Reorienting Retirement Risk Management

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Chapter 4

How Does Retirement Planning Software Handle Postretirement Realities?

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Good retirement planning and management requires building assets and deploying them well over a period of years. In the postretirement period, there are many potential risks requiring that assets be used to generate income under a range of uncertain outcomes. Retirement planning software offers individuals and advisors the opportunity to perform a range of calculations to help them in retirement planning. In this chapter, we first offer an overview of postretirement risks, including information on how they are perceived and understood by the public. Next we provide insights into how retirement planning software assists individuals and their advisors in evaluating these risks.[1]

The risks of retirement

A 2008 Society of Actuaries (SOA) study (2008*c*) identifies and describes 15 postretirement risks that span financial risks, changes in family status and needs, changes in housing needs, policy changes, and risks from bad advice, theft, and fraud. In this chapter, we focus on major financial risks, in as much as these are the risks analyzed by planning software. Over the period 2001–7, the evidence presented in the SOA study shows that pre-retirees have consistently been more concerned about risk than retirees. Furthermore, retirees have shown relatively little change in the level of concern about risk over the four risk surveys. By contrast, preretirees indicated growing concern from 2001 to 2003, but levels dropped back to 2001 levels by 2007. Rising concerns between 2001 and 2003 are believed to reflect a combination of the terrorist event in September 2001 as well as poor market conditions during that period (SOA 2008*c*). Top risk concerns over the full period include inflation as well as health and long-term care costs. Longevity is seen as a major risk concern by experts. These risks are discussed below.

Longevity risk

There are two sides to longevity risk: the problem of outliving one's assets and the problem of dying early and not providing adequately for dependent family members. Longevity can be predicted quite accurately in the aggregate for a group of people, but it is impossible to predict accurately for an individual. Table 4.1 shows the probability that one or both members of a couple, both of whom are initially aged 65, will live to ages 80, 90, and 100. Public attitudinal research shows that many people underestimate longevity risk – 40 percent underestimate population life expectancy by 5 years or more, and another 20 percent by 1–4 years (Cowell and Rappaport 2006).

   Family history and own health are the key factors used by retirees and those near retirement in estimating personal life expectancy, accounting for over 80 percent of the top considerations (Cowell and Rappaport 2006). It appears unlikely that most people understand the variability of longevity and have evaluated options for managing this risk. Some options include investment strategies that preserve principal, payout annuities with income guaranteed for the life of the survivor, and longer-term payouts without lifetime guarantees. The choice of a strategy for managing the payout period involves trade-offs between more versus less income, lifetime guarantees, availability of a bequest, and control of assets (Rappaport 2008). For lower- and lower-middle-income retirees, deferring retirement

TABLE 4.1 Probability of survival (%) from age 65 to 80, 90, and 100: status quo projections

	Female	Male	Both	One only
Panel 1: Probability of survival from age 65 in 2005				
To age 80	75.30	64.70	48.70	91.30
To age 90	37.00	23.50	8.70	51.80
To age 100	4.20	1.50	0.10	5.60
Panel 2: Probability of survival from age 65 in 2025				
To age 80	78.00	71.80	56.00	93.80
To age 90	41.20	29.80	12.30	58.70
To age 100	5.00	2.00	0.10	6.90
Panel 3: Probability of survival from age 65 in 2045				
To age 80	80.40	77.80	62.60	95.60
To age 90	45.30	36.20	16.40	65.10
To age 100	5.70	2.50	0.10	8.10

Note: Calculations are based on UP 1994 Tables projected.
Source: Cowell and Rappaport (2006:16).

and receipt of Social Security benefits is the most available strategy. The strategies that retirees cited as most common for managing longevity risk were elimination of consumer debt, paying off mortgages, trying to save as much as possible, and cutting back on spending (Cowell and Rappaport 2006). Most try to manage this risk themselves rather than insuring it (Cowell and Rappaport 2006). It appears that many individuals handling their own retirement assets will be unable to manage their resources so as to not outlive them, and financial advisors may not present a full range of options.

Inflation risk

Inflation risk was the top concern of retirees in 2007, with 57 percent very or somewhat concerned about inflation compared to 52 percent concerned about having enough money to pay for a long stay in a nursing home, and 51 percent concerned about having enough money to pay for adequate health care. Among preretirees, the corresponding levels of concern were 63, 63, and 69 percent, respectively (SOA 2008*c*). As with longevity, averages do not tell the story well. The United States experienced double-digit inflation in 1947, 1974, and 1979–81 (SOA 2008*b*).

