Retirement Planning Software

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ACKNOWLEDGMENT

EXECUTIVE SUMMARY

Retirement, the last phase of life, is undergoing dramatic change. These changes are affecting how long people spend in retirement, how retirement is funded, and what it means to be retired. While recent evidence suggests the median retirement age has leveled off and may have begun to increase, the median retirement age declined by around five years during the latter half of the twentieth century. At the same time, people are living longer. This results in people spending more time in retirement than in the past. Fewer employers are now offering post-retirement benefits such as pensions and health insurance. With longer retirements and fewer employer-provided post-retirement benefits, individuals are by necessity becoming responsible for a growing share of their retirement funding. However, it is not simply a matter of having enough resources, but also how they are utilized. Consideration must be given to the many risks retirees face; risks that were previously less prominent or were mitigated by employer-provided programs. These risks include, but are not limited to:

- **Longevity:** Retirees must now ensure their assets will last as long as they do. While Social Security provides workers with income for as long as they live, employer-provided retirement benefits are increasingly being paid out in a form that does not guarantee a lifetime income.

- **Inflation:** While inflation has been modest in recent years, even modest inflation can have a profound effect on purchasing power when compounded over many years. Social Security and many public employee retirement systems increase benefit payments to retirees annually to reflect inflation, but private pension plans generally do not.

- **Investment:** With an increasing share of responsibility for retirement funding and longer investment horizons, retirees often invest a portion of their assets in equities, subjecting them to market risk. When previous generations of retirees invested in equities, it was less likely that they needed to rely on these funds as today's retirees must. Another investment risk is interest rate risk. A common strategy of people who retired a decade or two ago was to invest their retirement assets very conservatively in fixed income products such as certificates of deposit or fixed rate annuities. They saw their income decrease upon renewal of these products as interest rates declined since then.

- **Health:** A focus is needed on both acute care and long-term care. Retirees bear the cost of health care and coverage up to Medicare eligibility and after Medicare eligibility, of Medicare supplement and/or other private health insurance, and any costs over and above what these programs cover. The rapidly escalating cost of health care and prescription drugs will continue to strain retirees' limited resources going forward. While Medicare covers a small part of long-term care, most long-term care is not covered either by employer sponsored health plans or Medicare. An extended period of long-term care needs can decimate even a fairly substantial nest egg, and providing for long-term care is a major issue for many individuals.

The very nature of retirement is also undergoing change. It is no longer standard to stop working altogether and retire. More and more people are retiring gradually, or in phases. In doing so, they are remaining actively engaged in the workforce, perhaps part time, through volunteerism, or even new careers.

All of these factors are making it more difficult for people to plan their retirement. LIMRA, the Society of Actuaries (SoA), and the International Foundation for Retirement Education (InFRE) decided to work together to find out what computerized tools are available to help retirees with their planning. The goal of the research was to determine how prevailing programs treat the retirement phase and, more specifically, how they treat retirement risks.

This report reviews retirement planning software programs currently available to individuals and their professional advisors. Such programs can help individuals decide how much to save toward retirement, how to invest these savings, when they can afford to retire, and how to manage their financial affairs after retirement.

We selected a total of 19 programs for analysis. Six of the programs are available for consumer use, 11 are available for professionals or their firms to help in developing plans for their clients, and two are proprietary programs developed by large planning firms.[1] We developed six case studies to help test the programs and their capabilities. The cases represent a range of situations from pre-retirees to retirees, married couples to individuals, financially not so well off to fairly affluent, and included a variety of special situations and issues.

This report does not rate or recommend specific programs. Rather, it explains how programs that are currently available work, and what features can be improved. This presentation should assist individuals and their advisors in choosing the kinds of programs that will be useful, and encourage software firms and financial institutions to improve the software they make available.

As a result of this research, we hope that:

- More people will plan well for retirement

- People will analyze their options and understand the tradeoffs available to them

- Actuaries will improve the methodology available for planning, and

- Tools will be improved to better handle risks

Conclusions

- 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 are generally not developed to address retirement risks. Instead, the tools mainly mask risk. That is, the calculations may use average figures to represent an individual's future life span, the expected rate of inflation, etc. Because actual experience will vary widely around the averages, in practice such calculations may suggest a plan for retirement which some individuals

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[1]Proprietary programs are developed by planning firms, usually for exclusive use by the financial planners they employ.

can't afford. For example, in selecting a time horizon for the analysis of twenty years, a program may provide a false sense of security if the results show the financial resources sufficient to provide required income over that time, when in fact their resources may not last much longer. Because of the lack of risk treatment, it is important to run multiple scenarios.

- The programs varied greatly on their inputs and how to treat 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 was impossible. However, there is tremendous variability across programs regarding when the assets ran out, if at all.

- With results that vary across programs, it is recommended that, where possible, consumers or financial professionals working with them run multiple programs and use multiple scenarios within each program.

- These programs are merely tools to help facilitate the retirement planning process and there is no right answer. 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 very likely that professionals using these programs consider many of the issues raised in this report and may also do so out of recognition of the limitations of the program(s) they have chosen to use.

RECOMMENDATIONS

Specific recommendations follow for financial services providers, financial planners and advisors, consumers, actuaries, and software manufacturers. Since the analysis focuses on the programs themselves and not on the various industry players, the majority of the recommendations suggest improvements that the manufacturers of these types of programs might want to consider. Many programs apply more to specific situations or segments of the population (e.g., a program that has little Social Security capability may not be an impediment to analysis for a high-net-worth client). As such, some recommendations relate more to some segments than others.

FINANCIAL SERVICE PROVIDERS

- Providers should be selective in which programs they advocate for use in retirement planning. Priority should be given to those programs where multiple retirement risks are examined, particularly those risks that are interdependent. Programs that focus on risks will not only benefit the retiree, they will also naturally frame the analysis in terms of insurable events, which will benefit insurers.

- In order to illustrate the benefits of a provider's products and services, programs could be customized. For example, a long-term care insurance provider's retirement planning program might show the impact of long-term care costs without insurance, compared to a policy possessing the costs and features of one sold by the company.

- Customers who are educated about post-retirement risks will be more likely to appreciate their impact. Consumer-driven programs should therefore contain abundant information about market performance, inflation rates, health care costs and long-term care costs. They must also contain guidance and recommendations specific to the customer's needs.

- Providers need to examine whether developing their own proprietary software is feasible. They should analyze whether they have enough financial advisors to justify the cost, if they have the technical assets to develop and support the software, and whether they can improve on existing software.

FINANCIAL PLANNERS/ADVISORS

- Some financial advisors specialize in a particular aspect of retirement, and often the area of specialization is product based (e.g., annuities, long-term care insurance [LTCI]). They will likely focus on programs that emphasize their specialty. In order to provide retirees with comprehensive retirement planning advice, planners should consider an approach that involves referrals to specialists in other aspects of retirement or collaborate/partner with others to provide this comprehensive service.

- Advisors who provide financial planning for individuals in their accumulation years should be cautious about applying the same tools (or programs that use the same approach) to post-retirement planning. Pre-retirement planning generally involves developing a savings strategy and using appropriate asset allocation and investment vehicles over the course of a known time period. Post-retirement planning needs to address a complex set of risks over the course of an unknown time period. Programs that treat post-retirement the same as pre-retirement could frame the post-retirement strategy inadequately. This does not discount the definite link between post-retirement and pre-retirement goals and considerations. It also does not account for drawing the line in phased retirement or situations where there is no clear cut point of switching from pre- to post-retirement.

- Retirement planning programs, particularly when designed for professionals, require additional interpretation by a financial planner or advisor. Sometimes many of the recommendations are left to the professional. Planners who are relatively new to the business might benefit from a program that contains more built-in guidance and structure.

- Planners need to be in frequent contact with clients to know of any changes that could adversely affect the plan they have provided. A regularly scheduled follow-up with clients to examine how the plan is proceeding and any changes that need to be made is a good idea.

- Since capabilities and results vary widely across programs, professionals should purchase multiple programs to help validate results before making recommendations to their clients.

CONSUMERS

- Consumers should identify the issues that are important to them personally. For example, if their home is a large part of their assets, they need to understand how it is treated in the programs they choose to use.

- If an individual is part of a dual-income couple, be sure the program handles both spouses' incomes.

- Run several scenarios. In addition to incorporating assumptions that demonstrate consumer expectations (e.g., rate of return on assets, inflation, longevity), they should also run best and worst case scenarios.

- Understand that risks can be inter-related. For example, some people may have high acute care and long-term care expenses.

- Setting assumptions requires expertise. Attempt to ensure consistency across assumptions. In some cases, consumers may be better off seeking professional advice.

- Consumers must understand the qualifications of advisors and have them explain the assumptions used. They must also understand the purposes the program was designed for and that their situation fits into those purposes.

ACTUARIES

- Many actuarial risks are not included in these programs. Therefore, actuaries are best suited to help develop methods for demonstrating retirement risks and the impact of various management techniques on those risks. This would include how to analyze multiple risks simultaneously and the impact of utilizing different methods for different risks.

- In developing ways to treat retirement risks, actuaries should consider the interaction of various risks.

- Actuaries should assist in improving programs to help users understand the tradeoffs of risk transfer approaches.

- Actuaries could also identify and communicate specific risks for the financial and retirement planning professions to incorporate when planning.

SOFTWARE MANUFACTURERS

Experience Using the Software

Links
- Programs should improve user friendliness with help screen links next to corresponding inputs. This would greatly reduce the difficulty and frustration involved in finding appropriate information. More important, this reduces the likelihood that a user will overlook something important.

Data manipulation
- Programs should reduce the amount of data manipulation that is needed by users by including more fields and worksheets. Having to perform data manipulation makes the process much more tedious and reduces the value of the program. Allowing for itemization of expenses, income sources, and assets can help to reduce the possibility of miscalculation.

- Programs should provide more expense breakdowns because it is difficult to determine overall expense figures. In particular, programs need to separate expenses related to specific post-retirement risks such as medical or long-term care expenses. Some of these costs may also be tax deductible.

Periodic update capability
- Programs should suggest that users rerun their analysis from time to time since people's circumstances almost certainly will evolve over time. Rather than redoing the analysis entirely, programs could offer an "update" module that allows users to easily adjust inputs periodically.

Capabilities

Income/expense adjustments

- Programs should allow income and expense needs to vary over time because these needs can change. Expenses do not usually increase at a steady, linear rate throughout retirement — they vary depending upon a number of factors, including health status, spousal mortality, statutory age of distribution requirements, and the overall economic environment.

- Consider having programs solve for expenses. Often income is pre-determined in retirement whereas expenses are not. Aside from withdrawals from financial assets, typical income sources such as defined benefit pensions and Social Security are generally set by the time an individual retires. Expenses, on the other hand, can be modified within certain limits. For example, once basic living expenses are covered, a retiree might make ends meet by cutting back on travel or entertainment costs. Retirement programs might focus on helping individuals to manage their expenses, given their income constraints.

- Programs should categorize income sources as guaranteed or not. A pie chart showing Social Security benefits, pensions, and lifetime payout annuities in one color, and work income, asset distributions, and other sources in a different color might be effective, if shown in combination with recommended percentage.

Home equity

- Programs should include specific input and processing for home equity. Retirees can access their home equity through loans, reverse-mortgage annuities, or by selling their home and moving into a less expensive residence. To be useful to individuals who intend to use their home values to finance their retirement, programs must be able to accommodate these situations.

Client specific

- Programs need to include more client-specific goals in their analysis. Doing so will make the analysis more relevant to the individual's particular needs.

- Programs should ask specific questions about current and expected health status in order to assess the need for long-term care. If individuals need it, LTCI should be recommended to insure against long-term care costs. The cost of uninsured long-term care could be directly compared to LTCI premiums over time.

Nonstandard characteristics

- Nonstandard characteristics or circumstances (e.g., immigrants who had not worked enough years in the U.S. to qualify for full Social Security benefits, an elderly mother sharing living expenses with her daughter) posed a challenge to the software. The individuals in these scenarios are not typical, and are difficult to anticipate when creating the programs; however, they are often the very people who require the most guidance.

Dependents

- Programs need to allow for inputs other than clients and spouse. For instance, children and grandchildren can be important considerations in post-retirement planning. Some individuals also care for brothers and sisters, other family members, or friends.

Social Security adjustments

- Social Security will likely remain an important source of retirement income. Therefore, programs must be able to provide useful processing for users facing a variety of situations, including the death of one's spouse, taking early Social Security benefits, and working while receiving benefits.

- The relative importance of social security adjustments varies by market segment. For roughly 40 percent of the retired population this is nearly all of their retirement income, but this group is unlikely to be using professional planners. For the roughly 50 percent in the middle, this is very important. For planners geared toward high-net-worth individuals (the top 5 percent or 10 percent of the population), this is less important since Social Security is a smaller portion of their income.

Updates

- Programs should provide periodic tax law and 401(k) limit updates. This feature will keep the program from becoming obsolete. This feature would be very useful because retirement analysis should be updated periodically. Alternatively, programs could allow users to manually adjust these limits in the program itself. For instance, one of the consumer programs allows users to adjust 401(k) and IRA limits.

Risks

- If the client is not comfortable with the risk as demonstrated, then solutions for managing that risk should be explored. Programs should be able to incorporate these solutions so the client can see the magnitude of the risk decline when the solution is illustrated or implemented. For example, if longevity risk is at a level the client is uncomfortable with, then the program should be able to demonstrate the impact of annuity income on the scenario.

- If a deterministic approach to mortality is employed, care should be taken to guide users in selecting a sufficiently long time horizon. Asking users for the client's life expectancy should be avoided as well. Programs should educate users regarding the likelihood of survival to specified ages for both individuals and couples.

- Programs should be able to handle the consequences and resultant impact on cash flow of the death of either or both spouses.

- For consumer programs, the output should explain non-deterministic analyses (e.g., Monte Carlo procedures) using straightforward language and real-world examples.

- Consider including inputs for needs that could be addressed through risk-transfer products such as long-term care insurance, health insurance, or life insurance.

