Converting Retirement Savings into Income: Annuities and Periodic Withdrawals

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Summary

To a worker contemplating retirement, there is perhaps no more important question than "How long will my money last?" Congress has a strong interest in the income security of older Americans because much of their income is either provided directly from public programs like Social Security, or in the case of pensions and retirement accounts, is subsidized through tax deductions and deferrals.

Many retirees must decide how to convert retirement account balances into income and how to preserve the accounts in the face of several kinds of risk.

- *Longevity risk* is the risk that the individual will exhaust his or her account before death and experience a substantial decline in income.
- *Investment risk* is the risk that the assets in which the individual has invested his or her retirement account will decline in value.
- *Inflation risk* is the risk that price increases will cause the individual's retirement income to decline in purchasing power.
- *Unexpected events* such as divorce, the death of a spouse, the cost of medical care, or a need for long-term care services are also risks.

There are strategies for dealing with each of these risks, but no single strategy can deal effectively with all of them. For example, purchasing a life annuity insures against longevity risk and it shifts the investment risk to the insurer. However, purchasing an annuity depletes the purchaser's available assets by the amount of the premium. These assets are no longer available to the retiree in the event of a catastrophic illness or other unexpected major expense. To date, the demand for annuities has been low. There are many reasons for the low demand for annuities, but one of the most important has been that many potential annuity purchasers do not value the longevity insurance provided by annuities at its market price.

Retirees who choose not to purchase life annuities must decide how much to withdraw from their retirement accounts each year. Because they face uncertainty with respect to both life expectancy and the rate of return on investment, this decision carries its own risks. If withdrawals are too large, retirees risk spending down their savings too quickly, possibly leaving them impoverished. If withdrawals are too small, they might spend too little and leave substantial assets unspent when they die.

An analysis conducted by CRS indicates that under specific conditions there is a 95% or greater probability that a man who retires at age 65 will not exhaust his retirement account before the earlier of death or age 95 if his initial withdrawal does not exceed 5% of the account balance and later withdrawals are the same in inflation-adjusted dollars. Under the same conditions, there is a 95% or greater probability that a woman who retires at age 65 will not exhaust her retirement account before the earlier of death or age 95 if her initial withdrawal does not exceed 4.5% of the account balance and later withdrawals are the same in inflation-adjusted dollars.

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Introduction

The 78 million members of the "baby boom" generation are beginning to retire.[1] After many years of accumulating assets to spend in retirement, they now must decide how to convert these assets into a steady stream of income. Because of the trend away from defined benefit (DB) pensions to defined contribution (DC) plans—such as 401(k) plans—future retirees will be less likely to have a guaranteed stream of income from defined benefit pensions. Furthermore, while Social Security will provide a guaranteed income to most retirees, it will replace only a relatively small proportion of their pre-retirement income.[2] As a result of these trends, many future retirees will rely greatly on their savings to finance their consumption during retirement.

A retiree who is deciding how to convert wealth into retirement income will have to balance many risks. Increases in average life expectancy will mean that future retirees will have to ensure that their wealth will last through a retirement that could span 30 or 40 years. Increased volatility in equity markets, the effects of inflation on purchasing power, and the possibility of substantial expenses for medical treatment and long-term care will further complicate this decision.

There are a number of ways to convert retirement wealth into income. One option is to purchase a life annuity from an insurance company. In exchange for payment of an initial premium, a life annuity pays a guaranteed income throughout retirement, regardless of how long the purchaser lives.[3] Life annuities represent only about 5% of individual annuities sold in the United States. Most annuities sold in the U.S. are deferred annuities, which are tax-deferred retirement savings accounts. At retirement, a deferred annuity can be converted to a life annuity; yet, relatively few deferred annuities are converted to life annuities. Likewise, most individuals who have accumulated retirement savings in 401(k) plans or individual retirement accounts (IRAs) choose to access these funds through lump-sum distributions or periodic withdrawals rather than by purchasing a life annuity.

There are many reasons why relatively few retirees choose to purchase a life annuity as a source of retirement income.[4] Among these reasons are that

- most retirees receive annuity income from Social Security;
- about one-third of retirees receive annuity income from defined benefit pensions;
- the fees charged by annuity providers can be high and the fee structure is not transparent;
- purchasing an annuity reduces the assets available to the retiree to meet unexpected expenses, and breaking the contract is costly; and

[1] The Bureau of the Census defines the baby boom as people born between 1946 and 1964.

[2] The Social Security Administration estimates that Social Security replaces about 55% of earnings for a career-long low-wage worker, 41% of earnings for a career-long median-wage worker, and 27% of earnings for a career-long high-wage worker.

[3] Life annuities are also sometimes called immediate annuities. This report uses these terms interchangeably.

[4] Some individuals choose not to spend assets because they wish to leave the assets as a bequest to their heirs. However, given that an individual chooses to spend some or all of his or her retirement savings, the relevant question for this analysis is why relatively few choose to do so by purchasing a life annuity.

- there have been instances of deceptive sales practices by some agents, many of whom receive large commissions for each sale.

Another option for converting retirement savings into income is to take periodic withdrawals from a retirement account. Some retirees attempt to "self-annuitize" by basing the amount of each periodic withdrawal from the account on their remaining life expectancies. Retirees who self-annuitize take on the responsibility of managing their investments and also the risk that they will live longer than average.

This report has two sections. The first section describes four kinds of risk that retirees face in retirement: longevity risk, investment risk, inflation risk, and the risk of large, unexpected expenses for medical care or long-term care. It then describes the basic features of life annuities and examines some of the reasons that the market for these annuities remains small, in spite of the protection that they provide against outliving one's retirement assets. The second section of the report describes various strategies for self-annuitizing and presents the results of an analysis that CRS conducted to estimate the probability that an individual who elects to self-annuitize would exhaust his or her retirement assets before death.

The Nature of Risk in Retirement

Decisions about how to draw down assets in retirement must take into account many risks. These include longevity risk (i.e., the risk that one will live beyond the average life expectancy), inflation risk, investment risk, and the risk associated with unexpected financial shocks from widowhood, divorce, medical care, or the need for long-term care services.

Longevity Risk

The U.S. population is living longer than previous generations. A man who reached age 65 in 1960 could expect to live another 13.0 years, while a woman who turned 65 in 1960 had a remaining life expectancy of 15.8 years. A man who reached age 65 in 2004 could expect to live another 17.1 years, while a woman who turned 65 in 2004 had a remaining life expectancy of 20.0 years.[5] Looking beyond the averages, more than one-fourth of women who reach age 65 are likely to live to age 90, and 12.4% are likely to live to age 95. One out of six men who attain age 65 will live to age 90, and an estimated 6% will live to age 95. (See **Table 1**). Individuals who underestimate the likelihood of living into very old age might spend their assets too quickly, depleting their savings while they still have many years to live. This could lead to a decline in their standard of living, and possibly to increased reliance on public assistance programs.

[5] U.S. National Center for Health Statistics, National Vital Statistics Report, *United States Life Tables, 2004*, Vol. 56(9), (Dec. 2007).

Table 1. Estimated Percentage of Individuals Age 65 in 2004 Surviving to Selected Ages

Surviving to Age	Total	Male	Female
75	66.6	60.3	72.7
80	53.9	46.5	61.0
85	38.3	30.6	45.4
90	22.2	15.9	27.8
95	9.4	5.8	12.4
100	2.5	1.3	3.5

Source: U.S. National Center for Health Statistics, National Vital Statistics Report, *United States Life Tables, 2004*, vol. 56(9), (December 2007).

Inflation Risk

As overall prices in the economy rise over time, the purchasing power of income declines unless income increases at the same rate that prices increase. Few pensions in the private sector provide regular cost-of-living increases. Data collected by the Department of Labor indicate that fewer than 5% of pensions in the private sector provide regular cost-of-living adjustments to retirees. Retirees must account for the potential impact of inflation on their investment portfolios as they decide how to draw down their retirement wealth.

Social Security is one of the few sources of retirement income that is fully inflation-indexed each year. Yet, even Social Security's annual cost-of-living adjustments may not fully protect retirement income from the effects of inflation. The annual cost-of-living adjustment for Social Security is based on the increase in the overall level of prices. Prices for some categories of expenditures that the elderly use at higher rates than younger consumers – such as health care – have been growing faster than overall prices. Over the period from 1980 to 2007, the average annual rate of inflation for goods and services averaged 3.5%, but prices for medical care rose at an average annual rate of 5.9%.[6] For those who have above-average out-of-pocket health care expenditures, these price increases can significantly reduce the amount of income available for other expenditures. In addition, Medicare Part B premium increases are tied to program cost increases which have historically exceeded growth in general inflation.[7] By 2025, these premiums are expected to equal over 50% of the average Social Security benefit, as compared to 27% in 2006.[8]

[6] From 1980 to 2007, the Consumer Price Index (CPI) for all goods and services rose from 82.4 to 207.3 while the CPI for medical care rose from 74.9 to 351.1. See Council of Economic Advisers, *Economic Report of the President, February 2008*, Table B-60, p. 295.

[7] See CRS Report RL33364, *The Impact of Medicare Premiums on Social Security Beneficiaries*, by Kathleen Romig,.

[8] CRS estimates based on data reported in CMS Office of the Actuary Memorandum, "Additional Information Regarding Comparisons of Beneficiary Income and Out-of-Pocket Costs For Medicare Supplementary Medical Insurance." March 25, 2008.

Investment Risk

Investment risk is the possibility that an individual's retirement assets might decline in value because specific stocks, bonds, or other assets depreciate. Diversification can reduce investment risk, because declines in the value of some assets are likely to be fully or partially offset by gains in the value of other assets. Stock and bond mutual funds, for example, help protect individuals from investment risk by purchasing securities from many companies in a variety of industries. In a mutual fund, investment losses from companies that are performing poorly may be offset by investment gains from companies that are performing well.

Investment risk includes market risk, which is the possibility that an individual's retirement assets will decline in value because of an overall decline in asset prices, as when the stock market falls. Even a well-diversified portfolio of stocks will not protect the value of an individual's retirement from depreciating if stock values fall across the board, as they have in 2008. Although a diversified portfolio can moderate investment risk, there have been extended periods of time when declines in the stock market and low interest rates resulted in negative returns on investment. For example, between 1929 to 2006 there were 14 ten-year periods of negative annual rates of return after adjusting for inflation. **Table 2** shows the five worst of those 14 ten-year periods. There have also been instances when negative rates of return spanned 15 years. Between 1966 and 1981, real rates of return on stocks averaged -0.4%, and the average annual real rate of return on short-term government securities was -0.2%.[9] Those who retire at the beginning of a period of negative returns could face significant reductions in retirement wealth.