Understanding and managing inflation risk requires better long-term thinking and understanding of the time value of money than many retirees have. Focus groups conducted with retirees having at least $100,000 of assets to manage indicated that many of them had a shorter-term focus, and did not factor in inflation, market volatility, or longevity risk when deciding if they could afford to retire (Greenwald, Bryck, and Sondergeld 2006: 6). Questions included in the 2004 Health and Retirement Study show very low levels of financial literacy among individuals at retirement ages. Only 18 percent of baby boomers were able to answer the following question correctly: 'Let's say you have 200 dollars in a savings account. The account earns 10 percent interest per year. How much would you have at the end of two years?' (Lusardi and Mitchell 2007).

Delaying receipt of Social Security benefits is a relatively easy way to increase inflation-indexed monthly income benefits, yet more than half of Americans take Social Security at the earliest claiming age. Treasury Inflation-Protected Securities (TIPS) and inflation-indexed annuities are strategies for investing to hedge inflation risk, but neither are commonly used. Many retirees have invested in housing and common stocks, but neither are good hedges against inflation as shown during 2008.

Investment risk

Also important are interest rate risk and stock market risk. Lower interest rates tend to reduce retirement income because workers need to save more to build up assets, retirees earn less income on investments such as certificates of deposit and bonds, reinvested income earns less, and annuities are more expensive when long-term interest rates are low. Stocks offer the potential for significant gain or loss, and have been a major source of investment of defined contribution (DC) plan assets. Experts disagree about the desirability of investing such assets in common stocks, and the lineup of opinions is likely to change after the global financial crisis of 2008 and beyond. In any event, individuals tend to overestimate future investment returns. One study found that 401(k) participants anticipated a 5-year average return of 10.9 percent from US equities, 8.1 percent returns on corporate bonds, 7.7 percent from money market funds, and 7.6 percent from stable-value funds (Sondergeld and Greenwald 2005: 21).

Research by the John Hancock Life Insurance Company has shown consistent misunderstanding of the features and characteristics of different investments. For example, when asked what money market funds include, only 9 percent correctly replied that a money market fund includes only short-term investments. Further, respondents believed that the stock of their employer was less risky than a diversified portfolio of stocks, and they did not understand the relationship between changes in interest rates and bond prices (SOA 2008*c*).

Health care and long-term costs

Paying for health and long-term care are consistently identified as top retirement risk concerns. It is interesting that these are ranked similarly, despite the fact that after age 65, Medicare pays for a substantial part of acute health care while there is no universal program to pay for long-term care services. Costs of both health care and medical care also vary greatly across individuals, with a few users accounting for a great deal of the cost.

Long-term care is a serious issue. As shown in Table 4.2, men aged 65 and older can expect to spend 1.5 years with mild or moderate disability on average, and 1.5 years with severe disability. For women, the anticipated periods of disability are 3.0 and 2.8 years. Most long-term care is provided by family members or friends at home, but long-term care may also be provided by paid caregivers at home, in nursing homes, in continuing care retirement communities, in assisted living facilities, and at adult care centers. For those with virtually no assets, Medicaid is a primary source of financing long-term care. Privately purchased long-term care insurance and private saving provide advance financing for the better-off. Relatively

TABLE 4.2 Expected periods of long-term care need and expected costs for long-term care

	Age	All	Healthy	Mild/moderate disability	Severe disability
Panel 1: Remaining life expectancy in years by age, sex, and disability status					
Male	65	15.3	12.3	1.5	1.5
	85	5.7	2.9	1.0	1.8
Female	65	19.4	13.6	3.0	2.8
	85	7.2	2.5	1.7	3.0

	All[a]	Users of long-term care services[b]
Panel 2: Estimated average lifetime costs of long-term care ($2,000)		
Male	29,000	127,000
Female	82,000	158,000

[a] 92% of these amounts are expected to be incurred during periods of severe disability.
[b] Highest lifetime costs average $300,000–750,000.
Source: Derived from SOA (2008*a*: 18, 20, 21).

few buy insurance; however, only 28 percent of retirees say they have purchased long-term care insurance, and 9 percent say they plan to, in the 2007 Risks and Process of Retirement survey (SOA 2008*c*). Seventeen percent of preretirees (age 45 and older) say they have purchased long-term care insurance, and 23 percent say they plan to. This survey provides higher positive responses compared to other sources.