Output

Describe limitations

- All program limitations should be described to the user. Some of the consumer programs explain their limitations and how the program should only be used as a tool, whereas others include advertisements stating that the results would provide users with all of their retirement planning needs. Failure to provide information about a program's limitations is dangerous because it can make users take the analysis too seriously. This could cause potential business risk and liability issues for program developers.

Provide case-specific guidance/suggestions

- Programs should provide more case-specific suggestions on how to avoid running out of money in retirement. Most consumer programs only show when an individual runs out of money. When consumer programs do provide suggestions, they tend to be very generic. The lack of recommendations in consumer programs represents a serious weakness. Consumers need recommendations on how to fix the problem. They are not financial professionals.

- The decisions involving distribution — when to begin distributions, how to meet required minimum distributions, how much to withdraw, tax implications, the order of withdrawal from different asset classes, whether to annuitize some assets — are often complex and interdependent. Many retirees could use the assistance of a program that integrates all of the factors and constraints surrounding retirement distributions.

Scenarios

- To help software users understand the impact of various assumptions on the results, programs should be able to automatically run sensitivity analysis on several key variables (e.g., investment return, retirement age, inflation).

- No one knows when they will die, regardless of their estimated future lifetime. Therefore, program analysis needs to be less focused on life expectancy. Programs can address variability of life span much better by automatically showing different outcomes based on a range of different life spans.

INTRODUCTION

In the business community, there has been a shift in employment away from large companies to small companies, and a shift to many more people having defined contribution plans as their primary retirement plan. In addition, defined benefit plans are increasingly offering lump sum distributions. When employees have a choice of a lump sum vs. monthly income, it has been observed that they overwhelmingly choose lump sums. Many people have only 401(k) benefits, and others have no retirement plan at all.

All of these changes are part of a larger trend toward greater emphasis on individual responsibility for retirement. However, in order for individuals to assume this responsibility effectively, they must have access to methods for better understanding their options for financial management both before and after retirement. This includes understanding the risks they face and the options for addressing those risks.

In this study we compile information about the methods used by various retirement planning tools to address issues related to risk and uncertainty. We are primarily interested in post-retirement risks and in risks faced by people who are near or at retirement age. With this as our charge, we set out to analyze prevailing software tools that address the retirement phase. The main forms of distribution of such software today are Web sites, CD-ROMs, and diskettes.[2]

The original plan was to analyze a total of 24 programs: six designed for consumer use and 18 for financial services professionals. Of the 18 professional programs, 12 were to be available for professionals or their firms to purchase and six were to be proprietary.[3] The rationalization for this mix of programs was the hypothesis that when software is employed in retirement planning, it is most often used by professionals for their clients and less often used by consumers for themselves. We were unable to find six firms with proprietary programs that were willing to have their programs included in this analysis. In the end, a total of 19 programs were analyzed: six designed for consumers and 13 designed for professionals, including two proprietary programs.

This study reviews retirement planning software, which is one of several kinds of calculation tools available to workers preparing for retirement.

1. Retirement savings calculators tell workers how much they will need to save in order to attain a certain level of income after retirement. Such a program usually tells the worker the pattern of savings needed to retire at a given age or, less frequently, the retirement age when a given level of retirement income will be available. A retirement savings calculator usually gives a single numeric answer. Although such a tool can be helpful as a rough guide, a retirement savings calculator disregards much of the uncertainty and risk inherent in planning for retirement and does not give any analysis of the post-retirement period.

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[2]One program in the study, T. Rowe Price's *Retirement Income Manager* is actually a lengthy form for the consumer to complete and return to T. Rowe Price. However, T. Rowe Price then enters the data, runs it through their program and returns a report to the customer.

[3]Proprietary programs are developed by planning firms, usually for exclusive use by the financial planners they employ.

2. Online advice providers have this same general approach. Although they also may provide information about asset mix, they have the same shortcomings with regard to the post-retirement period.

3. Retirement planning software goes further, recognizing that we don't know the answers to some important questions. How long will the worker (and spouse) live? How will their retirement years unfold, including any needs for health care or long-term care? After they retire, what will happen to investment return, inflation, and health care costs? To deal with such uncertainties, retirement planning software allows for more input data, and gives a wider range of answers. For example, instead of a single numeric answer, retirement planning software can output ranges of probability or alternative courses of action.

Retirement Calculators

About one third of American workers claim to have calculated how much they need to save for retirement.[4] Many people may have used online retirement calculators, given their prominence on financial services companies' Web sites. The goal of most of these is to put you on track to save adequately for retirement. A cousin to the standard retirement calculator is the reverse retirement calculator, or million-dollar calculator. Such programs tell users how much they need to save each year in order to amass $1 million by their predicted retirement date. Programs such as these may lead some to believe (correctly or not) that $1 million is the key to a comfortable retirement.

The targeted sum to accumulate is calculated as some present value of annual retirement income that is a percentage of pre-retirement income (the percentage is either assumed by the program or entered by the user). This strategy does not help users plan their actual retirement, nor does it address the many risks people face in retirement. These risks include uncertainty of investment returns, variability in mortality, and the risk of catastrophic health care costs, among others. For this reason, retirement calculators have been excluded from this analysis.

Online Advice Providers

During the last several years, several firms have created programs to help retirement plan participants determine how to allocate their plan contributions and assist them in selecting specific funds among those available to them in the plan. Their absence in the list of programs included in this analysis may seem conspicuous at first glance. To our knowledge, however, existing online advice providers (such as Morningstar, mPower, Financial Engines) do not offer programs that address the retirement phase.

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[4] *2002 Retirement Confidence Survey*, Employee Benefits Research Institute, the American Savings Education Council, and Mathew Greenwald and Associates, http://www.ebri.org/rcs/2002.

Use of Retirement Planning Software

This study analyzes retirement planning software programs with an eye toward how they handle the retirement phase in general and the many risks retirees face in particular. However, these programs are only tools and are not, nor could one expect them to be, the answer. In this report, you will find that the prevailing programs do not do an adequate job in their treatment of most post-retirement risks. Such risks are likely incorporated into discussions with financial professionals.

In addition, not all people are capable of doing their own retirement planning. Retirement risks only add to the complexity of the job. Whether or not prospective retirees are engaging the assistance of a paid professional, there is sufficient data to suggest they are not using financial planning software in planning their retirements. According to one study, just 7 percent of recent retirees used retirement planning software when deciding what to do with money in their retirement plans.[5] Data from another study shows that 3 percent of retirees purchased financial planning software, 2 percent use Internet tools, and 6 percent use tools they created (e.g., spreadsheets) for financial planning.[6] It does not appear that financial planning software is generally available at the worksite either.[7] Just 4 percent of near-retirees and 8 percent of retirees that have started planning the details of their retirement used financial planning software provided by their employers to help them in that planning.[8]

How to Use This Report

The remaining chapters of this report primarily cover the analysis of the capabilities of the software programs analyzed. Implications and recommendations for various individuals or types of firms are also included.

Retirement planning software developers can benefit from this report's suggestions for improving existing software. Existing software providers have a competitive advantage in that they already have a program(s) developed. They will be able to implement recommendations quicker than a firm that decides to build a program from scratch.

Financial services professionals, particularly those that are independent, must decide what tools to use in their practice. This report provides guidance on the types of capabilities to look for as well as what drawbacks to watch out for in any program.

Financial services firms, including banks, investment companies, and insurers, all manufacture and distribute products for retirees, including investment and insurance products. Such firms have an interest in making sure any software they develop or software available in the marketplace adequately provides for the purchase of the types of products they develop. For example, insurance companies would benefit from programs that have provisions for immediate annuities, and that educate consumers (and professionals) about longevity risk.

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[5]*Opportunities in the Pension Rollover Market: Employee Perspective,* LIMRA International, 2002.

[6]Unpublished data, LIMRA International, 2002.

[7]One program in this study, *LifeFocus* by the Rouse Companies, is specifically designed for use at the worksite.

[8]*Retirement Planning:The Ongoing Challenge,* LIMRA International, 2003.

CHAPTER 1: EXPERIENCE USING THE SOFTWARE

The researchers analyzing the software programs spent a great deal of time learning how to use them, running them, and finally, analyzing them. The learning curve for consumer programs needs to be relatively short and probably not too long for programs designed for financial professionals. In this chapter, we look at how user-friendly these programs are and what guidance programs offer for using the software and interpreting the results.

EASE OF USE

The ease of use of consumer programs was rated on a scale of one to five (1 = very complex, 5 = very easy).[9] Five consumer programs were given a score of four or five. Quality of assistance and speed in which users can perform an analysis are important criteria when rating ease of use.

TABLE 1-1

Consumer Software: Ease of Use

Score	# of programs
1	0
2	0
3	1
4	2
5	3

Quality of Assistance

Many factors determine a program's quality of assistance. These factors are even more important for consumer programs because consumers are less likely to be familiar with the terminology. Factors considered in determining quality of assistance include help screens, online manuals, and detail worksheets.

Most consumer programs provide a good degree of assistance. Some consumer programs include on-line help guides that facilitate data entry. One consumer program includes step-by-step explanations for all necessary inputs. Two consumer programs offer help in the form of a phone representative.

Some consumer programs have extensive help files that provide good assistance on filling in inputs. These help files often contain glossaries of terms and user guides that facilitate navigation through the program and understanding of program graphs and tables.

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[9]The ratings applied to the scales used in this chapter were selected by the researchers running the programs and, as such, are somewhat subjective.

A few consumer programs include expense worksheets that allow users to enter detailed expense information. Users may find it difficult to estimate their total annual expenses. Having a worksheet that breaks down total expenses into specific components can be very helpful.

Ease of use is less critical with professional programs since financial professionals tend to be more knowledgeable of the vocabulary and analysis. Also, professionals using these types of programs will undoubtedly use them repeatedly for their various clients, so while there will be a learning curve, with practice they will become relatively proficient at using the program(s) they have chosen. However, financial professionals are not necessarily technically savvy, so the quality of assistance remains an issue for those users also. Complexity of inputs was measured in professional programs on a scale of one to five (1 = very complex, 5 = very simple). Eighty percent of the programs had a score of three or higher.

TABLE 1-2

Professional Programs: Input Complexity

Score	# of programs
1	1
2	1
3	5
4	6
5	0

Time Savers

Criteria considered in determining how quickly a consumer can conduct an analysis include the following: Does the program alert users to specific fields that need to be answered? Can a consumer quickly jump from section to section within the program? Does the program include help links near corresponding inputs?

One consumer program alerts users to answer only those questions that are necessary to their specific situation. This feature makes it very easy to start using the program and can significantly shorten the user's learning curve.

A few consumer programs include hyperlinks that allow users to quickly move among various data sheets and reports within the program. This feature becomes very helpful with programs containing many data sheets that would otherwise be time-consuming to navigate.

One important distinction between the consumer programs analyzed is whether they provide context-sensitive help links or if they force users to go through instruction manuals to find appropriate information. Having to sift through lengthy instruction manuals can be frustrating. Only one program includes tip buttons that are located directly next to corresponding fields. These tip buttons link to different explanations, tables, and charts that help users fill corresponding fields in a timely manner. This feature reduces the likelihood that users may overlook an important detail that may be missed in a lengthy instruction manual.

One software package includes a "Wizard" that explains how each data screen works, and tutorials that help with saving and investing issues. These features can dramatically reduce the user's learning curve.

One area where programs become more complex is when they utilize stochastic[10] analyses, such as Monte Carlo simulation. It is difficult, especially for consumers, to understand statistical terms such as standard deviations within Monte Carlo graphs.

Inputs

Users must input various data throughout each program. Examples of inputs include income tax rates, income levels, date of birth, retirement age, and Social Security benefits. The number of possible inputs within consumer software packages range from 20 to 160. As one would expect, the number of inputs increases with professional software,[11] which ranges from a low of 70 to a high of 480.

Having relatively few inputs makes consumer programs appear simplistic. However, this is not always the case. Occasionally, a substantial amount of data entry manipulation is necessary to force the scenarios to run. The majority of consumer programs ignore certain inputs that can be very important to post-retirement planning.

Consumer programs often completely overlook home equity. As a result, users are either forced to manipulate the data that they enter into the program's limited fields or are forced to enter extra data, assuming the consumer even recognizes that home equity is lacking and should be incorporated into a section where it really does not belong. For instance, the sale of a home had to be entered in the investment deposit section of one program and in the income section of another. Since the home sale was not occurring until a future date, the entry had to be manually adjusted to include an increase in home prices in one program. In another program, after entering the home sale in the income section, the program required that the income be either fully taxable or fully non-taxable. With home equity, the first $500,000 of gains is usually nontaxable, while excess gains are taxed. All this data entry manipulation is time consuming and reduces the value of the program. Yet another program includes a section on home equity, but demands that the client sell the home immediately.

Some consumer programs do not include specific investment fields such as IRAs, 401(k)s, and 403(b)s. When programs lack these specific input fields, users are forced to lump these funds into what is generally an overall investment fund input. It would be helpful if these programs included more specific field entries, especially since different funds can be expected to grow at different rates. When lumping together different investment funds that include different rates of return, users must average out the expected rates of return.

Some consumer programs do not split client and spousal entries, while other programs do not include field entries for dependents such as parents and children. The dependent mother in Case 3 (see Appendix C) had to be entered as a spouse in the consumer programs because there were no options other than *client* and *spouse*.

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[10] See Chapter 3: Risks and Chapter 4: Output, for a discussion of this approach.

[11]Non-proprietary programs only. It was not possible to count the number of inputs with proprietary programs.

APPROPRIATENESS OF ASSUMPTIONS AND THEIR VALUES

The majority of consumer programs allow users to enter assumptions such as inflation, rate of return on assets, salary increase rates, pre-retirement tax rates, post-retirement tax rates, and life expectancy. Some of the programs provide guidance including historical data to help consumers fill in these assumptions. For instance, one program provides various life expectancies for different age groups. Only one consumer program extensively limits the number of assumptions that users can enter. This program assumes an inflation rate of 3.08 percent this year and updates this rate each year, a lifetime of 90 years, and a state tax rate of 5 percent.

