Potential Impacts of the Great Recession on Future Retirement Incomes

Barbara A. Butrica, Richard W. Johnson, and Karen E. Smith

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Abstract

This study examines the long-run effects of the Great Recession on future retirement incomes for working-age adults using a microsimulation model. We estimate that the recession will reduce average age-70 annual incomes by four percent. Retirement incomes will fall most sharply for those workers who were youngest when the recession began. They are most likely to have lost their jobs and the impact of lower wages will accumulate over their entire careers. High-income retirees with the most to lose will also see substantial absolute income declines, but their losses are not particularly large when measured relative to their projected incomes.

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The Great Recession, as many analysts dubbed the 2007-09 economic downturn, lived up to its name. Economic activity plummeted, millions of workers lost their jobs, and unemployment soared (Elsby, Hobijn, and Sahin, 2010). Many jobless Americans were out of work for more than 12 months (Pew Economic Policy Group, 2010), and wages stagnated for those able to keep their jobs (Mishel and Shierholz, 2010). As incomes fell, families struggled to make ends meet and poverty rates surged (DeNavas-Walt, Proctor, and Smith, 2010; Godofsky, Van Horn, and Zukin, 2010; Hurd and Rohwedder, 2010). Declining tax revenues and expanding public expenditures swelled the federal deficit and squeezed state and local governments (Congressional Budget Office 2010; McNichol, Oliff, and Johnson, 2011). Although the National Bureau of Economic Research declared the recession over in 2009, many analysts predict that unemployment will stay above its pre-recession level for years (Eberts, 2011).

One fallout from the Great Recession is its impact on future retirees. Earlier research showed that the 2008 stock market crash could erode retirement security for high-income workers most likely to hold equities (Butrica, Smith, and Toder, 2009, 2010). But high unemployment could reduce future retirement incomes for a broader segment of the population, since in addition to reducing earnings, job loss will lower social security and pension credits, and leave workers with less income to set aside for retirement. This chapter uses the Urban Institute's dynamic microsimulation model (DYNASIM3) to examine the likely impacts of the Great Recession on future retirement incomes. The analysis projects average incomes to age 70 for adults who were ages 25-64 in 2008, and compares them to what retirees would have received if the recession had not occurred.

Our results show that the Great Recession will modestly reduce future retirement incomes. This drop results almost entirely from the anemic wage growth that occurred during the recession, which our model assumes will permanently reduce future wages. Employment declines will have little effect on future aggregate retirement incomes because most workers remained employed during the recession, and the losses that occurred are generally inconsequential when averaged over decades-long careers. Retirement incomes will fall most sharply for high-socioeconomic-status groups, who have the most to lose, but relative income losses will not vary much across groups. Those workers who were youngest when the recession began will be hit hard, since they are most likely to lose their jobs and the impact of lower wages will accumulate over their entire careers. But retirement incomes will also fall substantially for those now in their late 50s, because the drop in the economy-wide average wage will lower the index factor in the social security benefit formula, permanently reducing their annual benefits.

Methodology

To assess the impact of the Great Recession on future retirement security, we project incomes at age 70 for adults ages 25-64 in 2008 and compare them to what older adults would have received, had the recession not occurred. We focus on income at age 70 because the vast majority of adults have retired by then. The impact of high unemployment on future retirement incomes will likely depend on one's stage of the life course when the recession hit. To capture these differences, the analysis compares outcomes by 10-year cohorts, ranging from those ages 25-34 in 2008 (who turn 70 between 2044 and 2053) to those ages 55-64 in 2008 (who turn 70 between 2014 and 2023).

Projections come from the Urban Institute's Dynamic Simulation of Income Model, known as DYNASIM3. This model starts with a self-weighting sample of 103,072 individuals from the 1990 to 1993 panels of the United States Census Bureau's Survey of Income and Program Participation (SIPP) and ages this starting sample in yearly increments to 2085, using parameters estimated from longitudinal data sources. DYNASIM3 then projects demographic and economic changes annually from 1993 to 2085. The model integrates many important trends and group-level differences in life course processes, including birth, death, schooling, leaving home, first marriage, remarriage, divorce, disability, work, retirement, and earnings. It projects the major sources of income and wealth annually from age 15 until death, including employment, earnings, social security benefits, benefits from employer-sponsored defined benefit (DB) pensions, supplemental security income (SSI), retirement accounts (defined contribution or DC plans, IRAs, and Keoghs), and other assets (saving, checking, money market, certificates of deposit (CDs), stocks, bonds, equity in businesses, vehicles, and non-home real estate, less unsecured debt).

We examine the impact of the Great Recession on lifetime employment and several income measures including own lifetime earnings, per capita household lifetime earnings, and per capita household income at age 70. Individuals are considered employed in a given year if they have any earnings, even if they worked relatively few hours because they were unemployed for part of the year. (The Social Security Trustees follow the same convention when setting their employment targets.) As a result, employment rates calculated in DYNASIM3 do not match those from BLS, which are annual averages of monthly employment.[1] Own lifetime earnings are reported in 2010 dollars and averaged from ages 22-62. Per capita household earnings, which we term 'shared lifetime earnings,' are computed as half of the husband's and wife's earnings in

years when an individual is married and own earnings in years when single. As with own lifetime earnings, shared lifetime earnings are indexed to 2010 dollars and averaged from ages 22-62. Both measures include years with zero earnings. Per capita household income includes all income received by the individual and spouse, divided by two if married. It excludes income of other household members. Because income and asset distributions are highly skewed, we drop individuals in the top 1 percent of the income distribution to lessen the impact of these outliers on reported means. All financial amounts are reported in constant 2010 dollars (adjusted by the projected change in the consumer price index).

Our baseline simulation uses the Social Security Trustees' 2010 assumptions (Social Security Board of Trustees 2010), which account for the actual and projected effects of high unemployment and lower wages from the Great Recession. Our alternative scenario, designed to simulate outcomes if the recession had not occurred, is based largely on the Trustees' 2008 assumptions (Social Security Board of Trustees 2008). One complication is that some differences between the 2008 and 2010 Trustees' assumptions were unrelated to the recession. For example, the Trustees changed their assumptions about mortality and immigration after 2008. They also increased their long-range real wage growth assumptions from 1.1 to 1.2 percent per year, because the Affordable Care Act, signed by President Obama in March 2010, is expected to reduce employers' health care spending and boost earnings. To isolate the changes in the Trustees' assumptions between 2008 and 2010 related to the recession, we use adjusted 2008 targets in the no-recession simulation. That simulation uses the employment and disability onset rates from 2008 and assumes that real wages grow at the 2008 assumed rate through 2010, after which they grow at the higher rates assumed by the Trustees in 2010. Both the baseline and no-recession simulations, then, capture the expected impact of health reform on projected wage

growth. The no-recession scenario also uses the 2008 price growth series through 2010 and aligns price growth with the 2010 assumptions for later years.[2] As a result, the no-recession simulation includes permanently higher average earnings and price targets than the baseline simulation in all years after 2007. All other parameters in the no-recession simulation rely on the 2010 Trustees' assumptions.