Health care costs are much more likely to be covered by insurance than are long-term care costs. Virtually, all Americans aged 65 and over have Medicare coverage, and many purchase additional supplemental coverage. In the 2007 Risks and Process of Retirement survey, 61 percent of retirees say they have purchased supplemental health insurance or participate in an employer's postretirement health plan, and 14 percent say they plan to obtain coverage (SOA 2008*c*). Twenty-eight percent of preretirees (age 45 and older) indicate they have purchased supplemental health insurance or participate in an employer's health plan; 50 percent say they plan to do so. The most commonly cited strategy to protect against financial health shocks is to maintain healthy habits: 75 percent of retirees say they do this currently, and 23 percent say they plan to; among preretirees, 69 percent say they do now, and 29 percent say they plan to. Of course, as SOA (2008*a*: 8) notes, 'maintaining healthy lifestyle habits is an admirable goal, [but] in light of . . . increases in obesity, these high percentages may be more indicative of wishful thinking than tangible action.'

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Health spending varies greatly by individual. It has been estimated that 10 percent of the population each year accounts for 60 percent of spending on health services, and the half of the population with the lowest health spending accounts for only 3 percent of health costs. At age 65, the expected present value of lifetime health costs (in excess of Medicare) per couple, where both are aged 65 and excluding long-term care, has been estimated at $225,000 in 2008; these costs are projected to rise to $284,000 by 2020 (SOA 2008*a*).

Incorporating nonfinancial assets

Housing is an extremely important component of wealth among middle-income Americans. Among households aged 55–64 in the 25th–85th percentiles by wealth, nonfinancial assets accounted for 68–75 percent of their wealth (not including Social Security and defined benefit (DB) pensions; Abkemeier and Hamann 2009). Table 4.3 shows both financial and nonfinancial assets for middle-income individuals (in the 25th–75th percentiles) and the well-off (75th–85th percentiles). For both groups, nonfinancial assets (mainly residential housing) are two to three times as large as financial assets (excluding pensions and Social Security; Abkemeier and Hamann 2009). Despite this, existing planning software is incomplete, in that it usually does not take explicit account of how housing wealth fits

TABLE 4.3 Wealth of middle-income, middle-aged households (age 55–64)

Household type	Number of households (M)	Median annual income ($)	Median net worth ($)	NonFinancial assets ($)	Financial assets ($)	NonFinancial assets as % of net worth
Panel 1: Middle mass household segments (25–75% of all households)						
Married	5.2	75,000	348,000	240,000	108,000	69
Single female	2.5	28,000	111,000	75,000	36,000	68
Single male	1.4	41,000	125,000	89,000	36,000	71
Panel 2: Mass affluent household segments (75–85% of all households)						
Married	1.0	132,000	1,300,000	884,000	416,000	68
Single female	0.5	58,000	415,000	299,000	116,000	72
Single male	0.3	79,000	465,000	349,000	116,000	75

Source: Derived from Abkemeier and Hamann (2009) using 2004 Survey of Consumer Finances.

into retirement planning. Even when it does, housing wealth is handled in very different ways (Sondergeld et al. 2003).

Behavioral finance provides a broader context for understanding that individuals often have incomplete understanding of risks, and that they often do not make decisions that are economically optimal. Retirement planning software could work to combat this situation, but to date, available programs do not appear to have taken due account of this opportunity.

An overview of retirement planning software

Many studies have looked at how much wealth people nearing retirement have, and analysts often disagree over whether these amounts seem adequate or inadequate.[2] Hence it may not be surprising that retirement planning software in the marketplace varies greatly in complexity, sophistication, and number of inputs required. Furthermore, retirement planning challenges differ considerably across income levels. Lower-income individuals tend to have few assets, so they rely primarily on Social Security. For them, the main retirement planning issues are when to stop working, when to take Social Security, and how to limit spending. Middle-income people with longer-term employment records may have employer-sponsored retirement programs, own homes, and must manage their saving so as to not run out of money. This group is unlikely to have financial advice beyond what employers provide at the workplace. And for those in higher-income brackets, people with more assets are still concerned about having adequate retirement income for their desired consumption, but they are also concerned about tax issues and estate planning.

Previous analyses

A small prior literature has analyzed aspects of retirement planning software. For instance, Bodie (2003) examines financial advice provided by retirement planning software available on four major web sites, and concludes that they have a pro-equity (pro-risk) bias. Kotlikoff (2006) evaluated advice provided by four well-known, reputable financial services companies, and he concludes that they all advised dramatic oversaving compared to what workers would need to maintain a constant level of consumption. Dowd, Atherly, and Town (2008) evaluate a dozen retirement planning calculators and conclude that these calculators were weak in their recognition and handling of health costs. In 2003, a joint study by the SOA, Life Insurance and Market Research Association (LIMRA), and the International Foundation for Retirement Education (InFRE) focused on a mix of consumer programs and professional programs, including

both programs available for purchase by advisors and proprietary programs for use in a single organization (Sondergeld et al. 2003). And a 2009 SOA and Actuarial Foundation study brought in a mix of web-based and professional programs.

