RETIREMENT POLICY

What the 2008 Stock Market Crash Means for Retirement Security

Barbara A. Butrica, Karen E. Smith, and Eric J. Toder

May 2009

The Retirement Policy Program

Discussion Paper 09-03

What the 2008 Stock Market Crash Means for Retirement Security

Barbara A. Butrica, Karen E. Smith, and Eric J. Toder

May 2009

The Retirement Policy Program

A crosscutting team of Urban Institute experts in Social Security, labor markets, savings behavior, tax and budget policy, and micro-simulation modeling ponder the aging of American society.

The aging of America raises many questions about what's in store for future and current retirees and whether society can sustain current systems that support the retired population. Who will prosper? Who won't? Many good things are happening too, like longer life and better health. Although much of the baby boom generation will be better off than those retiring today, many face uncertain prospects. Especially vulnerable are divorced women, single mothers, never-married men, high school dropouts, and Hispanics. Even Social Security—which tends to equalize the distribution of retirement income by paying low-income people more then they put in and wealthier contributors less—may not make them financially secure.

Uncertainty about whether workers today are saving enough for retirement further complicates the outlook. New trends in employment, employer-sponsored pensions, and health insurance influence retirement decisions and financial security at older ages. And, the sheer number of reform proposals, such as personal retirement accounts to augment traditional Social Security or changes in the Medicare eligibility age, makes solid analyses imperative.

Urban Institute researchers assess how current retirement policies, demographic trends, and private sector practices influence older Americans' security and decision-making. Numerous studies and reports provide objective, nonpartisan guidance for policymakers.

The nonpartisan Urban Institute publishes studies, reports, and books on timely topics worthy of public consideration.

Contents

Tables

Figures

What the 2008 Stock Market Crash Means for Retirement Security

Abstract

The one-third drop in the S&P 500 index between year-end 2007 and 2008 raises concerns about retirement security since Americans now hold more equities through their retirement plans. Those near retirement will fare the worst because they have no time to recoup their losses. Mid-career workers will fare better because they have more time to rebuild their wealth. They may even gain income if they buy stocks at low prices and get above-average rates of return. High-income groups will be the most affected because they are most likely to have financial assets and to be invested in the stock market.

Executive Summary

Between year-end 2007 and 2008, the S&P 500 index fell by over a third—the largest single-year drop in the index since 1974. Any large decline in the stock market is reason for concern, but this one is particularly worrisome because Americans have a much larger share of their retirement assets invested in equities than they did in the past. Over the past 25 years, employment-based pensions have been shifting from traditional defined benefit (DB) plans that require employers to manage retirement savings to defined contribution (DC) plans that place the investment responsibility on workers. Consequently, the share of households holding wealth inside retirement accounts has risen over the past two decades, with the bulk of these retirement assets invested in equities.

This study examines how the 2008 market decline could affect future retirement incomes. We compare alternative recovery scenarios with a "no crash" scenario that assumes the stock market had not collapsed in 2008 but instead had increased at its long-term historical rate from the 2007 level. We simulate three possible recovery scenarios: (1) a "no recovery" scenario in which the stock market does not rebound but instead resumes its long-term historical rate after 2008; (2) a "full recovery" scenario in which the stock market fully rebounds after 10 years to the projected no-crash level in 2017; and (3) a "partial recovery" scenario in which the stock market rebounds to halfway between the levels projected under the no-recovery and full-recovery scenarios after 10 years.

We examine retirement resources at age 67 before and after the stock market collapse and compare these outcomes by sex, marital status, race/ethnicity, education, and retirement income

quintile. We report results separately for those born from 1941 to 1945 (pre-boomers), from 1951 to 1955 (middle boomers), and from 1961 to 1965 (late boomers). When the stock market crashed in 2008, the pre-boomers were between ages 63 and 67, the middle boomers were between ages 53 and 57, and the late boomers were between ages 43 and 47.

The effect of the 2008 stock market crash on future retirement incomes will vary by age, income level, and assumptions about future market performance. Most pre-boomers and boomers will be affected in some way since about 63 percent of them are estimated to have owned stocks in 2008. The effect of the stock market decline on their income at age 67 will depend on the initial share of assets held in equities, the level and composition of future contributions, the number of years they have to rebuild their assets, the relative importance of asset returns as a share of retirement income, and the future performance of the stock market.

- Those farthest from retirement fare better than their older counterparts. Under all the scenarios, late boomers experience smaller income losses at age 67 than other birth cohorts. Because they had fewer years to accrue wealth, late boomers had less wealth (and fewer equities) in 2008 than earlier cohorts and less to lose when the market crashed, even though they were more likely to have DC plans and to invest in equities. They will also have more years to restore their lost wealth from both new stock purchases and future appreciation before retirement.

  ➢ For late boomers, average household income per person declines 7.2 percent from $59,800 under the no-crash scenario to $55,500 under the no-recovery scenario but it increases 3.2 percent to $61,700 under the full-recovery scenario.

- Pre-boomers likely will not have enough time to recover all their losses before reaching age 67. Consequently, their average income falls under all scenarios, ranging from an 8.5 percent decline under the no-recovery scenario to a 6.9 percent decline under the full-recovery scenario.

- High socioeconomic groups will be most affected—negatively and positively—by the stock market collapse because they are more likely than low socioeconomic groups to have retirement accounts and financial assets and to be invested in the stock market.

  - Middle boomers in the highest income quintile will have only 86 percent of their no-crash income under the no-recovery scenario but 104 percent under the full-recovery scenario.

  - In contrast, middle boomers in the lowest income quintile will have 98 percent of their no-crash income under the no-recovery scenario and virtually no change in their no-crash income under the full-recovery scenario.

- The long-term effects of the 2008 stock market crash on retirement incomes will depend on the stock market performance going forward.

  - Under the no-recovery scenario, there are no winners. About half of 67-year-olds in each cohort will see their income drop 2 percent or more under this scenario, but many will lose much more. About one in six pre-boomers and one in eight late boomers are expected to lose at least 10 percent of their no-crash income at age 67 if the stock market does not recover.

> ➢ The full-recovery scenario generates no winners among pre-boomers, but more winners than losers among middle and late boomers. More than two in five pre-boomers are expected to suffer a loss in their retirement income, and about one in eight will experience declines of at least 10 percent. In contrast, 29 percent of late boomers will have higher income at age 67, but only 3 percent can expect gains of 10 percent or more.

Doing everything that financial planners recommend—maximizing contributions to retirement accounts and rebalancing portfolios away from stocks when near retirement age—may be the best strategy for building retirement savings, but it leaves people substantially exposed to market risks. However, timing matters in unpredictable ways, and market swings affect different cohorts differently. Those now furthest from retirement have the best chance of recovering losses from the recent crash and even coming out ahead if the market rebounds. For those at or near retirement, time has almost run out.

As DC pensions continue to replace DB pensions, people are increasingly likely to be directly affected by stock market fluctuations. Many are calling for reforms that expand pension participation among workers. For example, President Obama has proposed requiring employers to offer automatic enrollment in IRAs, which are funded solely through worker contributions. Our results show that most low-income retirees will not be affected by the 2008 stock market crash because they have little or nothing saved in equities. But research shows that participation, contribution levels, and investment allocations in retirement plans are heavily influenced by employer default rules. Proposals requiring automatic enrollment could lead to much higher participation in DC plans by low-income workers and should be designed in ways that offer

some protection from market risks. Sensible default investment strategies that reduce exposure to risk near retirement could improve retirement outcomes for many retirees.

Target maturity or life-cycle default investments that automatically adjust workers' portfolios to reduce stock market exposure as they age can help reduce risks. Other possible solutions include establishing retirement accounts that earn a rate of return guaranteed by the federal government or developing equity products that provide some guarantees, with government backstops and insurance, for low- and moderate-income investors. Beyond the risk of losing their wealth just before retiring, workers also face the risk of depleting their assets after retirement. Options for retirees who wish to minimize both financial and longevity risk should include purchasing annuities that guarantee a stream of lifetime income. Of course, annuitization does nothing to reduce risk while workers are accumulating assets.

