from the HRS (1992-2020).

The question is the extent to which the overall improvement in women’s wealth relates to their marital status. Table 4 presents the wealth holdings for three groups of women: 1) never married; 2) mostly single (less than 50 percent of adult years married); and 3) mostly married (more than 50 percent of adult years married). The large decline in median wealth for women who spend their lives mostly married largely reflects declining fortunes for their husbands, who felt the full impact of reduced Social Security wealth and the Great Recession without a countervailing increase in earnings. Since the

wealth of the mostly-single and never-married women has remained relatively stable, their holdings have increased sharply relative to the mostly married. For the Late Boomer cohort, the relevant percentages are 65 percent for the mostly-single and 48 percent for the never-married women. Those percentages are high, given that, as noted above, the mostly-married wealth belongs to two people. Thus, in terms of wealth, women do not appear to have undone their economic gains by changing their marriage patterns.

Table 4. Median wealth at ages 59–60 for women by lifetime marital status and cohort, 2020 dollars

Lifetime marital status	Cohort				
	HRS Cohort	War Babies	Early Boomers	Mid Boomers	Late Boomers
Mostly married	\$579,400	\$731,400	\$646,000	\$530,700	\$446,400
Mostly single	226,500	333,800	285,600	259,700	290,400
Never married	297,400	226,200	232,600	223,400	216,000
As a % of mostly married;					
Mostly single	39%	46%	44%	49%	65%
Never married	51*	31	36	42	48

* This number appears to reflect noise from a small sample size rather than the earnings of never-married women.
Source: Authors’ calculations from the HRS (1992-2020).

Table 5 repeats the same calculations for Black women. Because the sample sizes by cohort, race, and marital status are relatively small, the calculations collapse the pre-Title IX cohorts—the HRS and the War Babies—and those who mainly entered their 20s after Title IX—namely, the Early, Mid, and Late Boomers. Although the

wealth levels are lower for Black women than for women in general, the pattern of mostly-single and never-married women gaining on the mostly married is similar to that of women generally.

Table 5. Median wealth at ages 59–60 for Black women by lifetime marital status and cohort, 2020 dollars

Lifetime marital status	Cohort	
	HRS/ War Babies	Early, Mid, and Late Boomers
Mostly married	\$334,600	\$343,400
Mostly single	180,600	199,900
Never married	101,800	152,500
As a % of mostly married;		
Mostly single	54%	58%
Never married	30	44

Source: Authors' calculations from the HRS (1992-2020).

The ultimate purpose of retirement wealth, however, is to support people's pre-retirement standard of living in retirement. So, Tables 6 and 7 repeat the exercise for replacement rates, projected retirement income as a percentage of pre-retirement earnings. In this exercise, retirement income is based on annuitizing non-housing wealth at ages 59-60 and pre-retirement income is set at the five years of highest earnings before age 55.¹⁰ Housing is excluded because, as much as experts urge them to do so, homeowners rarely tap their equity to support themselves in retirement. The level of reported replacement rates is lower than they will be ultimately, because these households are 59-60 and still have several years more to work and save before they retire. The pattern of replacement rates across cohorts mirrors the pattern of wealth in that mostly-single and never-married women have gained relative to the mostly married. But the story is slightly more complicated. Mostly-married women have seen a sharp decline in replacement rates due to two factors. First, the increase in Social Security's Full Retirement Age reduced benefits for all. While women's improved economic success acted as a countervailing force, men had no offsetting gains and, therefore, absorbed the full impact of the FRA increase. Second, household replacement rates have further declined as the increased labor force participation of married women has led to a dramatic decline in

the prevalence of the 50-percent spousal benefit. (At the extreme, if both members of a couple have the same earnings, they get no spousal benefit and their replacement rate is equal to the husband's rate alone, whereas a household getting a full spousal benefit would have a replacement rate that is 50 percent higher.)¹¹ At the same time, never-married Boomers have seen higher replacement rates than the earlier cohorts, while replacement rates for the mostly-single women have declined only slightly. Again, the conclusion is that women foregoing marriage for some or all of their life have not sacrificed economic security. Just as their wealth has increased relative to their married counterparts, so too have their replacement rates become more equal.

10 Non-housing wealth includes the discounted value of Social Security benefits; wealth in all employer-sponsored retirement plans and balances in IRAs; and financial assets less outstanding debt.

11 When most women did not work, the wife who claimed at age 65 was entitled to a benefit equal to 50 percent of that of her husband's, so if the replacement rate for the typical worker was 40 percent, the replacement rate for the couple would be 60 percent. As women went to work, however, the calculation became less obvious, since women were entitled to the larger of the spouse's benefit or the benefit they could earn on their own. When women's earnings were modest, their wages increased the couple's pre-retirement income, but did not increase the total amount the couple received from Social Security. As women's wages became equal to their husband's, the replacement rate for the couple with two typical workers would be 40 percent.

