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Jamie Hopkins, JD, MBA, LLM, CLU®, RICP® is the Larry R. Pike Chair in Insurance and Investments, Co-Director of the New York Life Center for Retirement Income and Associate Professor of Taxation at The American College.

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Although significant amounts of research and public policy have been directed toward financial literacy in recent years, not nearly as much attention has been placed on the type of information needed by the nearly 10,000 baby boomers reaching age 65 each day until 2030. As such, it would be wise not to lose focus on an important literacy measurement: retirement income planning knowledge. The reality is that retirement income planning is challenging, as it requires knowledge across a broad array of legal, financial, and social topics. To make informed retirement income planning decisions, retirees will require an appropriate level of retirement income planning knowledge.

This article discusses the findings of the The American College RICP® Retirement Income Literacy Survey, which was used to gather information about the retirement income planning knowledge of those individuals just entering retirement and those individuals about to retire. Additionally, this article presents the top distinguisher questions that can be used by retirement advisors to gauge the retirement income knowledge of their clients.

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This study examines the improvements in sustainable retirement income that can be generated by utilizing either of two options under the HECM reverse mortgage program—the tenure option and line of credit (LOC). For comparison, the study also analyzes the impact of utilizing a single-premium immediate annuity (SPIA) to generate retirement income. The base case for these comparisons is a systematic withdrawal plan that does not use reverse mortgage or annuity options. The study also examines the impact of combining reverse mortgage options and SPIAs.

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V. Sivarama Krishnan, Associate Professor of Finance, University of Central Oklahoma

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When created in 1998, the Roth IRA denied access to high-income individuals. Tax law changes enacted in 2005 and later have made the benefits of a Roth IRA available to nearly everyone, regardless of income levels, through...
possible conversions of deductible/non-deductible IRAs. This paper develops a multi-dimensional decision framework. The framework includes a metric to compare the expected marginal tax rate at the time of the withdrawal of funds, as well as, the minimum investment horizon needed to break even in terms of expected after-tax future values of the alternatives. The paper also analyzes the impact of random variability in the expected returns on these metrics. Roth conversion would benefit investors with long investment horizons and those who do not expect any significant reduction in their marginal tax rates. Possible tax law changes represent the greatest uncertainty for anyone considering conversion.

**Measuring the Financial Consequences of IRA to Roth IRA Conversions**

*James S. Welch, Jr., Senior Application Developer for Dynaxys, LLC.*

The tax code permits the conversion of IRA funds to a Roth IRA provided that personal income taxes are paid on the IRA distributions. Common motivations for IRA to Roth IRA conversions are to increase retirement disposable income, insure against future tax increases, and allocate retirement savings to minimize combined taxes for retirees and their heirs. This paper quantitatively assesses the financial consequences of making conversions with respect to these motivations. Our laboratory was a linear programming retirement planning calculator that, given a set of assumptions and constraints, computes retirement cash flow that maximizes disposable income by minimizing taxes and maximizing compounded asset returns. Disposable income is our metric for evaluating different assumptions, such as doing or not doing conversions. Our results are that partial conversions early in the optimal plan increases disposable income by around 1% in most situations. Conversions reduce total income taxes paid by 19% as it shifts taxes from later in retirement to earlier in retirement. Pre-positioning savings for inheritance purposes can be accomplished with minor reductions in disposable income.

**Making Your Money Work: Tax Refunds to Debt Reduction**

*Norma B. Coe, Assistant Professor, University of Washington and NBER

Timothy Clegg*

Financial education and literacy, especially among low-income households, have become popular policy and research topics. This qualitative study combined information from tax preparation services with credit counseling services at a Volunteer Income Tax Assistance (VITA) site, and documents the existence of low-income, high-debt, over-withholding households. A subgroup of these clients who also predicted stable tax situations for the upcoming year were selected to receive additional information and tools to change their withholding and pay down their debt to help achieve the broader goal of improving their financial security. This study suggests that this combining of tax preparation and credit counseling services may provide a promising avenue to help individuals change their financial security.

**Measuring Risk Tolerance: A Review of Literature**

*Michael S. Finke, Professor, Department of Personal Financial Planning, Texas Tech University

Michael A. Guillemette, Assistant Professor, Department of Personal Financial Planning, University of Missouri*

This paper provides a review of literature on the theory and measurement of risk preferences. The manuscript begins with a discussion on the origin of risk aversion and the evolution of prospect theory. We explore how risk perceptions alter household financial decision making, the effect cognitive ability has on risk preferences and the extent to which risk preferences change over time. Next, we examine ways to measure investor risk preferences and provide insight into the construction of risk assessment questionnaires. We conclude with a discussion on advisor compensation models and how they may affect the risk level of client portfolios.
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- Behavioral factors related to financial decisions
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Editors’ Notes

Welcome to the Spring 2016 issue of the Journal of Personal Finance, the first issue in which Wade Pfau and Walt Woerheide, both professors from The American College of Financial Services, serve together as co-editors. In this issue we have six articles with an alliterative focus on the letter R: retirement income knowledge among the public, reverse mortgages, Roth IRAs, tax refunds, and risk tolerance.

The issue begins with an article by Jamie Hopkins and David Littell, which provides results from an in-depth survey of the American public designed to elicit the levels of knowledge about retirement income planning topics. They note the challenges of retirement income planning, which crosses into the fields of law, finance, and gerontology. Their goal was to gather information about the retirement income planning knowledge of those individuals just entering retirement and those individuals about to retire. They have identified top distinguisher questions to include in a shorter survey that can be used by advisors to gauge the retirement income knowledge of their clients.

The second article is by Joe Tomlinson, Shaun Pfeiffer, and John Salter. The use of reverse mortgages as a retirement income tool has been the focus of much research in the past few years, with the past focus being on how to coordinate distributions from a reverse mortgage line of credit and an investment portfolio. This innovative article is the first to more seriously consider how the tenure payment option on a reverse mortgage compares with the use of a single-premium immediate annuity. Given the desire for a guaranteed income stream, this article explores conditions for when a client may be better off using a tenure payment on a reverse mortgage, or using a single-premium income annuity with a portion of assets in the investment portfolio. As well, when an income annuity is used, the article further explores whether to also open a line of credit on a reverse mortgage.

The third and fourth articles both focus on different aspects of converting assets from traditional IRAs to Roth IRAs. In the third article, V. Sivarama Krishnan and Julie Cumbie explore conditions for when it is worthwhile to convert assets to a Roth IRA. By assuming that any taxes on the conversion will be paid from assets in a taxable account, the authors find that the breakeven point for future tax rates to make Roth conversions optimal can be less than the current tax rate. Roth conversion would benefit investors with long investment horizons and those who do not expect any significant reduction in their marginal tax rates.

In the fourth article, James Welch further explores the topic of Roth conversions by quantifying the impacts of conversions on a retirement income plan. He notes that common motivations for IRA to Roth IRA conversions are to increase retirement disposable income, insure against future tax increases, and allocate retirement savings to minimize combined taxes for retirees and their heirs. Using a linear programming model, he determines that partial Roth conversions early in the optimal plan increase disposable income by around 1% in most situations. As well, pre-positioning savings for inheritance purposes can be accomplished with minor reductions in disposable income.

We next turn to the topic of financial literacy and tax refunds, with an article by Norma Coe and Timothy Clegg. They present a qualitative study about the effects of combined information from tax preparation services with credit counseling services at a Volunteer Income Tax Assistance (VITA) site. For low-income, high-debt, over-withholding households, they investigate the impact of further education and tools about changing withholding to pay down debt for a subgroup of these clients who also predicted stable tax situations for the upcoming year. The study suggests that this combination of tax preparation and credit counseling services may provide a promising avenue to help individuals improve their financial security.

Our final paper is by Michael Finke and Michael Guillemette. They review the literature on the theory and measurement of risk preferences. Topics include the origin of risk aversion and the evolution of prospect theory, an exploration on how risk perceptions alter household financial decision making, the effect cognitive ability has on risk preferences and the extent to which risk preferences change over time. The article also examines ways to measure investor risk preferences and provide insight into the construction of risk assessment questionnaires. They conclude with a discussion on advisor compensation models and how they may affect the risk level of client portfolios. We hope you enjoy the current issue of the Journal of Personal Finance.

— Wade Pfau
— Walt Woerheide

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Abstract

Although significant amounts of research and public policy have been directed toward financial literacy in recent years, not nearly as much attention has been placed on the type of information needed by the nearly 10,000 Baby Boomers reaching age 65 each day until 2030. As such, it would be wise not to lose focus on an important literacy measurement: retirement income planning knowledge. The reality is that retirement income planning is challenging, as it requires knowledge across a broad array of legal, financial, and social topics. To make informed retirement income planning decisions, retirees will require an appropriate level of retirement income planning knowledge.

This article discusses the findings of The American College RICP® Retirement Income Literacy Survey, which was used to gather information about the retirement income planning knowledge of those individuals just entering retirement and those individuals about to retire. Additionally, this article presents the top distinguisher questions that can be used by retirement advisors to gauge the retirement income knowledge of their clients.