The recent stock market crash reminds us how important Social Security benefits, which are based on lifetime earnings and do not fluctuate with the stock market, are for maintaining adequate retirement income for most retirees. Under the no-recovery scenario, pre-boomers lose about 22 percent of their asset income at age 67 (inside and outside of retirement accounts), but only 8.5 percent of their household income. Late boomers lose about 17 percent of their asset income, but only 7.2 percent of their household income. Had Social Security been invested in private accounts, the impact of the stock market crash on retirement outcomes would have been larger— positive or negative, depending on one's birth cohort and future market performance.

Introduction

Between year-end 2007 and 2008, the S&P 500 index fell by over a third. This is the largest drop in the index in any 12-month period since it declined by 43 percent between October 1973 and October 1974 (figure 1).[1] Any large decline in the stock market is reason for concern, but this one is particularly worrisome because Americans have a much larger share of their retirement assets in equities than they did in the past.[2]

Over the past 25 years, employment-based pensions have been shifting from traditional defined benefit (DB) plans in which employers bear most investment risks to defined contribution (DC) plans that place the investment responsibility on workers.[3] Consequently, the share of households holding wealth inside retirement accounts has risen over the past two decades, with the bulk of these retirement assets invested in equities. According to a recent study, the share of households owning stocks inside retirement accounts, including employer-sponsored DC plans and individual retirement accounts (IRAs), rose from 12 percent in 1989 to 31 percent in 2008 (Investment Company Institute [ICI] and the Securities Industry and Financial Markets Association [SIFMA] 2008). A separate study found in 2007 that about two-thirds of participants' assets in 401(k) plans—the most widely used type of employer-sponsored DC plan—were invested in equities (ICI 2008).

---

[1] The S&P 500 Index Adjusted Close declined from 108.78 on October 3, 1973 to 62.28 on October 3, 1974 (http://ichart.finance.yahoo.com/table.csv?s=%5EGSPC&a=00&b=3&c=1950&d=01&e=27&f=2009&g=d&ignore=.csv).

[2] Our analysis only considers the impact of the stock market crash on retirement outcomes. It does not incorporate recent activity in the bond market.

[3] Employees could bear some risks from DB plans if the plans default or are frozen before their high accrual years, although the Pension Benefit Guaranty Corporation (PBGC) provides substantial protection. The likelihood that plans could default or freeze increases when equity prices fall.

Figure 1. S&P 500 Index, January 1, 1960 - December 31, 2008 (2007 dollars)
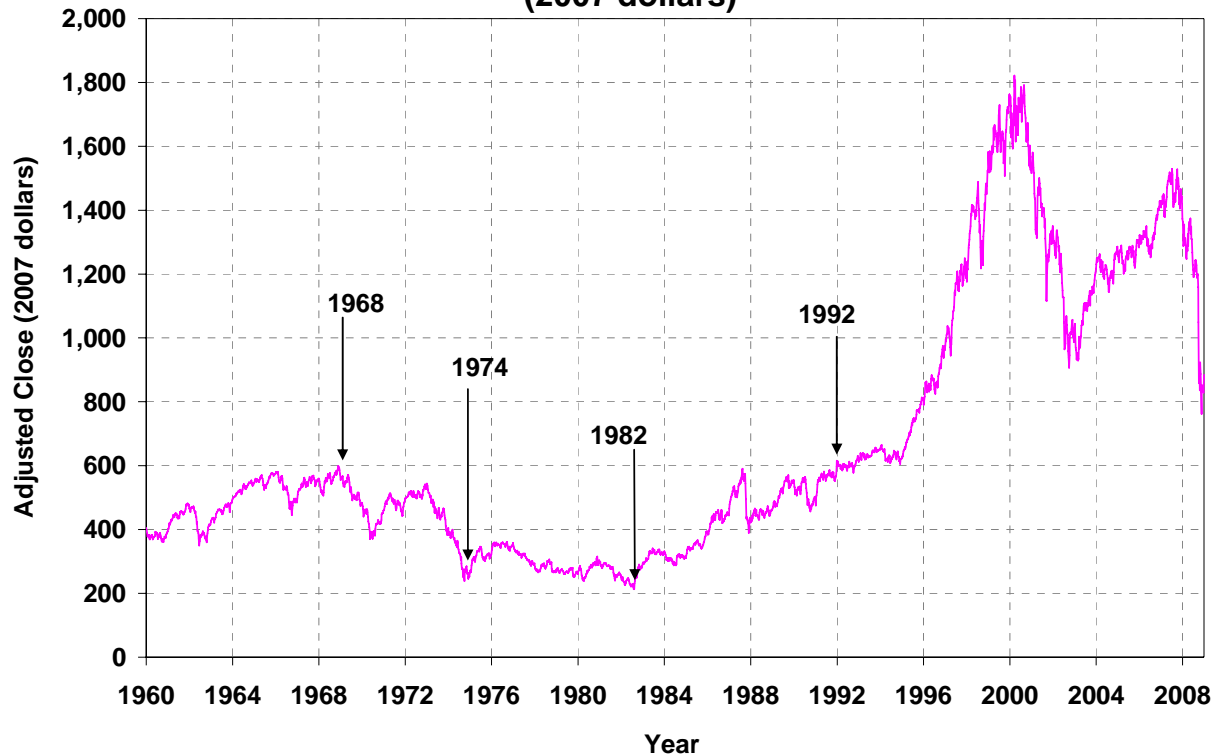
As a result of the stock market crash, retirement accounts lost about $2.8 trillion or 32 percent of their value as of December 2, 2008 (Soto 2008). Additional losses were incurred in equities held outside retirement accounts.

Experts say to hold on because people will see their wealth increase in the long run as markets recover and resume their long-run upward trend. But no one knows for sure when the stock market will rebound.[4] Nor do they know how long it will take to reach its level before the

---

[4] Contrary to some expectations, markets continued their decline in 2009, closing at 1995 real levels at the beginning of March.

---

recent crash. We can, however, say something about how fluctuations in stock prices will affect different groups in the population.

Those most affected are likely to be higher-income families and people nearing retirement age. Low-income families are not expected to be significantly affected by the stock market crash since they have little wealth in retirement accounts and financial assets and only a small share of the financial wealth they have is in the stock market. As DC pensions expand, however, low-income families are more likely to own stocks than they once were. Between 1995 and 2004, the share of families in the lowest income quintile holding stocks increased from 6.5 to 11.7 percent (U.S. Census Bureau 2008, table 1181).

The financial crisis will also have little effect on younger people. Holden and VanDerhei (2002) find that a worker's age is a major factor in his or her ability to recover from an economic downturn. Although younger people invest more heavily in stocks than older people (ICI 2008), they lose less from a stock market crash because they have not had time to accrue significant account balances. Younger people also have many years to rebuild any lost wealth before retirement and, if they buy into the market at discounted prices, may even gain enough from the higher than average growth rates in a recovery to end up better off than if the crash had not occurred. But time has almost run out for retirees and those nearing retirement age.

This paper uses projections from the Urban Institute's Dynamic Simulation of Income Model (DYNASIM3) to examine the projected impact of the current financial crisis on retirement savings for current and future retirees. The analysis compares alternative recovery scenarios with a counterfactual scenario that assumes the stock market had not collapsed in 2008 but instead had increased at its long-term historical rate from the 2007 level. It simulates three

possible recovery scenarios: (1) the stock market does not rebound but instead resumes its long-term historical rate after 2008, (2) the stock market fully rebounds after 10 years to the level projected in 2017 if the market had not crashed, and (3) the stock market partially rebounds after 10 years to the projected no-crash level in 2017. The scenarios assume that individuals rebalance their portfolios to maintain the target allocation for their age and that they purchase more equities as prices fall, but that they do not change their behavior in other ways, such as by working longer to offset losses in wealth. The scenarios only estimate the effect of stock price changes. They do not consider other effects of the current economic downturn on retirement incomes, such as the effects of job losses, falling house prices, and losses in non-equity financial assets.[5] The analysis examines changes in retirement resources and compares these outcomes among individuals grouped by sex, marital status, race/ethnicity, educational attainment, and quintile of retirement income.

Background

Between 1980 and 2008, the proportion of workers covered by a traditional DB pension plan that pays a lifetime annuity, often based on years of service and final salary, fell from 38 to 20 percent (U.S. Department of Labor 2002).[6] In contrast, the percentage of workers covered by only an employer-provided DC pension plan—that is, an investment account established and often subsidized by employers but owned and controlled by employees—increased from 8 to 31 percent during the same period. The share with any investment account is even higher.

