



RESEARCH REPORT

The Retirement Outlook for Millennials

What Is the Early Prognosis?

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March 2018

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Acknowledgments

This report was funded by the Social Security Administration through the Retirement Research Consortium. We are grateful to them and to all our funders, who make it possible for Urban to advance its mission.

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The authors gratefully acknowledge valuable comments from Melissa Favreault and Sean Huang and editorial assistance from Rachel Kenney.

Executive Summary

Various policy developments and long-term economic, social, and demographic trends raise worrisome questions about the financial security of future retirees. Changes in retirement programs, such as erosion in employer-sponsored defined benefit pension coverage and the increase in Social Security's full retirement age, could shrink future benefits. Stagnating employment and earnings for men could threaten future retirement security because retirement benefits and the capacity to save for retirement depend on lifetime earnings. The financial crisis, Great Recession, and collapse of the housing market in the late 2000s could significantly disrupt retirement savings.

This report assesses retirement prospects for future generations, with a special focus on late Gen Xers (born in the last half of the 1970s) and millennials (born in the first half of the 1980s). Because retirement outcomes depend on how much people earned and saved when they were younger, much of the analysis compares trends in employment, earnings, pension coverage, and wealth during working ages across birth cohorts, using data from the Current Population Survey and the Survey of Consumer Finances. The analysis also projects age-70 incomes for future generations, accounting for working-age outcomes that have already occurred, using the Urban Institute's Dynamic Simulation of Income Model (DYNASIM4).

Many recent trends threaten retirement security for future generations.

- Men's labor force participation rates continue to decline before age 55, and their median wages have been stagnant for decades.
- Full-time male workers born in the late 1970s and early 1980s were less likely to participate in an employer-sponsored retirement plan than previous cohorts, and their female counterparts were less likely to participate than those born a decade earlier.
- Millennials and late Gen Xers are continuing the trend toward later marriage that began a few generations ago, and the share of people born in the last half of the 1970s and the first half of the 1980s who marry by their forties will likely fall far short of marriage rates for people born in the 1930s. Falling marriage rates threaten retirement security because marriage allows spouses to pool resources, insure against risks, and qualify for spouse and survivor benefits from Social Security.
- People born after 1970 are not accumulating household wealth faster than those born in the 1960s, reversing the generational growth experienced by earlier cohorts.

- The collapse in home prices and the stock market in the late 2000s reduced household wealth for nearly a decade.
- Although median levels of outstanding debt have fallen for the past decade, debt levels remain substantially higher now than they were two decades ago, especially at older ages.
- Millennials and late Gen Xers are much less likely to own a home by their early to mid-thirties than previous generations.

Other trends have been more encouraging, however.

- Millennial and Gen X women worked and earned more in their twenties and thirties than now-retired women did at those ages.
- Over the past two decades, labor force participation at older ages has risen sharply, which allows people to receive higher monthly Social Security benefits, save part of their additional earnings, and shrink the period over which their retirement savings are spread.
- Millennial men and women are much more likely to have a four-year college degree than previous cohorts.
- For all cohorts, household net worth grows rapidly with age, and the millennials and late Gen Xers generally seem to be following the path set by earlier cohorts. At ages 31 to 36, median per capita household net worth was lower for millennials than for those born in the 1960s and early 1970s, but the shortfall was less than \$10,000.
- The late 2000s financial turmoil did not affect millennials much, because they were too young to have accumulated much when prices plummeted.

Our DYNASIM4 estimates combine data from multiple high-quality sources to project how various forces might play out over the next thirty years to shape future retirement incomes. Our projections show that median age-70 income will be higher for Gen Xers and millennials than previous generations, but they face a higher risk of seeing their living standards fall when they retire. Using a measure of retirement income that includes payouts that could be collected from an actuarially fair annuity valued at 80 percent of a retiree's financial assets and retirement accounts, we found that 40 percent of 70-year-olds born between 1976 and 1985 would be unable to replace at least 75 percent of the inflation-adjusted average annual earnings they and their spouse received from ages 50 to 54, assuming average wages grow at the same rate as they did between 1966 and 2015. By comparison, replacement rates at

age 70 would likely fall short of the 75 percent threshold for 32 percent of those born between 1936 and 1945, and for 30 percent of those born between 1956 and 1965.

The Retirement Outlook for Millennials: What Is the Early Prognosis?

Changes in retirement programs and ongoing economic, social, and health care trends raise worrisome questions about the financial security of future retirees. The increase in Social Security's full retirement age will reduce benefits for future retirees, and the system's long-term financing problems could lead to additional benefit cuts in two decades unless Congress addresses the funding shortfall. Private-sector employers have moved away from defined benefit (DB) pensions to defined contribution (DC) retirement plans over the past three decades, shifting much of the responsibility for retirement saving from employers to employees and reducing future retirement benefits for many workers (Morrissey 2016; Munnell 2014). Falling labor supply among middle-aged men (Council of Economic Advisers 2016) and stagnant earnings for lower- and moderate-income men (Mishel 2015) threaten future retirement security because Social Security benefits and the capacity to save for retirement depend on lifetime earnings. Future retirees will need more money than earlier generations as health care costs and indebtedness rise (Hatfield et al. 2018; Karamcheva 2016), and retirement savings must last longer as retirees' life expectancy grows.

The financial crisis, Great Recession, and collapse of the housing market in the late 2000s led to unusually high and long-lasting unemployment, wiping out trillions of dollars of household wealth (Grusky, Western, and Wimer 2011; Smeeding 2012; Wolff 2016). Lost earnings and wealth can derail retirement savings. The recession hit younger workers especially hard. They were more likely to lose their jobs than older workers (Farber 2015), and the economic consequences of a layoff can persist for decades, leading to lower earnings on future jobs (Davis and von Wachter 2011). Moreover, people who graduate from college during a recession often have trouble finding a good job, suppressing their earnings for years (Oreopoulos, von Wachter, and Heisz 2012). Consequently, the Great Recession could significantly disrupt retirement savings for people born in the late 1970s and early 1980s, who were in their twenties at the time. On the other hand, relatively few younger people own a home or hold much wealth, so the collapse in housing and equity prices in the wake of the financial crisis probably did not affect them as much as it affected older people.

Other economic and demographic trends, however, are more encouraging. Women who retire in coming decades will have worked in paid employment longer and earned more than previous

generations (Goldin and Mitchell 2017), thus accumulating more Social Security benefits and retirement savings in their own names. Increases in the national average wage raise Social Security payments for all beneficiaries, even for those with relatively low earnings. Widows are especially likely to be impoverished (Sevak, Weir, and Willis 2003/2004), but the shrinking gender gap in life expectancy (Trovato and Heyen 2006) will reduce future widowhood rates. In addition, people are working longer than previous generations (Johnson and Wang 2017), increasing their lifetime earnings, future Social Security benefits, and capacity to save for retirement.

Given these conflicting trends, it is not surprising that there is no consensus about how future generations will likely fare in retirement. Several studies warn of a looming retirement crisis, predicting that in coming decades many older adults will live in or near poverty, and a majority will be unable to maintain their preretirement living standards (Munnell, Hou, and Webb 2014; Rhee 2013). Other studies are more sanguine, concluding that most people are saving adequately and that economic growth will boost future retirement incomes (Biggs and Schieber 2014; Butrica, Smith, and Iams 2012; Scholz, Seshadri, and Khitatrakun 2006).

This report used household survey data from the past five decades and a dynamic microsimulation model to assess retirement prospects for future generations, with a special focus on the late Gen X and millennial generations. Because retirement outcomes depend on how much people earned and saved when they were younger, much of our analysis compared trends in employment, earnings, pension coverage, and wealth during working ages across cohorts. We projected future incomes at age 70, accounting for working-age outcomes that have already occurred. The analysis focused on outcomes for adults born between 1976 and 1980, labeled late Gen Xers, and adults born between 1981 and 1990, the early millennials. We excluded from our analysis millennials born after 1990, because their labor market experience is too thin to draw firm conclusions about their long-term earnings potential and capacity to save for retirement. We compared outcomes for these cohorts to those born earlier, including pre-boomers (born before 1946), early boomers (born between 1946 and 1955), and late boomers (born between 1956 and 1965).

Our results suggest retirement security for late Gen Xers and millennials will be shaped by many of the same forces that are already beginning to buffet the financial security of current retirees, including the erosion of DB pension plans and rising debt levels. So far, outcomes for millennials are not dramatically worse than those for previous recent cohorts, although the steady generational improvement in economic status that defined American society in the mid-twentieth century appears to have ended, at least for now. Men's labor force participation rates continue to decline before age 55, and their median wage remains stagnant. Gen X and millennial women are earning more than the

boomers did, but millennials are not earning more than Gen Xers. People born after 1970 are not accumulating household wealth any faster than those born in the 1960s, reversing the generational growth experienced by earlier cohorts, and millennials are less likely to own a home than earlier generations. The collapse in home prices and the stock market in the late 2000s reduced household wealth for nearly a decade. However, the financial turmoil did not affect millennials much, because they were too young to have accumulated much when prices plummeted. The most encouraging development for millennials is the growth in college graduation rates, which raises their future earnings potential.

Our projections show that median age-70 income will be higher for Gen Xers and millennials than previous generations, but a greater share may experience falling living standards when they stop working. Using a measure of retirement income that includes payouts that could be collected from an actuarially fair annuity valued at 80 percent of a retiree's financial assets and retirement accounts, we found that 40 percent of 70-year-olds born between 1976 and 1985 would be unable to replace at least 75 percent of the inflation-adjusted average annual earnings they and their spouse received from ages 50 to 54, under the assumption that average wages grow at the same rate as they did between 1966 and 2015. By comparison, replacement rates at age 70 would likely fall short of the 75 percent threshold for 32 percent of those born between 1936 and 1945 and for 30 percent of those born between 1956 and 1965.

Data and Methods

To assess retirement prospects for people born in the 1980s and late 1970s, we compared employment, earnings, pension coverage, and household wealth at younger ages for several generations, using household survey data. We also compared projections of retirement incomes for different birth cohorts, generated by our dynamic microsimulation model. The analysis computed outcomes at the individual level and reported all financial amounts in constant 2017 dollars, adjusted by the change in the consumer price index.¹

Measuring Recent Economic Trends before Retirement

We used household survey data spanning several decades from the Current Population Survey's (CPS) Annual Social and Economic (ASEC) supplement and the Survey of Consumer Finances (SCF) to examine

long-term trends in demographic and economic outcomes. Although the surveys do not follow the same people or households over time, we created synthetic birth cohorts by combining information from interviews completed in various years by respondents born in the same period. We then compared aggregate outcomes across cohorts at various ages. When comparing outcomes across cohorts, however, we must recognize the sometimes-substantial differences in macroeconomic conditions, such as the unemployment rate and average asset prices, that confronted each generation at particular ages. For example, high unemployment rates and slow wage growth during and immediately after the Great Recession and the collapse in housing and equity values in 2007 and 2008 complicate cohort analysis.

The CPS, conducted by the US Census Bureau for the Bureau of Labor Statistics, is a monthly survey of about 60,000 households that collects demographic and employment data. Every March the ASEC collects additional information from CPS respondents on income received during the previous year, employer-sponsored retirement plans during the previous year, and homeownership. With CPS/ASEC data from 1966, 1971, 1976, 1981, 1986, 1991, 1996, 2001, 2006, 2011, and 2016, we created synthetic five-year cohorts for the birth years 1931 to 1935 through 1986 to 1990. Members of our youngest cohort were ages 26 to 30 in 2016, and members of our oldest cohort were ages 31 to 35 in 1966 and ages 81 to 85 in 2016. We accessed CPS data through the Integrated Public Use Microdata Series (Ruggles et al. 2015).

We used CPS/ASEC data to examine trends in educational attainment, labor force participation, full-time employment, marriage rates, homeownership rates, and, for full-time workers, median earnings and participation rates in employer-sponsored retirement plans. Full-time employment, earnings, and pension coverage data in the CPS/ASEC refer to outcomes in the previous year, so our cohorts are one year younger for those comparisons. We defined full-time employment as working at least 35 hours per week. Data on homeownership were not available before 1976 and data on employment-based retirement plans were not available before 1980. When computing homeownership rates, we counted only household heads and their spouses as homeowners if the owner occupied the home; other people living in an owner-occupied home were classified as nonhomeowners. The analysis generally examined outcomes separately for men and women. Results are reported graphically in the body of the report, but the figures exclude certain cohorts to improve readability. Appendix tables report results for all cohorts.

We used data from the SCF to examine trends in household wealth levels. The SCF is a national, cross-sectional survey of US families that began in 1983. Sponsored by the Federal Reserve Board and conducted by NORC at the University of Chicago since 1992, the SCF is widely regarded as the premier data source on household wealth (Czajka, Jacobson, and Cody 2003). Every three years, it interviews

between 4,500 and 6,500 families covering all economic groups. Sampling began with a geographically based random sample, which was then supplemented with a sample of disproportionately wealthy families to reflect ownership of certain assets. Our sample included only household heads and their spouses, if married. For married people, we divided reported household wealth by two. Following the approach we used with the CPS/ASEC, we grouped respondents into six-year birth cohorts—from the 1926 to 1931 cohort through the 1980 to 1985 cohort—and measured their wealth every six years, in 1992, 1998, 2004, 2010, and 2016, the most recent year available when we conducted our analysis. This approach allowed us to compare household wealth at the same age for people born in different years. Members of our youngest SCF cohort were ages 31 to 36 in 2016, and members of our oldest cohort were ages 61 to 66 in 1992 and ages 85 to 90 in 2016. Before turning to our cohort analysis, we first computed household wealth and its components every three years from 1989 to 2016, to understand overall trends in household wealth and how they responded to the business cycle and changes in average asset prices.

Because our SCF analysis included only household heads and their spouses, it excluded young adults who were still living with their parents. Consequently, our SCF sample of younger adults might include a disproportionate share of relatively successful people who have already started their own households, biasing our wealth estimates upwards, because people who recently entered adulthood are leaving home and starting their own households later than previous generations (Furlong 2016; Lee and Painter 2013).

The financial measures we examined were total net worth, retirement account balances, financial wealth (including retirement account balances), home equity, and debt. Retirement account balances included the value of individual retirement accounts (IRAs), Keogh accounts, and employer-sponsored retirement accounts, such as 401(k) plans. Financial wealth consisted of retirement account balances plus financial assets held outside of retirement accounts, including the value of bank accounts, certificates of deposit, annuities, trusts, stocks, bonds, mutual funds, and the cash value of life insurance. We measured home equity as the value of a primary residence, minus any outstanding housing debt, such as outstanding mortgages and home equity loans. Debt included outstanding housing debt, installment loans, credit card balances, and any other debt held by a household. Total net worth equaled the sum of financial wealth, home equity, and other nonfinancial wealth (which included the value of vehicles, business interests, real estate except for a primary home, and other real assets), minus nonhousing debt.

Projecting Retirement Outcomes

To project future retirement income, we used the Urban Institute’s Dynamic Simulation of Income Model (DYNASIM4), a dynamic microsimulation model designed to analyze the long-run distributional consequences of retirement and aging issues. The model starts with a representative sample of individuals and families from the 2004 and 2008 Survey of Income and Program Participation (SIPP) and ages them year by year, simulating key demographic, economic, and health events. For example, DYNASIM4 projects that, each year, some people in the sample get married, have a child, or find a job. The model projects that other people become divorced or widowed, stop working, begin collecting Social Security, become disabled, or die. These transitions are based on probabilities generated by carefully calibrated equations estimated from nationally representative household survey data. The equations account for differences by sex, education, earnings, and other characteristics in the likelihood of various experiences. Other equations in DYNASIM4 project annual earnings, savings, and home values. The model uses program rules—combined with projections of lifetime earnings, disability status, and household income and wealth—to project Social Security retirement and disability benefits and Medicaid coverage. For consistency with Social Security’s projections about system finances, we generally use the same assumptions as the Social Security and Medicare trustees. The appendix describes in more detail how DYNASIM4 projects economic outcomes. For more information about DYNASIM4 and an earlier version of the model, see Urban Institute (2015) and Favreault, Smith, and Johnson (2015).

Using DYNASIM4, we projected outcomes for five 10-year birth cohorts: 1936 to 1945 (pre-boomers), 1946 to 1955 (early boomers), 1956 to 1965 (late boomers), 1966 to 1975 (Gen X), and 1976 to 1985 (late Gen X, early millennials). The analysis compared inflation-adjusted income levels and retirement replacement rates at age 70. We focused on incomes at age 70 because most people have stopped working by then. Replacement rates were computed by dividing age-70 income by average annual earnings received from ages 50 to 54, both expressed in inflation-adjusted dollars. We divided family income by two for married adults to create a per capita measure.

We compared two measures of median annual per capita family income at age 70. The traditional income measure counted cash income (earnings, Social Security, DB pensions, Supplemental Security Income, interest, dividends, and rent), plus money withdrawn from retirement accounts (based on historic withdrawal trends and required minimum distributions). The alternative total potential income measure accounted for the shift away from DB pensions to DC retirement accounts by adding to cash income the income stream that retirees would receive if they annuitized 80 percent of their retirement accounts and other financial assets under actuarially fair terms. Because relatively few retirees

annuitize their assets and many do not spend much of their wealth (Lockwood 2012; Smith, Soto, and Penner 2009), we examined both income measures. Each measure used Social Security benefits scheduled under current law, even though Social Security projects that it will be able to finance those benefits under existing revenue forecasts only until 2034 (Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds 2017), before late Gen Xers and millennials reach age 70.

Future retirement income for late Gen Xers and millennials depends on how fast average wages grow over the next three or four decades. The Social Security trustees assume that real wages grow 1.2 percent per year in the long term (Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds 2017), much faster than actual growth over the past half century. Real annual wage growth averaged 0.81 percent between 1966 and 2015 and only 0.70 percent between 1973 and 2015, which excluded the high-growth period from 1966 to 1973. Because of the uncertainty surrounding future wage growth, we projected retirement income under three scenarios—a high wage-growth scenario that assumed real wages grow 1.2 percent per year, a moderate wage-growth scenario that assumed real wages grow 0.81 percent per year, and a low wage-growth scenario that assumed real wages grow 0.70 percent per year.

Results

We first report cohort comparisons for preretirement outcomes, based on historical data from the ASEC/CPS and SCF. We then report retirement income projections from DYNASIM4.

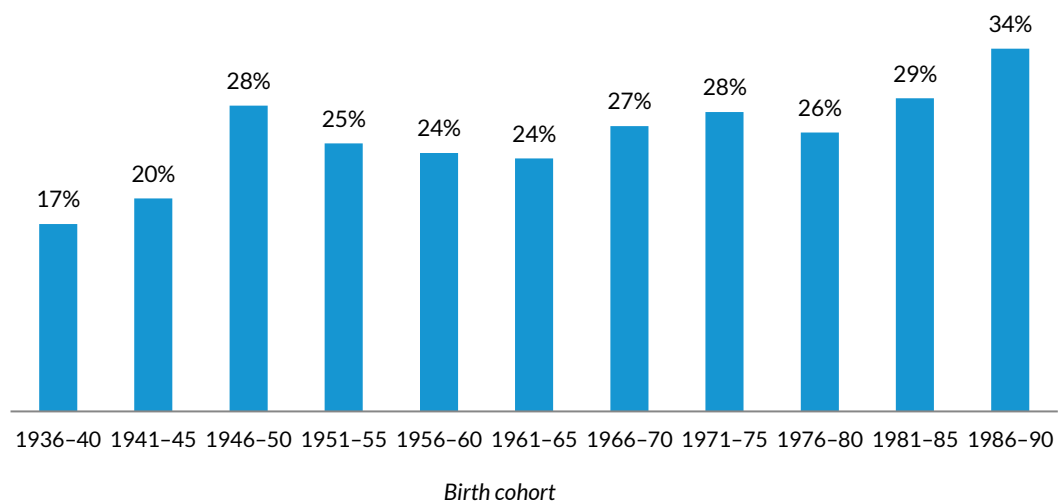
Education

Men's educational attainment surged with the early baby boomers and then tapered off for men born in the 1950s and 1960s. Among men ages 26 to 30, 28 percent of those born between 1946 and 1950 had a four-year college degree, compared with 20 percent of those born five years earlier, 17 percent for those born 10 years earlier, and 24 percent for those born 10 years later (figure 1). The Vietnam War draft, which men could avoid with an educational deferment, appears responsible for the surge in college attendance for men in the 1946 to 1950 birth cohort, who were 20 years old in the late 1960s (Card and Lemieux 2001). For men born between 1951 and 1980, the share with a four-year college degree fluctuated between 24 percent and 28 percent. However, the share edged up to 29 percent for

the early millennials, born between 1981 and 1985, and surged to 34 percent for those born between 1986 and 1990, who were in their early 20s during and immediately after the Great Recession and likely pursued higher education because employment prospects were bleak (Mordechay 2017). It remains to be seen whether the recent educational surge for men will persist now that the job market has improved.

FIGURE 1

Percentage of Men Ages 26 to 30 with a Four-Year College Degree by Birth Cohort

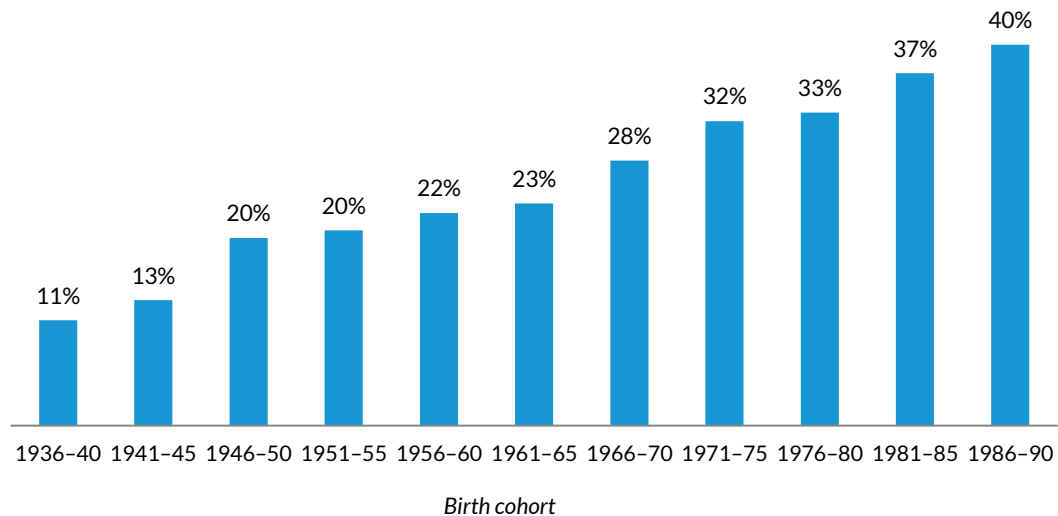


Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Educational attainment for women has improved steadily over the past 50 years (figure 2). The share of women ages 26 to 30 with a four-year college degree increased from 11 percent for those born between 1936 and 1940 to 20 percent for those born between 1946 and 1950 (the early baby boomers) to 33 percent for those born between 1976 and 1980 (the late Gen Xers). This trend continued, and even accelerated, among millennials, with 40 percent of women born between 1986 and 1990 having completed college by ages 26 to 30. Since the 1961 to 1965 birth cohort, women have been more likely than men to hold a four-year college degree. Millennials' high level of educational attainment bodes well for their future earnings and retirement security.