Introduction

A tremendous amount of research, focus, and public policies have been directed toward financial literacy in recent years (Lusardi & Mitchell, 2014). However, as nearly 10,000 Baby Boomers reach age 65 each day until 2030 (Dunlap, 2013), it would be wise not to lose focus on another important literacy measurement: retirement income planning knowledge. The reality is that retirement income planning is challenging, as it requires knowledge across a broad array of legal, financial, and social topics. While studies have surveyed different groups of people on specific financial topics such as Social Security knowledge or health care expenditure knowledge, there is little existing research that surveys Baby Boomers on their overall retirement income knowledge (Greenwald, Kapteyn, Mitchell & Schneider, 2010). This task was undertaken by The American College RICP®
Retirement Income Literacy Survey. The goal was to gather information about the retirement income planning knowledge of those individuals just entering retirement and those individuals about to retire. This article discusses the overall results of the research and presents the top distinguisher questions that can be used by advisors to gauge the retirement income knowledge of their clients.

While performing a Google search is not the most academic research method, it can be a valuable tool. In January 2014, a quick Google search of the phrase “Retirement Income Planning Literacy” resulted in zero responses. This highlights the need for greater understanding of and attention to this important area of financial literacy. Retirement income planning, which is a relatively new field of expertise, is distinctly different than traditional financial planning. General financial literacy does not require the vast array of skills and knowledge required to demonstrate a competent level of retirement income planning literacy. For instance, knowledge of Social Security claiming strategies, reverse mortgages, Medicare benefits, and sustainable portfolio withdrawal rates fall well outside the scope of traditional financial literacy. However, these topic areas, among others, reflect the major decision points facing Americans as they move into retirement. Unfortunately, Americans do not have enough money saved for retirement, making their decisions in retirement even more crucial. As such, retirement income planning literacy needs special attention because the retirement income decisions of the Baby Boomers will have an incredible impact not only on their own retirement satisfaction, but also on the future economic security of the United States.

While retirement income literacy has not been widely studied, some researchers have taken deeper dives into specific retirement literacy issues, such as Social Security knowledge (Benitez-Silva, Demiralp & Liu, 2010). Furthermore, broader reviews of financial literacy have been performed in order to demonstrate both the overall level of financial literacy in the United States and the impact of financial literacy on retirement planning (The HRS).

The lack of retirement-related financial literacy research is troubling because of the importance of retirement and the challenges facing Americans with regard to retirement income planning. According to the Employee Benefit Research Institute (EBRI), Baby Boomers and Gen Xers have a retirement income shortfall of nearly $4.3 billion, when taking into account current Social Security retirement benefits and the assumption that net housing equity is utilized “as needed” (EBRI, 2012). Despite this large retirement income shortfall, employers are continuing to move away from offering traditional pension plans to employees and instead are offering defined contribution plans like 401(k)s (DiCenzo & Fronstin, 2008). Additionally, Social Security, which for many people is the only guaranteed income source they will have in retirement, might be unable to provide all of its promised benefits after the trust fund assets are depleted (SSA, 2014). This is expected to occur in 2033 if the status quo is maintained, and poses a real challenge for those individuals depending on Social Security for their guaranteed retirement income. Americans are facing retirement planning without adequate savings, with limited access to pension plans, and with serious concerns regarding the future status of Social Security. As such, Americans need to have the information necessary to make informed decisions regarding their retirement plans. However, a review of existing retirement and financial literacy research shows that there are still many questions regarding the retirement planning knowledge of Americans.

Existing Retirement Planning and Financial Literacy Literature

In 2013, the Consumer Financial Protection Bureau, in conjunction with the Treasury Department and the Financial Industry Regulatory Authority (FINRA) Investor Education Foundation, released a research study report, Financial Capability in the United States, which looked at the financial literacy of Americans (FINRA, 2012). The 2012 National Financial Capability Study (NFCS) evaluated the financial knowledge of respondents by asking them five fundamental finance questions (NFCS, 2015). The five questions focused on interest rates, inflation, investment diversification, bond prices, and mortgage payments. Only 14 percent of respondents were able to answer all five questions correctly, but 39 percent were able to answer at least four questions correctly. This study provided a good baseline for determining the financial literacy of Americans. However, it did not focus specifically on retirement income literacy or knowledge. Utilizing the questions developed for the 2012 National Financial Capability Study, the RICP® Literacy Survey included some basic financial questions on the same topics to gauge the overall financial literacy of the survey group.

In 2012, an article entitled Numeracy, Financial Literacy, and Financial Decision-making was published that reviewed...
existing financial literacy and financial decision-making research as it related to different age-banded demographic groups (Lusardi, 2012). The article concluded that basic financial literacy, as tracked by numeracy, is very low in the adult U.S. population, and especially low among the elderly. Additionally, links were found between this low level of financial literacy and financial decision-making.

With research showing an inverse relationship between low levels of financial literacy and good decision making, it is imperative that the retirement income literacy of Americans be well understood in order to increase their retirement planning decision-making skills. In 2013, David Blanchett and Paul Kaplan conducted research in conjunction with Morningstar around the value of making intelligent financial planning decisions (Blanchett & Kaplan, 2013). This research focuses on five fundamental financial planning decisions and the impact of making a “good” and intelligent decision. While good and intelligent decisions can be hard to quantify, the research depicted the concept as “Gamma” and measured it as the value added by “calculating the certainty-equivalent utility-adjusted retirement income across different scenarios.” Gamma shows “the additional value achieved by an individual investor from making more intelligent financial planning decisions, measured by the percentage increase in certainty-equivalent retirement income over a base case.” The five decisions examined were related to asset location, asset allocation, annuity allocation, a withdrawal strategy, and liability/risk planning. The research showed that a retiree could be expected to generate nearly 22.6 percent more income by making more informed and good decisions than in the base scenario of a 4 percent withdrawal rate and a 20 percent equity allocation portfolio. This research highlights the need for financially literate retirees, as good decision making can substantially improve one’s financial security in retirement. However, there remains a need for a comprehensive retirement income literacy study (Greenwald, Kapteyn, Mitchell & Schneider, 2010).

The most comprehensive research project collecting data with regard to retirement is the Health and Retirement Study: A Longitudinal Study of Health, Retirement, and Aging (HRS). The HRS, conducted by the Institute for Social Research at the University of Michigan and sponsored by the National Institute on Aging, surveyed a sample of more than 26,000 Americans over the age of 50 at two year intervals starting in 1992. The HRS collected information about asset levels, liabilities, insurance, health, and other expenses. The data is available for other researchers to use. Many have examined the data over time with over 7,000 people registered to use the data, generating nearly 1,000 reports, 600 peer-reviewed articles, and 70 doctoral dissertations (NIA).

While the questionnaire has changed over time with new questions being added and some questions being replaced, the topics surveyed have remained fairly consistent from 1992 until 2014. Even though the questionnaire itself was focused more on lifetime situations, events, behavioral questions, hobbies, actions and perceptions than actual knowledge, it did contain some knowledge-based questions. For instance, the survey asks about how much financial planning was done and what type of insurance respondents have in place as opposed to what type of insurance would be best for them in a given situation. However, the HRS has been incredibly valuable by allowing researchers to track a large group of people as they move into retirement and make a tremendous amount of critical retirement income planning decisions. The HRS also asked basic financial literacy questions about computations, compound interest, and political literacy.

In a 2007 study, Annamaria Lusardi and Olivia S. Mitchell set out to evaluate how well people plan for retirement and the impact that financial literacy has on retirement planning (Lusardi & Mitchell). Their analysis used two sets of data, including the HRS data from 2004 and the HRS data from 1992. Their review of the HRS data focused on the impact of improved financial literacy on retirement planning decisions. One question in the HRS asks, “How much have you thought about retirement? A lot, some, a little, or hardly at all?” The results showed that roughly 28 percent of early Baby Boomers had not thought about retirement at all. Additionally, Lusardi and Mitchell’s review of the HRS showed that the respondents struggled with compound interest but fared satisfactorily on the other financial literacy questions. Individuals with higher levels of completed education performed better on the financial literacy questions. The least educated individuals, who demonstrated low levels of financial literacy, did not show a change in wealth over time as compared to their more highly educated and more financially literate counterparts.

Furthermore, the HRS data showed that those who had planned for retirement entered retirement with more wealth. It also demonstrated that planning for retirement was strongly correlated with financial literacy, even after controlling for most other socio-demographic factors, including income. As such, their study indicated that higher levels of financial literacy improved the likelihood of planning for retirement, which in turn improved overall wealth.