Methodology

Typically, evaluative studies chose a set of programs to provide a sense of the range of outcomes and use case studies with each program, to understand how it operates, what a user would experience, and to compare results.[3] These cases are selected with the aid of financial planners in order to reflect a mix of different situations similar to those encountered in real life.

Types of software

A lot of software is now available over the Internet for free. We group the programs evaluated into those providing advice about investments and portfolios, advice on how much to save for retirement, and advice on managing resources and risks in retirement. Some programs combine two or all three of these capabilities. Programs also differ in their target market (level of household income and complexity of household finances), with some programs intended for households with relatively simple finances, while others can handle fairly complex financial situations. The Internet has revolutionized the transmission of information, including information on retirement planning and risks. A new SOA and Actuarial Foundation study (Turner and Witte forthcoming) is addressing the changing ways that people receive computer-based assistance with retirement income planning.[4] This assistance is no longer limited to stand-alone programs, but now it includes programs at web sites seeking to tailor information to users' self-identified needs. Professional software used by financial planners allows for analysis of complex financial situations encountered by wealthy individuals. The free, web-based software, by comparison, are best viewed as educational tools to help users address major issues in financial planning, rather than for making detailed projections.

Masking or understanding risks

Modeling approaches embodied in these software programs may be deterministic, stochastic, or provide various different scenarios. The earlier SOA/LIMRA/InFRE study concluded that most of the planning tools did not recognize several key postretirement risks; in fact, often the programs

mask risks instead of highlighting them. This would be true of the two-thirds of the programs that used a deterministic approach; only one-third used a stochastic approach. In a deterministic model, the program presents a single outcome, without considering other possible outcomes resulting from different circumstances (such as living longer than expected or the stock market performing worse than expected).

Of course, even in a deterministic setting, multiple alternative scenarios may be generated, but a user must take the initiative to do this which may be time consuming and awkward. Turner and Witte (forthcoming) conclude that more programs today are using Monte Carlo techniques to take into account financial market risk, but most programs still use a small number of runs (500 or 1,000), and generally the only parameter that is stochastic is the rate of return on financial markets. Thus, while Monte Carlo techniques do offer additional and valuable information on financial risks, there is room for improvement: multiple scenarios are needed to explore variations in other risks. Only one family of programs examined incorporated stochastic inflation as well as stochastic returns (including returns on bonds), while another program incorporated stochastic life expectancy and rates of return.

How the programs address postretirement risks

This section discusses how the programs evaluated differ in how they handle key aspects of postretirement risk management.

Longevity

Many people underestimate their life expectancies: two-thirds of male preretirees underestimated the life expectancy of the average 65-year-old man, and 42 percent of that group underestimated it by 5 years or more (SOA 2004). Among women, half (54 percent) of preretirees underestimated the life expectancy of the average 65-year-old woman. For this reason, there is a good chance that people will underestimate their own life expectancies if they are asked to supply this information as an input to financial planning software. Accordingly, they may need guidance from the program in estimating their anticipated longevity.

Some of the free consumer-oriented programs supply a life expectancy for the user but do not distinguish differences by sex.[5] Even when they do provide an age and sex-specific life expectancy, they tend not to recognize that about half of the population will live beyond the average life expectancy. Thus, longevity determines the length of one's planning horizon and retirement period, but it is generally not recognized as a risk. One program

allows a user to estimate his or her life expectancy based on nine factors: age, gender, marital status, height, weight, blood pressure, alcohol consumption, use of tobacco products, and exercise. By varying the inputs, the user can see how changes in health habits, such as losing weight, could affect life expectancy. The software provides both life expectancy and the age to which the user has a 25 percent probability of survival. This latter is a desirable feature that most programs do not have. Given the importance of longevity in financial planning, this is an area where programs could be improved.

Length of planning horizon

Planning software programs take different approaches when determining the length of the planning period relevant to the user. One ignores life expectancy and calculates expenses to age 95; another assumes that retirement lasts 30 years (ignoring differences in life expectancy between men and women, and assuming that people who retire earlier die earlier). Still another assumes that people live to their 25 percent life expectancy, which is the age at which 25 percent of a birth cohort is still alive. And another permits the user to determine his or her own life expectancy, which then becomes the length of the planning period.