FIGURE 2

Percentage of Women Ages 26 to 30 with a Four-Year College Degree by Birth Cohort



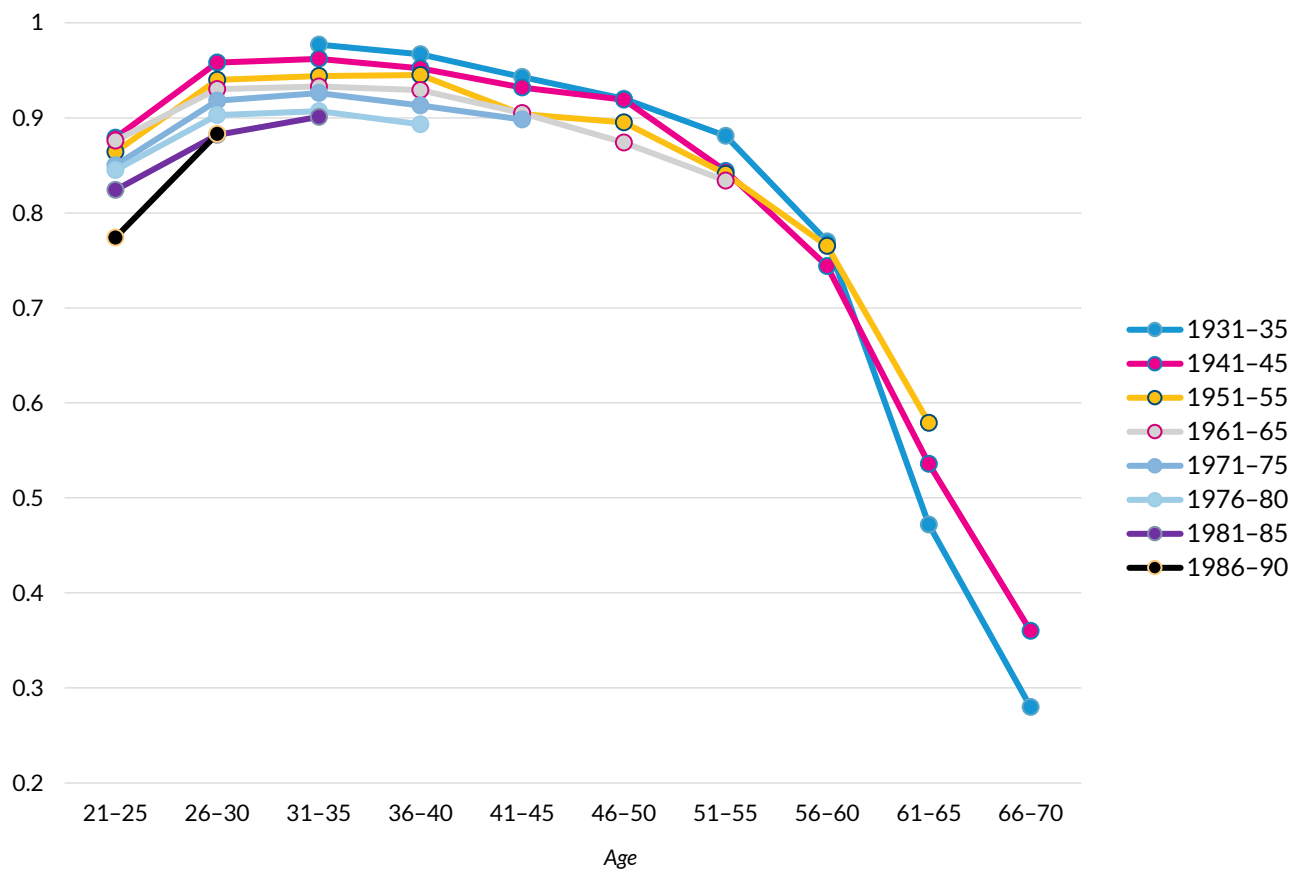
Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Labor Force Participation

Millennial men were less likely to participate in the labor force in their 20s and early 30s than previous cohorts (figure 3). At ages 26 to 30, 88 percent of men born between 1986 and 1990 participated in the labor force, compared with 90 percent in the 1976 to 1980 birth cohort, 93 percent in the 1961 to 1965 cohort, and 96 percent in the 1941 to 1945 cohort. Participation rates at ages 21 to 25 were especially low for millennial men born between 1986 and 1990, with only 77 percent participating in the labor force. The low participation rates for millennials may simply reflect the high unemployment rates that existed early in their careers and discouraged them from looking for work, or they may have been related to their high college attendance rates (which may have also resulted from the poor job market). Millennial men's participation rates may be catching up to those of earlier recent cohorts; at ages 31 to 35, men born between 1981 and 1985 were just about as likely to participate in the labor force as those born five years earlier. However, men born in the late 1970s were less likely to participate in the labor force than earlier cohorts, so the fact that millennial men are catching up to them may not be particularly encouraging.

FIGURE 3

Men's Labor Force Participation Rates, by Age and Birth Cohort



Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Notes: The labor force participation rate is the share of the civilian noninstitutionalized population that is working or looking for work. The vertical axis does not begin at zero. Appendix table B.1 provides additional data.

A more worrisome trend for future retirement security is the long-term decline in labor supply among men in their forties and fifties. At ages 41 to 45, for example, male labor force participation rates fell from 93 percent for the 1941 to 1945 birth cohort to 90 percent for the 1971 to 1975 birth cohort. This decline has been concentrated among men with no more than a high school education, perhaps because technological change and increased globalization reduced employer demand for low- and middle-skilled workers (Aaronson et al. 2014; Beaudry, Green, and Sand 2016; Council of Economic Advisers 2016; Juhn et al. 1991; Juhn and Potter 2006). Rising receipt of Social Security Disability Insurance benefits and the growing opioid epidemic may also affect the growth of male labor force dropouts (Autor et al. 2016; Autor and Duggan 2003; Bound and Burkhauser 1999; French and Song 2014; Krueger 2017). As average educational attainment rises, the increasing selectivity of those who fail to complete high school may also contribute to growing educational disparities in employment.

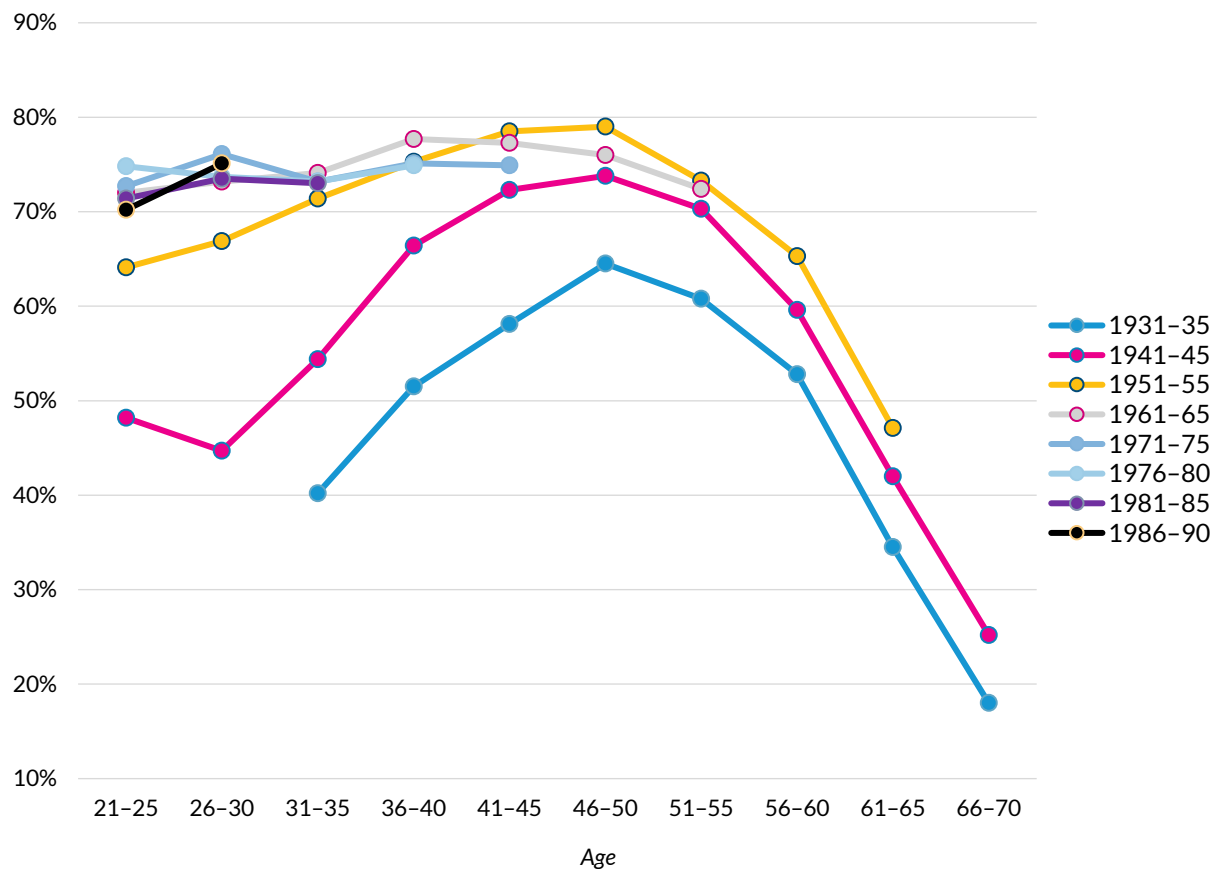
An encouraging sign for retirement security is the recent increase in labor force participation among older men. Men born between 1951 and 1955 were 11 percentage points more likely to participate in the labor force at ages 61 to 65 than those born 20 years earlier. This recent surge reflects higher educational levels among older adults, changes in Social Security rules that increased work incentives, and erosion in DB pension and retiree health insurance coverage from private-sector employers (Friedberg and Webb 2005; Gustman and Steinmeier 2015; Johnson, Davidoff, and Perese 2003; Mermin, Johnson, and Murphy 2007; Song and Manchester 2007).

Working longer can significantly improve the lives of older adults. Extending the work life and delaying retirement benefit take-up can bolster financial security at older ages (Maestas and Zissimopoulos 2010), because adults who work longer can receive higher monthly Social Security benefits, accumulate more employer-sponsored pensions, save part of their additional earnings, and shrink the period over which their retirement savings are spread. Butrica, Smith, and Steuerle (2006) show that average annual retirement incomes rise 9 percent when older adults work an additional year and 56 percent when they work an additional five years. Working longer might also improve health and happiness at older ages by keeping people physically and mentally active, allowing them to maintain social networks and giving purpose to their lives (Calvo 2006). However, employment gains after age 65 have been concentrated among college graduates (Johnson and Wang 2017).

Millennial women's labor force participation rates have not fallen as far behind the participation rates of previous cohorts as they have for their male counterparts (figure 4). At ages 26 to 30, female participation rates were 74 percent for the 1981 to 1985 cohort and 75 percent for the 1986 to 1990 cohort, compared with 76 percent for the 1971 to 1975 cohort. Although the Great Recession appears to have reduced millennial women's labor force participation rates, the downward pressure created by the weak economy was somewhat offset by the long-term generational increase in women's labor supply. Among women ages 31 to 35, for example, those in the 1981 to 1985 cohort were more likely to participate in the labor force than women born before 1956. As other studies have noted, however, generational gains in women's labor force participation have slowed over the past two decades (Blau and Kahn 2007). Across generations, female labor supply tends to dip when women move through their thirties, as they work less when raising children, but there is no evidence that women have become more likely over the past two decades to leave the labor force to raise children (Goldin and Mitchell 2017). Women, like men, are also lengthening their careers, working more at older ages than earlier generations (Goldin and Katz 2016).

FIGURE 4

Women's Labor Force Participation Rates, by Age and Birth Cohort



Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

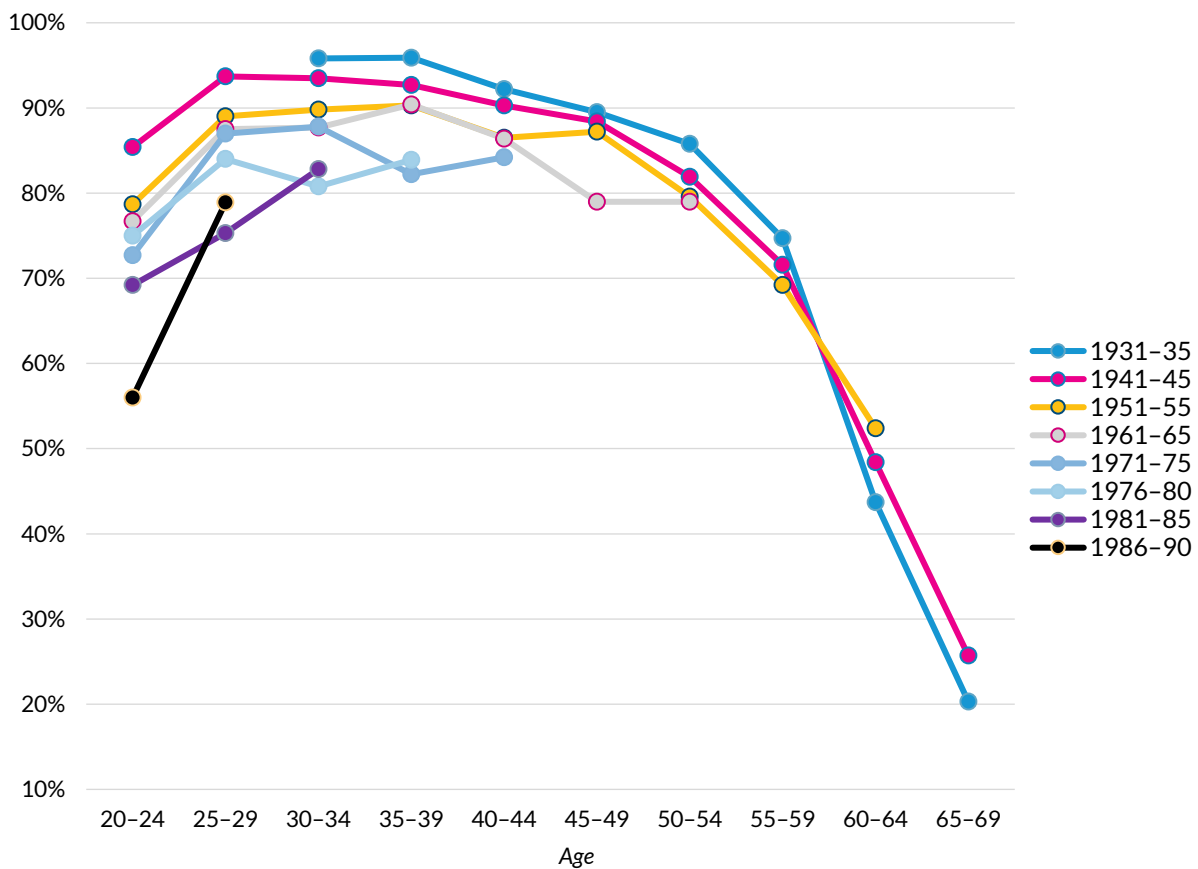
Notes: The labor force participation rate is the share of the civilian noninstitutionalized population that is working or looking for work. The vertical axis does not begin at zero. Appendix table B.2 provides additional data.

Full-Time Employment

The percentage of young men working full time has fallen sharply over the past decade (figure 5). At ages 25 to 29, 79 percent of men in the 1986 to 1990 birth cohort were employed full time, down 5 percentage points relative to those born 10 years earlier and down 9 percentage points relative to those born 25 years earlier. Full-time employment has also been slowly declining at middle age, following the pattern we observed for men's labor force participation. At ages 45 to 49, men born between 1966 and 1970 were 6 percentage points less likely to work full time than men born between 1946 and 1950. However, full-time employment rates at older ages (after age 60) increased over the past two decades.

FIGURE 5

Men's Full-Time Employment Rates by Age and Birth Cohort



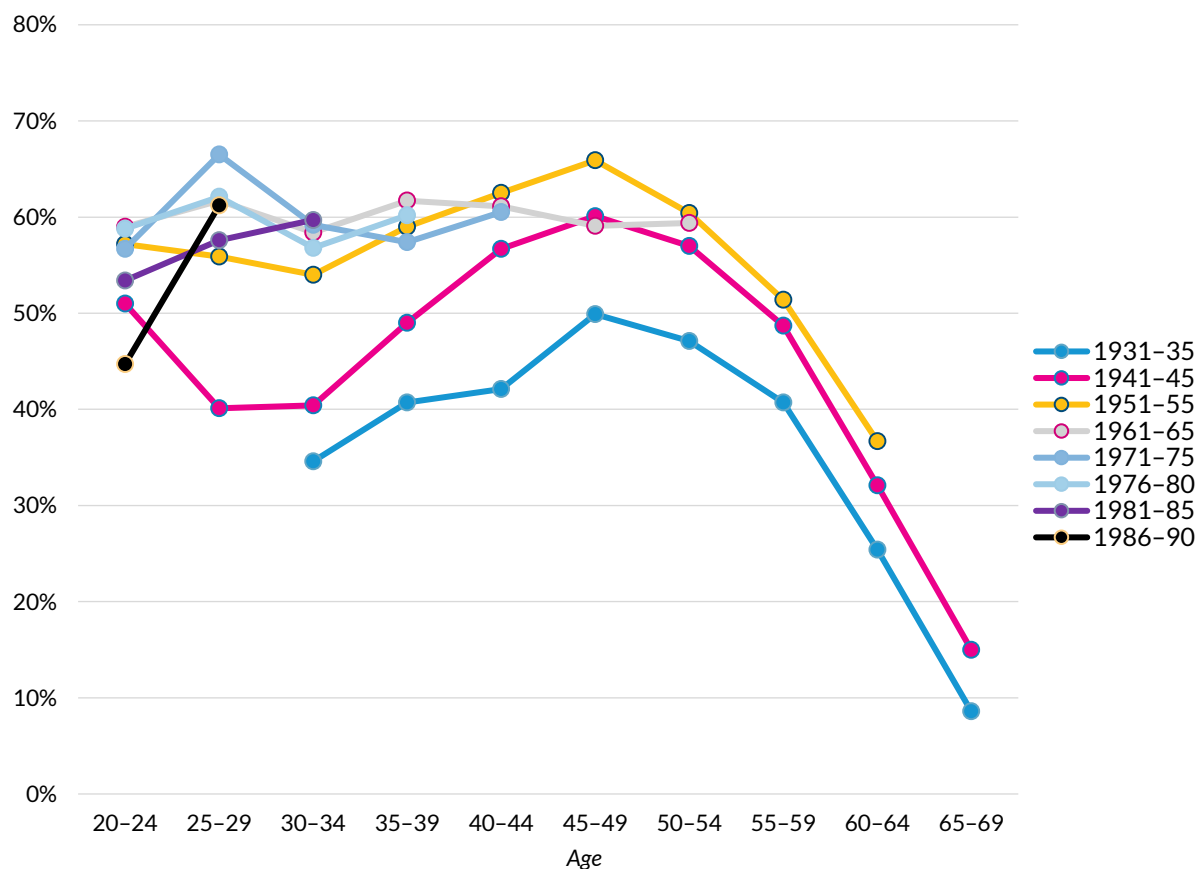
Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Notes: The figure shows the percentage of civilian noninstitutionalized men working at least 35 hours per week. The vertical axis does not begin at zero. Appendix table B.3 provides additional data.

Full-time employment rates for women in their early thirties increased steadily for 30 years, from those born in the first half of the 1930s through those born in the second half of the 1960s (figure 6). Since then, full-time employment rates have generally stabilized at about 60 percent (although rates dipped for most ages in 2011, when unemployment rates were high). So far, full-time employment rates for millennial women is similar to full-time employment rates for recent earlier cohorts and higher than the rates for cohorts born before 1955. As with older men, full-time employment for older women has increased over the past 20 years.

FIGURE 6

Women's Full-Time Employment Rates by Age and Birth Cohort



Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Notes: The figure shows the percentage of civilian noninstitutionalized women working at least 35 hours per week. Appendix table B.4 provides additional data.

