

Improving Retirement Outcomes: Timing, Phasing and Benefit Claiming Choices

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Executive Summary

In a recent SOA research study, “Measures of Retirement Benefit Adequacy: Which, Why, for Whom, and How Much?” (January 2013), we developed a Monte Carlo simulation model of retirement cash flows. The most common risks and uncertainties faced by retirees, including longevity, inflation, investment, health, and long-term care risks, were built into the model. In the previous study, this model was used to investigate the impact of risk mitigation strategies on retirement income adequacy. We now extend the model to evaluate the feasibility of various retirement timing and benefit claiming strategies and their impact on retirement wealth needs.

Many households in the United States are resource constrained, and approach retirement age with limited financial assets. The median household age 55 to 64, for example, earned approximately \$60,000 in 2010 and had only \$100,000 in non-housing wealth. For households with limited assets, delayed retirement and Social Security claiming, combined with significant cuts in spending, may be the only realistic retirement option.

In the first part of this report, we provide background information and discuss trends in labor force participation of older workers, Social Security claiming, phased retirement and employer retirement plan offerings. These are used to motivate the selection of scenarios that are modeled in the latter part of the report.

The simulation focuses on two hypothetical married-couple households, age 62, based on the 50th and 75th percentile of income: \$60,000 income with \$100,000 non-housing wealth; and \$105,000 income with \$250,000 non-housing wealth. The objective of both households is assumed to be to make it through retirement without reducing their standard of living and without running out of money.

The main conclusions that can be drawn from the simulation results are summarized below:

- The base case households with \$60,000 and \$105,000 of pre-retirement income, respectively, have insufficient wealth to retire securely and maintain their current standard of living. To have a 90 percent chance of fully meeting their needs in retirement, the \$60,000-income couple retiring at age 62 would need \$520,000; and the \$105,000-income couple would need \$1.2 million. (See Table 18.) Note: Forecast wealth needs are all reported in nominal dollars.
- Delaying retirement and Social Security claiming significantly reduces the amount of wealth needed for successful retirement. However, these representative households still have insufficient financial resources to meet their retirement objectives. To retire at age 70, the \$60,000-income couple can be 90 percent confident of meeting their needs if they have \$290,000 in retirement wealth at the time of retirement. In contrast, they would have needed \$520,000 to retire successfully at age 62, about five times actual pre-retirement savings levels. For the \$105,000-income couple, delayed retirement and Social Security

claiming provide a similar percentage reduction in wealth needed for a successful retirement. The magnitude of the changes is greater for the \$105,000 household because the amount of the present value of the Social Security benefits is larger. (See Table 19 and the Appendix Tables A-1 and A-2.)

- Phasing strategies modestly reduce the amount of wealth needed for retirement. As compared to retiring fully at age 66, a phasing strategy in which the couple claims Social Security at 66, but works 50 percent until age 70 requires about \$80,000 less in wealth at age 66 for the \$60,000-income couple and \$150,000 less for the \$105,000-income couple. (See Table 20.) During the phasing period, the benefits accrue from the reduced need to dip into savings during the phasing period.
- For those with lower wealth at retirement, reducing discretionary and housing expenses can be highly effective in improving retirement outcomes, particularly when combined with delayed retirement. For example, without reducing expenses, the \$60,000 household needs \$388,000 to retire at age 66 and \$288,000 to retire at age 70 in order to be 90 percent confident of meeting all cash flow needs. A 30 percent reduction in discretionary spending changes the \$388,000 wealth target to \$205,000, and a 30 percent reduction in both discretionary and housing expenses changes it to \$183,000. Age 70 retirement with 30 percent reductions in discretionary and housing expenses can be successfully accomplished with only \$122,310 in wealth at retirement. Although the magnitude of the impact on wealth needed is greater for the \$105,000-income couple, the expense reductions result in similar percentage declines. (See Table 21.)
- Households that qualify for defined-benefit (DB) pension benefits will have lower wealth needed at retirement depending on the present value of the expected benefits. Although a DB plan can help retirees meet regular cash flow needs, it will not insulate them from shortfalls driven by investment, health and long-term care risks. (See Figure 6 and Appendix Tables A-6-8.)
- Based on our analysis, our overall conclusions are that retirement timing, benefit claiming, and phasing strategies are important components of a successful retirement plan, but do not completely reduce the risk of retirement wealth shortfall for typical retiree households. The shocks that result in unexpectedly large cash outflows, such as extended long-term care, are similar regardless of income, retirement age or Social Security claiming scenario.
- The simulation results show very large differences between the wealth needed to be 90 percent versus 95 percent confident of meeting all financial needs in retirement. For example, the \$60,000-income household needs \$388,000 at age 66 to be 90 percent sure of meeting all needs, but they would need \$678,000 to be 95 percent confident. (See Table A-1.) Similarly, the amount needed to be 90 or 95 percent confident is much greater than what is needed on average. To be 95 percent confident requires more than double the savings needed on average.
- One of the advantages of using a simulation methodology is that we are able to quantify the “tail risk.” If households plan to have enough retirement savings to meet their needs

on average, they have a very low probability of making it through retirement without running out of money. By simulating shocks that commonly impact retirees, including adverse investment performance, unexpected inflation, uninsured health care costs and long-term care risk, our results illustrate the magnitude of the potential shortfall. Some strategies reduce the average amounts needed, but have little effect on the “tail risk”; whereas others enable the individual to address tail risk.

The background section of this report provides insights into labor market and retirement trends, as well as Social Security claiming issues and behavior. Some of the key findings include:

- Over the long run, there have been major reductions in retirement ages, but there have been modest increases in recent years.
- The aging of the population and delayed retirement trends are expected to lead to an increasing number of persons over age 55 in the labor force. The older-age segments of the labor force are growing much more rapidly than the labor force as a whole. At the same time that labor force participation rates at higher ages have increased, the differences between male and female labor force participation at higher ages have declined a great deal.
- Social Security is a vitally important part of the retirement picture for many Americans, providing one of the only sources of cost-of-living-adjusted lifetime income. Despite the opportunity to receive higher benefits for delayed claiming, more Social Security participants claim benefits at age 62 than at any other age. The percentage of new retirees claiming benefits at age 62 has declined from over 50 percent to under 50 percent for individuals born in 1940 to 1944. (See Table 8.) There are major gaps in public knowledge about the implications of different Social Security claiming ages, including spousal claiming strategies, and the value of retiring later.
- Phased retirement is an idea of major interest to the public, but not of much interest to many employers. There are, however, a range of examples and ideas for putting this retirement strategy into practice. The majority of implementations to date involve informal phased retirement or rehiring of retirees. Employees can also phase by retiring from their primary employer and obtaining alternative part-time employment with a new employer.
- Employer retirement plans are increasingly of the defined-contribution (DC) type. DB plans were relatively common for previous generations of workers, but very few younger workers are accruing benefits in DB plans today. Although employers often make contributions to DC plans, the risks of inadequate savings rates and poor investment performance are increasingly borne by plan participants. Income in retirement is highly dependent on investment decisions made during the working years, so it is important that workers receive good advice regarding level of contributions and investment choices.

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I. Introduction

Household decisions related to the timing of retirement and the claiming of benefits are complex and are often made without a full understanding of the financial implications and the potential ramifications. In some cases, these decisions are beyond the retiree's control. Poor health or an unexpected layoff may necessitate moving into retirement earlier than would otherwise have been chosen. In other cases, retirees may not fully appreciate the financial costs and risks associated with early retirement.

This report provides background on U.S. trends in the timing of retirement, the claiming of benefits behavior, including discussion of labor force participation trends, the timing of commencement of Social Security, phased retirement alternatives, work as part of retirement, and the effects of retirement plan participation on these decisions. This study evaluates several of the more common retirement timing and claiming strategies using a retirement simulation model that incorporates investment, inflation, health and long-term care risks. Results of these simulations provide insight into the comparative risk exposures and costs of various retirement timing and claiming strategies for typical retiree households.

This report is organized as follows. Section II provides background and context to support the choice of the timing and claiming scenarios that are tested. Section III explains the simulation model and the retirement scenarios that are considered, and Section IV summarizes and discusses

the results of the empirical work. In the final section we identify key insights gained from this research study and trends in public and private employment that impact retirement timing decisions. The Appendix provides more detailed results of selected simulations.

II. Background and Context

Due to increased interest in retirement decision making and timing among public policymakers, employers and individuals, there is extensive information available on many aspects of this issue. It is becoming increasingly recognized that retirement timing and Social Security claiming decisions are very important in determining the well-being and success of people in retirement. This background discussion is not intended to be all-inclusive, but rather is intended to provide the context and an overview of the key issues in support of the selection of the retirement timing and claiming scenarios considered in the report. While these issues are related, they are usually not woven together. Our goal is to better understand the trends in these important retirement decisions, as well as retirees' attitudes, knowledge and preferences with regard to these issues.

Practical issue: The timing of retirement and Social Security claiming is a major factor in determining the well-being and success of middle class Americans in retirement. Evidence suggests that many retirees do not fully understand or investigate their timing and claiming options.

In a world where more retirement benefits are paid as lump sums, it is up to the individual to decide how funds will be used over time, and to understand the implications of retirement timing. Perceptions and gaps in knowledge become increasingly important because poor decisions can result in very serious negative outcomes. The topic of retirement decisions has been the focus of several Society of Actuaries (SOA) research projects, and many projects by others. The changing patterns of retirement, including work during retirement, have been major topics included in the work of the SOA Committee on Post-Retirement Needs and Risks.

Key findings with regard to perceptions and retirement timing:

- Several recent studies confirm that people tend to retire at earlier ages than surveyed pre-retirees say they expect to retire.
- Approximately four in 10 people retire earlier than planned. This

has been true for many years and is not necessarily just a function of the economic downturn.

- Many people continue to work in retirement, but more people expect to work than actually do.
- Common reasons given by retirees for working during retirement include income and engagement.

The 2011 SOA Risks and Process of Retirement Survey included retirement timing and preferences as an area of emphasis (Society of Actuaries, 2012). Some highlights of that survey's findings include:

- Thirty-five percent of pre-retirees said that retirement does not apply to them.
- Individuals have retired at a much earlier age than pre-retirees expected to retire. There have been similar findings in the prior surveys. Many pre-retirees failed to consider the possibility of retiring earlier than planned.
- Pre-retirees and retirees offered different reasons for retirement timing. Among the retirees, the most important reason for retirement timing has been health problems and disability. Among pre-retirees, the biggest reason for expected retirement timing has been having enough money.
- In 2011, 44 percent of pre-retirees expected to stop working all at once, whereas 18 percent expected to gradually reduce hours, 31 percent to continue to work part time, and 3 percent to continue to work full time.
- Both retirees and pre-retirees cited income and engagement as their top reasons for working in retirement. Pre-retirees were more likely to say that continued saving and preservation of employee benefits were also important.

An obvious reason to retire later would be to improve financial security in retirement. Additional years of wage income, retirement savings and investment returns, combined with fewer years of retirement to fund and higher expected pension benefits, would be expected to increase the odds of making it through retirement without running out of money. Based on survey data, however, these benefits of delayed retirement are not well understood. To illustrate this, we reproduce responses to select questions from the SOA post-retirement risk surveys below. Table 1 summarizes responses to the question: "Suppose you retired three years later than you did/plan.

Do you think this would make your retirement...?” The large proportion of retirees and pre-retirees who did not think that delaying retirement would increase their security is surprising.

Table 1: The Expected Effect on Retirement Security of Working Three Years Longer

Answer:	Retirees	Pre-retirees
A lot more secure	14%	10%
A little more secure	35	49
No more secure	46	37

Source: Society of Actuaries: 2011 Risks and Process of Retirement Survey Report, “Key Findings and Issues: Working in Retirement” (data from the 2009 survey).

The only factor that scored high on making retirees a lot more secure was continuing to receive employee health insurance. Sixty-two percent of pre-retirees and 28 percent of retirees said that continuing to receive employee health insurance would make them a lot more secure. The impact of that factor may change in 2014 with the full implementation of the Affordable Care Act.

Practical issue: Employees need help evaluating the impact of retiring at different ages. This is a complex decision and employers may be in the best position to provide such a service.

Focus groups conducted in 2013 by the SOA explored how people made decisions to retire as well as how they made their spending decisions. The focus group members were individuals who had retired voluntarily, had constrained assets, and who were a few years beyond their retirement date. The focus group results indicated that many of the retirees had retired because they found their jobs difficult, felt it was important to leave, or faced the need to care for family members. They were influenced by pressures pushing them to leave rather than the desire to be retired or to pursue dreams. The focus groups indicated that while the individuals had done relatively little long-term planning, they did actively manage current cash flows and had the ability to adapt spending to match available resources as necessary. For many of the participants, their goal was to spend from current income and to preserve, rather than spend down, invested assets (Society of Actuaries, 2013).

In the following sections, we consider four background issues:

- Labor force participation trends
- Social Security claiming behavior
- Phased retirement choices
- Changes in employer retirement plan offerings.

A. Labor Force Participation Trends

While this research is focused on the impact of individual retirement actions, background on the labor force and labor force participation rates will help inform the project.

Key findings with regard to labor force participation:

- In response to population aging and personal choices, the percentage of the labor force over age 55 has been increasing and is expected to continue to increase. By 2020, 25 percent of the labor force is projected to be age 55 and over (as compared to 12 percent in 1990). However, at higher ages, more people work part time.
- The difference between men and women's labor force participation is narrowing. Whereas older men's labor force participation has slightly declined over time, the percentage of older women in the workforce has increased steadily in the last 50 years.
- People who have employment-based pension benefits are much less likely to work in retirement than those who do not.
- Businesses will need to adapt to the changing age mix of the labor force. Retaining older workers will be increasingly important in future years.

Employment of older workers: Recent Department of Labor projections by Toossi (2012) indicate that, although the labor force is projected to grow more slowly from 2010 to 2020 than in recent decades, the age 55 and older labor force is projected to grow much more rapidly than the total labor force. This implies that the share of the labor force over age 55 will rise, as shown in Table 2.

Table 2: Civilian Labor Force and Projections, 1990, 2000, 2010 and 2020 (projected)

	1990	2000	2010	2020 (proj)
Total (ooo's)	125,840	142,583	153,889	184,360
Age 55 and older	15,026	18,669	30,014	41,411
% 55 and older	11.9%	13.1%	19.5%	25.2%
Annual growth rate—total (prior 10 years)		1.3%	.8%	.7%
Annual growth rate—55 + (prior 10 years)		2.2%	4.9%	3.3%

Source of data: Toossi, Mitra, Employment Outlook: 2010–2020, *Monthly Labor Review*, January 2012, Table 3.

The projected slower growth of the total labor force is dependent on expectations with regard to a number of variables including immigration, women's labor force participation, labor force participation at older ages, and other factors. Immigration is particularly important and accounts for more than 40 percent of underlying population growth (Toossi, 2012).

The Congressional Research Service projects that, between 2010 and 2030, the U.S. population will grow by 23.2 percent, but in that same period, the over-65 age group will grow 79.2 percent, more than three times as fast (Purcell 2009). Table 3 summarizes that study's projections by age group.