Table 2. Annual Average Rate of Return Over 10-Year Period

(adjusted for inflation)

	Portfolio Mix	
Time Period	**65% Stocks/35% Bonds**	**65% Bonds/35% Stocks**
1968 to 1978	-4.3	-1.8
1972 to 1982	-4.0	-1.7
1964 to 1974	-3.9	-1.3
1971 to 1981	-3.8	-1.6
1938 to 1948	-3.6	-3.4

Source: CRS analysis of data from Ibottson Associates.

Unexpected Events

Unexpected events can adversely affect retirement income. These include losing a spouse through death or divorce, high medical expenses, and the need for long-term care services. According to a recent study by the Urban Institute, more than two-thirds of adults age 70 and older experienced at least one such financial shock over a nine-year period. Widowhood occurred among nearly

[9] Siegel, Jeremy J. *Stocks for the Long-Run*. 2nd ed. New York: McGraw-Hill. 1998.

one-third of married adults over age 70. The study found that widowhood was more likely to reduce women's wealth than men's wealth.[10]

Unexpected health care costs can also reduce retirement wealth. Although the majority of retirees are covered by Medicare, deductibles and co-payments can be significant for those who are seriously ill. Medicare provides only limited coverage for long-term hospital stays and nursing home care. A recent analysis of the Health and Retirement Survey found that 6% of households aged 75-84 paid more than 50% of their income for out-of-pocket medical expenses.[11] These costs can be especially high at the end of life when a surviving spouse may face large medical bills and an accompanying reduction in retirement income. A study in 2002 found that out-of-pocket costs for end-of-life medical expenses could average about $23,000 (adjusted to 2007 dollars).[12] While the introduction of Medicare Part D may offset some of these costs, even under this program an individual who is not eligible for a low-income subsidy could be responsible for more than $6,000 in copayments for prescription medicines in 2009.

Another potential economic shock is the cost of long-term care services.[13] It has been estimated that over two-thirds of individuals aged 65 and older will require long-term care services at some point in their lives. In 2008, the annual average cost of a nursing home stay is $68,255 for a semi-private room and $76,285 for a private room.[14] These costs greatly exceed the 2007 median income of $29,730 among households in which either the householder or householder's spouse was 65 or older.[15] Medicare does not cover extended stays in nursing homes, and Medicaid coverage generally is available only to individuals who are poor or become poor by spending down their assets on long-term care services.[16] For those who are not Medicaid-eligible and who have not purchased private long-term care insurance, long-term care costs must be paid out-of-pocket.

Annuities as a Source of Retirement Income

A life annuity – also called an immediate annuity – is an insurance contract that provides income payments on specified dates in return for an initial premium. Life annuities can help protect retirees against some of the financial risks of retirement, especially longevity risk and investment risk. Life annuities pay income to the purchaser for as long as he or she lives, and in the case of joint-and survivor annuities, for as long as the surviving spouse lives. In addition, some annuities

[10] Johnson, R., et al. "When the Nest Egg Cracks: Financial Consequences of Health Problems, Marital Status Changes, and Job Layoffs at Older Ages," *Urban Institute*, 2006.

[11] Jonathan Skinner, "Are You Sure You're Saving Enough for Retirement?" *Journal of Economic Perspectives*, 21(3), (Summer 2007), p. 59-80.

[12] Hoover, D., S. Crystal, R. Kumar, U. Sambamoorthi, and J. Cantor, "Medical Expenditures During the Last Year of Life: Findings from the 1992-1996 Medicare Current Beneficiary Survey," *Health Services Research*, 37(6), p. 1625-1642, 2002.

[13] Long-term care refers to a broad range of medical, personal, and supportive services needed by individuals who can no longer care for themselves due to physical or cognitive impairments.

[14] Genworth Financial 2008 Cost of Care Survey, April 2008.

[15] This median income is based on the 99% of households with any income. See CRS Report RL32697, *Income and Poverty Among Older Americans in 2007*, by Patrick Purcell.

[16] The Medicaid statute prohibits individuals from transferring their assets to others in order to qualify for Medicaid. The law also protects some of the income and assets of the community spouse of a nursing home resident so that he or she is not impoverished.

offer limited protection against inflation through annual increases. However, the annual increases must be paid for by accepting a lower initial monthly annuity income. Other annuities allow the purchaser to share in the investment gains from growth in equity markets as a way to offset the effects of inflation; however, such annuities also require the purchaser to share in the investment losses if markets fall.

Despite the potential advantages of annuities in reducing longevity risk and investment risk, life annuities continue to represent a small proportion of all annuities sold in the U.S. In recent years, deferred annuities – used as tax-deferred savings vehicles – have outsold life annuities by a ratio of almost 20 to 1.[17] As noted earlier, the irrevocable nature of annuity contracts appears to be an important factor in dissuading many retirees from purchasing life annuities. Although insurers have devised options to assure that the payments will continue after the purchaser's death – joint-and-survivor annuities, and term-certain annuities, for example – these options add to the cost of the annuity. Because of the projected increase in the number of older Americans over the next 20 years, and the concurrent increase in the potential market for life annuities, insurers are likely to continue to add features to their annuity products in an attempt to broaden their appeal to retirees.

The Current Market for Annuities

Annuities are either provided through employer-sponsored pension plans (the group market) or are purchased directly by individuals (the individual market).

Group Annuities

Annuities from defined-benefit pensions can protect retirees from investment risk and longevity risk. The benefit formula under most defined benefit pensions is based on the worker's years of service and final average salary. The individual's benefit does not vary with investment returns, nor does it decrease as a result of increases in average life-expectancy.[18] The employer that sponsors the plan bears both the investment risk and the longevity risk. If investment returns fall below expectations, or if the plan's actuaries project increases in life expectancy, the plan sponsor must provide additional funding to the plan to meet these costs. Since the mid-1980s, the proportion of workers who retire with a defined benefit pension has declined substantially. The number of workers participating in defined benefit pension plans fell from 26.9 million in 1985 to 20.6 million in 2006, a decline of 23%.[19]

Another reason for the decline in the number of workers retiring with an employer-sponsored annuity has been an increase in the number of defined benefit plans that offer the option of taking a lump-sum rather than an annuity. Of all those who are covered under a defined benefit plan, more than half are offered the choice between a lump sum and an annuity.[20] When offered this choice, many individuals choose the lump-sum option. According to a study by the Vanguard Group, only 40% of defined benefit plan participants who are offered a lump-sum choose to

[17] National Association of Variable Annuities, 2007 Factbook.

[18] Although annuity payouts vary depending on the age of retirement, these payouts are not tied to an individual's own life expectancy but rather that of a group of individuals.

[19] Pension Benefit Guaranty Corporation, *Pension Insurance Data Book, 2006*.

[20] Bureau of Labor Statistics, *2007 National Compensation Survey*.

receive an annuity.[21] Given these trends, the share of retirement income that will be guaranteed in the form of a defined benefit annuity is likely to decline in the future.

Individual Annuities

Annuities purchased directly from insurance companies or from insurance agents or brokers by individuals are called individual annuities. Two features that vary across individual annuities are the timing of payments and the rates of return.

Timing of Payments

Annuities can either be *deferred*, in that premiums are paid and assets are accumulated while the individual is working and payment of income is deferred until the worker retires, or *immediate*, in which a single premium is paid in exchange for lifelong stream of income that begins immediately.

A deferred annuity is similar to a savings account in which individuals can accumulate money over time. Investment earnings accrue on a tax-deferred basis. Deferred annuities represent nearly 95 percent of annuity sales. While individuals holding a deferred annuity can convert the funds into a guaranteed stream of income in retirement, most take a lump-sum payment or a series of periodic withdrawals.[22]

An immediate annuity provides a guaranteed monthly income for a specified period of time in exchange for a one-time premium payment. Income from an annuity can be either fixed or variable. Income from an annuity may be a received for specific number of years, as with a *term certain annuity*, for the life of the annuitant, as in a *single-life annuity*, or for the lives of both the annuitant and his or her spouse, as in a *joint and survivor annuity*. Under a joint and survivor annuity, the surviving spouse is eligible to receive income until he or she dies. The survivor benefit is typically 50%, 75%, or 100% of the income received while the annuity purchaser was living. As noted earlier, while immediate annuities can protect retirees from longevity risk and transfer the investment risk to the insurer, only 5% of individual annuities currently sold are immediate annuities.[23]

Table 3 shows some examples of monthly income from an immediate annuity. Most annuities purchased in the private sector provide different incomes for men and women. Men can purchase an annuity with a higher monthly income than women for the same premium because the average life expectancy of a man is lower than for a woman of the same age. The average lifetime values of the annuities for a man and woman of the same age would be equal. Employer-sponsored pension plans must offer unisex annuities to retirees.[24] Under a unisex annuity, a man would

[21] G. Mottola, and S. Utkus, "Lump Sum or Annuity? An Analysis of Choice in DB Pension Payouts," Vanguard Center for Retirement Research, vol. 30, November 2007.

[22] *National Association of Variable Annuities, 2007 Factbook.*

[23] *National Association of Variable Annuities, 2007 Factbook.*

[24] The United States Supreme Court ruled in 1983 that under federal civil rights statutes, employer-sponsored retirement plans cannot offer annuities that differentiate on the basis of gender. See *Arizona Governing Comm. v. Norris*, 463 U.S. 1073 (1983).

receive a lower monthly annuity income than he would get from a gender-based annuity, reflecting the higher average life expectancy of a group that includes both men and women. Likewise a woman would receive a higher monthly annuity income from a unisex annuity than she would receive would from a gender-adjusted annuity.

Table 3. Monthly Income By Gender and Joint/Survivor Option for Fixed Annuity With a $100,000 Premium, 2008

		Unisex	Male	Female
Age 60	Single Life	690	716	666
	Joint and Survivor	645	656	645
Age 65	Single Life	714	801	734
	Joint and Survivor	657	721	707
Age 70	Single Life	869	917	828
	Joint and Survivor	810	811	793

Source: Based on CRS Annuity Calculator. Assumes fixed real (inflation-adjusted) rate of return equal to historical average of 2.8%, and no added adjustments for adverse selection.