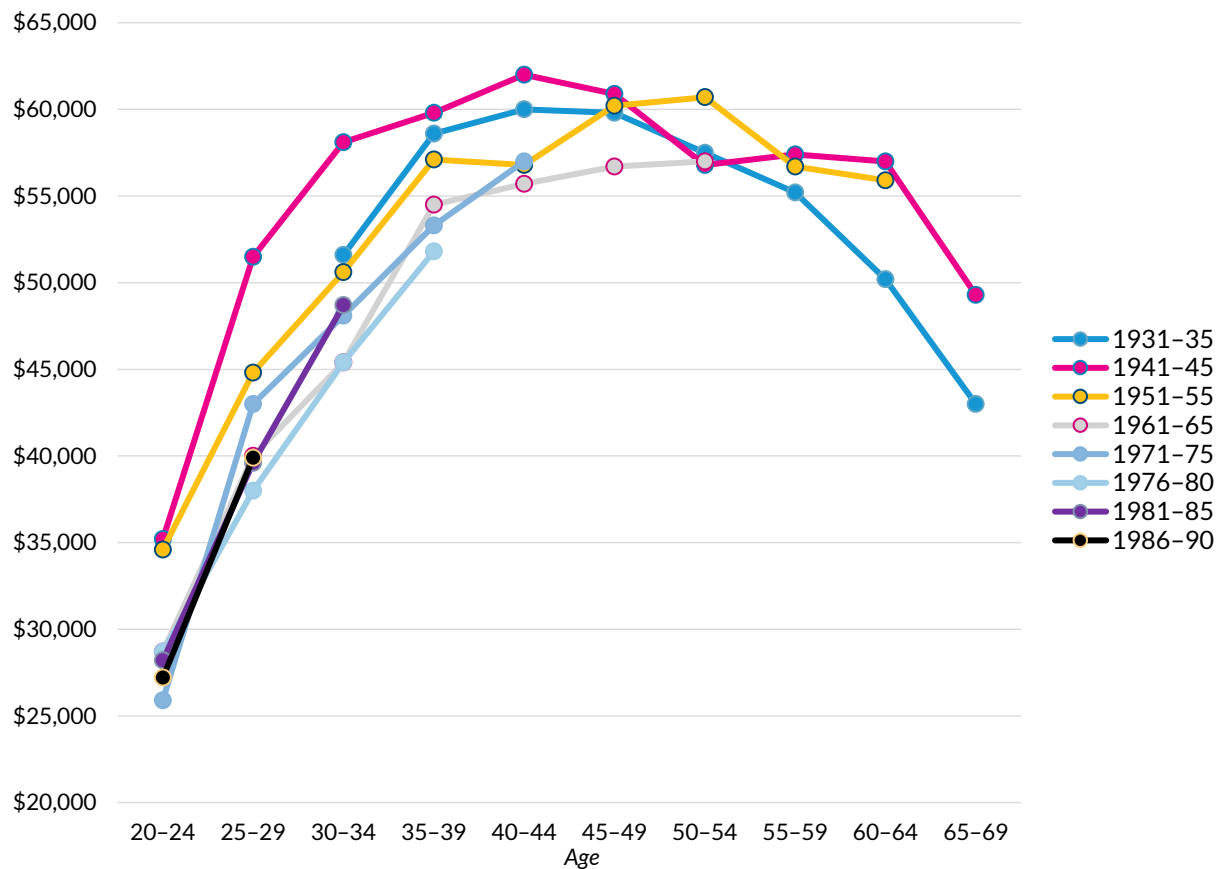
Earnings

Although millennial men have generally earned less than men born 30 or more years earlier, their earnings so far have been roughly comparable to those in recent cohorts (figure 7). Among men ages 25 to 29 employed full time, median annual earnings were \$39,900 (in inflation-adjusted 2017 dollars) for the 1986 to 1990 birth cohort, about 5 percent higher than the median for the 1976 to 1980 cohort and the 1966 to 1970 cohort and 7 percent lower than the median for the 1971 to 1975 cohort. However, median inflation-adjusted annual earnings at ages 25 to 29 were 29 percent higher for full-time male workers born between 1941 and 1945 than those born between 1986 and 1990.

FIGURE 7

Median Earnings for Full-Time Male Workers by Age and Birth Cohort

Constant 2017 dollars



Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Notes: The vertical axis does not begin at zero. Appendix table B.5 provides additional data.

The recent stagnation in median earnings reflects deteriorating labor market prospects for low- and middle-skilled men. Technological advancements, increasing globalization, and declining union membership have increased earnings for men in the top quarter of the earnings distribution, as earnings in the bottom half of the distribution fell or remained flat (Gottschalk and Danziger 2005; Holzer and Hlavec 2012; Kopczuk, Saez, and Song 2007; Mishel 2015; Rose 2016). Rising health care costs have also increased the share of compensation going to fringe benefits, suppressing growth in cash earnings (Burtless and Milusheva 2012).

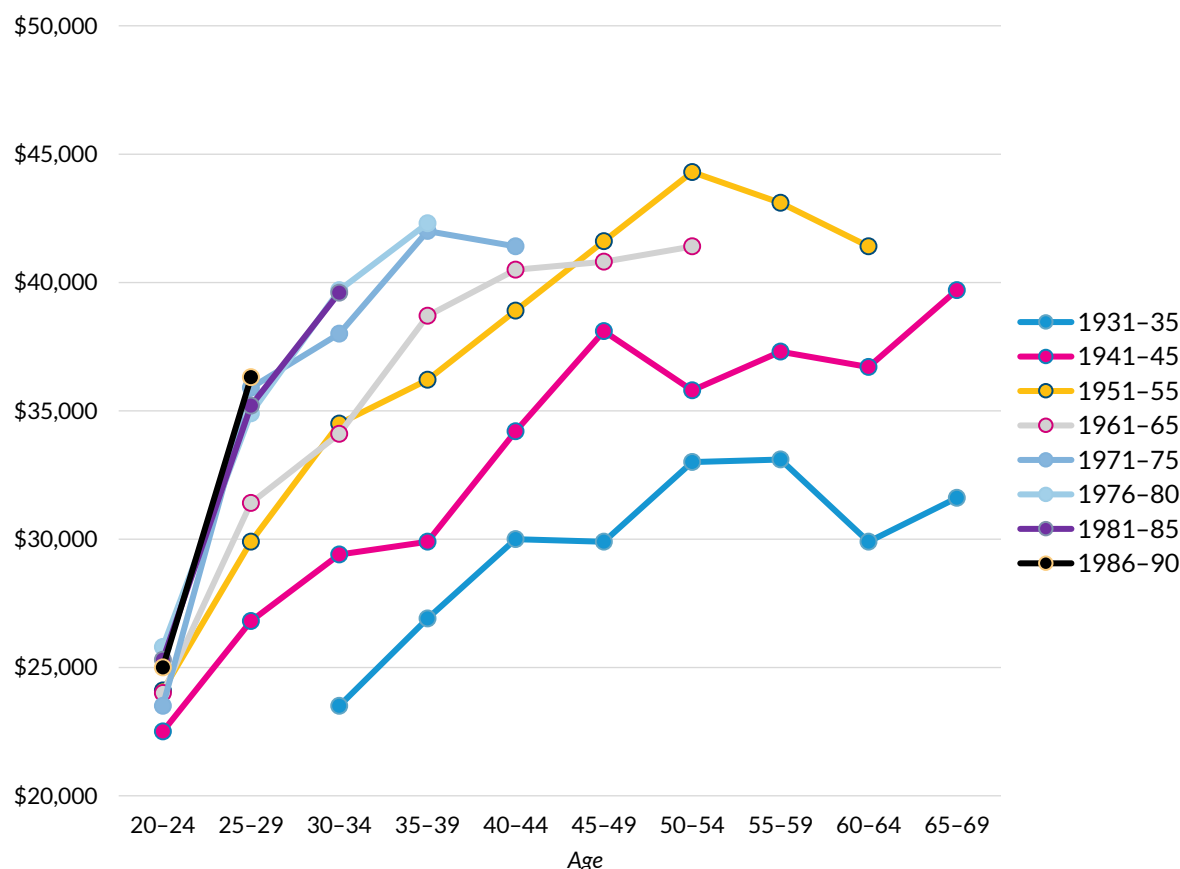
Millennial women, by contrast, are generally earning more than previous cohorts of women employed full time (figure 8). Median inflation-adjusted annual earnings for full-time workers ages 25 to 29 were higher for the 1986 to 1990 cohort than for any other cohort going back to 1936. Similarly,

median inflation-adjusted annual earnings for full-time female workers ages 30 to 34 were higher for the 1981 to 1985 cohort than any other cohort we observed except for the 1976 to 1980 cohort, which was only \$100 higher. The evidence indicates that the long-term growth in women's earnings has continued through the millennial generation, although it has slowed substantially.

FIGURE 8

Median Earnings for Full-Time Female Workers by Age and Birth Cohort

Constant 2017 dollars



Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Notes: The vertical axis does not begin at zero. Appendix table B.6 provides additional data.

Employer-Sponsored Retirement Plan Coverage

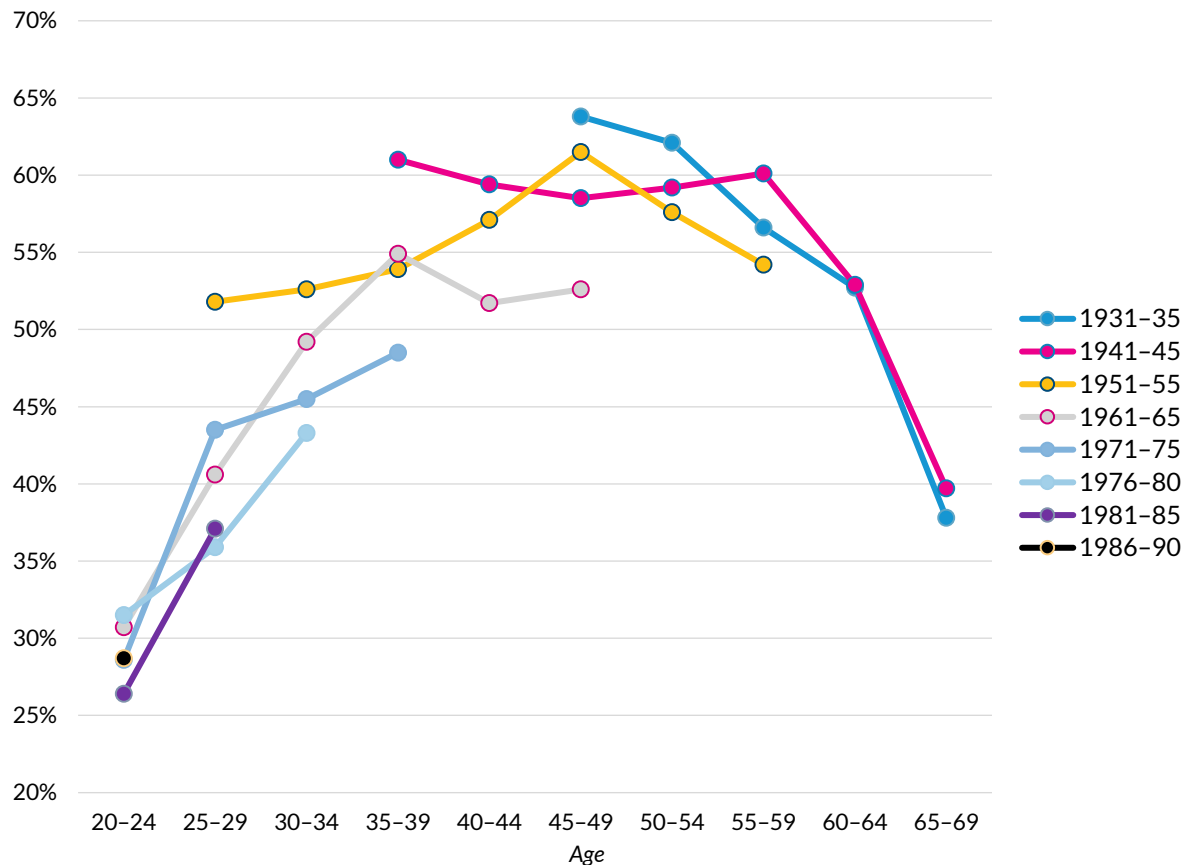
The share of full-time workers in the CPS/ASEC reporting employer-sponsored retirement plan coverage fell sharply across all age groups in 2016 relative to previous years. Between 2011 and 2016, retirement plan coverage rates for the 1976 to 1980 cohort declined 5 percentage points for men

employed full time (appendix table B.7) and 8 percentage points for women employed full time (appendix table B.8).² However, these declines seem to indicate a problem with the recent CPS/ASEC retirement plan data. The survey questionnaire related to pensions was redesigned in 2014, and comparisons of coverage rates using the old survey instrument and the new survey instrument show that rates were much lower after the redesign (Copeland 2016). Moreover, coverage rates reported by the Bureau of Labor Statistics' National Compensation Survey did not decline after 2014.

Because of the apparent problems with the survey redesign, we restricted the sample to data from 1981 to 2011 and reran the tabulations. Participation rates in employer-sponsored retirement plans among full-time male employees generally fell with each successive cohort (figure 9). For the 1951 to 1955 cohort, coverage rates peaked at ages 45 to 49 at 62 percent. Among those born 10 years later, only 53 percent had coverage at that age. The decline in unionization and the growth in service industries, where retirement plan coverage is less common than in goods-producing industries, appear at least partly responsible for falling coverage rates (Costo 2006; Wiatrowski 2004). However, coverage rates seem to be dropping more slowly for people born between 1976 and 1990 than for previous cohorts. At ages 25 to 29, full-time male employees born between 1981 and 1985 have about the same coverage rate as those born between 1976 and 1980.

FIGURE 9

Percentage of Full-Time Male Workers Participating in an Employer-Sponsored Retirement Plan
By age and birth cohort

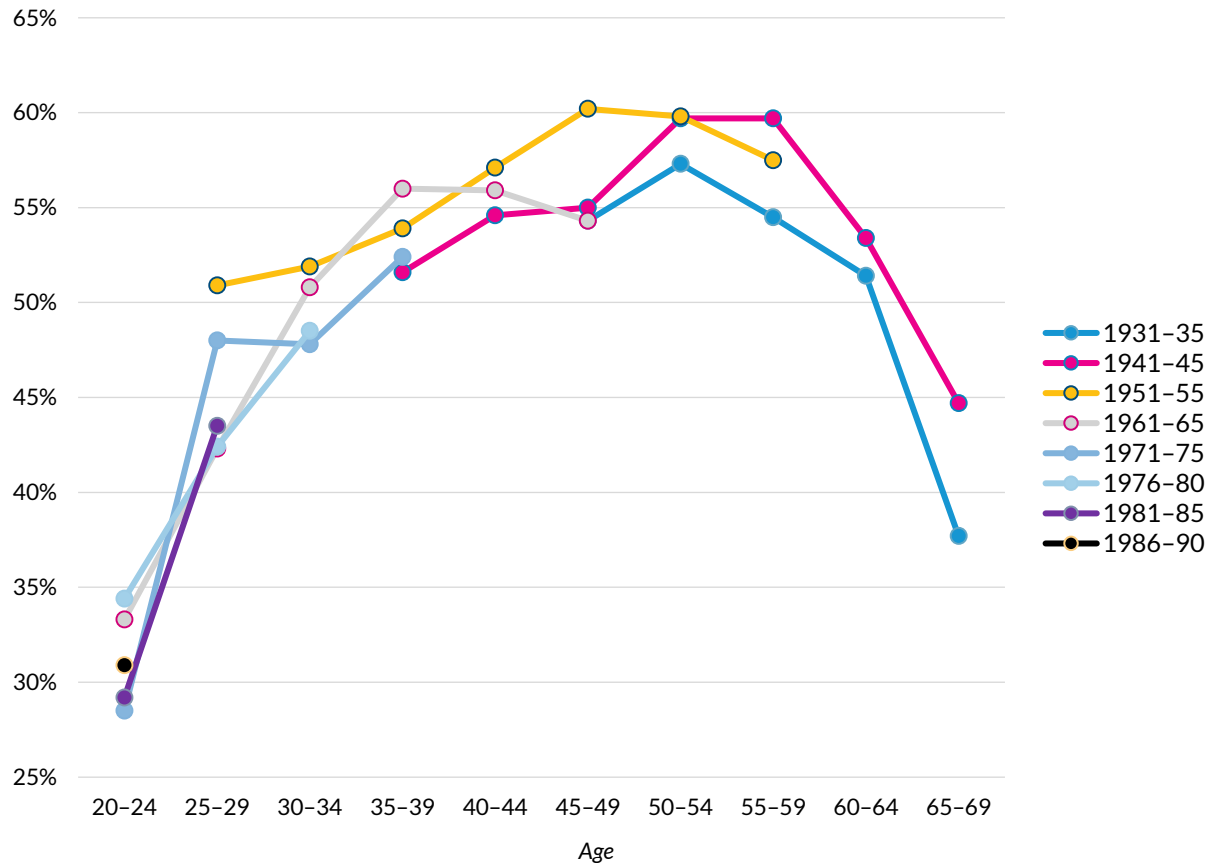


Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2011.
Notes: The figure excludes 2016 data because the survey appears to have underestimated retirement plan coverage since 2014. The vertical axis does not begin at zero. Appendix table B.7 provides additional data.

Retirement plan coverage has also dipped for women working full time, but not as dramatically (figure 10). For older cohorts, coverage among full-time employees did not differ much by sex. At ages 45 to 49, female coverage rates peaked at 60 percent for the 1951 to 1955 cohort and fell to 54 percent for those born 10 years later. For more recent cohorts, women working full time had higher retirement plan coverage rates than their male counterparts. At ages 25 to 29, women in the 1976 to 1980 cohort and the 1981 to 1985 cohort who worked full time were about as likely to participate in an employer-sponsored retirement plan as their late boomer counterparts born between 1961 and 1965.

FIGURE 10

Percentage of Full-Time Female Workers Participating in an Employer-Sponsored Retirement Plan
By age and birth cohort



Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2011.

Notes: The figure excludes 2016 data because the survey appears to have underestimated retirement plan coverage since 2014. The vertical axis does not begin at zero. Appendix table B.8 provides additional data.

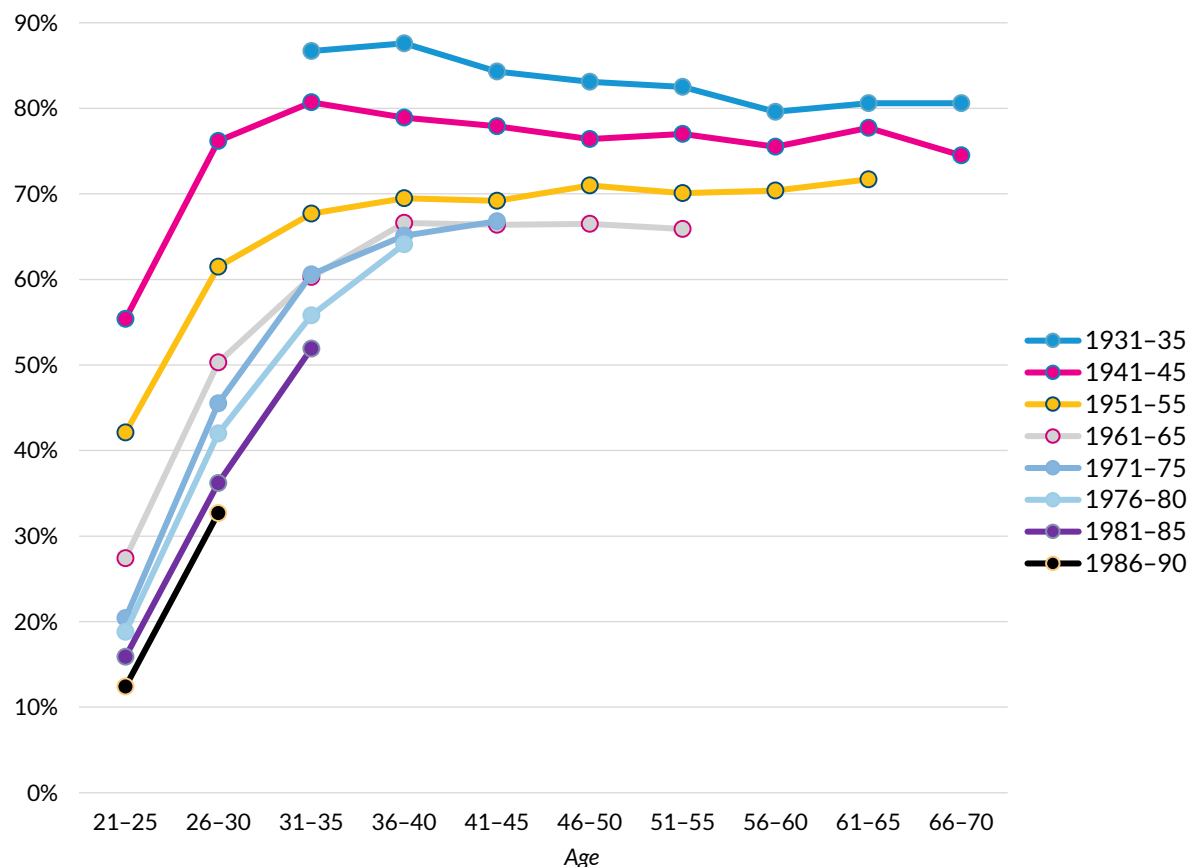
Marriage

Marriage is an important source of retirement security, because it allows spouses to pool resources, insure against risks, and qualify for spouse and survivor benefits from Social Security (and from employer pensions if they have them). However, the institution of marriage has been eroding for decades for both men and women (Cherlin 2010). For men, each successive cohort has increasingly postponed marriage, and marriage rates for earlier cohorts have plateaued in middle age at successively lower levels (figure 11). At ages 51 to 55, 66 percent of men in the 1961 to 1965 cohort were married,

compared with 77 percent of men born 20 years earlier. An encouraging sign is that marriage rates are no longer falling for men in their late 30s. At ages 36 to 40, men in the 1976 to 1980 birth cohort are just about as likely to be married as those born 5 or 10 years earlier. Marriage rates for men born between 1976 and 1990 have been increasing rapidly as they move through their 20s and early 30s, suggesting that men are still delaying marriage, but that the likelihood that they will ever marry is no longer dropping.

FIGURE 11

Percentage of Men Married by Age and Cohort



Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2011.

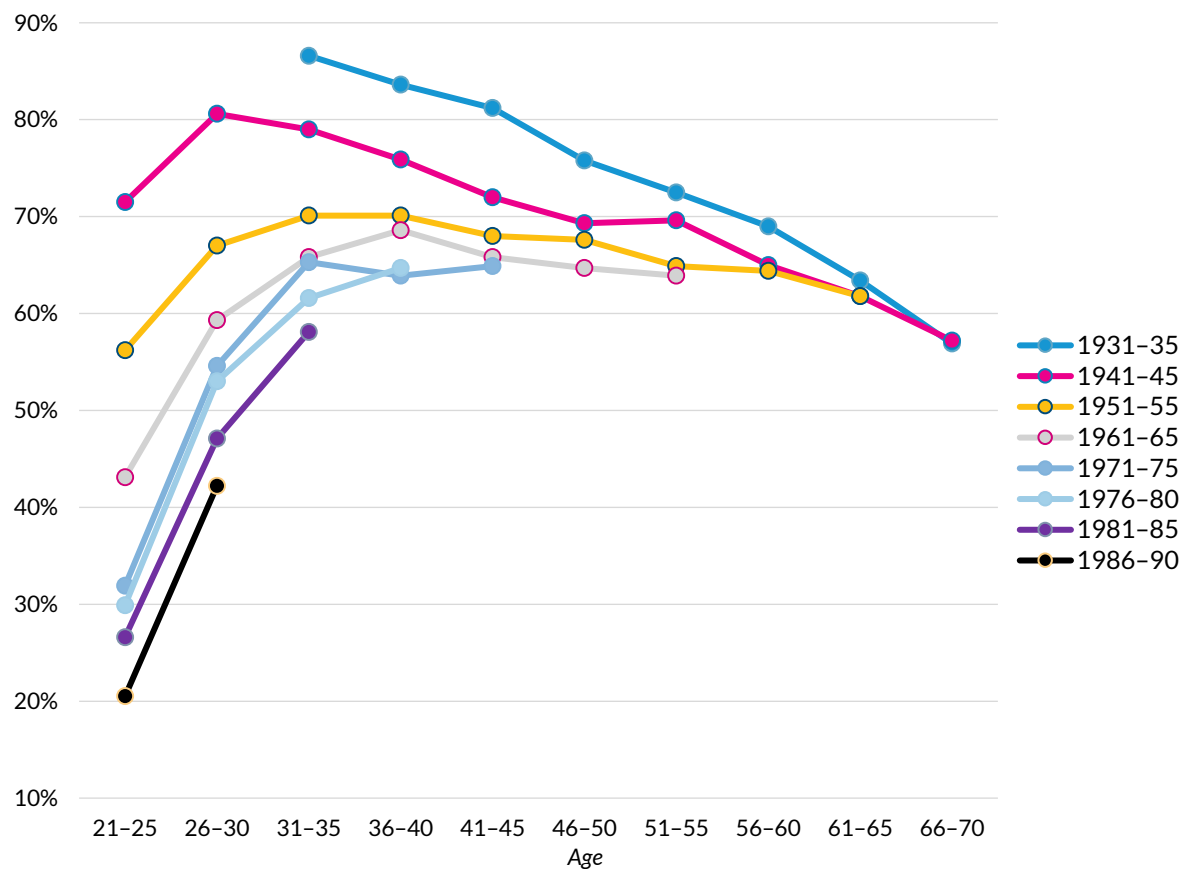
Note: Appendix table B.9 provides additional data.