Table 3: U.S. Population Age 25 and Older, 2010 and 2030 (projected), in ooo's

	25-34	35-44	45-54	55-64	65 +	Total
2010	41,818	41,277	44,705	36,275	40,229	204,303
2030	47,020	48,223	44,029	40,266	72,092	251,629
Increase	5,202	6,946	-675	3,991	31,683	47,326
% Change	12.4%	16.8%	-1.5%	11.0%	79.2%	23.2%

Source of data: Purcell, Patrick, "Older Workers: Employment and Retirement Trends," Congressional Research Service, 2009, Table 1.

While total labor force participation rates have been falling slightly, rates at ages 55 and over have been steadily rising, responding to demographic shifts and indicating later retirement. Table 4 summarizes historical and projected labor force participation rates at older ages for 1990 to 2020 (Toossi, 2009).

Table 4: Civilian Labor Force Participation Rates, 1990, 2000, 2010 and 2020 (projected)

	1990	2000	2010	2020 (proj)
Total, 16 and older	66.5	67.1	64.7	62.5
Men, 16 and older	76.4	74.8	71.2	68.2
Women, 16 and older	57.5	59.9	58.6	57.1
Older ages total				
55-59	67.0	68.9	73.3	76.3
60-61	55.1	57.1	62.5	64.2
62-64	38.0	40.2	49.8	58.5
65-69	21.0	24.5	31.5	37.8
70-74	11.3	13.5	18.0	22.8
75-79	6.1	7.5	10.9	15.2
Men at older ages				
55-59	79.9	77.1	78.5	78.6
60-61	68.8	66.0	67.4	62.9
62-64	46.5	47.0	54.6	63.4
65-69	26.0	30.3	36.5	41.4
70-74	15.4	18.0	22.0	27.0
75-79	9.5	10.7	14.5	18.2
Women at older ages				
55-59	55.3	61.4	68.4	74.1
60-61	42.9	49.0	58.0	65.4
62-64	30.7	34.1	45.3	54.1
65-69	17.0	19.5	27.0	34.5
70-74	8.2	10.0	14.7	19.2
75-79	3.9	5.3	8.2	13.0

Source of data: Toossi, Mitra, Employment Outlook: 2010-2020, *Monthly Labor Review*, January 2012, Table 3.

Longer-term trends in labor force participation rates show that participation rates for men at ages 55 and over decreased steadily through the 1990s, but have been slowly increasing for more than a decade. Patterns for women are completely different. Women have been increasing their labor force participation over the long run, and the difference between participation of men and women has narrowed a great deal, as detailed in Table 5.

Table 5: Labor Force Participation Rates by Gender and Age Group, 1950 to 2008

	25-54	55-64	65 and Older
Men			
1950	96.5%	86.9%	45.8%
1970	95.8	83.0	26.8
1990	93.4	67.8	16.3
2000	91.6	67.3	17.5
2005	90.5	69.3	19.8
2008	90.5	70.4	21.5
Women			
1950	36.8%	27.0%	9.7%
1970	50.1	43.0	9.7
1990	74.0	45.2	8.6
2000	76.8	53.0	9.7
2005	75.3	57.0	11.5
2008	75.8	59.1	13.3

Source of data: Purcell, Patrick, "Older Workers: Employment and Retirement Trends," Congressional Research Service, 2009, Table 2.

Part-time work: The percentage of older individuals working part time increases by age, and is higher for women than men in all age groups. However, Table 6 shows that the percentage of older individuals working part time has been declining, particularly at ages over age 65 for both men and women.

Table 6: Percentage of Workers Age 55 and Over Working Part Time—1990 to 2009

	% Employed	Of Those Employed, % Full Time	Of Those Employed, % Part Time
Men Age 55–61			
1990	72.0%	91.2%	8.8%
2000	71.3	92.3	7.7
2009	69.4	90.0	10.0
Men Age 62–64			
1990	42.3	76.6	23.4
2000	47.2	77.9	22.1
2009	52.0	79.8	20.2
Men Age 65–69			
1990	25.9	55.6	44.4
2000	30.4	60.5	39.5
2009	33.3	68.6	31.4
Men Age 70 and older			
1990	9.7	47.2	52.8
2000	12.3	48.5	51.5
2009	14.0	54.4	45.6
Women Age 55–61			
1990	50.0	70.8	29.2
2000	58.1	77.2	22.8
2009	62.0	78.2	21.8
Women Age 62–64			
1990	28.1	60.5	39.5
2000	34.6	61.4	38.6
2009	41.0	66.7	33.3
Women Age 65–69			
1990	16.6	43.6	56.4
2000	19.7	44.2	55.8
2009	24.5	53.6	46.4
Women Age 70 and up			
1990	5.0	32.8	67.2
2000	5.9	36.3	63.7
2009	7.9	38.6	61.4

Source of data: Purcell, Patrick, “Older Workers: Employment and Retirement Trends,” Congressional Research Service, 2009, Tables 3 and 4.

Practical issue: Part-time work may be a good solution for some older individuals who want to continue working, but who also want to spend more time with their family.

Many people who receive pension income still choose to continue working, often part time.

Employment of pension recipients: Comparing the employment rates of pension recipients in Table 7 to the overall population statistics summarized in Table 5 above, it is clear that pension recipients¹ have lower labor force participation rates (Purcell, 2009). In fact, the labor force participation of pension recipients age 55 to 64 is approximately half the average (for example, 37.2 percent of male pension recipients employed versus 70.4 percent of all men in that age group). For those age 65 and over, labor force participation is about 50 percent lower (for example, 13.2 percent of male pension recipients compared to 21.5 percent labor force participation for all men age 65 and older).

Table 7: Percentage of Pension Recipients Who Are Employed, 1990–2008

Age Group and Year	Men	Women
Age 55–64		
1990	37.1%	26.5%
2000	37.5	33.1
2009	37.2	32.2
Age 65 and Over		
1990	10.4%	7.0%
2000	11.8	8.0
2009	13.2	8.9

Congressional Research Service, 2009, Table 6.

There are several possible explanations for the lower labor force participation of pension recipients. First, some types of plan designs typically encourage and/or allow workers to retire at earlier ages. This is most often true about traditional DB plans. Second, the promise of lifetime income hedges longevity risk, making it less risky to retire early. Lastly, many of the non-frozen DB plans are in the public sector. These public sector plans are more likely to include features such as subsidized early retirement and cost-of-living adjustments than those in the private sector. Notably, there has not been much change in pension recipient employment rates over the last two decades. As will be discussed in a later section, the percentage of workers with traditional pensions has been declining over time, and more workers in the future will have only DC benefits. This may be expected to result in increases in overall labor force participation at older ages.

¹ Pension recipients include individuals receiving retirement income from traditional pensions and retirement savings plans, or both.

B. Social Security Claiming Behavior

Key issues regarding Social Security claiming:

- Social Security is the primary source of retirement income for many households and often the only source of cost-of-living-adjusted income. Survey data suggests that workers commonly underestimate its importance and expect to receive most of their retirement income from other sources.
- Most people claim Social Security early (age 62) despite the reduced benefit.
- The relative value of claiming at different ages and coordinating married-couple claiming strategies is poorly understood by Social Security participants.
- Households wishing more guaranteed life income often do best by claiming Social Security later before buying more income in the annuity market. The “cost” for the increase in Social Security benefits is a good deal compared to the cost of purchasing an inflation-indexed annuity.
- There is a huge need for education of the public and advisors on issues related to Social Security choices.

Public Knowledge and Misinformation about Social Security Claiming

Although Social Security continues to be an important source of retirement income for many retirees, participants are often poorly informed about their benefits and claiming options. The AARP did a study “[The Impact of Claiming Age on Monthly Social Security Retirement Benefits: How Knowledgeable Are Future Beneficiaries?](#)” published in February 2012. That study surveyed 2,000 adults ages 52 to 70 who were eligible for Social Security, had not yet claimed benefits, and expected to claim benefits within the next 15 years.

That study highlighted some of the key issues with public understanding of Social Security:

- The survey respondents generally knew that Social Security benefits increased with delays in retirement age, but they did not know much the increase was. Only 29 percent were aware that the highest benefit was at age 70. Generally, respondents underestimated the reduction for early retirement at age 62 and overestimated the increase for delaying benefits for one year beyond full retirement age.
- The vast majority of respondents who were married or had ever been married had some familiarity with Social Security benefits for widows and widowers.
- Only 7 percent of the respondents knew how many years of earnings were included in the benefit calculation. The most common answers were five years and 10 years, chosen by 30 percent and 21 percent of the respondents, respectively.
- There was low awareness of benefits for living spouses. Few respondents understood what claiming strategy would maximize widow's benefits.
- There was widespread misunderstanding of how the earnings test operates. Seventy-one percent did not understand the benefit would later be adjusted upward to adjust for the benefits not paid as a result of the earnings test.
- Respondents within five years of expected claiming age were more knowledgeable than those who were more than five years away from expected claiming age.

Practical issue: There is a great opportunity for any stakeholder involved with the public or employees to help improve understanding of these important issues. There is an SOA decision brief available to help.

Earlier research from the SOA, the "Public Misperceptions About Retirement Security" study, indicated that many people underestimated the importance of Social Security before they retired, and they overestimated the benefits from employer plans. One study

(Sondergeld et al., 2005) demonstrated that workers often misunderstood what their primary sources of income would be in retirement. This study showed considerable evidence that workers downplayed the role Social Security was going to play in their retirement and overestimated the contribution of personal savings. The 2005 report cited one study finding that retirees were most likely to say Social Security was a major source of their retirement income (56 percent of retirees versus 26 percent of workers). On the other hand, workers were most likely to think that savings (either through a workplace savings plan or outside of work) would be a major source of income in retirement (41 percent of workers versus 26 percent of retirees) (EBRI, 2003). Other studies found similar differences between workers and retirees (Society of Actuaries, 2004).

The "Public Misperceptions" study found that, regardless of how important they viewed Social Security, almost all workers were counting on it as part of their retirement income. Yet many did not know when they would be eligible to receive retirement benefits from Social Security without a reduction for early retirement. More than half of workers thought they would be eligible for full benefits before they actually would be (54 percent), while another two in 10 admitted they did not know when they would be eligible. The study also pointed out that many workers may not have realized that Social Security, unlike the majority of private-employer benefits, is inflation protected. No data was provided to support this last point (Sondergeld et al., 2005).

Patterns of Social Security Benefits by Claiming Age

Social Security monthly benefits are approximately 75 percent higher if benefits begin at age 70 instead of at age 62. The SOA 2012 publication, "[Deciding When to Claim Social Security](#)," a part of the Managing Retirement Decisions series, sets forth many of the issues.

Social Security benefit calculations are complex and poorly understood by most individuals. The most important benefit and claiming rules include the following:

- Social Security benefits are reduced if claimed before the "normal retirement age," which is gradually increasing to age 67.
- Social Security benefits are increased if claimed after the "normal retirement age," up until age 70. There are no further increases after age 70.²

² These increases apply to worker benefits only and not to spousal benefits.

- The reductions and increases were approximately actuarially equivalent when introduced, not considering spousal benefits and widow's benefits. However, the percentage adjustments are fixed and do not vary as the interest rate environment changes. Furthermore, they are based on population averages and do not consider individual mortality risk.
- When someone collects benefits and works prior to normal retirement age, benefits are adjusted in accordance with the earnings test. If earnings are above an exempt amount, a portion of benefits will be withheld and paid after normal retirement age. After the normal retirement age, there is no restriction on working and collecting benefits.
- A non-working spouse gets a benefit equal to half of the normal-retirement-age benefit of the working spouse, regardless of when the working spouse claims benefits. The spousal benefit is reduced if the non-working spouse claims before his or her normal retirement age.
- Where both spouses have earnings records, the lower-earning spouse gets the greater of a benefit based on personal work history and a spousal benefit. This benefit is further reduced if claimed before the full retirement age of the person claiming.
- When a married recipient dies, the survivor gets the larger of the benefit based on personal work history or the actual benefit of the deceased spouse, which include impacts of early or delayed claiming. Benefits are reduced if survivors claim before their normal retirement age.
- Couples can get the best benefit by coordinating their claiming strategies. In some cases, the best idea is for the higher earner to claim late, and the lower earner to claim early (Mahaney, 2012).
- Social Security benefits may be taxed. Total income is considered when determining whether the benefit will be taxed.
- Medicare is not available until age 65, and Medicare premiums are deducted from Social Security benefits.

Various studies have shown that for people who want to increase their guaranteed life income, claiming Social Security later is more cost effective than buying an individual annuity to achieve the increased income objective. Mahaney (2012) argues that many people make poor Social Security decisions because they do not fully understand the tax rules related to earned income, they underestimate the benefit of delayed claiming, and they fail to make integrated household claiming decisions.

One of the important protections for beneficiaries of Social Security is that benefits are cost of living indexed. In contrast to Social Security, private sector DB pensions do not usually include cost-of-living increases, while public sector employee benefit plans often do include cost-of-living increases.

Although Social Security retirement benefits increase with inflation, increases in Medicare Part B and D premiums are based on rising costs of those programs. Because medical inflation has been greater than general inflation in the past, the net monthly benefit after payment of Medicare Part B and D premiums may actually decline over time.

Age at Claiming Social Security Benefits

Historically, most Social Security participants have made their initial claim for benefits prior to the normal retirement age, with nearly half claiming at age 62. However, in a recent study, Haaga and Johnson (2012) show that early claiming has declined and older claiming has increased. They analyzed the *Survey of Income and Program Participation* (SIPP) files from 1984 to 2009 linked to administrative records on earnings and benefits. As shown in Table 8, the 1940 to 1944 birth cohort reversed the trend. As compared with the previous birth cohort, the percentage of men claiming at ages 62 to 64 declined from 74 percent to 60.8 percent, and the percentage of women claiming early declined from 75.1 percent to 66.2 percent.

Table 8: Social Security Claiming by Birth Cohort

Birth Cohort	% Claiming at 62	% Claiming at 63-64	% Claiming at 65+
Men			
1920-24	49.5	27.2	23.3
1925-29	53.1	26.2	20.7
1930-34	55.3	23.1	21.5
1935-39	52.1	21.9	26.0
1940-44	46.4	16.4	37.1
Women			
1920-24	57.7	22.3	20.0
1925-29	56.8	22.5	20.2
1930-34	57.3	18.3	24.4
1935-39	54.8	20.3	24.9
1940-44	49.0	17.2	33.8

Source: Haaga and Johnson. 2012. "Social Security Claiming: Trends and Business Cycle Effects." *CRR WP 2012-5*. Center for Retirement Research at Boston College. Figures 3 and 4.

Haaga et al. (2012) also found that educational level impacted Social Security claiming. For example, as shown in Table 9, both men and women with limited education were more likely to claim at 62. The percentage claiming at 62 decreased with increased educational attainment.

Table 9: Birth Cohort 1940-1944 Social Security Claiming, by Educational Attainment

Extent of Education	% Claiming at 62	% Claiming at 63-64	% Claiming at 65+
Men			
Not high school grad	55.5	16.8	27.7
High school grad	53.1	16.7	30.2
Some college	48.6	18.1	33.3
Bachelor's degree	37.5	16.6	45.9
Advanced degree	33.0	13.4	53.7
Women			
Not high school grad	57.4	14.8	27.8
High school grad	54.3	15.6	30.1
Some college	47.9	18.2	33.9
Bachelor's degree	39.4	20.5	40.1
Advanced degree	35.3	19.3	45.4

Source: Haaga and Johnson. 2012. "Social Security Claiming: Trends and Business Cycle Effects." *CRR WP 2012-5*. Center for Retirement Research at Boston College. Table 1.