Findings

Figure 1 shows actual and projected employment rates for persons ages 16-64 under the baseline scenario, where the impact of the Great Recession is evident. Employment rates fall from 82 to 75 percent for men and from 77 to 71 percent for women between 2007 and 2010. After 2010, employment rates are projected to gradually recover, stabilizing at about 80 percent for men and 74 percent for women in 2016.

Figure 1 here

Figure 2 shows projected labor earnings paths for the two scenarios, in 2010 dollars. Real earnings fall between 2007 and 2009 in the baseline scenario, but then grow at about two percent per year in the no-recession scenario. By the time earnings growth rates converge again in the two scenarios in 2010, average real earnings in the no-recession scenario exceed those in the baseline scenario by six percent, a differential that persists throughout the projection period. The absolute value of the real wage differential in the two scenarios grows from about $2,700 in 2010 to $3,200 in 2020 to $3,600 in 2030. The projected price targets do not differ much between the two scenarios.

Figure 2 here

The recession's impact on employment. Table 3-1 shows simulated employment rates in 2010 when actual unemployment peaked under the baseline scenario, and the absolute and percentage change relative to the no-recession scenario. In 2010, we estimate that 71.1 percent of 25-64 year-olds were working (had earnings), 3.4 percentage points (4.6 percent) below the share that would have been employed had the recession not occurred. The hardest hit were 35-44 year-olds, whose employment rate declined by 3.9 percentage points (5 percent). In contrast, 55-64-year-olds were least affected. Because older workers were less likely to lose their jobs during the Great Recession (as in previous recessions) than younger workers (Johnson and Mommaerts, 2011; Johnson and Park, 2011), their employment rate declined only by only 2.5 percentage points (4.0 percent). Men, blacks, Hispanics, those who did not complete high school, and those with intermittent employment histories and lower wages were generally hit harder by the recession than others. In the youngest age group, employment rates fell by 10.9 percent for those lacking high school diplomas, but only 3.4 percent for college graduates.

Table 3-1 here

Projecting outcomes to age 70 shows the effects of the recession compounded over a lifetime. Although employment rates fell by 3.4 percentage points in 2010—at the peak of the downturn in the labor market—most workers retained their jobs or received at least some earnings in the year they became unemployed. As a result, the average number of years worked between ages 22-62 is projected to decline by less than 1 percent for all cohorts (Table 3-2). Among the youngest age group, 66 percent are projected to work 30 or more years over their lifetimes. This share is only 0.5 percentage points below what it would have been, had the recession not occurred. The recession will have very little impact on lifetime work years for those closest to retirement when the downturn began.

Table 3-2 here

Projected incomes for future retirees. Although the Great Recession will not shorten

worklives, it is projected to reduce average own lifetime earnings by 3.4 percent, because the

economic downturn interrupted the growth in hourly wages (Table 3-3). The impact will be

greater for workers who were relatively young in 2008 and will spend much of their careers in

the new, lower-wage labor market, and smaller for older workers who will spend few years in the

less-inviting labor market. For example, the recession will reduce average own lifetime earnings

4.8 percent for those ages 25-34 in 2008, but only 0.7 percent for those ages 55-64. Results are

similar for husbands' and wives' shared lifetime earnings.

Table 3-3 here

Our projections also indicate that the recession will reduce social security benefits in two

ways. Because benefits are based on the average highest 35 years of earnings, the decline in

annual earnings after 2008 will directly reduce future benefits. Benefits will receive an additional

hit because they are indexed to the economy-wide average earnings in the year the beneficiary

turns age 60. Strong growth in average wages before age 60 raises future social security benefits

even for those whose own wages did not increase much, because the indexing means that all

earnings received before age 60 count more in the benefit formula than they would if average

wages grew more slowly. Our baseline scenario assumes that the recession will permanently

reduce earnings after 2008, in turn reducing the index factor in the social security benefit formula

for everyone who turns 60 after 2008. As a result, future social security benefits will generally

decline more sharply than lifetime earnings, especially for those approaching age 60 in 2008.

Average own social security benefits will drop 1.4 percent for those ages 55-64 in 2008, and 3.8

percent for those ages 45-54, or about twice the decline in lifetime earnings.[3] For those age 25-

34 who will spend nearly their entire careers in the post-recession labor market, the percentage decline in social security benefits roughly equals the percentage decline in lifetime earnings.

The recession will also affect other sources of retirement income outside of social security. Lower earnings will reduce wealth in employer retirement plans and limit workers' ability to save outside of them. Unemployed workers may be forced to dip into their retirement savings at relatively young ages to meet current consumption needs. Moreover, the recession will curtail post-retirement earnings.

Table 3-4 reports projected average per capita household income at age 70. We suggest that the recession will reduce annual household income by 4.1 percent (or $2,100 per person in 2010 dollars) for those closest to retirement when the recession hit, and by 4.9 percent (or $3,200 per person) for those farthest from retirement. For those ages 55-64 in 2008, average retirement incomes will drop more steeply than average social security benefits, primarily because their age-70 earnings will fall 9.0 percent and their income from assets outside of pension and retirement plans will fall 4.7 percent. Earnings at age 70 will drop so much for this age group because many lost their jobs late in life and will never become reemployed. We project that the recession will reduce age-70 employment rates by 2.3 percentage points for those ages 55-64 in 2008, but by only 0.2 percentage points for later cohorts (not shown). Wealth outside of pension plans falls for those near retirement when the recession hit, because the recession forced many to dip into their savings to meet current consumption needs, and they have little time to recoup their lost savings. For the youngest adults in 2008, the recession depresses overall retirement income by about the same percentage as social security benefits.

Table 3-4 here

The recession's impact on income sources is projected to vary across the income distribution. Retirees in the bottom income quintile receive most of their household income (around 71 percent) from Social Security benefits. As a result, the projected drop in Social Security benefits for these retirees' accounts for nearly the entire decline in their age-70 income. By contrast, retirees in the top income quintile receive relatively little of their household income (around 16 percent) from Social Security benefits, so the projected benefit decline explains only part of their total income losses. Although they will receive more social security benefits than lower-income retirees (despite the program's progressivity) and the recession will reduce their benefits more, this cut will account for only about 16 percent of the total income decline (averaged across all cohorts). Instead, the projected decline in household income for the highest-income retirees is driven mostly by drops in income from nonpension assets and earnings at age 70. For the youngest age group, 38 percent of their projected total loss is in nonpension asset income and 20 percent is in earnings. For the oldest age group, 41 percent of their projected total loss is in nonpension asset income and 44 percent is in earnings.

The recession-induced decline in household income is also projected to increase the number of Americans living in or near poverty at age 70. Table 3-5 reports the number and percentage of adults surviving to age 70 with incomes below 100 percent and 125 percent of the federal poverty level (FPL). We focus on those below the higher threshold because many with incomes that slightly exceed the FPL struggle financially (Zedlewski and Butrica, 2008). Moreover, the official poverty measure does not fully capture households' health care spending needs, a particularly pressing concern for many older Americans. The National Academy of Sciences developed a revised poverty threshold that better accounts for out-of-pocket spending (Citro and Michael, 1995). The 2009 poverty rate for adults age 65 and older under this revised

measure was about equal to the share with incomes below 125 percent of the official poverty threshold, suggesting that 125 percent of the FPL is an appropriate indicator for financial hardship at older ages (DeNavas-Walt, Proctor, and Smith, 2010; Short 2010).