HOW CLEARLY RESULTS ARE PRESENTED AND EXPLAINED

Some programs provide good guidance in interpreting results, whereas other programs provide little or none. Guidance is extremely critical, especially with consumer software. How clearly results are explained was rated on a five point scale (1 = poorly, 5 = very well). For consumer programs, four programs received a score of either four or five. Lower scores are attributable to output screens that were difficult to understand. For instance, one program does not provide any recommendations and the output screen is just one page with no qualitative explanations. Professional programs scored better than consumer programs on how clearly results are presented and explained.

TABLE 1-3

How Clearly Results are Presented and Explained

(Number of programs)

Score	Consumer	Professional
1	0	0
2	1	1
3	1	5
4	2	2
5	2	5

HOW VARIABILITY OF RESULTS IS EXPLAINED TO CONSUMER

The professional programs were rated on how well they explained the variability of results to consumers on a scale of zero to five (0 = not at all, 5 = very well). Most of the programs were rated very poorly. Presumably professionals are expected to explain results to their clients.

TABLE 1-4

**How Well Professional Programs Explain
Variability of Results to the Consumer**

Score	# of programs
0	4
1	0
2	3
3	5
4	1
5	0

CHAPTER 2: CAPABILITIES

This chapter focuses on the general capabilities of the programs analyzed, especially as these capabilities relate to the post-retirement period. Many of the features discussed here can improve the usability or overall quality of the product. However, these features may or may not be relevant to our investigation of risks in retirement.

We assumed that programs designed for direct use by consumers would be simpler and therefore have fewer capabilities than those designed for use by financial professionals. Consumer-oriented programs also require more user guidance and helpful recommendations than professional programs. Accordingly, our discussion begins with the capabilities especially relevant to consumers when running programs for themselves and concludes with capabilities applicable to consumer and professional programs alike.

CAPABILITIES OF CONSUMER PROGRAMS

Post-Retirement Issues: What Do They Consider?

Various post-retirement issues are considered in the consumer programs. However, few consumer programs consider the same issues. The issues include inflation protection, survivorship, when to start Social Security, diversification and investment allocation strategies, stock holding periods, changing income needs, success probabilities, and variability of returns. One program takes variability of returns into account by running a series of simulated market scenarios. This program utilizes randomly generated return rates to build yearly investment type returns. Two consumer programs include information on issues such as long-term care and disability coverage. However, these issues are not used in the program analysis. One consumer program includes information on the benefits of using annuities.

Job Earnings During Retirement

Four of the six consumer programs we examined allow users to continue to work in retirement. Two of these consumer programs allow for varying wages/work schedule during retirement. For those individuals who retire prior to the age of full benefits but continue to work, none of the consumer programs adjusted their Social Security benefits because of earnings in excess of a dollar limit. That is, the programs did not attempt to follow the actual Social Security formulas, which first decrease benefits up to the full-benefit age, then increase benefits after that age (or the age at which the individual stops working, if earlier) by an amount which is approximately equivalent. Because the values of the decrease and increase are offsetting, these programs use a method that is valid for long-term planning, though the year-by-year cash flow numbers are distorted. It would be incorrect to recognize just the decreases and not the subsequent increases.

Account Aggregation

Two consumer programs allow users to enter asset information for several kinds of qualified plans (both individual and employer-sponsored) as well as nonqualified assets. These amounts are then aggregated for the analysis. One of these programs also allows users to list assets that are not earmarked for retirement income purposes. Another consumer program allows users to enter asset information for different stock investments. The remaining programs simply ask for a single, total asset figure from which analyses are performed.

Saving Multiple Cases

Four consumer programs allow users to save practically an infinite number of cases for future use. Only one consumer program does not have the capability of saving prior data, but instead only saves screen shots. The capability to save multiple cases is essential for adequate planning, in order to reflect the changes retirees face, including trends in the economic environment and re-prioritization of planning objectives.

Lack of Inputs

As discussed in Chapter 1, the simplicity and small number of inputs within consumer programs leads to serious capability shortfalls.

- Only one consumer program includes sections specific to home equity. Home equity can be a substantial source of retirement income. Retirees may choose to sell their home and relocate to a less expensive residence. The absence of home equity represents a huge disadvantage.

- No consumer programs include specific sections designated to education expenses. Grandparents or parents may include this in their financial and retirement planning.

- Only one consumer program examines user attitudes and ideal retirement goal issues.

Guidance Given on Assumptions Required of Consumers

The need for guidance on the various assumptions is less important for planners, who presumably have a better understanding of inflation rates, rates of return, life expectancy, and so on. As a result, this section mostly deals with the degree to which programs designed for consumers provide assistance in determining reasonable inputs.[12]

Rate of return on assets

All consumer programs provide assistance with estimating rates of return on assets. This assistance is generally in the form of historical rates of return data for conservative, moderate, and aggressive asset allocations.

Salary increase rate

The single consumer program that includes inputs for salary increase rates suggests that the inflation rate should be considered when determining salary increase rates. No other guidance is provided.

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[12]One consumer program, for which users complete a paper input form, allows the consumer to call for assistance with any of the items prior to submission. This program was not considered for this section.

Inflation

The level of guidance that consumer programs provide on inflation was rated on a scale of zero to five (0 = no guidance, 5 = lots of guidance). The results were mixed, with some programs providing good assistance and others providing little or none (Table 2-1).

TABLE 2-1

Guidance Given on Inflation

Score	# of programs
0	1
1	2
2	0
3	0
4	2
5	0

Taxes pre- and post-retirement

The amount of guidance that consumer programs provide regarding tax rates during pre- and post-retirement was rated on a scale of zero to five (0 = no guidance, 5 = lots of guidance). Only one program provided a meager level of guidance with a rating of two. All other consumer programs provided no guidance.

Life expectancy

Three consumer programs provide advice regarding life expectancy. The advice includes charts that illustrate different life expectancies for different age groups. One program suggests that users enter ages that are older than they anticipate in order to be safe.

CAPABILITY ISSUES WITHIN PROFESSIONAL AND CONSUMER PROGRAMS

Ability to Handle a Wide Range of Potential Retirement Issues

While the programs possess the ability to demonstrate the impact of changes to a pre-existing scenario, they often suffer from an inability to handle all of the relevant details of the scenarios we used.

TABLE 2-2
Frequency of Inputs

	Many programs asked for	Some programs asked for	Few programs asked for
Inflation	✓		
Date of birth	✓		
Marital status	✓		
Retirement years	✓		
Age want to retire	✓		
Income tax rate	✓		
Salary increase rate	✓		
Annual pension income	✓		
Rate of return on assets	✓		
Gender		✓	
Primary residence current value		✓	
401(k) current balance		✓	
Traditional IRA current balance		✓	
Personal risk tolerance		✓	
State of residence		✓	
Children's college costs			✓
Long-term care benefit desired			✓
Annual medical cost increase			✓
Life insurance death benefit			✓

Many = 6+ programs, Some = 3 to 5 programs, Few = Fewer than 3 programs

Table 2-2 displays a sampling of inputs that are contained in many programs, some programs, and few programs. For the most part, programs asked for basic information about age, expected retirement length, income taxes, pension income, rates of return on assets, and marital status. A handful of programs asked for account balances in specific investment categories (e.g., 401(k), IRA), primary residence value, or personal risk tolerance. Very few programs contained inputs for needs that could be addressed through risk-transfer products such as long-term care insurance, health insurance, or life insurance.

The lack of frequency for many critical inputs made it difficult to run the various scenarios through the different programs. Much of the output variability can be attributed to this input variability. For example, most professional programs had difficulty handling the sale of a residence — at times, the value of the home was simply considered an investable asset. Five professional programs also were unable to allow for scheduled withdrawals from savings for a set number of years, followed by a different distribution schedule thereafter.

Nonstandard characteristics or circumstances (e.g., immigrants who had not worked enough years in the U.S. to qualify for full Social Security benefits, an elderly mother sharing living expenses with her daughter) posed a challenge to the software. The individuals in these scenarios are not typical, and are difficult to anticipate when creating the programs; however, they are often the very people who require the most guidance.

ABILITY TO USE OWN ASSUMPTIONS

Rate of Return on Assets

Four of the six consumer programs allow users to include their own rate of return on assets. Software intended for professional planners allows users to set the rate of return on assets. Some consumer and professional programs went a step further and produced (through Monte Carlo analysis) a range of possible returns, based on anticipated volatility above and below the expected return. Others used a simpler approach that produced a single (deterministic) answer based only on the expected return.

Professional programs generally allowed for different rates of return for different asset types and investment classes (e.g., equities, bonds). Only one professional program forces users to accept a set of established rates of return for different risk tolerance levels.

Three consumer programs allow for different rates of return for different asset types. One consumer program allows for different returns for pre- and post-retirement.

Several programs provided users with historical rates of return for various investment classes, to help determine appropriate inputs.

Salary Increase Rate

All professional programs are able to increase income at a specified rate, whereas only one consumer program allows for this. This consumer program also allows users to increase their salaries at different rates at different points in time.

Inflation

All professional programs enable users to set a rate of inflation. Several professional programs provide a default rate. All but one of the professional programs has the additional ability to set different cost increases for medical, college tuition, and other costs that historically rise at a faster rate than general inflation. Four of six consumer programs also allow users to set a rate of inflation. One consumer program does not allow users to enter an inflation rate, but instead assumes a certain rate that is updated annually based on historical data.

Taxes Pre- and Post-Retirement

In general, the programs we examined are not geared toward a detailed tax analysis. The programs are most appropriate in cases where taxes were a straightforward function of income, without consideration for deductions. Situations where a retiree receives many sources of income with

different tax implications (e.g., life insurance proceeds, Social Security benefits, part-time work, pensions, distributions from qualified retirement plans) would likely overwhelm the capabilities of most of the programs examined.

Programs for professional planners adopt a variety of approaches for dealing with taxes. Some ask for a marginal tax rate with an input for total deductions. Other programs ask users to complete a shortened version of a tax form. Eight professional programs determine the approximate amount of tax to be paid based on the inputs.

For six of the 13 professional programs, tax rates are specified for pre- and post-retirement income. Some professional programs simply adjust tax rates after retirement to reflect the drop in income that occurs at this point.

Four of six consumer programs do not allow users to include both pre- and post-retirement tax rates. Instead, these programs allow for only one tax rate input. One consumer program includes a worksheet to help consumers determine average tax rates by itemizing specific tax expenses.

Percent of Final Pay Target for Retirement Income Needs

Despite the fact that many sources urge people to plan to spend a certain percentage of their pre-retirement income (e.g., 70 percent) on post-retirement expenses, several professional programs make entering this goal difficult. In part, the difficulty involves the tax treatment of these income needs. If a client wants to receive 90 percent of her annual gross pre-retirement income in retirement, then the planner may need to adjust this goal to reflect taxes; usually, this adjustment has to occur after the analysis is run, so that the taxes can then be subtracted from the goal to determine available spending. None of the programs explicitly ask for a replacement ratio (percentage of pre-retirement income). One consumer program suggests that users aim for a specific replacement ratio for estimating retirement income needs (e.g., 70 to 80 percent). However, this program warns the consumer that this is only a rough estimate, and that everyone's needs are different.

Life Expectancy

Users of all but one of the professional and consumer programs can enter the expected age of the client's (and spouse's) death. However, two professional programs have a default death age based on life expectancy. One consumer program has a default death age of 90.

One program for professionals urged the planner to "use the client's life expectancy age" (which it did not provide). No professional or consumer programs allow users to specify a range of possible death ages for a single scenario. This inability to consider variability in estimated future life span represents an enormous weakness within these programs (see Chapter 3 — Risks, for further discussion of longevity risk).

Treatment of Married Couples as Two Individuals or as a Unit

Professional software programs generally are capable of handling married couples as a unit, in terms of household expenses. For nine professional programs, at least expenses could be grouped together for two individuals. Income sources (and sometimes assets) were kept separate. Non-married couples (e.g., Case 3) posed a problem for seven of the programs. For example, tax filing status could not be set correctly (e.g., two individuals filing separately) for one program.

Two of the consumer programs treat married couples as a unit and four treat couples as two individuals. One consumer program allows users to input data as two individuals, but combines the two individuals together when displaying results. Another program does not allow for joint income handling for Social Security.

Approach Used to Determine Personal Risk Tolerance

For the most part, the professional and consumer programs make no attempt to discover the client's personal risk tolerance. Four professional programs explicitly asked for the client's attitude toward investment risk. Some professional programs allow users to rank client goals (e.g., provide adequate income in retirement, minimize taxes, protect assets) but the ranking has little or no impact on the actual analysis.

One consumer program has a list of questions, including some dealing with the desire to preserve principal and minimize exposure to market volatility, which the client answers using a 1 to 10 scale. Otherwise, the consumer programs do not assist users in determining personal risk tolerance.

Provisions for Frailty of Spouse

A variety of approaches were observed for spousal frailty. Six programs contain modules dealing with disability and/or long-term care needs, and allow users to see the impact of hypothetical disability on the individual's or couple's financial situation. One program asks general, open-ended questions about the health status of the client or couple. Finally, another makes no mention of disability or long-term care.

The integration between these separate disability or long-term care modules and the main program is not always clear. Some programs adjust expenses in the main program to reflect the results of the disability/long-term care analysis, while others do not. Presumably, these stand-alone modules are for illustration purposes only.

Fewer consumer programs consider provisions for frailty of spouse. Two programs include information on long-term care. Otherwise, consumer programs are limited when it comes to provisions for frailty of spouses.

Provisions for Death of Spouse

Most consumer programs do not adjust Social Security benefits when a spouse dies. Instead, this adjustment has to be done manually, which greatly adds to the time it takes to carry out the analysis. Consumer programs do not handle survivor income on pension and annuities. One consumer program measures life insurance needs, whereas most other consumer programs ignore life insurance.