---

[5] Although the simulations do not reflect the recent decline in housing values, they also do not capture the housing market gains of the early 2000s.

The movement from DB to DC pension plans is important because of vast differences between the two types of pensions, particularly differences in investment risks. DB plans provide workers with guaranteed lifetime annuities that begin at retirement and promise benefits that are typically expressed as a multiple of years of service and earnings received near the end of one's career (e.g., 1 percent of average salary received during the final three years on the job times the number of years of service). In DC plans, employers (and generally employees) make tax-deferred contributions to a retirement account in the participant's name, often specified as a particular share of salary or a given dollar amount. Benefits increase each year by the value of employee and employer contributions to the plan and by any investment returns earned on the account balance.

Both DB and DC pensions involve some degree of investment risk. However, workers with DB pensions are more insulated from fluctuations in the stock market than workers with DC pensions since DB plan providers bear the market risk instead of workers.[7] DB plan providers can smooth out market fluctuations in a ways that workers cannot. With DC pensions, account balances at retirement depend directly on the share of DC assets invested in the stock market and on how well those stocks perform. However, changes in DB pension funding requirements incorporated in the Pension Protection Act of 2006 might cause more DB plan providers to

---

[6] See also U.S. Bureau of Labor Statistics, "Table 2. Retirement Benefits: Access, Participation, and Take-Up Rates, Private Industry, National Compensation Survey, March 2008," http://www.bls.gov/ncs/ebs/benefits/2008/ownership/private/table02a.pdf.

[7] Before enactment of the Employment Retirement Security Act of 1974 (ERISA), workers were at risk if large market losses caused DB plans to fail. Since then, the PBGC has shifted much of that risk to taxpayers. Today, workers are still at risk if market losses cause employers to freeze plan benefits accrued to date, denying mid-career workers the promised high accruals in the years just before retirement eligibility.

freeze their plans given the effect the dramatic drop in stock market value will have on plan

funding requirements (Butrica et al. 2009).[8]

The pension shift has increased the share of Americans with a direct stake in the stock

market. And while stocks have historically outperformed bonds, their returns fluctuate more. To

demonstrate this, Burtless (2009) computed replacement rates for individual retirement accounts

using historical stock and bond returns, interest rates, and price changes dating back to 1872. A

hypothetical person who worked, contributed 4 percent of wages to retirement accounts, and

invested entirely in stocks between 1960 and 1999 had the highest replacement rate (89 percent)

at retirement, while a person who behaved identically between 1881 and 1920 had the lowest

replacement rate (12 percent) at retirement. The differences in replacement rates for these

hypothetical people are based entirely on differences in the stock market performance between

the two periods.

While bonds tend to produce lower returns than stocks, they are also less volatile, which

can have huge implications for retirement outcomes. Burtless (2009) shows that a hypothetical

person who started working in 1960 and retired at the end of 1999 could expect a replacement

rate of only 25 percent if he invested entirely in bonds—64 percentage points less than the

worker who invested entirely in stocks. While the differences in replacement rates due to

different investment strategies are dramatic, they are not as large in every year. For example, a

hypothetical person who retired at the end of 2008 could expect a 27 percent replacement rate if

he invested entirely in stocks and a 22 percent replacement rate if he invested entirely in bonds.

---

[8] See also Mercer, "Pension Plan Deficit Hits Record $409 Billion for S&P 1500 Companies; Pension Expense May
Rise," http://www.mercer.com.sg/summary.htm?idContent=1332250.

In this paper, we provide new evidence on the significance of the stock market collapse for retirement incomes. To do this, we use the Urban Institute's DYNASIM3 model which is based on the Survey of Income and Program Participation (SIPP). DYNASIM3 starts with SIPP panels, representing respondents in the first third to the first half of their lives, and statistically projects their characteristics and income into retirement using models that simulate demographic and socioeconomic changes. Particularly important to this project is that DYNASIM3 captures each worker's employment and pension decisions over time and captures the shift from DB to DC pension plans. Unlike some other studies, this paper considers the impact of the stock market crash on both retirement accounts *and* financial assets. DYNASIM3 also provides estimates of both the short-run consequences for current retirees and the long-run consequences for future retirees. Finally, DYNASIM3 makes it possible to conduct distributional analyses of projected retirement outcomes.

The Urban Institute's DYNASIM3 Model

To understand the potential impact of the current financial crisis on retirement savings, we use the Urban Institute's DYNASIM3 model. DYNASIM3 is a useful tool for gaining insights into the future retiree population and their retirement income. The model starts with a self-weighting sample of 103,072 individuals from the 1990 to 1993 SIPP panels. DYNASIM3 ages this starting sample in yearly increments to 2080, using parameters estimated from longitudinal data sources. The model integrates many important trends and differentials in life course processes, including birth, death, schooling, leaving home, first marriage, remarriage, divorce, disability, work, and earnings. DYNASIM3 uses the demographic and economic assumptions of the 2008 Federal Old-Age and Survivors Insurance and Disability Insurance (OASDI) Trustees report to guide

these outcomes at the aggregate level. For a fuller description of DYNASIM3, see Favreault and Smith (2004).

DYNASIM3 projects the major sources of wealth and income at retirement age. For this analysis, household income includes income from retirement accounts (DC pensions, IRAs, and Keoghs) and financial assets, Social Security benefits, benefits from employer-sponsored DB plans, earnings, Supplemental Security Income (SSI), and imputed rental income. Retirement accounts and financial assets in the starting SIPP are adjusted to align with those in the Survey of Consumer Finances (SCF).[9] Below we describe how DYNASIM3 projects pensions and measures income from retirement accounts, financial assets, and housing.

Projecting Pensions

DYNASIM3 projects pensions from employer-sponsored DB plans, cash balance (CB) plans, and DC plans (including IRAs and Keoghs).[10] Baseline information about pension coverage on current and past jobs, contribution rates, and account balances come from SIPP self-reported information. The baseline DC pension information was updated to reflect participation and contributions through 2004 using the Social Security Administration's Detailed Earnings Records (DER).[11] The baseline DB pension information was updated to reflect pension plan structures through December 2006, including DB pension plan freezes and conversions to CB

---

[9] Researchers commonly regard the SCF as one of the best sources of wealth data, and superior to wealth data in the SIPP.

[10] CB plans are a hybrid type of pension plan in which employers guarantee rates of return, as in a DB plan, but the employee receives a separate account that increases in value from both employer contributions and the plan rate of return, as in a DC account.

[11] The DER includes longitudinal values for taxable and deferred earnings based on IRS W-2 forms from 1990 to 2004.

---

plans. Various data sources and models were then used to project job changes, pension coverage, participation, and contributions into the future.

DYNASIM3 uses data on synthetic work histories from the PENSIM[12] model to impute future job changes and pension coverage on future jobs from the time of the SIPP interview through age 50. After age 50, the pension module assumes that no further job changes take place.

DYNASIM3 projects future DC pension participation using logit models estimated on the 1996 SIPP matched to the DER. Separate models of the probability of participation are estimated for those who contributed to a plan in the previous year and those who did not contribute. DYNASIM3 projects future DC pension contributions using a random effects Tobit model. This model incorporates individual-level permanent and random error effects. It also controls for the statutory annual contribution limit.[13] DYNASIM3 separately projects IRA, Keogh, and DC contributions, but it pools the balances.[14] DC and IRA/Keogh accounts are invested in stock and bond portfolios that vary by age and risk tolerance according to SCF data on asset allocations.[15] Every year, DYNASIM3 rebalances the portfolios according to the allocation strategy for the individual's attained age and risk tolerance category.

---

[12] PENSIM is a microsimulation model developed by Martin Holmer of the Policy Simulation Group. PENSIM is used to analyze the retirement income implications of government policies affecting employer-sponsored pensions. The PENSIM projections of employee pension coverage are calibrated by worker age, broad industry group, union status, and firm size to the 2008 National Compensation Survey.

[13] DYNASIM3 uses the methodology developed for the Social Security Administration's Model of Income in the Near Term (MINT) to project pensions and assets. See Toder et al. (2002) and Smith et al. (2007) for more details on these models.

[14] Cash balance plan balances are rolled over into the workers' IRAs at job separation.