Table 3-5 here

Across the four cohorts, the share of adults projected to have incomes below 125 percent of the FPL at age 70 will increase 7.4 percent because of the recession. The impact will grow over time, increasing 6.2 percent for those closest to retirement in 2008 and 9.6 percent for the youngest group. Among those ages 25-64 in 2008, the recession will leave an additional 711,000 adults with incomes below 125 percent of the FPL.[4]

Variation in projected outcomes by individual characteristics. Table 3-6 shows how the recession's impact on average per capita household income at age 70 is projected to vary across the population. Although employment rates fell most dramatically during the recession among those with the least education and earnings, these groups are unlikely to experience the sharpest declines in future retirement incomes. In absolute terms, incomes at age 70 will fall most for those with the highest incomes, who have most to lose. In relative terms, however, high-socioeconomic-status groups will not lose much more income than less privileged groups, because the large absolute losses for affluent groups represent only a small share of their total income. Within the youngest age group, the recession will reduce age-70 incomes for the highest-income retirees by 4.7 percent, compared with 3.5 percent for the lowest-income retirees. Although, the recession will cut future incomes for high-socioeconomic-status groups, they will remain much better off than others.

Table 3-6 here

Differential survival mutes the observed variation in retirement incomes at age 70. Table 3-7 shows survival rates by employment status. Among men ages 45-54 in 2008, 85.5 percent of those who worked every year between 2008 and 2013 will survive to age 70, compared with only 73.6 percent of those with at least one year of zero earnings during that period—about a 12 percentage point difference. These results suggest that the impact of the recession would be even worse had these individuals survived to age 70. Additionally, we would likely observe more significant effects for the recession if we compared retirement outcomes at younger ages.

Table 3-7 here

Conclusion

Our projections indicate that the Great Recession, by many measures the most severe economic downturn since the Great Depression, will modestly reduce future retirement incomes for today's workers. Workers unemployed for many months accumulate fewer social security and employer-sponsored pension credits, and are less able to contribute to retirement accounts or save in other ways. Most workers, however, remained employed during the recession, and the reduction in work years for those who lost their jobs was generally inconsequential when averaged over decades-long careers. More important for future retirement incomes is the wage stagnation that the recession triggered, since people can never make up lost wages. Lower wage growth affects nearly all workers, not just the relatively few who lost their jobs. Our results show that average age-70 incomes for those ages 25-64 when the recession began will fall 4.3 percent from the levels that would have prevailed had the recession not occurred, almost entirely because of the long-term reduction in wages.

Unemployment rates rose sharply during the recession for workers with limited education, yet the recession will not disproportionately reduce their retirement incomes. Because lower-socioeconomic-status groups are less likely to have pensions or to accumulate significant retirement savings even in good times, they had less to lose. The most disadvantaged are also less likely to survive into old age. Low-income and less-educated workers have certainly suffered during the recession, with unemployment leaving many impoverished. And even modest retirement income losses could significantly reduce their economic well-being in later life, because their resources are so limited even in the absence of the recession. Nonetheless, retirement incomes will fall most sharply for well-educated, high-income workers, the same groups that have borne the brunt of the stock market crash associated with the financial crisis (Butrica, Smith, and Toder, 2009, 2010).

Projecting incomes over the next 40 years involves much uncertainty, and future developments could lead to outcomes very different from our forecasts. Retirement projections are more certain for those who were in their late 50s when the recession began. The recession will undoubtedly reduce their social security income because the index factor in the benefit formula is lower today than it would have been had the recession not occurred. Moreover, those older workers who lost their jobs in the recession have limited employment prospects and little chance of extending their working lives. Unlike workers who were young when the recession hit and have years to adjust before retiring, there is little older workers can do to offset their recession-induced losses.