Not surprisingly, people in better health claim later than those in poor health. It has long been known that early retirement is often motivated by morbidity issues. For birth cohorts 1940 to 1944, the estimated distribution of claiming age by health status is shown

in Table 10. The sample was restricted to adults with 40 quarters of coverage who did not claim before age 62.

Table 10: Birth Cohort 1940–1944 Social Security Claiming, by Health Status

Health Status	% Claiming at 62	% Claiming at 63–64	% Claiming at 65+
Excellent or very good	42.9	17.3	39.8
Good	49.8	16.4	33.8
Fair or poor	60.5	11.5	28.0

Source: Haaga and Johnson. 2012. “Social Security Claiming: Trends and Business Cycle Effects.” *CRR WP 2012-5*. Center for Retirement Research at Boston College. Table 3.

Purcell (2009) also reported on Social Security claiming age by year, as summarized in Table 11. Because this study was based on complete participant records, rather than being limited to the SIPP sample, it may be a more accurate representation of claiming than what is reported above from the Haaga et al. (2012) study. However, the results still support the conclusion that a large percentage of people continue to claim early.

Table 11: Percentage of Social Security Retirement Worker Claimants by Age 1990–2007

Age Group and Year	Men	Women
1990 Claimants		
Age 62–64	74.4%	80.0%
Age 65	18.5	13.9
Over 65	7.1	6.1
2001 Claimants		
Age 62–64	75.1	78.5
Age 65	20.7	14.4
Over 65	4.2	7.1
2007 Claimants		
Age 62–64	67.6	73.1
Age 65	28.6	21.3
Over 65	3.9	5.6

Source of data: Purcell, Patrick, “Older Workers: Employment and Retirement Trends,” Congressional Research Service, 2009, Table 7. (Note: 2001 is used instead of 2000 because the earnings test was changed in 2000 and it was an atypical year.)

Practical issue: The public often does not make optimal Social Security claiming decisions, and many people do so without understanding the implications of their choices.

C. Phased Retirement Choices

Working in Retirement and Phased Retirement Defined

There is no universal definition of working in retirement or of phased retirement, although certain features are common. Working in retirement can include working for the same employer or for someone different. It is unclear when people decide that they are working in retirement versus just working. Some people may consider themselves to be retired because they have retired from a long-term job, or because they are receiving a pension, or because they have changed their priorities, or because they have cut back their schedule.

Whether phased retirement is offered as a formal program or an informal arrangement, it may include any or all of the following:

- Ability for employees to work on a reduced or modified basis as they approach retirement (phasing pre-retirement)
- Re-employment of retirees (phasing post-retirement)
- Ability for employees to collect some portion of pension benefits while being paid for continued work.

From an individual or societal perspective, working in retirement or phasing post-retirement also includes working for a different employer or setting up one's own business in retirement. Sometimes the distinction between working for a former employer and someone else is not clear. For example, a retiree may go to work for a temp agency and then be assigned to the former employer, or the retiree may set up a consulting practice, and then be engaged by the former employer as a consultant. The example in Table 12 illustrates how phased retirement may work for two different types of jobs.

Table 12: Examples of Phasing Pre-Retirement and Phasing Post-Retirement

	Phasing Pre-Retirement	Phasing Post-Retirement
Bank teller	<ul style="list-style-type: none"> • Work four days a week on an ongoing basis • Work as a regular employee • Work at the “normal” work location • Can be paid partial pension after age 62, if company policy allows 	<ul style="list-style-type: none"> • Work as fill-in during vacations or on-call during the year • Work as a temporary or through a retiree pool • In a bank with multiple branches, might be able to work in different locations, but working from home or from a seasonal residence not possible • Paid pension and appropriate compensation for work
Research scientist	<ul style="list-style-type: none"> • Move out of management role, take on mentoring of some younger scientists and reduce number of projects • Paid salary on pro-rated or other agreed-upon basis, rather than by the job or project • Potential for a lot of flexibility of time with agreed-upon commitment; type of work being done may or may not require specific location.³ Can be paid partial pension after age 62 in addition to salary; at present, unlikely that such payment is being made 	<ul style="list-style-type: none"> • Serve as advisor, trainer or team member on specific projects • Paid pension and part salary, or paid by hour or project while collecting pension • Time commitment as agreed upon; work probably involves significant flexibility of place

Source: Phased Retirement After the Pension Protection Act, The Conference Board, 2007.

Documentation of phased retirement is fuzzy. Phased retirement is often negotiated locally, on a case-by-case basis, rather than as a matter of company policy. Human resource records may not indicate that an employee has chosen to phase, either pre- or post-retirement; they may simply show that an individual has cut back to working part time. When a company hires a former employee as a consultant or a temp through an

³ Work locations could include a laboratory, an office, a remote office or working from home. Some jobs have flexibility with regard to working remotely some or all of the time.

outside agency or hires a mature worker who has retired from *another* organization, the arrangement is even less likely to be noted as phased retirement.

Experiences of People Working in Retirement

As indicated above, there are different reasons for working in retirement. The SOA 2011 Risks and Process of Retirement Survey explored the experiences of people working in retirement or expecting to work in retirement. The survey responses illustrate the wide variety. For example, when asked who they would work for in retirement, pre-retirees split fairly evenly between current employer, a new employer and an entrepreneurial venture. However, about half of retirees said they continued to work for their original employer. When asked about the type of work they would be engaged in, the answers from pre-retirees and retirees were virtually the same with about four in 10 expecting to be or actually engaged in something completely different from before.

Legal Complications of Phased Retirement

Employers who want to offer phased retirement and who offer pensions are faced with a variety of legal challenges. Retirees can be rehired and still continue to receive their pension benefits under some qualified retirement plans. However, the employer must be sure that there has been a bona fide termination of employment in order not to jeopardize the plan's tax qualification (Purcell, 2008; Sheaks and Catsoupes, 2007).

Practical issue: Safe harbors for rehiring retirees would encourage more employers to offer work options. This could help both employers and employees.

Employers who want to pay pensions to employees who are still working on some basis are allowed to do so after age 62 in accordance with the Pension Protection Act (Purcell, 2008; Rappaport and Young, 2007). The business community would have preferred to have an earlier age after which pensions can be paid. There may also be plan design and other technical legal issues if pensions are to be paid after age 62.

Health Benefits and Phased Retirement

The availability of employer-provided health benefits has, in the past, been a major factor in work and retirement decisions. Individuals in poor health often had a very difficult time securing individual health coverage and, even for those in good health, it has been

very expensive. Access to health benefits regardless of health status is expected to change in 2014 when the provisions of the Patient Protection and Affordable Care Act (PPACA) are expected to be in force (Rappaport, Wojcik and Baxter, 2011).

Another impact of PPACA is on part-time workers. Many employers offer health benefits only to full-time employees, and this has been a barrier to phased retirement, early retirement or self-employment. It is expected that this will change with the availability of health insurance through the exchanges. People who want to try scaling down but were prevented from doing so by health insurance issues will now be able to do so.

Prevalence of Phased Retirement

Relatively few employers offer phased retirement programs, and very few offer formal phased retirement. It appears that most people working in retirement are not part of an organized phased retirement program.

Many more employers offer part-time work options, which individuals can use as a method of scaling down. Part-time work is a regular part of the business arrangements in health care, retail and tourism, for example. Some types of businesses also offer seasonal work.

Examples of Phased Retirement

Federal government—Under a new program, federal employees are eligible for phased retirement. The regulations were issued in proposed form in June 2013. Under the proposed rules, employees who worked full time for the last three years and who complete 30 years of service at age 55, or 20 years of service at age 60, can request phased retirement. An exception is that employees subject to mandatory retirement, such as law enforcement officers, firefighters and air traffic controllers, are not eligible. Phased retirees will be expected to spend at least a fifth of their working time mentoring other employees. The employing agency is to decide what satisfies that requirement.

If the application is approved by their agency, the employee will switch to a half-time schedule with a proportionate salary. The pension benefit the employee accumulated to that point would be calculated, and the employee will receive half of that as well.

The salary paid will be increased by standard pay raises, and the pension will be increased by retirement cost-of-living adjustments. The employer contribution toward health insurance will remain the same as for a full-time employee, and benefit levels under the

federal life insurance program are to be based on the full-time salary for the position (Office of Personnel Management, 2013).

Part-time employment—Health care organizations, retailers, banks and restaurants are examples of organizations that routinely offer part-time employment. While some may offer phased retirement, many do not. Employees can elect to work part time as part of a personal phased retirement program. However, the part-time schedules available may not fit the needs and interest of the employee.

Entrepreneurship—Entrepreneurship is another potential stop on the route between full-time employment and total exit from the labor force. Although this may be a good choice for some people, caution is warranted because most start-up businesses do not succeed (PBS, 2013; Williams, 2013). To the extent that new ventures require cash investments, retirees should avoid using their retirement savings for this purpose unless they have first set aside enough for living expenses and emergencies.

“Snow bird” programs—Some organizations offer “snow bird” programs allowing employees to work at different locations during different parts of the year. Examples of organizations with such programs include some health care placement organizations and Home Depot, CVS and Walgreens. These programs support phased retirement (Rappaport, 2008).

Traditional phased retirement—The federal government program described above is a very good example of a formal program. Universities also may offer formal programs to faculty members. University programs are typically for a maximum period of time.

While most programs in businesses tend to be informal, Bon Secours Health System is a good example of a formal program (Rappaport, 2007). Bon Secours offers employees three different phased retirement options. The options are:

- Employees can “retire” at age 65 but continue working part time up to 24 hours per week while collecting their full pension.
- Employees who work past age 70.5 begin receiving their pension in April of the following year, regardless of continued work.
- Employees who retire and do not work for three months can then return to work and receive their full pension (Rappaport, 2007).

Rehire of retirees—Pools are an ideal way to rehire retirees. They can register for the pool, and they will be used when fill-in people are needed. Some pools are much more

formal than others. Some industries can predict additional demand for workers at certain times, such as during peak holiday seasons, for special events, or after storms. All industries need to have a method to fill in when a worker is gone for several weeks. Retiree and temporary pools are used in a variety of situations. For example, Southern Company, a utility, has used a retiree pool to fill in when additional workers are needed.⁴ Utilities face heavy demands after storms. Kelly Services operates pools for employers. For example, it operates a pool of claims examiners for an insurance company. They can be used whenever there is demand for added people (Piktialis, 2007). School systems have pools of substitute teachers, and retirees can participate in these pools. Health care organizations supplement their regular on-staff nurses with members of a pool.

The Aerospace Corporation is an independent, not-for-profit company that provides technical analyses and assessments for national security. The organization has a retiree casual program to bring back retired engineers. At one time, about 600 retirees were signed up for the program and approximately 300 could be working at any one time (Rappaport, 2008).

MITRE is another nonprofit organization that manages government-funded research and development (R&D) programs and brings back retirees through its “Reserves at the Ready” program (Rappaport, 2008).

Monsanto Corporation has a Resource Re-entry Center, a program available to former employees, whether they are retired or not (Rappaport, 2008).

Organizations specializing in creating opportunities for seniors and enabling phased retirement—YourEncore (www.yourencore.com/about-us.aspx) is an organization designed to capitalize on the talent in the American workforce and to match the needs of retirees wanting to continue working, with the needs of major American companies. It is a consulting and innovation company that works with a group of client organizations on projects using a core of over 7,500 engineers and other experts, including both retirees and others seeking to participate in their projects. The experts cannot work more than 1,000 hours in a year, and they may work for their former employers or others. YourEncore’s original client companies were Eli Lilly, Procter & Gamble and Boeing Corporation, and it now has 70 clients. Its reach is global, and experts are located in Europe, Asia, Australia and the Americas. As of December 2012, YourEncore had completed over 3,000 assignments for clients. YourEncore is an example of a third-party solution using an innovative approach well fitted to the needs of individuals and

⁴ Reported in a webcast sponsored by The Conference Board.

companies. However, it is limited to specialized work performed by highly trained experts.

From the point of view of the individual, there are many advantages to working with an organization like YourEncore versus trying to work independently. YourEncore secures the projects, handles the contracting and business elements, and can offer support. From the point of view of the client company, it is much easier to contract with an organization such as this since they offer access to a range of experts, and once the arrangement is set up, its management is easy (Piktialis et al., 2007; Rappaport, 2007).

Retirementjobs.com (www.retirementjobs.com/about-us) is an Internet-based organization offering help to individuals seeking jobs and career advice, and offering help to employers seeking older workers. A job listing service is included. The service is free to job seekers, but there is a premium service available, which offers more information and some advice. The website includes information about options and considerations for individuals interested in working in retirement. The website has over a million individual subscribers nationwide. There are about 30,000 active job listings. The organization administers a widely recognized program that certifies “Age Friendly Employers.” This company was established in 2005.

Encore.org (www.encore.org) is devoted to helping individuals 60 and over find a passion linked to a purpose, and to helping them pursue that passion. Encore provides resources for individuals, help with getting connected, and runs the Purpose Prize program. The Purpose Prize program provides awards to people over age 60 who are changing the world. In 2012, five prizes of \$100,000 each were awarded. The program encourages encore careers. The Encore website says: “*Encore careers combine personal fulfillment, social impact and continued income, enabling people to put their passion to work for the greater good.*”

Practical issues: Working longer is often not easy and may not be possible. People who want to work longer need to focus on how to preserve their job options, keep their skills up to date, and maybe move into less-demanding roles.

There are a variety of different models for supporting older worker employment for companies interested in this matter. For retired individuals who want to continue to work, there are some special services and opportunities to help them. A road map to help them find these services

would be potentially quite helpful. Employers could also facilitate longer work by offering more job options specially suited to older employees.

D. Changes in Employer Retirement Plan Offerings

In earlier generations, the percentage of workers covered by employer-sponsored DB plans was much higher. Many private sector employers have replaced DB plans with defined-contribution (DC) plans. Many of the former DB plans provided opportunities for retirement prior to age 65 with lifetime benefits, whereas early retirement is not as attractive for workers with DC only, given that fewer years of participation translate into lower retirement wealth accumulation; and early commencement translates into a longer retirement period to fund from that wealth. Some of the DB plans also offered incentives that made early retirement very attractive, whereas DC plans do not offer any form of subsidized early retirement.