[15] The updated version of DYNASIM used in this report assigns asset allocations to individual observations into five groups (0 percent stocks, 20 percent stocks, 50 percent stocks, 80 percent stocks, and 100 percent stocks) according to patterns by age and risk tolerance observed in pooled 1998 to 2007 SCF data. In earlier versions of DYNASIM, portfolio allocations varied only age group, according to averages from EBRI/ICI data. The new allocations better represent the diversity of portfolio allocations among individuals.

DYNASIM3 uses historical price changes and returns for stocks, long-term corporate bonds, and long-term government bonds through 2007 to grow portfolios. Investment experience varies for each individual by setting the rates of return stochastically, using historical means and standard deviations. After 2007, DYNASIM3 assumes a consumer price index (CPI) of 2.8 percent, mean real rates of return of 6.5 percent for stocks, 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.[16] 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, which are 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.

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.[17] DYNASIM3 uses actual benefit formulas to calculate benefits for federal government workers and military personnel, and uses tables of replacement rates from the U.S. Bureau of Labor Statistics (BLS) to calculate replacement rates for state and local government workers. DYNASIM3 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

---

[16] The CPI is based on the intermediate assumptions of the 2008 OASDI Trustees (Board of Trustees 2008). The 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 50-year period between 1952 and 2001 for large company stocks and Treasury bills reported in Ibbotson Associates (2008).

(i.e., private, federal, state). 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.

Measuring Income from Retirement Accounts, Financial Assets, and Housing

DYNASIM3 computes income from retirement accounts and financial assets by determining the real (price-indexed) annuity a family could buy if it annuitized 80 percent of its total wealth. The annuity value calculated is used for that year's imputation of income from retirement accounts and financial assets only. The annuity is recalculated each year to reflect changes in wealth as individuals age, based on a model of wealth spend-down and changes in life expectancy as individuals survive to older ages. For married couples, DYNASIM3 assumes a 50 percent survivor annuity.

We measure income from financial wealth and retirement accounts as annuities in order to ensure comparability with DB pension and Social Security benefits, which are also annuities. Without this adjustment, DYNASIM3 would overstate the loss in retirement well-being owing to the shift from DB pension income to DC assets because one dollar in DB pension wealth produces more measured income than one dollar in DC wealth.

This income measure differs conceptually from asset income as measured by the U.S. Census Bureau and other analysts, 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. The U.S. Census Bureau and many analysts include consumption of capital from retirement accounts only if people choose regularly to

---

[17] PIMS is a model developed by the PBGC. It contains data for a sample of DB plans but lacks CB plans. The model estimates future pension costs that must be borne by PBGC due to the bankruptcies of firms with DB plans.

withdraw money from the accounts, rather than estimating the potential stream of income as we do in DYNASIM3.

To capture the amount by which homeowners are better off than non-homeowners, DYNASIM3 imputes a rate of return (3 percent) to housing equity (imputed rent) which represents the saving in rent from owning a home, net of costs of interest and home maintenance. In these scenarios, we do not attempt to include the recent run-up or downturn in house values.

Our assumptions aim to estimate the potential income from assets at retirement and compare relative differences by income quintile and other characteristics across birth cohorts.

Simulating the Effect of the Stock Market Collapse

We assess the impact of the current financial crisis on individuals' retirement resources by comparing DYNASIM3 projections under a scenario in which the stock market had not crashed with alternative scenarios. As discussed earlier, the "no crash" scenario is actually a counterfactual that assumes the historic rates of return continued in 2008 and beyond. The alternative scenarios capture the market decline in 2008 and then assume different patterns of recovery. Between its peak in 2007 and December 2008, the S&P 500 index fell by about 42 percent. However, any individual's projected equity losses may be more or less than 42 percent because DYNASIM3 assumes individual variation in returns. The alternative scenarios make three different assumptions about market recovery after 2008:

(1). The "no recovery" scenario assumes that the stock market does not rebound but instead resumes its long-term real growth rate of 5.5 percent after 2008 (6.5 percent less a 1

percent administrative fee). In 2017, stock portfolios will be back up to about 94 percent of their

pre-crash 2007 level and about 55 percent of the projected level had the market not crashed. The

projected real value of $100 invested in the S&P 500 in 2007 with reinvested dividends, less

administrative fees, is only $94 in 2017 under the no-recovery scenario (figure 2).

Figure 2. Real Value of $100 Invested in S&P 500 in 2007 with Reinvested Dividends (Less an Administrative Fee) Under Alternate Recovery Scenarios
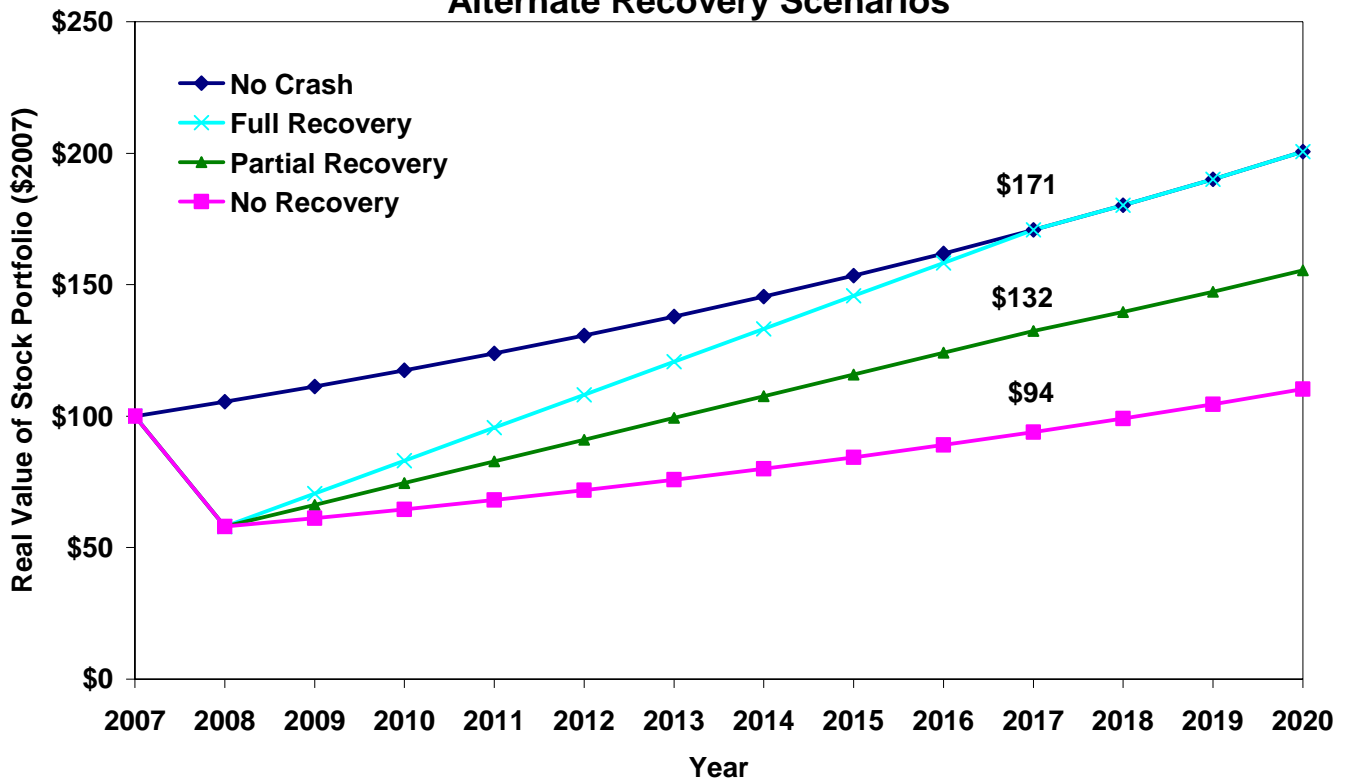
Source: Authors' computations based on historic market returns and alternate simulations (see text for details).
Note: The no-crash scenario assumes that the stock market had not crashed in 2008. The no-recovery scenario incorporates the 2008 stock market crash and assumes it subsequently grows at historic rates. The full-recovery scenario incorporates the 2008 stock market crash and assumes it returns to the projected no-crash level in 2017. The partial-recovery scenario incorporates the 2008 stock market crash and assumes it recovers halfway between the no-recovery and full-recovery levels in 2017.