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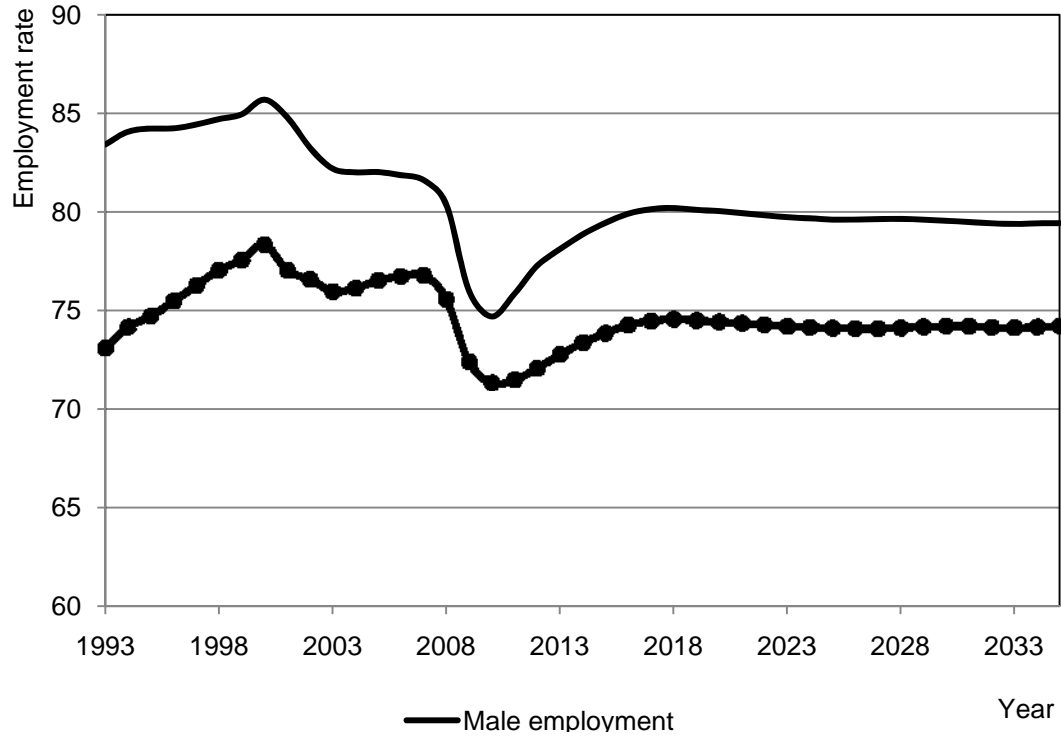
Figure 1. Employment rate of men and women ages 16-64: 1993 to 2035. *Source:* Authors' calculations from data provided by the Social Security Board of Trustees (2008 and 2010).
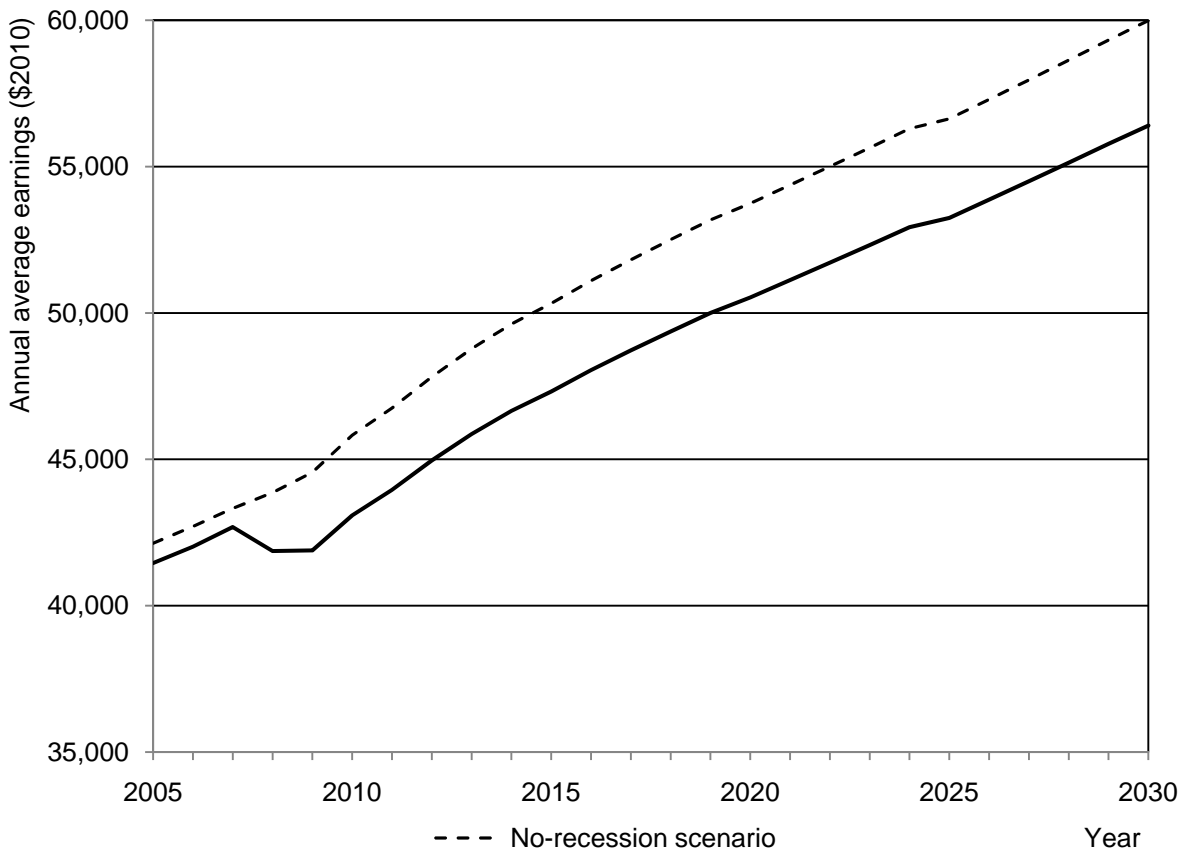
Figure 2. Average earnings of workers by simulation in $2010: 2005 to 2030. *Source:* Authors' calculations from data provided by the Social Security Board of Trustees (2008 and 2010).

Table 1. Employment rates in 2010, adults ages 25-64

	Employment rate (%)					Absolute change due to recession					Percent change due to recession				
Age in 2008		25-34	35-44	45-54	55-64		25-34	35-44	45-54	55-64		25-34	35-44	45-54	55-64
Year Age 70	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23
All	71.1	74.1	73.8	74.7	59.8	-3.4 ***	-3.7 ***	-3.9 ***	-3.3 ***	-2.5 ***	-4.6	-4.8	-5.0	-4.2	-4.0
Gender															
Female	67.8	70.7	71.2	72.6	54.5	-2.5 ***	-2.9 ***	-3.0 ***	-1.9 ***	-2.1 **	-3.6	-3.9	-4.0	-2.6	-3.7
Male	74.8	77.8	76.4	77.0	65.9	-4.4 ***	-4.4 ***	-4.9 ***	-4.9 ***	-3.0 ***	-5.6	-5.4	-6.0	-6.0	-4.4
Race/Ethnicity															
Non-Hispanic white	75.3	79.8	78.1	78.8	63.6	-3.3 ***	-3.8 ***	-3.9 ***	-3.1 ***	-2.4 ***	-4.2	-4.5	-4.8	-3.8	-3.6
Non-Hispanic black	67.2	78.0	73.9	68.5	38.3	-4.0 ***	-2.9 **	-4.4 ***	-4.7 ***	-4.1 *	-5.6	-3.6	-5.6	-6.4	-9.7
Hispanic	58.2	60.3	59.0	58.1	51.5	-3.9 ***	-4.3 ***	-4.4 ***	-4.2 **	-1.6	-6.3	-6.7	-6.9	-6.7	-3.0
Asian/Native American	62.6	59.8	64.3	67.6	59.0	-2.4 **	-2.5	-2.2	-2.3	-2.8	-3.7	-4.0	-3.3	-3.3	-4.5
Education															
Did not complete high school	38.9	42.6	40.4	38.7	33.3	-4.2 ***	-5.2 ***	-4.7 ***	-4.8 ***	-1.5	-9.7	-10.9	-10.4	-11.0	-4.3
High school grad or some college	71.1	75.4	74.1	75.5	57.3	-3.7 ***	-3.9 ***	-4.3 ***	-3.7 ***	-2.8 ***	-4.9	-4.9	-5.5	-4.7	-4.7
College grad	83.1	82.4	84.9	87.7	75.8	-2.5 ***	-2.9 ***	-2.8 ***	-1.8 **	-2.4 **	-2.9	-3.4	-3.2	-2.0	-3.1
Years worked from age 15 through 2010															
<= 10	35.0	44.9	29.2	22.6	18.9	-3.0 ***	-3.9 ***	-2.5 **	-2.3	-0.8	-7.9	-8.0	-7.9	-9.2	-4.1
11-29	77.2	89.1	81.5	63.4	36.8	-3.7 ***	-3.2 ***	-4.0 ***	-4.5 ***	-2.4 *	-4.6	-3.5	-4.7	-6.6	-6.1
30+	81.6	0.0	96.5	90.3	71.1	-2.6 ***	0.0 .	-2.4 ***	-2.6 ***	-2.7 ***	-3.1	.	-2.4	-2.8	-3.7
Own lifetime earnings quintile															
Bottom	29.9	28.7	31.2	33.2	25.5	-2.7 ***	-2.9 **	-3.1 **	-3.2 **	-1.4	-8.3	-9.2	-9.0	-8.8	-5.2
Second	69.3	75.7	72.2	74.3	51.9	-4.5 ***	-5.4 ***	-5.6 ***	-3.5 ***	-2.9 **	-6.1	-6.7	-7.2	-4.5	-5.3
Third	79.7	84.3	83.1	83.1	65.8	-3.7 ***	-3.8 ***	-4.3 ***	-4.0 ***	-2.0	-4.4	-4.3	-4.9	-4.6	-2.9
Fourth	86.1	89.5	89.9	89.4	73.3	-3.2 ***	-3.0 ***	-3.0 ***	-3.2 ***	-3.5 ***	-3.6	-3.2	-3.2	-3.5	-4.6
Top	90.6	92.5	92.6	93.4	82.4	-3.0 ***	-3.1 ***	-3.4 ***	-2.7 ***	-2.8 ***	-3.2	-3.2	-3.5	-2.8	-3.3

Notes: *** Significant at 1% level; ** at 5% level; * at 10% level. Sample excludes individuals with incomes in the top 1 percent of the income distribution. Years worked is the number of years with positive earnings from age 15 through 2010. Own lifetime earnings is the average of wage-indexed earnings from age 15 until 2010. Quintiles are calculated within age groups.
Source: Authors' computations from DYNASIM3 projections.