Marriage patterns are similar for women, who have increasingly delayed marriage over the past four decades, perhaps to pursue education or a career (figure 12). At ages 26 to 30, 81 percent of women born between 1941 and 1945 were married, compared with only 42 percent of women born between 1986 and 1990. As with men, however, the share of women who were married in middle age

no longer appears to be declining. Women in the 1976 to 1980 birth cohort were just as likely to be married at ages 36 to 40 as those in the 1971 to 1975 birth cohort.

FIGURE 12

Percentage of Women Married by Age and Cohort



Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2011.

Notes: The vertical axis does not begin at zero. Appendix table B.10 provides additional data.

Homeownership

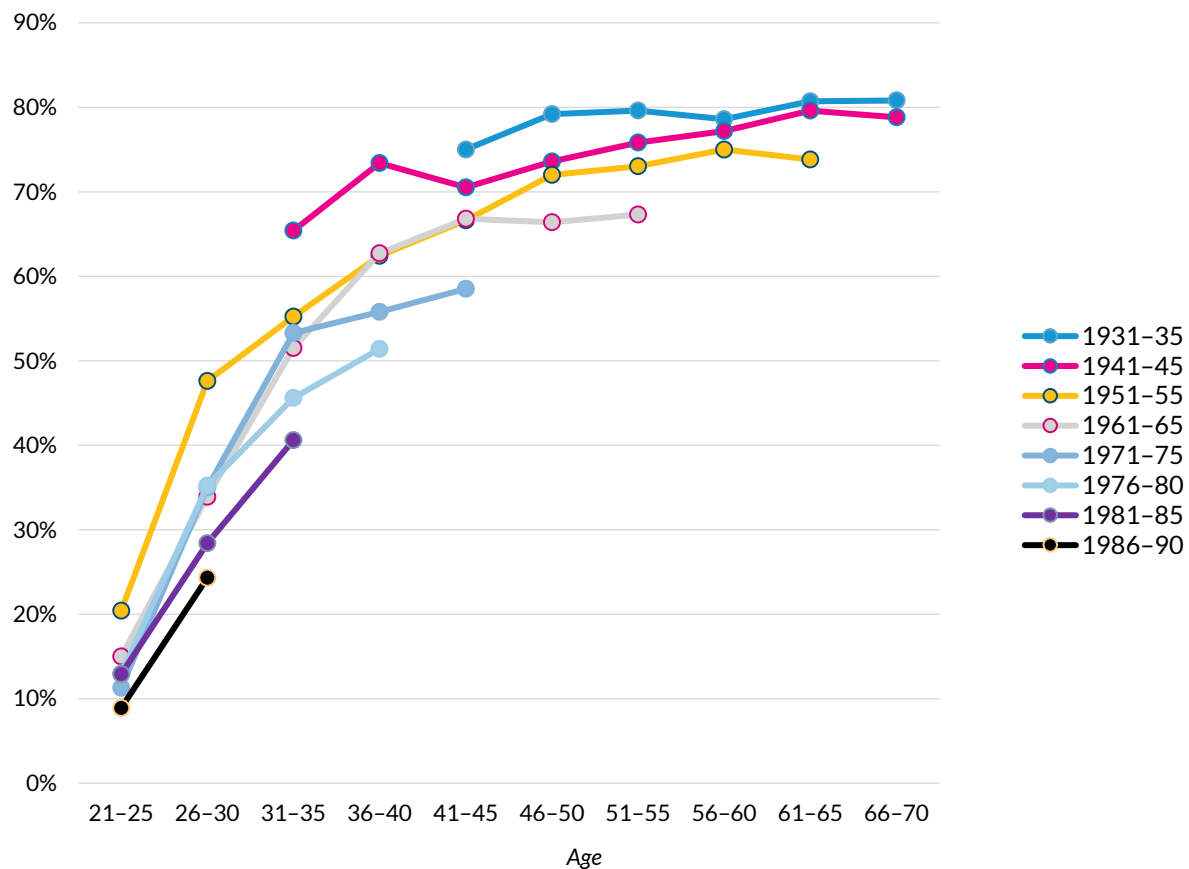
Homeownership is an important financial resource in retirement. Retirees can avoid rental payments by owning a home, and homeowners may tap into their housing wealth to supplement their retirement income. The overall homeownership rate—the number of owner-occupied housing units divided by the total number of occupied housing units—increased from World War II through 2005, when it hit a high of 69 percent, and then fell to 64 percent in 2017 following the financial crisis, Great Recession, and collapse of the housing bubble (Garriga, Gavin, and Schlagenhauf 2006; US Census Bureau 2017). Much

of the rise in homeownership through 2005 resulted from economic growth that made homeownership more affordable and from financial market innovations and regulatory changes that increased access to mortgage finance (Garriga, Gavin, and Schlagenhuaf 2006; Li 2005). The aging of the large baby boom generation, which moved into their 30s and 40s in the 1980s and 1990s, also appears to have raised the homeownership rate, because homeownership generally becomes more common with age, up to typical retirement ages.

However, our calculations of CPS/ASEC data that hold age constant show that homeownership has been declining across the age span for several decades (figure 13). Unlike the Census Bureau's homeownership rate, which shows the share of *households* in an owner-occupied dwelling, our calculations show the share of *adults* who own a home. At ages 61 to 65, the share of adults owning a home fell from 80 percent for the 1941 to 1945 birth cohort to 74 percent for the 1951 to 1955 cohort. At ages 51 to 55, the likelihood of owning a home fell from 80 percent for the 1931 to 1935 birth cohort to 67 percent for the 1961 to 1965 cohort. And at ages 41 to 45, the likelihood of homeownership fell from 75 percent for the 1931 to 1935 birth cohort to 59 percent for the 1971 to 1975 cohort. Homeownership has stabilized at younger ages for people born between 1961 and 1980, but it slipped again for millennials. At ages 26 to 30, only 28 percent of those born between 1981 and 1985 and 24 percent of those between 1986 and 1990 owned a home, compared with 35 percent of those born between 1976 and 1980 and 48 percent of those born between 1951 and 1955. This long-term decline in homeownership predated the Great Recession and related financial crisis.

FIGURE 13

Percentage of Adults Who Own a Home by Age and Cohort



Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Note: Appendix table B.11 provides additional data.

Trends in Household Wealth

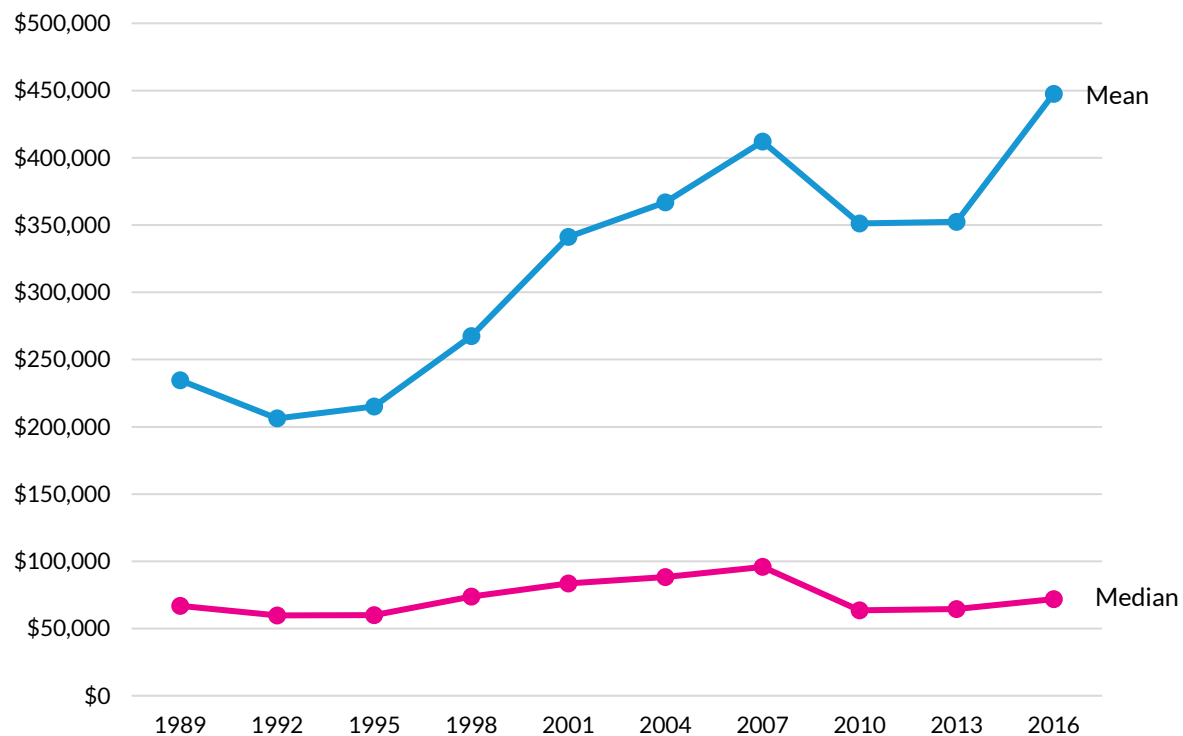
Before considering how household wealth and its components have evolved over time for various birth cohorts, we examined overall household wealth trends in the SCF between 1989 and 2016 for household heads and their spouses and showed how they responded to the business cycle and changes in average asset prices. Mean and median per capita household net worth dipped in inflation-adjusted dollars in 1992, in the wake of the 1990–91 recession, but grew steadily over the next 15 years (figure 14). Between 1992 and 2007, inflation-adjusted mean per capita net worth doubled, and inflation-adjusted median net worth increased 60 percent. Per capita household net worth plummeted between 2007 and 2010 as equity and housing markets crashed and the economy entered the Great Recession; the inflation-adjusted mean value fell 15 percent, and the inflation-adjusted median value fell 33

percent. However, mean net worth fully rebounded from the Great Recession and the financial crisis over the next six years. In 2016, inflation-adjusted mean net worth was 9 percent higher than in 2007 and 91 percent higher than in 1989. Inflation-adjusted median net worth, however, remained 24 percent lower in 2016 than 2007. Between 1989 and 2016, inflation-adjusted median net worth increased by only 8 percent.³ The mean value grew faster than the median because wealth increased most sharply near the top of the distribution, raising household wealth inequality (Saez and Zucman 2014).

FIGURE 14

Per Capita Household Net Worth by Year

Constant 2017 dollars



Source: Authors' estimates from the Survey of Consumer Finances, 1989 to 2016.

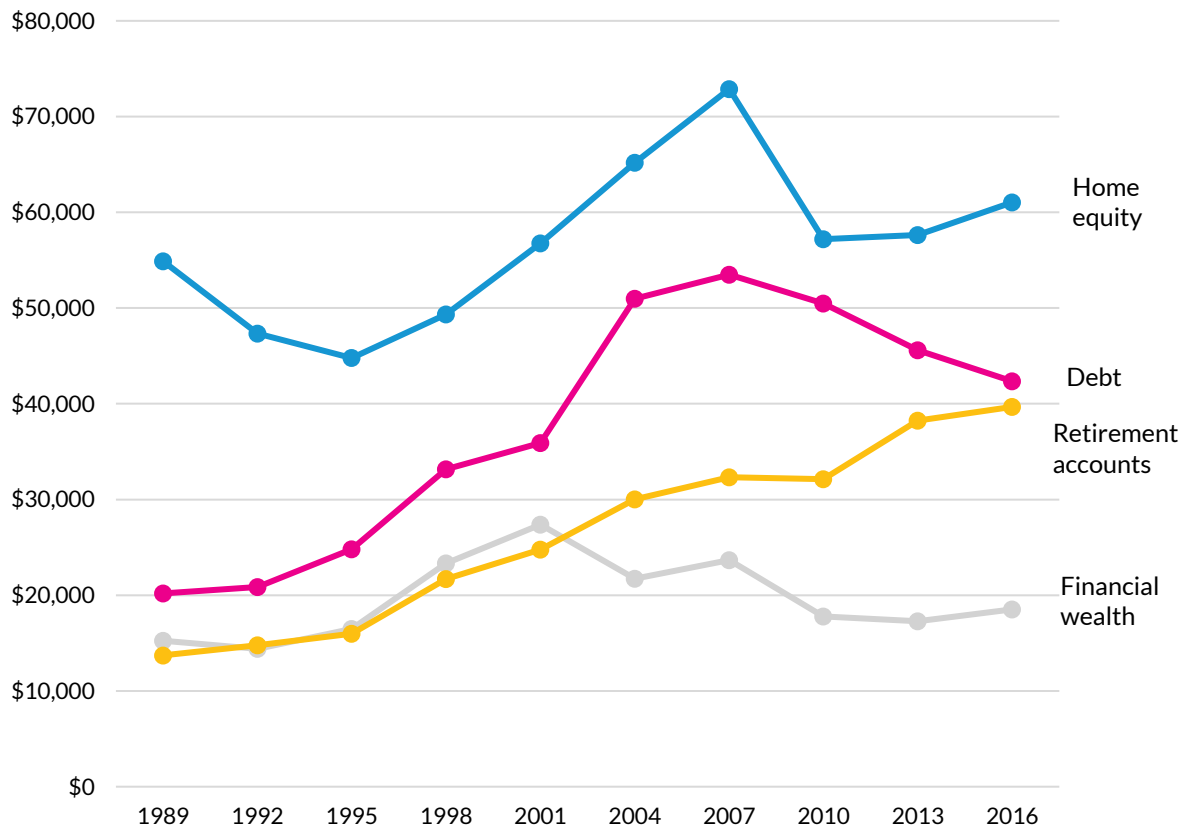
Notes: Estimates are restricted to household heads and their spouses. Net worth includes the value of a primary residence, other real estate, financial assets (including retirement accounts), and other real assets, minus outstanding debt. The analysis divided household estimates by two for married adults. Appendix table B.12 provides additional data.

The share of household heads and their spouses with positive financial wealth, retirement accounts, and home equity or with any outstanding debt did not change much between 1989 and 2016 for household heads and spouses (appendix table B.13). However, median values for household heads and their spouses with holdings varied substantially over time (figure 15). Median per capita home equity

grew steadily between 1995 and 2007, increasing 63 percent, and then plummeted after 2007, dropping 22 percent by 2010. Between 2010 and 2016, inflation-adjusted median home equity increased only 7 percent, and it was only 11 percent higher in 2016 than in 1989. Inflation-adjusted median financial wealth responded to trends in the stock market, increasing steadily from 1992 to 2001 and then dropping sharply after 2001 and after 2007 when markets crashed.⁴ Inflation-adjusted median financial wealth was only 11 percent higher in 2016 than 1989. The inflation-adjusted median value of retirement accounts among accountholders increased steadily between 1989 and 2016, except for a small decline between 2007 and 2010 when the stock market crashed and unemployment rates were unusually high.⁵ Debt grew rapidly between 1989 and 2007 but fell between 2007 and 2016. Nonetheless, inflation-adjusted median debt among debt holders was more than twice as high in 2016 as in 1989.⁶

FIGURE 15

Median Per Capita Household Wealth and Debt for Adults with Holdings by Type and Year
Constant 2017 dollars



Source: Authors' estimates from the Survey of Consumer Finances, 1989 to 2016.

Notes: Estimates are restricted to household heads and their spouses with debt or holdings in the specified asset classes. Home equity is the value of a primary residence minus any outstanding housing debt, such as mortgages and home equity loans. Debt includes outstanding housing debt, installment loans, credit card balances, and other debt held by a household. Retirement account balances include the value of IRAs, Keogh accounts, and employer-sponsored retirement accounts, such as 401(k) plans. Financial wealth includes retirement account balances plus financial assets held outside of retirement accounts, including the value of bank accounts, certificates of deposit, annuities, trusts, stocks, bonds, mutual funds, and the cash value of life insurance. The analysis divided household estimates by two for married adults. Appendix table B.14 provides additional data.

Household Net Worth

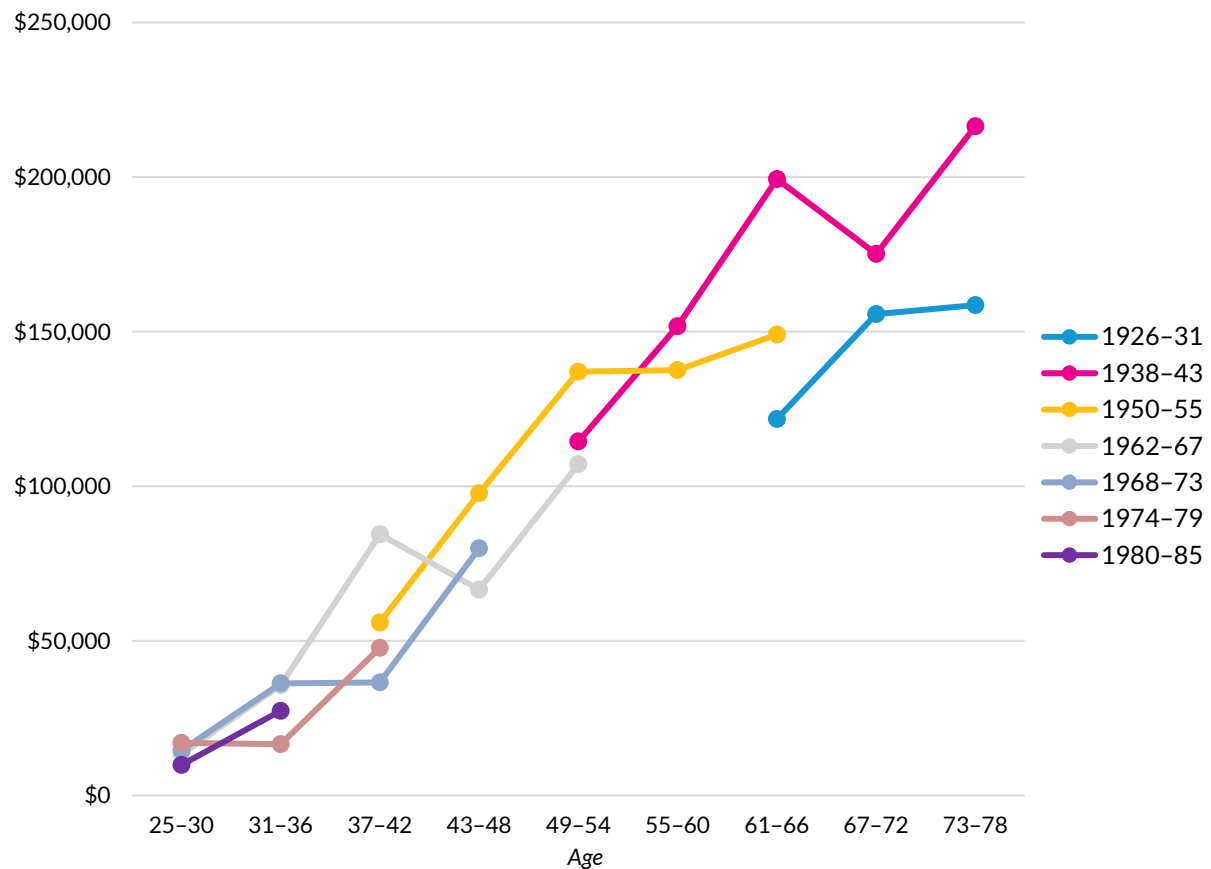
Figure 16 reports median per capita household net worth, in constant 2017 dollars, by six-year age and birth cohort groups. The SCF data used to compute these estimates cover 1992 to 2016. The most noteworthy feature of the chart is the drop in median net worth in 2010 following the 2007 collapse in

housing values, the 2008 stock market crash, and the Great Recession for nearly every birth cohort, as indicated by the dip in the second-to-last data point in most lines in the figure.⁷ The strong increase in median net worth in 2016 for nearly every cohort, as indicated by the last data point on each line, is equally noteworthy. Through 2004, most cohorts had higher median per capita net worth than the previous cohort. In 2016, however, most cohorts had less median net worth than the previous cohort at the same age, despite the strong wealth gains that most cohorts experienced between 2010 and 2016. Nonetheless, the chart does not reveal substantial, long-lasting wealth losses in the run-up to retirement. For all cohorts, household net worth grows rapidly with age, and the most recent cohorts generally seem to be following the path set by earlier cohorts. At ages 31 to 36, median per capita household net worth was lower for millennials than for those born in the 1960s and early 1970s, but the shortfall was less than \$10,000.