(2). The "full recovery" scenario assumes it takes the stock market 10 years to fully

rebound to where it would have been with 5.5 percent annual growth from the 2007 level. Under

this scenario, as with the no-crash scenario, investors can expect their stock portfolios to be about 71 percent higher in 2017 than they were in 2007. While 10 years may seem like a long recovery period, stock market rebounds from some past downturns have been even slower. For example, the S&P 500 in constant (inflation-adjusted) dollars peaked in 1968 and then declined sharply, recovered a bit, and declined again, reaching a low point in 1982. It did not return to its 1968 real value until December 1991 (figure 1). More recently, the stock market peaked in 2000 and then suffered a serious decline with the dot-com bust. Although stock values rose sharply after 2002, they were still lower in 2007 than in 2000 (in constant dollars).

Getting back to the no-crash level from the recent depressed levels will require an annual real growth rate of 12.8 percent in equity values between 2009 and 2017. Although this growth rate is very high compared with long-term historical growth, it is less than the average real growth in the S&P 500 index between 1990 and 1999.[18] After returning to the level projected under the no-crash scenario in 2017, stocks will then grow at the baseline 5.5 percent rate.

Under the full-recovery scenario, people who do nothing other than hold their existing stocks until the market recovers will see no change in their projected income from the no-crash scenario. Those who buy stocks at low prices and hold them through the recovery period will get above average returns on their new investments and will gain income between the no-crash and full-recovery scenarios. Those who sell their stocks before the market can recover will lose on their initial investments and lose income between the no-crash and full-recovery scenarios.

---

[18] The 12.8 percent real growth rate includes reinvested dividends. Excluding dividends lowers the average growth rate to 10.4 percent.

(3). The "partial recovery" scenario assumes that the stock market rebounds to halfway between the 2017 levels projected under the no-recovery and full-recovery scenarios. Under this option, stock portfolios will be about 32 percent higher in 2017 than they were in 2007. The partial-recovery scenario requires an annual real growth rate of 9.6 percent in equity values between 2009 and 2017. After 2017, stocks will grow at the baseline rate of 5.5 percent.[19]

The simulations assume that people rebalance their portfolios to maintain the target allocation for their age and that they purchase more equities as prices fall. But they also assume that people will continue making the same total contributions to retirement accounts, working at the same jobs for the same pay, and retiring at the ages predicted under the no-crash scenario. The alternative simulations only change retirement accounts and financial assets. We assume that housing wealth, Social Security benefits, DB pension benefits, earnings, and SSI are unaffected by the stock market collapse, and we do not simulate the parallel fall that has occurred in bonds or housing values or the effects of the current recession on employment and earnings.[20] Therefore, our simulations provide an incomplete picture of recent economic events and how people might respond to them. They show only the partial effect of changes in stock prices on retirement incomes.

We analyze the characteristics and household income of individuals born between 1941 and 1965 when they reach age 67 (the age by which most people will have retired). We assume husbands and wives share resources within the household. We report all income projections in

---

[19] The 9.6 percent real growth rate includes reinvested dividends. Excluding dividends lowers the average growth rate to 7.38 percent.

[20] People may be less affected by declines in housing and bond prices than by declines in stock prices if they are not at risk of mortgage default, plan to continue living in their homes, and are planning to live off the interest from their bonds instead of cashing them in.

annual per capita 2007 dollars. Since our sample sizes are large (19,732 records), differences between most variables in the simulations are statistically significant. We report results separately for those born from 1941 to 1945 (pre-boomers), from 1951 to 1955 (middle boomers), and from 1961 to 1965 (late boomers). When the stock market crashed in 2008, the pre-boomers were between ages 63 and 67, the middle boomers were between ages 53 and 57, and the late boomers were between ages 43 and 47.[21]

Results

DYNASIM3 estimates that about 63 percent of Americans born from 1941 to 1965 owned stocks in 2008. The effect of the stock market decline on their income at age 67 will depend on the initial share of assets held in equities, the level and composition of future contributions, the number of years they have to rebuild their assets, the relative importance of asset returns as a share of retirement income, and whether the stock market recovers some of or all the 2008 losses. Thus, the financial crisis will produce both winners and losers at age 67.

Effects on Retirement Incomes Depend on Age

We find substantial differences in how people's incomes at age 67 are affected by the different stock market scenarios depending on their birth cohort. Relative to the no-crash scenario, average income at age 67 falls under the no-recovery and partial-recovery scenarios for all birth cohorts, but it rises under the full-recovery scenario for middle and late boomers (table 1).

---

[21] These individuals turn age 67 over a range of years: between 2008 and 2012 for pre-boomers, between 2018 and 2022 for middle boomers, and between 2028 and 2032 for late boomers.

Table 1. Sources of Mean Household Income Per Person at Age 67 by Birth Cohort (thousands, $2007)

	No Crash	No Recovery	Partial Recovery	Full Recovery
Pre-Boomers (1941-45)				
Retirement Accounts	4.8	3.7	3.8	3.9
Income from Assets	14.7	11.5	11.7	12.1
Social Security Benefits	11.8	11.8	11.8	11.8
DB Pension Benefits	4.1	4.1	4.1	4.1
Earnings	11.0	11.0	11.0	11.0
SSI	0.2	0.2	0.2	0.2
Imputed Rent	2.7	2.7	2.7	2.7
Total Income	49.2	45.0	45.2	45.8
Middle Boomers (1951-55)				
Retirement Accounts	6.5	5.1	6.0	6.9
Income from Assets	20.5	15.9	18.6	21.8
Social Security Benefits	13.6	13.6	13.6	13.6
DB Pension Benefits	3.9	3.9	3.9	3.9
Earnings	13.1	13.1	13.1	13.1
SSI	0.1	0.1	0.1	0.1
Imputed Rent	3.0	3.0	3.0	3.0
Total Income	60.6	54.7	58.3	62.3
Late Boomers (1961-65)				
Retirement Accounts	8.5	7.1	8.1	9.0
Income from Assets	17.3	14.4	16.6	18.5
Social Security Benefits	14.3	14.3	14.3	14.3
DB Pension Benefits	2.7	2.7	2.7	2.7
Earnings	14.3	14.3	14.3	14.3
SSI	0.1	0.1	0.1	0.1
Imputed Rent	2.6	2.6	2.6	2.6
Total Income	59.8	55.5	58.7	61.7

Source: Authors' computations of DYNASIM3 (see text for details).
Note: The no-crash scenario assumes that the stock market had not crashed in 2008. The no-recovery scenario incorporates the 2008 stock market crash and assumes it subsequently grows at historic rates. The full-recovery scenario incorporates the 2008 stock market crash and assumes it returns to the projected no-crash level in 2017. The partial-recovery scenario incorporates the 2008 stock market crash and assumes it recovers half way between the no-recovery and full-recovery levels by 2017. Income from retirement accounts includes the annuity value of 80 percent of investment assets in DC pensions, IRAs, and Keogh accounts. Income from assets includes the annuity value of 80 percent of non-retirement accounts including stocks, bonds, saving, checking, money market, non-residential real estate, business assets, and vehicles, less debt. Imputed rent is 3 percent of housing equity. Income is in thousands of annual per capita 2007 dollars.

Under all the alternative scenarios, late boomers have better retirement outcomes than other birth cohorts. They were relatively young (between ages 43 and 47) when the market crashed in 2008 with less accumulated wealth and less to lose than older adults. The younger cohort will also have more years to restore their lost wealth from both new stock purchases (at relatively lower prices) and future appreciation. Though these late boomers lose under the no-recovery scenario, they gain under the full-recovery scenario. Average household income per late boomer declines 7.2 percent from $59,800 under the no-crash scenario to $55,500 under the no-recovery scenario but increases 3.2 percent to $61,700 under the full-recovery scenario. The higher returns late boomers receive on their new stock investments under the full-recovery scenario more than make up for the 2008 loss in market value.

Under the no-recovery scenario, pre-boomers have a slightly smaller percentage loss in income than middle boomers because they hold a smaller share of their assets in equities (reflecting the assumption that workers move to more conservative investment portfolios as they near retirement). Relative to the no-crash scenario, average household income per person is 8.5 percent lower ($45,000 versus $49,200) for pre-boomers and 9.7 percent lower ($54,700 versus $60,600) for middle boomers.