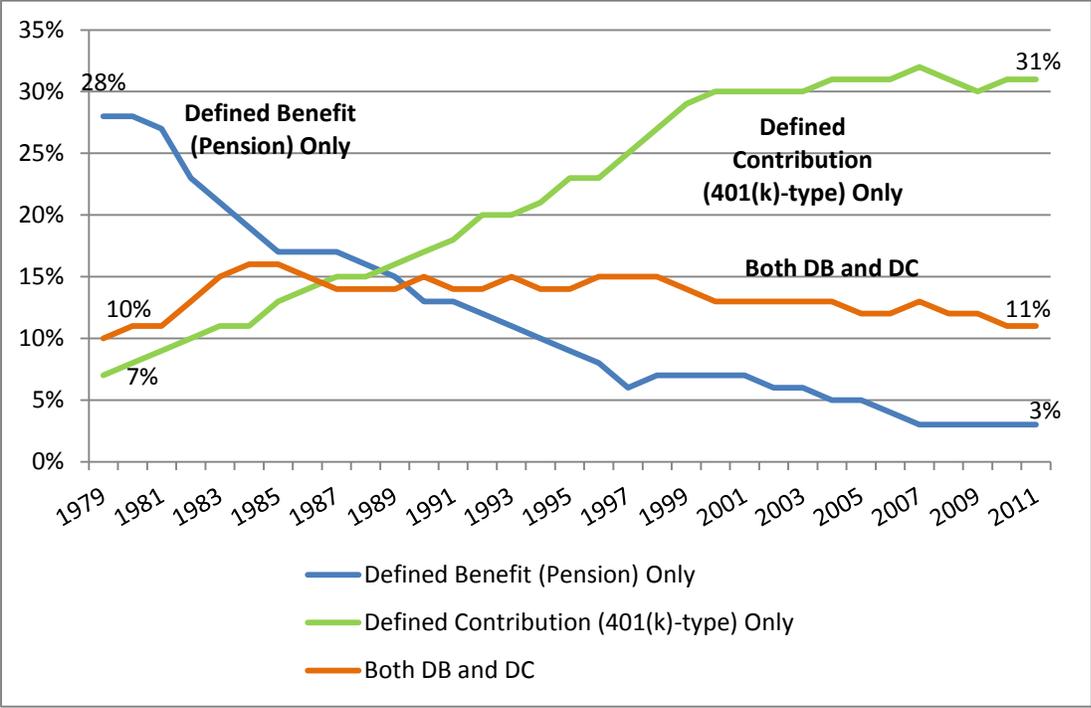
Employees with only a DC plan tend to retire one to two years later than employees with DB plans (Friedberg, 2007). This confirms an earlier study that analyzed retirement behavior of participants in the Health and Retirement Study by type of plan. Munnell, Triest and Jivan (2004) found that respondents without pension coverage⁵ expected to retire at 64.4, those with only a DC plan at 63.5, those with a DB plan only at 62.5, and those with both DB and DC at 62.2.

In addition to the economic impact of the benefits from different types of plans, benefit plan designs and Social Security's definitions of normal retirement age create signals about when retirement is expected. For example, setting the early retirement age at 62 provides the signal to participants that it is socially acceptable to retire at that age. Identifying age 67 as the Social Security "normal retirement age" sends a strong signal as well. DB plans often allow retirement as early as 55. Although DC plans may have a minimum retirement age, the signal is not as strong. Signals have been an area of emphasis in the SOA Retirement 20/20 project, which is focused on the future of retirement.

⁵ The Munnell, Triest and Jivan (2004) paper indicated that those with no pension had neither a DB or DC plan from their current job. The status did not consider benefits that might have been provided from a prior job.

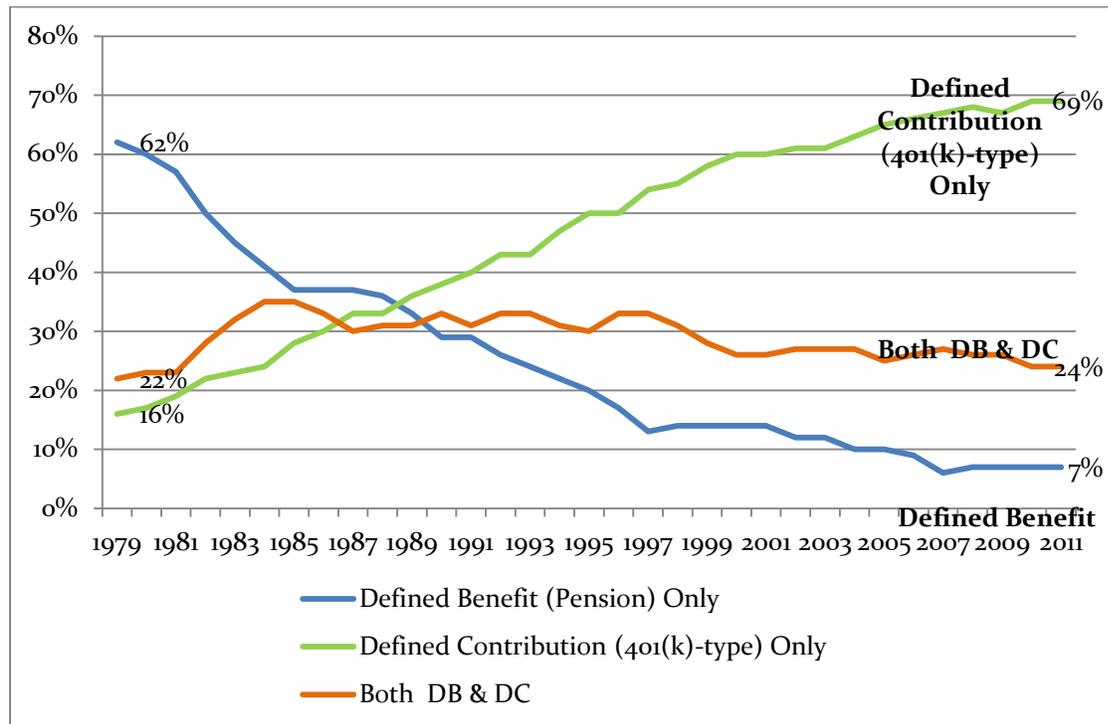
As shown in **Figure 1**, 28 percent of all U.S. workers in 1979 had a DB plan and another 10 percent had both a DB and a DC. By 2011, these percentages had dropped to 3 percent and 11 percent, respectively. **Figure 2** shows the percentage having DB and DC plans *out of workers who have a plan*. In 1979, about two-thirds of workers with retirement plans had a DB only; whereas by 2011, those with DB only had dropped to 7 percent.

Figure 1: Private Sector Workers Participating in an Employer-Sponsored Retirement Plan (as a percent of all workers)



Source: Employee Benefit Research Institute, based on U.S. Department of Labor Form 5500 Summaries for 1979–1998; PBGC, Current Population Survey Data for 1999–2011.

Figure 2: Private Sector Workers Participating in an Employer-Sponsored Retirement Plan (as a percent of those who have a plan), 1979–2011



Source: Employee Benefit Research Institute, based on U.S. Department of Labor Form 5500 Summaries for 1979–1998; PBGC, Current Population Survey Data for 1999–2011.

The data on long-term DB and DC trends includes private sector plans covered by ERISA, without limitation by type of employer plan size. The *International Foundation Employee Benefits Survey 2011* provides data that compares a sample of four types of employers: corporations, professional service firms, public employers and multi-employer plans.⁶ As summarized in Table 13, public employer programs and multi-employer plans are most likely to be DB. Professional service firms are very heavy users of DC, and a majority of corporate plans in their study are DC. Their study does not include very small firms. (International Foundation of Employee Benefit Plans, 2011). It provides insights into differences between different types of plans and plan sponsors. Organizations offering a combination of DB and DC will be included in both DB and DC in this survey. 32.4 percent of the corporations offered both types of plans in this survey.

⁶ The survey universe is members of the International Foundation of Employee Benefit Plans. The study is very interesting because it compares different types of employers and provides insight into major differences in practice by type of employer. Results are not representative of all businesses in the United States.

Table 13: Retirement Plan Usage and Types of DB Plans by Type of U.S. Employer, 2011

(% of firms offering DB and DC plans and % of DB plans by type)

	Corporations	Professional Service Firms	Public Employers	Multi-Employer Plans
% offering DB plans	40.6%	19.0%	88.0%	88.3%
% offering DC plans	82.7	76.9	60.5	58.1
Types of DB plans offered				
Final average earnings	62.1	36.7	82.2	7.8
Dollar amount formula	11.2	3.3	2.0	36.2
% of contributions	7.5	33.3	2.0	36.2
Cash balance plan	23.0	23.3	3.0	3.5
Pension equity plan	8.7	0.0	1.0	1.6
Career average formula	9.9	3.3	4.0	4.7
Other	1.8	10.0	6.9	3.5

Source: International Foundation, Employee Benefits Survey, 2011. Note: This is a survey of International Foundation members.

Towers Watson has studied the history of the *Fortune* 100 retirement plans, and has found a major shift among this group to DC plans. All offer some type of retirement plans, and many use a combination. As shown in Table 14, among the *Fortune* 100, in 1985 90 percent had some type of DB plan, only 1 was a hybrid, and 10 percent had DC only. By 2012, 70 percent were offering only DC plans for ongoing credit, and of the 30 percent with DB plans, 11 percent were traditional plans and 19 percent were hybrids (McFarland, 2012).

Table 14: Fortune 100 Companies Retirement Plan Sponsorship—1985 to 2012 By Number of Companies

	1985	1998	2005	2010	2012
Total DB plans	90	90	62	37	30
Traditional DB plan	89	67	32	17	11
Hybrid pension plan	1	23	30	20	19
DC plan only	10	10	38	63	70

Source: Towers Watson *Insider* October 2012, *Retirement Plan Types of Fortune 100 Companies in 2012*.

Note: The companies are in the *Fortune* 100 in each year. The sample in each year is the Fortune 100 for that year. DB plans include plans available to new hires.

The companies that entered the *Fortune* 100 later were more likely to offer DC plans only, as this look back at the 2012 *Fortune* 100 companies in Table 15 illustrates (McFarland, 2012).

Table 15: 2012 *Fortune* 100 Companies Retirement Plan Sponsorship—1998 to 2012 By Number of Companies

	1998	2005	2010	2012
Total DB plans	71	64	40	30
Traditional DB plan	64	36	18	11
Hybrid pension plan	7	28	22	19
DC plan only	29	36	60	70

Source: Towers Watson *Insider* October 2012, *Retirement Plan Types of Fortune 100 Companies in 2012*.

Note: Companies are the *Fortune* 100 in 2012. Some were in the list the entire period, but many were not.

Some types of plans encourage retirement at particular points in time whereas others do not. DB final average earnings plans are most likely to have significant incentives built into the plan design, such as subsidized early retirement. With the trend away from traditional DB plans and the increase in DC and hybrid plans that do not generally incent early retirement, fewer retirees will have the benefit of these types of subsidies.

Clearly, there are many options for retirement timing, phasing and claiming. Decisions may be motivated by qualification for Social Security and private pension plan benefits, investment performance leading up to retirement, employment flexibility, as well as idiosyncratic health and family issues. Ultimately, retiree households want to be able to meet their required expenses throughout their retirement period. However, this is a very complex decision, and anecdotal evidence suggests that many households make these decisions without a full understanding of the post-retirement risks they face. In the following section, we explain how a retirement simulation model can be used to place a dollar value on the costs and benefits of various retirement timing and claiming decisions.

III. Simulation Methodology and Key Assumptions

In a recent SOA research study, “Measures of Retirement Benefit Adequacy: Which, Why, for Whom, and How Much?” (January 2013), we developed a Monte Carlo simulation model of retirement cash flows. The most common risks and uncertainties faced by

retirees, including longevity, inflation, investment, health and long-term care risks, were built into the model. In the previous study, this model was used to investigate the impact of risk mitigation strategies on retirement income adequacy. We now extend the model to evaluate the feasibility of various retirement timing and benefit claiming strategies and their impact on retirement wealth needs.

In this section, we explain the base case simulation model and the scenario variations that are discussed in the later sections. The basic model construct is a detailed cash flow forecast for a married couple from age 62 to the date of the death of both spouses. Post-retirement risks that impact the household's cash flows are introduced through the use of Monte Carlo simulation. Table 16 summarizes the base case values for two representative households. These households have income and wealth at approximately the 50th and 75th percentiles of pre-retiree households in 2012. Household earnings are assumed to be split between the spouses with the husband earning approximately 70 percent of the total income.

Table 16: Summary of Base Case Simulation Assumptions

	Median Household	75 th Percentile Household
Total Pre-Tax Income	\$60,000	\$105,000
Husband (age 62)	H: \$42,000	H: \$74,000
Wife (age 62)	W: \$18,000	W: \$31,000
Base Case Housing	Home-Owner Value at Ret.: \$180,000 No Mortgage	Home-Owner Value at Ret.: \$315,000 No Mortgage
Non-Housing Wealth	\$100,000	\$250,000
Social Security Status	H: Fully Insured W: Qualifies on H's Earnings	H: Fully Insured W: Qualifies on H's Earnings
Defined Benefit	Base Case: None	Base Case: None

A. Simulation Assumptions and Methodology

Stochastic elements are incorporated in the cash flow forecast by imposing risky distributions on various elements for each year of a hypothetical retirement. The advantage of this methodology is that, instead of assuming that everyone gets the average outcome, we can see the impact of risks that, while uncommon, can have a devastating impact on household finances. We then run the hypothetical retirement cash flows

50,000 times for each scenario. Based on the outcomes of these many iterations, we can evaluate the probability of a household being able to meet all expenses in retirement, as well as estimate the amount of pre-retirement wealth that would have been sufficient to meet those needs at various levels of confidence.

Household Cash Flows: We assume that the couple desires to maintain their pre-retirement standard of living and to have sufficient resources from all sources to make it through their retirement period without running out of money. (In some scenarios, we later consider the effect of downsizing discretionary and housing expenditures.) After-tax expenditures for the first year of retirement are based on expenditure patterns in the Consumer Expenditure Survey. Households are assumed to pay for their cash flow needs first from income sources and then, if income is insufficient, from taxable withdrawals out of retirement savings. Except in some scenarios, they do not reduce spending in response to a shortfall. The model incorporates changes in various categories of expenses over the retirement period, modeled stochastically to incorporate general inflation, health care inflation and other post-retirement risks.

Investment Wealth and Returns: Investment wealth is assumed to include all forms of invested savings, including IRAs, employer defined-contribution (DC) plans, and the like. It is assumed that all investment wealth is accessible to the household and can be drawn down as cash income or can be used to purchase an annuity. For simplicity, we assume all retirement wealth is tax-deferred savings, i.e., is subject to ordinary income tax at the time of withdrawal. In any years in which the household has more income than it needs to meet its expenses, the extra is assumed to be invested. Investment wealth is assumed to be allocated between stocks and long-term corporate bonds. The portfolio allocation is assumed to change each year following the rule of thumb, where the percent of equity investment (split equally between large cap and small cap stocks) is 100 minus current age (e.g., at age 66 the equity portion is $100 - 66 = 34$ percent, with 17 percent in large cap stocks and 17 percent in small cap stocks). Returns on each asset class in each year of the simulation are stochastically modeled based on the historical distribution of investment returns.⁷

⁷ Investment returns are assumed to be drawn from a lognormal distribution with mean and standard deviation consistent with historical returns. For the period January 1947 through December 2010, the large cap/small cap portfolio returned an average of 14.2 percent with a standard deviation of 15.2 percent, and bonds averaged 6.5 percent with a standard deviation of 9.3 percent. Historical correlation was statistically

Inflation: General inflation is simulated for each year and is used to inflate all prices except for health care and long-term care (LTC) costs.⁸

Health and LTC Risk: Health expenditures are stochastically determined for each year of retirement, with the minimum set at approximately the cost of Medicare Part B premiums. In each year, the mean, standard deviation, minimum and maximum increase based on simulated medical inflation.⁹ LTC costs are determined in a two-step process. The first step determines whether the individual will require LTC in a given year. The second step determines how long the person will be in care.¹⁰ The cost of a full year of care is based on national average data for full care and increases over the retirement period with simulated medical inflation. When one spouse goes into care, the discretionary expenses for the remaining spouse (covering everything except housing and health care) are reduced by 25 percent.