Table 6. Median replacement rate at age 59–60 for women by lifetime marital status and cohort

Lifetime marital status	Cohort				
	HRS Cohort	War Babies	Early Boomers	Mid Boomers	Late Boomers
Mostly married	44%	47%	44%	38%	35%
Mostly single	36	36	36	33	33
Never married	43*	24	37	34	34

*This number appears to reflect small sample size rather than the earnings of never-married women.
 Note: Median is measured as the average for the middle quintile of the wealth distribution.
 Source: Authors' calculations from the HRS (1992-2020).

Finally, Table 7 reports replacement rates for Black women—again comparing the HRS/War Babies and the Boomers. Because of the progressive nature of Social Security, despite having less wealth, Black women have replacement rates roughly equal to those for women as a group. And the pattern over time is similar. Women who spend most of their life married have experienced

a decline in replacement rates, while the mostly single and never married have seen increases. Like the story for women as a group, the replacement rates for mostly-single and never-married women have reached and now even exceed those for women who spend their lives mostly married.

Table 7. Median replacement rate at age 59–60 for Black women by lifetime marital status and cohort

Lifetime marital status	Cohort	
	HRS/ War Babies	Early, Mid, and Late Boomers
Mostly married	37%	33%
Mostly single	32	34
Never married	26	38

Source: Authors' calculations from the HRS (1992-2020).

Conclusion

In the half century since Title IX's passage, women have made substantial economic progress. The key comparison in this study is between Baby Boomers, who were reaching adulthood in the wake of Title IX, and prior generations. Baby Boomer women are much more likely to have college degrees and the Mid to Late Boomers have even surpassed men on this metric. Women's labor force participation rates have also risen sharply, particularly for married women. Not surprisingly, women are earning more as well. The economic status of both Black and White women has improved over this period, though Whites have seen greater progress than their Black counterparts.

While these economic advancements are encouraging, the focus of this study is on the extent to which women are prepared for retirement. One factor that could potentially undermine women's economic gains during their working lives is a change in their living arrangements. In recent decades, women are more likely to live independently, with the Late Boomers spending only 44 percent of their adult lives married compared to over 70 percent for the oldest cohorts. Baby Boomers are more likely to have married later, gotten divorced, and never married at all. These overall trends have been similar by race, but White women have seen a bigger

surge in divorces, while Black women have experienced a larger increase in the never-married group. This movement away from marriage, by reducing the potential support of a spouse, could have put women more at risk economically.

Strikingly, though, the results show that it is the women who have spent most of their lives married who look worse off in terms of retirement preparedness. Compared to earlier cohorts, they have seen significant drops in their retirement wealth and in their replacement rates. The reason is, in large part, the declining economic fortunes of their husbands, who experienced the full impact of the rise in Social Security's Full Retirement Age and labor market setbacks during the Great Recession without countervailing improvements in education and earnings. Additionally, mostly-married couples have seen a drop in replacement rates due to their declining eligibility for Social Security's spousal benefit. In contrast, mostly-single and never-married women have gained ground on those who are mostly-married. These overall patterns are similar for both White and Black women. The conclusion, then, is that women do not appear to have undone their economic gains since Title IX's passage by opting to spend more time on their own. They have gained both income and wealth, and are as well prepared for retirement as married couples.

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Technical appendix

The analysis draws from the *Health and Retirement Study* (HRS), a nationally representative longitudinal survey that has interviewed people over age 50 every two years since 1992. It uses all 15 waves of the HRS (1992-2020) to examine the wealth and changing demographics of women in different birth cohorts. It also supplements the HRS with restricted administrative earnings data provided by the U.S. Social Security Administration (SSA).

Documenting women's lifetime marital status

The calculation of the percentage of years spent married is based on detailed survey questions about current and past marital status.¹² Women in earlier cohorts are followed until 2020, when most are well into their eighties or beyond.

However, later cohorts cannot be observed beyond their mid-to-late fifties. To address potential bias from truncating the observation period, we adjust the estimates for later cohorts based on how the oldest cohorts fared as they aged beyond their fifties. This adjusted estimate starts with the ratio of the percentage of years spent married for the (oldest) HRS cohort as of 2020 to the percentage for this same cohort at ages 54-60:

$$\text{Share of Years Married}_{54-60}^{\text{adj}} = \frac{\text{HRS Cohort Share of Years Married}_{79-89}}{\text{HRS Cohort Share of Years Married}_{54-60}} \quad (1)$$

This ratio is then applied to the reported percentages at ages 54-60 for the younger cohorts. The adjusted share of years married is then used to categorize women into three groups: 1) never married; 2) mostly single (less than 50 percent of adult years married); and 3) mostly married (more than 50 percent of adult years married).