FIGURE 16

Median Per Capita Household Net Worth by Age and Birth Cohort

Constant 2017 dollars



Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

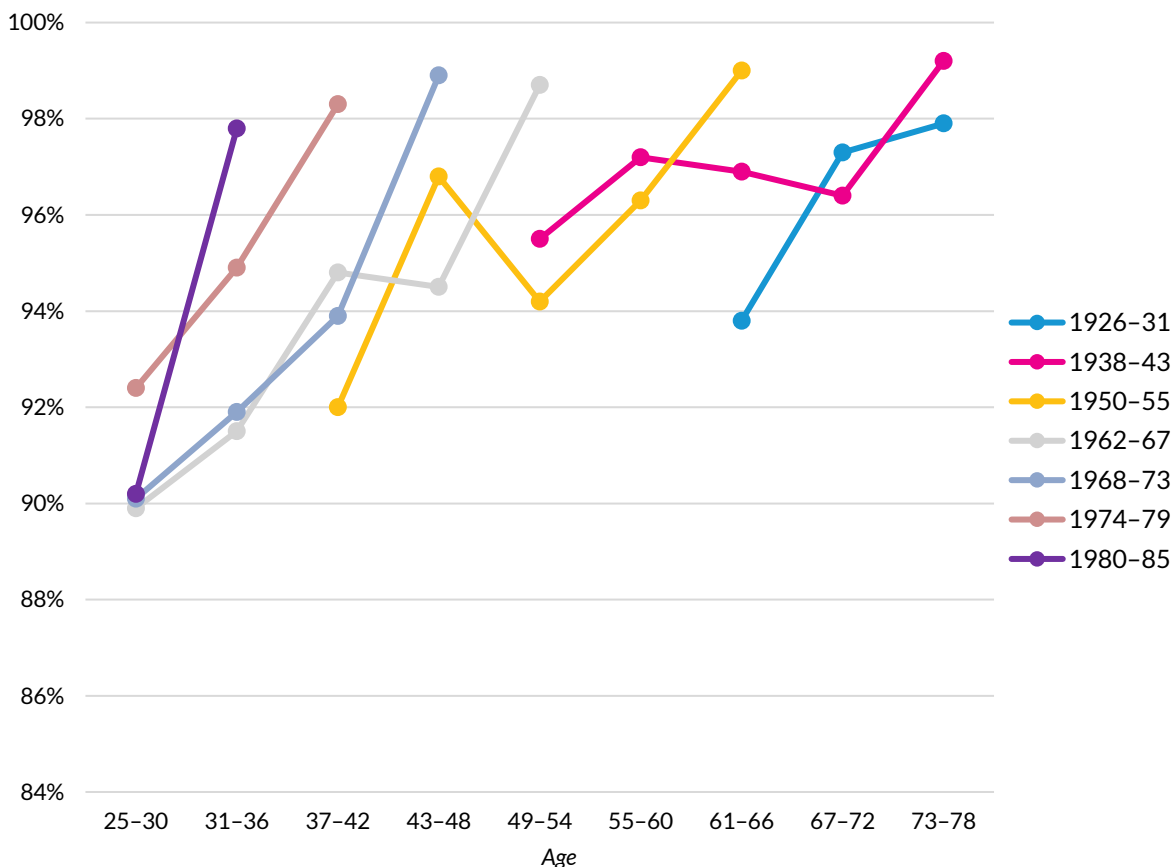
Notes: Estimates are restricted to household heads and their spouses. Net worth includes the value of a primary residence, other real estate, financial assets (including retirement accounts), and other real assets, minus outstanding debt. The analysis divided household estimates by two for married adults. Appendix table B.15 provides additional data.

Financial Wealth

Across all cohorts, the likelihood of having financial wealth increased with age, and nearly all adults—about 95 percent—held some financial assets by the time they reached their mid-forties (figure 17). The share of adults with some financial wealth generally increased with each successive cohort, although shares dropped for some cohorts in 2010 after the financial crisis.

FIGURE 17

Percentage of Adults with Positive Financial Wealth by Age and Birth Cohort



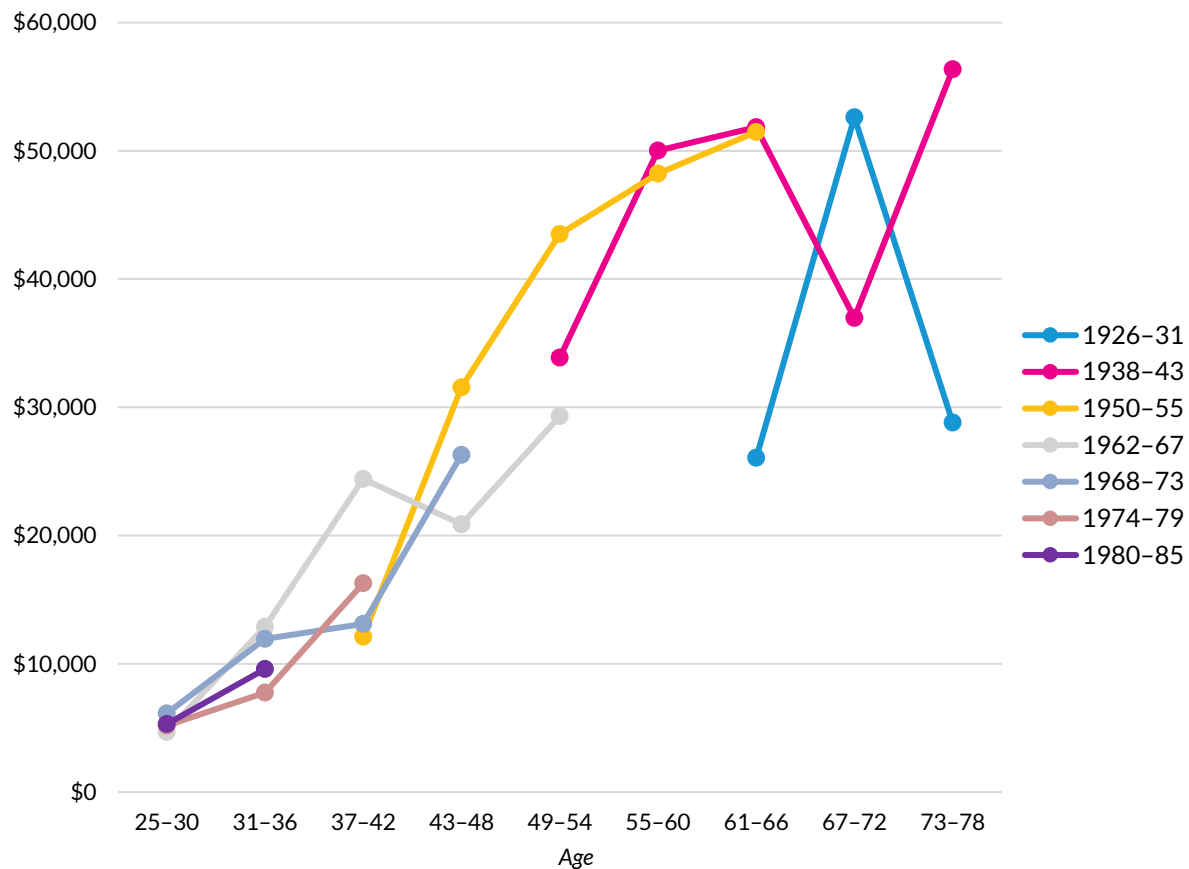
Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: The vertical axis does not begin at zero. Estimates are restricted to household heads and their spouses. Financial wealth includes retirement account balances plus financial assets held outside of retirement accounts, including the value of bank accounts, certificates of deposit, annuities, trusts, stocks, bonds, mutual funds, and the cash value of life insurance. Appendix table B.16 provides additional data.

People born through the mid-1950s have generally accumulated more financial wealth than people born earlier, when stock market fluctuations are considered, but millennials have fallen behind. At ages 31 to 36, inflation-adjusted per capita household financial wealth was \$7,700 for people born between 1974 and 1979 and \$9,600 for people born between 1980 and 1985, compared with \$12,900 for people born between 1962 and 1967. These gaps, however, are relatively modest.

FIGURE 18

Median Per Capita Household Financial Wealth for Wealth Holders by Age and Birth Cohort
Constant 2017 dollars



Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

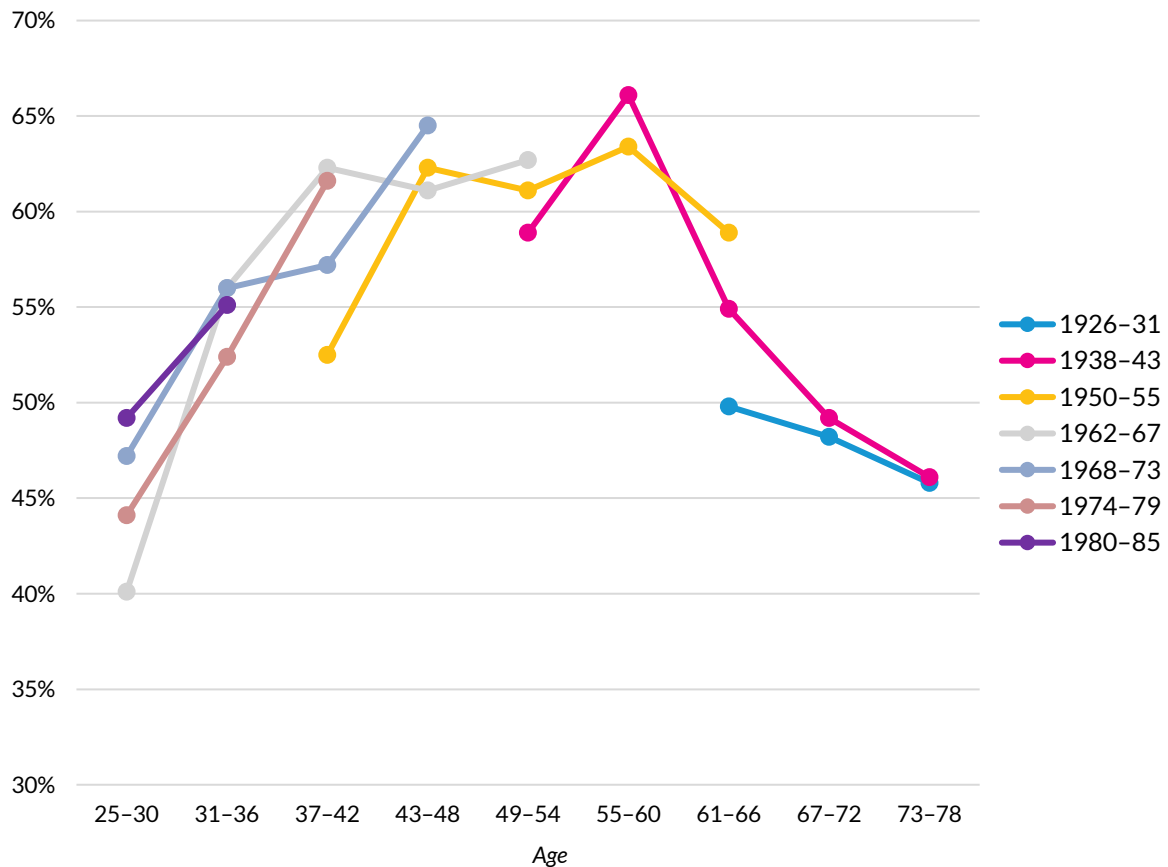
Notes: Estimates are restricted to household heads and their spouses in households with positive financial wealth. Financial wealth includes retirement account balances plus financial assets held outside of retirement accounts, including the value of bank accounts, certificates of deposit, annuities, trusts, stocks, bonds, mutual funds, and the cash value of life insurance. The analysis divided household estimates by two for married adults. Appendix table B.17 provides additional data.

The outlook for the most recent generation appeared somewhat more promising when we considered only retirement account holdings. The share of adults holding a retirement account increases with age until it reaches about 65 percent in the mid-forties (figure 19). Retirement account ownership has generally increased with each successive birth cohort, although growth has slowed recently. At ages 31 to 36, people born between 1980 and 1985 were just about as likely as those born between 1962 and 1967 and those born between 1968 and 1973 to hold a retirement account. At ages 37 to 42, people born between 1974 and 1979 were just about as likely to hold a retirement account as

those born between 1962 and 1969, and they were 4 percentage points more likely to hold an account than those born between 1968 and 1973.

FIGURE 19

Percentage of Adults with Retirement Accounts by Age and Birth Cohort



Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

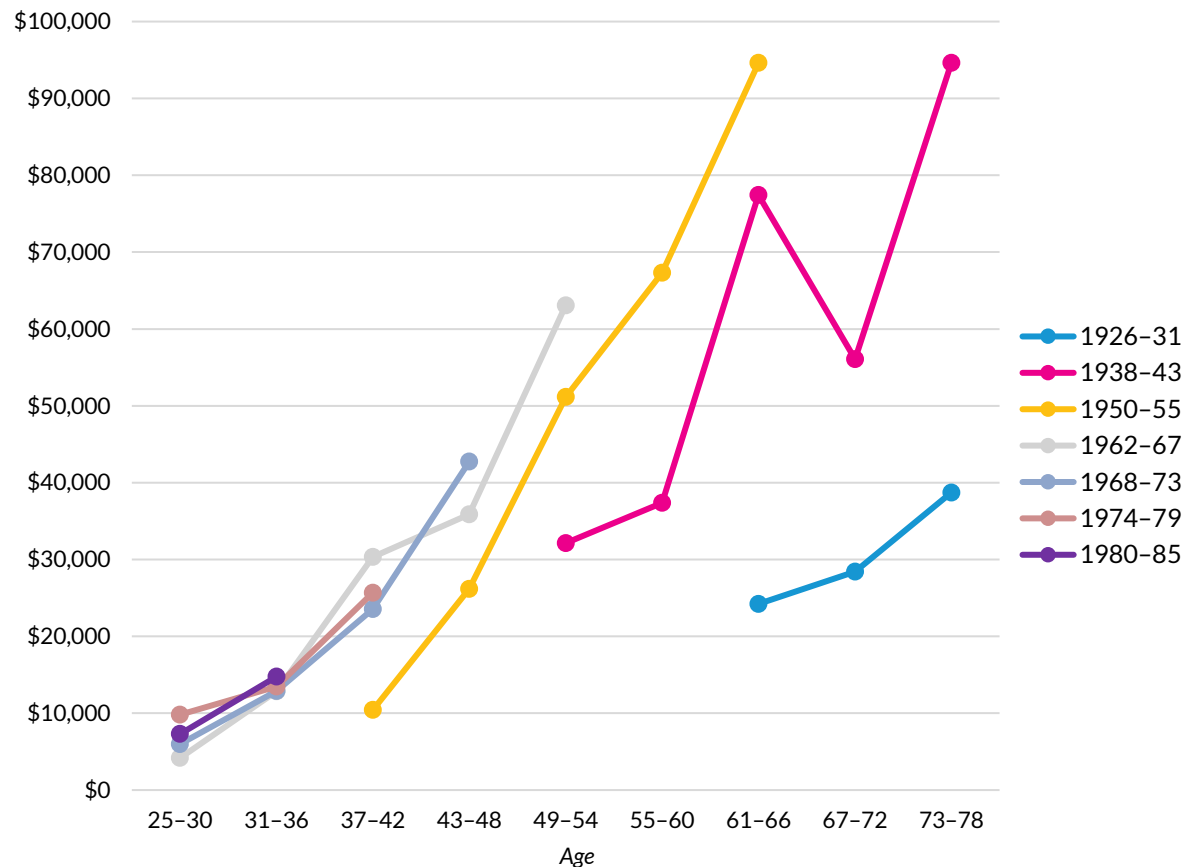
Notes: The vertical axis does not begin at zero. Estimates are restricted to household heads and their spouses. Retirement accounts include IRAs, Keogh accounts, and employer-sponsored retirement accounts, such as 401(k) plans. Appendix table B.18 provides additional data.

Inflation-adjusted median per capita retirement account balances among account holders increased with each successive birth cohort through the 1962 to 1967 birth cohort (figure 20). At ages 49 to 54, the median account balance was nearly twice as high for those born between 1962 and 1967 as for those born between 1938 and 1943. Account balance growth has stagnated for more recent cohorts, but late Gen Xers and millennials generally have higher account balances in the thirties than boomers born in the first half of the 1950s had at that age. Median account balances for Gen Xers and millennials

are growing with age at about the same rate as for earlier cohorts. If these trends continue, Gen Xers and millennials can expect to accumulate more retirement account wealth than boomers born between 1950 and 1955, whose median per capita value of retirement accounts reached \$94,600 at ages 61 to 66.

FIGURE 20

Median Per Capita Value of Retirement Accounts for Accountholders by Age and Birth Cohort
Constant 2017 dollars



Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

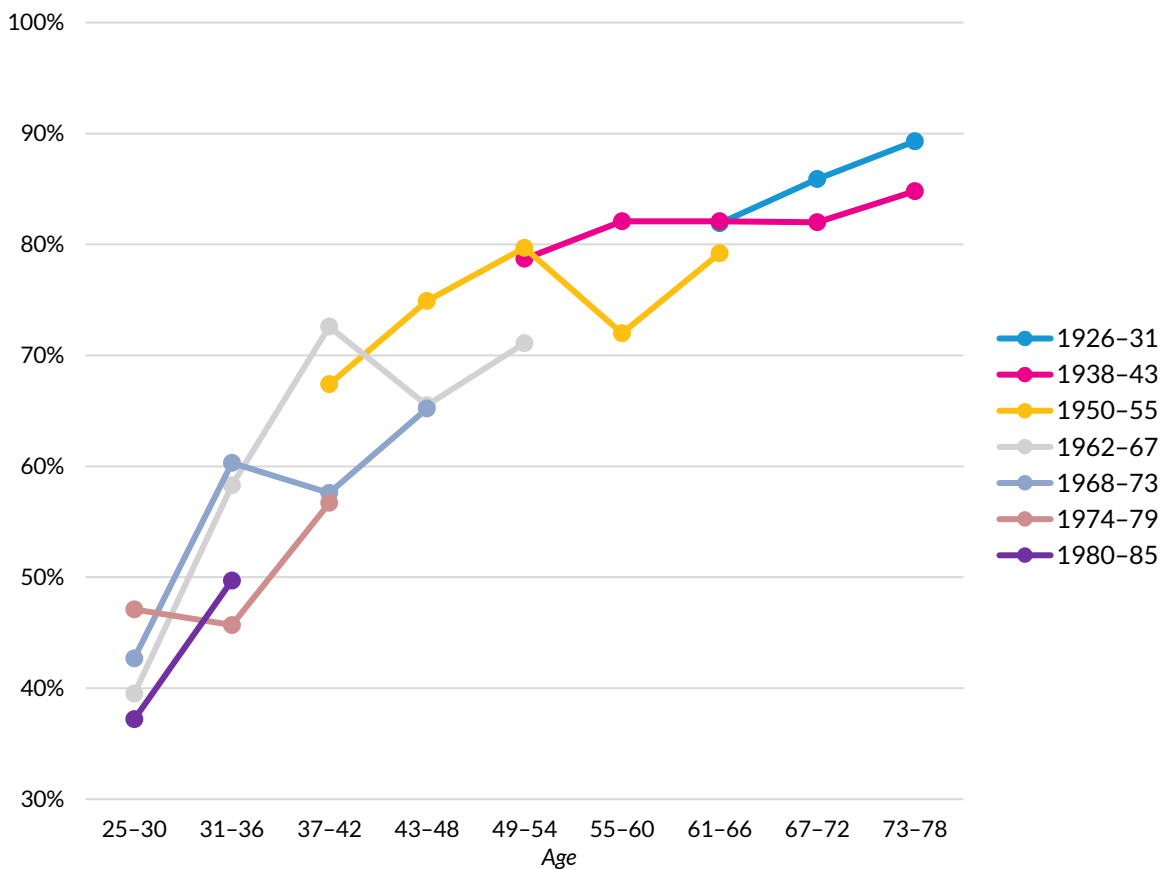
Notes: Estimates are restricted to household heads and their spouses in households with at least one retirement account. Retirement account balances include the value of IRAs, Keogh accounts, and employer-sponsored retirement accounts, such as 401(k) plans. The analysis divided household estimates by two for married adults. Appendix table B.19 provides additional data.

Home Equity

Homeownership was more common in our SCF sample than in our CPS/ASEC sample, because we restricted our SCF sample to household heads and their spouses, excluding adults who had not established their own households (whom we included as nonhomeowners in our CPS/ASEC sample). The share of household heads and their spouses with positive home equity did not vary much by cohort in the SCF (figure 21). The share with positive home equity increases with age, although it fell for most cohorts between 2004 and 2010 in the wake of the financial crisis and collapse in home values before increasing again through 2016. However, only one-half of millennials born between 1980 and 1985 had positive home equity at ages 31 to 36, 10 percentage points less than for early Gen Xers born between 1968 and 1973.

FIGURE 21

Percentage of Adults with Positive Home Equity by Age and Birth Cohort



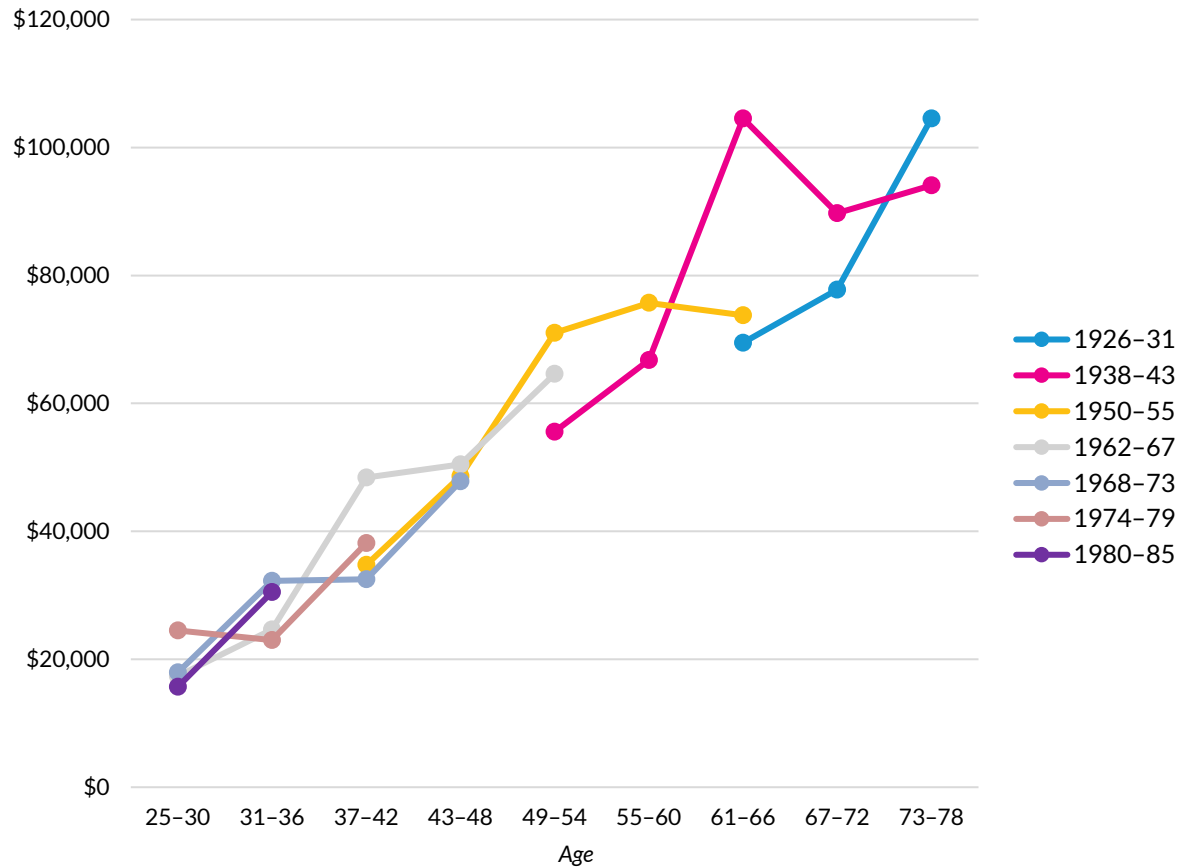
Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: The vertical axis does not begin at zero. Estimates are restricted to household heads and their spouses. Home equity is the value of a primary residence minus any outstanding housing debt, such as mortgages and home equity loans. Appendix table B.20 provides additional data.