In 2011, Lusardi and Mitchell examined the HRS data again to review the impact of financial literacy on different demographic groups and the likelihood of each group to plan for retirement (Lusardi & Mitchell, 2011). Their study revealed that Hispanics and African-Americans scored the lowest on financial literacy. The study also found that women and less-educated people demonstrated low levels of financial literacy. One surprising finding was that all groups rated themselves as “well-informed” about financial matters, regardless of their financial literacy performance. Lastly, Lusardi and Mitchell (2011) concluded that those who scored higher on the financial literacy questions were also more likely to plan for retirement. For instance, those individuals who planned for retirement scored an average of 2.2 out of 3 on the basic financial literacy questions, consisting of an interest rate, inflation, and risk diversification questions. However, the non-planners scored on average 1.6 out of 3. Again, because low levels of planning can result in fewer retirement assets, the financial literacy of the respondents emerged as an important factor (Lusardi & Mitchell, 2008).

In addition to the HRS, another study shed some light on the relationship between financial literacy and planning for retirement. The MetLife Mature Market Institute conducted the MetLife Retirement Income IQ Survey for a number of years to heighten public awareness and understanding of key retirement income concepts (MMMI, 2011). The MetLife Retirement Income IQ Survey was conducted in three different years: 2003, 2008, and 2011. The survey group consisted of 1,213 pre-retirees in North America, ages 56–65, working full-time (MMMI, 2011). The survey included 15 general financial knowledge questions and nine additional questions more specifically involving retirement security and planning. The survey asked questions about longevity, inflation rates, income replacement in retirement, retirement savings, withdrawal rates, annuities, reverse mortgages, and health care costs. The respondents demonstrated low levels of retirement planning knowledge, answering only five of 15 questions correctly in the 2011 survey.

Furthermore, the MetLife data showed a slight decrease in correct answers from the 2008 survey to the 2011 survey (MMMI, 2011). While the majority of respondents had done some planning for retirement (87 percent), only 62 percent were currently seeking financial product advice. With regard to topic-specific questions, respondents struggled more in some areas than in others. For example, 42 percent of respondents incorrectly believed that health insurance, Medicare, or disability insurance would cover the costs of long-term care expenditures. A surprising 83 percent of respondents did not know the benefits of delaying Social Security by three years. Respondents also did not demonstrate a great deal of knowledge about the potential uses of reverse mortgages in retirement. The MetLife Retirement Income IQ Survey in 2011 concluded that the respondents “face difficulty in ‘connecting the dots’ to get a coherent picture of both the ‘what’ and ‘why’ of their retirement prospects under different scenarios of their own future.” The MetLife survey showed a variety of key misconceptions held by Americans about retirement.

In another study conducted in 2012, The Middle Class Retirement Survey by Harris Interactive on behalf of Wells Fargo, a variety of key misconceptions was brought to light with regard to retirement knowledge (Wells Fargo, 2012). The survey was conducted through over 1,000 telephone interviews of middle wealth Americans from age 20–75. The Middle Class Retirement Survey found that Americans vastly under-projected the amount of money they will need in retirement. For instance, most Americans believed they will need less than half of their current income in retirement. Additionally, they projected the present value median out-of-pocket health care costs over their expected lifetime to be around $47,000, while The Center for Retirement Research at Boston College projects that figure to be closer to $260,000 for a typical 65-year-old couple (Webb, Zhivan & Sun, 2010).

Research Methodology

The RICP® Literacy Survey’s primary goal was to determine the level of retirement income planning literacy of Americans near or in early retirement. In order to ascertain their knowledge levels, a questionnaire was developed to include knowledge questions regarding the most pertinent retirement planning issues. These questions were developed with the input and help of retirement income
planning researchers and practitioners, with over 20 professionals being consulted for input on important retirement income planning topics. In addition, topic areas from such leading retirement income educational programs as the Retirement Income Certified Professional® (RICP®) were reviewed in order to ensure that the proper retirement income topics were covered in the survey instrument. A pilot survey was run to test the questions with consumers and to ensure that they were easily understood. Additionally, the questions were vetted by industry professionals to ensure the accuracy of the questions.

The questions dealt with topics that gauge an individual’s knowledge of the core features of retirement income planning. Those topics included general retirement planning, the ability to maintain one’s lifestyle, retirement income generation, annuities, Social Security, life expectancy, death of a spouse, taxes, inflation, housing decisions, medical insurance, and long-term care planning. The respondents were scored on their ability to answer 38 different knowledge questions correctly, all of which were weighted equally.

In addition to answering knowledge questions, respondents were asked to answer behavioral and attitudinal questions on retirement income planning topics. Some of these questions were used to gauge the confidence of the respondents in relation to their knowledge levels. The questionnaire also included a series of demographic questions.

The RICP® Literacy Survey gathered information through 15-minute online surveys conducted between July 17 and July 25, 2014. Respondents were recruited through the Research Now online panel that would drop respondents if they did not meet our qualifications. As such, respondents did not know the qualifications needed to qualify for the survey. A total of 1,019 Americans were interviewed. To qualify for the study, respondents needed to be between ages 60 and 75. The ages were restricted to those individuals right before and right after retirement.

While retirement income planning is important for all Americans, the study was focused on those closest to the retirement decision. This was important for a comprehensive retirement income study because for those individuals too far before retirement, the need to understand certain topics, such as Medicare, is not as crucial. However, for those in early retirement and just nearing retirement, the entirety of retirement income planning is more important to understand. Additionally, respondents needed to have at least $100,000 in household assets, excluding their primary residence. The asset level requirement does create a real limitation for the data to be applied to all Americans as many people do not have $100,000 outside of home equity. The survey was conducted and data was gathered by Greenwald & Associates on behalf of the New York Life Center for Retirement Income at The American College. The reason to limit respondents to those in the specified age range with assets to invest was to find a targeted group with a stake in being knowledgeable about the topics that were tested because they do not rely solely on Social Security for their retirement income.

Topline Results

The RICP® Literacy Survey contained 38 different retirement income planning knowledge questions across a spectrum of 13 different retirement planning topics and found that only roughly 20 percent of respondents could score 61 percent or better, with 60 percent and below being a failing grade. A failing score was determined to be 60 percent because it has been used as a common benchmark for other financial literacy research reports, allowing comparison among groups (Mandell, 2008). Furthermore, no one scored in the 91–100 percent range, and very few people (1.3 percent) scored in the 81–90 percent range. The mean respondent score was 17.12, for an average of 45 percent correct. Among the 13 issues surveyed, only three areas of knowledge averaged a passing literacy score above 60 percent correct.

Results by Category

The survey results also suggest specific areas in which there is an obvious lack of knowledge that could have

3. The RICP® curriculum includes educational material on distribution strategies, general planning, tax efficient withdrawals, investments, long-term care planning, Social Security, housing options, health care, insurance products, qualified plans, IRAs, optimal retirement ages, and government programs. See RICP® Description—https://ricp.theamericancollege.edu/learn-more.

4. See Table 1.
5. See Table 2 (Average Scores by Each 11 Sections).
6. The data in the results by category section comes from our weighted data in the Retirement Literacy Study Banner 1—Dec. 23, 2014. This section of the data set was weighted by age, education, and asset level to reflect the distribution of those characteristics among Americans age 60–75 with at least $100,000 in investable assets (based on the 2010 Survey of Consumer Finance). The rest of the
consequences on the retirement decisions of older Americans.\(^7\) For instance, the survey looked at 13 specific areas of knowledge: 1) ability to maintain lifestyle, 2) life expectancy, 3) income generation, 4) early death of a spouse, 5) annuity product knowledge, 6) taxes, 7) inflation, 8) housing, 9) medical insurance planning, 10) long-term care, 11) basic financial and investment questions, 12) Social Security, and 13) company retirement plans.\(^8\) Overall, the respondents performed best on inflation, housing, and medical insurance planning questions and performed worst on annuities, early death of a spouse, and income generation questions.

**Ability to Maintain Lifestyles**

When looking at the respondents’ knowledge with regard to their ability to maintain their lifestyle in retirement, we found that respondents only scored 38 percent, or roughly 1.5 correct out of 4 (Table 2). Respondents did not show exceedingly high knowledge on any of the four “ability to maintain lifestyle” questions. Only 32 percent knew that $4,000 is the most they can afford to safely withdraw per year from a $100,000 retirement account, based on the 4 percent safe withdrawal rate research (Bengen, 1994) (Table 8, Question #17). In addition, only 35 percent of respondents knew that maintaining a portfolio of 50–60 percent in equities is likely to yield a higher sustainable withdrawal rate than a much higher equity allocation (90–100 percent) or a much lower (20–30 percent) allocation (Table 8, Question #18). Only 47 percent of respondents knew that using a portion of the portfolio to purchase a life annuity can protect against longevity risk (Table 8, Question #19). Lastly, only 37 percent knew that a person planning to retire at age 65 should take the least amount of investment risk at age 65, rather than earlier or later (Table 8, Question #20). These are not necessarily easy questions, but they are all extremely relevant for a retiree choosing and executing a retirement income strategy. There was a higher expectation for a correct answer result concerning the $4,000 withdrawal question, as this is an expression of the 4 percent safe withdrawal rule, one of the most talked about issues in the field.

