Actuaries
Risk is Opportunity.®

Retirement Planning Software and Post-Retirement Risks: Highlights Report

DECEMBER 2009

SPONSORED BY

SOCIETY OF ACTUARIES
ASA 889
AIA 1909
1949

THE ACTUARIAL FOUNDATION®

PREPARED BY

John A. Turner
Pension Policy Center

Hazel A. Witte, JD

Retirement Planning Software and Post-Retirement Risks: Highlights Report

Retirement plan software packages used by consumers and financial professionals offer individuals the opportunity to do longer term planning far beyond what could be done without such tools. However, perhaps because of the difficulty of the issues involved, they generally fall short in their objective to provide adequate analysis of post-retirement risks. The software packages need to better address key planning drivers such as rates of return, life expectancy and the length of the planning period, Social Security benefits and age at which Social Security benefits are taken, housing, and survivor's benefits. As well, vendors are encouraged to make other improvements to the packages as described in the Major Findings section of this report.

Background

Managing retirement income in the post-retirement period is challenging because there is a wide variety of potential risks. Approaches to managing these risks are often not integrated across risks. Retirement planning software tools offer individuals and advisors the opportunity to perform a range of calculations to help them in retirement planning. This study assesses the extent to which retirement planning programs help users understand post-retirement risks.

We review a selection of software programs commonly used by consumers and financial advisors. A path-breaking 2003 study sponsored by the Society of Actuaries, InFRE and LIMRA (Sondergeld et al.2003) served as a baseline. While we find improvements in the ease of use of programs (online web interface, easy input screens) and use of Monte Carlo analysis to highlight risk, we also find that some of the same issues and weaknesses identified in the 2003 study continue today. Some of the remaining problems may reflect lack of consensus on how to deal with some issues, and some may reflect the difficulty of addressing some issues. Nonetheless, improvements can be made that would address these issues, as suggested in this report.

In 2008, the Society of Actuaries published *Managing Post-Retirement Risks: A Guide to Retirement Planning* that identifies risks, discusses their predictability and provides information on how they can be managed. It is important to note that often experts do not agree on how to manage specific risks. Two important conclusions from that study and other work help explain the results of this study:

- The issues are complex.
- Experts do not agree on the right solutions.

Therefore, it is not surprising that different software provide different results, and that there is a range of practice.

A wide range of retirement planning software is available in the marketplace. The programs vary greatly in complexity, sophistication and number of inputs required. This study

investigates ways that programs deal with post-retirement risks, highlighting innovative approaches.

We examine twelve non-randomly selected retirement planning software programs. Five of the programs are available for free over the Internet (identified in the study as consumer programs). One program is available to consumers for a fee, and six programs are designed for use by financial planners for their clients (identified in the study as professional programs).

Major findings

A common problem is that programs use rates of return that are too high, either due to program defaults or likely user error by unsophisticated users. When that is combined with user input for life expectancy, and the tendency of individuals to underestimate life expectancy, the result is understating the amount of resources needed for retirement, particularly in consumer programs. Many programs do not recognize heterogeneity across users in life expectancy, and consequently programs may determine the length of the planning period using life expectancies that are too high for many individuals.

Ongoing issues of financial planning software post-retirement include the following, some of which can be overcome with informed inputs, which is more likely in the use of professional programs:

1. Results and outputted information vary widely across programs.
2. Consideration of the planning period and the handling of longevity risk vary considerably among the programs.
3. In terms of planning, there is often a pro-equity and pro-risk bias, particularly in consumer software.
4. Consumer software generally does not take into account the results of behavioral finance studies indicating that many users have a low level of knowledge about financial issues. For instance, certain studies suggest that individuals tend to overestimate rates of return and underestimate life expectancy, a combination that would lead to having inadequate resources in retirement when this information is provided by unsophisticated users.
5. The failure of programs to take into account fees on investments overstates net returns and may result in rates of return that are generally not attainable.
6. Programs generally overstate gross rates of return received by individuals because individual investors tend to under-perform the market due to the timing of their investments.
7. With the exception of financial market risks, most programs do a poor job of evaluating the risks that retirees face and in fact they often obscure potential risks.
8. Programs under-represent and do not encourage focus on extreme events, such as the possibility of multiple risks occurring at the same time; for example, a stock market decline of 50 percent and a decline in housing price. While sophisticated users using the professional programs can run scenarios to investigate these possibilities, behavioral economics suggests that most users will not do so.
9. Most software programs inadequately estimate the level of Social Security benefits users are entitled to, and at the same time they do not direct users to the Social

Security administration website, where they can obtain an accurate benefit estimate at no charge. The age at which Social Security benefits are taken is an important decision for most people, and could be better addressed in most programs.

10. Software programs usually do not evaluate the possibility of annuitization (converting assets into lifetime income annuities) as an option to reduce risk, nor do they focus on different options for timing of payouts.
11. There is inconsistent treatment of housing as an asset for use in financing retirement consumption.
12. The programs generally do not consider variable rate mortgages.
13. The programs generally do not take into account the risk of retiring earlier than expected, which is significant due to unexpected poor health of the worker or dependent or due to job loss, compounded by the difficulty that older workers often have in finding new employment.
14. The programs generally fail to consider inflation-indexed bonds as an investment.
15. The programs often have a "one size fits all" approach, failing to take into consideration different life expectancies of people. Studies have shown great variability in life expectancy across different population groups.
16. The programs usually do not include a statement of suitability helping users understand what questions they will answer well. Furthermore, there is a wide variation in the structure of different software.
17. Programs generally need to better address the income needs of survivors and issues for couples.
18. Programs, particularly consumer programs, should improve their checking for input errors.

The main conclusions of the previous study (Sondergeld et al. 2003) are still valid. These conclusions include:

• Combined, the tools analyzed have an extensive list of features and capabilities. Their value is in helping people estimate income, retirement needs, and spending.

• The programs varied greatly on their inputs and treatment of various situations. For example, the handling of home equity ranged from no treatment to programs that automatically withdrew income from the home each year. It was difficult to accurately portray each case study in any program or to do so consistently across programs.

• Because of the variety in the programs' inputs, capabilities, and results, direct comparisons of a wide range of results were impossible. However, there is tremendous variability across programs regarding when assets ran out, if at all.

• These programs are merely tools to help facilitate the retirement planning process. Nor is there any general agreement on the right answer or how to arrive at it. The results from any program should not be used as the sole input for decision making for retirees or prospective retirees. It is likely that professionals using these programs consider many of the issues raised in this report and may do so out of recognition of the limitations of the program(s) they have chosen to use.

Comparing our study with the previous study, for the programs we analyzed we found improvements in several areas: a greater use of Monte Carlo techniques, greater ease of use, and a greater amount of help with inputs provided to users by the programs.

Methodology

While our sample of programs is non-random and cannot be used to provide evidence as to prevalence of features, it represents a variety of programs provided by different types of institutions. The programs have been chosen so that a variety of approaches are included; so that different types of providers are included; and so that some of the most widely used programs are included. Some well-known programs were excluded because they focus on helping the user determine savings and investment decisions pre-retirement, with little or no attention paid to issues arising during the retirement period.

This study's methodology consists of several components:

- Selecting and obtaining a sample of software to provide insight on a range of practice
- Focusing on post-retirement risk, creating a context for the study
- Reading documentation, running tutorials, and examining programs to see what capabilities they offer
- Developing case studies to provide situations for testing of the software
- Running the software to determine how it operates, and to provide results for comparison, and an understanding of the capabilities including input and output.

The complete project report is divided into an introduction, followed by eight chapters, and a conclusion. It contains three Appendices. The eight chapters discuss different types of post-retirement risks and ways of dealing with them. The report also discusses issues relating to financial planning for retirement. It discusses various features that affect the ease of use of the programs. This summary report provides highlights of the results.