Among homeowners with positive home equity, inflation-adjusted median per capita home equity generally increased for each successive birth cohort through the 1950 to 1955 cohort (figure 22). For more recent cohorts, inflation-adjusted median per capita has not changed much when age is held constant. At ages 25 to 30 and ages 31 to 36, median home equity among homeowners was nearly identical for millennials born between 1980 and 1985 and early Gen Xers born between 1968 and 1973. For all birth cohorts, home equity increased steadily over the life course through age 60. Most of these gains, however, were concentrated among homeowners living in and around major cities on the coasts where housing prices have increased (Glaeser and Gyourko 2018).

FIGURE 22

Median Per Capita Value of Home Equity for Equity Holders by Age and Birth Cohort
Constant 2017 dollars



Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

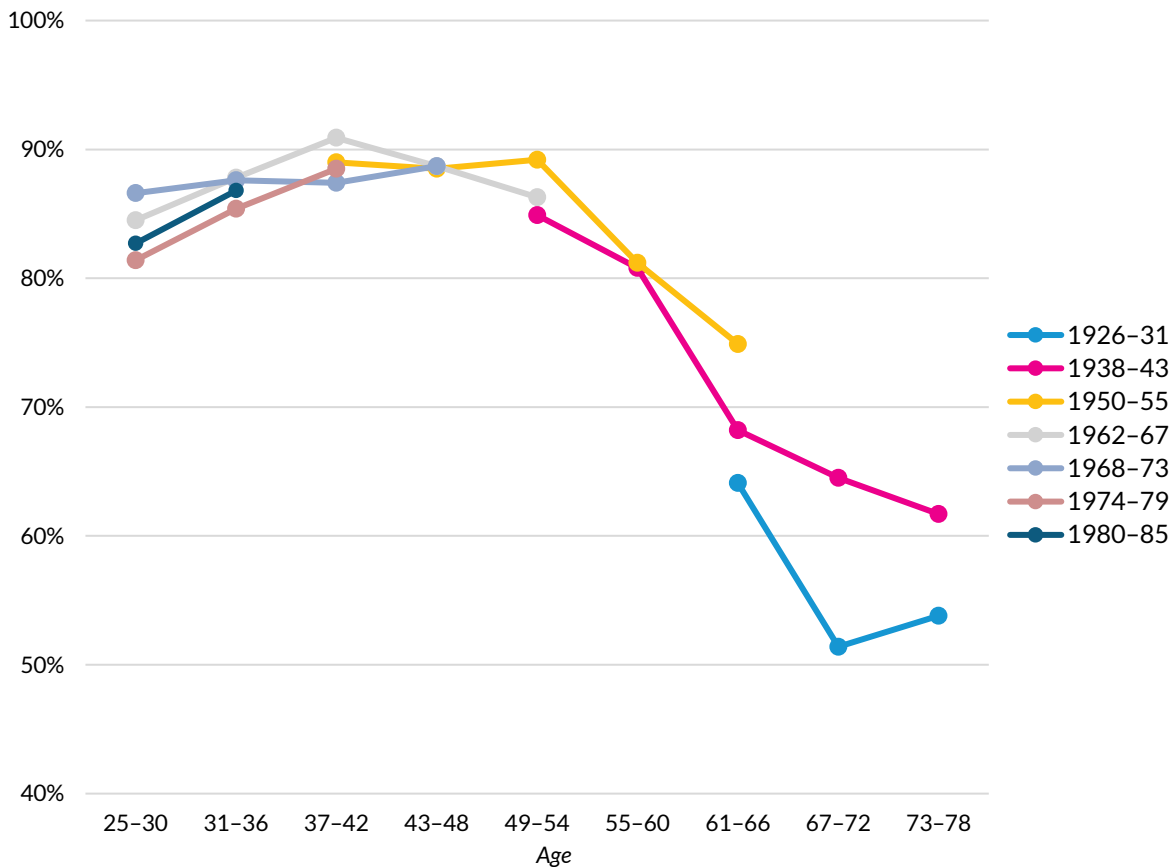
Notes: Estimates are restricted to household heads and their spouses in households with positive home equity. Home equity is the value of a primary residence minus any outstanding housing debt, such as mortgages and home equity loans. The analysis divided household estimates by two for married adults. Appendix table B.21 provides additional data.

Household Debt

The growth in household debt is one of the most striking changes in household finances over the past quarter-century. The share of household heads and spouses with debt has not changed much at midlife or younger ages, although it has fallen somewhat over the past two decades for people in their twenties, thirties, and early forties (figure 23). Older Americans, however, are now more likely to hold debt than in the past. At ages 61 to 66, 75 percent of those in the 1950 to 1955 cohort held debt, compared with 64 percent of those in the 1926 to 1931 cohort.

FIGURE 23

Percentage of Adults with Outstanding Debt by Age and Birth Cohort



Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

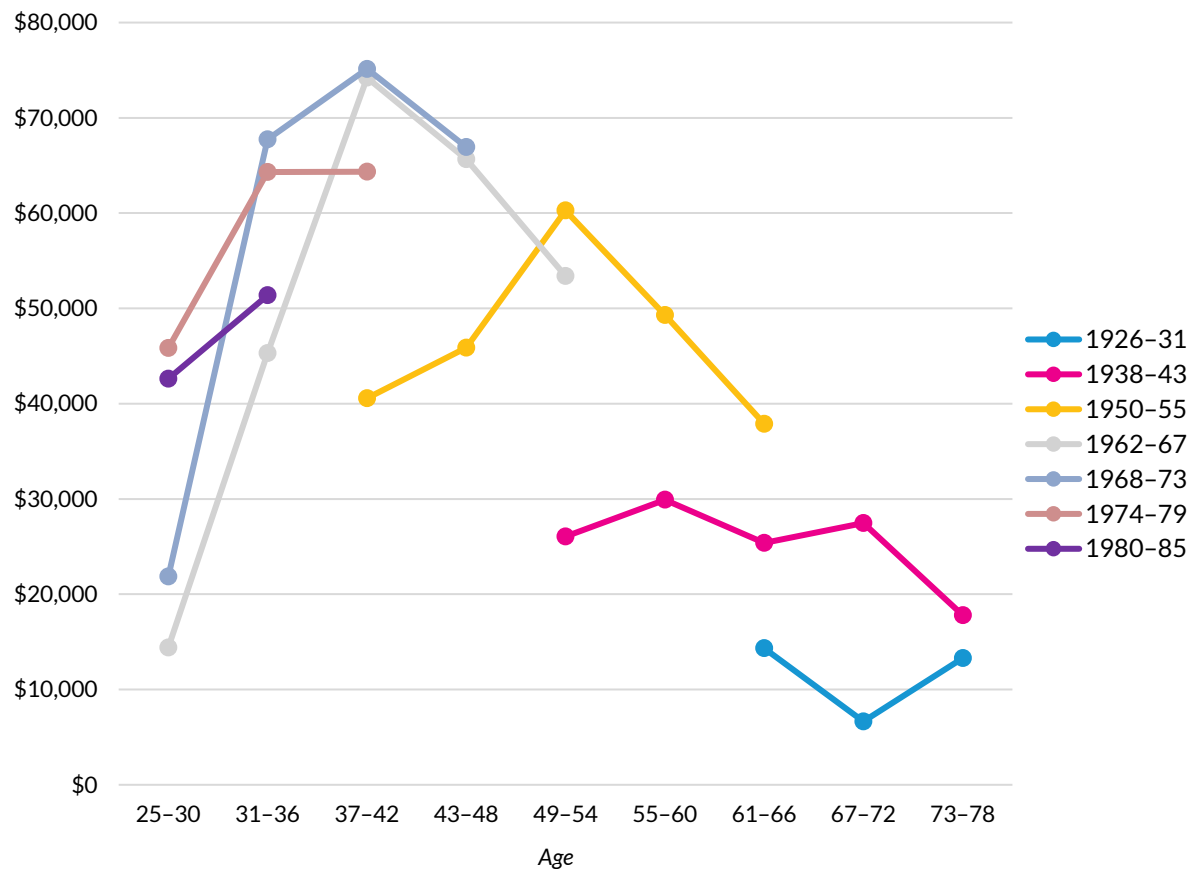
Notes: The vertical axis does not begin at zero. Estimates are restricted to household heads and their spouses. Debt includes outstanding housing debt, installment loans, credit card balances, and other debt held by a household. Appendix table B.22 provides additional data.

Debt holdings among people with debt have risen sharply over time. At ages 49 to 54, inflation-adjusted median per capita outstanding debt for debt holders was \$61,700 in the 1956 to 1961 cohort, compared with only \$26,100 for debt holders in the 1938 to 1943 cohort, 12 years earlier (figure 24). Median debt peaked at ages 37 to 42 at \$75,100 for adults in the 1968 to 1973 birth cohort, nearly twice as high as the median at that age for adults in the 1950 to 1955 cohort. Increases in housing prices, financial innovations that increased access to credit, demographic shifts, and low and stagnating incomes spurred the rise in household indebtedness (Barba and Pivetti 2009; Dynan and Kohn 2007). Student loan debt has also been growing (Brown et al. 2014). The median debt level for debt holders declined between 2007 and 2016 but remained much higher than in the 1990s. As people enter

retirement with more debt, debt service payments could strain their financial resources (Butrica and Karamcheva 2013; Karamcheva 2013).

FIGURE 24

Median Per Capita Value of Outstanding Household Debt for Debtholders by Age and Birth Cohort
Constant 2017 dollars



Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: Estimates are restricted to household heads and their spouses in households with outstanding debt. Debt includes outstanding housing debt, installment loans, credit card balances, and other debt held by a household. The analysis divided household estimates by two for married adults. Appendix table B.23 provides additional data.

Retirement Income Projections

Turning to future retirement income, we estimated that median per capita family income at age 70 will generally increase over time. For both men and women, DYNASIM4 projected that median traditional income at age 70—the cash income measure used by the Census Bureau—will be higher for the 1946 to

1955 cohort than the previous 10-year cohort, which turned 70 between 2006 and 2015 (table 1). Median age-70 incomes were projected to fall for the 1956 to 1965 birth cohort—the late baby boomers—but then rise steadily over time. The projected increases depended on assumptions about future wage growth. When we followed the Social Security trustees’ optimistic annual wage growth assumption of 1.2 percent—our high wage-growth assumption—we projected that median per capita age-70 income for men and women combined will reach \$39,400 in 2017 inflation-adjusted dollars for the late Gen Xers and early millennials, born between 1976 and 1985. This projection is 18 percent higher than the projection for those born 40 years earlier (between 1936 and 1945). When we assumed more moderate wage growth of 0.81 percent per year, DYNASIM4 projected that median per capita age-70 income would be \$36,400 for the late Gen Xers and early millennials, 9 percent more than for those born 40 years earlier. Projected median per capita age-70 income for the late Gen Xers and early millennials fell to \$35,500, 7 percent more than for those born 40 years earlier, when we assumed relatively slow wage growth of 0.70 percent per year.

Patterns were similar when we compared age-70 incomes across cohorts using the total potential income measure. This measure included the annuitized value of 80 percent of household financial assets and better reflects the impact on financial security of the shift from DB pensions to DC retirement accounts. Overall median age-70 income was 10 percent higher using the total potential income measure than the traditional cash measure under the moderate wage-growth assumption and 11 percent higher under the high wage-growth assumption. Compared with the 1936 to 1945 cohort, median total potential income was 17 percent higher for the 1976 to 1985 cohort under the high wage-growth assumption, 7 percent higher under the moderate wage-growth assumption, and 5 percent higher under the low wage-growth assumption. However, under the low and moderate wage-growth assumptions, median age-70 incomes for the 1946 to 1955 cohorts slightly exceeded those for the 1976 to 1985 cohorts.

Projected median per capita family income at age 70 grew faster for women than men, reflecting the growth in women’s earnings. Compared with the 1936 to 1945 cohort, projected median traditional cash income in the 1976 to 1985 cohort under the moderate wage-growth assumption was 15 percent higher for women but only 2 percent higher for men. However, for each cohort median age-70 income was higher for men than women for both income measures under all wage-growth assumptions.

TABLE 1

Projected Median Per Capita Annual Family Income at Age 70 by Birth Cohort, Sex, and Wage-Growth Assumption

Constant 2017 dollars

	1936–45	1946–55	1956–65	1966–75	1976–85
Traditional income measure					
<i>Men and women</i>					
High wage growth (1.2% per year)	33,300	36,000	34,100	36,500	39,400
Moderate wage growth (0.81% per year)	33,500	35,700	33,700	34,800	36,400
Low wage growth (0.70% per year)	33,200	35,900	33,600	34,700	35,500
<i>Men</i>					
High wage growth (1.2% per year)	36,800	38,300	36,500	38,800	41,300
Moderate wage growth (0.81% per year)	37,100	38,000	35,900	37,000	38,000
Low wage growth (0.70% per year)	36,900	38,100	36,200	36,800	37,200
<i>Women</i>					
High wage growth (1.2% per year)	30,400	34,200	31,800	34,300	37,600
Moderate wage growth (0.81% per year)	30,400	34,000	31,300	32,700	35,000
Low wage growth (0.70% per year)	30,300	34,200	31,200	32,500	33,800
Total potential income measure					
<i>Men and women</i>					
High wage growth (1.2% per year)	37,600	40,900	38,700	40,600	43,900
Moderate wage growth (0.81% per year)	37,600	40,600	38,000	38,600	40,100
Low wage growth (0.70% per year)	37,500	40,600	38,000	38,300	39,300
<i>Men</i>					
High wage growth (1.2% per year)	41,400	43,500	41,900	44,000	46,900
Moderate wage growth (0.81% per year)	41,700	43,100	41,000	41,900	42,500
Low wage growth (0.70% per year)	41,400	43,300	41,200	41,400	41,900
<i>Women</i>					
High wage growth (1.2% per year)	34,400	38,700	36,000	37,600	41,300
Moderate wage growth (0.81% per year)	34,400	38,500	35,400	35,900	38,000
Low wage growth (0.70% per year)	34,300	38,500	35,300	35,400	37,200

Source: Dynamic Simulation of Income Model 4, run numbers 942B, 942D, and 942E.

Notes: Estimates are rounded to the nearest \$100. The traditional income measure includes earnings, Social Security, DB pensions, SSI, interest, dividends, rent, and occasional withdrawals from retirement accounts. The total potential income measure includes earnings, Social Security, DB pensions, SSI, and the annual income from an actuarially fair annuity valued at 80 percent of financial assets, including retirement accounts. The analysis divided total household income by two for married adults.

For lower- and middle-income retirees, much of the projected income increase came from higher Social Security incomes. For 70-year-olds in the middle income quintile, projected mean per capita income in the 1976 to 1985 birth cohort was \$2,500 higher than in the 1936 to 1945 cohort, after we adjusted for inflation (table 2). Projected mean income grew \$5,900 for Social Security, \$2,400 for income from financial assets, and \$1,100 for earnings, while mean DB pension income fell \$6,900. For adults in the bottom income quintile, mean Social Security income grew \$1,900 over the period, while an \$800 average gain in income from financial assets was nearly offset by losses in average DB pension income and SSI. Earnings growth accounted for most of the projected age-70 income gains from the 1936 to 1945 cohort to the 1976 to 1985 cohort for adults in the top income quintile. Their mean DB pension income fell \$21,300.

TABLE 2

Projected Mean Per Capita Annual Family Income at Age 70, by Income Type, Income Quintile, and Birth Cohort

Constant 2017 dollars

	1936–45	1976–85	Difference
Bottom income quintile			
Social Security income	8,500	10,400	1,900
Earnings	500	500	0
Income from financial assets	800	1,600	800
DB pension income	600	200	-400
SSI	500	200	-300
Total	11,000	12,900	2,000
Middle income quintile			
Social Security income	16,200	22,100	5,900
Earnings	6,100	7,200	1,100
Income from financial assets	7,300	9,700	2,400
DB pension income	8,000	1,100	-6,900
SSI	0	0	0
Total	37,600	40,000	2,500
Top income quintile			
Social Security income	18,500	27,300	8,800
Earnings	35,000	79,700	44,700
Income from financial assets	49,100	48,700	-400
DB pension income	26,200	4,900	-21,300
SSI	0	0	0
Total	128,800	160,100	31,800

Source: DYNASIM4, run numbers 942B, 942D, and 942E.

Notes: Estimates are rounded to the nearest \$100. The table shows mean total potential income, which includes earnings, Social Security, DB pensions, SSI, and the annual income from an actuarially fair annuity valued at 80 percent of financial assets, including retirement accounts. The analysis divided total household income by two for married adults. The projections assumed that future wage growth averaged 0.81 percent per year.

Although we projected that median age-70 income will rise in the coming decades, we projected that the share of 70-year-olds able to replace at least 75 percent of the average annual earnings they received between ages 50 and 54—a common rule of thumb for retirement income adequacy—will decline (table 3). According to DYNASIM4 projections that used the traditional income measure and moderate wage growth assumptions, the share of 70-year-olds with a replacement rate below 75 percent will increase from 38 percent for the 1936 to 1945 birth cohort to 44 percent for the 1966 to 1975 cohort and 46 percent for the 1976 to 1985 cohort. The share with potentially inadequate retirement incomes was somewhat lower when the projections used the high wage-growth assumption—44 percent for the 1976 to 1985 cohort—and somewhat higher when they used the low wage-growth assumption—47 percent for the 1976 to 1985 cohort.

TABLE 3

Percentage of Adults Whose Projected Age-70 Income Falls Short of a 75 Percent Replacement Rate
By birth cohort, income measure, and wage-growth assumption

	1936–45	1946–55	1956–65	1966–75	1976–85
Traditional income measure					
High wage growth (1.2% per year)	38	39	36	42	44
Moderate wage growth (0.81% per year)	38	40	37	44	46
Low wage growth (0.70% per year)	38	39	37	45	47
Total potential income measure					
High wage growth (1.2% per year)	32	33	30	37	38
Moderate wage growth (0.81% per year)	32	33	30	38	40
Low wage growth (0.70% per year)	32	33	30	39	41

Source: Dynamic Simulation of Income Model 4, run numbers 942B, 942D, and 942E.

Notes: Estimates are rounded to the nearest \$1,000. The traditional income measure includes earnings, Social Security, DB pensions, SSI, interest, dividends, rent, and occasional withdrawals from retirement accounts. The total potential income measure includes earnings, Social Security, DB pensions, SSI, and the annual income from an actuarially fair annuity valued at 80 percent of financial assets, including retirement accounts. The analysis divided total household income by two for married adults.

We projected that more older adults would be able to replace 75 percent of their preretirement earnings if they annuitized their financial assets, but the projected share likely to experience lower living standards in retirement than while working again increased over time. Using the total potential income measure, we estimated that 40 percent of adults in the 1976 to 1985 cohort would fall short of a 75 percent replacement rate at age 70 if wages grew moderately over time, up from 32 percent for the 1936 to 1945 cohort and 30 percent for the 1956 to 1965 cohort. The corresponding share for the 1976 to 1985 cohort was 38 percent under the high wage-growth assumption and 41 percent under the low wage-growth assumption.

Conclusions

How future generations fare in retirement will depend largely on how much they earned and saved when they were younger. Many recent employment, earnings, and demographic trends are discouraging. Men's labor force participation rates continue to decline before age 55, and their median wages have been stagnant for decades. Full-time male workers born in the late 1970s and early 1980s were less likely to participate in an employer-sponsored retirement plan than previous cohorts, and their female counterparts were less likely to participate than those born a decade earlier. Millennials and late Gen Xers are continuing the trend toward later marriage that began a few generations ago, and it seems likely that the share of people born in the last half of the 1970s and the first half of the 1980s who marry by their forties will fall far short of marriage rates for people born in the 1930s. Falling marriage rates threaten retirement security because marriage helps people pool resources, insure against risks, and access Social Security spouse and survivor benefits.

Some wealth trends are also concerning. People born after 1970 are not accumulating household wealth any faster than those born in the 1960s, reversing the generational growth experienced by earlier cohorts. The collapse in home prices and the stock market in the late 2000s reduced household wealth for nearly a decade. Although median levels of outstanding debt have been falling for the past decade, debt levels remain substantially higher now than they were two decades ago, especially at older ages. Millennials and late Gen Xers are also much less likely to own a home by their early to mid-thirties than previous generations.

Other trends have been more encouraging, however. Millennial and Gen X women worked and earned more in their twenties and thirties than now-retired women did at those ages. Labor force participation has risen sharply over the past two decades at older ages, which allows people to receive higher monthly Social Security benefits, save part of their additional earnings, and shrink the period over which their retirement savings are spread. Millennial men and women are much more likely to have a four-year college degree than previous cohorts. For all cohorts, household net worth grows rapidly with age, and the millennials and late Gen Xers generally seem to be following the path set by earlier cohorts. At ages 31 to 36, median per capita household net worth was lower for millennials than for those born in the 1960s and early 1970s, but the shortfall was less than \$10,000. And the financial turmoil of the late 2000s did not affect millennials much, because they were too young to have accumulated much when prices plummeted.

Our DYNASIM4 estimates combine data from multiple high-quality sources to project how the various forces might play out over the next thirty years to shape future retirement incomes. Our

projections show that median age-70 income will be higher for Gen Xers and millennials than previous generations, but they face a higher risk of seeing their living standards fall when they retire. Using a measure of retirement income that includes payouts that could be collected from an actuarially fair annuity valued at 80 percent of a retiree's financial assets and retirement accounts, we found that 40 percent of 70-year-olds born between 1976 and 1985 would be unable to replace at least 75 percent of the inflation-adjusted average annual earnings they and their spouse received from ages 50 to 54, under the assumption that average wages grow at the same rate as they did between 1966 and 2015. By comparison, replacement rates at age 70 would likely fall short of the 75 percent threshold for 32 percent of those born between 1936 and 1945, and for 30 percent of those born between 1956 and 1965.