**Life Expectancy**

Another barrier to proper planning is poor performance on life expectancy questions, as planning requires a reasonable estimate of the length of retirement. Over half (60 percent) underestimated the life expectancy of a 65-year-old man, suggesting that they may not realize how long their assets have to last (Table 8, Question #26). Similarly, only 30 percent understood that it is more effective to work two years longer, or defer Social Security for two years, than to increase contributions by three percent for five years just prior to retirement (Table 8, Question #32). Both of these questions illuminate the importance of income throughout retirement and understanding the longevity risk. However, in both cases it appears that respondents underestimated life expectancies of retirees.

**Income Generation**

Respondents also lacked knowledge about the best strategies to consider as they approach retirement in order to improve retirement security. Respondents did not appear to understand the benefits of delaying Social Security or working longer as a retirement income generation strategy. Instead, respondents fell into the misconception that saving more will be the more effective way to increase retirement income and security as opposed to delaying retirement. Respondents only scored on average 28 percent on income generation questions, one of the lowest three marks of the 13 categories (Table 2).

**Early Death of a Spouse**

Another one of the worst performance areas involved knowledge questions about the early death of a spouse. Respondents were asked about issues dealing with the early death of a spouse and life insurance and only scored an average of 26 percent (Table 2). More specifically, respondents were asked about the taxation of life insurance policy proceeds and the benefits of cash value life insurance. Respondents did not demonstrate a strong understanding of the taxation or benefits associated with life insurance. Life insurance can be used as a great tool to protect against the financial impact of an early death of a spouse. The failure to understand the risks associated with an early death of a spouse on retirement income planning can put the surviving spouse and the entire family unit at risk. This is also a bigger issue for women, as they are more likely to be widowed in retirement, possibly leaving them without sufficient income and assets to meet their retirement needs and goals.

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7. See Table 8.
8. See Table 2.

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Annuity Product Knowledge

Respondents knew very little about using annuities as a retirement income strategy. Unlike many other areas of knowledge, 65 percent admitted having very little knowledge about immediate annuities, and 57 percent admitted having very little knowledge about deferred income annuities. Overall, respondent knowledge on annuity products was the lowest performing knowledge area among all 13 categories, with an average score of 18 percent on the three questions, well below the passing mark of 60 percent (Table 2). Only 28 percent knew that buying an immediate annuity income of $1,000 a month would be more expensive for a younger person than an older one (Table 8, Question #39). Only 13 percent knew that a deferred annuity with a guaranteed lifetime withdrawal benefit can provide payments even if the investment account goes to zero (Table 8, Question #40). As annuities play an increasingly larger role in retirement income plans, it is imperative that Americans understand the products they are purchasing and relying upon to generate their retirement income.

Taxes

Respondents could answer roughly two questions out of four (50 percent correct) with regard to taxation (Table 2). However, most respondents (72 percent) knew that you must begin required minimum distributions for the year in which you reach age 70½ (Table 8, Question #41). Nearly 47 percent knew that all distributions from a Roth IRA could come out tax-free if certain holding period and trigger events were satisfied (Table 8, Question #42). However, most respondents (62 percent) did not know when would be a good time to convert a portion of a traditional IRA to a Roth IRA (Table 8, Question #44).

Inflation

Inflation risk is one of the biggest risks that retirees face, as it can erode their purchasing power, leaving them without sufficient assets to meet their retirement income needs. Inflation was one of the few topic areas in which respondents demonstrated a passing grade. On average, respondents answered 1.5 correct out of 2 inflation questions (Table 2). Perhaps an even more encouraging view of the results was that over 50 percent of respondents got both questions correct and only 5 percent of respondents answered zero correct.

Housing

Home ownership has long been a part of the American dream and one of the largest assets for retirees as they enter retirement. As such, they need to understand how to strategically take advantage of their home equity in retirement. Respondents performed well with regard to housing questions, as more than 50 percent answered both questions correctly, with an average score of 70 percent (Table 2). Most respondents (76 percent) understood when a reverse mortgage would become due, but fewer (66 percent) understood some basic features of continuing care retirement communities (Table 8, Questions #50 & #51). Nonetheless, both questions received above passing response rates on average.

Medical Insurance Planning and Long-term Care

While long-term care is an issue many will face in the future, Americans have limited knowledge of long-term care and the challenge it may pose. Only 19 percent knew that Medicaid pays the majority of all long-term care expenses (Table 8, Question #58) and only 24 percent knew that 70 percent of the population is going to need assistance in the activities of daily living at some point (Table 8, Question #57). Only 35 percent realized that family members end up paying most of long-term care costs (Table 8, Question #59). Long-term care risk is one of the biggest risks that retirees face, considering the fact that a year in a nursing home can easily cost more than $85,000 and completely decimate a retiree’s savings (Genworth, 2013).

Basic Financials and Investments

Respondents showed a lack of knowledge when it comes to understanding basic investment considerations. They only scored roughly 46 percent on the basic financial and investment questions (Table 2). However, this response rate was roughly in line with the overall correct response rate on the entire survey. Only 41 percent understood that when interest rates rise significantly, the value of bond funds will decrease significantly (Table 8, Question #63). Less than one in 10 understood that small cap mutual funds have a higher return over time than large cap funds, dividend paying stock funds, or high yield bond funds (Table 8, Question #64). While understanding basic investment features is not unique to retirement income
planning, it is crucial for wealth generation and portfolio management before and during retirement.

**Social Security**

As approximately two-thirds of retirees receive more than half their income from Social Security, the Social Security claiming decision is one of the most important decisions that retirees face. There has been a lot of discussion on this topic, which is reflected in somewhat better results on the quiz than in other areas. However, too many Americans do not understand key elements of Social Security, as reflected in the average score of 44 percent that is well below the 60 percent required for passing the total survey (Table 2). Perhaps most critically, only a little more than half (53 percent) know that it is best to wait until age 70 to claim Social Security if one is going to live to 90 (Table 8, Question #67). As Social Security is the main source of income for most Americans in retirement, understanding its features and the best strategies to maximize benefits is crucial to ensuring a secure retirement. It is interesting that the results in this survey were significantly better than The MetLife Retirement Income IQ Survey in 2011 in which 83 percent of respondents did not know the benefits of delaying Social Security by three years. This may imply that the media attention and educational efforts of advisors and others seems to have moved the bar on this issue. Again, the respondents could have a slightly lower understanding of Social Security because they will not rely solely upon it as a source of income in retirement as the respondents had other sources of assets.

**Company-Sponsored Retirement Plans**

Overall, the mean score was roughly 0.8 correct out of two questions on employer-sponsored retirement plans, or 39 percent correct for the respondents (Table 2). Again, this represented a failing grade for this specific knowledge area, as respondents demonstrated little understanding about what they should consider when taking a distribution from a retirement plan. Selecting the correct distribution option from a qualified retirement plan is one of the most important retirement decisions and has garnered a lot of attention lately from both the federal government and financial advisors with regard to rollovers from qualified plans to IRAs and the implication of extended fiduciary roles. More troublesome was the fact that only 29 percent of respondents knew that 401(k) assets were protected from the claims of outside creditors, and nearly 17 percent believed they could lose their 401(k) assets to company creditors (Table 8, Question #71). This fear of losing money could inhibit increased savings into a 401(k) plan and keep people from saving enough money for retirement because they are not aware of the liability protection their 401(k) has from company creditors.

**Attitudes About Retirement Readiness**

In addition to the quiz portion of the survey, respondents were asked about their attitudes toward their preparation for retirement. When asked “How good of a job do you think you are doing when it comes to saving for retirement?” roughly half of the respondents reported they have done/are doing a very good to excellent job of saving for retirement; most of the remainder stated that they have done or are doing a reasonably good job. The respondents were provided with a scale of 1–7, with 1 being poor, 4 being moderately good, and 7 being excellent. Not one single respondent picked the lowest value for saving for retirement.

The respondents showed a high level of confidence that they were financially prepared for retirement. Approximately half of the respondents were highly confident about having enough money to live comfortably in retirement, while the other half was somewhat confident. However, when asked “How concerned are you about running out of money?” all of the respondents demonstrated some level of concern as no respondents picked the lowest level of concern. Most respondents showed a moderate to extreme level of concern about running out of money despite believing they were doing a reasonably good job of saving for retirement. There is a clear mismatch between the respondents’ belief that they were doing a good job saving for retirement, a high level of confidence about financial preparedness, and yet still suffering from a great deal of concern about running out of money.

When asked about what retirement issues concerned them the most, the cost of health care headed the list followed by cuts to Social Security and Medicare. Consistent with the level of confidence about their finances, running out of money was the lowest ranked concern.

There was other data to indicate whether actual financial preparation matches the level of confidence shown by the respondents. First, almost 4 in 10 of the respondents who
were pre-retirees admitted to being behind schedule when it comes to planning and saving for retirement. Second, when looking at financial assets, the numbers at first blush do not seem sufficient: 40 percent had less than $300,000 in investable assets with another 16 percent having between $300,000 and $500,000. A total of 21 percent had between $500,000 and $1,000,000, while 20 percent had more than one million dollars. However, it is hard to draw conclusions about financial security, as a large percentage (71 percent) had at least $3,000 a month or more of guaranteed income coming from pensions, annuities, or other sources.