Calculating household wealth

The analysis includes all sources of retirement wealth: 1) Social Security wealth as measured by the expected discounted value of future benefits; 2) wealth in employer-sponsored retirement plans, including both defined contribution and IRA balances and the present discounted value of expected benefits from a defined benefit plan; 3) financial assets less any outstanding debt; and 4) the value of the primary residence less any outstanding mortgage debt. The method for calculating each wealth component is described below.

Social Security. The calculation of Social Security wealth is common in the literature.¹³ The starting point is the individual's annual Social Security benefit, which is a function of Average Indexed Monthly Earnings (AIME) and claiming age. The AIME calculation relies on a link between the publicly available HRS and the restricted SSA earnings data.¹⁴ The annual benefit is calculated from AIME using a legislated formula, assuming that individuals claim at their Full Retirement Age. To convert this annual income stream to a measure of wealth, future benefit flows are adjusted for legislated cost-of-living adjustments and the probability that individuals are still living, and then discounted back to age 60.¹⁵ For married women, household Social Security wealth includes not only individual benefits for both spouses, but also the present discounted value of spousal and survivor benefits, adjusted for the probability of receipt.

Employer-Sponsored Retirement Plans. For both defined benefit (DB) and defined contribution (DC) retirement plans, we follow Gustman et al. (2010) to calculate wealth based on self-reported data. DB wealth is based on estimates of pension income at the participant's expected retirement age. Similar to Social Security, the analysis takes this income stream and calculates the expected present value of lifetime benefits.¹⁶ Respondents who report having a DC plan,

12 Women were eliminated from the sample in cases where the responses on marriage history are missing or inconsistent, such as a marriage starting before a previous one ended.

13 See Fang and Kapinos (2016); Fang, Brown and Weir (2016); and Gustman, Steinmeier, and Tabatabai (2014).

14 For individuals who have yet to reach retirement age, future earnings are projected using a five-year weighted average of their past earnings, rolled forward each year (see Mitchell, Olson and Steinmeier 2000 for a detailed description of the methodology).

15 Assumptions about inflation and real interest rates are drawn from the *Social Security Trustees Report*. Survival probabilities are drawn from SSA life tables by birth year and sex.

16 As in Mitchell and Moore (1997) and Gustman, Steinmeier, and Tabatabai (2010).

such as a 401(k) or 403(b), in either their current job or a previous one are asked for the account balance. DC wealth is simply the total balance of all accounts, plus the balance of any IRA accounts.

Housing Wealth. Housing wealth is defined as the net value of the primary residence, which is calculated as the gross value of the primary residence less any relevant mortgages and home loans. For households where debt exceeds equity, housing wealth is allowed to be negative.

Financial Wealth. Financial wealth includes the net value of stocks, mutual funds, bonds and bond funds; the value of checking, savings, and money market accounts; certificates of deposit; and government savings bonds (excluding holdings of any of these assets in DC plans or IRAs); minus non-housing debt. For households where debt exceeds assets, financial wealth is allowed to be negative.

Calculating replacement rates

The analysis also calculates the replacement rate for each household, which is the ratio of the retirement income that could be generated by the household's resources divided by its pre-retirement income. The numerator of this ratio is estimated by converting wealth totals to annual flows assuming that households purchase an actuarially fair single-life immediate annuity. Although few households voluntarily annuitize wealth, annuities are a proxy for a sustainable withdrawal rate. For the denominator, the analysis takes the average of the highest five years of household earnings before age 55, based on the SSA administrative earnings records.

About the authors

Alicia H. Munnell is the Peter F. Drucker Professor of Management Sciences at Boston College's Carroll School of Management. She also serves as the director of the Center for Retirement Research at Boston College.

Before joining Boston College in 1997, Alicia Munnell was a member of the President's Council of Economic Advisers (1995-1997) and assistant secretary of the Treasury for economic policy (1993-1995). Previously, she spent 20 years at the Federal Reserve Bank of Boston (1973-1993), where she became senior vice president and director of research in 1984. She has published many articles, authored numerous books, and edited several volumes on tax policy, Social Security, public and private pensions, and productivity.

Alicia Munnell was co-founder and first president of the National Academy of Social Insurance and is currently a member of the American Academy of Arts and Sciences, Institute of Medicine, and the Pension Research Council at Wharton. She is a member of the board of The Century Foundation, the National Bureau of Economic Research, and the Pension Rights Center. In 2007, she was awarded the International INA Prize for Insurance Sciences by the Accademia Nazionale dei Lincei in Rome. In 2009, she received the Robert M. Ball Award for Outstanding Achievements in Social Insurance from the National Academy of Social Insurance. In 2015, she chaired the U.S. Social Security Advisory Board's Technical Panel on Assumptions and Methods.

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