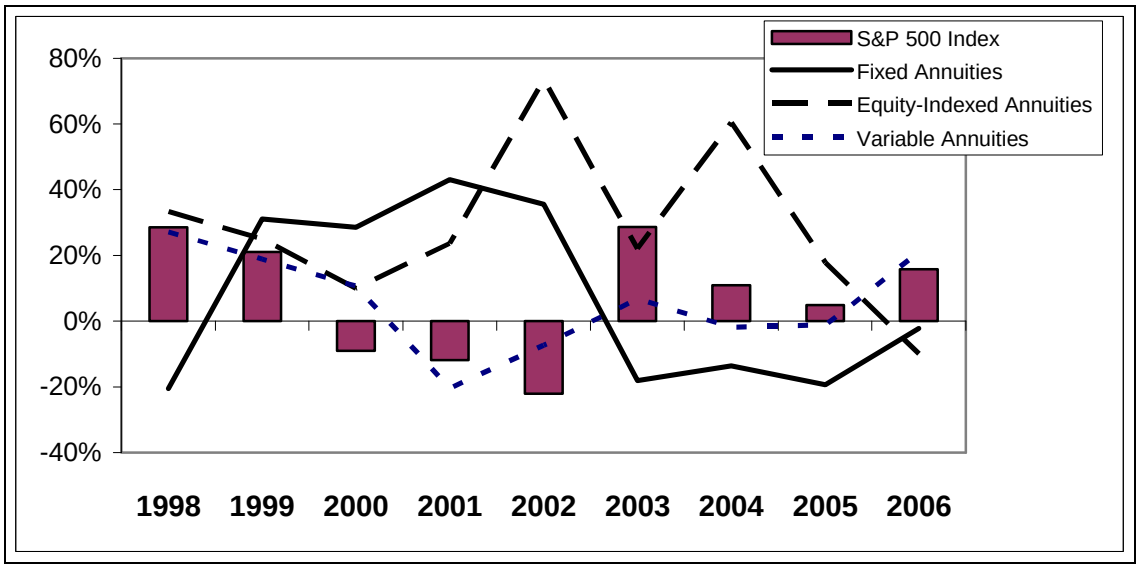
Rates of Return

Annuities are similar to other investment vehicles in that purchasers earn a rate of return on their premium investment. The rate of return on the annuity can be fixed, indexed, variable, or some combination of the three. The risk, regulation and fee structure varies across these different types of annuities.

A *fixed annuity* pays a fixed monthly payment for the term of the annuity. The amount of the monthly payment is determined at the time the annuity is purchased. The income that any given premium amount will purchase depends mainly on the age of the purchaser (and the age of the purchaser's spouse in the case of a joint and survivor annuity) and prevailing market interest rates for medium-term bonds at the time the annuity is purchased. In 2007, fixed annuities represented 22% of annuity sales.[25]

[25] *National Association of Variable Annuities, 2007 Factbook.*

Figure 1. Growth in Annuity Sales Relative to Growth in the S&P 500 Index



Source: CRS estimates based on data from National Association of Variable Annuity, 2007 Annuity Factbook. Data on growth in equity markets based on annual rate of return of S&P index reported by Ibbotson Associates.

A *variable annuity* offers annuity purchasers a choice of a wide range of investment options that can vary in value over time. The investment options can include stocks, bonds and money market portfolios. The monthly income provided by a variable annuity will fluctuate according to the investment performance of the funds in which the annuity premium is invested. Income from a variable annuity can decline if the investment underlying the annuity loses value. Some variable annuity policies offer limited protection against declines in value through a guaranteed minimum income. In 2007, the majority of annuity sales (67%) comprised variable annuities.[26]

An *equity-index* annuity earns a rate of return based on the performance of an equity index fund. Examples of equity indexes used include Dow Jones Industrial Average, Lehman Brothers Aggregate U.S. Index, and Standard and Poor's (S&P) 500 Composite Stock Price Index. If the underlying index declines, the income provided by the annuity will also decline. To reduce this risk, the insurer in some cases may provide a guaranteed minimum payment to protect the consumer against market fluctuations. This minimum, however, costs more to annuity purchasers by reducing their initial annuity income. In 2007, 11% of annuity sales were indexed annuities.[27]

The demand for each type of annuity is influenced by rates of return in equity markets. A strong equity market reduces demand for fixed annuities while a weak stock market increases demand for fixed annuities. During the strong equity market in late 1990s, growth in variable annuities sales exceeded growth in fixed annuity sales. By early 2000, when equity markets were earning negative rates of return, the demand for variable annuities fell. After 2000, growth in variable annuity sales dominated the market. (See **Figure 1**.)

[26] Ibid.

[27] *National Association of Variable Annuities, 2007 Factbook.*

Inflation Protection Options

Inflation-indexed annuities preserve the purchasing power of annuity income by providing a lifetime stream of income that increases with inflation. Treasury Inflation Protected Securities (TIPS) could be used as an investment vehicle by insurers that would like to offer inflation-indexed annuities, but few U.S. insurers offer such annuities. Potential purchasers have proven unwilling to accept a substantially lower initial payment in exchange for protection against inflation. Some insurers offer *graded annuities* that provide annual increases in payments, which are typically capped at 3%, but graded annuities do not fully protect against inflation that exceeds the annual cap.

Tax Treatment of Annuities

The taxation of an annuity differs between the accumulation phase and the payout phase. Deferred annuities receive favorable tax treatment in the accumulation phase. Returns on investment are not taxed in the year they are earned. During the payout phase, taxation of annuity income differs between payments taken as withdrawals and payments taken as a life annuity. In either case, annuity income is taxed at ordinary income tax rates rather than at capital gains tax rates.[28] The taxation of annuity income depends on whether the income is received as

- a single lump sum,
- a series of withdrawals that are not annuitized, or
- a life annuity (either variable or fixed).

When funds are withdrawn as a lump sum, the amount of the distribution that exceeds the amount the annuity owner invested is subject to taxation at the owner's ordinary income tax rate.[29] If money is taken out of the annuity in a series of withdrawals, each withdrawal is considered to consist of investment earnings until all investment gains have been withdrawn.[30] The taxation of annuity income is summarized in **Table 4**.

Taxation of Income from a Fixed Annuity

Each payment from a fixed annuity is treated as consisting partly of the investment gains, which are taxable, and partly as a return of principal, which is not taxable. The proportion of each payment that is excluded from taxable income is determined by dividing the amount that the individual paid into the annuity by the total amount that would be paid out over an average life

[28] The long-term capital gains tax rate, as enacted in the 2003 Jobs and Growth Tax Relief Reconciliation Act, is 15%. Annuity withdrawals are taxed at the marginal tax rate for ordinary income, which could be higher than the capital gains tax rates.

[29] Annuities purchased in the individual market are purchased with after-tax income. The amount of any distribution from an annuity that represents a return to the purchaser of his or her own premium payments is not taxed a second time.

[30] For example, if someone invested $25,000 in a deferred annuity and the value of the annuity when he or she begins to take withdrawals is $50,000, the first $25,000 withdrawn is taxable as ordinary income. The remaining $25,000 is not taxed because it is considered a return of principal to the purchaser.

expectancy, according to life tables published by the Internal Revenue Service. Each payment is multiplied by this ratio to determine the fraction of the annuity payment that is not subject to income taxes. For example, consider an individual who has paid a $100,000 premium for an immediate annuity at age 65. In November 2008, a 65 year-old male would receive monthly income of about $675 for a premium of $100,000. IRS life tables indicate that, on average, the purchaser will receive annuity payments for 20 years.[31] The total expected lifetime income from the annuity therefore would be $162,000.[32] The proportion of each payment that would be excluded from taxable income would be 100,000/162,000, or 61.7%. The other 38.3% percent of each payment would be subject to income taxes.

Taxation of Income from a Variable Annuity

With a variable annuity, income varies with the performance of the underlying investments. The amount of income from a variable annuity that is excluded from taxable income is computed by dividing the premiums paid for the annuity by the number of years that payments are expected to be made to the annuitant. For a life annuity, this would be the annuitant's life expectancy as determined using IRS tables. In the case of a 65 year-old who had paid a premium of $100,000, the amount of each monthly annuity payment that would be excluded from taxable income would be $416.[33]

Tax Exclusion for Long-Term Care Insurance

An exception to the taxation of annuity income was included in the Pension Protection Act of 2006 (P.L. 109-280). Beginning in 2010, withdrawals from annuity contracts that are used to pay for qualified long-term care insurance premiums are not subject to income tax. However, the investment in the annuity contract is reduced by the amount of the long-term care insurance premiums. This means that a larger percentage of the future income received from the annuity will represent investment gains and will be subject to income taxes.

Table 4. Tax Treatment of Annuities

Type of Account	Individual's Contributions	Investment Returns	Withdrawals
Deferred Annuity	After-tax	Tax-Deferred	Amounts in excess of contributions are taxed as ordinary income
Immediate Annuity	After-tax	Not applicable	Amounts in excess of contributions taxed as ordinary income
Defined Benefit Pension	Varies[a]	Tax-deferred	Amounts not previously included in taxable income taxed as ordinary income

Source: Congressional Research Service.

a. In the private-sector, employee contributions are rarely required. Federal employee pension contributions are made with after-tax income. Tax treatment of pension contribution by state and local employees varies by locality.

[31] See IRS Publication 939, *General Rule for Pensions and Ann*uities, Table 5, p 25.

[32] 675 x 12 x 20 = 162,000.

[33] In the IRS tables, the individual's life expectancy at 65 is 20 years, or 240 months. 100,000/240 = 416.

Consumer Protections and the Regulatory Environment

Consumer protections are intended to ensure that information used to sell an annuity is truthful, and that individuals who purchase an annuity fully understand the future consequences with respect to retirement income. The key challenge in the development and enforcement of consumer protections is that some annuity products are regulated exclusively at the state level while others are also regulated by federal agencies. Because state governments have primary jurisdiction over regulation of fixed annuities, there is wide variation in regulation across states. Further, while variable annuities are regulated by the federal Securities and Exchange Commission (SEC), equity-index annuities, which are designed to track the performance of a common stock index, such as the S&P 500 or the Russell 2000, are regulated primarily by the states.

State Regulation of Annuities

Like other insurance products, most annuities are regulated by the states. State laws govern the organization and licensing of insurance companies and their agents and state insurance departments oversee insurance company operations. These state laws and regulations also govern marketing and sales practices as well as insurer requirements.

To help guide states in their oversight efforts, the National Association of Insurance Commissioners (NAIC) has developed language for "model laws and regulations" to provide guidelines for legislators to modify and adopt in their respective states. The NAIC Model Act has not been uniformly adopted across states, thus leaving potential gaps in consumer protections. As of February 2008, 17 states have not adopted the NAIC model regulations on suitability.[34] The NAIC Model Suitability language requires insurance companies to give objective financial information to potential purchasers, and it requires agents to use a standardized form to determine whether an annuity would be suitable for the potential purchaser. Some state laws ban the use of professional designations or titles – such as Senior Financial Advisor – that might mislead senior consumers into thinking the advisor has special financial expertise related to the needs of older consumers.