Naturally, if the planning period assumed for the computations is too short, people may be forced to curtail their consumption at older ages. If they have sufficient annuitized income (e.g., Social Security benefits), they may not be too concerned about completely running out of money – though they might run out of financial assets and have insufficient resources to maintain their accustomed level of consumption. If the planning period is set too long, people risk dying with extra resources, having given up opportunities for consumption during their lifetime, but leaving extra bequests to their heirs.

How long the planning horizon is anticipated to be relates to the question of whether people purchase annuities to protect against outliving their assets. In fact, in most developed nations, people rarely have price-indexed annuities other than Social Security. In many countries, those benefits do not provide high replacement rates (except for the low lifetime wage workers). While insurers offer annuity products to generate life income, the products tend to be complex, incorporating different trade-offs including control over investments, liquidity, guarantee of life income, guarantee of minimum returns, and level of bequest. Most existing financial planning software available to the consumer cannot analyze the range of products for providing lifetime payouts nor analyze the purchase of financial products.

Inflation

None of the free consumer programs, and few of the professional programs evaluated, treat inflation as a risk. That is, they assume that inflation is constant over the period analyzed. In the professional programs, a higher inflation rate than the default can be input, but some consumer programs specify a single inflation rate. Only one professional program examined offers the option of treating inflation as stochastic.

Medical and long-term care expenses

Some of the free web-based programs allow the user to input information about expected medical and long-term care expenses. Yet none examined by Turner and Witte (forthcoming) treats these expenses as a risk factor or alerts the user to possibly huge variations in these expenses.

Social Security benefit receipt

In the United States, most people receive more in Social Security benefits than from investments. Accordingly, the age at which the person claims benefits and the decision whether or not to postpone taking benefits becomes key. Unfortunately, most consumer-oriented programs do not highlight this issue; rather, the user simply specifies the age he or she will claim benefits.

A related point is that many financial planning tools do not accurately determine each individual's Social Security benefit. For instance, one software tool simply presumes that everyone receives the same Social Security benefit, regardless of whether it is a single or married household. Some programs require the user to provide that information, but older workers tend not to be very well apprised as to the level of their future Social Security benefits (Mitchell 1988; Gustman and Steinmeier 2003). Indeed, the research shows that many workers underestimate their Social Security benefit and overestimate how much income they will receive from pensions and work in retirement (Sondergeld and Greenwald 2005). Focusing on those within 2 years of benefit receipt, Rohwedder and Kleinjans (2004) find that about 30 percent did not know what their Social Security benefits would be, and of those who said they did, half were accurate to within 10 percent of their actual benefits. One-quarter overestimated their future benefits by 10 percent or more.

It is the case that the programs often recommend postponing the age at which Social Security benefits are taken, if retirement savings are inadequate. One web site inputs the user's age and sex, and calculates the 'break-even'

point if benefit receipt were postponed from age 62 to the normal retirement age (66 for a person, currently 59 years old). It notes that a person with average life expectancy for their age and gender has a given percentage chance of living longer than the break-even point, with the likelihood of living longer than that age being higher for women than for men. It would be useful to integrate more detail on longevity risks with the discussion of the benefit claiming age. Moreover, that program does not calculate (or even note), that the optimal claiming age depends on whether the user has a dependent spouse or is a dependent spouse. More detailed information is provided in a separate document, including the option of purchasing a 5-year fixed-term annuity as a bridge from 62 to 67 in order to postpone receipt of Social Security benefits. This option of purchasing an annuity is noted in the software provided by a life insurance company.

One program suggests that everyone would be better off in terms of lifetime benefits received by postponing receipt of retirement benefits past age 62. A substantial portion of the population, however, has life expectancy less than the mean. Many of these people would not receive higher lifetime benefits by postponing retirement. In addition, many women would be better off taking Social Security at age 62 on their own earnings records and then claiming spousal benefits at a later date, with their husbands postponing retirement. Some of the consumer programs have no option for separately entering information for spouses. Thus, they are incapable of assessing the issues of whether the survivor has adequate income, economies of scale in consumption, and the decline in family consumption following the death of a spouse.

Poor planning

Financial planning software programs are designed to reduce the risk of poor planning, but few programs have checks on inconsistent or outlandish assumptions. This may be less of an issue for professional programs because a professional financial planner is inputting the data, but some internal consistency checks are important for the consumer programs. For example, many programs permit the user to specify long-term risk-free rates of return of 10 or even 20 percent.