Retirement is still more than three decades away for most people born in the 1980s, and their financial security in old age will hinge on several factors that have yet to play out. The future course of stock market returns, interest rates, housing prices, and inflation will affect future retirement incomes. How long people tend to work, which depends partly on how health trajectories evolve, will help determine financial security for future retirees. Policy choices regarding retirement programs, especially Social Security, will play a role. Our projections assumed that Social Security will pay all future retirees the benefits that they are scheduled to receive under current rules. However, because Social Security faces a long-term financing shortfall, the program's trustees project that within two decades it will be able to pay only about three-quarters of scheduled benefits (Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds 2017). If Congress cuts benefits to close the funding gap, or does nothing and allows benefits to fall by about one-quarter, future retirement incomes will be much lower than we projected.

How rapidly future wages grow will also shape future retirement security. Wage growth will depend on labor productivity, which will likely continue to rise, although perhaps more slowly than in the past (Fernald 2016; Gordon 2014). However, the relationship between wage growth and labor productivity growth has been weakening, reducing the share of the nation's output that goes to labor. Over the past decade, productivity in the non-farm-business sector increased 12.3 percent, while real compensation of labor increased only 5.1 percent (Solow 2015). Declining unionization, the shift from labor to capital, and rising employer health care costs may explain why wages have not been keeping pace with productivity growth (Congressional Budget Office 2016; Ginsburg 2014; Karabarbounis and Neiman 2013).

Rising out-of-pocket spending on health care and long-term services and supports pose an additional threat to future retirees' financial security. Although Medicare covers nearly all older adults,

out-of-pocket spending on Medicare premiums, premiums for supplemental private insurance, copays, and uncovered services can be financially burdensome. Hatfield et al. (2018) project that between 2012 and 2030, the median share of income that adults ages 65 and older spend on medical services will increase from 10 to 14 percent. Fronstin and VanDerhei (2017) estimate that a 65-year-old man would need \$127,000 in savings to be 90 percent certain of covering all future medical expenses, and a 65-year-old woman would need \$143,000. Spending on long-term services and supports, which includes nursing home care, residential care, and home care, can be even more burdensome for families because Medicare does not usually cover them, relatively few people have private long-term care insurance, and Medicaid pays only for people who have already depleted virtually all their wealth. Favreault and Dey (2015) project that people turning 65 today need to set aside \$36,000 by age 65 to cover expected lifetime out-of-pocket costs for intensive long-term services and supports, and about 1 in 10 will need to set aside more than \$100,000. DYNASIM4 now projects out-of-pocket and third-party spending on medical care and long-term services and supports, and we will incorporate these estimates into our upcoming analyses of retirement income adequacy.

Our analysis focused on median outcomes, describing the employment, earnings, and wealth of “typical” workers and the income that “typical” future retirees are likely to receive. However, medians mask important differences across population subgroups. Employment, earnings, and household wealth vary substantially by educational level, race and ethnicity, household structure, immigrant status, and other factors (Autor 2014; Cobb-Clark and Hildebrand 2006; Fisher and Houseworth 2017; Hirsch and Winters 2014; McKernan et al. 2014). Consequently, future retirement income for people with limited education, people of color, and people who spent much of their lives single may differ significantly from the overall median outcome. Future research should explore these distributional differences.

Appendix A. DYNASIM4 Projections

This appendix describes how DYNASIM4 projects financial outcomes.

Employment and Earnings

DYNASIM projects the likelihood that an individual works each year as a function of age, sex, race/ethnicity, education, health and disability status, geographic region, marital status, student status, number of young children, spouse characteristics (employment, age, disability, and education), immigrant status, Social Security benefit status, cohort, and the state-specific unemployment rate. The likelihood also includes an estimated individual-specific error term that captures nonvarying individual preferences that are independent of observed characteristics. The model classifies a person as employed if his or her expected probability of working exceeds a given random number. The selection criteria are adjusted so that our employment projections for men and women within particular age groups hit the trustees' targets.⁸

DYNASIM uses a similar set of explanatory variables to assign hourly wages and annual hours of work to those projected to work in the calendar year. Annual earnings are computed as the product of the hourly wage and annual hours worked. DYNASIM adjusts the underlying predicted annual wage for real wage growth based on the trustees' economic assumptions. It also aligns the annual earnings of workers to hit the Social Security trustees' annual earnings targets. The model has a special projection procedure for very high earners—those in the top one-tenth of 1 percent—because of the relatively high share of aggregate earnings that such earners garner.

The underlying price and wage targets from the Social Security trustees affect various other projections, including the Social Security earnings and benefit base (the taxable maximum), the indexing of wages for the calculation of Social Security benefits, SSI benefit parameters, stock and bond rates of return, and interest rates. Changes in economic conditions also affect retirement and Social Security benefit claiming, as do marriage, divorce, fertility, and schooling outcomes.

Income and Payroll Tax

DYNASIM calculates federal income tax liabilities by using an income tax calculator developed by Jon Bakija (Smith et al. 2007). The tax calculator uses annual projected tax unit income and assets from the SIPP panels matched to a Statistics of Income data file that includes itemized deductions and other variables needed to calculate income tax. The tax calculator assumes current-law federal income tax rules, including the provisions in the American Tax Relief Act of 2012. Tax provisions affecting the treatment of Social Security benefits have not changed since 1993, but the share of Social Security benefits included in taxable income is continually increasing under current law partly because the thresholds for including benefits in taxable income are not indexed for inflation. Other than the Social Security thresholds, DYNASIM inflates thresholds by projected changes in the consumer price index. DYNASIM also calculates Social Security coverage and annual payroll taxes by using current-law payroll tax rates. Only earnings in Social Security–covered employment are subject to payroll taxes.

Retirement Accounts

DYNASIM projects retirement accounts based on annual contributions to investment accounts and accumulated investment returns. DYNASIM starts with the self-reported SIPP retirement account balances. Because of documented deficiencies in the SIPP asset data (Czajka, Jacobson, and Cody 2003; Smith, Favreault, and Cashin 2005), asset balances in retirement accounts—as well as financial assets outside retirement accounts—in DYNASIM’s starting SIPP sample are adjusted to align with asset distributions from the 2007 SCF.

DYNASIM grows stock, long-term corporate bonds, and long-term government bond portfolios by using historical price changes and returns through 2015. Investment experience varies for each person because the model sets rates of return stochastically, using historical means and standard deviations. The model accounts for the 2008 stock market crash, which reduced equity values by 37 percent, by assuming the market recovers to half its projected precrash value by 2017 (Butrica, Smith, and Toder 2009, 2010). DYNASIM implements this assumption by using historic returns through 2015 and assumes a 7.42 percent average real rate of return on stocks from 2016 to 2017, before stocks resume their historic average real return of 6.5 percent after 2017. DYNASIM assumes mean real rates of return of 3.5 percent for corporate bonds, 3.0 percent for government bonds, and standard deviations of 17.28 percent for stocks and 2.14 percent for bonds.⁹ The 6.5 percent real return on stocks reflects a capital appreciation of about 3.5 percent and a dividend yield of around 3.0 percent, in line with the

long-term performance of the Standard & Poor's 500, better known as S&P 500. The model subtracts 1 percentage point from annual stock and bond returns to reflect administrative costs.

People are assigned an individual-specific risk tolerance based on SCF data. A person's share of retirement account assets invested in equities varies by age and risk tolerance, with high-risk and younger people investing more in equities than low-risk and older people.

DYNASIM assigns a growing share of workers to invest in target-date funds over time by using prevalence rates from the Employee Benefits Research Institute (Copeland 2011). DYNASIM assigns target-date investors to specific target-date funds based on the dollar-weighted share of the 40 largest target-date funds (Morningstar 2012, table 3). Workers with target-date funds use the stock and bond portfolio mix of their assigned fund at each age. All investors rebalance portfolios annually to preserve the target mix of stocks and bonds.

DYNASIM assumes 40 percent of firms offering DC plans implement automatic enrollment beginning in 2008. Automatic enrollment increases the probability new hires will participate in DC plans in the first year on the job, but workers can still opt out. Automatic enrollment affects new hire participation, but the participation probability is higher for workers who contributed in a prior year, so automatic enrollment increases participation on average beyond the first year on the job.

DYNASIM allows some workers to cash out retirement account balances with job changes or job losses. Younger workers, workers with lower account balances, and workers who lose their jobs are more likely to cash out retirement account balances than are older workers, those with higher balances, and those who move from one job to another without a break in employment. High unemployment contributes to lower lifetime DC pension savings through workers' hardship withdrawals and loss of contributions (and lost returns on those lost contributions) when out of work.

DYNASIM's pension projections allow the user to select alternate future pension assumptions including a more rapid shift from DB pensions to DC pensions as well as expansions of DC plans to firms not currently offering pensions (Butrica and Smith, forthcoming). Users can specify investment choice (Roth IRA, traditional IRA, 401[k]), firm size thresholds, default investment rate, share of participants that select the default investment, portfolio allocation (target-date fund, Treasury G fund, blend of stocks and bonds).

Financial Assets

DYNASIM uses random-effects models developed for the Social Security Administration's MINT model to project financial assets. DYNASIM starts with SIPP self-reported assets (saving, checking, and money market accounts; certificates of deposit; stocks; bonds; and equity in businesses, vehicles, and nonhome real estate, less unsecured debt). As with retirement accounts, we adjust the SIPP starting values to align with the household asset distribution from the 2007 SCF.

Financial assets accumulate and decumulate as a function of family characteristics and earnings and projected wage differentials. The main economic explanatory variable is a person's lifetime earnings relative to the cohort average. People with above-average lifetime earnings accumulate assets faster than those with below-average lifetime earnings. A spell of unemployment will lower a worker's average compared with a worker who remains employed continuously. The longer the unemployment spell, the greater the differential in lifetime earnings relative to the cohort average, and the greater the impact on projected assets. Assets accumulate at the family level, so spouses equally share family assets. We assume couples split assets at divorce and survivors inherit the assets of deceased spouses.

DYNASIM projects nonpension financial assets over three age ranges: up to age 50, from 51 to retirement, and from retirement to death. Equations projecting assets to age 50 were estimated based on the Panel Study of Income Dynamics (Toder et al. 2002). Equations projecting assets from age 51 to retirement were estimated on the first seven waves of the Health and Retirement Study (Smith et al. 2007). Equations projecting assets from retirement to death were estimated on a synthetic panel of SIPP data (Toder et al. 1999). The latter two datasets include historic earnings from the Social Security Administration's summary earnings records data.

Asset decumulation includes simulated sharp reductions in assets associated with health shocks, institutionalization, and end of life.

Homeownership

DYNASIM starts with self-reported homeownership status. Nonhomeowners are subject to an annual home purchase logistic hazard model. Homeowners are subject to an annual home sale logistic hazard model. The home purchase and sale hazard models were estimated on 1984–2013 Panel Study of Income Dynamics from age 25 until death. The home purchase model includes age, lifetime earnings, recent earnings, marital status, education, and number of children. It also included the ratio of median state home value to national median home value and an indicator for whether the family lives in a metro

area with 1 million or more people (defined in 2014 American Community Survey data). The home sale model includes age, sex, lifetime earnings, recent earnings, marital status, divorce duration, first child indicator, and number of children under age 18.

Home Equity

As with financial assets, DYNASIM uses random-effects models developed for the Social Security Administration's MINT model to project home equity among homeowners. DYNASIM starts with SIPP self-reported home equity. These models project home equity over three age ranges: 25 to 50, 51 to 70, and 71 to death. Equations projecting home equity to age 50 were estimated based on the Panel Study of Income Dynamics (Toder et al. 2002). Equations projecting equity from ages 51 to 70 were estimated based on the first seven waves of the Health and Retirement Study (Smith et al. 2007). DYNASIM holds real home equity constant after age 70 for people who continue to own their homes.

Retirement Income

DYNASIM projects income from various other sources to generate a measure of total household income. Social Security income is computed based on the benefit formula, projected lifetime earnings, marriage history, and an equation projecting benefit take-up. DYNASIM projects retirement plan coverage and participation, plan contributions, and payments from employer-sponsored DB pension plans, cash balance plans, and retirement accounts based on equations of job change. DYNASIM also projects asset income as a function of projected assets. Finally, DYNASIM calculates SSI for eligible people based on total family income, assets, and state-specific program rules.

Pensions

DYNASIM projects pensions from employer-sponsored DB plans, cash balance plans, and retirement accounts, including 401(k) and 403(b) plans, Keoghs, and IRAs. Starting information about pension coverage on current and past jobs, pension contribution rates, and account balances come from SIPP self-reported information. DYNASIM projects employer characteristics and employer benefits (pensions and health insurance) at each simulated job change.

DYNASIM projects private DB pensions by using DB plan formulas from the Pension Benefit Guaranty Corporation's pension insurance modeling system. These DB plan formulas are randomly assigned to DB participants based on broad industry, union status, and firm size categories, as well as an indicator of whether the firm offers both DB and DC plans. For government pensions, DYNASIM uses actual benefit formulas to calculate benefits for federal government workers and military personnel; to estimate pension benefits for state and local government workers, DYNASIM assigns workers to one of 481 state and local government pensions from the Urban Institute's State and Local Employee Pension Plan database based on workers' state and job sector (Urban Institute 2016).

Projected DB pension information reflects pension plan structures through December 2008, including DB pension plan freezes and conversions to cash balance plans.¹⁰ DYNASIM assumes all nonunion private-sector DB pensions will experience a hard freeze between 2008 and 2016 and assumes two-thirds of state and local pensions will experience a soft freeze between 2008 and 2016.¹¹ (Users can run alternative scenarios by changing these assumptions.)

DYNASIM adjusts worker DB pensions and survivor pensions after initial pension receipt for cost-of-living adjustments. DYNASIM varies the probability of selecting a joint and survivor annuity by gender, education, family health status, wealth, and expected pension income. It also varies DB cost-of-living adjustments by employment sector (i.e., private, federal government, and state and local government).

Most DB plan formulas assign pension income as a function of workers' earnings and job tenure. DB pension benefits are capped by the statutory limitations under Section 415(b)(1)(A). Most private-sector workers must complete five years of service before they vest in the DB plan. Changes in job tenure directly affect expected DB pension income.

Social Security

DYNASIM includes a detailed Social Security benefit calculator that accounts for virtually all benefit provisions under current law (scheduled and payable). The benefit calculator can also modify many of the current law provisions to simulate Social Security reforms, including changes in the benefit formula, payroll taxes and the wage cap, changes in the early and full retirement ages, cost-of-living adjustments, spouse and survivor provisions, minimum benefits, and changes to the windfall elimination provisions and government pension offsets.

Means-Tested and Non-Means-Tested Benefits

DYNASIM projects means-tested and non-means-tested benefits using models estimated for MINT6 and MINT7 (Smith et al. 2010). Means-tested benefits include payments from the Temporary Assistance for Needy Families program. Non-means-tested benefits include veterans' benefits, unemployment insurance, and workers' compensation payments. DYNASIM starts with self-reported receipt and benefit amounts from the SIPP. It then models annual transitions separately for prior year beneficiaries and prior-year nonbeneficiaries. Means-tested and non-means-tested benefits depend on lagged benefit status, lagged SSI receipt, age, marital status, education, health status, number of children, financial assets, longitudinal earnings, and a measure of a change in earnings or impending death. DYNASIM first projects benefit receipt and then benefit amounts among beneficiaries.

Total Retirement Income

DYNASIM projects income and assets annually from 2006 to 2087 by age, gender, marital status, race and ethnicity, poverty status, geographic region, educational attainment, per capita lifetime work years, nativity, and per capita income quintile. Results can be summarized for any individual year and in numerous ways. Typically, income and assets are measured on a per capita basis in current price-adjusted dollars. Per capita values are half the sum of a married couple's values and own values for single people. Our measure of per capita lifetime work years is the sum of years with positive earnings since 1951.¹² In years when both spouses have positive earnings, both partners get one year of work credit. If only one partner works, both partners get half a year of work credit. If neither partner works, both partners get zero work credits. Single individuals get work credits based on their own earnings in years they are single. DYNASIM also calculates the income of nonspouse family members, which is used only for calculating poverty status.

DYNASIM can generate three per capita income measures (census, annuity, and return income) that vary by the asset income source and by the inclusion of imputed rental income. Per capita income is the sum of a married couple's income divided by two and own income for single individuals. DYNASIM can also calculate equivalent income that uses the family size parameters used to determine supplemental poverty to adjust for family size (Short and Garner 2012). The model also can use these optional measures in replacement rate calculations based on the highest 35 years of earnings between ages 20 and 70 or the average of earnings received between ages 50 and 54. Poverty measures used to assess well-being in retirement also include the income of nonspouse family members.

Census income is the sum of per capita earnings, Social Security, SSI, DB pension, interest, dividends, net rental income, means-tested and non-means-tested benefits, and retirement account withdrawals. Except for the per capita conversion, this is the standard measure the US Census Bureau uses to calculate personal income. The census income poverty rate includes family census income (including nonspouse family members) divided by the family poverty threshold. Equivalent income uses census income divided by the family equivalence factor (relative to a two-adult, two-child family).

Annuity income is the sum of per capita earnings, Social Security, SSI, DB pension, and annuitized asset income. The annuity income poverty rate uses family annuity income (including nonspouse family members) divided by the family poverty threshold.

The annuitized asset income measure calculates income from retirement accounts and financial assets each year as the real (price-indexed), actuarially fair annuity income a family would receive if it annuitized 80 percent of its retirement accounts and other financial assets (using a 3 percent annual real return). The annuity factor is recalculated each year to reflect changes in wealth as people age, based on DYNASIM projections of wealth accumulation and spend down and changes in life expectancy and marital status as people survive to older ages. For married couples, DYNASIM assumes a 50 percent survivor annuity.

The annuity measure ensures comparability with DB pension and Social Security benefits, which are also annuities. Without this type of adjustment, DYNASIM would overstate the loss in retirement well-being from the shift from DB pension income to DC assets. A dollar in DB pension wealth produces more income by standard measures than a dollar in DC wealth because measured DB income counts both a return on accumulated assets and some return of principal, but measured income from financial wealth includes only the return on accumulated assets and realized retirement account withdrawals. The annuity measure differs conceptually from the Census measure, which includes only the rate of return on assets (interest, dividends, and rental income) and excludes the potential consumption of capital that could be realized if a person spent down his or her wealth.¹³

Return income is the sum of per capita earnings, Social Security, SSI, DB pension, and a 6 percent return on retirement and financial assets. The return income poverty rate includes family return income (including nonspouse family members) divided by the family poverty threshold.

The return income measure provides a measure of well-being from both income-generating assets (like stocks, bonds, and savings accounts) and non-income-generating assets (like vehicles and vacation property), but it does not include a factor based on life expectancy. A problem with the annuity measure is that it typically shows asset income increasing with age because the remaining assets support fewer

years of remaining life. In reality, the assets of seniors generally decline with age. The return measure captures this pattern. Unlike the Census measure, which excludes asset values inside of retirement accounts unless they are withdrawn, the return income includes notional returns on retirement accounts.

The model optionally captures the amount by which homeowners are better off than those without any home equity. DYNASIM imputes a 3 percent rate of return to housing equity (imputed rent) that represents the savings in rent from owning a home, net of costs of interest and home maintenance. DYNASIM does not project the rapid increase in home values between 2004 and 2006, nor does it project the rapid decline in home values between 2006 and 2009.¹⁴ Instead, it projects steadier, smoothed growth in home equity through this period based on Panel Study Income Dynamics- and Health and Retirement Study-estimated models of home equity. It accounts for the housing bubble and bust by using an out-of-the-model adjustment calculated from the 2006–14 American Community Survey data at the state level.

Appendix B. Tables

APPENDIX TABLE B.1

Men's Labor Force Participation Rates (%)

By age and birth cohort

	Age									
	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70
1931-35			97.7	96.7	94.3	92.0	88.1	77.0	47.2	28.0
1936-40		97.3	97.2	95.5	94.2	92.1	87.4	75.4	50.4	29.1
1941-45	87.9	95.8	96.2	95.2	93.2	91.9	84.4	74.4	53.6	36.0
1946-50	84.7	94.6	96.5	94.4	93.6	90.5	85.3	75.0	54.5	33.9
1951-55	86.4	94.0	94.4	94.5	90.4	89.5	84.1	76.5	57.9	
1956-60	87.3	93.6	93.4	91.6	91.7	89.0	83.5	75.6		
1961-65	87.6	93.0	93.3	92.9	90.5	87.4	83.4			
1966-70	85.6	92.8	93.5	91.7	89.3	87.4				
1971-75	85.0	91.8	92.6	91.3	89.8					
1976-80	84.5	90.3	90.7	89.3						
1981-85	82.4	88.2	90.1							
1986-90	77.4	88.3								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Note: The labor force participation rate is the share of the civilian noninstitutionalized population working or looking for work.

APPENDIX TABLE B.2

Women's Labor Force Participation Rates (%)

By age and birth cohort

	Age									
	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70
1931-35			40.2	51.5	58.1	64.5	60.8	52.8	34.5	18.0
1936-40		37.4	46.9	58.4	67.0	68.1	64.9	55.9	37.3	20.8
1941-45	48.2	44.7	54.4	66.4	72.3	73.8	70.3	59.6	42.0	25.2
1946-50	55.5	57.1	66.9	72.8	78.1	77.3	72.4	63.5	47.0	25.7
1951-55	64.1	66.9	71.4	75.3	78.5	79.0	73.3	65.3	47.1	
1956-60	69.3	70.9	73.6	76.9	79.1	77.2	72.3	65.6		
1961-65	72.0	73.2	74.1	77.7	77.3	76.0	72.4			
1966-70	70.8	75.1	75.7	74.7	76.7	75.3				
1971-75	72.7	76.1	73.2	75.1	74.9					
1976-80	74.8	73.7	73.2	74.9						
1981-85	71.4	73.5	73.0							
1986-90	70.2	75.1								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Note: The labor force participation rate is the share of the civilian noninstitutionalized population working or looking for work.

APPENDIX TABLE B.3

Men's Full-Time Employment Rates (%)

By age and birth cohort

	Age									
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
1931-35			95.8	95.9	92.2	89.5	85.8	74.7	43.7	20.3
1936-40		94.4	95.7	93.1	92.1	88.2	83.4	71.0	46.3	21.7
1941-45	85.4	93.7	93.5	92.7	90.3	88.4	81.9	71.6	48.4	25.7
1946-50	79.8	90.5	93.1	90.2	90.0	87.8	82.6	71.2	48.2	26.4
1951-55	78.7	89.0	89.8	90.3	86.5	87.2	79.6	69.2	52.4	
1956-60	81.0	87.3	88.9	87.9	89.3	85.4	75.7	70.5		
1961-65	76.7	87.5	87.7	90.4	86.4	79.0	79.0			
1966-70	76.1	85.2	90.3	87.7	80.7	82.3				
1971-75	72.7	87.0	87.8	82.2	84.2					
1976-80	75.0	84.0	80.8	83.9						
1981-85	69.2	75.3	82.8							
1986-90	56.0	78.9								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Note: The table shows the percentage of civilian noninstitutionalized men employed full time (35 or more hours per week).