Housing: We assume homeownership with no remaining mortgage at retirement. The value of the home at retirement is assumed to be three times income. Home values increase with inflation throughout the retirement period. When neither spouse is living in the home, e.g., one person is deceased and the other is in LTC, the house is assumed to be sold, for 90 percent of market value, one year after the last person vacates the home.

insignificant during this period, so was not incorporated in the simulation. Some experts believe that future asset market returns may be lower than historical averages, in which case, the estimated wealth needed to support retirement needs should be viewed as a lower bound.

⁸ General inflation is assumed to be normally distributed with mean, standard deviation, and correlation with the previous year based on historical inflation (CPI-U) from January 1947 through October 2011. Medical inflation is assumed to be normally distributed with a mean, standard deviation, correlation with general inflation, and correlation with the previous year's medical inflation, based on Medical Care cost component of the CPI, from January 1947 through October 2011. General inflation had a mean of 3.71 percent, a standard deviation of 1.22 percent, and an annual correlation with the previous year's general inflation of 0.60. Historical medical inflation had a mean of 5.43 percent, a standard deviation of 1.06 percent, an annual correlation with the previous year's medical inflation of 0.78, correlation with the current year's general inflation of 0.73, and a correlation with last year's general inflation of 0.77.

⁹ In the first year, health care costs are simulated with a mean of \$2,000; standard deviation of \$2,000; a minimum of \$1,560, which is approximately the cost of Medicare Part B premiums; and a maximum of \$100,000 (an extremely rare event). No special provision has been made to recognize higher health care costs for individuals who do not yet receive Medicare and who do not have employer-sponsored health benefits.

¹⁰ The probability of going into LTC in a given year is modeled as a Bernoulli distribution where the probability is determined by the person's age and gender. Next, if the person goes into LTC, the length of stay is assumed to be either three months or remaining life.

Life Span: Mortality risk in each year for each spouse is stochastically generated based on the Social Security Administration’s (SSA’s) actuarial life table, given the individual’s current age and gender. Because life expectancy is positively related to wealth, these projections may underestimate individual life spans for wealthier households.

B. Timing, Claiming and Phasing Scenarios

In the next section of the report, we compare retirement outcomes for a variety of timing, claiming and phasing scenarios. Although there are many different variations possible, we have selected case examples that are expected to be most instructive. Table 17 summarizes the simulated scenarios:

Table 17: Summary of Simulation Scenarios

Social Security Claiming Scenarios
<p>Both Spouses Retire and Claim at Same Age (62, 66 or 70) Husband Retires at 70, Wife at 62 Retire at 66 & Claim Social Security at 62 Retire at 66 & Claim Social Security at 70</p>
Phased Retirement Scenarios
<p>One Phase: Both phase to 50% employment at 66, fully retire at 70 Two Phases: Both phase to 80% employment at 62, 20% at 66, fully retire at 70</p>
Defined Benefit Scenarios (with 50% J&SA)
<p>Husband has Frozen DB from Previous Employment (\$5,000) Retire and claim everything at 62, 66 or 70</p> <p>Husband has DB at primary employer (18 Years of Service at age 62) Retire and claim everything at 62 (18 YOS) Retire and claim DB at 62; 50% part time to 66, claim SS at 66</p> <p>Retire at 66 from primary employer with 22 Years of Service Retire and claim everything at 66 (22 YOS) Retire and claim DB at 66; 50% part time to 70, claim SS at 70</p>
Defined Benefit w/ Different Annuity Scenarios
<p>Retire and claim DB and SS at 66, take Single Life Annuity Retire and claim DB and SS at 66, take 100% J&SA</p>
Normal and Delayed Retirement with Expenditure Cuts
<p>Cut Discretionary Spending Retire and Claim SS at 66, Cut Discretionary Spending 20% or 30% Retire and Claim SS at 70, Cut Discretionary Spending 20% or 30%</p> <p>Cut Discretionary Spending <u>and</u> Housing</p>

Retire and Claim SS at 66, Cut Discretionary & Housing 20% or 30%
Retire and Claim SS at 70, Cut Discretionary & Housing 20% or 30%

IV. Simulation Results

Output Metrics

There are several ways to report the results of these simulations. In comparing the success or failure of various retirement strategies represented by the simulated scenarios identified above, we use one or more of several metrics, as follows:

- Probability of having wealth left at death: This is the percentage of the simulation runs in which the last spouse to die has any investment wealth remaining. The difference from 100 percent is the risk of outliving your assets. For example, if the probability of having wealth left at death is 29 percent, then 71 percent of the time you can expect to experience an income shortfall.
- Expected wealth at death: This is the amount of money remaining in the investment portfolio when the last spouse dies, in nominal dollars. For most of the scenarios we consider, this value is zero because the amount of starting wealth is insufficient to support the household's spending needs and risks.
- Retirement Wealth That Would Have Been Sufficient to Meet Needs: This is an estimate of the target lump sum wealth, in nominal dollars, that the couple would have needed at the beginning of the retirement period to cover all of their expenses after employment earnings, Social Security benefits, and regular income from defined-benefit (DB) plan annuities. In many cases, we report percentile values for this output variable. For example, the 50th percentile, or median, is what the household would have needed to be 50 percent sure of having enough, whereas the 90th percentile is the amount necessary to have only a 10 percent chance of running short.

Base Case

As described above, the base case assumes that a married couple, both age 62 at the outset of the simulation, have income and wealth corresponding to either the median pre-retiree household (\$60,000 income and \$100,000 non-housing wealth) or the 75th percentile household (\$105,000 income and \$250,000 non-housing wealth). They desire to maintain their standard of living in retirement and are assumed to be allocating their spending consistently with the averages in the Current Population Survey spending patterns. In the base case, they are assumed to retire at 62 and fund their spending needs from Social Security and their accumulated investment wealth. The ultimate goal is to make it through retirement without running out of investment wealth and

without having to sell their home (except in the circumstance where the second spouse enters permanent long-term care (LTC) and the home is no longer needed).

Table 18 summarizes the simulated retirement outcomes for the two representative couples retiring and claiming Social Security at age 62, incorporating longevity risk, investment risk, inflation risk, health and LTC risk. The conclusion that can be drawn from these results is that the likelihood of having a financially successful retirement based on the base case assumptions is very

Key finding: The typical pre-retiree married-couple household in the United States has insufficient wealth to maintain their standard of living in retirement if they retire and claim Social Security at age 62.

low.

All of the simulation output metrics tell a similar story: At the assumed level of pre-retirement wealth, these households have insufficient resources to retire and claim Social Security at age 62, while still maintaining their current standard of living. To be 90 percent confident of meeting all household cash flow needs in retirement, for example, the median household couple (\$60,000 pre-retirement income) would have needed \$520,338 saved by age 62. This is approximately five times actual savings for households at this age and income level. This is an important conclusion when considered in light of the prevalence of early retirement and Social Security claiming reported earlier in this report.

Table 18: Simulation Results for Base Case Households Retiring at Age 62 with No Decrease in Standard of Living

Simulation Output	\$60,000 Income at 62		\$105,000 Income at 62	
	50th Percentile	90th percentile	50th Percentile	90th percentile
Probability of Wealth at Death	1%		1%	
Wealth at Death	\$0	\$0	\$0	\$0
Years Short	23	31	23	31
Age Wealth Runs Out	66	67	66	67
Wealth Needed at 62 to Meet Needs	\$383,077	\$520,338	\$917,798	\$1,195,318

Source: Author calculations based on Monte Carlo simulation results for married couple households with \$60,000 and \$105,000 pre-retirement income at age 62, respectively; incorporates investment, inflation, mortality, health and LTC risks as described in this report.

Alternative Social Security Claiming Strategies

As noted in the background section of this report, many Social Security recipients make their initial claim for benefits at age 62. Due to the reduction in benefits that occurs when claimants have earned income, this is also commonly associated with separation from employment or phasing to part-time work.

To examine the impact of alternative Social Security claiming strategies, we simulate each separately. Although there are many other possible variations, we limit our consideration to basic timing strategies in order to more easily integrate these decisions with retirement timing and phasing strategies in other scenarios. The Social Security claiming strategies considered are:

- Both husband and wife retire at age 62 and claim Social Security at age 62.
- Both husband and wife retire at age 66 and claim Social Security at age 66.
- Both husband and wife retire at age 70 and claim Social Security at age 70.
- Husband retires and claims at age 70; wife retires and claims at 62.
- Both retire at age 66 and both claim Social Security at 70.
- Both claim Social Security at 62 and retire at 66.

Claiming Social Security at 62 (or, alternatively, 70) results in an actuarially reduced (increased) benefit which is received over a longer (shorter) retirement period. In high (low) interest rate environments, the actuarial reduction or increase may provide a rationale for early (late) claiming of benefits. However, given that we have assumed long-run average rates of return, the actuarial reduction was established at the outset of the program and was, at that time, approximately correct for a single life only, based on unisex mortality. Even without factoring in increased longevity, this implies that delayed claiming should be beneficial for couples where the wife is claiming on the husband's earnings history, as is the case here.

Table 19 shows the amount of wealth needed by the \$105,000-income household to meet future cash flow needs through the retirement period under different Social Security scenarios. Values are reported for the 90 percent confidence level and the 50 percent confidence level (median). For comparability, the values on this table are amounts needed *at age 62*, even for scenarios incorporating later retirement dates. Scenarios with age 66 or age 70 retirement dates incorporate the expected additional savings and investment returns that would be accrued. Therefore, the values on this table can be seen as a baseline metric: If a couple reaches age 62 and does not have wealth equal to the 90 percent confidence level, they have at least a 10 percent chance of running out of money during retirement. Given that U.S. pre-retirement households at these income levels have only \$100,000 and \$250,000 in wealth, respectively, we conclude that these retirement and claiming strategies are not feasible without additional savings levels and/or much-reduced standards of living.

The two "Differential" columns in the table show the present value benefit of alternative retirement and Social Security claiming strategies as compared to retiring and claiming Social Security at age 62. For example, the \$105,000-income couple needs to have saved approximately \$300,000 less by age 62 if they plan to retire and claim at age 66 and \$500,000 less if they plan to retire and claim at 70. The differentials are approximately the same at both the 50th and 90th percentiles.

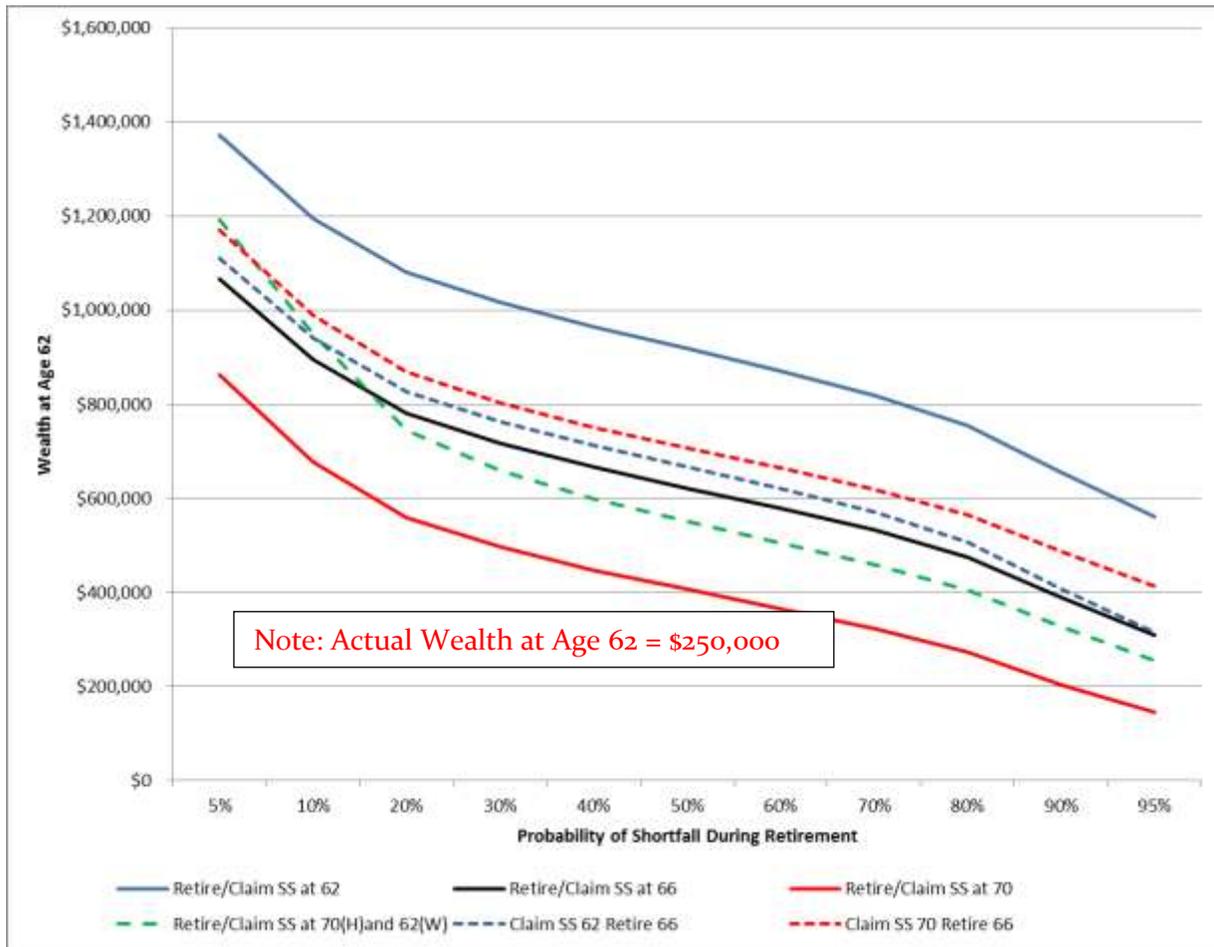
Table 19: Impact of Retirement and Social Security Claiming Strategies on Wealth Needed at Age 62 to Be 50 Percent or 90 Percent Confident of Meeting Retirement Income Needs, for Married-Couple Household with \$105,000 Income at Age 62

	Wealth Needed at Age 62			
	To be <u>50%</u> Confident of Meeting Needs	Differential from Retire and Claim at 62	To be <u>90%</u> Confident of Meeting Needs	Differential from Retire and Claim at 62
Retire and Claim SS at 62	\$917,798	0	\$1,195,318	0
Retire and Claim SS at 66	\$621,506	(296,292)	\$894,661	(300,657)
Retire and Claim SS at 70	\$405,972	(511,826)	\$677,709	(517,609)
Retire and Claim 70H/62W	\$549,986	(367,813)	\$948,104	(247,214)
Retire 66 and Claim SS at 70	\$707,105	(210,693)	\$988,333	(206,986)
Retire 66 and Claim SS at 62	\$666,522	(251,276)	\$941,079	(254,239)

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$105,000 income at age 62; incorporates investment, inflation, mortality, health and LTC risks as described in this report.

Another way of looking at these simulation results is to consider the *probability* of retirement wealth shortfall. **Figure 3** shows how the amount of wealth at retirement impacts the risk of running out of money in retirement. In the table above, we reported the amount of wealth needed to be 90 percent confident of meeting needs, equivalent to a 10 percent shortfall risk. It is interesting to note that it requires a fairly large incremental amount of wealth to reduce the shortfall risk from 10 percent to 5 percent. Although it varies by scenario, the approximately \$200,000 additional wealth needed is primarily driven by health, LTC and investment risks.