Many also felt knowledgeable about saving for a comfortable retirement, with 4 in 10 describing themselves as highly knowledgeable. Almost all of the rest identified themselves as moderately knowledgeable. Only 3 percent admitted to not being knowledgeable. Self-reporting did not match the test results, indicating a great deal of overconfidence in this area.

Planning Activity

The respondents showed engagement with their finances, as two-thirds indicated taking the time to figure out a savings goal for retirement. A large majority check the status of their investments at least four times a year. Fewer—but still a majority—check as often to see if their income and spending are in balance. Nearly 2 in 3 Americans surveyed have an ongoing relationship with a professional financial advisor. Typically, they talk with their advisor at least twice a year. Nearly half of those with an advisor rely heavily on that advisor to manage their finances and investments.

It is interesting, however, that a limited number have a formal, written retirement plan with only about 1 in 4 indicating that they have one. Another finding shows that individuals may not be spending enough time planning for key areas of retirement. For example, only 38 percent of retirees said that they spent a great deal of time calculating their retirement budget. Similarly, only 27 percent indicated spending a great deal of time considering the risks faced in retirement that could undermine retirement security.

It is interesting that the survey results showed somewhat more engagement by retirees than pre-retirees. Retirees were more likely to have an advisor (65 percent for retirees and 59 percent for pre-retirees), and were more likely to talk to their advisor two or more times a year (81 percent for retirees and 69 percent for pre-retirees). This is a surprising result. According to the Society of Actuaries, only 52 percent of pre-retirees have a financial advisor and the number actually drops to 44 percent for retirees (Society of Actuaries, 2013). Retirees were also somewhat more inclined to have a written plan than pre-retirees (30 percent for retirees and 20 percent for pre-retirees).

Impact of Demographics

In line with previous studies (Lusardi and Mitchell, 2011), the demographics of the respondents yielded interesting results. The RICP® Literacy Survey gathered data on the respondents’ age, gender, wealth, education, and whether or not they engaged with an advisor for financial planning. While the respondents’ ages did not have a large impact on scores, all of the other demographic classifications identified had high correlations with their knowledge levels.

Gender appears to have a large impact on retirement income planning knowledge, as nearly 29 percent of male respondents posted a passing score as opposed to only 11 percent of female respondents. This is a real concern with the increased likelihood for women to become widows in retirement. The lack of retirement income literacy could create additional challenges for women. In addition, nearly 49 percent of female respondents fell into the low fail category, while only 29 percent of men posted low fail scores. The average score for male respondents was 49 percent, while females scored on average 41 percent. The five questions with the biggest disparity in performance between men and women show women underperforming in a number of areas including investment basics, tax treatment, and the cost of annuities.  

Wealth also had a strong correlation to the respondents’ knowledge. Wealth was determined by asking the respondent about his or her total financial assets, excluding the value of the primary residence and the value of a traditional pension plan. The asset level responses were grouped into bands, with individuals with less than $100,000 being terminated in the survey. Scores increased from each asset level range, with individuals in the highest asset range ($1.5 million or more) scoring an average of 52 percent while those in the lowest asset range ($100,000 to $199,999) scored only 41 percent on the knowledge quiz.

While the existence of an ongoing relationship with a professional financial advisor was listed in our general

9. See Table 9.
planning activity section of questions, it also fits nicely into the demographics discussion. A large portion of respondents (nearly 63 percent) did engage a financial advisor to help with finances or investments. Additionally, most of those respondents talked with their advisor more than two times a year. The existence of an advisor relationship corresponded with a lower knowledge score on the quiz. For instance, those individuals with a financial advisor scored on average 43 percent, while those without a financial advisor scored on average 48 percent.

To ensure that the differences were not caused by pure statistical accident or randomness, t-tests were run on the differences to determine whether the differences were indeed statistically significant. Both with one-tail and two-tail t-tests, the differences were statistically significant at the P<0.001 level. The one-tail test is a better analysis here because we did expect a knowledge difference between do-it-yourselfers and people with financial advisors.

Even more telling was the impact of a formal written retirement plan on the knowledge level of the respondents. For instance, those with a formal written plan and no financial advisor performed even better on the quiz, scoring an average of 49 percent, with nearly 30 percent of the respondents passing the quiz at nearly 10 percentage points higher than the average respondent. For people with a plan, it is likely that this group is made up of do-it-yourselfers. This group will need to spend more time learning the issues and planning as they are not outsourcing their retirement income planning. However, the group of respondents with advisors is likely a group that likes to outsource their financial planning to an expert. This group is probably less likely to be made of do-it-yourselfers and instead rely upon the knowledge and expertise of the planner that they engage. Additionally, those with a financial planner who did not have a formal written financial plan performed the worst, with an average score of 43 percent and a pass rate of only 14 percent. The existence of a formal written financial plan appears to impact the knowledge level of respondents, with a formal written plan having a positive impact for both respondents with and without a financial planner.

Written financial plans appear to educate clients to some degree as a difference occurs for both those with an advisor and without. This may not be that surprising as working through a comprehensive planning process forces an individual to be engaged and to make decisions along the way. For those without advisors, building a plan would require a lot of knowledge about the process and the individual topics that need to be considered. It is likely that those doing a plan on their own are following an approach that they learned about through a book or other educational process. For those working with advisors, going through a fact-finding process, being presented with alternatives, and being presented with a comprehensive plan is likely to result in a more educated client as well.

It is interesting that we found that those without advisors performed better than those with advisors. That may be in part because at least some who hire advisors are delegators who hire the advisor so that they can have minimal engagement in the process. They simply may not have an interest in knowing more.

We don’t have a clear sense from this study whether advisors see it as their role to educate clients, or if advisors themselves would perform well on this quiz. These would be interesting follow-up areas for additional research.

**Distinguisher Questions—How Advisors Can Better Understand Their Clients**

While the role of the financial advisor or retirement planner in educating his or her clients is not clear, it should be beneficial to understand the knowledge level of one’s clients. While the full RICP® Literacy Survey would help in that regard, it also takes longer to complete than most clients and advisors would want to sit through. As such, in order to determine the best questions for gauging an individual’s retirement knowledge, a point-biserial correlation coefficient was calculated to determine the relationship between a test question and the total final test score, or knowledge level.

While the point-biserial correlation coefficient was used for the RICP® Literacy Survey, there are other ways to determine the distinguisher quality of a question. The formula used for this statistic is as follows:

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10. See Appendix II.
\[
 r_{pt} = \frac{X_i - \bar{X}}{S_x} \sqrt{\frac{P_i}{(1-P_i)}}
\]

Where:

- \(X_i\): The mean test score of those who answered question \(i\) correctly
- \(\bar{X}\): The mean test score of everyone who took the test
- \(S_x\): The standard deviation for everyone who took the test
- \(P_i\): The percent of students who answered question \(i\) correctly (i.e., item difficulty)
- \((1-P_i)\): The percent of students who answered question \(i\) incorrectly (sometimes called \(Q_i\))

Based on the point-biserial correlation coefficients, the test questions appeared to perform fairly well with respect to overall performance on the test, as there were no negative coefficients. However, in an attempt to narrow the questions down for use by an advisor to gauge the knowledge of his or her clients, only the top 10 questions were provided in the appendix as a way to measure knowledge levels with a shorter quiz. The questions that are included cover retirement topics such as investments, reverse mortgages, safe withdrawal rates, inflation, IRAs, and taxation issues.11

However, another way to help clients is to look at the top five questions on the quiz in which respondents performed the worst, demonstrating the least amount of knowledge. Respondents across the board struggled with the taxation of life insurance, the payout rates of annuities, who pays for long-term care expenses, and investment returns.12 When dealing with clients preparing for retirement, it would help to explain the taxation of their life insurance policies, how their annuities work and the costs associated with them, and proper long-term care planning strategies. Most people were ill-informed on these planning issues, with scores all below 20 percent correct.

**Takeaways for Advisors**

This research has many implications for financial advisors. First, it shows that consumers seem to think they know more than they actually do about retirement income planning. This means that clients may be reporting that they understand concepts and terminology that they actually do not understand. This makes it difficult for them to make good decisions, and makes it difficult for the advisor to understand the clients’ rationales for the decisions they are making. This lack of comprehension can lead to suboptimal decisions. There are actions that deal with this concern.

- Communication needs to be a two-way street. Quiz-zing clients to see what they understand, asking them to say back to the advisor in their words what was just discussed, and having them summarize conclusions may all help to ensure that everyone is on the same page.
- More education is required. The most obvious conclusion from the research is that advisors need to increase their efforts to educate their clients. Options for educating clients are discussed below.
- Build a plan. In the survey, individuals who went through a comprehensive planning process did better on the quiz, suggesting that the process of building a plan may be educational in itself.