For the professional programs, many of the same capabilities and limitations regarding disability/long-term care analysis are present in their spousal death analysis. Some packages mention life insurance benefits, or offer a life insurance needs analysis, while others do not. Upon the death of a spouse, most survivors face a reduced income stream, but also are able to reduce their expenses. All professional programs allow users to adjust expenses following the death of the client's spouse.

Distribution Alternatives for Qualified and Nonqualified Assets

Professional programs differ in their treatment of distributions from qualified and nonqualified assets. One program assumes that qualified assets would be distributed first, but allows users to change the withdrawal order from any nonqualified assets. Others allow for any order of withdrawal. However, five programs neither allow nor mention different withdrawal strategies. Even those programs that allow users to vary the distribution from qualified and nonqualified plans do not always provide any clear guidance or recommendations on how to best do so.

Furthermore, programs show a great deal of variation in their sophistication regarding required minimum distributions from qualified plans. While some have automatic withdrawals to meet current federal requirements for people above a certain age (i.e., 70½ years), other programs would allow for any pattern of withdrawal, regardless of the potential for tax penalties.

Only one consumer program offers a specific distribution strategy, balancing the stated needs and use preferences. The other five programs we examined have no flexibility in terms of withdrawal from retirement assets.

Approach Used to Adjust Results for Income Taxes

All professional programs include inputs on tax rates; some ask for specifics such as state and local tax rates, or include a shortened tax form for processing deductions. Programs are generally able to make adjustments to taxes following the death of a spouse, either by automatic reduction of a tax rate or through manual adjustment.

Consumer programs ask for a single tax rate; one program asks for a pre- and post-retirement tax rate. None of the programs are capable of determining tax rates based on each year's earnings and/or capital gains.

The tax treatment of inputs was sometimes a source of confusion in processing the cases. While most programs ask for the client's tax rates, the programs differ in whether they assume retirement income needs are in pre- or post-tax dollars. For example, a user might enter the goal of receiving $10,000 annually from savings during retirement, in order to cover expenses. Depending on the software, this $10,000 withdrawal might be taxed or not. If it is assumed to be pre-tax, then the withdrawal amount is reduced based on the tax rate specified, and the user must manually adjust upward the amount withdrawn in order to reach the $10,000 goal.

Moreover, most programs do not determine whether Social Security benefits would be taxable, based on the overall income of the individual or couple.

Very few professional programs allow consumers/professionals to receive updates to remain current with respect to any changes in the tax code.[13] One consumer program offers updates that allow users to receive new tax rate and tax credit rate files periodically.

The professional programs usually allow users to adjust distributions at specific times, such as after a spouse dies. However, the programs generally do not make adjustments to required minimum distribution schedules (see Chapter 4 — Output).

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[13]It may be that software manufacturers intend to incorporate new tax and Social Security modifications in future versions of the programs.

Scenarios

Three consumer programs take into account a range of scenarios by utilizing Monte Carlo methodology. Two other consumer programs provide tools that help users quickly adjust key variables to see how the analysis is impacted.

In terms of investment returns, professional programs usually provide users the ability to show the results under a variety of different scenarios. For example, Monte Carlo analysis is included in three professional programs in order to demonstrate the probability of various outcomes given the original inputs.

On the other hand, some programs use deterministic methods, where only a single outcome is presented. This approach serves to mask riskiness, and represents a major pitfall associated with some software. In the absence of guidance from a planner, people might implicitly assume that the single outcome presented by the program will be correct, and thus base their planning from this result. Moreover, if a higher expected investment return is entered for a riskier asset without reflecting the risk, users will likely be led to migrate their investments to riskier investment classes. Risk is therefore both unexplained and hidden from users.

Six of the professional software packages display flexibility in creating alternate scenarios, which can then be easily compared with the original case. This feature can be especially helpful in cases where the program indicates that the original plan was insufficient; the user can see what happens if the client were to work an additional few years, or change asset allocations, or save more in the years preceding retirement. However, other programs require manual input of new data and re-running the analysis in order to show different outcomes.

Administrative Costs

Depending on the particulars of the cases, the retirement plan could involve various additional costs associated with its implementation, such as fees for a lawyer or other professional. For both consumer and professional programs, recommendations are either not specific to the case, or entirely left to the planner/user. There is no discussion of how to deal with administrative costs or the complexity of the recommendations.

Retirement Asset Withdrawal Strategy

The professional programs do not provide guidance on asset withdrawal strategies; in fact, some restrict the user's ability to specify the order of withdrawal (see "Asset Distribution Alternatives for Qualified and Nonqualified Plans" above). This is a fairly serious limitation, given the different tax consequences of withdrawing nonqualified assets versus qualified assets, and the penalties incurred when required minimum distributions are not met. The guidance not provided by the programs is undoubtedly something which professionals provide by advising their clients.

For the most part, consumer programs do not produce a withdrawal strategy for retirement assets. One consumer program suggests using up nonsheltered investments before sheltered investments. Another consumer program includes articles on withdrawal strategies.

Retirement Asset Investment Strategy

One professional program offers a case-specific recommendation concerning the investment strategy for tax-qualified and nonqualified retirement assets. The user of each program generally has considerable flexibility in setting asset allocations, specific investment types, and rates of return, but the only guidance in doing so, presumably, comes from the planner him/herself. Another professional program includes worksheets that compare the outcomes of investing in different products such as CDs and insured annuities. This program also includes worksheets that compare investing in qualified versus nonqualified investments.

Three consumer programs investigated provide users with flexibility in setting asset allocations, investment types, and rates of return. Two consumer programs provide users with an optimal investment allocation and include qualitative sections discussing the advantages of products such as annuities and bonds.

Increasing or Decreasing Income Needs Over Time

Only one consumer program allows users to adjust their income needs over time. The inability to adjust income needs over time is a serious weakness because lifestyles, and thus income needs generally do not remain constant during retirement.

Unlike most consumer programs, the majority of professional programs have the ability to vary an individual's or a couple's income needs over time. One program could not limit particular expenses to a given time period (e.g., medical expenses that cease when the person receiving them dies).

Alerts

A final capability that we assessed involved programs' ability to ensure quality control of user inputs. Even if a program performs reliable analyses, results will not be useful if the original input is faulty. Ideally, all programs should provide some kind of warning or alert if inputs fall well outside a reasonable range (e.g., an annual inflation rate of 50 percent, or an interest rate of 60 percent). For consumer programs, it might even be necessary to prevent an analysis from continuing unless the user changes the input. Likewise, programs could warn the user if too great a proportion of their assets are allocated to a single investment, and are hence subject to diversification risk, or are located solely in low-liquidity assets, subject to liquidity risk. The most sophisticated programs could go a step further and ensure that combinations of inputs are sensible. For example, it is highly unlikely that very high inflation could occur simultaneously with very low bond returns.

To assess quality control capability, programs were tested to see if they would warn the planner/user if extreme assumptions were entered into their various data fields. Two programs do not allow planners/users to enter their own assumptions. Thus, they were not included in the analysis. As shown in Table 2-3, relatively few of the programs alert users that their inputs fall outside of a reasonable range. None of the programs are capable of warning the user if the combination of high inflation and low bond returns or a high concentration in a single investment is entered.

TABLE 2-3

Program Alerts

Program Alerts	# of programs that alert planner/user
Alert interest rates over 25%	2
Alert inflation rates over 20%	1
Alert tax rates over 70%	3
Alert life expectancy over 150	4
Alert high inflation and low bond returns	0
Alert if high concentration in a single investment	0

CHAPTER 3: RISKS

As mentioned in the Introduction, one of the main purposes of this research is to determine how prevailing retirement planning software programs address the many risks people face in retirement. In this chapter we define these risks, describe several approaches for addressing and managing them, and discuss how the programs analyzed address these risks. Table 3-1 provides a definition of several retirement risks. The risks listed are the more significant retirement risks and these will be the focus of this chapter.[14]

TABLE 3-1

Retirement Risks

Risk	Definition
Mortality risk	
• Order of death	The risk that a surviving spouse may not have the financial and nonfinancial resources to maintain his/her standard of living. The impact often varies depending on which spouse dies first.
• Longevity	The risk that retirees will live so much longer than expected that they will not be able to maintain their standard of living in retirement.
Investment risk	
• Market risk	The risk that actual investment returns on equities are less than projected because of adverse stock market trends or unfavorable portfolio management. A few years of poor investment performance early on can be very costly.
• Interest rate risk	The risk that interest rates will decline during retirement, particularly when fixed income investments (such as CDs or deferred fixed annuities) mature or come up for renewal.
Inflation risk	The risk that rising prices will erode purchasing power over time. Retirees living on a fixed income will eventually feel the impact of even modest inflation.
Health care costs	This is the risk of not having sufficient funds or not anticipating health-related costs over and above what Medicare and any Medicare supplement policies a retiree has will cover. Included are prescription drug costs, which have grown rapidly in recent years.
	Individuals retiring before age 65 will not be eligible for Medicare until that age. They will need to purchase private coverage. Such coverage is not widely available and they may be uninsurable.
Long-term care costs	The risk that long term nursing or related care will be needed. Such costs can liquidate a retiree's savings in a short time.

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[14]Other risks that can have a significant impact on some retirees and may be less well known include: business risks, particularly if the pension plan sponsor goes out of business or an insurer becomes insolvent; employment risk, since many retirees will supplement their incomes with earned income; changes in marital status during retirement can impact benefit entitlement and divorce can create financial problems; and retirees' children and parents may have needs that cannot be anticipated.

APPROACHES TO ADDRESSING RISK

There are many potential means of addressing risks in retirement planning tools. No single method is perceived to be superior for all risks. Each has its strengths and weaknesses. There appear to be three primary approaches that can be applied to virtually any risk.

1. The deterministic approach utilizes a single assumption or one that might change over time. An example is assuming a 3 percent rate of inflation.

2. The scenario approach is nothing more than applying the deterministic approach several times, changing the assumption at hand each time. Using the same inflation example, scenarios showing no, low, moderate, and high inflation could be run to demonstrate the impact on one's retirement plans of different levels of inflation.

3. The stochastic approach, often called the Monte Carlo method, is analogous to spinning a roulette wheel hundreds or thousands of times to see what numbers come up. For example, if we want to model longevity, the numbers on the "wheel" represent probabilities of dying vs. surviving one year. Or, if we want to model investment return on equities, the numbers represent historical stock market performance data. A numeric example below illustrates this concept in more detail.

It should be noted that these approaches do not manage risk, but only demonstrate what effect these risks could have on retirees' plans. For example, if a retired couple has a significant amount of their assets invested in equity mutual funds they are exposed to investment, or market, risk. Monte Carlo analysis can demonstrate the potential variability of returns and the impact of this variability on one's retirement plans. The analysis does not manage this risk, but it does show what effect market risk could have. If the client is not comfortable with the risk as demonstrated then solutions for managing that risk should be explored. Programs should be able to incorporate these solutions so the client can see the magnitude of the risk decline when the solution is illustrated or implemented.

TABLE 3-2

Approaches to Addressing Retirement Risks

Risk	Deterministic	Scenarios	Stochastic
Mortality risk		✓	✓
Investment risk		✓	✓
Inflation risk	✓	✓	✓
Health care costs		✓	✓
Long-term care costs		✓	✓

TABLE 3-3

Approaches Utilized by Software Programs

(Number of programs)

Risk	Deterministic	Scenarios	Stochastic	None
Mortality risk				
• Longevity	18	16	0	1
• Order of death	15	14	0	4
Investment risk				
• Interest rate risk	19	17	0	0
• Market risk	17	18	7	0
Inflation risk	19	17	1	0
Health care costs	11	11	0	8
Long-term care costs	8	8	0	11

Mortality Risk

Deterministic approach

Other than showing that a retired couple will run out of money prior to the end of a predetermined planning horizon, most programs do not really demonstrate longevity risk. However, if the assets last longer than this horizon, the result is often interpreted as zero longevity risk. Entering life expectancy or some other planning horizon shows only one out of many possible scenarios. In addition, most programs do nothing with assets, survivor income, etc. upon the death of the first spouse. Some programs allow you to "hard code" the life expectancy for each spouse. Then, cash flows such as annuity and pension income can be entered to last exactly that long.

Using a single number for expected future lifetime hides the facts about longevity risk. Individuals may get a false sense of security about a plan that "succeeds" even though it relies heavily on their educated guess about how long they will live. Often, life expectancy or a few years beyond life expectancy is used as the time horizon. There is a reasonable chance that the client (or his/her spouse) may live beyond that date. What threshold of the probability of failure can retirees withstand? One related approach is to select a sufficiently long planning horizon, such as age 100 or higher (many planning firms do this and one program analyzed uses age 100 as the default). This approach can demonstrate the effect of running out of money by a specific age. However, the planner or client may suggest that running out of money at age 90 is nothing to worry about. In other words, the likelihood of survival to age 90, in this example, may be underestimated.

There are some possible explanations for the prevalence of using the deterministic approach for mortality risk in retirement. First, investing for a predetermined time horizon (for example, age 65) is common for people saving for retirement. This same method may have been transferred to the retirement phase, along with the methods for determining risk tolerance and asset allocations. Second, it is a simple approach; select a timeframe and see if the resources last that long. Third, and perhaps most significant, is the fact that life expectancy statistics are often used to educate people

that people are living longer. Unfortunately, this may be propagating the use of life expectancy as a planning tool rather than simply an educational tool. A preferred way to educate people about longevity risk is to show them probabilities of survival to specific ages (for single and joint lives). If the program they are using asks for a life expectancy or planning horizon, they could then select an age that is sufficiently high so that they are comfortable with the financial risks of living past that age.

Scenario approach

Running multiple scenarios with different possible dates of death for a client or, in the case of couples, for the husband and wife can demonstrate the impact of death at various ages, and the financial impact of the order of death. Programs should be able to handle the consequences and resultant impact on cash flows of the death of either or both spouses in these scenarios. Of the 19 programs we examined, nearly all are able to run multiple scenarios to illustrate this risk. However, one of the programs does not allow the user to change the client death age. One program allows for a death scenario to show the impact of death today. It also demonstrates, through its estate planning module, the impact of death (of both spouses, for a couple) on the estate in each year. Another program designed for professional financial planners lets users establish a death scenario for any year in the analysis.