Table 2. Projected work histories of future retirees at age 70

| | Baseline work history | | | | | Absolute change due to recession | | | | | Percent change due to recession | | | | |
| Age in 2008 | | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 |
Year age 70	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23
Average age worked	31.1	31.1	31.2	31.2	30.8	-0.1	-0.1	-0.2	-0.2	-0.1	-0.3	-0.3	-0.6	-0.6	-0.3
Distribution of years worked (%)																
≤10	8	7	8	8	9	0.1	0.1	0.0	0.2	0.1	1.2	1.4	0.0	2.5	1.1
11-29	24	27	23	22	22	0.3	0.4	0.6	0.4	0.0	1.3	1.5	2.7	1.8	0.0
30+	68	66	69	69	68	-0.5 *	-0.5	-0.6	-0.5	-0.1	-0.7	-0.7	-0.9	-0.7	-0.1

Notes: Sample excludes individuals with incomes in the top 1 percent of the income distribution. Years worked is the number of years with positive earnings between ages 22-62.
Source: Authors' computations from DYNASIM3 projections.

Table 3. Projected income of future retirees at age 70

| | Average income (thousands of $2010) | | | | | Absolute change due to recession (thousands of $2010) | | | | | Percent change due to recession | | | | |
| Age in 2008 | | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 | | 25-34 | 35-44 | 45-54 | 55-64 |
Year Age 70	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23
Own lifetime earnings	36.6	42.2	39.5	32.9	30.5	-1.3 ***	-2.1 ***	-1.8 ***	-0.7 **	-0.2	-3.4	-4.8	-4.3	-2.2	-0.7
Shared lifetime earnings	36.0	41.7	38.7	32.6	30.2	-1.3 ***	-2.1 ***	-1.7 ***	-0.7 ***	-0.2	-3.4	-4.8	-4.2	-2.2	-0.7
Own Social Security benefits	17.1	19.5	18.0	16.2	14.5	-0.7 ***	-1.0 ***	-0.8 ***	-0.6 ***	-0.2 ***	-4.1	-4.6	-4.5	-3.8	-1.4
Per capita household Social Secirty benefits	16.1	18.3	16.7	15.2	13.6	-0.6 ***	-0.7 ***	-0.7 ***	-0.6 ***	-0.2 ***	-3.8	-3.9	-4.2	-4.0	-1.5

Notes: *** Significant at 1% level; ** at 5% level; * at 1% level. Sample excludes individuals with incomes in the top 1 percent of the income distribution. Own lifetime earnings is the average of wage-indexed earnings between ages 22-62. Shared lifetime earnings is the average of wage-indexed shared earnings between ages 22-62, where shared earnings are half the total earnings of the couple in the years when married and individual earnings in years when not married.
Source: Authors' computations from DYNASIM3 projections.

Table 4. Average per capita household income of future retirees at age 70 by income source and income quintile

	Average per capita household income (thousands of $2010)					Absolute change due to recession (thousands of $2010)					Percent change due to recession				
Age in 2008		25-34	35-44	45-54	55-64		25-34	35-44	45-54	55-64		25-34	35-44	45-54	55-64
Year age 70	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23
All															
Total income	54.5	61.1	57.8	49.3	49.0	-2.4 ***	-3.2 ***	-2.4 ***	-2.1 ***	-2.1 ***	-4.3	-4.9	-4.0	-4.1	-4.1
Earnings	11.5	13.3	12.8	10.0	9.6	-0.6 ***	-0.6 **	-0.2	-0.6 **	-1.0 ***	-5.2	-4.5	-1.6	-5.9	-9.0
DB pension benefits	4.2	3.9	3.7	3.9	5.8	-0.2 **	-0.3 *	-0.2	-0.2	0.0	-4.8	-7.5	-5.4	-5.1	0.0
DC assets	6.1	6.8	6.8	5.8	5.0	-0.2 ***	-0.5 ***	-0.3 **	-0.1	-0.1	-3.3	-7.2	-4.5	-1.8	-2.1
Social Security benefits	16.1	18.3	16.7	15.2	13.6	-0.6 ***	-0.7 ***	-0.7 ***	-0.6 ***	-0.2 ***	-3.8	-3.9	-4.2	-4.0	-1.5
SSI benefits	0.1	0.1	0.1	0.1	0.2	0.0 **	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-pension assets	16.5	18.8	17.7	14.2	14.9	-0.7 ***	-0.8 *	-0.8 **	-0.6 *	-0.7 *	-4.3	-4.3	-4.5	-4.3	-4.7
Bottom quintile															
Total income	10.4	11.5	10.4	10.0	9.5	-0.4 ***	-0.4 ***	-0.4 ***	-0.3 ***	-0.1	-3.9	-3.5	-3.9	-3.1	-1.1
Earnings	0.6	0.7	0.6	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DB pension benefits	0.3	0.3	0.3	0.3	0.3	0.0	0.0 *	0.1	0.0	0.0	0.0	0.0	50.0	0.0	0.0
DC assets	0.3	0.4	0.4	0.3	0.3	0.0	0.0 **	0.1	0.0	0.0	0.0	0.0	33.3	0.0	0.0
Social Security benefits	7.4	8.3	7.3	7.2	6.5	-0.3 ***	-0.3 **	-0.3 **	-0.3 ***	-0.1	-4.1	-3.7	-4.2	-4.2	-1.6
SSI benefits	0.6	0.5	0.6	0.6	0.8	0.0 **	0.1	0.0	0.0	0.1	0.0	25.0	0.0	0.0	14.3
Non-pension assets	1.1	1.3	1.2	1.1	0.8	-0.1 ***	0.0	-0.1 **	-0.1 **	0.0	-9.1	0.0	-8.3	-9.1	0.0
Middle quintile															
Total income	36.8	39.8	38.1	34.7	33.9	-1.8 ***	-2.2 ***	-2.1 ***	-1.5 ***	-1.3 ***	-4.7	-5.3	-5.2	-4.1	-3.6
Earnings	6.3	7.1	6.9	5.7	5.6	-0.4 ***	-0.4 *	-0.3	-0.4 *	-0.6 ***	-6.3	-5.6	-4.4	-6.9	-10.2
DB pension benefits	2.7	2.2	2.2	2.5	4.0	-0.1 ***	-0.1	-0.2	-0.2 *	-0.2	-3.7	-4.5	-8.7	-7.7	-5.0
DC assets	4.3	4.3	4.5	4.2	4.0	-0.2 ***	-0.3 *	-0.4 ***	-0.1	-0.1	-4.7	-6.8	-8.5	-2.4	-2.6
Social Security benefits	17.3	19.4	18.2	16.5	14.8	-0.5 ***	-1.0 ***	-0.6 ***	-0.5 ***	-0.1	-3.0	-4.7	-3.4	-3.1	-0.7
SSI benefits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-pension assets	6.0	6.7	6.3	5.6	5.5	-0.4 ***	-0.5 **	-0.6 ***	-0.2	-0.2 *	-6.6	-7.4	-9.1	-3.6	-3.7
Top quintile															
Total income	141.9	162.2	152.9	124.2	125.7	-6.2 ***	-7.9 ***	-5.3 ***	-5.5 ***	-6.1 ***	-4.2	-4.7	-3.3	-4.2	-4.6
Earnings	33.6	39.8	37.5	28.7	27.0	-1.3 ***	-1.6	0.3	-1.6 *	-2.7 ***	-3.6	-3.8	0.9	-5.2	-9.2
DB pension benefits	11.6	11.1	10.5	10.6	15.2	-0.7 **	-1.2	-1.0	-0.3	0.0	-6.0	-9.5	-8.3	-2.9	0.0
DC assets	16.4	19.0	18.5	14.9	12.5	-0.5 *	-1.0	-0.4	-0.3	-0.3	-3.1	-4.8	-2.2	-2.1	-2.5
Social Security benefits	22.0	25.5	23.0	20.6	18.1	-1.0 ***	-1.0 ***	-1.2 ***	-1.0 ***	-0.5 ***	-4.1	-3.6	-4.8	-4.4	-2.8
SSI benefits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-pension assets	58.4	66.9	63.4	49.4	52.9	-2.6 ***	-3.0	-3.0 *	-2.2 *	-2.5	-4.3	-4.2	-4.5	-4.3	-4.6