Further Observations

Change since last study. The results from studying this sample of programs suggest that in spite of substantial advances in some aspects of the software, the major conclusions of the first study still hold. Notably, that with the exception of financial market risks, most programs do not do a good job of evaluating the risks that users face. This study, however, finds some major improvements in financial planning software. For example, the use of Monte Carlo analysis to highlight risk has increased, though it generally focuses on financial market risk only.

Suitability statements. Different people have different issues and considerations in retirement planning, and software that works well for a specific situation will need to address the relevant issues. However, generally the software programs do not include a statement as to who they are suitable for, though some programs indicate that they are suitable for individuals with at least a stated minimum level of assets.

Strengths of Retirement Planning Software. Many people do not think long-term and are not able to do complex math, or even simple math. Planning software encourages long term thinking and enables users to consider alternative scenarios to test and understand the links between saving for retirement and resources in retirement. Further, the software offers resources, often at no cost or modest cost, that enable average Americans to financially plan for the long term.

Problems with Retirement Planning Software. The current financial crisis exposes weaknesses in financial planning software. The programs we examined generally are unable to analyze the risks of variable rate mortgages or large declines in housing prices. Extreme stock market declines seen recently are underrepresented in the Monte Carlo models. They do not consider the possibility of a large stock market and housing market decline occurring at the same time that a person nearing retirement has lost his or her job. In short, they under-represent, or fail to represent, extreme events.

For users anticipating the possibility of these events, the software permit the running of "what if" scenarios to investigate the effect of such events. The tools, however, should help users identify risks, rather than relying on the sophistication of the user.

Overall, rather than focusing on greater detail for issues that are not important to most individuals using the programs, we recommend that programs focus on better treatment of key inputs: longevity, rates of return, Social Security benefits, housing, and target consumption, including target consumption for survivors. The issues of importance will vary depending on the target population of the programs.

Longevity Risk and the Length of the Planning Period. There are large differences in the treatment of longevity risk and the planning period. While focusing on longevity is central to the length of the planning period, there is no agreement about the right way to handle longevity in terms of determining a planning period and inadequate focus on making assets last a lifetime. Most of the software did not analyze products and solutions making money last a lifetime, such as annuities.

Programs that set the length of the planning period the same for everyone do not recognize the large amount of heterogeneity in life expectancy across the population. However, programs that allow the user to choose the length of the planning period do not recognize the lack of knowledge among many users as to life expectancy. A program that allows the user to choose the length of the planning period but provides assistance in doing so, such as providing a longevity calculator based on age, gender, and health risks, may be the best approach.

The combination of overestimating rates of return and underestimating life expectancy that may occur, particularly with consumer programs, would cause financial planning programs to underestimate the financial needs of users. Other errors may offset, however, so that it cannot be concluded that that is the net effect.

One approach to dealing with the length of the planning period would provide information as to the adequacy of resources if death occurs at different ages. For example, in a deterministic framework the output could indicate that a particular individual would have

adequate resources if death occurred at age 80 but not if it occurred at age 90 or later. For a couple, the output could indicate that they had adequate resources if death of the surviving spouse occurred at age 90 or earlier but not at age 95 or later. This approach would require deterministic programs to automatically run scenarios with death occurring at ages 80, 90 and 95.

Rates of Return. A common problem with many of the programs examined is that they use rates of return that are too high, either due to user or program specifications. First, historical rates of return may be a poor guide for future rates of return, which may be lower. Second, market rates of return exceed the rates of return individuals receive due to investment fees they pay. Third, individuals tend to underperform the market because of errors they make in investing, such as selling (or not buying) when the market is low and buying when it is high. Fourth, the rates of return used often do not take into account taxes. In some programs, this issue is dealt with by calculating taxes separately, while in others taxes are ignored. Fifth, other studies have shown that individuals tend to overestimate future investment returns. Sixth, it appears that most stochastic programs under-represent the risk of large stock market declines. Seventh, the deterministic programs generally do not reduce expected rates of return as a way of taking into account risk. In a deterministic setting, an expected rate of return of 10 percent is easily perceived as a risk free rate of return of 10 percent.