A similar problem exists with respect to disclosure requirements in annuity contracts. The NAIC Annuity Disclosure Model Regulation requires certain information to be disclosed, including information about premiums and how they are charged, a summary of the options and restrictions for accessing money, and an outline of fees. According to the NAIC, 35 states have adopted the NAIC disclosure regulation.

The states also play a role in protecting annuity owners against the insolvency of annuity insurers. To do this, each state has a state guaranty association to provide a financial safety net for each line of insurance and to ensure that coverage continues if an insurer becomes insolvent. State laws require insurers to become members of the guaranty associations in every state in which they are licensed to do business. The actual coverage for annuity contracts varies from state to state, but cash values and annuity benefits are usually protected up to at least $100,000. However, coverage is not provided for variable annuity contracts. Variable annuity contracts are held in separate

[34] *American Council of Life Insurers*, "Life Insurers' Initiative to Improve the Annuity Sales Environment," Factsheet, February 2008.

accounts by insurers and they are protected from the general creditors of the insurance company in the event of insolvency. Although the Securities Investor Protection Corporation (SIPC) protects against fraud in variable annuity sales, it does not provide any relief to investors whose variable annuities decline due to falling prices in equity markets.

Federal Regulation of Annuities

Because the assets underlying variable annuities are invested in equities, they are also regulated by the federal government through the Securities and Exchange Commission (SEC). Equity-index annuities, which are based on market indexes, are now regulated by the SEC (see discussion below). Federal securities laws require certain disclosure documents, including a prospectus, to be given to investors. Certain disclosure documents must also be filed with the SEC. In addition, written marketing materials, such as advertisements, are subject to federal regulation.

Federal law prohibits agents who sell variable annuities from making untrue statements of material fact or failing to state a material fact that is necessary to prevent the statement from being misleading.[35] Annuity agents also have a fiduciary duty to provide full and fair disclosure of all material facts to their clients and their prospective clients, including all statements in advertising materials. Up until 2009, equity-index annuities were regulated by the states, rather then the SEC. To address this inconsistency in regulation between variable and equity-index annuities, the Securities and Exchange Commission has finalized regulations on January 16, 2009, that would extend federal securities laws with respect to full and fair disclosure and sales practice protections to certain equity-index annuities.[36]

Why Is Demand for Individual Annuities So Low?

Despite some of the potential advantages of individual life annuities, immediate annuities remain a small part of retirement assets held in the U.S. Of those who purchased immediate annuities in 2003, the median age of purchase was 70.[37] The Internal Revenue Code requires owners of individual retirement accounts to begin taking withdrawals from their accounts and including the withdrawals in their taxable income no later than April of the year in which they reach age 70½. Some owners of IRAs use immediate annuities to meet the requirement to take these "required minimum distributions" from their retirement accounts. Without this requirement, demand for annuities might even be lower.

There are several reasons why the demand for annuities is low despite the aging of the population. Some potential purchasers may already feel they have a sufficient amount of annuitized income from Social Security, and about a third of people 65 and older also have annuity income from defined benefit pensions. Another reason may be the amount and non-transparency of fees and expenses charged by insurance companies. Further, annuity contracts are not easily canceled, and many individuals fear that after purchasing an annuity they may later need a large sum of money to pay for unexpected expenses, such as long-term care or health

[35] Section 17(a) of the Securities Act of 1934, Section 10(b) of the Exchange Act and Rule 10b-5, and Section 206 of the Investment Advisors Act of 1940

[36] See CRS Report RS22974, *Annuities and the Securities and Exchange Commission Proposed Rule 151A*, by Baird Webel.

[37] M. Drinkwater, "Annuitization Study: Profiles and Attitudes," LIMRA International, 2003.

expenses. Even among people who understand that it is important to insure against longevity risk, some fear that they will die before reaching their normal life expectancy, and will end up "losing the bet" with the insurance company that sold the annuity. Finally, recent adverse publicity about deceptive sales practices in the annuity market has added to concerns among potential buyers of immediate annuities.

Complexity and Lack of Transparency in Annuity Expenses

Annuity providers impose a number of fees and expenses that are complex and are not transparent to the annuity purchaser. Even a rather "simple" prospectus identifying the various fees can be more than 50 pages long.[38]

Fees and expenses fall into three main categories: surrender charges, investment fees, and insurance charges. Fees and expenses vary depending on the type of annuity (fixed or variable). Both fixed and variable annuities have surrender charges, which are fees for cancelling the contract before a specified number of years have passed. A typical surrender charge starts at 7% of the premium in the first year of the contract and declines by 1% a year until it reaches zero. However, a few companies have surrender charges of up to 15% to 25% of the annuity premium.[39]

Variable annuities have two additional fees associated with managing assets. These are investment management fees and insurance charges. Investment management fees cover the cost of managing the different funds across investment accounts. Investment fees vary depending on the type of investment portfolio chosen. Insurance charges include administration, sales commissions, and mortality and expense charges. Mortality and expense charges average 1.15% of the average value of investment and cover three components of the insurance guarantee:

- Mortality premium or guarantee of income over one's lifetime;
- Death benefit to protect beneficiaries (also called survivor benefit); and,
- The cost of the minimum income guarantee.

These fees vary by product design. Typically, a fixed annuity with a joint and survivor option is subject to all three components. However, a variable annuity without a joint and survivor option and no minimum guarantee would only be subject to the mortality premium.

It is difficult for consumers to identify and understand each fee charged for an annuity. Each insurer has a different format for disclosing information. The insurance industry has recognized this problem and has begun to standardize fee disclosure. A group of insurance organizations is working to develop a simple, standardized disclosure document that presents information about fees in a consumer-friendly manner.[40]

[38] *Best's Review*, "Tis a Gift to be Simple: Complex Annuities Scare Off Both Buyers and Advisers, So the Industry is Offering Less Intimidating Products," April 1, 2006.

[39] Testimony of Minnesota Attorney General Lori Swanson Before the Senate Special Committee on Aging on "Advising Seniors About Their Money: Who is Qualified and Who is Not?" September 5, 2007.

[40] Members of this group include American Council of Life Insurers, National Association of Variable Annuities, National Association of Insurance and Financial Advisors, and the National Association of Independent Life Brokerage Agents.

Another factor affecting the cost of annuities is that people who buy annuities tend to be those who expect to live longer than average. A person who chooses to purchase an annuity may have information about his or her health, habits, or family history that the insurance company does not have regarding their risk of living longer than average. This phenomenon, called "adverse selection," leads to higher annuity premiums than insurers would otherwise have to charge if longevity risk were spread over the entire population. Estimates of the cost of adverse selection vary. Some studies have found that adverse selection reduces income to annuity purchasers by 4 cents to 10 cents per dollar of premiums paid.[41] A more recent study defined "potential annuitants" more narrowly to only include those with sufficient wealth to purchase an annuity. When re-defined in this manner, potential annuitants tend to live considerably longer than average and thus would receive a better deal from an annuity than the average person. According to this analysis, the impact of adverse selection on annuity prices is only about half as great as previously estimated, or about 2 cents to 5 cents per premium dollar.[42] If participation in individual annuities were broader, the effect of adverse selection would be reduced and annuitants' income would be higher.

Lack of Flexibility in Dealing with Unexpected Expenses

Once an individual purchases an immediate annuity, the decision is not easily reversible. Most states require a 10-day look back period during which a buyer can change his or her mind, but after this, canceling an annuity contract will result in substantial surrender charges. Part of the lack of flexibility in annuity contracts was recently addressed in the Pension Protection Act of 2006, which allows funds used to purchase an annuity to be withdrawn tax-free to buy long-term care insurance. It is important to note that long-term care insurance must be purchased well in advance of actually needing long-term care services. Annuity owners would have to make the decision to purchase long-term care insurance in the early years of the payout phase.

Dying Before Getting Full Value. Annuity buyers pay for the insurance component of the annuity, which guarantees a monthly income no matter how long the annuitant lives. Some people are reluctant to purchase an annuity out of fear that they will die before they get back the premiums that they paid into it. Joint and survivor annuities and term-certain annuities can assure that annuity payments will continue even if the purchaser dies earlier than he or she expected, but these options reduce the monthly payments that the annuitant receives while he or she is living.

Adverse Publicity and Lack of Knowledge About Annuities. Another factor affecting current demand for annuities may be adverse publicity surrounding false advertising and deceptive sales practices employed by insurance agents selling equity-index annuities. These practices may have led some consumers to avoid all annuity products. Equity-index annuities, however, currently account for only 11% of annuity sales. Further, recent proposals by the SEC to strengthen regulations for sales of equity-index annuities may help to alleviate consumers' concerns in the future.

[41] Mitchell, Olivia, James Poterba, Mark Warshawsky, and Jeffrey Brown, "New Evidence on the Money's Worth of Individual Annuities." *American Economic Review*, 89(5), 1999.

[42] Webb, Anthony. "Is Adverse Selection in the Annuity Market A Big Problem?" Issue Brief, Center for Retirement Research at Boston College, January 2006, Number 40.

Retirement Account Withdrawal Strategies

Although annuities offer protection from longevity risk and investment risk, relatively few people use their retirement savings to purchase an annuity. Most people choose instead to take periodic withdrawals from their retirement accounts. Individuals who purchase life annuities transfer the responsibility for managing assets and the risk of outliving their assets to an insurance company. In contrast, retirees who "self-annuitize" take on the responsibility of managing their investments and also the risk of living longer than average. Annuity purchasers, however, give up control over the assets that they use to purchase their annuities, while those who take periodic withdrawals have the money in their retirement accounts available to meet large, unexpected expenses that may arise during retirement.

For those who choose to take periodic withdrawals, there are two basic approaches to taking money out of their retirement accounts. The first approach attempts to "smooth" consumption over the period of retirement through equal (inflation-adjusted) withdrawals each year. This method provides a steady income from year to year, but as the examples presented in this report will illustrate, it can be difficult to choose a rate of withdrawal that can be sustained in the face of uncertain life expectancy and variable rates of return on investment. Another strategy for drawing down retirement assets is to take withdrawals that are based on the individual's remaining life expectancy in the year that each withdrawal is taken. This method of withdrawing money from a retirement account is prescribed by law for the *required minimum distributions* that all owners of traditional IRAs and retired owners of 401(k) accounts must begin taking after they reach age 70½ .[43] Under this approach, it is unlikely that the individual will exhaust his or her savings, but withdrawals can vary substantially from year to year. This can make planning and budgeting difficult.

An individual who chooses to take periodic withdrawals might want to have some idea how likely his or her chosen strategy is to succeed. The first step in such an assessment is to define success. Financial planners often advise clients that they should adopt a method of withdrawing retirement funds that will result in a high probability that their savings will last 30 to 40 years. Assuming that 40 years is a reasonable upper bound for the number of years that a retirement account might need to last, the next task for the retiree is to determine the minimum probability of success that he or she is willing to accept. There is no fixed standard for the minimum probability of success that a retiree should be willing to accept for the annual rate of withdrawal that he or she chooses. For purposes of illustration, we have highlighted in the tables that follow the combinations of initial withdrawal rates and investment allocations that resulted in an account balance lasting for a given number of years (or to a given age) in 95.0% or more of our simulations.