Notes: ** Significant at 1% level; ** at 5% level; * at 1% level. Sample excludes individuals with incomes in the top 1 percent of the income distribution. Quintiles are calculated within age groups. The sum of the components of income does not always equal total income because of rounding. DB=defined benefits, DC=defined contributions, and SSI=Supplemental Security Income.
Source: Authors computations from DYNASIM3 projections.

Table 5. Projected number and share of adults at age 70 with low incomes

	Baseline simulation					Absolute change due to recession					Percent change due to recession			
Age in 2008		25-34	35-44	45-54	55-64		25-34	35-44	45-54	55-64		25-34	35-44	45-54	55-64
Year age 70	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23
Percent with income below 100% FPL	4.9	3.9	5.0	5.4	5.5	0.2	0.1	0.3	0.3	0.2	4.3	2.6	6.4	5.9	3.8
Percent with income below 125% FPL	7.3	5.7	7.1	7.9	8.6	0.5 ***	0.5 *	0.5 *	0.5 *	0.5	7.4	9.6	7.6	6.8	6.2
Number with infome below 100% of FPL (thousands)	6,971	1,444	1,863	2,039	1,663	284.5	37.0	111.8	113.3	60.5	4.3	2.6	6.4	5.9	3.8
Number of income below 125% FPL (thousands)	10,385	2,111	2,645	2,982	2,600	711.3 ***	185.2 *	186.3 *	188.8 *	151.1	7.4	9.6	7.6	6.8	6.2

Notes: ** Significant at 1% level; ** at 5% level; * at 1% level. Sample excludes individuals with incomes in the top 1 percent of the income distribution. FPL=federal poverty level.
Source: Authors' computations from DYNASIM3 projections.

Table 6. Average projected per capita household income of future retirees at age 70, by personal characteristics