The programs commonly advise users to consider increasing the risk in their portfolios if they face a financial shortfall, generally ignoring that the user would face an increased risk of market volatility and downside risk as well as upside potential.

While changing portfolios is often recommended, either because of an asset shortfall or because the portfolios are inconsistent with the user's self-reported risk aversion, the programs generally do not take into account the possible tax consequences of doing so with a taxable account, or even mention that as an issue to consider.

Social Security. The treatment of Social Security benefits generally could be improved. Several programs set the cost-of-living increase for Social Security benefits in payment at less than the inflation rate. This level of partial indexation is counter to the legal requirement that Social Security benefits be inflation-indexed.

Some programs calculate Social Security benefits based on the person's birth year, expected retirement age, and a single year of earnings. However, administrative records reveal many different pay patterns over the lifetime. For this reason, a model of pension outcomes that assumes all workers have a common earnings profile is unlikely to capture any user's Social Security benefits. Instead, programs should integrate with the online calculator provided by the Social Security Administration, where users can calculate their Social Security benefits based on their own earnings record or at least advise users of the availability of the more precise estimate.

Inputs. All of the consumer programs and most of the professional programs we examined can be accessed online, without downloading software. While this makes them easy to use, it also raises questions of the security of the financial information that users are transmitting over the internet.

Why Results Differ. The programs differ considerably in the rate of return assumptions and in longevity and planning period assumptions. They also differ in how they treat housing assets. Some professional programs allow users to specify whether they are willing to sell their home to meet retirement expenses. Other programs either assume that the house is illiquid or assume that home equity will be used to meet retirement expenses. Some programs do not permit users to specify a rate of depreciation in the nominal value of the home. Given that housing prices in some areas have depreciated by 30 percent or more and that housing is such a large part of assets for many Americans as they near retirement, this is a major drawback.

Programs differ considerably in their treatment of the amount of resources survivors need. One professional program scales consumption needs by the number of people in the household, taking into account economies of scale in consumption (two can live more cheaply per person than one) and taking into account that the cost of children differs from the cost of adults and varies by their age. The default scale for economies of scale in household consumption is that two adults can live as cheaply as 1.6, or alternatively that it costs one person 62.5 percent as much to live as it does two people. For example, it generally costs substantially less than twice as much to provide housing for two people living together than for a single person. By comparison, another program assumes that it costs one person 80 percent as much to live as it does two people. Thus, one program assumes that the living expenses of the survivor will be nearly 30 percent higher than the other program. This wide range suggests that this is an area where further work is needed to determine a reasonable value.

The different programs provide different results in terms of retirement income adequacy in some circumstances, while in other circumstances they provide similar results. Various reasons may explain why the results differ and under what circumstances that occurs.[1]

1. The input or parameter values differ. This explanation is probably the most obvious explanation, but the reasons behind it are not necessarily obvious. For example, one program uses a rate of return of 10 percent on equities, while another program has a default rate of return of 5 percent on equities, and a maximum allowable rate of 7 percent. Some programs ignore the sizable effect of investment fees on accumulated account balances. One of the factors identified in the previous study as causing differences in results is that some programs recognize that the price of medical care is rising faster than other prices. For that reason, in those programs, expenses rise more quickly during retirement. The default inflation rate varies across programs we examined from 2.3 percent to 4.6 percent. Some programs set the default increase in Social Security benefits in retirement at less than the inflation rate, causing the benefits to decline in real value over the period of retirement.
2. The capabilities of dealing with special situations differ. For example, some programs are not capable of handling expenses that last only a few years, such as college expenses for dependent children. Some programs are not capable of dealing with cost-of-living adjustments on pensions.