How Long Will a Retirement Account Last with Fixed Annual Withdrawals?

One way to evaluate the likely success of a withdrawal strategy is to determine the probability that the retiree's assets will last for at least a specific number of years, assuming that rates of

[43] See 26 U.S.C. §401(a)(9) and §408(a)(6) and CRS Report RL31770, *Individual Retirement Accounts and 401(k) Plans: Early Withdrawals and Required Distributions*, by Patrick Purcell.

return on investment will vary from year to year. To estimate this probability, CRS developed a model that estimates how long a sum of money will last, assuming a particular initial rate of withdrawal and the probable distribution of annual rates of return on investment. The model estimates the annual rate of return on investment through a Monte Carlo simulation process in which the rate of return in each year is based on the distribution of annual total returns on stocks and bonds over the 82 years from 1926 through 2007.[44] (See **Appendix A** for a description of Monte Carlo simulation processes.)

It is important to note that an annual rate of withdrawal that minimizes the risk of exhausting a retirement account – whether by delaying the initial withdrawal or by taking "small" annual withdrawals – will increase the likelihood that the account will have substantial assets remaining at the time of the owner's death. Delaying the initial withdrawal and taking relatively small withdrawals both help to preserve assets in the event that the individual outlives his or her normal life expectancy or experiences below-average rates of investment return. However, for the individual who lives to his or her normal life expectancy and experiences average rates of return on investment, the end result of successfully reducing the risk of exhausting his or her account may be a substantial unexpended account balance at the time of death.

Initial Rate of Withdrawal

CRS estimated the probability that assets would last for five periods of time ranging from 20 years to 40 years at five initial withdrawal rates ranging from 4.0% to 6.0% of the value of the account when the first withdrawal is taken. We chose this range of withdrawal rates because "a large body of research on 'safe' withdrawal rates for individuals has determined that a real withdrawal rate in the neighborhood of 4 percent of the initial retirement portfolio has a 'low' chance of running out of money,"[45] and because recent research has demonstrated that initial rates of withdrawal equal to 7.0% or more are very likely to exhaust the assets too rapidly.[46] In the estimates presented in the following tables, the withdrawal rate is stated as the percentage of the *initial* withdrawal from the account. Subsequent withdrawals are equal to the first withdrawal in constant (inflation-adjusted) dollars, but they may represent a different percentage of the remaining account balance.[47]

[44] We used the real annual rates of total return on the Standard and Poor's 500 index of common stocks (and its predecessor S& P index) and AAA-rated corporate bonds from 1926 through 2007 to represent the rates of return on investment. The Monte Carlo simulations were performed with Palisade Corporation's @RISK simulation software.

[45] J.J. Spitzer, J.C. Strieter, and S. Singh, "Guidelines for Withdrawal Rates and Portfolio Safety During Retirement," *Journal of Financial Planning*, vol. 20(10), (October 2007).

[46] Spitzer, Strieter, and Singh note that simulations of withdrawal rates of 7.0% or more of the account balance "invariably resulted in unnacceptable runout rates."

[47] This is mathematically equivalent to increasing an initial nominal withdrawal by the estimated annual rate of change in the consumer price index. As Spitzer, et al. (2007) note: "Some authors used nominal rates of return and then adjusted the withdrawals each year for inflation such that the withdrawal amount was the same amount in real terms. We chose to use real dollars throughout and avoid the annual inflation adjustment. The outcomes of either process should be the same irrespective of where the adjustment for inflation is made, whether in the withdrawal rate or in the rate of return earned by the investment."

Investment Portfolio

Many financial advisors recommend that retirees should keep 50% or more of their retirement savings invested in a diversified portfolio of stocks because stocks have historically achieved a higher long-run average rate of return than bonds. The higher long-run average rate of return on common stocks compared to bonds acts as a form of longevity insurance for the retiree. Generally, advisors recommend that the remainder of assets should be invested in bonds and money market securities that are less susceptible than stocks to large capital losses.

In our analysis, we simulated withdrawals from two portfolios. In one set of simulations, retirees allocated 65% of assets to the *Standard & Poor's 500* index of stocks and invested the remainder in AAA-rated corporate bonds. In the second set of simulations, retirees allocated 35% of assets to the *Standard & Poor's 500* index of stocks and invested the remainder in AAA-rated corporate bonds. In all of the simulations, withdrawals were taken at the beginning of each year. Accounts were re-balanced annually so that the portfolio would start each year at the chosen allocation between stocks and bonds. The model also took into account the correlation between annual returns on stocks and bonds.[48] The effects of account fees and income taxes were ignored for purposes of this analysis.[49]

Probability of Assets Lasting for at Least a Specific Number of Years

The data presented in **Table 5** illustrate the likelihood that savings will last for at least a given number of years under several initial rates of withdrawal and under the two investment portfolios described above. Panel 1 of **Table 5** shows the probability that a retirement account will last for at least a given number of years, assuming that 65% of the assets in the account are invested in stocks represented by the *Standard & Poor's 500* index and 35% of the assets are invested in AAA-rated corporate bonds. Panel 2 of **Table 5** shows the probability that savings will last for at least a given length of time, assuming that 35% of the assets are invested in stocks and 65% of the assets are invested in bonds.[50]

Portfolio of 65% Stocks and 35% Bonds

The results presented in **Table 5** indicate that at an initial withdrawal rate of 4.0%, there is a 98.5% probability that an account invested in this portfolio will last for at least 20 years. The longer the period of time over which withdrawals are taken, the lower the likelihood that a given rate of withdrawal will continue to be successful. At a 4.0% initial rate of withdrawal, there is a 92.5% chance that the account will last for 30 years or more, and an 86.8% chance that it will last for at least 40 years.

[48] Over the period from 1926 through 2007, the correlation coefficient for the real rates of return on the S&P 500 index and AAA-rated long-term corporate bonds was .236.

[49] In reviewing the literature on retirement account withdrawals, we found that research studies were about evenly divided between those that simulated the effects of fees and taxes and those that did not. Since the purpose of our analysis was to illustrate the effects of rates of withdrawal, rates of return on investment, and life expectancy on account balances, we decided to focus on these variables and ignore fees and taxes.

[50] For these simulations, the initial account balance was assumed to be $100,000; however, the results are independent of the initial balance and apply equally to other amounts.

For any given number of years, the likelihood of an account lasting for at least that length of time is lower for higher initial rates of withdrawal. While there is a 98.5% chance that an account will last for at least 20 years at a 4.0% initial rate of withdrawal, this probability drops to 94.1% for a 5.0% initial rate of withdrawal and to 84.2% for a 6.0% initial rate of withdrawal.

Portfolio of 35% Stocks and 65% Bonds

Panel 2 of **Table 5** shows the probability that a retirement account in which 35% of assets are invested in stocks and 65% of assets are invested in bonds would last for at least 20, 30, or 40 years. The results of the simulations indicate that for periods of time of 20 years or more, the likelihood of exhausting a retirement account is higher for an account with a 65% allocation to bonds compared to an account with a 65% allocation to stocks.

The likelihood that an account would last for at least 20 years is slightly higher for an account with a 65% allocation to bonds compared to an account with a 65% allocation to stocks. This result occurs because a portfolio that is more heavily invested in stocks has a greater chance than a portfolio mainly invested in bonds of experiencing a large capital loss. If this happens in the early years of retirement, the account may be depleted rapidly. Over longer periods of time, however, the probability of running out of money is substantially higher with a portfolio in which 65% of assets are invested in bonds compared to a portfolio in which 65% of assets are invested in stocks because of the lower expected average annual rate of return on bonds.

Table 5. Estimated Probability a Retirement Account Will Last for at Least a Specific Number of Years

Probability that Money Will Last:	Initial Annual Withdrawal from Retirement Account				
	4.0%	4.5%	5.0%	5.5%	6.0%
Panel 1: Investment Portfolio = 65% Stocks, 35% Bonds					
20 years or more	*98.5*	*96.9*	94.1	89.8	84.2
25 years or more	*95.7*	92.3	87.0	80.7	72.3
30 years or more	92.5	87.2	80.5	72.6	63.3
35 years or more	89.6	82.7	75.3	66.4	56.3
40 years or more	86.8	78.3	71.0	61.7	51.4
Panel 2: Investment Portfolio = 35% Stocks, 65% Bonds					
Probability that money will last:					
20 years or more	*99.7*	*98.9*	*96.4*	92.2	84.8
25 years or more	*97.7*	94.5	87.8	78.3	65.2
30 years or more	94.0	87.3	77.0	64.1	49.5
35 years or more	89.4	79.7	66.9	53.2	38.8
40 years or more	84.3	73.2	58.9	45.6	31.1

Source: Congressional Research Service.

Notes: Probabilities >= 95.0% are in italics.

Estimates Incorporating Life Expectancy

The estimates presented in **Table 5** illustrate the probability that a retirement account will last for at least a given number of years, assuming a particular initial rate of withdrawal, a specific allocation of investments between stocks and bonds, and the estimated annual rates of return on investment. These results are likely to underestimate the likelihood that a particular strategy will succeed because they do not account for individual mortality. Because not all account owners will live until the end of a fixed interval of time, the probability of an account having money in it at the *earlier* of either the account owner's death or the end of the interval is greater than the probability of the account having money in it at the end of the interval. To ignore the possibility of the account owner dying in any year will result in underestimating the probability that a particular rate of withdrawal will sustain the account throughout the owner's lifetime. As other researchers have noted, the relevant consideration in planning retirement withdrawals is "the probability of running out of money in the retirement life span, whether that span is shorter or longer than a predetermined number of years."[51]

Estimates of the likelihood that a retirement account will last for a particular number of years should include the probability that the account owner will survive for that number of years. This can be done by including in the model of retirement withdrawals the probability of the individual surviving from one year to the next. To incorporate the effect of mortality on the probability that a retiree will exhaust his or her retirement account before the earlier of either the retiree's death or the attainment of a particular age, CRS added two variables to its model. One variable accounts for the individual's age at retirement and in each succeeding year, and the other makes each annual withdrawal conditional on the individual having survived from one year to the next.[52] The probability of survival from year to year was based on male and female life expectancies taken from cohort life tables.[53] An individual's withdrawal strategy was considered to have been successful if there was a 95.0% or higher probability that he or she had a positive account balance in the year of death or, if still living, at the ages of 80, 85, 90, 95, and 100.