Educating clients can take many forms. One option is for financial advisors to give clients the quiz portion of the RICP® Literacy Survey that was used in the research. The quiz can be used to find out the level of retirement income literacy of clients, beginning a conversation about what they know and do not know. Through the research process, we learned that people like to learn from quizzes. A number of media outlets (USA Today, 2014) that reported on the survey included shorter versions of the quiz, and The American College has made the full version of the quiz available online.13

For advisors who want to provide a shorter version of the quiz, one option is to choose the 10 questions that distinguished those who passed the test from those who failed. They represent a cross-section of the areas tested. In addition, there are other educational options.

- Seminars can be a cost-effective way to deliver education to a group of clients or prospective clients. Seminars can cover the planning process or any of the specific subject areas involved in retirement income planning. A series of seminars provided to the same group of individuals allows for more depth of coverage, gives participants the time to study or take

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11. See Appendix II.
12. See Appendix II.
action steps along the way, and can help motivate participants who are working together in a group.

- Working one-on-one is another option, but it can be very time consuming. Providing clients educational materials prior to a meeting and allowing them to ask questions, or providing follow-up materials after a meeting, may be a way to streamline that process.

- The New York Life Center for Retirement Income at The American College has created a series of videos that can be an excellent way to provide an overview of the issues involved in retirement income planning.14

- More consumer books on Social Security planning and other aspects of retirement income planning are becoming available. Several resources are cited in the footnote (Vernon, 2012).

There has been a lot of research on the specific challenges of retirement planning for women. Receiving lower wages and on average having fewer years of work than men, women have fewer resources to meet retirement needs. At the same time, longer life expectancy means more exposure to retirement risks that are amplified by a longer life, including inflation, market risk, lack of long-term care, and excess withdrawal risk. Unfortunately, this survey confirms one more disadvantage for women—a lack of knowledge. The good news is that education is relatively inexpensive, and more knowledge can mean better decisions—even with limited available resources. Financial advisors should consider:

- providing educational seminars specifically for women,
- ensuring that, when working with couples, women are fully involved in the planning process, and
- when planning for couples, making sure to focus on the income needs of a surviving spouse.

An educated consumer may be more likely to understand the complexity involved and be more willing to seek advice. An educated client is likely to be a much better partner as he or she is:

- more likely to make informed decisions and take more ownership in the plan,
- more likely to appreciate the value the advisor is providing in the relationship, and
- more likely to be a better referral source for a competent advisor.

Another interesting result was that those surveyed did quite well on two questions used to test financial literacy. Ninety percent correctly answered a basic question testing their understanding of the concept of inflation and eighty-four percent understood that investing in one stock was riskier than holding a stock mutual fund. This indicates that the knowledge needed for retirement income planning is quite specialized, and general financial literacy is not a good indicator of retirement income knowledge. For financial advisors this means that even when working with fairly sophisticated clients, be aware that there may still be a need for additional education.

This study shows consumers to be overconfident in their financial preparation for retirement, as also seen in other studies. A lack of knowledge and a sense that they know more than they do is a bad combination. It may in part explain the low level of preparation: fewer than half of individuals actually calculate how much they need to retire. It also suggests a false sense that working with a professional is not that important. It is quite possible that more education is required simply to help consumers understand why they need to work with an advisor. The most beneficial result of this research may be putting the spotlight on the complexity of retirement income planning.

Conclusion—Improving Financial Literacy

The results of the survey help to establish a baseline for retirement income knowledge of those just nearing or entering retirement. Given the survey performance results, retirement income literacy needs drastic improvement. Improved retirement income literacy is a must, because we know that Americans are facing a large retirement income shortfall and that most Americans will be unable to maintain their current standard of living in retirement if nothing changes (EBRI, 2012). The survey also identified three opportunities to increase retirement income literacy and, therefore, the financial security of retired Americans.

- A written retirement plan has been found to be effective in leading to better planning and financial decisions; it is also an effective vehicle for education.

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However, only one in four have a written retirement plan. Increasing this number can be highly effective in increasing retirement income literacy and security.

- While two-thirds of people ages 60–75 with investable assets of at least $100,000 have a financial advisor, the lack of knowledge here suggests that advisors have not done a good job in educating their clients. Support for and further training of advisors on how best to educate pre-retired and retired clients can be a most effective strategy for increasing retirement income literacy.

- A significant minority of respondents have never tried to figure out how much they need to accumulate to retire securely, and this is important for older Americans to do. One of the keys to financial security in retirement is accumulating enough money to at least fund basic needs. Therefore, it is striking that one in three have not even attempted a calculation of need.

Some of the suggestions stemming from this study may not be easy to implement. Education will be difficult if consumers do not want to put that much thought into preparing a retirement strategy, in spite of its importance toward ensuring financial security in retirement. Motivating people to prepare a plan appears to be a major opportunity to educate and create more effective investment and spending strategies. However, findings here suggest few do it. While financial advisors are best equipped to educate their clients because of the one-on-one interaction and trust that most clients have with their advisors, many clients prefer to delegate decisions to an advisor and not really learn about financial products and strategies. Nevertheless, findings here suggest it is important for all to have some level of knowledge. Efforts to teach financial advisors the most effective methods for educating their clients on key aspects of financial security are likely to produce important results.

### Appendix I: Tables

#### Table 1: Scores by Grade

<table>
<thead>
<tr>
<th>Scores</th>
<th>Total Number</th>
<th>Total Percentage of 1,109</th>
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</thead>
<tbody>
<tr>
<td>91–100</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>81–90</td>
<td>13</td>
<td>1%</td>
</tr>
<tr>
<td>71–80</td>
<td>47</td>
<td>5%</td>
</tr>
<tr>
<td>61–70</td>
<td>142</td>
<td>14%</td>
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</table>

**Passing Totals:**

<table>
<thead>
<tr>
<th></th>
<th>202</th>
<th>20%</th>
</tr>
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<tbody>
<tr>
<td>51–60</td>
<td>147</td>
<td>14%</td>
</tr>
<tr>
<td>41–50</td>
<td>275</td>
<td>27%</td>
</tr>
<tr>
<td>31–40</td>
<td>210</td>
<td>21%</td>
</tr>
<tr>
<td>21–30</td>
<td>128</td>
<td>13%</td>
</tr>
<tr>
<td>11–20</td>
<td>46</td>
<td>5%</td>
</tr>
<tr>
<td>1–10</td>
<td>11</td>
<td>1%</td>
</tr>
</tbody>
</table>

**Failing Totals:**

<table>
<thead>
<tr>
<th></th>
<th>817</th>
<th>80%</th>
</tr>
</thead>
</table>
### Table 2: Average Scores by Section

<table>
<thead>
<tr>
<th>Sections</th>
<th>Average Score</th>
<th># of Questions</th>
<th>% Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to Maintain Lifestyle</td>
<td>1.51</td>
<td>4</td>
<td>37.88%</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>0.40</td>
<td>1</td>
<td>40.13%</td>
</tr>
<tr>
<td>Income Generation</td>
<td>0.56</td>
<td>2</td>
<td>28.21%</td>
</tr>
<tr>
<td>Early Death of Spouse</td>
<td>0.52</td>
<td>2</td>
<td>26.25%</td>
</tr>
<tr>
<td>Annuity Product Knowledge</td>
<td>0.56</td>
<td>3</td>
<td>18.71%</td>
</tr>
<tr>
<td>Taxes</td>
<td>2.03</td>
<td>4</td>
<td>50.90%</td>
</tr>
<tr>
<td>Inflation</td>
<td>1.55</td>
<td>2</td>
<td>77.72%</td>
</tr>
<tr>
<td>Housing</td>
<td>1.41</td>
<td>2</td>
<td>70.70%</td>
</tr>
<tr>
<td>Medical Insurance Planning</td>
<td>2.11</td>
<td>3</td>
<td>70.39%</td>
</tr>
<tr>
<td>Long-term Care</td>
<td>2.00</td>
<td>5</td>
<td>40.19%</td>
</tr>
<tr>
<td>Basic Financial and Investment Questions</td>
<td>2.30</td>
<td>5</td>
<td>46.14%</td>
</tr>
<tr>
<td>Social Security</td>
<td>1.32</td>
<td>3</td>
<td>44.32%</td>
</tr>
<tr>
<td>Company Retirement Plans</td>
<td>0.79</td>
<td>2</td>
<td>39.74%</td>
</tr>
</tbody>
</table>

### Table 3: Demographics—Education

<table>
<thead>
<tr>
<th>Education</th>
<th>Total Number of Respondents</th>
<th>Percent Pass</th>
<th>Percent Mid Fail</th>
<th>Percent Low Fail</th>
<th>Average Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some High School or Less:</td>
<td>1</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>16%</td>
</tr>
<tr>
<td>High School Graduate</td>
<td>134</td>
<td>7%</td>
<td>34%</td>
<td>59%</td>
<td>37%</td>
</tr>
<tr>
<td>Trade or Vocational School</td>
<td>20</td>
<td>10%</td>
<td>45%</td>
<td>45%</td>
<td>39%</td>
</tr>
<tr>
<td>Some College</td>
<td>193</td>
<td>15%</td>
<td>38%</td>
<td>47%</td>
<td>42%</td>
</tr>
<tr>
<td>College Graduate (4 Year Degree)</td>
<td>262</td>
<td>21%</td>
<td>48%</td>
<td>31%</td>
<td>47%</td>
</tr>
<tr>
<td>Post-Graduate Work</td>
<td>95</td>
<td>25%</td>
<td>40%</td>
<td>35%</td>
<td>50%</td>
</tr>
<tr>
<td>Post-Graduate Degree</td>
<td>314</td>
<td>26%</td>
<td>41%</td>
<td>32%</td>
<td>48%</td>
</tr>
<tr>
<td>Total:</td>
<td>1019</td>
<td>20%</td>
<td>41%</td>
<td>39%</td>
<td>45%</td>
</tr>
</tbody>
</table>

1. Of the people with level of schooling, how many passed. (i.e., if you had a graduate degree, what percentage of graduate degree respondents passed).