	Average per capita household income (thousands of $2010)					Absolute change due to recession (thousands of $2010)					Percent change due to recession				
Age in 2008		25-34	35-44	45-54	55-64		25-34	35-44	45-54	55-64		25-34	35-44	45-54	55-64
Year age 70	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23	All	2044-53	2034-43	2024-33	2014-23
All	54.5	61.1	57.8	49.3	49.0	-2.4 ***	-3.2 ***	-2.4 ***	-2.1 ***	-2.1 ***	-4.3	-4.9	-4.0	-4.1	-4.1
Gender															
Female	51.8	58.4	54.6	47.4	46.1	-2.5 ***	-3.2 ***	-2.5 ***	-1.9 **	-2.3 ***	-4.7	-5.1	-4.4	-3.9	-4.8
Male	57.5	63.9	61.1	51.4	52.5	-2.4 ***	-3.1 ***	-2.2 **	-2.3 ***	-1.9 **	-4.1	-4.6	-3.5	-4.3	-3.5
Race/Ethnicity															
Non-Hispanic white	62.4	72.0	67.3	56.1	55.7	-2.6 ***	-3.6 ***	-2.4 ***	-2.2 ***	-2.2 ***	-4.1	-4.7	-3.5	-3.8	-3.8
Non-Hispanic black	34.8	41.4	37.4	30.0	26.7	-1.6 **	-1.6	-1.8	-1.6	-1.3	-4.4	-3.7	-4.6	-5.0	-4.5
Hispanic	34.9	43.5	34.1	28.2	25.7	-2.3 ***	-2.4 *	-2.7 **	-1.5	-1.6	-6.3	-5.3	-7.4	-5.0	-5.8
Asian/Native American	46.8	52.2	50.6	42.5	36.7	-2.9 **	-3.8 *	-2.4	-1.7	-2.9	-5.7	-6.8	-4.6	-3.8	-7.2
Education															
Did not complete high school	22.9	27.7	24.1	20.5	18.7	-1.0 *	-1.2	-1.2	-1.0	-0.5	-4.0	-4.0	-4.6	-4.4	-2.7
High school graduate/some college	44.9	51.7	46.9	41.0	40.4	-2.0 ***	-2.5 ***	-1.9 **	-1.7 ***	-1.9 ***	-4.3	-4.7	-3.9	-4.0	-4.5
College graduate	82.6	85.1	86.2	78.4	78.5	-3.6 ***	-4.5 ***	-3.3 **	-3.3 **	-3.3 **	-4.2	-5.1	-3.7	-4.0	-4.0
Years Worked															
<= 10	19.0	20.7	18.9	18.5	18.1	-1.0 *	-1.2	-1.5	-0.5	-0.7	-4.8	-5.3	-7.3	-2.8	-3.9
11-29	35.4	41.2	35.3	31.1	32.5	-1.6 ***	-1.7	-1.4	-1.7 **	-1.3	-4.3	-3.9	-3.7	-5.2	-3.8
30+	65.5	73.4	70.1	58.9	58.6	-2.6 ***	-3.6 ***	-2.4 ***	-2.1 ***	-2.5 ***	-3.9	-4.7	-3.3	-3.5	-4.1
Social Security benefit status															
Retired, spouse, or survivor	59.8	66.6	63.6	54.4	53.7	-2.6 ***	-3.5 ***	-2.6 ***	-2.0 ***	-2.2 ***	-4.2	-5.0	-4.0	-3.6	-4.0
Disabled beneficiary	39.0	45.3	42.5	33.9	32.7	-1.6 **	-1.7	-1.4	-1.9 *	-0.6	-3.9	-3.6	-3.1	-5.3	-1.9
SSI	7.1	6.9	6.7	7.2	7.5	0.0	0.1	-0.1	0.1	0.0	0.0	1.6	-1.6	1.5	0.0
Not beneficiary	24.6	20.0	20.6	25.6	33.0	-0.7	-1.1	0.2	-0.6	-1.7	-2.9	-5.0	1.0	-2.4	-4.9
Own lifetime earnings quintile															
Bottom	24.4	27.9	23.8	23.8	22.0	-1.3 ***	-1.2	-1.6 *	-1.5 *	-0.7	-4.9	-4.0	-6.3	-5.9	-3.3
Second	34.4	39.4	34.4	31.0	32.6	-1.8 ***	-2.4 **	-1.7 *	-1.4 *	-1.7 *	-5.0	-5.8	-4.7	-4.2	-4.9
Third	45.7	51.7	48.1	41.5	41.2	-2.1 ***	-2.3 *	-2.0 *	-1.7 **	-2.0 **	-4.4	-4.3	-4.0	-3.9	-4.6
Fourth	63.6	68.3	70.4	56.9	57.7	-3.0 ***	-4.4 ***	-2.2	-2.6 **	-2.3 *	-4.4	-6.1	-3.1	-4.4	-3.9
Top	104.5	118.2	112.2	93.6	91.6	-4.2 ***	-5.2 **	-4.5 **	-3.4 **	-3.9 **	-3.9	-4.2	-3.9	-3.5	-4.1
Shared lifetime earnings quintile															
Bottom	16.9	19.8	16.6	15.3	15.8	-0.6 **	-0.2	-0.8 *	-0.6	-0.5	-3.6	-1.1	-4.8	-4.0	-3.2
Second	31.3	35.3	31.4	28.5	29.8	-1.8 ***	-2.5 ***	-2.0 ***	-1.3 **	-1.3	-5.4	-6.7	-6.0	-4.3	-4.1
Third	45.7	49.2	48.0	42.4	42.9	-1.6 ***	-1.6	-1.5	-1.5 *	-1.9 *	-3.3	-3.1	-3.0	-3.4	-4.2
Fourth	64.3	68.9	69.3	60.1	57.8	-3.7 ***	-6.0 ***	-3.1 **	-2.6 **	-3.0 **	-5.4	-8.0	-4.2	-4.2	-4.9
Top	114.5	132.4	123.7	100.5	98.8	-4.5 ***	-5.2 **	-4.5 **	-4.4 ***	-4.1 **	-3.8	-3.8	-3.5	-4.2	-4.0
Household income quintile															
Bottom	10.4	11.5	10.4	10.0	9.5	-0.4 ***	-0.4 ***	-0.4 ***	-0.3 ***	-0.1	-3.9	-3.5	-3.9	-3.1	-1.1
Second	22.5	24.7	23.1	21.3	20.5	-1.1 ***	-1.5 ***	-1.3 ***	-0.8 ***	-0.6 ***	-4.5	-5.6	-5.2	-3.8	-3.0
Third	36.8	39.8	38.1	34.7	33.9	-1.8 ***	-2.2 ***	-2.1 ***	-1.5 ***	-1.3 ***	-4.7	-5.3	-5.2	-4.1	-3.6
Fourth	61.2	67.2	64.3	56.6	55.5	-2.9 ***	-3.6 ***	-3.1 ***	-2.3 ***	-2.6 ***	-4.5	-5.1	-4.5	-3.9	-4.5
Top	141.9	162.2	152.9	124.2	125.7	-6.2 ***	-7.9 ***	-5.3 ***	-5.5 ***	-6.1 ***	-4.2	-4.7	-3.3	-4.2	-4.6

Notes: ** Significant at 1% level; ** at 5% level; * at 1% level. Sample excludes individuals with incomes in the top 1 percent of the income distribution. Own lifetime earnings is the average of wage-indexed earnings between ages 22-62. Shared lifetime earnings is the average of wage-indexed shared earnings between ages 22-62, where shared earnings are half the total earnings of the couple in the years when married and individual earnings in years when not married. Quintiles are calculated within age groups.
Source: Authors' computations from DYNASIM3 projections.

Table 7. Projected survival rates at age 70 by sex, education, and employment status between 2008 to 2013

	Female				Male			
Age in 2008	Employed each year (%)	Not employed at least one Year (%)	Absolute difference		Employed each year (%)	Not employed at least one Year (%)	Absolute difference	
25-34								
All	86.7	83.2	-3.5	***	82.0	77.5	-4.5	***
Did not complete high school	77.2	81.2	4.0		70.2	72.0	1.8	
High school graduate/ some college	83.6	81.7	-1.9		80.1	75.8	-4.3	***
College graduate	90.2	87.7	-2.5	**	86.6	86.1	-0.5	
35-44								
All	86.1	82.8	-3.3	***	83.2	75.8	-7.4	***
Did not complete high school	77.9	80.2	2.3		70.2	69.8	-0.4	
High school graduate/ some college	83.6	82.3	-1.3		81.3	75.6	-5.7	***
College graduate	89.8	86.4	-3.4	***	86.6	82.0	-4.6	***
45-54								
All	88.2	81.9	-6.3	***	85.5	73.6	-11.9	***
Did not complete high school	78.4	80.4	2.0		79.1	69.1	-10.0	***
High school graduate/ some college	86.6	81.6	-5.0	***	83.4	73.5	-9.9	***
College graduate	91.5	85.4	-6.1	***	89.1	78.9	-10.2	***
55-64								
All	93.8	87.1	-6.7	***	91.0	80.3	-10.7	***
Did not complete high school	89.6	85.8	-3.8		83.6	77.4	-6.2	*
High school graduate/ some college	93.1	87.1	-6.0	***	90.0	79.3	-10.7	***
College graduate	95.3	88.4	-6.9	***	93.2	83.8	-9.4	***

Notes: ** Significant at 1% level; ** at 5% level; * at 1% level. Table includes all individuals age 25 to 64 living in the U.S. in 2008. The "employed each year" category includes individuals with positive earnings in all years between 2008 and 2013. The other category includes all individuals with no earnings in at least one year between 2008 and 2013. The survival rate is the share of the 2008 population that survives to age 70.
Source: Authors' computations from DYNASIM3 projections.

Appendix

This appendix provides additional information about how the DYNASIM3 model projects employment, earnings, pensions, retirement accounts, other assets, and income.

Employment and earnings. DYNASIM3 projects the likelihood that an individual works each year as a function of age, sex, race and 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 non-varying individual preferences that are independent of observed characteristics. The model classifies an individual 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 Social Security Trustees' targets.[5]

DYNASIM3 uses a similar set of explanatory variables to assign hourly wages and annual hours of employment to those projected to work. Annual earnings are the product of the hourly wage and annual hours worked. DYNASIM3 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 Trustees' annual earnings targets.