Stochastic approach

As an alternative to the scenario approach to longevity, the Monte Carlo type approach has considerable merit. Although this method may seem complex at first glance, it uses a large number of simple trials that are like the spins of a roulette wheel. We can forecast population mortality rates and trends more closely than stock market performance and trends. For a given trial, a random number from zero to one is drawn. If the number is less than or equal to the mortality rate for that person's age, then he/she is assumed dead (and will remain dead for all remaining time periods in that trial). Otherwise, he/she is assumed to survive to the year. For a married couple a separate simulation would be run for the spouse. Each numbered trial for the client would be matched with the same numbered trial for the spouse. This is necessary so that each trial would end upon the second death. Care must be taken in developing trials for both spouses as their mortality functions are not entirely independent.

Table 3-4 below demonstrates how this approach could be set up. For purposes of brevity a three-trial simulation is provided and displayed for only 10 years. In practice, the number of trials would usually be at least 1,000, with each extending up to age 100 or more. In each year of each trial, a random number is compared to the mortality rate for the corresponding age. The trial continues until the random number is less than or equal to the mortality rate. Otherwise, the client is assumed to survive to the next period. The expected cash flows (not displayed) while the client is alive would then be used until the year death occurs. There may also be specific cash flows associated with death.

A major challenge with this method is displaying the results. After the program analyzes all trials, it could return the probability of failure (e.g., running out of money by a specified age or ages). However, seeing results of some of the trials could be useful for the client to see the impact of death on the spouse and on the overall plan.

TABLE 3-4

Demonstration of Stochastic Approach to Mortality

Age	Mortality rate*	Trial 1			Trial 2			Trial 3		
		Random number**	Result		Random number**	Result		Random number**	Result	
65	0.0078	0.1844	Survives		0.1522	Survives		0.7872	Survives	
66	0.0087	0.9983	Survives		0.1969	Survives		0.8231	Survives	
67	0.0096	0.1428	Survives		0.8010	Survives		0.6086	Survives	
68	0.0108	0.1851	Survives		0.1126	Survives		0.6707	Survives	
69	0.0121	0.5539	Survives		0.6633	Survives		0.4539	Survives	
70	0.0138	0.0010	Dies		0.4633	Survives		0.4217	Survives	
71	0.0157				0.2564	Survives		0.2243	Survives	
72	0.0180				0.8281	Survives		0.5931	Survives	
73	0.0205				0.6113	Survives		0.3807	Survives	
74	0.0234				0.9862	Survives		0.1726	Survives	
75	0.0267				0.9452	Survives		0.0187	Dies	

*Source: Society of Actuaries, 1983 US GAM Basic, Male

**The random numbers are between 0 and 1, and can easily be generated by a spreadsheet program. Whenever the random number is greater than the mortality rate, the individual is deemed to survive to the next age.

Investment Risk

Deterministic approach

Those programs not utilizing stochastic modeling for investment risk and all programs in their treatment of interest rate risk utilize a single input or inputs for investment yields. For example, some of the professional programs ask users to input a single rate of return for groups of assets (e.g., qualified, nonqualified). Other programs ask for a pre- and post-retirement rate of return. The deterministic approach does not demonstrate the magnitude or impact market risk could have on a retirement portfolio.

Scenario approach

Several scenarios of investment returns, such as 0, 6 percent, 12 percent, can demonstrate the impact of not attaining a desired or anticipated return. If the program allows, the rates of return could vary by year, including some years with negative returns. The most sophisticated professional programs examined in this study allow users to indicate returns for every year of the analysis.

Stochastic approach

Several programs include Monte Carlo type simulation to demonstrate equity investment risk. The results are usually the probability of not running out of money by the planning horizon. For example, one professional program requires users to enter various parameters for the stochastic analysis, such as the mean and standard deviation for rates of return, the standard deviation of inflation rates, and the number of iterations. One of the three consumer programs that utilize Monte Carlo type simulation allows users to enter similar inputs, such as annualized rates of return, standard deviation, and number of realizations. The output in both programs shows the probability that the portfolio is

sufficient to meet expenses in each year of the client's retirement. Another professional program does not allow users to set the analysis parameters, and produces graphs indicating projected wealth in nominal or constant-year dollars, for every year of the retirement period. The graphs also indicate percentiles associated with each end point (e.g., 5 percent chance of running out of assets in 10 years, 25 percent chance of running out in 20 years, 50 percent chance of running out in 35 years). Two consumer programs that utilize Monte Carlo simulation do not allow users to set parameters.

Monte Carlo simulation is getting a reputation as a very effective retirement planning tool. It must be understood that it is only a tool (as are retirement planning programs in general). The downsides of Monte Carlo are its complexity, and validating the assumptions. Do Monte Carlo simulations create reasonable scenarios? Will it work for the entire portfolio, or just the equity component? How does Monte Carlo consider clients who plan to modify their asset allocation over time? Monte Carlo, which is designed to demonstrate investment risk, is used to somewhat model longevity risk as well. For example, most programs using this method for investment risk display the probability of "success" (or failure) for several ages. Also, if a retiring couple has a very low threshold for failure, a Monte Carlo analysis may lead them to make decisions on statistical certainty (e.g., trusting the underlying distribution of returns) and worst case scenarios. They may need to save more (if they still have time to do so), delay retirement, or cut back on spending.

If some of the actual scenarios generated are displayed for the client or user, the impact of the order of good vs. poor returns can be demonstrated. For example, while a client is taking distributions from investments, a period of poor investment performance has a greater impact if it occurs earlier rather than later in the scenario.

Inflation Risk

Deterministic approach

With the exception of one professional program, all programs analyzed treat inflation determine-istically. The rate of inflation is either assumed by the program or entered by the user. This seems to be a reasonable approach to demonstrating inflation. Inflation is one risk where using the deterministic approach allows users to manage the risk (though managing it to its assumed value). Since expenses and other cash flows will be inflated by the assumed rate, the income sources must keep up with these growing expenses. One consumer program does consider inflation protection in its recommendations but does not utilize it in analysis.

Of course, different retirement expenses will not all arise at the same rate. Retirees are likely to face quickly escalating health care and prescription drug costs, depending on their health status; whereas other costs might increase at a more modest rate (e.g., price of utilities, food). Some of the programs have the ability to itemize expenses, with each having a set rate of inflation associated with it. This approach allows for a more precise approximation of how inflation risks might impact retirees.

Scenario approach

As with investment returns, several different inflation scenarios could be created. Each scenario could be a static rate of inflation applied to all years. Or a series of inflation rates (perhaps actual inflation rates taken from history) could be entered, though most programs do not allow for a series of rates.

Stochastic approach

One program stochastically simulates inflation. However, the mere inclusion of an inflation assumption(s) in retirement planning analysis demonstrates the impact that inflation can have over time.

Health Care Costs

Several of the programs examined make no mention of health care costs at all, including all of the consumer programs. Even when they do, the treatment of health care risks often involves little more than an input for medical expenses which, for most people, are difficult to estimate or predict. More sophisticated professional programs allow the users to distinguish between reimbursed and un-reimbursed health care costs.

One professional program includes a disability needs analysis that examines the need for disability insurance. This analysis considers how much insurance would be needed in both client and spouse disability scenarios. While related, this particular analysis is more beneficial before retirement.

Long-Term Care Costs

Like health care costs, long-term care costs are often not explicitly mentioned by the programs. However, unlike health care costs, some of the programs attempted to incorporate long-term care needs into the analysis. At least one professional program provides an illustration of long-term care costs, given certain assumptions about daily costs at an assisted-living facility. These costs could then be added to the main analysis to show how expensive they might be. Other programs are less sophisticated in their treatment of long-term care and long-term care insurance costs. For example, a few professional programs ask users to enter features of a desired long-term care policy, such as waiting period, cost-of-living adjustments, and so on. The program then estimates a LTCI premium. However, sometimes the user has to input the cost manually because this premium is not always automatically added to the main analysis.

None of the programs attempt to illustrate long-term care costs using a stochastic approach. At best, some provide background information on the likelihood that people of different ages might eventually require long-term care.

CHALLENGES IN RISK TREATMENT

Adequately accounting for risk in retirement planning software programs is no easy task. Some of the methods described above can be very technical in nature, making them not only difficult to implement but difficult to explain to financial professionals, let alone clients. For example, in treating some of the mortality or morbidity-related risks, hiring the services of a qualified actuary may be warranted.

While programming the treatment of a single risk using a given method can be complicated, incorporating several risks, each using a different approach, can be a daunting task. Below are several questions and issues that should be addressed if multiple risks are to be incorporated in a program.

- Can a variety of approaches across risk categories be properly, mathematically combined? If so, can the results be explained to a client or user?

- If either a scenario or stochastic approach is applied to more than one risk, care must be taken to ensure that the combined scenarios are realistic.

- Are any of the risks competing? For example, if in a mortality scenario the client dies, but in the vast majority of others the client survives, the treatment of the cash flows and the other risks for that particular scenario should consider this death. Or, if a client has life insurance and income annuities, modifying the mortality assumption (up or down) will impact the results only to the extent the value of one benefit (the life coverage or the annuity) is greater.

- Risks could also be interdependent. For example, people who need a lot of acute medical care are also likely to need long-term care.

- The distribution of costs is very different for different risks. If you live long, you need annual income and may incur few, if any, large one-time expenses. In contrast, medical care can have large costs in a single year due to catastrophic payments. Long term care, once it starts, is an ongoing periodic payment.

CHAPTER 4: OUTPUT

This chapter examines the output produced by the consumer and professional programs analyzed, including both the financial calculations and the recommendations. Our intention here is to highlight the essential results as they relate to various post-retirement risks, rather than an exhaustive illustration of each program's treatment of each case. However, where relevant, we discuss specific results for a particular program. The six cases[15] we examined were:

- Case 1 — John (age 50) and Judy Liebold (age 55), a high income working couple
- Case 2 — Sue Shackleton (age 60), a recent divorcée
- Case 3 — Lisa Smith (age 58), cares for ailing 83-year-old mother
- Case 4 — Hal (age 65) and Karen Grainger (age 60), middle-class recent retirees
- Case 5 — Javi (age 62) and Amar Aziz (age 62), working-class immigrants considering phased retirement
- Case 6 — Jim and Linda Stewart (both age 75), 10 years into retirement

It is important to note that the differences across programs preclude a direct comparison of most kinds of output. We strove to enter each case on a consistent basis across programs, but inputs varied so widely that only the most basic outcomes could be compared directly. Table 4-1 illustrates the frequency with which particular kinds of output were provided by the programs we examined. The main output that programs produced were cash-flow analyses, showing how inflows (from Social Security, pensions, employment, annuities, and asset distributions) and outflows (expenses) affect clients' overall financial situations for each year of retirement. Fewer than half of the programs provided further breakdowns of expenses (e.g., health care costs, general living expenses) or separated home value from the value of other kinds of investments. A very small number of programs produced case-specific recommendations to address important issues such as asset allocation, dealing with taxes and inflation, or health care and long-term care costs.

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[15]For the assumptions and details of each of the cases, refer to Appendices A and C.

TABLE 4-1
Frequency of Outputs

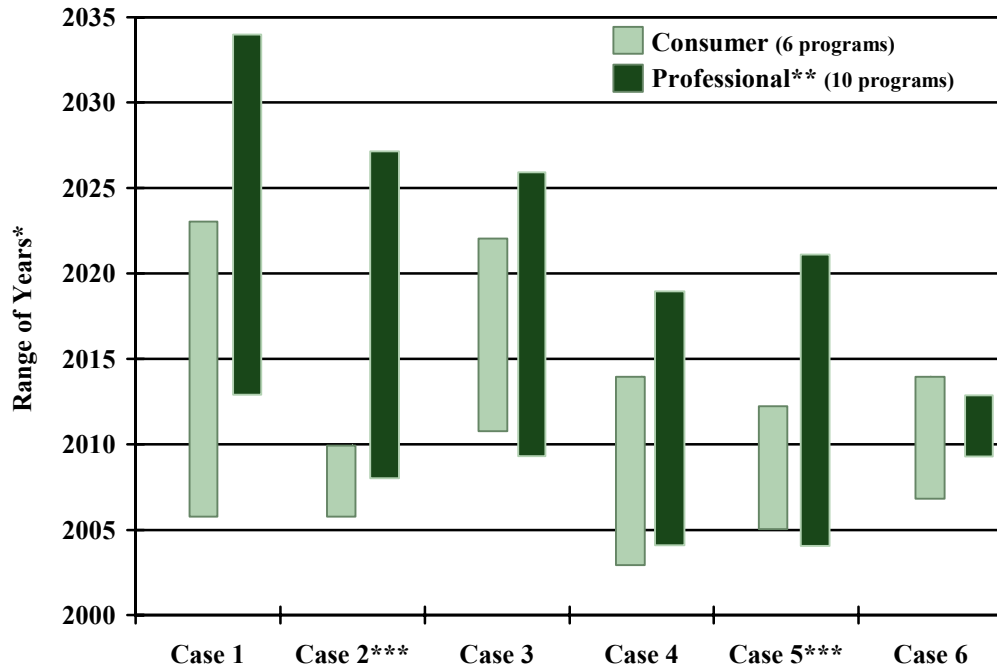|	Most programs output*	Some programs output	Few programs output
Whether client runs out of money	✓		
Income from various sources	✓		
Asset balances and investment performance (separately for different investment classes)	✓		
Distributions from assets	✓		
Real estate value at time of sale		✓	
Itemized expenses		✓	
Detailed taxation report		✓	
Recommendations for distributions from assets			✓
Recommendations for dealing with inflation			✓
Recommendations for minimizing taxes			✓
Recommendations for asset allocations			✓
Recommendations for annuitizing assets			✓
Recommendations for long-term care insurance			✓
Recommendations regarding health care costs			✓

*Most = 10+ programs, Some = 3 to 9 programs, Few = Fewer than 3 programs

AGE, LONGEVITY (RUNNING OUT OF MONEY)

The question, "Will I run out of money in retirement?" is often the most critical one for retirees using these programs themselves or by way of a professional. Given their current circumstances and their plans for the future, how likely are they to maintain a reasonable standard of living while ensuring an income stream, maintaining some savings, and simultaneously paying all of their expenses?