### Table 4: Demographics—Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total Number of Respondents</th>
<th>Percent Pass</th>
<th>Percent Mid Fail</th>
<th>Percent Low Fail</th>
<th>Average Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male:</td>
<td>512</td>
<td>29%</td>
<td>42%</td>
<td>29%</td>
<td>49%</td>
</tr>
<tr>
<td>Female:</td>
<td>507</td>
<td>11%</td>
<td>40%</td>
<td>49%</td>
<td>41%</td>
</tr>
<tr>
<td>Total:</td>
<td>1019</td>
<td>20%</td>
<td>41%</td>
<td>39%</td>
<td>45%</td>
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</table>
### Table 5: Demographics—Age

<table>
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<tr>
<th>Age by Birth Year</th>
<th>Total Number of Respondents</th>
<th>Percent Pass</th>
<th>Percent Mid Fail</th>
<th>Percent Low Fail</th>
<th>Average Scores</th>
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<tbody>
<tr>
<td>1939</td>
<td>30</td>
<td>40%</td>
<td>40%</td>
<td>20%</td>
<td>44%</td>
</tr>
<tr>
<td>1940</td>
<td>32</td>
<td>34%</td>
<td>56%</td>
<td>9%</td>
<td>43%</td>
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<tr>
<td>1941</td>
<td>38</td>
<td>29%</td>
<td>45%</td>
<td>26%</td>
<td>48%</td>
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<tr>
<td>1942</td>
<td>61</td>
<td>33%</td>
<td>41%</td>
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<td>47%</td>
</tr>
<tr>
<td>1943</td>
<td>66</td>
<td>44%</td>
<td>38%</td>
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<td>45%</td>
</tr>
<tr>
<td>1944</td>
<td>63</td>
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<td>54%</td>
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</tr>
<tr>
<td>1945</td>
<td>70</td>
<td>46%</td>
<td>43%</td>
<td>11%</td>
<td>44%</td>
</tr>
<tr>
<td>1946</td>
<td>87</td>
<td>34%</td>
<td>48%</td>
<td>17%</td>
<td>44%</td>
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<tr>
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<td>83</td>
<td>34%</td>
<td>42%</td>
<td>24%</td>
<td>48%</td>
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<tr>
<td>1948</td>
<td>102</td>
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<td>43%</td>
<td>17%</td>
<td>44%</td>
</tr>
<tr>
<td>1949</td>
<td>68</td>
<td>46%</td>
<td>37%</td>
<td>18%</td>
<td>41%</td>
</tr>
<tr>
<td>1950</td>
<td>76</td>
<td>38%</td>
<td>46%</td>
<td>16%</td>
<td>46%</td>
</tr>
<tr>
<td>1951</td>
<td>71</td>
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<td>35%</td>
<td>28%</td>
<td>47%</td>
</tr>
<tr>
<td>1952</td>
<td>68</td>
<td>50%</td>
<td>28%</td>
<td>22%</td>
<td>42%</td>
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<tr>
<td>1953</td>
<td>66</td>
<td>45%</td>
<td>33%</td>
<td>21%</td>
<td>45%</td>
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<tr>
<td>1954</td>
<td>38</td>
<td>39%</td>
<td>37%</td>
<td>24%</td>
<td>45%</td>
</tr>
<tr>
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### Table 6: Demographics—Assets

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<th>Assets</th>
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<th>Percent Low Fail</th>
<th>Average Scores</th>
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<td>$1.5 million or more</td>
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<td>42%</td>
<td>23%</td>
<td>52%</td>
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<tr>
<td>$1 million to $1.49 million</td>
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<td>25%</td>
<td>50%</td>
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<tr>
<td>$500,000 to $999,999</td>
<td>279</td>
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<td>45%</td>
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<td>$300,000 to $499,000</td>
<td>206</td>
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<td>44%</td>
<td>43%</td>
</tr>
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<td>$200,000 to $299,999</td>
<td>149</td>
<td>14%</td>
<td>37%</td>
<td>49%</td>
<td>41%</td>
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<tr>
<td>$100,000 to $199,999</td>
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<td>35%</td>
<td>50%</td>
<td>41%</td>
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<tr>
<td>Total:</td>
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<td>41%</td>
<td>39%</td>
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### Table 7: Demographics—Financial Advisor and Plan

<table>
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<th></th>
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<th>Average Grade</th>
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<th>Mid Fail</th>
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<td>48</td>
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<td>39</td>
<td>29</td>
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<td>Financial Planner</td>
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<td>16</td>
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<td>42</td>
<td>43</td>
<td>15</td>
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<tr>
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<td>16</td>
<td>43</td>
<td>44</td>
<td>42</td>
<td>14</td>
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### Table 8: Question Scores by Section (Weighted Data)

(Some quiz questions were true-false (T/F) questions and some were multiple choice (MC) questions. Next to each question it has been identified as to how many answer choices were available. Additionally, respondents could pick an “I don’t know” selection to reduce random guessing.)

<table>
<thead>
<tr>
<th>Question by Section</th>
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<th>% Wrong</th>
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<tr>
<td>Ability to Maintain Lifestyle</td>
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<td>Question #18 (4 MC)</td>
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<td>65%</td>
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<td>47%</td>
<td>53%</td>
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<tr>
<td>Question #20 (3 MC)</td>
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<td>63%</td>
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<td>60%</td>
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<td>Question #39 (4 MC)</td>
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</tr>
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<td>Inflation</td>
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<td>9%</td>
</tr>
<tr>
<td>Question #47 (3 MC)</td>
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<td>35%</td>
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<td>24%</td>
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<td>Question #53 (4 MC)</td>
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</table>
Question # 54 (2 T/F) | 72% | 28%
---|---|---
Question # 55 (2 T/F) | 69% | 31%

<table>
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</thead>
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<td>Question # 58 (4 MC)</td>
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</tr>
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</tr>
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<td>39%</td>
</tr>
<tr>
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<td>37%</td>
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<tr>
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<td>15%</td>
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<tr>
<td>Question # 63 (4 MC)</td>
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<td>59%</td>
</tr>
<tr>
<td>Question # 64 (4 MC)</td>
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<td>67%</td>
</tr>
<tr>
<td>Question # 66 (4 MC)</td>
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<td>35%</td>
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<table>
<thead>
<tr>
<th>Social Security</th>
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<th>% Wrong</th>
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<tr>
<td>Question # 67 (4 MC)</td>
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<td>47%</td>
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<td>Question # 68 (4 MC)</td>
<td>56%</td>
<td>44%</td>
</tr>
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<td>Question # 69 (4 MC)</td>
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<td>76%</td>
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<th>% Wrong</th>
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<td>49%</td>
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### Table 9: Largest Gender Disparity Questions

<table>
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<tr>
<th>Question Number</th>
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<th>Absolute Difference</th>
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<td>Question 66—P/E Ratio</td>
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<td>28%</td>
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<td>Question 33—Bond Yields</td>
<td>38%</td>
<td>14%</td>
<td>24</td>
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<tr>
<td>Question 42—IRA Taxation</td>
<td>58%</td>
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<td>22%</td>
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<tr>
<td>Question 63—Interest Rates</td>
<td>51%</td>
<td>30%</td>
<td>21%</td>
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<tr>
<td>Question 71—401(k) Assets</td>
<td>39%</td>
<td>19%</td>
<td>20%</td>
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</table>
Appendix II: Distinguisher Questions—Retirement Income Planning Quiz

t-Test for Advisors v. No Advisors Literacy Scores

<table>
<thead>
<tr>
<th>t-Test: Two-Sample Assuming Unequal Variances</th>
<th>No</th>
<th>Yes</th>
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<tbody>
<tr>
<td>Mean</td>
<td>0.48253176</td>
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<tr>
<td>Variance</td>
<td>0.029651991</td>
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<tr>
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<tr>
<td>df</td>
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<tr>
<td>t Stat</td>
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Lowest Response Rate Questions:

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<th>Topic</th>
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<tr>
<td>36</td>
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<td>Taxation of Life Insurance</td>
</tr>
<tr>
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<tr>
<td>40</td>
<td>13%</td>
<td>Annuities</td>
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<tr>
<td>58</td>
<td>19%</td>
<td>Long-Term Care</td>
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<tr>
<td>64</td>
<td>7%</td>
<td>Investments</td>
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Distinguisher Questions Ranked

<table>
<thead>
<tr>
<th>Question</th>
<th>Point-Biserial Correlation Coefficient</th>
<th>Question</th>
<th>Point-Biserial Correlation Coefficient</th>
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<td>0.120073</td>
<td>55</td>
<td>0.377171</td>
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<td>0.381026</td>
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<tr>
<td>46</td>
<td>0.351818</td>
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</tr>
</tbody>
</table>
Top Ten Distinguisher Questions:

50. Sarah is single, age 65 and takes a reverse mortgage with a lump sum payment. When does the loan have to be repaid?
   - When she permanently leaves the home [CORRECT].
   - When she takes on any other loan.
   - Whenever the mortgage company wants it back.
   - When she attains age 75.
   - Don't know.