Figure 3: Risk of Retirement Wealth Shortfall by Wealth at Age 62 and Social Security Claiming Strategy for Married-Couple Household with \$105,000 Income at Age 62



Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$105,000 income at age 62; incorporates investment, inflation, mortality, health and LTC risks as described in this report.

Comparing these alternatives, it is clear that the delayed retirement scenario reduces the probability of retirement wealth shortfall. However, to be 90 percent confident of meeting all cash flow needs in retirement, the \$105,000-income pre-retiree household needs to have almost \$700,000 saved by age 62 to maintain their standard of living in retirement. At their assumed level of wealth, \$250,000 at age 62, the household has more than an 80 percent risk of shortfall.

Practical issues: Delayed Social Security claiming reduces the risk of retirement wealth shortfall by shortening the expected retirement period

and increasing lifetime inflation-adjusted benefits during retirement. However, households are still exposed to substantial risk from health, LTC and investments.

Phased Retirement Scenarios

When wealth is insufficient to fully retire at the desired age, some households choose to phase into retirement by reducing paid employment. This may be accomplished by separating from employment and working for a different employer or by making an arrangement to work part time with the original employer. Although there are many possible ways to phase, we consider two alternative phasing strategies, focusing attention on the percentage reduction in household income rather than the way that it is accomplished.

- Both husband and wife phase to 50 percent part time and claim Social Security at age 66. They fully retire at age 70.
- Both husband and wife phase to 80 percent at age 62, then phase to 20 percent and claim Social Security at age 66. They fully retire at age 70.

In addition to the psychological and social advantages of phased retirement, it offers financial advantages of reducing the need to draw down retirement savings during the early years of retirement.

Table 20 reports the wealth needed *at age 66* to be 50 percent and 90 percent confident of meeting retirement expenses using each of these strategies. The wealth needed at age 66 for retiring and claiming Social Security at ages 66 and 70 without phasing is also included for comparison. The differential columns show how much less is needed at age 66, as compared to retiring fully at 66. Although it takes more wealth to be 90 percent confident of meeting cash flow needs, the differentials are similar for both the 50th and 90th percentiles because these strategies impact relatively certain cash inflows but do not reduce the uncertain future cash flows related to health and LTC risks.

Table 20: Effect of Alternative Claiming and Phasing Strategies on Amount of Wealth Needed at Age 66 to Be 50 Percent and 90 Percent Confident of Meeting Needs

Panel A: Median Household (\$60,000 Pre-retirement Income at Age 62)				
	Wealth Needed at Age 66			
	To be 50% Confident of Meeting Needs	Differential from Retire and Claim SS at 66	To be 90% Confident of Meeting Needs	Differential from Retire and Claim SS at 66
Retire and Claim SS at 66	\$251,585		\$388,295	
Retire and Claim SS at 70	\$137,458	(\$114,127)	\$273,734	(\$114,561)
Claim SS at Phase 50% at 66, Retire at 70	\$177,849	(\$73,736)	\$309,151	(\$79,144)
Phase 80% at 62, Claim SS and Phase 20% at 66, Retire at 70	\$218,230	(\$33,355)	\$352,364	(\$35,930)
Panel B: 75th Percentile Household (\$105,000 Pre-retirement Income at Age 62)				
	Wealth Needed at Age 66			
	To be 50% Confident of Meeting Needs	Differential from Retire and Claim SS at 66	To be 90% Confident of Meeting Needs	Differential from Retire and Claim SS at 66
Retire and Claim SS at 66	\$636,204		\$910,116	
Retire and Claim SS at 70	\$421,271	(\$214,934)	\$683,170	(\$226,946)
Claim SS at Phase 50% at 66, Retire at 70	\$494,966	(\$141,238)	\$757,395	(\$152,720)
Phase 80% at 62, Claim SS and Phase 20% at 66, Retire at 70	\$579,272	(\$56,933)	\$845,302	(\$64,813)

Source: Author calculations based on Monte Carlo simulation results for married-couple households with \$60,000 (Panel A) and \$105,000 (Panel B) income at age 62; incorporates investment, inflation, mortality, health and LTC risks as described in this report.

As in the cases of delayed retirement and Social Security claiming considered in the earlier section, we conclude that households can reduce their risk of retirement income shortfall by electing to phase into retirement. For households that phase to part-time employment (at 50 percent of previous income) from age 66 to 70, required wealth at age 66 is reduced by 15 to 20 percent as compared with full retirement at age 66.

Key finding: Phased retirement strategies in which retirees delay Social Security claiming and wealth draw-down reduce the risk of retirement shortfall. However, the wealth needed at retirement under these scenarios still exceeds the amount that typical U.S. retirees have accumulated.

Retirement Timing with Expenditure Reductions

Reviewing the results of these simulations, it is clear that the base case households do not have sufficient funds to maintain their current standard of living in retirement. Therefore, we investigate additional scenarios in which they combine selected retirement timing decisions with expense reductions. Because the simulation assumes that certain expenses are beyond the control of the household, e.g., health and LTC, we apply expense reduction goals only to discretionary expenses.

We consider expense reduction scenarios for each of the two household income levels. For each retirement age (66 and 70), we consider 20 percent and 30 percent discretionary expense reductions, with and without a corresponding 20 percent and 30 percent downsizing of the housing. In scenarios in which housing is downsized, it is assumed that the couple nets 90 percent of the value of their home (to account for commissions and market factors), purchases a smaller home, invests the remaining funds, and reduces annual housing expense by the stated percentage.

Table 21 summarizes the wealth needed at retirement by each of the representative households to be 90 percent confident of meeting cash flow needs for alternative spending reduction scenarios. As compared with previously reported results, the wealth amounts on this table are as of the date of retirement (66 in the top panel and 70 in the bottom panel).

Table 21: Wealth Needed at Retirement (Age 66 or 70) to Be 90 Percent Confident of Meeting Needs, with and without 20 Percent and 30 Percent Reductions in Discretionary and Housing Expenditures

Panel A: Median Household (\$60,000 Pre-Retirement Income at Age 62)				
		Discretionary Expense Reduction		
Retire at 66		0%	20%	30%
Housing Expense Reduction	0%	388,295	262,729	205,016
	20%		243,013	
	30%			182,504
Retire at 70		0%	20%	30%
Housing Expense Reduction	0%	286,646	190,023	143,615
	20%		176,588	
	30%			122,310
Panel B: 75th percentile Household (\$105,000 Pre-Retirement Income at Age 62)				
		Discretionary Expense Reduction		
Retire at 66		0%	20%	30%
Housing Expense Reduction	0%	910,116	655,841	524,997
	20%		621,260	
	30%			479,206
Retire at 70		0%	20%	30%
Housing Expense Reduction	0%	682,939	479,318	382,791
	20%		459,501	
	30%			349,126

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$60,000 (Panel A) and \$105,000 (Panel B) income at age 62; incorporates investment, inflation, mortality, health and LTC risks as described in this report.

Key finding: Expense reduction in retirement, combined with delayed retirement, will improve the chances that retirement wealth lasts a lifetime. However, typical households will still need to increase pre-retirement saving relative to current levels.

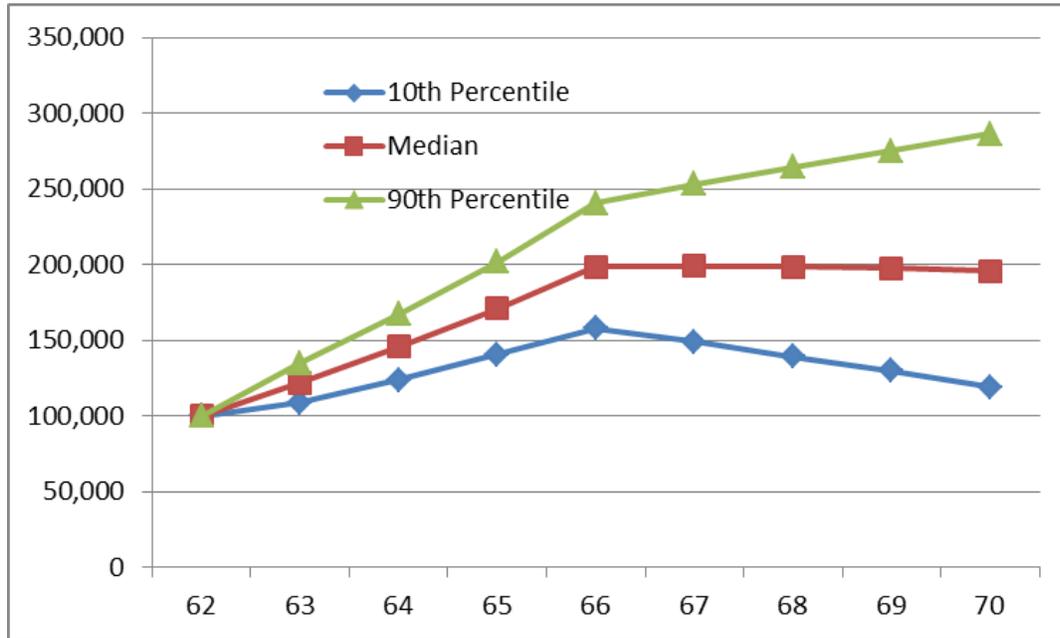
As compared with the base case (\$388,295 in Panel A and \$910,116 in Panel B), expense reduction significantly reduces wealth needed at retirement. If discretionary expenditures are cut by 20 percent, wealth needed at retirement is approximately one-third lower. With both discretionary and housing expenses cut by 30 percent, households can retire with about half as

much wealth. With \$100,000 and \$250,000, respectively, at age 62, these households will be closer to reaching these goals as they continue to save and invest in the years leading to their later retirement dates.

Figure 4 illustrates the potential growth in wealth for the median household from age 62 to age 70, for the scenario in which the household cuts discretionary spending by 20 percent at age 62 and retires at age 66. In addition to receiving investment earnings during that time, the expense reduction allows them to continue saving for four additional years prior to retirement. However, their wealth and investment earnings are subject to market risk, as illustrated by the bands for the 10th and 90th percentiles. On average, the household will approximately double their wealth, but they can be 90 percent certain of having at least \$150,000 by age 66. Comparing this to the values on Table 20, this is still substantially less than the amount they need at that time (\$262,729) to be 90 percent confident of not running out of investment wealth.

Practical issues: Expense reduction reduces predictable cash flow needs, but does not mitigate the impact of big risks such as LTC. SOA focus groups show that retirees adjust expenses to available funds, and that they are much more focused on current cash flow management than on longer-term risk management. The retirees demonstrated adaptability and a willingness and ability to adjust their spending to fit resources.

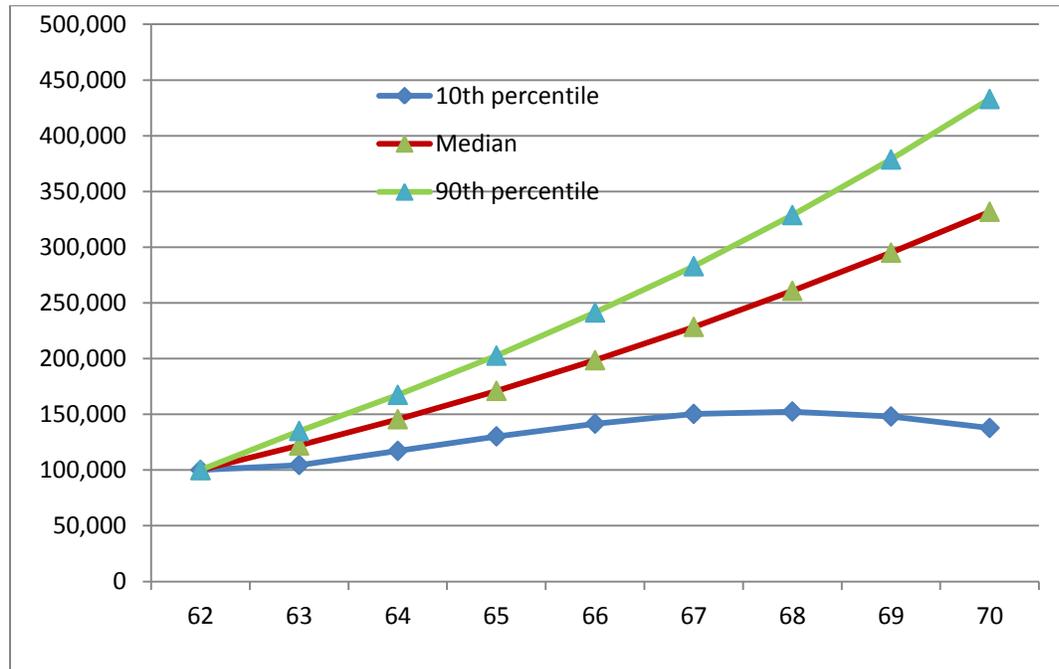
Figure 4: Simulated Range of Growth in Wealth from Age 62 to 70 with 20 Percent Cut in Discretionary Expenditures



Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$60,000 income at age 62; assumes discretionary spending cut by 20 percent beginning at age 62, retirement and Social Security claiming at age 66; incorporates investment, inflation, mortality, health and LTC risks as described in this report.

In contrast, consider the graph in **Figure 5**, which illustrates the growth in wealth in the scenario where the household cuts their discretionary and housing expenses by 30 percent at age 62 and delays retirement and Social Security claiming to age 70. By retiring later, they have a longer time to save, and will have, on average, accumulated more by the time they retire. Although they still can only be 90 percent sure of having \$150,000 at the time of retirement (due to the risks incorporated in this simulation), this amount will be sufficient to meet their projected needs 90 percent of the time (\$122,310 in Table 21).

Figure 5: Simulated Range of Growth in Wealth from Age 62 to 70 with 30 Percent Cut in Discretionary and Housing Expenditures



Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$60,000 income at age 62; assumes discretionary spending cut by 20 percent beginning at age 62, retirement and Social Security claiming at age 70; incorporates investment, inflation, mortality, health and LTC risks as described in this report.

Alternative Defined-Benefit Scenarios

Defined-benefit (DB) plans offer participants the opportunity to receive lifetime income, with the amount usually dependent on number of years of service and on salary. Although there are many variations on benefit plan design and claiming options, we focus here on decisions related to timing and phasing retirement under these plans.

For each of the two household income levels, we assume two different types of DB benefits. First, we consider the effect of a small frozen benefit from an earlier employer. Although frozen benefits are commonly adjusted for early and late retirement, for simplicity, we assume the same dollar amount (\$5,000) regardless the age of retirement. Thus, earlier retirement increases the present value of the benefit because of the time value of money and the greater expected number of years it will be received.