Table 6, Table 7, and **Table 8** show the estimated probabilities that the retirement accounts of men and women who retire at ages 60, 65, or 70 will last until the ages of 80, 85, 90, 95, and 100, taking into account the probability of the individual dying in each year.[54] The initial withdrawal rates range from 4.0% to 6.0% and subsequent withdrawals are assumed to be equal in real value

[51] R.G. Stout and J.B. Mitchell, "Dynamic Retirement Withdrawal Planning, *Financial Services Review*, vol. 15(2), (Summer 2006). The authors further note that, "by incorporating the uncertain retirement life span, [a model of phased withdrawals] generates a more meaningful probability of financial ruin." Stout and Mitchell's analysis looked at one portfolio consisting of 65% stocks and 35% bonds, and their estimates were based on a unisex life expectancy table. CRS tested two portfolios, one of 65% stocks and one of 35% stocks, and we used separate life expectancy tables for men and women.

[52] In each simulation, the individual's probability of having died between age x and age x+1 was compared to a random number generated by the model. If the random number was greater than the probability of having died, the simulation continued for another year. If the random number was lower than the probability of death, the simulation stopped.

[53] Male and female life expectancies at each age were taken from "United States Life Tables, 2004," *National Vital Statistics Reports*, vol. 56(9), U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, (December 2007), available at http://www.cdc.gov/nchs/data/nvsr/nvsr56/nvsr56_09.pdf.

[54] Relatively few people take withdrawals from retirement accounts before age 60 because withdrawals from a traditional IRA or a 401(k) plan taken before age 59½ are subject to a 10% additional tax except for certain situations defined in law at 26 U.S.C. §72(t). Section 401(a)(9) of the Internal Revenue Code requires owners of traditional IRAs and retired owners of 401(k) plans to start taking distributions after they reach age 70½.

(i.e., adjusted for inflation) to the initial withdrawal.[55] The tables show the estimated probabilities of success for two portfolios. In one portfolio, 65% of assets are invested in stocks and 35% in bonds, and in the other portfolio, 65% of assets are invested in bonds and 35% in stocks.

The data presented in **Table 6** show the estimated probabilities of a retirement account lasting until ages 80, 85, 90, 95, and 100 for men and women retiring at age 60. **Table 5** showed that at a 4.0% initial rate of withdrawal from an account invested 65% in stocks and 35% in bonds, there is a 98.5% chance that a retirement account will last for at least 20 years. The results presented in **Table 6**show that under the same set of assumptions, but incorporating the effects of mortality, a man retiring at 60 has a 99.1% chance that his retirement account will last until at least age 80, while for a woman retiring at age 60 there is a 98.9% chance that her account will last until at least age 80. In this case, the probabilities are almost equally high in both **Table 5** and **Table 6**, and there is little difference in the probabilities of success between and women. Both of these results change for the probability of success at later ages.

Table 5 showed that at a 4.0% withdrawal rate, the probability of a retirement account lasting for at least 30 years was 92.5%. The data in **Table 6** show that once the effects of mortality are taken into consideration, there is a 97.3% chance that a man who retires at 60 and takes an initial withdrawal of 4.0%, will still have some money in the account at age 90, while a woman retiring at age 60 and taking an initial withdrawal of 4.0% has a 96.1% chance of still having money in her account on her 90th birthday. The probability that a woman will still have money in her account at any given age is lower than the probability for a man because a woman has a higher probability of having survived to that age. (See **Appendix B**.)

In simulations representing retirement at age 60, a withdrawal rate of 4.0% was successful in 95.0% or more of simulations for both men and women under both investment portfolios at all ages up to 100. (See **Table 6**.) A withdrawal rate of 6.0% failed to achieve a 95.0% success rate for either men or women under either investment portfolio even just to age 80. For both men and women retiring at age 60, a withdrawal rate of 5.0% or higher carries a high risk that their retirement accounts will be exhausted before they have attained their normal life expectancies.

Table 7 and **Table 8** show that, compared to retiring at age 60, delaying retirement until 65 or 70 can substantially increase the likelihood that an individual will not exhaust his or her retirement account before he or she dies. In simulations representing retirement at age 65, withdrawal rates of 4.0% and 4.5% were successful in 95.0% or more of simulations for both men and women under both investment portfolios at all ages up to 100. (See **Table 7**.) A withdrawal rate of 6.0% achieved a 95.0% success rate under either investment portfolio for both men and women only up to age 80. For men who retire at age 65, a withdrawal rate of 5.5% or higher carries a substantial risk that their retirement accounts will be exhausted if they live to age 90 or older. For women who retire at age 65, a withdrawal rate of 5.0% or higher carries a substantial risk that their retirement accounts will be exhausted if they live to age 90 or older.

In simulations representing retirement at age 70, withdrawal rates of 4.0%, 4.5%, and 5.0% were successful in 95.0% or more of simulations for both men and women under both investment portfolios at all ages up to 100. (See **Table 8**.) A withdrawal rate of 5.5% was successful up to age

[55] As with the estimates shown in Table 5, for the results presented in Table 6, Table 7, and Table 8, the initial account balance was assumed to be $100,000, but the results are independent of the initial balance and would also apply to other initial account balances.

100 in 94.7% or more of cases for men under either investment portfolio, but succeeded in 95.0% or more of cases only to age 90 for women. For men who retire at age 70, a withdrawal rate of 6.0% or higher carries a substantial risk that their retirement accounts will be exhausted if they live to age 95 or older. For women who retire at age 70, a withdrawal rate of 5.5% or higher carries a substantial risk that their retirement accounts will be exhausted if they live to age 95 or older.

Table 6. Probability of Retirement Account Lasting to at Least a Given Age, Including Mortality Risk, Retirement at Age 60

Probability that Money Will Last at Least Until:	Initial Annual Withdrawal from Retirement Account				
	4.0%	4.5%	5.0%	5.5%	6.0%
Panel 1: Male Retiring at Age 60, Portfolio = 65% Stocks, 35% Bonds					
Age 80	*99.1*	*98.1*	*96.4*	93.5	89.8
Age 85	*98.1*	*96.3*	93.2	89.6	84.8
Age 90	*97.3*	*95.0*	91.4	87.3	82.6
Age 95	*97.0*	94.4	90.6	86.4	81.9
Age 100	*96.9*	94.3	90.5	86.3	81.7
Panel 2: Male Retiring at Age 60, Portfolio = 35% Stocks, 65% Bonds					
Age 80	*99.8*	*99.4*	*98.1*	95.1	90.8
Age 85	*99.1*	*97.6*	94.1	89.1	82.5
Age 90	*98.1*	*95.8*	91.4	85.6	78.6
Age 95	*97.7*	*95.0*	90.4	84.3	77.1
Age 100	*97.5*	94.8	90.1	84.1	76.9
Panel 3: Female Retiring at Age 60, Portfolio = 65% Stocks, 35% Bonds					
Age 80	*98.9*	*97.8*	*95.5*	92.7	88.3
Age 85	*97.5*	*95.6*	91.6	87.0	81.7
Age 90	*96.1*	93.6	89.0	83.7	78.3
Age 95	*95.5*	92.8	87.7	82.5	77.0
Age 100	*95.3*	92.6	87.4	82.2	76.6
Panel 4: Female Retiring at Age 60, Portfolio = 35% Stocks, 65% Bonds					
Age 80	*99.7*	*99.2*	*97.5*	94.4	88.6
Age 85	*98.4*	*96.7*	92.8	86.9	77.7
Age 90	*96.9*	94.3	88.2	81.2	71.7
Age 95	*96.1*	92.8	86.1	78.9	69.4
Age 100	*95.7*	92.3	85.4	78.4	69.0

Source: Congressional Research Service.

Notes: Probabilities >= 95.0% are in italics.

Table 7. Probability of Retirement Account Lasting to at Least a Given Age, Including Mortality Risk, Retirement at Age 65

Probability that Money Will Last at Least Until:	Initial Annual Withdrawal from Retirement Account				
	4.0%	4.5%	5.0%	5.5%	6.0%
Panel 1: Male Retiring at Age 65, Portfolio = 65% Stocks, 35% Bonds					
Age 80	*99.9*	*99.7*	*99.3*	*98.6*	*96.9*
Age 85	*99.3*	*98.4*	*97.3*	*95.1*	91.9
Age 90	*98.7*	*97.0*	*95.5*	92.6	88.5
Age 95	*98.3*	*96.4*	94.8	91.6	87.3
Age 100	*98.1*	*96.2*	94.6	91.4	87.1
Panel 2: Male Retiring at Age 65, Portfolio = 35% Stocks, 65% Bonds					
Age 80	*>99.9*	*>99.9*	*>99.9*	*99.6*	*98.7*
Age 85	*99.8*	*99.5*	*98.5*	*96.6*	92.5
Age 90	*99.3*	*98.2*	*96.2*	92.8	87.3
Age 95	*98.9*	*97.4*	*95.0*	91.3	85.5
Age 100	*98.7*	*97.1*	94.6	90.9	85.1
Panel 3: Female Retiring at Age 65, Portfolio = 65% Stocks, 35% Bonds					
Age 80	*99.9*	*99.7*	*99.1*	*98.2*	*97.0*
Age 85	*99.0*	*98.1*	*96.3*	93.8	90.9
Age 90	*97.8*	*96.3*	93.5	89.7	86.0
Age 95	*97.1*	*95.5*	92.2	87.8	83.9
Age 100	*96.9*	*95.1*	91.8	87.4	83.4
Panel 4: Female Retiring at Age 65, Portfolio = 35% Stocks, 65% Bonds					
Age 80	*>99.9*	*>99.9*	*99.9*	*99.5*	*98.3*
Age 85	*99.9*	*99.2*	*98.1*	*95.5*	90.9
Age 90	*99.1*	*97.3*	94.3	90.1	82.9
Age 95	*98.3*	*95.7*	92.1	87.3	79.6
Age 100	*98.0*	*95.2*	91.2	86.4	78.8

Source: Congressional Research Service.

Notes: Probabilities >= 95.0% are in italics.