One basic result that we examined was whether or not the individuals or couples described in the six cases would run out of assets during retirement. Although running out of assets is not necessarily the same as having insufficient funds to meet expenses, it is an important indicator of the likelihood of successfully meeting retirement goals. For example, an individual could have guaranteed income sources sufficient to meet ongoing expenses but have no investable assets. Moreover, the possibility of running out of assets is a major concern for many people planning their retirement.

FIGURE 4-1
Running Out of Assets

Did Not Run Out of Assets†

	Case 1	Case2***	Case 3	Case 4	Case 5***	Case 6
Consumer	0	0	2	0	0	3
Professional	3	2	7	0	2	8

*Not all programs showed the year in which assets were depleted.

**Three of the professional programs did not clearly indicate whether the case would run out of assets.

***These cases were not run for one of the consumer programs.

†By the stated retirement planning horizon.

Table 4-2 displays, for each case, the number of professional and consumer programs indicating that retirement assets were insufficient for the entire retirement period. It is important to note that if a program shows a case not running out of money, it is only considering the years until the end of the stated planning horizon. It does not consider money running out beyond that date. The table reveals the consequences of the programs' different capabilities and analysis strategies. While some programs produced output that indicated the assets were sufficient throughout retirement, others illustrated a depletion of assets. For example, one professional program's output showed that Case 2 would run out of nonresidential assets and incur a shortfall of nearly $27,000 in 2018. Another professional program indicated that Ms. Shackleton's assets would be depleted by 2016, and would incur a shortfall of over $8,000. For Case 1, output from one professional program illustrated a small shortfall of about $100 by 2014 (two years after they plan to retire), while three other programs showed the Liebolds never running out of assets during their entire 26-year retirement period. These discrepancies have more serious implications for the consumer programs than for the professional programs. A financial professional will likely attempt to work with the client and come up with alternative strategies for making assets last as long as possible.

The discrepancies among programs can be traced to a variety of factors, described in the Capabilities chapter and the remaining sections of this chapter. The overarching reason for the variability across programs results from the differences in program parameters. Although we endeavored to enter the cases as consistently as possible, the inputs differed so much across programs that an exact comparison was rendered impossible. In general, the professional programs have inputs that paint a more complete picture of the client's available resources than the consumer programs. As a result, the professional programs' greater specificity and flexibility often resulted in the depletion of assets occurring later than in consumer programs.

One important factor producing differences among programs' output involved the treatment of home equity as a retirement asset. For cases where home equity was supposed to be used as a retirement asset, the programs either liquidated the home (i.e., transferred the residence into cash) or gradually drew down from its value (an option not usually available to individuals unless they establish a reverse-mortgage annuity), or were simply unable to consider the residence as a retirement asset.

Taxes also caused the results to diverge. As discussed later in this chapter, the sophistication of the tax analysis varied greatly across programs. Accordingly, annual taxes played a large role in determining overall cash flow and the subsequent rate of asset depletion.

A third factor causing the lack of convergence involves the itemization of expenses. Programs that only allow for a single inflation rate could not provide an estimate for year-to-year expenses that reflected the higher rates of increase for medical expenses.

Beside these factors, the programs' handling of retirement age and longevity determined whether the people in each case would run out of money before death. These inputs mark the beginning and end points of the retirement period. All other things held constant, the further apart they occur, the greater the financial needs in retirement. Cases 1 and 3 in particular were designed to test the programs' treatment of longevity risk.

Retirement Age

All programs asked the users to enter a retirement age. However, few programs treated age of retirement as adjustable when generating alternative strategies. One professional program presented a list of possible tactics to help meet the client's retirement needs; this list included retiring at a later date. This alternative would simultaneously a) reduce expenses in retirement by shortening it, b) increase savings, and c) possibly increase Social Security and pension benefits. Unfortunately, most of the other programs simply showed clients running out of money (e.g., Cases 2, 4, and 5) rather than suggesting a later retirement date.

Longevity Risk

As discussed earlier, none of the programs model longevity risk. One professional program is designed to go on indefinitely, unless users make use of the "death scenario" wherein the user enters a specified death year. Another professional program has an estate planning tool whose output demonstrates the impact of both spouses dying in any year. But, the programs still do not treat life span as a stochastic variable.[16] As a result of this limitation, programs generally only show cash flow analyses until the entered death year. If the available assets and income sources are sufficient until that moment, then the plan is deemed successful. For example, one professional program displays the end-of-plan total investments, with a message indicating that the plan "works," "is risky," or "fails" depending on the balance. This approach — also used by several other programs — tacitly assumes that success means having enough assets to cover expenses until a single year. In reality, the plan might fail if the client lives longer than expected.

Compounding this problem are death year estimates for spouses. For some cases (e.g., Case 5), expenses are reduced more than income following the death of the spouse. The earlier this occurs, the lower the overall retirement expenses. But the spouse's actual death year is unknown, and could be much later. The output thus might underestimate expenses in retirement. Conversely, for other cases (e.g., Case 1), income is reduced more than expenses following the death of the spouse. If the spouse's death occurs earlier than planned, the surviving spouse could face a budgetary shortfall much sooner than anticipated.

INCOME SOURCES

The cases were deliberately constructed to test the programs' capability for handling a variety of different, and sometimes complex, sources of retirement income. If programs are incapable of dealing with each class of income (e.g., Social Security benefits, income annuities, defined benefit pension plans, alimony, wages) then the resultant projections for the post-retirement period will be less accurate. We were also interested in determining whether programs could make specific recommendations to address shortcomings in each case's income profile. For example, if a case had little Social Security income and no defined benefit or other annuitized income, yet had sizable investable assets, would a program suggest creating an income stream from these assets?

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[16]A stochastic variable is an unknown quantity that can vary within a range.

Most professional programs produced cash-flow analyses that illustrated income sources. Often these contained a detailed, year-by-year breakdown of Social Security benefits, pension payments, annuity income, and so on. Other programs grouped together all sources of income, making it more difficult to ascertain which sources were the greatest contributors to income. This lack of specificity is particularly troublesome when users need to distinguish between income drawn from assets and income from other sources, such as pensions or annuities.

Social Security Benefits

Social Security benefits posed a problem for some professional programs. For individuals who decide to collect benefits before the full benefit age and also earn over a certain amount from employment ($11,280 as of 2002), benefits are reduced by one dollar for every two dollars earned. For Case 5, in which this situation occurred, programs should have adjusted benefits accordingly. However, several did not, thereby biasing the projected future income upward. One professional program included a spreadsheet on the effects of taking Social Security early. The spreadsheet showed the effects that different rates of return had on payments and advised users whether or not they should take the Social Security benefits early in each scenario.

In Case 2, where the individual was considering working beyond age 65 in order to increase her eventual Social Security benefits, was likewise a challenge for some of the professional programs. Because Sue Shackleton's benefits were based on her ex-husband's work history, these earnings needed to be entered for the programs to estimate her benefits. If the professional instead directly entered an amount, it would not necessarily be adjusted depending on the age of benefit onset. In other words, if the professional wants to asses the impact of adjusting Sue's retirement age upward, she or he must also make manual adjustments to the Social Security benefits, thereby introducing the possibility of miscalculation.

Annuitized Income

The concept of annuitizing one's assets to provide retirement income was almost never put forward as an option for users of the programs. Annuities are the only products an individual can purchase to ensure guaranteed lifetime income, and can serve to cover basic expenses in retirement. While annuitization is obviously not appropriate in all circumstances, several of the cases we used were constructed to make this option suitable.

Case 2 presented programs with an individual with no annuitized income aside from Social Security benefits. None of the professional programs made the suggestion that Sue Shackleton, who expects to live another 27 years after the start of the analysis, insure against longevity risk by annuitizing a portion of her investable assets, or to perhaps take a reverse-mortgage annuity from her home. Instead, the programs attempted to meet the income goals by drawing down from assets. Similarly, Case 6 dealt with a couple that had chosen to take a single life annuity for the primary wage earner's pension, leaving the surviving spouse with a tiny pension income ($5,000 per year with a 2 percent COLA) and Social Security payment. Again, the programs did not recommend annuitizing some of the surviving spouse's assets upon the wage-earning spouse's death.

Even the other cases, where at least one individual of the couple had annuitized income sources such as defined benefit pension payments, might have benefited from additional guaranteed income. For example, Judy Liebold's (Case 1) income will drop sharply after her husband's death due to a reduction in John's Social Security and pension benefits. An annuity, paid for by cashing out some of their investments or possibly selling their home, might help her maintain her standard of living after John's death. However, none of the programs made this suggestion.

Some programs had difficulty handling joint and last survivor annuity payments following the death of one member of the couple. For example, one professional program had no provision for joint and survivor annuities, requiring users to split the income stream for Hal and Karen Grainger in Case 4 into two separate annuities, one of which begins after Hal's death (during a pre-determined year) and pays $2,500 per year instead of $5,000 per year. This could be cumbersome if the professionals want to examine their projections using several different death ages for Hal.

INVESTMENTS

Perhaps the greatest strength of the programs we examined was their ability to handle a variety of investments, and make detailed, sophisticated projections of these assets based on either modeling techniques, user-defined specifications, or both. Given that most of the professional programs were likely designed for customers dealing with substantial investment wealth, it is not surprising that this aspect of their functioning would be highly refined. Some programs are advanced enough to go beyond deterministic approaches to project investment returns, and produce a range of outcomes, based on the volatility of the underlying asset classes involved, or based on a Monte Carlo procedure. For example, the output from one professional program showed percentiles for projected wealth in nominal dollars. According to this program's Monte Carlo analysis, while the Graingers (Case 4) had a 5 percent chance of running out of money by 2027, they had a 50 percent chance of never running out of money until Karen's expected death year of 2032.

Despite these features, which help to assess investment risk, the programs for the most part do not provide users with recommendations for managing post-retirement assets. This lack of recommendations is especially true for programs designed for professionals. Those programs that do make recommendations often leave a great deal up to the financial advisor, and provide only general asset allocation guidelines.

One consumer program did provide alternative investment strategies to help the client achieve the desired income level in retirement while balancing the need to reach other goals. This program suggested a particular asset allocation and even suggested a variable income annuity where appropriate. For example, although the individuals in Case 4 were conservative investors, the program produced an alternative investment strategy that had a higher equity allocation, to demonstrate the potential for higher returns.

Professional programs were designed to process the accumulation of assets invested in nonqualified, qualified (e.g., traditional IRA, defined contribution plans), and tax-free (i.e., Roth IRA) accounts. Because earnings from these investments have different tax consequences, it is critical that the programs correctly determine the annual capital gains taxes. All of the professional programs did adjust the case's tax payments based on investment returns from nonqualified assets.

The programs for professionals were generally able to produce reasonable results for nonstandard investments such as employer stock purchase plans (e.g., Case 1). However, at least one of the programs we investigated had no specific input for stock purchase plans or stock options, thereby forcing users to enter the asset as an unspecified nonqualified asset.

REAL ESTATE

For many retirees, their residence represents their largest single asset. As such, it (or possibly a second home) can be an important source of funds for retirement, either through its sale, home equity loans, or a reverse mortgage annuity.

While some professional programs have specialized processing of homes (i.e., mortgage payments, appreciation, loans, and liquidation), several do not. As a result, the home must be entered as if it were any other investable asset, subject to distributions during retirement. For example, Case 2 involves an individual who will eventually have to sell her home in order to pay for expenses. At least two of the professional programs ended up reducing the value of the home over time, rather than liquidating it in a single year in the future and then taking distributions from the sale proceeds. One professional program showed the value of Ms. Shackleton's home drop from $131,000 in 2002 to about $11,000 by 2013, following annual withdrawal amounts that rose over time. This distribution method in Case 2 implies the use of a reverse mortgage annuity, which few people are likely to understand. Users of programs that follow this approach need to be told that the results imply using a reverse annuity, and also told how a reverse annuity works.

The programs for professionals generally do not offer advice concerning the timing of the home sale. In Cases 2 and 5, a home sale is necessary to meet expenses, but in neither case did the individuals set a specific date. Programs that lack specific inputs for homes do not allow the user to assess the impact of selling the home at different times. Instead, the funds are withdrawn from the home to meet any shortfalls in income, in spite of whether the individuals are in the position to sell their homes at that point. On a related point, the programs should have some provision to reflect the fact that the sale of the primary residence necessitates the individuals' relocation, with a resulting change in expenses (e.g., new mortgage, rent, moving expenses).

As mentioned earlier, another option available to retirees with home equity is a reverse mortgage annuity. While not currently popular, this method of creating an income stream might become more prevalent in the years to come, especially if investable assets do not soon recover from the stock market plunge of the past two years. None of the professional programs explicitly deal with this option, though, as mentioned earlier, some programs treated the home as an investable asset from which periodic withdrawals were made. This of course mimics a reverse mortgage annuity, except for the fact that the withdrawals are neither systematic nor guaranteed for life the way annuity income can be.

It appears that the limited processing of home sales reflects the likely clientele for these programs; that is, people who bring substantial investable assets to the analysis, from which they can pay for expenses without liquidating their home equity.

DISTRIBUTION

Many programs are available to individuals who are in the process of accumulating assets for retirement, but far fewer deal with the process of distributing assets in retirement. The decisions involving distribution — when to begin distributions, how to meet required minimum distributions, how much to withdraw, tax implications, the order of withdrawal from different asset classes, whether to annuitize some assets — are often complex and interdependent. It is in this area that many retirees could use the assistance of a program that integrates all of the factors and constraints surrounding retirement distributions.