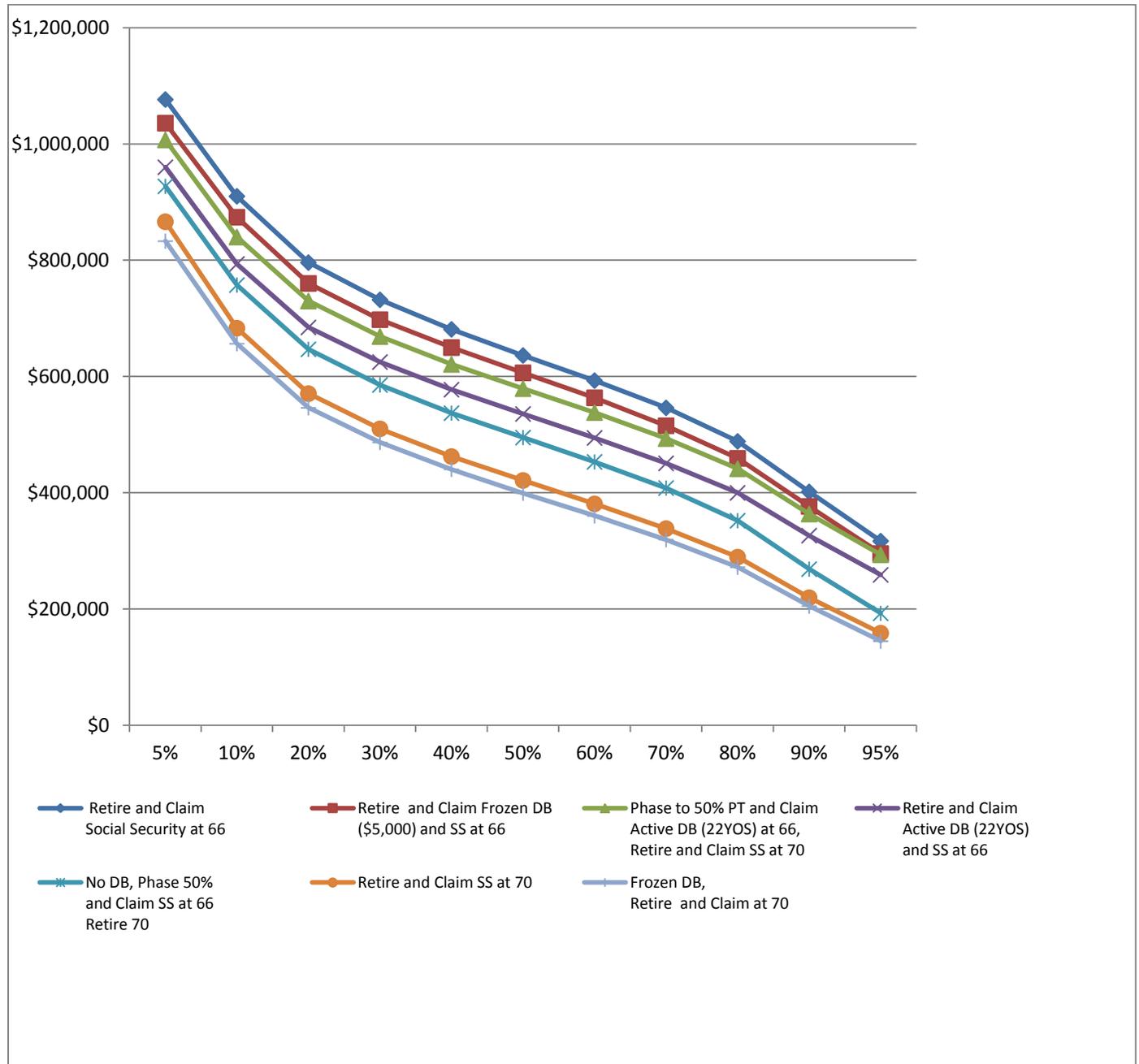
Perhaps more interesting, we also simulate the effect of an active participant's DB decisions. For each income level, we assume that the plan benefit is 1 percent of final pay for each year of service. In each case, the husband is the DB participant and the wife does not have a DB plan. We initially assume that they opt for a 50 percent joint and survivor benefit, although we consider other options in the next section of this report. The scenarios considered are:

- Early retirement at age 62 with 18 years of service (YOS)
- Normal retirement at age 66 with 22 years of service
- Phased retirement scenario in which the husband retires from the primary employer and claims the DB while continuing to work at 50 percent of the previous income level to age 70, at which point he fully retires and claims Social Security.

Figure 6 illustrates the impact on probability of shortfall, given different wealth levels at age 66, for the \$105,000 income household. The relative merit of these strategies for the other income level and retirement dates are similar and are included in the Appendix (See Tables A-6 through A-8).

Key result: Depending on plan generosity, pension benefits will reduce wealth needed at retirement to varying degrees. Although a DB plan will help retirees meet regular cash flow needs, it will not insulate them from shortfalls driven by investment, health and LTC risks.

Figure 6: Impact of DB Plan Eligibility on the Probability of Retirement Wealth Shortfall
 (assumes married household with \$105,000 income at age 62)



Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$105,000 income at age 62; incorporates investment, inflation, mortality, health and LTC risks as described in this report.

Choice of Benefit Payout Option

In all of the retirement timing and phasing scenarios considered in this report, it is important to note that much of the financial risk is borne by the spouse who is the last to die. Due to greater female longevity, this risk commonly falls on the wife. Although she will continue to have lifetime income from Social Security, the annual benefit will be one-third lower than the married couple benefit. Household resources are commonly depleted by the final illness of the first-to-die, leaving the surviving spouse to rely primarily on the reduced Social Security benefit. It may also be the case that the last-to-die will need to enter LTC earlier than would otherwise be necessary if the spouse had survived.

For households in which the primary earner is an active participant in a DB plan, the choice of annuity option at formal retirement impacts the cash flows available to the couple during retirement. All of the results reported in the previous section assume that the husband takes the 50 percent joint and survivor annuity option. The advantage of this option is that the couple can receive a higher benefit while they are both living, with the surviving spouse receiving a 50 percent benefit after the first dies. We consider two alternative scenarios:

- Husband takes a single life annuity, maximizing the current benefit from the plan, but resulting in zero benefit to the surviving spouse upon his death;
- Husband takes a 100 percent joint and survivor annuity, resulting in a lower benefit while they are both living, but maximizing the benefit available to the surviving spouse after he dies.

Table 22 summarizes the results for the different annuitization options at age 66, compared to outcomes without a DB plan for the \$60,000 income household. (See Appendix Table A-9 for the \$105,000 household results.) Although the difference between outcomes with and without a DB is substantial, the annuitization choice does not appear to have much impact on *average* success metrics. Although this may seem counterintuitive, the result makes sense because mortality risk is being simultaneously modeled. To the extent that the calculation of benefits under different payout options incorporates mortality risk, the present value of expected benefits under each option should be equivalent.

For example, the \$60,000-income household would need about \$60,000 less in retirement wealth if they expected to receive a relatively modest (22 percent of final pay) DB from the husband's employer. Being entitled to receive the DB also increases by several years

the average age that wealth will be expected to run out and reduces the years of shortfall because the household will have reduced the need to dip into savings to cover required expenses each year.

Key finding: Because alternative DB annuity payout choices are based on expected mortality, the present value of each option is approximately equivalent. Therefore, the simulated effect on retirement outcomes is also equivalent. However, focusing on average outcomes disguises the significant advantage the joint and survivor annuity can offer to a long-lived surviving spouse.

Although there are minor differences in the outcomes for the scenarios with different annuity selections, the choice of payout option generally has no impact on the success of a household's retirement plan, *on average*. In all cases, the DB, in combination with Social Security, will obviously reduce the amount of annual shortfall, which extends the number of years before wealth is depleted. Because we assume that the spouses are the same age, their life expectancies are different by only a few years. Focusing on average outcomes disguises the significant advantage the joint and survivor annuity can offer to a long-lived surviving spouse. Once wealth is depleted, the widow must rely solely on Social Security and the DB, if any. Thus, the two joint and survivor annuities provide much greater protection against the risk of old age.

Table 22: Impact of Defined Benefit on Retirement Success Metrics, by Annuitization Option, \$60,000-Income Household

Simulation Output	\$60,000-Income Household, Retire and Claim at 66			
	No DB	50% Joint and Survivor Annuity	100% Joint and Survivor Annuity	100% Single Life Annuity
Wealth Needed <u>at Age 66</u> to be 50% Confident of Meeting Needs	\$251,585	\$193,460	\$194,767	\$191,278
Wealth Needed <u>at Age 66</u> to be 90% Confident of Meeting Needs	\$388,295	\$327,057	\$326,522	\$277,199
Average Age Wealth Runs Out	80.0	83.9	84.2	83.2
Average Years of Shortfall	14.1	10.2	10.4	9.8
Probability of Wealth at Death	7%	18%	19%	18%

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$60,000 income at age 62; incorporates investment, inflation, mortality, health and LTC risks as described in this report.

IV. Summary of Key Findings and Policy Implications

This study surveys previous research and government data on retirement timing, benefit claiming and phased retirement. We use this background to establish the assumptions for a simulation model that tests the efficacy of various timing and claiming strategies. We find strong evidence that U.S. retirees face challenges to retirement security. Although increased retirement savings is one solution, we also find that delayed retirement and benefit claiming combined with expense reductions in retirement can improve retirement outcomes.

The base case households with \$60,000 and \$105,000 of pre-retirement income respectively (representative pre-retiree households at the 50th and 75th percentiles of income) have insufficient wealth to retire securely and maintain their current standard of living. To have a 90 percent chance of fully meeting their needs in retirement, the \$60,000-income couple retiring at age 62 would need \$520,000, and the \$105,000-income couple would need \$1.2 million. The results of this study highlight several retirement strategies that can result in better outcomes for households approaching retirement age with insufficient savings:

- Retire later: i.e., continue to work longer, either full time or on a reduced basis.
- Claim Social Security later to increase the monthly benefit from Social Security.
- Reduce living expenses.

The background research and simulation results show the following:

- While the public is not well informed about the implications of retirement timing decisions, they matter a great deal. Delayed retirement provides additional years of income and retirement savings, increases Social Security benefits, and reduces the number of years in retirement that must be funded from accumulated wealth.
- Delaying retirement and Social Security claiming reduces the amount of wealth needed for successful retirement, but does not totally solve the problem.
- Retiring and claiming Social Security later, combined with expense reductions, can make retirement viable for many households.
- DB income can make a big difference. The choice of payout option does not make a very large difference in the average situation, but it can make a huge difference to the surviving spouse. Note that typical methods of displaying the results of stochastic modeling do not illustrate the impact of major risks on those who live long.
- The reduction in retirement wealth needed that accrues from timing and claiming strategies is much greater at the median than at the 90 percent or 95 percent confidence level. None of these strategies are sufficient to offset the large cash flow shocks that may be associated with adverse investment results, unexpected health and long-term care expenses.
- For families that run out of assets and have major long-term care and health expenses, Medicaid systems are the system of last resort. Medicaid eligibility and claiming issues are beyond the scope of this study.

This study was designed to be Part II of continuing work on benefit adequacy. It built on an earlier study that laid the foundation, established the methodology and offered modeling on a wide range of post-retirement risk mitigation strategies. The first study also defined the risks and described the wide variety of stakeholders who can and should be involved in developing solutions and disseminating information to help retirees make good choices. The combined conclusions from the two studies are presented in the box at the end of this section. Perhaps the most important take-away from this research is that households need to take action earlier to be better prepared for retirement. This will require that couples invest of time and effort to estimate their cash flow needs, understand their post-retirement risks, and make good choices for

retirement timing and wealth decumulation. Plan sponsors, employers, and policymakers can help in a number of ways.

Employers and plan sponsors can provide planning tools and support to help individuals understand the implications of working longer and of claiming Social Security at different times. When offering information or tools with regard to Social Security claiming, it is critically important to point out that the issues are different when this is viewed for the couple rather than the individual. At a minimum, they should stress the importance of this issue. Employers can also offer different job options, phased retirement programs, and make it easier for individuals to work longer. Whether they will be interested in doing so will depend on business strategies, their talent needs and labor market issues. Employers may also wish to provide support for financial planning that will enable employees to evaluate different spending and saving strategies.

Policymakers should provide information to help people understand the household Social Security claiming decisions. At the point that Social Security reform is being considered, they should look at retirement ages and how benefits vary by retirement age and by household type. Life spans have increased a great deal since the inception of the system, and the increases in retirement ages have been much smaller than the increases in life spans. Policymakers should also reconsider policies that support or hamper phased retirement and longer work lives. They might also wish to review DB plan requirements that impact retirement ages. Public agencies can also be an important source of financial planning tools and information. Two examples are mymoney.gov and the [*U.S. Department of Labor's Taking the Mystery Out of Retirement Planning*](#). Policymakers may also wish to review the regulation of consumer financial instruments and debt, including items such as credit cards, to determine if added information or regulation would help consumers.

Individuals need planning information and tools to help them. They also need to start planning earlier and saving more, and to think longer term. Everyone should understand the issues involved with Social Security claiming. For people who want to work longer, it is important to think through what personal actions will make this possible. Things to think about include what to do if one loses one's job or if it becomes too challenging, whether full-time work is likely to be feasible, how to keep skills up to date, and how to keep open job options. EBRI research has shown that nearly half of Americans retire involuntarily. And, in addition, recent SOA focus groups indicated that many people felt that jobs had become too difficult as they neared retirement and that this led them to retire. Expense reduction is also a major issue, and it is important to think about what adjustments in lifestyle are feasible if they are needed. Individuals nearing retirement age without enough savings may also wish to put forth a major effort to save more.

Combined observations from the two studies:

This study followed an earlier study, "Measures of Benefit Adequacy: Which, Why, for Whom and

How Much?" in which we originally developed the simulation model and used it to evaluate a set of risk mitigation strategies. Considering the results of the two studies together provides several insights that are summarized below.

Households face a wide variety of post-retirement risks, and there is therefore a great deal of uncertainty inherent in individual retirement outcomes. Forecasts often focus on what will work on average, but it is important to look at the full range of possible outcomes for any given retirement scenario.

- There is a huge difference between the 50th and 90th percentile forecast and a large additional difference between the 90th and 95th. These differences are largely shock driven, and the specific amounts of the differences are highly sensitive to model assumptions and model construction.
- The values typically shown in stochastic modeling do not provide good insight about what happens to those who live longest and to those who experience shocks. Different methods are needed to illustrate the impact on those who experience major shocks.
- Retirement and Social Security claiming strategies tend to move the median values of assets needed, but they do not materially change the distributions.
- Factors driving the median values include retirement age, pension amounts, asset levels, Social Security claiming, and levels of expense reduction.
- Factors driving the "tails" of the distribution include long-term care, major health shocks and investment returns. Risk management strategies such as buying annuities and long-term care insurance can have a big influence for those who live long or who need the benefit. Such insurance is not affordable for the base case families studied in this study. These strategies do not improve the median situation since those who do not need the benefit of the insurance have paid for it. They can make a big difference for those who experience the shock. Added analysis is needed to understand the value of insurance, and how it redistributes funds to some individuals.
- Our studies show the importance of shocks. Others have also estimated the cost of health care to supplement Medicare. For example, EBRI finds a couple both with median drug expenses would need \$158,000 for a 50 percent chance of having enough money, and \$271,000 for a 90 percent chance (EBRI, 2010). Fidelity estimates that a couple both age 65 retiring today will need \$220,000 to cover medical expenses during retirement (Fidelity, 2013). Both studies assume they are covered by Medicare and do not include nursing home and long-term care costs.