A common problem with many consumer software programs is that most do not recognize users' low level of knowledge documented by numerous behavioral studies. That is, the programs are designed for knowledgeable users and may yield misleading results for many users. For example, users who underestimate their life expectancies and hence draw down their assets too soon will possibly outlive their assets in retirement.

Targets

A key aspect of retirement planning and retirement planning software has to do with the criteria for deciding whether retirement saving is adequate. Adequacy criteria involve the goal to be achieved and the probability that it will be achieved. Programs generally are based on the approach of determining whether the user is on the right path to meet a particular goal, with the goal either determined by the user or by the program. They have some criteria for determining whether savings are adequate. The next section discusses aspects of the target criteria for measuring success in retirement planning.

How the programs measure success

Whether one is successful in meeting one's retirement planning target depends on what measure of success is used. This will in general depend on the length of the planning period, the measure of income/asset adequacy, and the probability that adequacy will be achieved over the entire planning period. Furthermore, one's estimate of success will vary with risk aversion, rate of time preference, and mortality risk.

The software programs differ widely in what they deem success. One program that uses Monte Carlo analysis suggests that the goal is an 80 percent chance that income will last to age 95, given a 70 percent target replacement rate. A different nonstochastic program defines success as having sufficient resources to meet the user's specified target expenditure level, up to the user's specified life expectancy. A third program defines success as a 90 percent chance that the desired level of retirement income, based on an 85 percent target replacement rate, can be sustained over a 30-year retirement. Thus, for a person retiring at age 65, that would be a 90 percent chance of success up to age 95.

Sometimes, programs use measures of retirement income adequacy to measure success, including the replacement ratio. This refers to the ratio of postretirement income to the employee's preretirement pay. For some, a constant replacement ratio may make sense, but it will not be a good guide if retirement spending is anticipated to change significantly due to lifestyle choices, not needing to pay for dependent children, or having paid off a mortgage. One approach, taken by some software programs, divides retirement consumption into 'necessary' and 'desired' expenses, on the notion that people would be able to reduce desired expenses more readily than necessary expenses. Another way to measure what is 'necessary' uses the Elder Economic Security Index (Kuriansky 2007). This standard defined the elder standard per year for a single person who owned a home without

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a mortgage at $15,134 in 2006, for a single renter at $19,541, for a couple with a home without a mortgage at $21,658, and for a couple renting at $26,064.

Of course, what is necessary and desired is also a subjective concept, so more research is needed on ways to measure and explain different success concepts. An important question is whether the measure of success should be specified by the program or the user. Perhaps multiple outcomes would be useful to alert the user to different ways in which the goal and shortfalls can be defined.

Why projected outcomes differ

Based on what we have found thus far, it will not be surprising that retirement planning programs differ in terms of their results and advice. One reason is that their input values differ. While this explanation is obvious, the reasons behind it are not. For example, one program uses a rate of return of 10 percent on equity, while another program has a default rate of return of 5 percent on equity and a maximum allowable rate of 7 percent. Some programs recognize that the price of medical care is rising faster than other prices, while others do not. Another issue is that the measures of retirement resources differ. For example, one program asks the user to indicate expected inheritances or other onetime receipts, while others do not mention expected inheritances. Some incorporate the value of housing as a source of retirement income, while others do not. Many consumer-oriented programs ignore taxes, leading one to conclude that the user has more retirement resources than in reality. Programs that request more detail in the inputs for sources of income may tend to yield a higher probability of success because users end up specifying a higher level of expected income in retirement.

Also, as noted earlier, projected outcomes differ since measures of retirement needs also differ. One program specifies a replacement rate of 85 percent, while another program allows the user to specify the amount of income needed in retirement. Similarly, replacement rate definitions differ: some specify replacement rates relative to current income, while others specify postretirement relative to lifetime average income. Further, retirement planning periods differ across programs. One will stipulate a retirement planning period of 30 years, while another specifies a period that ends at age 95; yet another will base computations on the user's specification of life expectancy. A related point is that there is disparate treatment of surviving spouses' needs. Some programs set as a default that the surviving spouse needs half the income of a couple, while one program takes into account economies of scale in consumption, assuming that a couple needs 1.6 times as much as a single person.

Another source of differentiation is whether the models used are deterministic or stochastic. Stochastic programs recognize the possibility of worst-case scenarios, while deterministic programs do not explicitly incorporate that possibility in their methodology. And even in stochastic programs, the standard for the minimum probability of success differs. For example, one program requires that the user be successful in 90 percent of the scenarios, while other programs use lower standards.