The professional programs show a considerable range in level of sophistication regarding retirement distributions. Some let users decide when and how much to withdraw from assets. At least one of these programs also allows people to withdraw less than the required minimum distribution for a person over the age of 70½ without any penalty imposed. Obviously, this gives users an inaccurate picture of projected income, unless the planner makes clear to the client that this scenario does not reflect the actual rules of retirement plan distributions.

Other programs force the withdrawal of certain funds before tapping into others. For example, the individuals described in Cases 1 and 3 own a variety of qualified and nonqualified assets. Some programs forced the withdrawal from nonqualified assets before qualified assets, while others only allowed users to alter the order of depletion from nonqualified assets. As a result, the tax implications varied across program for these cases, depending on the order selected. Most professional programs did provide users with recommendations regarding the withdrawal order, although such recommendations were not case-specific.

Some programs were unable to handle nonstandard distribution goals, such as those desired by the Graingers in Case 4. This couple planned to take a portion of their qualified assets early on in retirement for travel, and then supplement their Social Security and annuity income with withdrawals from the remaining balance in later years. At least two programs ran into difficulty producing cash flow projections for this case. Likewise, these programs could not delay the sale of assets until later in retirement to meet specific expenses arising at that point. For example, in Case 3, Lisa Smith owns shares of stock that produce dividend income. If her mother's health declines as expected, she could liquidate the stock to supplement her income. This scenario could not be accurately represented by one professional program.

One consumer program assumes that all employer-sponsored retirement plan assets will be rolled over to a traditional IRA prior to distribution (unless contributions will continue to be made). One consequence of this assumption is that spouses would have to consent to the rollover if the employer-sponsored plan takes the form of a defined benefit pension. Depending on the circumstances, the client might not have this flexibility.

Taxation of Distributions

The taxation of distributions from assets varied across programs as well. For example, all of the professional programs produced tax-free distributions from Roth IRAs (e.g., in Case 2). One professional program provided an illustration of the taxation of qualified distributions. The Liebolds described Case 1, for example, were projected to distribute approximately $100,000 of their qualified assets in the year 2016. According to this program, they were expected to owe about $20,000 in federal taxes and $4,500 in state and local taxes upon withdrawing this amount.

However, none of the programs suggested a different withdrawal strategy from other assets to reflect the circumstances of each case. For example, the individuals in Case 1 may need substantial tax protection due to their high retirement income when John is alive, whereas most of the other individuals have more immediate needs but do not face significant tax burdens. As a result, they may be better off drawing down a portion of each kind of asset (both qualified and nonqualified) and spreading the taxes over time in order to meet their income goals. Although it could be argued that a full-fledged tax analysis should be considered beyond the scope of these programs (in fact, one consumer program admits that tax planning must be left up to a tax advisor), even a relatively simplistic analysis might help guide the users toward a distribution strategy that is appropriate to the client's needs.

EXPENSES

As described earlier, the programs produced different results concerning depletion of assets. The programs were somewhat more consistent in showing the timing of a cash flow deficit (usually for Cases 2, 4, 5, and 6) that would necessitate distributions from retirement plans or other savings. For example, three of the professional plans showed Sue Shackleton running a deficit starting between 2014 and 2018. The convergence might be due to the limited amount of processing involved in incrementing income and expenses according to inflation or manually-entered inputs. However, even for this relatively simple calculation, several of the programs diverged, owing to their differing capabilities. Furthermore, the presentation of results often made determining the timing of the deficit difficult. Some programs' output did not separate income streams such as Social Security from income drawn from assets, thereby making a comparison with annual expenses challenging.

Replacement Ratios

One popular rule of thumb for estimating expenses in retirement involves "replacement ratios," where retirees are expected to need a specified percentage of their pre-retirement income in order to meet their expenses and maintain their standard of living. It is assumed that the overall expense level will fall in retirement, reflecting the decreased need to save and a decline in spending and taxes. However, in several of our scenarios, later retirement costs eventually exceed initial costs even after factoring in inflation. One important test for the programs, therefore, was whether and how they could reflect the need for varying costs throughout the post-retirement years.

Itemization of Expenses

Most of the professional programs allow users to itemize expenses and apply different annual inflation rates to them. The impact of this capability was a more precise projection of future expenses. For example, in Case 3, costs are expected to stay the same or increase immediately after retirement, due to Julia's increasing medical needs. In Case 5, the Aziz's expenses are likely to increase faster than the overall rate of inflation, due to Javi's health care costs. While the majority of professional programs let users enter a different rate of increase (e.g., 8 percent) for medical costs, some programs simply ask for a single expense number (e.g., 3 percent inflation). As a result, the

projected expenses for Case 5 would be biased downward, unless the advisor takes the time to calculate expenses each year and then manually enter these figures. However, this approach is unsatisfactory; the program, not users, should perform such calculations to avoid the risk of miscalculation.

As stated earlier, most professional programs output a cash-flow analysis that displays income and expenses in each retirement year. For those cases where the analysis begins in the pre-retirement years (e.g., Case 1), this feature can be very useful to investigate how current expenses (college costs, credit card debt) play a role in determining assets available in retirement. Programs that allowed for itemized expenses with differing inflation costs produced a more exact estimate for the individual's year-to-year budget. Especially helpful were illustrations that showed expenses and taxes in each year. Not every program provided this level of detail; some only showed a detailed tax analysis for a subset of retirement years. As a result, assessing the accuracy of the results was not always a straightforward process. For example, for those cases that had mortgage payments, the interest paid should have been deducted from their adjusted gross income and thereby reduced the tax due. Unreimbursed medical expenses are also deductible. Depending on the level of detail in the results, these expenses and their resultant tax implications might not be shown in the analyses.

Solving for Expenses

Interestingly, none of the programs examined produced output that demonstrated alternatives to the pattern of expenses entered. Putting aside withdrawals from financial assets, typical income sources such as defined benefit pensions and Social Security are generally set by the time an individual retires. Expenses, on the other hand, can be modified within certain limits. For example, once basic living expenses are covered, a retiree might make ends meet by cutting back on travel or entertainment costs. More important, some significant assumed expenses (e.g., long-term care) can be insured against, thereby reducing future large expenses by adding a smaller, known expense in the present. Despite this real-life flexibility, the programs invariably assumed that the expenses input were unalterable parameters for the analysis, and focused on distribution and income options (such as working part-time or taking out less money from assets), when dealing with alternative approaches. The only exceptions were some programs that advised the client to "save more" without explaining how this might impact expenses.

LONG-TERM CARE, HEALTH, AND FRAILTY

Health and frailty are crucial issues for which retirees must plan. Often, health status is the key reason for individuals to stop working and begin retirement.[17] Prescription drug costs, Medicare supplement costs, and long-term care costs can amount to significant and usually escalating expenses. We constructed several of our cases (e.g., Cases 1, 2, and 6) with the intention of testing the programs' handling of these issues, particularly long-term care needs.

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[17]*Retirement Planning: The Ongoing Challenge,* LIMRA International., 2003.

Among the professional programs, a variety of approaches were observed, ranging from no mention of long-term care or health costs, to extensive analyses or stand-alone modules for these expenses. Some programs split out different kinds of health costs, so that unreimbursed medical expenses could be deducted from income for tax purposes. For example, one program for professionals lists the unreimbursed medical expenses ($5,000 in 2002) for Case 5 under the heading "partly deductible." These and other deductions (such as home mortgage interest) resulted in a very small federal tax payment of $322. Other programs simply lumped in medical expenses with other expenses in the output produced, which would produce a larger tax bill unless the deduction is manually entered. With regard to long-term care, at least one professional program provided an illustration of long-term care costs, given certain assumptions about daily costs at an assisted-living facility. These costs could then be added to the main analysis to show how expensive these potential costs might be. However, this program did not allow users to substitute long-term care costs with the cost of a hypothetical long-term care insurance premium that would address the estimated long-term care costs; instead, users had to manually input this cost.

Other programs were less sophisticated in their treatment of long-term care and long-term care insurance costs. For example, a few professional programs ask users to enter features of a desired long-term care policy, such as waiting period, cost-of-living adjustments, and so on. The program would then estimate a LTCI premium. However, sometimes users have to input the cost manually because this premium is not always automatically added to the main analysis.

Programs for professionals were usually lacking in any specific recommendations regarding long-term care. The output might show the impact of long-term care (or LTCI premiums) but the programs left the recommendations to the professionals.

ISSUES, ADVICE AND QUESTIONS

This section of the report analyzes the issues and advice for the different stakeholders. How well do these software programs meet the needs of the different segments affected by financial planning? These can be grouped into four general categories: consumers using these programs alone, financial advisors, software vendors/providers, and financial service providers.

Consumers Using Programs Alone

Chapter 1 of the report covered the ease of use of consumer programs. Generally, the programs are easy to use and operate, especially when compared with programs for professional use. They need fewer inputs and have good help screen functionality. Ease of use is an important factor with consumer programs, because they will be used by people that (in most cases) do not have the financial knowledge of a professional. Because of this, however, the importance of an advice component in software designed for consumer use cannot be overstated. A consumer without the benefit of a professional will rely heavily on what the software produces in the way of advice and an action plan.

Consumers should not put too much faith in any one software package or "snapshot" retirement plan. A retirement strategy is one of the most important decisions consumers will make, and it would be imprudent to rely totally on only one source to plan what very well can be a 30+ year strategy. For consumers, these software programs should be a tool, along with any combination of self-study, professional advice, advice from family, etc. Consumers need to understand that financial plans need to be updated. Changes in income, assets, life stage events, and age, among others can make a perfectly adequate plan completely inadequate.

Being able to balance ease of use and comprehensive advice is a challenge all consumer software providers face. The fact that one program does not provide any recommendations and the output screen is just one page with no qualitative explanations severely limits the usefulness of that program to the customer. Worse than limited advice is incorrect advice. If a consumer relies on the advice that a software program produces and that advice is incorrect, the customer would have been better off with no advice at all. Adverse consequences could include dissatisfied and impoverished customers, perhaps even legal action.

Companies that produce consumer software need to test and retest to make sure the validity of the advice is accurate. Using consumers to test how easily information can be entered and how easily the results and advice can be interpreted can only help design new software and updates to existing software. Companies should make it clear that consumers should only rely on the software program as a tool and not base their entire retirement strategy on the advice given. Software manufacturers should also encourage their customers to regularly update their financial plans. Not only will this help the consumer, but it also will make the consumer more comfortable with the software and more likely to purchase new editions and/or upgrades.

Financial Planners and Other Professionals

Planning software developed for professionals to offer advice is much less important than for software geared towards consumers. In fact many planners may ignore the advice section altogether; after all, that is a key element of their value proposition. For planners the most important aspect of any professional software package is probably the ease and accuracy of the inputs, how useful the inputs are, and how quickly they can be entered. They want something where they can summarize their client's personal information, including any dependents, expenses, assets, insurance policies, goals, objectives, etc. The ability to easily manipulate and change these inputs and a clear and concise summary of these inputs are what most planners will likely value most. A financial planner wants a customer to act on the plan they provide. If the plan is deemed to be too complex by a client, they may not act on the plan. Even worse, a customer may misinterpret a plan that is too complex, and think they are following the plan when they really are not.

One output summary that more software packages are producing and planners find valuable is Monte Carlo simulation. Monte Carlo simulation is a valuable tool because it allows a planner to generate values for unknown variables to develop a model. This allows a planner to generate a probability of success for a certain question such as: Will my client outlive his assets? The potential problem with Monte Carlo simulation is the output is only as good as the assumptions used. Some feel the typical Monte Carlo simulation that assumes normal distributions and correlation coefficients of zero, neither of which are typical in financial markets, can lead to problems with the analysis.[18] Planners should be aware of this fact before relying too heavily on Monte Carlo simulation.

Software Manufacturers

Software makers should also be aware of the limitations of Monte Carlo simulation. We outlined some steps consumer software manufacturers can take to help their customers and these would also apply to manufacturers of professional software. These include continually testing software, using disclaimers, and making customers aware that plans should be updated regularly. The software needs to allow easy manipulation of data and present clear and concise information, especially reports that can be presented to clients.

As stated, we had difficulty finding retirement software targeted to the consumer that met our criteria. The same is not true of software targeted at professionals. More and more manufacturers appear to be entering this market, increasing competition for the limited, though growing, number of advisors who will purchase this software, and at present there is no apparent market leader. Many of the software manufacturers are smaller companies. This competition may see companies leave the market, change their business models, or merge with other companies. It will be interesting to see if a few companies emerge as market leaders in this relatively new and evolving industry.

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[18]Nowrocki, Ph.D., David, "The Problems with Monte Carlo Simulation," *Journal of Financial Planning,* November 2001, pp. 92–106.

Financial Services Companies

For financial services companies, the use of software that results in customers purchasing their products is obviously deemed beneficial. The software can help a planner point to specific problems or shortcomings in the plan and he can then recommend a product to solve that problem. With the software corroborating the planner's recommendation, a client will be more likely to purchase the product. To accomplish this, some companies have established proprietary software for their financial planners. Software developed by Lincoln Financial Advisors and American Express Financial Advisors are indicative of this. For smaller financial services companies or those just moving their sales force to a financial planning model, many will not want to take on the expense of developing a proprietary software system and will use commercially available software. Consumers, planners, manufacturers, and financial services companies are greatly interconnected.

Future Questions and Issues

More companies appear to be getting into the retirement planning software business, especially software designed for professionals. At the same time more people are entering the financial planning business. There may come a point, however, where the industry cannot support all the different software manufacturers leading to the possibility of companies leaving the market and mergers. Today, there are very few financial planning programs available on the Web. The ubiquitous retirement calculators found on the Internet are not true financial planning programs, though many consumers may treat them as such. The addition of software products that can be accessed and used on the Internet can decrease costs to consumers, planners, and software manufacturers. The Internet will also allow updates and upgrades more quickly.