Pensions. DYNASIM3 projects pensions from employer-sponsored DB plans, cash balance (CB) plans, and retirement accounts. Information about pension coverage on current and past jobs, pension contribution rates, and account balances come from SIPP self-reported information. Projected DB pension information reflects plan structures through December 2008, including DB pension plan freezes and conversions to CB plans. Various data sources and models described

below are used to project job changes, pension coverage, pension participation, and pension contributions into the future.

DYNASIM3 projects DB pensions using the Pension Benefit Guaranty Corporation's (PBGC) Pension Insurance Modeling System (PIMS) DB plan formulas, which are randomly assigned to DB participants based on broad industry, union status, and firm size categories, and an indicator of whether the firm offers dual (DB and DC) coverage. The model uses actual benefit formulas to calculate benefits for federal government workers and military personnel, and uses tables of replacement rates from BLS to calculate replacement rates for state and local government workers. The model also 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, state, and local). The model projects conversions of pension plan type (from DB to CB or DB to DC) using actual plan change information for plans included in the PIMS data.

Most DB plan formulas assign DB pension income as a function of plan earnings and job tenure. Most private pensions require five years of employment before workers are vested in the DB plan. Any shortening of job tenure directly reduces expected DB pension income.

Retirement accounts. DYNASIM3 starts with the self-reported SIPP retirement account balance. Because of documented deficiencies in the SIPP asset data (Czajka, Jacobson, and Cody, 2003; Smith, Cashin, and Favreault, 2005), asset balances in retirement accounts (as well as financial assets outside of retirement accounts) in the starting SIPP sample are adjusted to align with asset distributions from the 2007 Survey of Consumer Finances (SCF). Individuals are also assigned an individual-specific risk tolerance based on SCF data. An individual's share of

retirement account assets invested in equities varies by age and risk tolerance, with high-risk and younger individuals investing more in equities than low-risk and older individuals.

The model uses historical price changes and returns for stocks, long-term corporate bonds, and long-term government bonds through 2008 to grow portfolios. Investment experience varies for each individual because the model sets rates of return stochastically, using historical means and standard deviations. We account for the 2008 stock market crash, which reduced equity values by 37 percent, by assuming that the market recovers to half of its projected pre-crash value by 2017 (Butrica, Smith, and Toder 2010). Specifically, the model assumes a 10.7 percent average real rate of return on stocks from 2009 to 2017 before resuming its historic average real return of 6.5 percent. DYNASIM3 assumes mean real rates of return of 3.5 percent for corporate bonds, three percent for government bonds, and standard deviations of 17.28 percent for stocks and 2.14 percent for bonds.[6] The 6.5 percent real return on stocks reflects a capital appreciation of about 3.5 percent and a dividend yield of around three percent, in line with the long-term performance of the S&P 500. The model subtracts one percentage point from annual stock and bond returns to reflect administrative costs.

The model 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 stay on their jobs or move seamlessly from one job to another. High unemployment contributes to lower lifetime DC pension savings through lost contributions (and returns on lost contributions) when out of work and hardship withdrawals.

Financial assets. The model uses random-effects models to project financial assets. DYNASIM3 starts with SIPP self-reported financial assets (saving, checking, money market, and certificate of

deposit balances, stocks, bonds, equity in businesses, vehicles, and non-home real estate, less unsecured debt). We adjust the SIPP starting values to align with the household asset distribution from the 2007 SCF. Unlike retirement accounts that are directly invested in stock and bond portfolios, financial assets accumulate and decumulate as a function of family characteristics and earnings and projected wage differentials. The main economic explanatory variable is individual lifetime earnings relative to the cohort average. Individuals 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 one who remain employed continuously. The longer the unemployment spell, the greater is the differential in lifetime earnings relative to the cohort average and the greater is the impact on projected assets. Assets accumulate at the family level, so husbands and wives equally share family assets. We assume that couples split assets at divorce and survivors inherit the assets of deceased spouses.

The model projects nonpension financial assets over three separate age ranges: up to age 50, from age 51 to retirement, and from retirement to death. Equations projecting assets to age 50 were estimated on the Panel Study of Income Dynamics (PSID) (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 (HRS) (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 data sets included historic earnings from the Social Security Administration's Summary Earnings Record (SER) data.

Other income sources. DYNASIM3 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, and an equation projecting benefit take-up. SSI is also

computed using benefit formulas that vary by state. The model projects SSI eligibility based on age, disability, family income, and assets. It then projects participation based on family characteristics and benefit size.

The model computes 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 total wealth. We use the calculated annuity value to assign only that year's income from retirement accounts and financial assets. The annuity factor is recalculated each year to reflect changes in wealth as individuals age, based on the projections of wealth accumulation and spend-down and changes in life expectancy and marital status as individuals survive to older ages. For married couples, the model assumes a 50 percent survivor annuity.

We measure income from financial wealth and retirement accounts as potential annuities to ensure comparability with DB pension and social security benefits, which are also annuities. Without this adjustment, the model would overstate the loss in retirement wellbeing 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, while measured income from financial wealth and DC retirement accounts includes only the return on accumulated assets. The income measure we use therefore differs conceptually from asset income as measured by the United States Census Bureau (as well as many analysts), which includes only the return on assets (interest, dividends, and rental income) and excludes the potential consumption of capital that could be realized if people spent down their wealth.

The model also projects income of non-spouse family members. We use this income primarily for determining poverty status, as these family member's incomes and characteristics

are included in the standard poverty measure. We include spousal income in our measure of

family income but exclude incomes of other family members in this report.

Endnotes

[1] Another difference is that the DYNASIM3 model includes institutionalized adults, overseas military personnel, and residents of United States territories, whereas the Bureau of Labor Statistics uses the civilian noninstitutionalized United States resident population.

[2] The underlying price and wage targets affect various other projections including the Social Security wage base (the taxable maximum), the indexing of wages for the calculation of Social Security benefits (AIME and PIA), 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 well as marriage, divorce, fertility, and schooling outcomes.

[3] Some people in the oldest age group turned 60 before 2008. The recession will not affect their social security benefits much.

[4] Poverty rates projected in the DYNASIM3 model are lower than the official poverty rates calculated by the Census Bureau because DYNASIM3 includes the annuitized value of 80 percent of household assets in the income measure. The Census income measure includes only the return on capital (dividend, interest, and rental income). See the appendix for more details.

[5] The random error term follows an autoregressive (AR1) process so that random shocks include both a current and lagged effect.

[6] The assumed rates of return are those recommended by the Social Security Administration's Office of the Chief Actuary for the President's Commission to Strengthen Social Security (President's Commission to Strengthen Social Security 2001). The standard deviations are derived from real returns over the 55-year period between 1952 and 2007 for large company stocks and Treasury bills reported in Ibbotson Associates (2008). Inflation assumptions follow

the 2010 intermediate assumptions used by the Social Security Trustees (Social Security Board

of Trustees 2010).