Under both recovery scenarios, however, middle boomers fare much better than pre-boomers. Average household income under the full-recovery scenario is 6.9 percent lower ($45,800 compared with $49,200) than the no-crash value for pre-boomers, but it is 2.8 percent higher ($62,300 compared with $60,600) than the no-crash value for middle boomers. Although pre-boomers initially lose less than middle boomers, they have little time to benefit from the growth in stock prices in the recovery scenarios. In contrast, middle boomers have some years to

recover and are able to buy stocks at the lower prices, which will appreciate rapidly in the recovery scenarios.

The projected changes in household income per person are smaller than those produced by asset value changes alone because Social Security is an important source of retirement income that is unaffected by the stock market. Under the no-recovery scenario, pre-boomers lose about 22 percent of their asset income at age 67 (inside and outside of retirement accounts), but only 8.5 percent of their household income. Late boomers lose about 17 percent of their asset income, but only 7.2 percent of their household income.

High Socioeconomic Groups Are Hardest Hit

Outcomes also depend on income and demographic characteristics. The financial crisis will have a much bigger effect on the retirement incomes of high than low socioeconomic groups because high socioeconomic groups have the most at stake. At age 67, income from retirement accounts and financial assets makes up 58 percent of average household income for middle boomers in the top income quintile but only 13 percent for middle boomers in the bottom quintile (table 2).

Middle boomers in the highest income quintile will have only 86 percent as much retirement income as in the no-crash scenario if the stock market does not recover, while those in the lowest income quintile will have 98 percent (table 3). Additionally, income under the no-recovery scenario is only 88 percent of the no-crash value for college graduates but 97 percent for high school dropouts. Lastly, income is 90 percent of the no-crash value for non-Hispanic whites compared with 95 percent for non-Hispanic blacks and Hispanics.

Table 2. Source Share of Mean Household Income Per Person at Age 67 Under the No-Crash Scenario by Birth Cohort and Retirement Income Quintile (%)

	Bottom Quintile	2nd Quintile	3rd Quintile	4th Quintile	Top Quintile	All
Pre-Boomers (1941-45)						
Retirement Accounts	3	7	10	12	10	10
Income from Assets	7	13	16	18	42	30
Social Security Benefits	63	55	40	27	12	24
DB Pension Benefits	4	8	11	10	7	8
Earnings	9	9	15	26	25	22
SSI	8	0	0	0	0	0
Imputed Rent	7	9	8	7	4	5
Total Income	100	100	100	100	100	100
Middle Boomers (1951-55)						
Retirement Accounts	5	8	12	14	10	11
Income from Assets	8	12	14	17	48	34
Social Security Benefits	66	54	39	27	11	22
DB Pension Benefits	4	6	8	9	6	6
Earnings	7	13	20	28	22	22
SSI	5	0	0	0	0	0
Imputed Rent	6	8	7	6	4	5
Total Income	100	100	100	100	100	100
Late Boomers (1961-65)						
Retirement Accounts	4	9	13	16	15	14
Income from Assets	10	13	15	17	40	29
Social Security Benefits	67	56	40	28	12	24
DB Pension Benefits	3	4	5	6	4	5
Earnings	6	11	21	28	26	24
SSI	4	0	0	0	0	0
Imputed Rent	7	7	6	5	3	4
Total Income	100	100	100	100	100	100

Source: Authors' computations of DYNASIM3 (see text for details).
Note: The no-crash scenario assumes that the stock market had not crashed in 2008. Income from retirement accounts includes the annuity value of 80 percent of investment assets in DC pensions, IRAs, and Keogh accounts. Income from assets includes the annuity value of 80 percent of non-retirement accounts including stocks, bonds, saving, checking, money market, non-residential real estate, business assets, and vehicles, less debt. Imputed rent is 3 percent of housing equity.

Table 3. Ratio of Mean Household Income Per Person at Age 67 Relative to the No-Crash Scenario for Middle Boomers Born 1951-55

	No Crash ($000's)	No Recovery (%)	Partial Recovery (%)	Full Recovery (%)
All	60.6	90	96	103
Gender				
Female	58.2	90	96	103
Male	63.5	90	96	103
Marital Status				
Unmarried	57.7	91	97	102
Married	62.4	89	96	103
Race/Ethnicity				
Non-Hispanic white	68.7	90	96	103
Non-Hispanic black	32.2	95	98	101
Hispanic	31.2	95	98	101
Other	59.4	90	94	103
Education				
High school dropout	19.7	97	99	101
High school graduate	45.0	92	97	102
College graduate	106.5	88	95	104
Income Quintile				
Bottom Quintile	10.8	98	99	100
2nd Quintile	22.2	97	99	101
3rd Quintile	36.0	95	98	101
4th Quintile	59.0	94	98	102
Top Quintile	175.5	86	95	104

Source: Authors' computations of DYNASIM3 (see text for details).

Note: The no-crash scenario assumes that the stock market had not crashed in 2008. The no-recovery scenario incorporates the 2008 stock market crash and assumes it subsequently grows at historic rates. The full-recovery scenario incorporates the 2008 stock market crash and assumes it returns to the projected no-crash level in 2017. The partial-recovery scenario incorporates the 2008 stock market crash and assumes it recovers half way between the no-recovery and full-recovery levels by 2017. Household income includes the annuity value of 80 percent of retirement and other financial assets, Social Security benefits, DB pension benefits, earnings, SSI, and imputed rent (3 percent of housing equity). Income is in thousands of annual per capita 2007 dollars.

Under the full-recovery scenario where the average middle boomer gains retirement income relative to the no-crash scenario, those with the highest incomes gain more than others. Retirement income at age 67 is 104 percent of the no-crash value for middle boomers in the highest income quintile, but is unchanged for those in the lowest income quintile and increases only 1 percent in the second quintile. Thus, high socioeconomic groups will have both the biggest losses and the biggest gains relative to others in their cohorts depending on the future path of the stock market.

Who Are the Winners and Losers?

If the market does not fully recover, everyone with retirement accounts or financial assets in equities at the time of the crash will be worse off compared with the no-crash scenario (table 4). Among all 67 year-olds, under the no-recovery scenario, between 44 and 51 percent in each cohort will lose 2 percent or more of their retirement income. About one in six pre-boomers and one in eight late boomers will lose at least 10 percent.

Table 4. Distribution of Percent Change in Per Person Household Income at Age 67 Between the No-Crash and Alternative Scenarios by Birth Cohort (%)

	No Recovery			Partial Recovery			Full Recovery		
	Pre-	Middle	Late	Pre-	Middle	Late	Pre-	Middle	Late
Percent Change in	Boomers	Boomers	Boomers	Boomers	Boomers	Boomers	Boomers	Boomers	Boomers
Household Income	(1941-45)	(1951-55)	(1961-65)	(1941-45)	(1951-55)	(1961-65)	(1941-45)	(1951-55)	(1961-65)
Win	**0**	**0**	**0**	**0**	**3**	**4**	**0**	**25**	**29**
2% - < 5%	0	0	0	0	2	3	0	16	17
5% - < 10%	0	0	0	0	1	1	0	7	8
>= 10%	0	0	0	0	0	0	0	3	3
No Change (< 2%)	**54**	**49**	**56**	**57**	**70**	**79**	**58**	**69**	**68**
Lose	**46**	**51**	**44**	**43**	**28**	**18**	**41**	**6**	**3**
2% - < 5%	15	18	18	16	15	10	16	4	2
5% - < 10%	14	15	14	13	8	5	13	2	1
>= 10%	17	18	13	15	4	2	12	1	0

Source: Authors' computations of DYNASIM3 (see text for details).
Note: The no-crash scenario assumes that the stock market had not crashed in 2008. The no-recovery scenario incorporates the 2008 stock market crash and assumes it subsequently grows at historic rates. The full-recovery scenario incorporates the 2008 stock market crash and assumes it returns to the projected no-crash level in 2017. The partial-recovery scenario incorporates the 2008 stock market crash and assumes it recovers half way between the no-recovery and full-recovery levels by 2017. Winners and losers are defined as having at least a 2 percent change in per person household income between the no-crash and alternative scenarios.

The full-recovery scenario generates only losers among pre-boomers with income changes because most are already retired and have no time to recover their assets between the 2008 market crash and reaching age 67. More than two in five pre-boomers have at least 2 percent less retirement income than under the no-crash scenario, and about one in eight have at least 10 percent less income. By the time they reach ages 70 or 75, however, some pre-boomers will be able to recoup some of their losses if the market rebounds, although any assets spent to finance retirement consumption will reduce their ability to recoup their initial losses.