As more people approach retirement and as many realize they are unprepared for it, the need for professional, competent advice will grow. The most pressing challenge clients and planners will face is developing a strategy so that the client's money will not run out during retirement. This challenge is growing with the trend away from traditional pension plans and towards defined contribution savings plans. With increasing life expectancy, this is (and should be) a very real concern for many. Financial planners will need to give clear and concise advice, and clients will need to take decisive steps to provide for their own retirement. Financial service companies have introduced products to help diminish this risk. Annuities that guarantee income for life, and long-term care insurance are two of the most well known products. Insurers will undoubtedly continue to develop products that meet these risks. Financial planners will need to be aware of how new products work, and their suitability for their clients. The software manufacturers will need to keep up with these innovations to remain useful and relevant.

APPENDIX A — METHODOLOGY

Software Selection

A total of 40 publicly available software programs were considered for this project. Eleven are designed for individuals or employees and 29 are designed for professional use. A few manufacturers offer multiple programs. In these cases, we considered only their most comprehensive planning tool. All programs had at least some ability to provide guidance on the post-retirement period. Software that focused exclusively on the pre-retirement period and dealt solely with saving for retirement were not included in our analysis.

The consumer software manufactured by Fidelity Investments, The Rouse Companies, and T. Rowe Price[19] were chosen. We chose these software packages due to their likely high prevalence of use. The remaining three consumer programs were selected randomly from the eight other programs.

The professional software manufactured by Sterling Wentworth/SunGard and Unger Software/Methuselah were preselected and the remaining nine programs were selected randomly. After randomly selecting programs, the sets of consumer and professional software were evaluated to ensure that a cross section of approaches was included. Specifically, we were interested in maintaining a reasonably sufficient representation in the following features: Monte Carlo procedures; the ability to perform "What if?" analyses; distribution planning; annuities; and long-term care planning.

Software manufacturers/distributors were sent a letter requesting their participation in this research project. We received positive responses from all companies we contacted.

In addition, six proprietary programs were selected for inclusion in the analysis. Two of the companies cooperated with our requests and provided us with access to their programs. As a result, the proprietary programs included might not represent a valid cross section of all proprietary programs.

The full list of software programs analyzed is shown in Appendix B.

Number of Programs Considered and Analyzed

	Consumer software	Professional software	Total
Number of programs considered	11	29	40
Number of programs analyzed:			
Widely used, preselected	3	2	5
Others, selected randomly	3	9	12
Others, with interesting features	0	2	2
Total number analyzed	6	13	19

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[19] This program was not commercially available and is designed for the clients of T. Rowe Price exclusively.

Scenario Creation and Processing

Six case scenarios were created, representing several stages of retirement (immediately before, several years into, later retirement, etc.). As explained in Appendix C, which provides more detail about the specific characteristics of each scenario, a variety of different financial and nonfinancial situations were built into the cases.

To ensure consistency across cases and software packages, the information specified in the scenarios was then transferred to an inputs table. This table contained all of the necessary values to process each case through each software package. Not all inputs were necessary for each individual program.

After the software packages were installed (or accessed, for those programs available online), members of the research team familiarized themselves with the software intended for professionals by examining capabilities, and running tutorials and test cases. This step was necessary for these programs because our goal was to approximate the normal circumstances under which individuals use these tools.

Following this initial training period, each of the six scenarios were entered into every program and submitted for analysis. Because the programs sometimes differed in how they asked for a particular input (e.g., monthly versus annual income, expenses in nominal or real dollars) some adjustments had to be made to the inputs to maintain consistency across programs. Also, some programs contained multiple modules (e.g., cash flow analysis, long-term care analysis, estate planning) in addition to a standard or main program. Where relevant to the needs of the individuals described in the scenarios, the cases were processed using these modules.

General Assumptions

To simplify our analysis, we made certain general assumptions regarding economic conditions, post-retirement goals, inflation rates, and asset allocation. Primarily we assumed that historical trends would continue into the future. Where the programs would allow it, we entered these assumptions when processing the scenarios.

Inflation/Cost-of-Living Adjustments

The historical rate of inflation over the past few decades has centered around 3 percent annually. We used 3 percent as our assumed inflation rate for both the inflation of costs (excluding health care, home values, and tuition) over time as well as the increase in benefits from Social Security. Unless otherwise noted, defined benefit and defined contribution pension arrangements were set to increase at 3 percent per annum. That is, the level income or lump sum available was converted to an increasing stream of payments having the same value.

Investment Rates of Return

Nominal rates of return in the pre-retirement period were set to 8 percent annually for the portfolios owned by the individuals described in the cases. We assumed that the individuals in retirement would be more risk averse, and hence transfer a greater proportion of their investments away from equities, thereby reducing their rate of return to 7 percent annually. These rates are a reasonable approximation of the average annual return for a balanced portfolio (i.e., a mix of stocks, bonds, and cash) over the past several decades.

Health Care Costs

Although health care costs have recently increased at a much faster rate than inflation, over the past few decades the discrepancy has not been as dramatic. Therefore we used a rate of cost increase of 8 percent annually.

College Tuition

As is true for health care costs, the increasing cost of college tuition has outstripped the inflation rate in recent times. We assumed a rate of increase of 7 percent annually for this expense.

Home Value

Appreciation of home values was assumed to be 4 percent per year. In some parts of the country, where home values have increased sharply, this might be an underestimate. However, these regions might also have experienced greater cost-of-living increases. Rather than complicate the analysis by varying home values with the region of the U.S. where the individuals described in the scenarios reside, we used the 4 percent rate in all scenarios.

Beneficiary

The spouse, as opposed to children or others, was assumed to be the primary beneficiary for any assets remaining at retirement.

Post-Retirement Income Goal

We assumed that the individuals described in the scenarios would need 90 percent of their pre-retirement final pay once they retire and for each successive year, taking into account inflation. This level would reflect guaranteed income sources such as Social Security, employer pensions, and income annuities, as well as income generated through private savings. When necessary, the individual's home would be sold to produce income.

While some research examining "replacement ratios" argues for the necessity of 70 to 80 percent of pre-retirement pay to maintain standard of living,[20] we used a more conservative 90 percent to incorporate retirement risk management. For example, individuals could purchase long-term care insurance, may have increased health-related expenses, and so on.

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[20]cf Palmer, B. A., *2001 GSU/Aon RETIRE Project Report*, Center for Risk Management and Insurance Research, Georgia State University, June 2001.

Asset Allocations

Depending on the risk tolerance of the individuals described in the scenarios, different proportions of equities, fixed income assets, and guaranteed assets were selected for portfolios. The following allocations were taken from Invesco's Lifestyle Fund asset allocations, which have been back-tested

using historical performance of market indices to ensure that they are appropriate for the intended level of investing risk tolerance:

- *Conservative*. 60 percent in fixed income assets, 40 percent in equities

- *Moderate*. 10 percent in guaranteed assets, 30 percent in fixed income assets, 60 percent in equities

- *Aggressive*. 10 percent in guaranteed assets, 10 percent in fixed income assets, 80 percent in equities

For cases where the individuals are entitled to a guaranteed income source (e.g., Social Security, a defined benefit pension plan), the actuarial present value of this income was calculated and treated as a guaranteed asset. Then, any remaining investable assets were allocated to best approximate the target percentages listed above.

APPENDIX B — SOFTWARE PROGRAMS ANALYZED

Consumer Programs

Name of Software	Manufacturer
Retirement Income Manager	T. Rowe Price
LifeFocus V 7.5-0405 English	The Rouse Companies
ISG Personal Version 1.0	ISG
McRetire (Monte Carlo Retire) V 1.1	Efficient Solutions Inc.
ANNPLAN V 3.00	ANNROC Retirement Financial Planning Corp.
Plan for Life after Work	Fidelity Investments

Professional Programs

Name of Software	Manufacturer
Wealth Strategies V 1.1	Advanced Impact
Pension & Roth IRA Analyzer	Brentmark Software
Profiles + V 6.2	Financial Profiles
Fplan Professional Advisor +	First Financial Software
Financial Planning Professional for Windows Version 2001.2a	Lumen Systems
Financial Planning Spreadsheets V 8.1.0	Money Minders Software
Integrate 2000	PlanWare, Inc.
ExecPlan V 5	Sawhney Systems
EXPERT Retirement Advisor	Sterling Wentworth/SunGard
Methuselah MVP (Platinum license)	Unger Software/Methuselah
R$P 2000	Wagner Math Finance
Advisor Workbench*	Lincoln Financial Advisors
FASware*	American Express

*Proprietary program

APPENDIX C — CASES ANALYZED

Every software program requires data to be entered. To adequately test the software's different attributes, six different scenarios were developed. These scenarios were designed to include different demographics and life-stage events so that a wide cross section of real world circumstances would be represented. These included different ages, incomes, asset accumulation, marital status, goals, and expectations. All six scenarios were run through each software program. Below is a brief look at the different cases created.

Case 1

Judy and John Liebold are ages 55 and 50 respectively. They would like to both retire in 10 years. Both come from long-lived families, and expect to both live well into their 80s. They have two children: a daughter, Sally, aged 19, who attends a private college, and a son Tom who is 17 and will be attending the same college as his sister next year. The present cost of the college is $26,000. John and Judy make a very good salary. John makes $200,000 a year in publishing and Judy makes $55,000 a year as a high school English teacher.

John and Judy, however, like the good life. They reside in a home valued at $600,000, but they still have an outstanding mortgage of $400,000. It will not be fully paid off at retirement due to three refinancings they completed to consolidate credit card debt in the 1980s and early 1990s. They still owe $20,000 on their credit card and insist on new cars every other year and expensive and exotic vacations. The last was to go skiing in New Zealand.

John will receive 55 percent of his final pay as his defined benefit pension payment. He also has a 401(k) presently valued at $150,000 and some stock options. Judy will only receive a straight DB benefit of $5,000 a year and has a 403(b) with a present balance of $28,000.

Among other results, we tested the software to see how the following were answered:

- Will John and Judy be able to retire at 65 and 60?
- How can they balance paying for their children's tuition while trying to save for retirement?
- Should they purchase long-term care insurance?
- Will they run out of money during retirement?

Case 2

Sue Shackleton, age 60, was recently divorced after 35 years of marriage. She presently works as a receptionist in a dentist's office and makes $16,000 a year and dutifully puts 10 percent of her salary in an IRA. As part of the divorce settlement, Sue received the home, presently valued at $130,000. She also received some of her husbands 401(k) balance, presently valued at $25,000. Her home, though completely paid for, needs work. The roof and furnace need to be replaced.

Sue has three grown children, but they are not financially able to help her. They also live out of state. Because of this, Sue would like to purchase long-term care insurance, but feels the premiums may be too high.

Among other results, we tested the software to see how the following were answered:

- Would Sue benefit by working beyond 65 and receiving a larger benefit?
- Sue's main asset is her home. How best can she use it?
- In what order should Sue withdraw money from her assets?
- Is LTC insurance too expensive or should she purchase it?

Case 3

Lisa Smith is 58 years old and a widow. Her husband Roger was a police officer killed in the line of duty 20 years ago. When Roger died she received his salary for life with a 3 percent COLA yearly. Lisa never remarried. Lisa presently works at a local school and makes $25,000 a year. She has a $20,000 fixed balance in her 403(b) and contributes 10 percent of her salary. She lives in a state where school workers do not participate in Social Security. She also has over $100,000 in a money market account, and rents a condominium for $1,200 a month.

Also living in the condo is Julia Stevens, Lisa's mother. Sadly, Julia suffers from Alzheimer's Disease and depends on Lisa for her care. Her condition will only worsen. Lisa insists she will not put her mother in a home.

Among other results, we tested the software to see how the following were answered:

- As the progression of Julia's disease continues, how will Lisa handle the increasing costs?
- Lisa does not own her home. What effect will that have?
- Should Lisa be more aggressive with her investment choices?

Case 4

Hal and Karen Grainger are 65 and 60 respectively. The both recently retired from their jobs. Hal was the manager of a grocery store where he made $50,000 a year. Karen was a supervisor at a local craft store where she made $20,000 a year. Hal and Karen always have lived within their means. Their primary residence, valued at $200,000, and vacation cabin, valued at $70,000, are both paid for completely. They, however, have been conservative investors. Their IRAs are invested in certificates of deposit and are valued at nearly $150,000. They also have an immediate annuity that will pay them $5,000 a year. Hal and Karen assumed that if they had $100,000 in their IRA accounts at retirement, along with Social Security and the annuity, that they would be fine. Because of this, they plan on traveling for the next two years.

Due to family history, Hal doesn't expect to live much past 75. Karen, on the other hand, comes from a family where many have lived into their 90s. She wouldn't be surprised if she lived another thirty years, or perhaps even longer.

Among other results, we tested the software to see how the following were answered:

- Are Hal and Karen too conservatively invested?
- Will their traveling for two years deplete their IRA too quickly?
- Hal expects to live to only 75. What if family history doesn't apply and he lives into his 80s?

Case 5

Javi and his wife Amar emigrated from Lebanon 10 years ago. They immediately began working at a cousin's restaurant. Javi made $38,000 as cook and Amar $32,000 as a pastry chef. They are both 62, but Javi's health has unexpectedly deteriorated. Javi was forced to stop working and Amar has also stopped working to be with him. She is planning on starting a part-time catering business from home. Their home, presently valued at $120,000 will be paid for in five years.

Among other results, we tested the software to see how the following were answered:

- Will they need to sell their home to cover expenses?
- How will they handle Javi's increasing medical expenses?
- Will they be able to afford to stay in the United States, or should they think about returning to Lebanon?

Case 6

Jim and Linda Stewart are both 75 and have been married for 50 years. The both retired 10 years ago at age 65. They both receive Social Security and Jim receives $14,000 a year from his pension. Their home, valued at $120,000 is paid for.

Jim is suffering from Rheumatoid Arthritis and it is getting progressively worse. Because of his condition, they are thinking of moving to Florida for its warmer climate. They would like to purchase long-term care insurance, but the premiums for someone aged 75 are extremely high.

Among other results, we tested the software to see how the following were answered:

- How are they going to sell their home and move to Florida?
- How will they pay for Jim's care?

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