---

[1] A further question, not addressed in this study, is why do the programs differ in the ways described above? Are the differences purely the result of the different backgrounds of the programmers, company preferences or expertise, or are there other explanations that cause the programs to differ in their results?

3. The measures of retirement resources differ. For example, some professional programs ask the user to indicate expected inheritances or other one-time receipts, while other programs do not include expected inheritances. One program incorporates the value of housing as a source of retirement income, while other programs do not. Programs differ in their treatment of taxes, so that consumer programs that basically ignore taxes indicate that the user has more retirement resources. 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.
4. The measures of retirement needs 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.
5. Programs differ in how they treat the retirement income needs of a surviving spouse. 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.
6. The replacement rate definition differs. One program specifies a replacement rate relative to current income for individuals still working, while another specifies it relative to lifetime average income.
7. The retirement planning period differs. One program specifies a retirement planning period of 30 years, while another specifies the period that ends at age 95, and yet another bases the retirement planning period on the user's specification of life expectancy.
8. Some programs are deterministic, while some are stochastic. Stochastic programs recognize the possibility of worst case scenarios, while deterministic programs do not explicitly incorporate that possibility in their methodology.
9. For 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.
10. Longevity generally is treated as affecting the length of the retirement period and planning horizon, but is not recognized as a risk.

Financial Education and Software. The use of consumer software should be an educational experience. This can occur in several ways. First, the software can provide links to related educational information. Second, the software can provide help when it appears that user-provided information, for example life expectancy, may be inaccurate. Third, the software can provide information such as historical rates of return on different asset classes, the average level of Social Security benefits, and the benefits of purchasing an annuity.

Advice

Table 5.1 from the report, reproduced below, summarizes some of the findings concerning advice the software provide.

TABLE 5.1. ADVICE ON POST-RETIREMENT STRATEGIES		
STRATEGY AREA	**CONSUMER PROGRAMS**	**PROFESSIONAL PROGRAMS**
Which funds to draw down first	Beyond the scope of the programs	Very spotty – programs weak on this point
Annuity purchase	Rarely suggested	Rarely suggested
Use of life, long-term care and health insurance	Beyond the scope in most programs, but some programs suggest user consider long-term care insurance	Covered extensively in professional programs
Changing investment strategies during retirement	Sometimes suggested as a way of dealing with a projected financial shortfall	Frequently suggested as a way of dealing with a projected financial shortfall
Use of housing wealth in retirement	Rarely considered	Frequently considered
Reducing expenses	Sometimes suggested	An option
Working during retirement	Sometimes an option	Generally an option
Postponing retirement	Sometimes suggested	Sometimes suggested as an option

Source: Authors' compilation

The programs generally are useful for indicating and exploring some options, for users choosing to do so. They allow users to consider alternative approaches to preparing for and dealing with retirement risks. Providing advice or suggestions occurs less commonly.

Conclusions

Long term planning is both important and difficult for individuals. Financial planning software opens up new vistas and makes much more planning possible.

But developers of financial planning software face daunting challenges. First, the problem of creating a program that can address the wide range of issues individuals face is exceedingly complex. Second, on many of the key issues, such as the level of replacement rates, experts do not agree as to the appropriate advice. The financial planning software programs represent a huge amount of programming and design effort and in that sense are a remarkable achievement. They have the possibility of providing users better information about their financial future. At the same time, we see reason to expect that the programs will be greatly improved in the future. For example, all programs as outputs could provide results for three ages of death so that users could evaluate the range of possible outcomes and use that to inform their planning process.

With the findings of this report, we encourage vendors to consider them carefully and strive to produce software that better addresses post-retirement risks.

Reference

Sondergeld, Eric T.; Chamerda, Robert S.; Drinkwatter, Matthew; and Landsberg, Daniel G. 2003. "Retirement Planning Software." LIMRA International, Inc. and the Society of Actuaries, in collaboration with the International Foundation for Retirement Education.