Under the full-recovery scenario, most middle and late boomers will see their retirement income change by less than 2 percent.[22] Most with income changes gain relative to the no-crash scenario because, compared with pre-boomers, they had fewer assets at stake in 2008 and more time to recover. Their equity holdings at the time of the crash return to the no-crash value, and they gain from buying stocks at low prices that subsequently grow at above-average market rates of return. One-quarter of middle boomers and 29 percent of late boomers have higher incomes relative to the no-crash scenario, though the majority of winners realize less than a 5 percent increase. Some middle and late boomers will lose income between the no-crash and full-recovery scenarios because they sell their stocks before the market can recover the losses on their initial investments.

Big winners and losers (an income change of at least 10 percent relative to the no-crash scenario) are concentrated in the high socioeconomic groups (table 5). For example, 40 percent of middle boomers in the top quintile lose 10 percent or more income under the no-recovery scenario, compared with only 4 percent in the lowest quintile. Average losses at age 67 are

---

[22] The no-change group in the tables include those that do not have retirement accounts or financial assets in equities and those with equities whose income changes by less than 2 percent.

Table 5. Share of Individuals Who Lose at Least 10 Percent of Per Person Household Income at Age 67 and Their Average Change in Income

	Share of Big Losers (%)			Average Change in Income Among Big Losers ($000's)		
	No Recovery	Partial Recovery	Full Recovery	No Recovery	Partial Recovery	Full Recovery
Pre-Boomers (1941-45)						
All	**17**	**15**	**12**	**-19.5**	**-20.8**	**-19.9**
Bottom Quintile	3	3	3	-1.6	-1.4	-1.5
2nd Quintile	9	7	5	-3.1	-3.0	-2.9
3rd Quintile	13	10	9	-5.1	-5.2	-5.1
4th Quintile	21	20	16	-9.6	-8.9	-8.8
Top Quintile	38	34	29	-35.2	-37.3	-35.0
Middle Boomers (1951-55)						
All	**18**	**5**	**1**	**-26.9**	**-33.2**	**-20.0**
Bottom Quintile	4	1	0	-1.9	-1.5	-1.8
2nd Quintile	9	2	1	-3.5	-3.2	-3.4
3rd Quintile	15	3	1	-5.8	-5.3	-5.0
4th Quintile	21	5	1	-9.9	-8.9	-9.3
Top Quintile	40	12	2	-51.5	-57.2	-40.8
Late Boomers (1961-65)						
All	**13**	**2**	**1**	**-24.6**	**-22.6**	**-11.9**
Bottom Quintile	3	1	0	-2.0	-1.7	-1.5
2nd Quintile	8	1	1	-3.4	-3.5	-3.7
3rd Quintile	10	2	1	-5.7	-6.0	-4.5
4th Quintile	14	2	1	-10.2	-10.1	-13.7
Top Quintile	29	6	0	-45.1	-38.7	-34.3

Source: Authors' computations of DYNASIM3 (see text for details).

Note: The no-crash scenario assumes that the stock market had not crashed in 2008. The no-recovery scenario incorporates the 2008 stock market crash and assumes it subsequently grows at historic rates. The full-recovery scenario incorporates the 2008 stock market crash and assumes it returns to the projected no-crash level in 2017. The partial-recovery scenario incorporates the 2008 stock market crash and assumes it recovers half way between the no-recovery and full-recovery levels by 2017. Big losers are defined as having at least a 10 percent loss in per person household income between the no-crash and alternative scenarios. Household income includes the annuity value of 80 percent of retirement and other financial assets, Social Security benefits, DB pension benefits, earnings, SSI, and imputed rent (3 percent of housing equity). Income is in thousands of annual per capita 2007 dollars.

$26,900 among all big losers but are more than 27 times larger for those in the highest income quintile ($51,500) than for those in the bottom quintile ($1,900).

Under the full-recovery scenario, 9 percent of late boomers in the highest income quintile gain 10 percent or more income compared with only 1 percent in the lowest income quintile (table 6). Average gains at age 67 are $23,800 among all big winners and range from $2,200 for those in the lowest income quintile to $39,500 for those in the highest quintile.

Conclusions

The 2008 stock market crash has important implications for Americans with equities in their retirement accounts and personal savings. Those at or near retirement age in 2008 will be hit the hardest. They had more wealth at risk when stocks collapsed and have little time to regain their losses or build new wealth through future asset purchases at discounted prices. Even under the most optimistic scenario, in which the market fully recovers, more than two in five Americans born between 1941 and 1945 (pre-boomers) will lose at least 2 percent of their retirement income at age 67; about one in eight will realize declines of at least 10 percent.

Today's mid-career workers will also lose retirement income if the stock market does not rebound back toward its pre-2008 growth path. If the market fully recovers, however, mid-career workers could retire with more assets than under the no-crash scenario. They have more time to recoup their losses, including years when they can buy stocks at low prices. If the market fully recovers to the projected no-crash level in 2017, 25 percent of Americans born between 1951 and 1955 (middle boomers) and 29 percent of those born between 1961 and 1965 (late boomers) will

Table 6. Share of Individuals Who Win at Least 10 Percent of Per Person Household Income at Age 67 and Their Average Change in Income

	Share of Big Winners (%)			Average Change in Income Among Big Winners ($000's)		
	No Recovery	Partial Recovery	Full Recovery	No Recovery	Partial Recovery	Full Recovery
Pre-Boomers (1941-45)						
All	**0**	**0**	**0**	**N/A**	**N/A**	**N/A**
Bottom Quintile	0	0	0	N/A	N/A	N/A
2nd Quintile	0	0	0	N/A	N/A	N/A
3rd Quintile	0	0	0	N/A	N/A	N/A
4th Quintile	0	0	0	N/A	N/A	N/A
Top Quintile	0	0	0	N/A	N/A	N/A
Middle Boomers (1951-55)						
All	**0**	**0**	**3**	**N/A**	**N/A**	**30.7**
Bottom Quintile	0	0	1	N/A	N/A	1.1
2nd Quintile	0	0	1	N/A	N/A	3.7
3rd Quintile	0	0	1	N/A	N/A	6.1
4th Quintile	0	0	3	N/A	N/A	8.8
Top Quintile	0	1	10	N/A	N/A	45.8
Late Boomers (1961-65)						
All	**0**	**0**	**3**	**N/A**	**N/A**	**23.8**
Bottom Quintile	0	0	1	N/A	N/A	2.2
2nd Quintile	0	0	1	N/A	N/A	3.3
3rd Quintile	0	0	2	N/A	N/A	5.2
4th Quintile	0	0	4	N/A	N/A	9.0
Top Quintile	0	0	9	N/A	N/A	39.5

Source: Authors' computations of DYNASIM3 (see text for details).

Note: The no-crash scenario assumes that the stock market had not crashed in 2008. The no-recovery scenario incorporates the 2008 stock market crash and assumes it subsequently grows at historic rates. The full-recovery scenario incorporates the 2008 stock market crash and assumes it returns to the projected no-crash level in 2017. The partial-recovery scenario incorporates the 2008 stock market crash and assumes it recovers half way between the no-recovery and full-recovery levels by 2017. Big winners are defined as having at least a 10 percent increase in per person household income between the no-crash and alternative scenarios. Household income includes the annuity value of 80 percent of retirement and other financial assets, Social Security benefits, DB pension benefits, earnings, SSI, and imputed rent (3 percent of housing equity). Income is in thousands of annual per capita 2007 dollars.

have at least 2 percent higher retirement incomes than under the no-crash scenario. Most of them, however, will realize modest gains.

The wide swings in stock prices affect non-Hispanic whites, college graduates, and those with the highest projected retirement incomes before the market crash more than other demographic and income groups. High-income households, those with more education, and non-Hispanic whites have the most income at risk, but they also would experience the largest gains from a stock market recovery. Under the no-recovery scenario, 38 percent of pre-boomers in the top income quintile will be big losers with losses averaging $35,200 compared with only 3 percent in the bottom income quintile with losses averaging $1,600. Under the full-recovery scenario, 9 percent of late boomers in the highest income quintile will be big winners with gains averaging $39,500, compared with only 1 percent of those in the lowest income quintile with gains averaging $2,200.