Conclusion

This chapter has reviewed how postretirement risk is handled by widely available retirement planning software. The programs evaluated here have entailed enormous programming and design efforts, and in that sense, they represent a remarkable achievement. At the same time, these are still in the relatively early stages; and future programs will likely be greatly improved.

In overview, and not surprisingly, we find that web-based programs aimed at the general consumer are less complex than programs used by professional financial planners. The five free web-based approaches considered here provide a rough idea of whether the user is on target for retirement, how much additional, if any, he or she would need to save, and whether he or she should consider postponing retirement. Yet one has a serious flaw in that it assumes that everyone, even if married, receives the same Social Security benefit. Another is inadequate in that it determines income sufficiency based on life expectancy and overlooks the chances of living longer. Several do not even permit calculations to take spouses' benefits and needs into account. Only one includes DC plan saving but ignores DB pensions or other sources of retirement income. Programs used by financial planners are far more complex, yet none is capable of dealing with variable rate mortgages. Nor do they anticipate the situation of falling housing prices, job loss, and foreclosures. We conclude that on the whole, the tools do not highlight nor address retirement risk particularly well; rather, they mainly mask risk.

A common problem with the consumer software programs evaluated is that most do not recognize the users' low level of financial knowledge. As a result, the programs tend to be designed to work best for knowledgeable users but they may produce misleading results for many. For example, users who fail to understand their longevity may underestimate the amount of resources they need for retirement. Future programs that confront limitations in individual knowledge and understanding could check user-provided inputs and provide warnings if these seem out of line. It would also be useful to provide consumers with outcomes from running multiple scenarios, and discuss the potential impact of inflation and health risks. Having said that, it

remains the case that even experts may disagree on what financial targets are best, and hence what advice may be optimal. No wonder then that software developers disagree on how to attain goals.

The global financial crisis has prompted many to pay new attention to the downside potential of investment risk. It has also revealed key weaknesses inherent in retirement planning software. Partly this is the result of deterministic approaches, which fail to prompt scenario testing. Yet even when stochastic modeling is preferred, the existing models still do not focus people on rare or 'tail' events, and how to deal with them. Furthermore, stochastic approaches currently in use tend to focus on financial market risks, but downplay or ignore other risks. An additional issue is that the crisis has induced many to consider working longer and delaying retirement, but few software models properly model and present this option. The crisis has also made it clear that housing values can fall, and variable rate mortgages can rise rapidly – yet neither eventuality is well handled by most programs. And finally, virtually no program has contemplated the possibility of all of these negative shocks happening at the same time – and just when the person loses his or her job. In short, existing retirement planning programs have a long way to go. They still underrepresent, or downplay, the impact of multiple extreme events and what to do about them. The next generation of software therefore has much to do to inform users of such uncertainties and offer new solutions.

Appendix 4A Case studies

Case studies can help researchers understand the operation and results of the software programs used in retirement planning. The question, 'Will I run out of money in retirement?' is often the most critical one for retirees and people nearing retirement. Given their circumstances and their plans for the future, how likely are they to be able to maintain their standard of living? This issue was addressed through the use of case studies developed for the 2009 SOA Research Study (Turner and Witte forthcoming) by the Project Oversight Group for comparing retirement software. They may be characterized in brief as follows:

- Case 1. Sue Singleton, a 60-year-old divorcee, still working. This case involves issues of working past age 65, changes in Social Security benefits with postponed retirement, using the home as a primary retirement asset, no employer retirement plan, reverse mortgage for retirement income, and Social Security benefits based on divorce and prior marriage.

- Case 2. Hal and Karen Middleton, ages 64 and 60, recently retired. This case involves issues of being too conservatively invested through retirement, spending a sizable part of assets early in retirement, annuity income stream reduced upon death of husband, and change in health coverage at Medicare eligibility.
- Case 3. Gary and Sandra Alterman, ages 74 and 74, retired. This case involves issues of long-term care needs, 40 percent of retirement income does not have a cost-of-living adjustment (COLA), liquidating home value through move in retirement; increasing medical, assisted living, and transportation costs as time goes on, and elimination of spousal pension benefit upon death of primary wage earner.
- Case 4. Leslie Gonzalez, a 58-year-old widow, still working, dependent mother. This case involves issues of increasing dependent costs, long life, does not own home, the majority of her retirement assets being in a taxable, low-earning account, different annuitization versus asset investment/withdrawal strategies, and health benefits from former husband's employment.
- Case 5. John and Judy Richman, ages 56 and 50, higher income, still working. This case involves issues of high credit card debt and mortgage going into retirement, college costs at the same time as the need to save for retirement, employer stock options, lack of long-term care insurance, not being able to afford retiring at age 65, and Social Security spouse benefits where spouse is a government employee not covered by Social Security.
- Case 6. Jim and Linda Goldin, ages 72 and 69, higher income, retired.