Table 8. Probability of Retirement Account Lasting to at Least a Given Age, Including Mortality Risk, Retirement at Age 70

Probability that Money Will Last at Least Until Age:	Initial Annual Withdrawal from Retirement Account				
	4.0%	4.5%	5.0%	5.5%	6.0%
Panel 1: Male Retiring at Age 70, Portfolio = 65% Stocks, 35% Bonds					
Age 80	*>99.9*	*>99.9*	*>99.9*	*99.9*	*99.9*
Age 85	*>99.9*	*99.8*	*99.4*	*98.5*	*97.9*
Age 90	*99.7*	*99.0*	*98.1*	*96.2*	94.5
Age 95	*99.4*	*98.4*	*97.4*	*95.0*	92.9
Age 100	*99.3*	*98.1*	*97.1*	94.7	92.6
Panel 2: Male Retiring at Age 70, Portfolio = 35% Stocks, 65% Bonds					
Age 80	*>99.9*	*>99.9*	*>99.9*	*>99.9*	*>99.9*
Age 85	*>99.9*	*>99.9*	*99.9*	*99.6*	*99.0*
Age 90	*99.9*	*99.7*	*98.9*	*97.6*	*95.2*
Age 95	*99.6*	*99.1*	*97.7*	*95.6*	92.4
Age 100	*99.5*	*98.8*	*97.2*	*95.1*	91.7
Panel 3: Female Retiring at Age 70, Portfolio = 65% Stocks, 35% Bonds					
Age 80	*>99.9*	*>99.9*	*>99.9*	*>99.9*	*99.9*
Age 85	*99.9*	*99.7*	*99.4*	*98.6*	*97.7*
Age 90	*99.5*	*98.6*	*97.4*	*95.2*	93.1
Age 95	*98.8*	*97.6*	*95.9*	93.3	90.6
Age 100	*98.5*	*97.2*	*95.3*	92.6	89.9
Panel 4: Female Retiring at Age 70, Portfolio = 35% Stocks, 65% Bonds					
Age 80	*>99.9*	*>99.9*	*>99.9*	*>99.9*	*>99.9*
Age 85	*>99.9*	*99.9*	*99.9*	*99.6*	*99.0*
Age 90	*99.9*	*99.4*	*98.5*	*96.5*	93.2
Age 95	*99.4*	*98.4*	*96.6*	93.4	88.7
Age 100	*99.1*	*97.9*	*95.7*	92.3	87.6

Source: Congressional Research Service.

Notes: Probabilities >= 95.0% are in italics.

Estimates of Variable Annual Withdrawals

The estimates shown in **Table 5, Table 6, Table 7,** and **Table 8** are based on simulations of a withdrawal strategy that produces annual income of a constant real (inflation-adjusted) amount. The individual takes an initial annual withdrawal equal to a particular percentage of the account balance, and all subsequent withdrawals are equal to the real value of the initial withdrawal. In

this respect, the withdrawal strategy mimics an inflation-indexed annuity by providing a steady annual income.[56] However, an individual who self-annuitizes must, in effect, insure against his or her own longevity by holding substantial "reserves" in the account to protect against the possibility of outliving his or her savings. Because insurers diversify the risk of longevity over all annuity purchasers, they are able to pay a higher annual income than an individual who self-annuitizes could safely withdraw from his or her account. Taking withdrawals from a retirement account that are equal to the amount that would be paid by an annuity purchased from an insurance company exposes the retiree to the risk of outliving his assets.[57]

If a retiree is willing to allow the amount withdrawn from the account to vary from year to year based on investment returns and remaining life expectancy, he or she can reduce the likelihood of fully depleting the account before dying. The trade-off for reducing this risk is that the individual's annual income will be less predictable. This can make planning and budgeting more difficult. One such strategy bases each annual withdrawal on the current account balance and the individual's remaining life expectancy.[58] This withdrawal rule is mandated under the Internal Revenue Code for owners of traditional IRAs and retired owners of 401(k) plans after they attain age 70½ "to ensure that retirees consume their tax-qualified retirement pension accounts instead of leaving them as bequests for their heirs."[59]

Table 9, **Table 10**, and **Table 11** show how annual withdrawals that are based on the individual's remaining life expectancy in the year that the withdrawal is taken can vary over the course of the person's retirement. **Table 9** illustrates the variability of withdrawals for a man and a woman each of whom retires at age 60 with an account balance of $100,000. **Table 10** and **Table 11** show withdrawals for men and women who retire at ages 65 and 70, respectively, also with initial account balances of $100,000.[60] In 2004, a 60 year-old man had a remaining life expectancy of 20.8 years and a woman had a remaining life expectancy of 24.0 years.[61] Under the $1/E(t)$ withdrawal rule, the 60 year-old man would withdraw 1/20.8 (4.8%) of his account balance and the 60 year-old woman would withdraw 1/24.0 (4.2%) of her account. One year later, the 61 year-old man would have a remaining life expectancy of 20.0 years and would withdraw 1/20.0 (5.0%) of his account balance. The 61 year-old woman would have a remaining life expectancy of 23.2 years and would withdraw 1/23.2 (4.3%) of her account balance. As the retiree ages, his or her remaining life expectancy falls, and the percentage of the account that he or she withdraws rises. At age 75, for example, a man has a remaining life expectancy of 10.7 years and so he would withdraw 1/10.7 (9.3%) of his remaining account balance. A 75 year-old woman has a remaining life expectancy of 12.8 years and would withdraw 1/12.8 (7.8%) of her remaining account balance.

[56] Most annuities are not adjusted for inflation, and the income therefore declines in value over time.

[57] Ivica Dus, Raimond Maurer, and Olivia Mitchell, "Betting on Death and Capital Markets in Retirement: A Shortfall Risk Analysis of Life Annuities Versus Phased Withdrawal Plans," *Financial Services Review*, vol. 14(3), (Fall 2005).

[58] In this method of withdrawing funds, the fraction withdrawn from the account each year is equal to 1/E(t), where E(t) is the person's remaining years of life expectancy at each age.

[59] Dus, Maurer, and Mitchell, *Financial Services Review*, (2005).

[60] The initial account balance is assumed to be $100,000 only for illustrative purposes. With a smaller initial balance, withdrawals would be smaller, but the relative variability of the withdrawals from year to year would be similar. Data from the Census Bureau indicate that 12.9 million households headed by persons aged 60 or older had a retirement account of some kind at year-end 2005, and that 4.6 million of these households (36%) had account balances of $100,000 or more.

[61] "United States Life Tables, 2004," *National Vital Statistics Reports*, vol. 56(9), (December 2007).

Under this method, annual withdrawals are a continually rising fraction of the remaining account balance, but the real dollar of value of the withdrawals may rise or fall from year to year, depending on the investment performance of the retirement account. In a "worst-case scenario" the aging retiree's withdrawals would be a rising fraction of a shrinking account balance. Although the retiree would not fully deplete the account—because the withdrawal is never equal to 100% of the remaining account balance—if the account shrinks in value due to a decline in asset values, the withdrawals could grow smaller from year to year.[62]

Withdrawals based on remaining life expectancy will vary in size (measured here in constant dollars) from year to year. For example, the top panel of **Table 9** shows the range of withdrawals taken between the ages of 60 and 100 by a man who retires at age 60 with an account balance of $100,000. Across 10,000 simulations, the typical male retiree could expect his annual withdrawals to range from $4,465 to $9,160 with an average withdrawal of $6,394. In 5% of the simulations, however, the *smallest* annual withdrawal was $1,409 or less, and in 5% of the simulations, the *largest* withdrawal was $22,803 or more. A woman with the same portfolio retiring at age 60 could expect her annual withdrawals to range from $3,940 to $9,729 with an average withdrawal of $6,342. (See Panel 3 of **Table 9**. In 5% of the simulations, the smallest annual withdrawal was $1,530 or less, and in 5% of the simulations, the largest withdrawal was $25,968 or more.

Panels 2 and 4 of **Table 9** show that when the simulations were based on a portfolio in which 65% of assets were invested in bonds and 35% invested in stocks, the average withdrawal was smaller than in the case of the more stock-heavy portfolio. The typical male retiring at 60 with a $100,000 portfolio invested 65% in bonds and 35% in stocks could expect his annual withdrawals to range from $4,491 to $7,370 with an average withdrawal of $5,734. (Again, all amounts are in constant dollars.) In 5% of all the simulations, however, the smallest annual withdrawal was $1,100 or less, and in 5% of the simulations, the largest withdrawal was $13,184 or more. A woman with the same portfolio who retires at age 60 could expect her annual withdrawals to range from $3,985 to $7,465, with an average withdrawal of $5,516. (See Panel 4 of **Table 9**.) In 5% of all the simulations, the smallest annual withdrawal was $1,349 or less, and in 5% of the simulations, the largest withdrawal was $14,460 or more.

For individuals who retire at age 65 or at age 70, average annual withdrawals will be higher than for those who retire at 60 because they will be based on shorter remaining life expectancies. **Table 10** shows the estimated range of withdrawals taken between the ages of 65 and 100 by men and women who retire at age 65 with initial account balances of $100,000. **Table 11** shows the estimated range of withdrawals taken between the ages of 70 and 100 by men and women who retire at age 70 with initial account balances of $100,000.[63]

For a man retiring at age 65 with an initial account balance of $100,000 of which 65% is invested in stocks and 35% is invested in bonds, annual withdrawals could be expected to range from $5,284 to $9,103 with an average withdrawal of $6,861. (See Panel 1 of **Table 10**.) In 5% of the

[62] As an example, consider a man age 85 with $25,000 in an account that loses 10% in value each year for three consecutive years. At age 85, he withdraws 1/7.2 (13.9%) of $25,000, or $3,468. One year later, he withdraws 1/6.8 (14.8%) of $19,379 or $2,864. The next year, he withdraws 1/6.3 (15.8%) of $14,864 or $2,343. The following year he withdraws 1/5.9 (16.9%) of $11,269 or $1,896. If the account earns a positive rate of return, the withdrawals could increase or decrease in size, depending on the rate of investment return.

[63] For easier comparison, the initial balance is assumed to be $100,000 in all cases, although an individual who delays retirement until age 65 or 70 might accumulate a larger balance.

simulations, however, the smallest annual withdrawal was $1,460 or less and in 5% of the simulations the largest withdrawal was $19,513 or more. A woman with the same portfolio retiring at age 65 could expect her annual withdrawals to range from $4,653 to $9,293 with an average withdrawal of $6,582. In 5% of the simulations, the smallest annual withdrawal was $1,554 or less, and in 5% of the simulations, the largest withdrawal was $22,126 or more.

For a man retiring at age 70 with an initial account balance of $100,000 of which 65% is invested in stocks and 35% is invested in bonds, annual withdrawals could be expected to range from $6,241 to $9,552 with an average withdrawal of $7,606. (See Panel 1 of **Table 11**.) In 5% of the simulations, however, the smallest annual withdrawal was $1,412 or less, and in 5% of the simulations, the largest withdrawal was $17,822 or more. A woman with the same portfolio retiring at age 70, could expect her annual withdrawals to range from $5,504 to $9,282 with an average withdrawal of $7,083. In 5% of the simulations, the smallest annual withdrawal was $1,519 or less, and in 5% of the simulations, the largest withdrawal was $19,314 or more.