Even if people do everything that financial planners recommend—maximize contributions to their retirement accounts and rebalance their portfolios away from stocks as they age—there is no guarantee that at some point they will not lose money in the stock market. Stocks involve more risk than other assets, but not many people want to forgo their higher expected returns completely. However, timing matters in unpredictable ways, and market swings affect different cohorts differently. Those now furthest from retirement have the best chance of recovering losses from the recent crash and even coming out ahead if the market rebounds. For those at or near retirement, time has almost run out.

As DC pensions continue to replace DB pensions, people are increasingly likely to be directly affected by stock market fluctuations. Many are calling for reforms that expand pension

participation among workers. For example, President Obama has proposed requiring employers to offer automatic enrollment in IRAs, which are funded solely through worker contributions. Our results show that most low-income retirees will not be affected by the 2008 stock market crash because they have little or nothing saved in equities. But research shows that participation, contribution levels, and investment allocations in retirement plans are heavily influenced by employer default rules (Beshears et al. forthcoming; Choi et al. 2002, 2004; Madrian and Shea 2001). Proposals requiring automatic enrollment could lead to much higher participation in DC plans by low-income workers and should be designed in ways that offer some protection from market risks. Sensible default investment strategies that reduce exposure to risk near retirement could improve retirement outcomes for many retirees.

Target maturity or life cycle default investments that automatically adjust workers' portfolios to reduce stock market exposure as they age can help reduce risks. In spite of these options, however, nearly one-quarter of 401(k) participants between ages 56 and 65 had 90 percent or more of their 401(k) assets in equities in 2007 compared with an average equity allocation of only about 51 percent in target-date funds for people that age (VanDerhei 2009). Establishing retirement accounts that earn a rate of return guaranteed by the federal government (Ghilarducci 2007) or developing equity products that provide some guarantees, with government backstops and insurance, can also reduce risk for low- and moderate-income investors (Aspen Institute 2008).

However, guarantees may induce individuals to hold excessively risky investment portfolios because their losses will be compensated. As a result, guarantees may increase costs to the government since the government bears mainly the downside risks (Smith, Steuerle, and

Montagnes 2004). Further, a recent household survey conducted by the Investment Company Institute (ICI) suggests that the public may not support these solutions. The survey found that 87 percent of households felt that the government should allow individuals to make their own investment decisions in DC accounts or IRAs, and 75 percent felt that the government should not replace retirement accounts with government bonds (Reid and Holden 2008).

Beyond the risk of losing their wealth just before retiring, workers also face the risk of depleting their assets after retirement. Options for retirees who wish to minimize both financial and longevity risk should include purchasing annuities that guarantee a stream of lifetime income. Although annuities provide insurance against outliving one's resources, few retirees purchase them. The Aspen Institute has recommended that President Obama allow retirees to use up to $100,000 of their assets to purchase inflation-projected annuities with spousal benefits through the Social Security Administration that are underwritten by the private sector (Aspen Institute 2008). Of course, annuitization does nothing to reduce risk while workers are accumulating assets.

The recent stock market crash reminds us how important Social Security benefits, which are based on lifetime earnings and do not fluctuate with the stock market, are for maintaining adequate retirement income for most retirees. Had Social Security been invested in private accounts, the impact of the stock market crash on retirement outcomes would have been much larger—positive or negative, depending on one's birth cohort and future market performance.

References

Aspen Institute, The. 2008. "The Chance for Change: A Memorandum to the Next President on a Savings Agenda for Americans." New York: The Aspen Institute.

Beshears, John, James Choi, David Laibson, and Brigitte Madrian. Forthcoming. "The Impact of Employer Matching on Savings Plan Participation under Automatic Enrollment." In *Research Findings in the Economics of Aging,* edited by David A. Wise. Chicago: University of Chicago Press.

Board of Trustees. 2008. "The 2008 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds." Washington, DC: Board of Trustees.

Burtless, Gary. 2009. "Financial Market Turbulence and Social Security Reform." In *Pensions, Social Security, and the Privatization of Risk*, edited by Mitchell A. Orenstein (72–85). New York, NY: Columbia University Press.

Butrica, Barbara A., Howard M. Iams, Karen E. Smith, and Eric J. Toder. 2009. "The Disappearing Defined Benefit Pension and Its Potential Impact on the Retirement Incomes of Boomers." Washington, DC: The Urban Institute.

Choi, James J., David Laibson, Brigitte C. Madrian, and Andrew Metrick. 2002. "Defined Contribution Pensions: Plan Rules, Participant Decisions, and the Path of Least Resistance." In *Tax Policy and the Economy Volume 16,* edited by James Poterba (67–114). Cambridge, MA: MIT Press.

———. 2004. "For Better or for Worse: Default Effects and 401(k) Savings Behavior." In *Perspectives in the Economic of Aging,* edited by David A. Wise (81–121). Chicago: University of Chicago Press.

Favreault, Melissa M., and Karen E. Smith. 2004. "A Primer on the Dynamic Simulation of Income Model (DYNASIM3)." Retirement Project Discussion Paper 02-04. Washington, DC: The Urban Institute.

Ghilarducci, Teresa. 2007. "Guaranteed Retirement Accounts: Toward Retirement Income Security." Briefing Paper 204. Washington, DC: Economic Policy Institute.

Holden, Sarah, and Jack VanDerhei. 2002. "Can 401(k) Accumulations Generate Significant Income for Future Retirees?" Issue Brief 251. Washington, DC: Employee Benefit Research Institute.

Ibbotson Associates. 2008. *Stocks, Bonds, Bills, and Inflation (SBBI) 2008 Yearbook: Market Results for 1926–2007*. Chicago: Ibbotson Associates.

Investment Company Institute (ICI). 2008. "401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2007." *Research Perspective* No. 14(3). Washington, DC: ICI.

Investment Company Institute (ICI) and the Securities Industry and Financial Markets Association (SIFMA). 2008. *Equity and Bond Ownership in America, 2008.* Washington, DC: ICI and SIFMA.

Madrian, Brigitte C., and Dennis F. Shea. 2001. "The Power of Suggestion: Inertia in 401(K) Participation and Savings Behavior." *Quarterly Journal of Economics* 116(4): 1149–87.

President's Commission to Strengthen Social Security. 2001. *Strengthening Social Security and Creating Personal Wealth for all Americans: Report of the President's Commission.* Washington, DC: President's Commission to Strengthen Social Security.

Reid, Brian, and Sarah Holden. 2008. "Retirement Saving in Wake of Financial Market Volatility." *Research Perspective* 13(1). Washington, DC: Investment Company Institute.

Smith, Karen E., Melissa M. Favreault, Caroline Ratcliffe, Barbara Butrica, Eric Toder, and Jon Bakija. 2007. "Modeling Income in the Near Term 5." Washington, DC: The Urban Institute.

Smith, Karen E., Eugene Steuerle, and Pablo Montagnes. 2004. "Providing Guarantees in Social Security." Working Paper 2004-22. Boston: Center for Retirement Research at Boston College.

Soto, Mauricio. 2008. "How Is the Financial Crisis Affecting Retirement Savings?" Fact Sheet on Retirement Policy, December 3, 2008, Update. Washington, DC: The Urban Institute.

Toder, Eric, Lawrence Thompson, Melissa Favreault, Richard Johnson, Kevin Perese, Caroline Ratcliffe, Karen Smith, Cori Uccello, Timothy Waidmann, Jillian Berk, and Romina Woldemariam. 2002. "Modeling Income in the Near Term: Revised Projections of Retirement Income through 2020 for the 1931–1960 Birth Cohorts." Washington, DC: The Urban Institute.

U.S. Census Bureau. 2008. *Statistical Abstract of the United States: 2008 (128th edition).* Washington, DC: U.S. Census Bureau.

U.S. Department of Labor. 2002. "Private Pension Plan Bulletin: Abstract of 1998 Form 5500 Annual Reports. Number 11, Winter 2001–2002." Washington, DC: U.S. Department of Labor. http://www.dol.gov/ebsa/PDF/1998pensionplanbulletin.PDF.

VanDerhei, Jack. 2009. "The Impact of the Recent Financial Crisis on 401(k) Account Balances." Issue Brief 326. Washington, DC: Employee Benefit Research Institute.