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APPENDIX

Expense Reduction Scenarios

Table A-1: Wealth Needed at Retirement to Be X Percent Confident of Meeting Needs, Comparison of Base Case with 20 Percent and 30 Percent Reductions in Discretionary and Housing Expenses and Retirement at Age 66 (Panel A) or Age 70 (Panel B), for Married-Couple Household with \$60,000 Income at Age 62

Panel A: Retire and Claim Social Security at Age 66					
Confidence Level	0%	-20% Discretionary		-30% Discretionary	
		-20% Discretionary	-20% Housing	-30% Discretionary	-30% Housing
5%	\$126,378	\$77,283	\$70,501	\$52,040	\$41,554
10%	\$156,591	\$95,555	\$87,063	\$64,639	\$51,361
20%	\$190,619	\$116,422	\$105,898	\$79,603	\$63,869
30%	\$213,914	\$131,096	\$119,587	\$90,785	\$73,687
40%	\$233,106	\$144,413	\$131,865	\$100,546	\$82,491
50%	\$251,585	\$157,217	\$143,740	\$110,696	\$91,450
60%	\$270,545	\$171,089	\$156,205	\$121,423	\$101,298
70%	\$293,119	\$186,650	\$170,876	\$134,281	\$113,195
80%	\$322,780	\$208,644	\$191,706	\$152,761	\$130,162
90%	\$388,295	\$262,729	\$243,013	\$205,016	\$182,504
95%	\$677,617	\$582,951	\$556,038	\$557,486	\$555,279

Panel B: Retire and Claim Social Security at Age 70					
Confidence level	0%	-20% Discretionary		-30% Discretionary	
		-20% Discretionary	-20% Housing	-30% Discretionary	-30% Housing
5%	\$52,429	\$23,266	\$18,302	\$6,161	\$0
10%	\$76,493	\$35,120	\$28,964	\$13,622	\$5,692
20%	\$102,513	\$50,106	\$43,134	\$24,340	\$14,682
30%	\$121,124	\$62,283	\$54,088	\$33,366	\$22,340
40%	\$137,888	\$73,763	\$64,886	\$41,851	\$29,814
50%	\$154,351	\$84,980	\$75,580	\$50,882	\$37,779
60%	\$172,165	\$97,595	\$87,234	\$60,844	\$46,664
70%	\$192,797	\$112,792	\$101,329	\$73,468	\$57,904
80%	\$221,814	\$134,725	\$121,614	\$91,752	\$74,411
90%	\$286,646	\$190,023	\$176,588	\$143,615	\$122,310
95%	\$548,124	\$476,002	\$489,171	\$463,713	\$441,408

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$60,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.

Table A-2: Wealth Needed at Retirement to Be X Percent Confident of Meeting Needs, Comparison of Base Case with 20 Percent and 30 Percent Reductions in Discretionary and Housing Expenses and Retirement at Age 66 (Panel A) or Age 70 (Panel B), for Married-Couple Household with \$105,000 Income at Age 62

Panel A: Retire and Claim Social Security at Age 66					
Percent Confidence	-20% Discretionary				
	0%	-20% Discretionary	-20% Housing	-30% Discretionary	-30% Discretionary
5%	\$316,822	\$221,860	\$209,320	\$170,579	\$150,565
10%	\$401,631	\$276,265	\$261,464	\$212,829	\$188,634
20%	\$488,448	\$335,762	\$318,514	\$259,276	\$231,267
30%	\$546,109	\$376,423	\$356,130	\$290,869	\$260,028
40%	\$592,998	\$409,510	\$387,556	\$317,202	\$284,465
50%	\$636,204	\$441,386	\$417,288	\$343,285	\$307,475
60%	\$681,197	\$474,174	\$448,380	\$369,739	\$332,207
70%	\$732,050	\$510,675	\$482,724	\$400,323	\$360,300
80%	\$795,991	\$559,363	\$529,125	\$441,031	\$398,347
90%	\$910,116	\$655,841	\$621,260	\$524,997	\$479,206
95%	\$1,076,615	\$869,480	\$853,425	\$759,740	\$757,535

Panel B: Retire and Claim Social Security at Age 70					
Percent Confidence	-20% Discretionary				
	0%	-20% Discretionary	-20% Housing	-30% Discretionary	-30% Housing
5%	\$149,074	\$94,768	\$86,868	\$68,398	\$57,709
10%	\$217,821	\$137,896	\$129,400	\$98,544	\$83,328
20%	\$290,288	\$186,324	\$173,867	\$133,470	\$113,039
30%	\$341,209	\$219,794	\$205,719	\$158,820	\$136,075
40%	\$383,974	\$249,123	\$233,676	\$181,576	\$157,328
50%	\$424,544	\$277,480	\$260,465	\$204,653	\$178,430
60%	\$465,444	\$307,721	\$288,337	\$229,565	\$201,163
70%	\$512,358	\$342,208	\$322,206	\$258,369	\$228,101
80%	\$573,338	\$389,043	\$366,984	\$298,379	\$266,210
90%	\$682,939	\$479,318	\$459,501	\$382,791	\$349,126
95%	\$853,592	\$681,284	\$668,461	\$603,159	\$607,799

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$105,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.

Phasing Scenarios

Table A-3: Wealth Needed at Age 66 to Be X Percent Confident of Meeting Needs, Comparison of Retiring and Claiming at 66 or 70 to Scenarios with Phased Retirement, for Married-Couple Household with \$60,000 Income at Age 62

Percent Confidence	Both Retire/Claim SS at 66	Both Retire/Claim SS at 70	Phase 50% and Claim SS at 66, Retire at 70	Phase 80% at 62, Claim SS and Phase 20% at 66, Retire at 70
5%	\$126,378	\$40,821	\$58,962	\$95,859
10%	\$156,591	\$61,053	\$88,181	\$126,067
20%	\$190,619	\$85,962	\$120,044	\$159,291
30%	\$213,914	\$104,078	\$141,807	\$181,551
40%	\$233,106	\$120,743	\$160,157	\$200,360
50%	\$251,585	\$137,458	\$177,849	\$218,230
60%	\$270,545	\$155,187	\$195,623	\$236,510
70%	\$293,119	\$176,396	\$216,492	\$257,781
80%	\$322,780	\$205,602	\$244,577	\$286,673
90%	\$388,295	\$273,734	\$309,151	\$352,364
95%	\$677,617	\$553,496	\$588,539	\$637,427

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$60,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.

Table A-4: Wealth Needed at Age 66 to Be X Percent Confident of Meeting Needs, Comparison of Retiring and Claiming at 66 or 70 to Scenarios with Phased Retirement, for Married-Couple Household with \$105,000 Income at Age 62

Percent Confidence	Both Retire/Claim SS at 66	Both Retire/Claim SS at 70	Phase 50% and Claim SS at 66, Retire at 70	Phase 80% at 62, Claim SS and Phase 20% at 66, Retire at 70
5%	\$316,822	\$158,534	\$192,611	\$269,344
10%	\$401,631	\$219,542	\$268,668	\$349,544
20%	\$488,448	\$289,314	\$351,964	\$434,186
30%	\$546,109	\$338,358	\$408,160	\$490,298
40%	\$592,998	\$380,894	\$453,135	\$537,283
50%	\$636,204	\$421,271	\$494,966	\$579,272
60%	\$681,197	\$462,348	\$536,965	\$623,528
70%	\$732,050	\$509,981	\$585,502	\$672,043
80%	\$795,991	\$570,551	\$646,875	\$733,455
90%	\$910,116	\$683,170	\$757,395	\$845,302
95%	\$1,076,615	\$866,361	\$927,226	\$1,016,861

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$105,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.

Defined-Benefit Scenarios

Table A-5: Wealth Needed at Age 62 to Be X Percent Confident of Meeting Needs, Comparison of DB Scenarios to Retiring and Claiming Social Security at Age 62 without a DB Plan, for Married-Couple Household with \$60,000 Income at Age 62

Percent Confidence	Retire and Claim SS at 62, No DB	Retire and Claim Frozen DB (\$5,000) and SS at 62	Retire and Claim Active DB (18YOS) and SS at 62	Phase to 50% PT and Claim Active DB (18YOS) at 62, Retire and Claim SS at 66
5%	\$235,121	\$201,770	\$182,959	\$148,797
10%	\$272,508	\$234,848	\$214,648	\$171,738
20%	\$313,702	\$271,952	\$249,305	\$200,237
30%	\$340,748	\$296,144	\$273,045	\$220,305
40%	\$362,585	\$316,199	\$292,680	\$238,166
50%	\$383,077	\$335,237	\$311,374	\$255,426
60%	\$403,566	\$354,604	\$330,512	\$273,875
70%	\$426,063	\$376,438	\$352,340	\$294,874
80%	\$455,445	\$405,711	\$381,462	\$324,408
90%	\$520,338	\$473,118	\$445,737	\$388,790
95%	\$804,223	\$752,451	\$731,697	\$662,320

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$60,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.

Table A-6: Wealth Needed at Age 66 to Be X percent Confident of Meeting Needs, Comparison of DB Scenarios to Retiring and Claiming Social Security at Age 66 without a DB Plan, for Married-Couple Household with \$60,000 Income at Age 62

Percent Confidence	Retire and Claim SS at 66, No DB	Retire and Claim Frozen DB (\$5,000) and SS at 66	Retire and Claim Active DB (22 YOS) and SS at 66	Phase to 50% PT and Claim SS at 66, Retire and Claim DB (22 YOS) at 70	No DB, Phase 50% and Claim SS at 66, Retire 70	No DB, Retire and Claim SS at 70	Frozen DB, Retire and Claim at 70
5%	\$126,378	\$103,293	\$88,602	\$110,303	\$58,962	\$40,821	\$26,948
10%	\$156,591	\$130,769	\$111,697	\$134,458	\$88,181	\$61,053	\$44,550
20%	\$190,619	\$161,349	\$138,904	\$162,294	\$120,044	\$85,962	\$67,018
30%	\$213,914	\$183,078	\$159,112	\$182,685	\$141,807	\$104,078	\$84,561
40%	\$233,106	\$201,596	\$176,433	\$200,440	\$160,157	\$120,743	\$100,561
50%	\$251,585	\$219,087	\$193,460	\$217,882	\$177,849	\$137,458	\$116,469
60%	\$270,545	\$237,424	\$211,250	\$235,980	\$195,623	\$155,187	\$134,359
70%	\$293,119	\$259,022	\$232,241	\$256,944	\$216,492	\$176,396	\$154,625
80%	\$322,780	\$288,429	\$261,258	\$285,341	\$244,577	\$205,602	\$183,856
90%	\$388,295	\$355,359	\$327,057	\$352,059	\$309,151	\$273,734	\$249,677
95%	\$677,617	\$636,264	\$606,151	\$642,379	\$588,539	\$553,496	\$538,581

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$60,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.

Table A-7: Wealth Needed at Age 62 to be X Percent Confident of Meeting Needs, Comparison of DB Scenarios to Retiring and Claiming Social Security at Age 62 without a DB Plan, for Married-Couple Household with \$105,000 Income at Age 62

Percent Confidence	Retire and Claim SS at 62, No DB	Retire and Claim Frozen DB (\$5,000) and SS at 62	Retire and Claim Active DB (18YOS) and SS at 62	Phase to 50% PT and Claim Active DB (18YOS) at 62, Retire and Claim SS at 66
5%	\$560,644	\$524,456	\$466,571	\$397,288
10%	\$654,616	\$615,477	\$549,715	\$468,816
20%	\$753,820	\$712,127	\$641,341	\$546,842
30%	\$819,455	\$773,864	\$701,340	\$599,317
40%	\$871,297	\$824,395	\$749,339	\$644,096
50%	\$917,798	\$870,178	\$793,882	\$684,735
60%	\$964,444	\$915,578	\$838,291	\$727,547
70%	\$1,016,259	\$966,769	\$886,653	\$776,804
80%	\$1,080,054	\$1,032,118	\$949,651	\$838,027
90%	\$1,195,318	\$1,141,786	\$1,058,765	\$951,742
95%	\$1,371,544	\$1,315,346	\$1,235,049	\$1,128,266

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$105,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.

Table A-8: Wealth Needed at Age 66 to be X Percent Confident of Meeting Needs, Comparison of DB Scenarios to Retiring and Claiming Social Security at Age 66 without a DB Plan, for Married-Couple Household with \$105,000 Income at Age 62

Percent Confidence	Retire and Claim SS at 66, no DB	Retire and Claim Frozen DB (\$5,000) and SS at 66	Retire and Claim Active DB (22 YOS) and SS at 66	Phase to 50% PT and Claim SS at 66, Retire and Claim DB (22 YOS) at 70	No DB, Phase 50% and Claim SS at 66, Retire 70	No DB, Retire and Claim SS at 70	Frozen DB, Retire and Claim at 70
5%	\$316,822	\$295,376	\$258,779	\$293,315	\$192,611	\$158,534	\$144,695
10%	\$401,631	\$376,603	\$326,233	\$363,476	\$268,668	\$219,542	\$205,068
20%	\$488,448	\$459,252	\$399,874	\$441,330	\$351,964	\$289,314	\$271,868
30%	\$546,109	\$515,313	\$450,693	\$493,259	\$408,160	\$338,358	\$319,285
40%	\$592,998	\$563,373	\$494,364	\$538,054	\$453,135	\$380,894	\$360,291
50%	\$636,204	\$606,371	\$535,590	\$579,164	\$494,966	\$421,271	\$399,327
60%	\$681,197	\$649,870	\$577,421	\$620,871	\$536,965	\$462,348	\$440,247
70%	\$732,050	\$697,843	\$624,913	\$668,892	\$585,502	\$509,981	\$486,598
80%	\$795,991	\$760,194	\$684,480	\$729,812	\$646,875	\$570,551	\$546,182
90%	\$910,116	\$874,117	\$793,679	\$840,017	\$757,395	\$683,170	\$656,518
95%	\$1,076,615	\$1,035,885	\$960,051	\$1,007,083	\$927,226	\$866,361	\$832,937

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$105,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.

Table A-9: Impact of DB on Retirement Success Metrics, by Annuitization Option, for Married-Couple Household with \$105,000 Income at Age 62

Simulation Output	\$105,000-Income Household, Retire and Claim at 66			
	No DB	50% Joint and Survivor Annuity	100% Joint and Survivor Annuity	100% Single Life Annuity
Wealth Needed at Age 66 to be 50% Confident of Meeting Needs	\$636,204	\$535,590	\$538,421	\$533,227
Wealth Needed at Age 66 to be 90% Confident of Meeting Needs	\$910,116	\$793,679	\$804,370	\$793,115
Average Age Wealth Runs Out	74.0	77.1	76.9	83.8
Average Years of Shortfall	16.1	14.0	14.1	13.7
Probability of Wealth at Death	0%	7%	7%	8%

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$105,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.

Social Security Scenarios

Table A-10: Impact of Retirement and Social Security Claiming Strategies on Wealth Needed at Age 62 to be 50 Percent or 90 Percent Confident of Meeting Retirement Income Needs, for Married-Couple Household with \$60,000 Income at Age 62

	Wealth Needed at Age 62			
	To Be 50% Confident of Meeting Needs	Differential from Retire and Claim at 62	To Be 90% Confident of Meeting Needs	Differential from Retire and Claim at 62
Retire and Claim SS at 62	\$383,077	0.00	\$520,338	0.00
Retire and Claim SS at 66	\$225,172	(157,905.37)	\$362,107	(158,230.87)
Retire and Claim SS at 70	\$110,342	(272,735.08)	\$256,335	(264,002.32)
Retire and Claim 70H/62W	\$176,620	(206,457.45)	\$478,879	(41,458.54)
Retire 66 and Claim SS at 70	\$278,345	(104,731.75)	\$427,291	(93,046.57)
Retire 66 and Claim SS at 62	\$234,895	(148,182.30)	\$373,478	(146,859.31)

Source: Author calculations based on Monte Carlo simulation results for married-couple household with \$60,000 income at age 62; incorporates investment, inflation, mortality, health and long-term care risks as described in this report.