Table 9. Variable Annual Withdrawals Based on Life Expectancy, Retirement at Age 60

(account balance at age 60 = $100,000)

	Annual Withdrawal Based on Remaining Life Expectancy		
	5th Percentile	Median	95th Percentile
Panel 1: Male Retiring at Age 60, Portfolio = 65% Stocks, 35% Bonds			
Smallest withdrawal	1,409	**4,465**	4,818
Mean withdrawal	3,857	**6,394**	12,781
Largest withdrawal	4,818	**9,160**	22,803
Panel 2: Male Retiring at Age 60, Portfolio = 35% Stocks, 65% Bonds			
Smallest withdrawal	1,100	**4,491**	4,818
Mean withdrawal	3,978	**5,734**	8,845
Largest withdrawal	4,818	**7,370**	13,184
Panel 3: Female Retiring at Age 60, Portfolio = 65% Stocks, 35% Bonds			
Smallest withdrawal	1,530	**3,940**	4,168
Mean withdrawal	3,589	**6,342**	13,638
Largest withdrawal	4,378	**9,729**	25,968
Panel 4: Female Retiring at Age 60, Portfolio = 35% Stocks, 65% Bonds			
Smallest withdrawal	1,349	**3,985**	4,168
Mean withdrawal	3,729	**5,516**	9,061
Largest withdrawal	4,311	**7,465**	14,460

Source: Congressional Research Service.

Table 10. Variable Annual Withdrawals Based on Life Expectancy, Retirement at Age 65

(account balance at age 65 = $100,000)

	Annual Withdrawal Based on Remaining Life Expectancy		
	5th Percentile	Median	95th Percentile
Panel 1: Male Retiring at Age 65, Portfolio = 65% Stocks, 35% Bonds			
Smallest withdrawal	1,460	**5,284**	5,851
Mean withdrawal	4,331	**6,861**	12,146
Largest withdrawal	5,851	**9,103**	19,513
Panel 2: Male Retiring at Age 65, Portfolio = 35% Stocks, 65% Bonds			
Smallest withdrawal	1,146	**5,210**	5,851
Mean withdrawal	4,442	**6,270**	9,025
Largest withdrawal	5,851	**7,689**	12,572
Panel 3: Female retiring at Age 65, portfolio = 65% Stocks, 35% Bonds			
Smallest withdrawal	1,554	**4,653**	5,006
Mean withdrawal	4,044	**6,582**	12,761
Largest withdrawal	5,006	**9,293**	22,126
Panel 4: Female Retiring at Age 65, Portfolio = 35% Stocks, 65% Bonds			
Smallest withdrawal	1,233	**4,648**	5,006
Mean withdrawal	4,097	**5,901**	9,059
Largest withdrawal	5,006	**7,541**	13,303

Source: Congressional Research Service.

Table 11. Variable Annual Withdrawals Based on Life Expectancy, Retirement at Age 70

(account balance at age 70 = $100,000)

	Annual Withdrawal Based on Remaining Life Expectancy		
	5th Percentile	Median	95th Percentile
Panel 1: Male Retiring at Age 70, Portfolio = 65% Stocks, 35% Bonds			
Smallest withdrawal	1,412	**6,241**	7,285
Mean withdrawal	4,935	**7,606**	12,127
Largest withdrawal	7,285	**9,552**	17,822
Panel 2: Male Retiring at Age 70, Portfolio = 35% Stocks, 65% Bonds			
Smallest withdrawal	1,230	**6,172**	7,285
Mean withdrawal	5,029	**7,285**	9,694
Largest withdrawal	7,285	**8,511**	12,512
Panel 3: Female Retiring at Age 70, Portfolio = 65% Stocks, 35% Bonds			
Smallest withdrawal	1,519	**5,504**	6,164
Mean withdrawal	4,584	**7,083**	12,239
Largest withdrawal	6,164	**9,282**	19,314
Panel 4: Female Retiring at Age 70, Portfolio = 35% Stocks, 65% Bonds			
Smallest withdrawal	1,273	**5,479**	6,164
Mean withdrawal	4,661	**6,552**	9,365
Largest withdrawal	6,164	**7,978**	12,741

Source: Congressional Research Service.

Summary of Withdrawal Strategies: Balancing Risks

The uncertainties that retirees face with respect to both life expectancy and annual rates of return on investment make choosing a withdrawal strategy for their retirement accounts one of the most complicated financial decisions of their lives. The decision is even more complicated if retirement assets must be managed over the joint life expectancies of a couple. In light of these complex considerations, some analysts have suggested that "the withdrawal phase of retirement planning may well require more professional guidance and expertise than the accumulation phase."[64]

A retiree who wishes to achieve a predictable annual income can take annual withdrawals that are equal in inflation-adjusted dollars. An individual who chooses a rate of withdrawal that is too high risks spending down the account too quickly, possibly leaving the person impoverished. An individual who chooses a rate of withdrawal that is too low risks spending down the account too

[64] Stout and Mitchell, *Financial Services Review*, (2006). Another prominent economist has observed that "retiring employees are ill-equipped to set a sensible drawdown program on their own, especially in the current volatile environment." See the testimony of Shlomo Benartzi, Ph.D. before the House Committee on Education and Labor on October 22, 2008, at http://edlabor.house.gov/testimony/2008-10-22-ShlomoBenartzi.pdf.

slowly, unnecessarily reducing his or her consumption and leaving substantial assets unspent at death. On the other hand, the retiree can choose to take withdrawals that vary from year to year based on the current balance in the account and the retiree's remaining life expectancy. This strategy can result in highly variable annual income.

The results of the analysis that CRS conducted indicate that under certain conditions there is a 95.0% or greater probability a man who retires at age 65 will not fully deplete his retirement account before the earlier of his death or age 90 if his initial withdrawal does not exceed 5.0% of the account balance and if later withdrawals are equal to the first in inflation-adjusted dollars. Under the same conditions, there is a 95.0% or greater probability that a woman who retires at age 65 will not fully deplete her retirement account before the earlier of her death or age 90 if her initial withdrawal does not exceed 4.5% of the account balance and if later withdrawals are equal to the first in inflation-adjusted dollars. The results hold for both a portfolio invested 65% in stocks and 35% in bonds and for one invested 35% in stocks and 65% in bonds.

The weight that individuals assign to each of the risks they face in retirement will vary from person to person. No one withdrawal strategy will be optimal for everyone. Other researchers have noted that "overall ... there is no clearly dominant strategy, because all involve trade-offs between risk, benefit, and bequest measures, and individual preferences may vary."[65] One way to balance these risks would be to segregate one's retirement funds into two or more accounts and adopt different withdrawal strategies for each. Likewise, one might use some retirement assets to purchase an annuity while taking withdrawals from one or more accounts using one or more withdrawal strategies. Many retirees, however, will not have accumulated enough retirement savings to make these options practical.

[65] Dus, Maurer, and Mitchell, *Financial Services Review*, (2005).

Appendix A. What is "Monte Carlo" Analysis?

Monte Carlo analysis is a method of estimating the probable outcome of an event in which one or more of the variables affecting the outcome are random. The term was coined by mathematicians in the 1940s who likened probability analysis to studying the games of chance played in the casinos of Monte Carlo. One common use of Monte Carlo simulations is to illustrate how the variability of investment rates of return can affect the balances in a retirement account. The essence of a Monte Carlo estimation process is to simulate an event many times, allowing the random variable to vary according to its mathematical mean and variance. Each outcome is then ranked according to the likelihood of its occurrence. Using Monte Carlo methods, analysts can estimate not just the result that will occur "on average," but also the likelihood of results that are significantly above or below the average. In other words, Monte Carlo methods of estimation allow us to incorporate into our estimates the element of *risk*.

Monte Carlo estimation methods utilize not just the average value of a random variable, but also the distribution of values around the average. For example, rates of return in the stock market vary from year to year. The nominal rate of return on the *Standard & Poor's 500* index of stocks averaged 10.3% between 1926 and 2007, but annual rates of return varied widely around this average, producing a standard deviation of 20.0%. Likewise, while the nominal annual return on AAA-rated corporate bonds averaged 6.3% between 1926 and 2007, the standard deviation around this average was 7.0%.

To estimate the likely rate of return that an investment would achieve over a 40-year period, for example, Monte Carlo simulation software generates a rate of return for each year based on the distribution of probable rates of return, as derived from historical data. The program then simulates the 40-year period a second time, again generating a rate of return for each year from the probability distribution of rates of return. The process is repeated until the simulation is completed, and thousands of 40-year investment periods have been simulated. The results of the simulation—in this case, investment rates of return—are then ranked by percentiles. The model CRS used also accounted for the correlation between the rates of return on stocks and bonds and the effects of inflation on real annual returns.

In our simulation of a 40-year period in which 100% percent of assets were invested in common stocks, the mean real rate of return in 10,000 iterations (simulating a 40-year period 10,000 times) was 7.0%, which is the same as the actual mean real rate of return on common stocks in the period from 1926 through 2007. (1.103/1.0305 = 1.70) However, in 5% of those 10,000 iterations, the mean real rate of return over the 40-year period was 1.6% or less, while at the other extreme, in 5% of the 10,000 iterations, the mean real rate of return over the 40-year period was 12.4% or more. In terms of evaluating risk, these results imply an expected annual average real rate of return on common stocks over any given 40-year period of 7.0%, and a 90% probability that the average annual real rate of return over that period will be between 1.6% and 12.4%.

Appendix B. United States Life Tables, 2004

Table B-1. Life Expectancy at Each Age, in Years

Age	Men	Women
60	20.8	24.0
61	20.0	23.2
62	19.3	22.4
63	18.5	21.6
64	17.8	20.8
65	17.1	20.0
66	16.4	19.2
67	15.7	18.4
68	15.0	17.7
69	14.4	16.9
70	13.7	16.2
71	13.1	15.5
72	12.5	14.8
73	11.9	14.1
74	11.3	13.5
75	10.7	12.8
76	10.2	12.2
77	9.6	11.5
78	9.1	10.9
79	8.6	10.3
80	8.2	9.8
81	7.7	9.2
82	7.3	8.7
83	6.9	8.2
84	6.5	7.7
85	6.1	7.2
86	5.7	6.8
87	5.4	6.3
88	5.0	5.9
89	4.7	5.6
90	4.4	5.2
91	4.2	4.9
92	3.9	4.5
93	3.7	4.2

Age	Men	Women
94	3.4	3.9
95	3.2	3.7
96	3.0	3.4
97	2.8	3.2
98	2.6	3.0
99	2.5	2.8
100+	2.3	2.6

Source: U.S. Department of Health and Human Services, National Center for Health Statistics, *National Vital Statistics Reports*, vol. 56, no. 9, December 28, 2007, Tables 2 and 3.

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