APPENDIX TABLE B.4

Women's Full-Time Employment Rates (%)

By age and birth cohort

	Age									
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
1931-35			34.6	40.7	42.1	49.9	47.1	40.7	25.4	8.6
1936-40		36.1	37.1	43.4	51.0	54.0	52.5	45.3	27.8	12.3
1941-45	51.0	40.1	40.4	49.0	56.7	60.1	57.0	48.7	32.1	15.0
1946-50	56.3	49.6	50.4	55.0	61.9	63.2	61.4	51.5	35.4	15.8
1951-55	57.2	55.9	54.0	59.0	62.5	65.9	60.4	51.4	36.7	
1956-60	60.7	57.8	58.4	59.2	63.9	63.8	57.4	54.1		
1961-65	59.0	61.7	58.4	61.7	61.1	59.1	59.4			
1966-70	59.4	61.8	62.5	59.7	59.0	60.6				
1971-75	56.7	66.5	59.2	57.4	60.5					
1976-80	58.8	62.1	56.8	60.2						
1981-85	53.4	57.6	59.7							
1986-90	44.7	61.2								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Note: The table shows the percentage of civilian noninstitutionalized women employed full time (35 or more hours per week).

APPENDIX TABLE B.5

Median Annual Earnings for Full-Time Male Workers, by Age and Birth Cohort

Constant 2017 dollars

	Age									
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
1931-35			51,600	58,600	60,000	59,800	57,500	55,200	50,200	43,000
1936-40		47,000	57,400	60,000	59,800	60,700	59,000	53,500	50,200	44,800
1941-45	35,200	51,500	58,100	59,800	62,000	60,900	56,800	57,400	57,000	49,300
1946-50	38,200	48,700	53,800	59,200	59,800	60,000	64,500	60,800	56,700	56,100
1951-55	34,600	44,800	50,600	57,100	56,800	60,200	60,700	56,700	55,900	
1956-60	32,900	42,500	48,500	51,900	57,400	58,200	56,700	57,000		
1961-65	28,700	40,000	45,400	54,500	55,700	56,700	57,000			
1966-70	28,600	38,100	50,200	52,400	54,500	57,000				
1971-75	25,900	43,000	48,100	53,300	57,000					
1976-80	28,700	38,000	45,400	51,800						
1981-85	28,200	39,600	48,700							
1986-90	27,200	39,900								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Note: Estimates are rounded to the nearest \$100.

APPENDIX TABLE B.6

Median Annual Earnings for Full-Time Female Workers, by Age and Birth Cohort

Constant 2017 dollars

	Age									
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
1931-35			23,500	26,900	30,000	29,900	33,000	33,100	29,900	31,600
1936-40		21,900	26,300	28,100	29,900	33,100	34,300	32,400	34,400	30,400
1941-45	22,500	26,800	29,400	29,900	34,200	38,100	35,800	37,300	36,700	39,700
1946-50	24,400	30,000	30,400	34,500	38,100	37,300	41,600	40,500	40,800	41,400
1951-55	24,100	29,900	34,500	36,200	38,900	41,600	44,300	43,100	41,400	
1956-60	23,900	32,200	34,300	35,700	39,200	40,500	43,100	41,400		
1961-65	24,000	31,400	34,100	38,700	40,500	40,800	41,400			
1966-70	23,900	32,400	37,300	39,900	40,800	42,200				
1971-75	23,500	35,900	38,000	42,000	41,400					
1976-80	25,800	34,900	39,700	42,300						
1981-85	25,300	35,200	39,600							
1986-90	25,000	36,300								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

Note: Estimates are rounded to the nearest \$100.

APPENDIX TABLE B.7

Percentage of Full-Time Male Workers Participating in an Employer-Sponsored Retirement Plan

By age and birth cohort

	Age									
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
1931-35						63.8	62.1	56.6	52.7	37.8
1936-40					60.2	62.1	58.8	57.5	50.6	35.6
1941-45				61.0	59.4	58.5	59.2	60.1	52.9	39.7
1946-50			57.8	59.8	58.3	60.5	61.8	56.9	53.0	34.3
1951-55		51.8	52.6	53.9	57.1	61.5	57.6	54.2	42.2	
1956-60	40.9	44.2	48.8	55.1	58.5	54.7	53.5	46.1		
1961-65	30.7	40.6	49.2	54.9	51.7	52.6	43.4			
1966-70	27.6	39.9	50.6	49.3	50.4	41.8				
1971-75	28.6	43.5	45.5	48.5	40.1					
1976-80	31.5	35.9	43.3	38.6						
1981-85	26.4	37.1	35.5							
1986-90	28.7	31.1								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

APPENDIX TABLE B.8

Percentage of Full-Time Female Workers Participating in an Employer-Sponsored Retirement Plan

By age and birth cohort

	Age									
	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
1931-35						54.3	57.3	54.5	51.4	37.7
1936-40					54.6	54.7	54.1	55.2	55.7	38.5
1941-45				51.6	54.6	55.0	59.7	59.7	53.4	44.7
1946-50			52.9	53.5	55.2	59.9	63.4	61.5	55.7	42.7
1951-55		50.9	51.9	53.9	57.1	60.2	59.8	57.5	46.6	
1956-60	39.1	45.3	49.4	53.8	57.8	57.4	56.1	50.0		
1961-65	33.3	42.3	50.8	56.0	55.9	54.3	47.3			
1966-70	29.2	46.2	51.7	50.8	52.5	46.2				
1971-75	28.5	48.0	47.8	52.4	42.0					
1976-80	34.4	42.4	48.5	40.5						
1981-85	29.2	43.5	37.6							
1986-90	30.9	32.5								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

APPENDIX TABLE B.9

Percentage of Men Married

By age and birth cohort

	Age									
	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70
1931-35			86.7	87.6	84.3	83.1	82.5	79.6	80.6	80.6
1936-40		80.0	84.3	84.6	80.2	80.7	79.7	80.8	77.4	76.4
1941-45	55.4	76.2	80.7	78.9	77.9	76.4	77.0	75.5	77.7	74.5
1946-50	49.5	71.0	73.9	75.8	75.1	76.4	76.0	75.1	73.8	73.8
1951-55	42.1	61.5	67.7	69.5	69.2	71.0	70.1	70.4	71.7	
1956-60	34.1	54.1	62.1	66.2	70.1	68.2	69.5	68.0		
1961-65	27.4	50.3	60.3	66.6	66.4	66.5	65.9			
1966-70	22.2	46.1	61.6	65.4	65.3	64.8				
1971-75	20.4	45.5	60.6	65.1	66.8					
1976-80	18.8	42.0	55.8	64.1						
1981-85	15.9	36.2	51.9							
1986-90	12.4	32.7								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

APPENDIX TABLE B.10

Percentage of Women Married

By age and birth cohort

	Age									
	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70
1931-35			86.6	83.6	81.2	75.8	72.5	69.0	63.4	56.9
1936-40		85.9	83.6	78.9	75.5	72.8	71.1	68.2	63.0	58.0
1941-45	71.5	80.6	79.0	75.9	72.0	69.3	69.6	65.0	61.8	57.2
1946-50	64.8	75.4	72.9	72.2	70.0	69.6	66.7	64.5	61.5	57.7
1951-55	56.2	67.0	70.1	70.1	68.0	67.6	64.9	64.4	61.8	
1956-60	47.6	62.3	67.3	68.1	68.4	66.6	64.6	62.4		
1961-65	43.1	59.3	65.8	68.6	65.8	64.7	63.9			
1966-70	36.4	56.2	65.6	65.9	66.4	65.6				
1971-75	31.9	54.6	65.3	63.9	64.9					
1976-80	29.9	53.0	61.6	64.7						
1981-85	26.6	47.1	58.1							
1986-90	20.5	42.2								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

APPENDIX TABLE B.11

Percentage of Adults Who Own a Home

By age and birth cohort

	Age									
	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70
1931-35					75.0	79.2	79.6	78.6	80.7	80.8
1936-40				71.5	76.7	75.0	76.8	78.4	78.3	78.1
1941-45			65.4	73.4	70.5	73.6	75.8	77.2	79.6	78.8
1946-50		49.1	64.3	66.1	69.3	73.1	75.9	78.0	77.1	76.8
1951-55	20.4	47.6	55.2	62.4	66.6	72.0	73.0	75.0	73.8	
1956-60	21.4	38.0	51.5	60.5	68.9	70.4	70.5	71.8		
1961-65	15.0	33.9	51.5	62.7	66.8	66.4	67.3			
1966-70	11.9	33.7	53.8	62.0	63.2	61.6				
1971-75	11.3	35.0	53.3	55.8	58.5					
1976-80	13.0	35.2	45.6	51.4						
1981-85	12.9	28.4	40.6							
1986-90	8.9	24.3								

Source: Authors' estimates from the Annual Social and Economic supplement to the Current Population Survey, 1966 to 2016.

APPENDIX TABLE B.12

Per Capita Household Net Worth by Year

Constant 2017 dollars

	1989	1992	1995	1998	2001	2004	2007	2010	2013	2016
Mean	234,600	206,200	215,100	267,600	341,200	367,000	412,200	351,100	352,400	447,600
Median	66,900	59,800	60,000	73,700	83,600	88,400	95,800	63,500	64,400	71,900

Source: Authors' estimates from the Survey of Consumer Finances, 1989 to 2016.

Notes: Estimates are rounded to the nearest \$100. The sample was restricted to household heads and their spouses. The analysis divided household net worth by two married adults.

APPENDIX TABLE B.13

Prevalence of Household Assets and Debt by Type and Year (%)

	1989	1992	1995	1998	2001	2004	2007	2010	2013	2016
Financial wealth	90.9	91.6	92.6	94.0	94.4	94.5	94.7	94.8	95.3	98.6
Retirement accounts	41.1	44.2	49.3	52.4	56.4	53.7	56.4	54.2	52.9	55.8
Home equity	67.1	65.8	65.9	67.2	69.4	70.5	69.4	62.4	61.4	64.3
Outstanding debt	75.9	76.3	77.0	77.2	77.7	78.8	79.7	77.4	77.2	79.2

Source: Authors' estimates from the Survey of Consumer Finances, 1989 to 2016.

Note: The sample was restricted to household heads and their spouses.

APPENDIX TABLE B.14

Median Per Capita Household Wealth and Debt for Adults with Holdings by Type and Year

Constant 2017 dollars

	1989	1992	1995	1998	2001	2004	2007	2010	2013	2016
Financial wealth	15,200	14,400	16,500	23,300	27,400	21,700	23,700	17,800	17,300	18,500
Retirement accounts	13,700	14,800	16,000	21,700	24,800	30,000	32,300	32,100	38,200	39,700
Home equity	54,900	47,300	44,800	49,300	56,700	65,200	72,900	57,200	57,600	61,000
Outstanding debt	20,200	20,800	24,800	33,200	35,900	51,000	53,500	50,500	45,600	42,400

Source: Authors' estimates from the Survey of Consumer Finances, 1989 to 2016.

Notes: Estimates are rounded to the nearest \$100. The sample was restricted to household heads and their spouses in households with debt or holdings in the specified asset classes. The analysis divided household estimates by two for married adults.

APPENDIX TABLE B.15

Median Per Capita Household Net Worth by Age and Birth Cohort

Constant 2017 dollars

	Age								
	25-30	31-36	37-42	43-48	49-54	55-60	61-66	67-72	73-78
1926-31							121,800	155,700	158,600
1932-37						127,600	164,400	164,900	154,100
1938-43					114,500	151,800	199,400	175,100	216,500
1944-49				81,300	117,100	235,300	169,200	153,800	
1950-55			56,000	97,800	137,100	137,600	149,100		
1956-61		31,000	68,700	107,200	114,300	134,500			
1962-67	13,400	35,700	84,500	66,600	107,100				
1968-73	14,600	36,300	36,600	79,900					
1974-79	17,000	16,600	47,800						
1980-85	9,900	27,400							

Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: Estimates are rounded to the nearest \$100. The sample was restricted to household heads and their spouses. The analysis divided household net worth by two for married adults.

APPENDIX TABLE B.16

Percentage of Adults with Positive Financial Wealth by Age and Birth Cohort

	Age								
	25-30	31-36	37-42	43-48	49-54	55-60	61-66	67-72	73-78
1926-31							93.8	97.3	97.9
1932-37						92.5	94.9	97.0	97.5
1938-43					95.5	97.2	96.9	96.4	99.2
1944-49				93.6	96.3	95.7	97.7	98.8	
1950-55			92.0	96.8	94.2	96.3	99.0		
1956-61		89.6	95.4	95.5	96.2	98.8			
1962-67	89.9	91.5	94.8	94.5	98.7				
1968-73	90.1	91.9	93.9	98.9					
1974-79	92.4	94.9	98.3						
1980-85	90.2	97.8							

Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: The sample was restricted to household heads and their spouses. Financial wealth includes retirement account balances plus financial assets held outside of retirement accounts, including the value of bank accounts, certificates of deposit, annuities, trusts, stocks, bonds, mutual funds, and the cash value of life insurance.

APPENDIX TABLE B.17

Median Per Capita Household Financial Wealth for Wealth Holders by Age and Birth Cohort

Constant 2017 dollars

	Age								
	25-30	31-36	37-42	43-48	49-54	55-60	61-66	67-72	73-78
1926-31							26,100	52,600	28,800
1932-37						37,400	52,600	43,900	32,000
1938-43					33,900	50,000	51,800	37,000	56,300
1944-49				18,900	44,900	72,300	48,200	44,300	
1950-55			12,100	31,600	43,500	48,200	51,500		
1956-61		8,800	25,000	27,100	35,600	44,800			
1962-67	4,700	12,900	24,400	20,900	29,300				
1968-73	6,100	11,900	13,100	26,300					
1974-79	5,200	7,700	16,300						
1980-85	5,300	9,600							

Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: Estimates are rounded to the nearest \$100. The sample was restricted to household heads and their spouses in households with positive financial wealth. The analysis divided household net worth by two for married adults. Financial wealth includes retirement account balances plus financial assets held outside of retirement accounts, including the value of bank accounts, certificates of deposit, annuities, trusts, stocks, bonds, mutual funds, and the cash value of life insurance.

APPENDIX TABLE B.18

Percentage of Adults with Retirement Accounts by Age and Birth Cohort

	Age								
	25-30	31-36	37-42	43-48	49-54	55-60	61-66	67-72	73-78
1926-31							49.8	48.2	45.8
1932-37						53.9	53.4	47.7	46.9
1938-43					58.9	66.1	54.9	49.2	46.1
1944-49				56.7	60.8	66.7	59.3	51.6	
1950-55			52.5	62.3	61.1	63.4	58.9		
1956-61		46.0	65.5	63.6	64.7	64.9			
1962-67	40.1	56.0	62.3	61.1	62.7				
1968-73	47.2	56.0	57.2	64.5					
1974-79	44.1	52.4	61.6						
1980-85	49.2	55.1							

Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: The sample was restricted to household heads and their spouses. Retirement accounts include the value of IRAs, Keogh accounts, and employer-sponsored retirement accounts, such as 401(k) plans.

APPENDIX TABLE B.19

Median Per Capita Value of Retirement Accounts for Accountholders by Age and Birth Cohort

Constant 2017 dollars

	Age								
	25-30	31-36	37-42	43-48	49-54	55-60	61-66	67-72	73-78
1926-31							24,200	28,400	38,700
1932-37						31,300	58,600	51,600	56,100
1938-43					32,100	37,400	77,400	56,100	94,600
1944-49				21,100	40,100	69,000	98,100	83,900	
1950-55			10,400	26,200	51,200	67,300	94,600		
1956-61		7,200	20,900	31,600	48,800	71,200			
1962-67	4,200	12,900	30,300	35,900	63,100				
1968-73	6,000	12,900	23,600	42,700					
1974-79	9,800	13,500	25,700						
1980-85	7,300	14,800							

Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: Estimates are rounded to the nearest \$100. The sample was restricted to household heads and their spouses in households with at least one retirement account. The analysis divided household net worth by two for married adults. Retirement account balances include the value of IRAs, Keogh accounts, and employer-sponsored retirement accounts, such as 401(k) plans.

APPENDIX TABLE B.20

Percentage of Adults with Positive Home Equity Age and Birth Cohort

	Age								
	25-30	31-36	37-42	43-48	49-54	55-60	61-66	67-72	73-78
1926-31							81.9	85.9	89.3
1932-37						78.1	82.6	83.8	83.7
1938-43					78.7	82.1	82.1	82.0	84.8
1944-49				74.5	76.1	81.7	79.3	80.6	
1950-55			67.4	74.9	79.7	72.0	79.2		
1956-61		58.3	69.2	76.3	70.6	73.3			
1962-67	39.5	58.3	72.6	65.5	71.1				
1968-73	42.7	60.3	57.6	65.2					
1974-79	47.1	45.7	56.7						
1980-85	37.2	49.7							

Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: The sample was restricted to household heads and their spouses. Home equity is the value of a primary residence minus any outstanding housing debt, such as mortgages and home equity loans.

APPENDIX TABLE B.21

Median Per Capita Value of Home Equity for Equity Holders by Age and Birth Cohort

Constant 2017 dollars

	Age								
	25-30	31-36	37-42	43-48	49-54	55-60	61-66	67-72	73-78
1926-31							69,500	77,800	104,500
1932-37						60,800	76,300	96,100	95,300
1938-43					55,600	66,800	104,500	89,700	94,100
1944-49				47,600	55,300	100,700	84,100	83,400	
1950-55			34,700	48,600	71,000	75,700	73,800		
1956-61		26,900	33,600	61,900	67,300	78,800			
1962-67	17,400	24,700	48,400	50,500	64,600				
1968-73	17,900	32,300	32,500	47,800					
1974-79	24,500	23,000	38,100						
1980-85	15,700	30,500							

Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: Estimates are rounded to the nearest \$100. The sample was restricted to household heads and their spouses in households with positive financial wealth. The analysis divided household net worth by two for married adults. Home equity is the value of a primary residence minus any outstanding housing debt, such as mortgages and home equity loans.

APPENDIX TABLE B.22

Percentage of Adults with Outstanding Debt by Age and Birth Cohort

	Age								
	25-30	31-36	37-42	43-48	49-54	55-60	61-66	67-72	73-78
1926-31							64.1	51.4	53.8
1932-37						75.3	62.9	58.7	45.6
1938-43					84.9	80.8	68.2	64.5	61.7
1944-49				88.7	88.8	79.9	74.4	69.0	
1950-55			89.0	88.5	89.2	81.2	74.9		
1956-61		87.6	90.7	89.7	83.5	80.4			
1962-67	84.5	87.8	90.9	88.7	86.3				
1968-73	86.6	87.6	87.4	88.7					
1974-79	81.4	85.4	88.5						
1980-85	82.7	86.8							

Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: The sample was restricted to household heads and their spouses. Debt includes outstanding housing debt, installment loans, credit card balances, and other debt held by a household.

APPENDIX TABLE B.23

Median Per Capita Value of Outstanding Household Debt for Debt Holders by Age and Birth Cohort

Constant 2017 dollars

	Age								
	25-30	31-36	37-42	43-48	49-54	55-60	61-66	67-72	73-78
1926-31							14,300	6,700	13,300
1932-37						16,700	18,700	19,400	27,100
1938-43					26,100	29,900	25,400	27,500	17,800
1944-49				34,700	44,300	42,600	46,000	26,700	
1950-55			40,600	45,900	60,300	49,300	37,900		
1956-61		31,900	52,500	67,200	61,700	49,800			
1962-67	14,400	45,300	74,200	65,700	53,400				
1968-73	21,900	67,800	75,100	66,900					
1974-79	45,800	64,300	64,300						
1980-85	42,600	51,400							

Source: Authors' estimates from the Survey of Consumer Finances, 1992 to 2016.

Notes: Estimates are rounded to the nearest \$100. The sample was restricted to household heads and their spouses in households with positive financial wealth. The analysis divided household net worth by two for married adults. Debt includes outstanding housing debt, installment loans, credit card balances, and other debt held by a household.

Notes

1. We assigned household-level outcomes, such as wealth, to each person in a household.
2. For the 1976 to 1980 cohort, the 2011 observations consisted of workers ages 30 to 34, and 2016 observations consisted of workers ages 35 to 39.
3. Bricker et al. (2017) estimate that between 2013 and 2016, inflation-adjusted mean net worth increased 26 percent for households, and median net worth increased 16 percent. These growth estimates differ from ours because we computed mean and median per capita household net worth across household heads and spouses, not total net worth across households.
4. Between October 2007 and February 2009, the S&P 500 index lost 53 percent of its value.
5. Data from IRA administrators and retirement plan recordkeeping organizations show that median IRA balances increased 31 percent from 2010 to 2014 (Copeland 2017), while median 401(k) balances fell by about one-third between 2007 and 2008 before rebounding in 2013 to about their 2007 levels (VanDerhei et al. 2017).
6. Estimates from Equifax credit-report data, however, show that debt levels have been rising since 2013 and reached an all-time high in the third quarter of 2017 (Federal Reserve Bank of New York 2017).
7. For the 1926 to 1931 birth cohort, the figures report outcomes only for 1992, 1998, and 2004.
8. The random error term follows an autoregressive process with a one-year lag so that random shocks include both new and lagged effects.
9. The standard deviations are derived from real returns over the 58-year period between 1952 and 2010 for large-company stocks and Treasury bills as reported in Ibbotson Associates (2014). Inflation assumptions follow the 2016 intermediate assumptions used by the Social Security trustees (Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds 2016).
10. DYNASIM projects conversions of pension plan type (from DB to cash balance or DB to DC) by using actual plan change information through 2008 for plans included in the Pension Benefit Guaranty Corporation's pension income modeling system.
11. In a hard freeze, all workers cease accruing DB benefits and the firm switches to a DC plan. In a soft freeze, new workers are offered a DC plan instead of DB plan, and existing workers remain in the DB plan and continue to accrue benefits.
12. Early cohorts have censored work years because DYNASIM4's earnings data begin in 1951. We do not measure work years before 1951.
13. We calculate annuitized retirement accounts and financial (nonpension) assets by using the same annuity factors
14. Standard & Poor's. 2011. S&P/Case-Schiller Home Price Indices. <http://us.spindices.com/index-family/real-estate/sp-case-shiller>.

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STATEMENT OF INDEPENDENCE

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