Case study results

The research used the six cases in each program to determine how long it would take to run out of money in each scenario. Results varied widely. For one case, one program assesses that when retirement occurs at age 70 the person has adequate retirement income, while another program finds the income to be insufficient. The differences are explained at least in part because the first program allows the user to set life expectancy, and uses life expectancy to determine the planning period, while the second program sets the planning period to end at age 95, 8 years later, or 47 percent longer, than in the first study.

For a case of a recently retired couple aged 60 and 64, one program finds the couple's saving to be inadequate, while another finds it to be adequate. The program that finds it to be adequate recognizes the value

of the home equity as a source of retirement income, while the other software does not. The first study found that consumer programs tended to completely overlook home equity. For the couple aged 56 and 50 who were still working, one program finds the couple's saving to be inadequate, while another finds it to be adequate. The one that finds it to be inadequate sets a maximum rate of return of 7 percent on investments, while the other allows the 8 percent specified in the case. Differences in assumed rates of return are more important the younger the users and the more financial assets they have.

To further explore the difference in results between deterministic and stochastic programs, in one case the person is aged 55, plans to retire at age 62, has a life expectancy of 95, has a salary of $100,000, and annual saving of $12,000. Again, a deterministic and a stochastic program were compared. The deterministic program indicated that the person would be able to retire if he or she had already accumulated $740,000, while the stochastic program indicated that he or she would need to have already accumulated $690,000. Thus, it cannot be concluded that the stochastic programs indicate that people need greater saving than do the deterministic programs.

Software analyzed in the 2009 SOA study

Free consumer programs

- Fidelity's Retirement Income Planner http://personal.fidelity.com/planning/retirement/retiree/content/ripover.shtml
- AARP Retirement Planning Calculator http://www.aarp.org/money/financial_planning/sessionseven/retirement_planning_calculator.html
- MetLife Calculator http://www.metlife.com/Applications/Corporate/WPS/CDA/PageGenerator/0,4773,P18280,00.html
- US Department of Labor, Employee Benefits Security Administration: Taking the Mystery Out of Retirement Planning http://askebsa.dol.gov/retirementcalculator/UI/general.aspx
- T. Rowe Price Retirement Income Calculator http://www.troweprice.com/common/index3/0,3011,lnp%253D10002%2526cg%253D1270%2526pgid%253D8277,00.html

Fee-based consumer program (included with professional programs)

- ESPlanner http://www.esplanner.com/

Professional programs

- NaviPlan Standard
  http://www.eisi.com/products/us/standard/product_features.htm
- NaviPlan Extended
  http://www.eisi.com/products/us/extended/index.htm
- NaviPlan Profiles
  http://www.eisi.com/products/us/professional/index.htm
- PIE's MoneyGuidePro
- http://www.moneyguidepro.com/Default.aspx?page=products
- AdviceAmerica – AdvisorVision Retirement Income Edition
  http://www.adviceamerica.com/AAweb/RIE.htm
- Money Tree
  http://www.moneytree.com/

Notes

[1] This chapter relies on several surveys conducted by the Society of Actuaries (SOA) examining how the public views retirement risks in 2001, 2003, 2005, and 2007; the SOA also ran several focus groups on how people manage their retirement assets. Additional information was derived from a 2003 analysis by the SOA, LIMRA (a US-based marketing and research organization serving over 850 financial services companies in over 70 countries), and the International Foundation for Retirement Education on the handling of postretirement risks by planning software (Sondergeld et al. 2003). Ongoing work (Turner and Witte 2009) builds on the first study to further show how such software treats the management of postretirement risks. Results from the 2009 study are preliminary and have not yet been finally approved by the sponsoring organizations. The software used in the 2009 study is listed in Appendix 4A.

[2] For a recent review, see Mitchell and Turner (2009).

[3] The case studies for the 2009 study can be found in Appendix 4A.

[4] Programs compared in the 2009 study are listed in Appendix 4A.

[5] Other differences in longevity are also considerable, with differences of a decade or more across identifiable demographic and economic groups, for example, low-income African-American men compared to high-income Asian women (Murray et al. 2006).

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