62. True or false?
   Buying a single company’s stock usually provides a safer return than a stock mutual fund.
   - True.
   - False [CORRECT].
   - Don't know.

17. Please choose the response below that best completes this statement
   If you had a well-diversified portfolio of 50% stocks and 50% bonds that was worth $100,000 at retirement, based on historical returns in the United States, the most you can afford to withdraw is ____ plus inflation each year to have 95% chance that your assets will last for 30 years.
   - $2,000.
   - $4,000 [CORRECT].
   - $6,000.
   - $8,000.
   - Don't know.

47. Most experts agree that the best way to protect against inflation is to have a…
   - Diversified portfolio of stocks [CORRECT].
   - Diversified portfolio of bonds.
   - Diversified portfolio of CDs (certificates of deposit).
   - Don't know.

65. True or false?
   Exchange traded funds generally have higher expenses than actively managed mutual funds.
   - True.
   - False [CORRECT].
   - Don't know.

66. A P/E ratio means…
   - Price to earnings [CORRECT].
   - Profits to expense.
   - Price to expense.
   - Par value to earnings.
   - Don't know.
44. Converting a portion of a traditional IRA into a Roth IRA is a good idea this year if...
   You have a big tax deduction this year and your marginal tax rate is lower than normal [CORRECT] A
   You have more taxable income than usual and your marginal tax rate is higher than normal B
   The value of the assets in your IRA have remained the same for 10 years C
   Don't know D

42. Which one of the following statements concerning the federal income tax treatment of distributions to a 65-year-old retiree is true?
   All distributions from a Roth IRA that has been maintained for more than five years will be tax-free [CORRECT] A
   Distributions from a traditional IRA prior to age 70 1/2 will be subject to an additional 10% penalty tax B
   All distributions from a traditional IRA created with tax deductible contributions will be taxed as long-term capital gains C
   Don't know D

33. Which of the following types of long-term bonds typically has the highest yield?
   AAA-rated corporate bonds. A
   B-rated corporate bonds [CORRECT] B
   Treasury bonds. C
   Don't know D

63. If 100% of a mutual fund's assets are invested in long-term bonds and the investment climate changes so that interest rates rise significantly, then the value of the mutual fund shares...
   Decrease significantly [CORRECT] A
   May rise or fall depending upon the type of bond B
   Increase significantly C
   Will not change at all. D
   Don't know E
Reverse Mortgages, Annuities, and Investments: Sorting Out the Options to Generate Sustainable Retirement Income

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Abstract

This study examines the improvements in sustainable retirement income that can be generated by utilizing either of two options under the HECM reverse mortgage program—the tenure option and line of credit (LOC). For comparison, the study also analyzes the impact of utilizing a single-premium immediate annuity (SPIA) to generate retirement income. The base case for these comparisons is a systematic withdrawal plan that does not use reverse mortgage or annuity options. The study also examines the impact of combining reverse mortgage options and SPIAs. The reverse mortgage tenure option was shown to be particularly attractive, generating more income than a SPIA purchased with the same financial commitment. The LOC option generated less income than tenure with average interest rates remaining level, but came close to tenure under the assumption of future higher rates. Tests were also run with higher stock allocations for the retirement savings and with increases in the amounts of SPIAs purchased. The reverse mortgage options are most attractive for those who do not need to hold onto home equity for either a bequest or late-in-life spending.

Introduction

Although the most popular financial planning approach for generating retirement income is systematic withdrawals, planners have other options that may be worth considering. Two such options are annuities and reverse mortgages. Such options may be particularly useful for clients whose finances are constrained and they need to either generate more retirement income or make the income more secure.

The use of annuities has been studied extensively and we are beginning to see research on reverse mortgages as a retirement planning tool. But an issue for planners is how to choose among these two options plus systematic withdrawals, and another
issue is how to combine these alternatives in a way that will best meet client needs. This article examines these issues by modeling retirement outcomes based on the use of different options or combinations. The particular annuity used in the analysis is a single-premium immediate annuity (SPIA) and, for reverse mortgages, the line of credit option (LOC) and tenure option—where the borrowers receive monthly payments for as long as they occupy their home—are both considered.

Prior research

The analysis of combinations of systematic withdrawals, annuities, and reverse mortgages is a new area of research. Tomlinson (2015) provided a brief analysis of options for an Advisor Perspectives article. The principal findings were that, compared to systematic withdrawals alone, SPIAs could be used to improve the safety of retirement income, but without increasing the amount of income. Reverse mortgages, on the other hand, provided the added benefit of increasing retirement income, although home equity was used up in the process. Of the two reverse mortgage options, the tenure option performed better than the LOC under a level interest rate scenario, but the LOC came close to the tenure option under a scenario where interest rates increase after the initial reverse mortgage is set up. The examination of combinations showed that adding SPIAs helped improve the sustainability of the higher levels of retirement income that could be generated using the reverse mortgage options.

This study is related to Tomlinson (2015), but adds to the existing literature on reverse mortgages and annuities in the following important ways:

• This study accounts for taxes, whereas Tomlinson (2015) reports findings on a pre-tax basis. Modeling the tax effects is particularly important for illustrating the financial impact on clients, because funds received from reverse mortgages are untaxed loans as contrasted with taxable withdrawals from retirement savings or annuities purchased with retirement savings. There are a number of additional tax nuances included in the modeling.
• This analysis is for a husband and wife as borrowers, which presents a more typical client situation for financial planners, whereas the prior article was based on a single individual. The modeling for the couple takes into account variable lifetimes for each member, so the simulations include periods where both members of the couple are alive and periods where the wife or husband remains as a survivor.
• The prior study reports results based on four performance measures and this study expands the number of measures to nine in order to provide more detail about the composition of bequests (home value or remaining savings), the late-in-life liquidity available from LOCs when that option was used, and the level of guaranteed lifetime income generated.
• This study also analyzes the impact of adjusting the stock/bond mix for the portion of savings used for systematic withdrawals, whereas the prior study was based on a single stock/bond mix. This analysis also shows the effect of varying the SPIA purchase amount when that option is utilized.
• This study also contains a section on the importance of home equity in the asset structure of households and how that varies as a function of overall income level.

Setting the stage

Which options work best will vary with particular client circumstances. If clients have enough savings to generate desired retirement income without undue risk of running out of money, it may not be necessary to consider annuities or reverse mortgages. Ideal candidates for annuities—SPIAs in particular—are those who need more security so that their retirement income will last for life, and can tolerate the illiquidity that a SPIA entails. Ideal candidates for reverse mortgages are those who need additional retirement income, plan to stay in their home for life, have adequate long-term care insurance, and do not place importance on leaving a bequest.

The importance of home equity

Prior literature has documented the significance of home equity as a resource for households approaching or in retirement. For example, Fisher, Johnson, Marchand, Smeeding and Torrey (2007) found that home equity represented more than 50 percent of net worth for the typical, or median, household over the age of 65. Housing, as a percentage of wealth, is even more substantial for some retirees. Bishop and Shan (2008) noted that housing wealth was 80 percent of total wealth for roughly 30 percent of people above the age of 62.

Despite rising mortgage debt among older households it has been documented in the literature that home equity as a percent of home value remains significant among older households (Smith, Finke, and Huston, 2012). The availability of home equity is even more important to households that are most constrained in terms of income and/or other resources. Timmons and Naujokaitė (2010), using data from the 2007 American Housing Survey, reported that more than 3 million seniors with less than $15,000 in
annual income own their home without any debt. In short, past survey data has suggested that many retirees with and without resource constraints typically own a significant portion of their home.

Recent survey results from the 2013 Survey of Consumer Finances¹ (SCF) are shown in Table 1 and continue to echo the findings from prior literature, i.e., home equity continues to be a significant resource for many households in or approaching retirement. The 2013 SCF survey results suggest that 94 percent of households in Panel A of Table 1 and 88 percent of households in Panel B of Table 1 reported that they own a home. Table 1 reports median home equity and retirement savings levels for each category of retirement savings percentile in order to provide some background on the variation in resources available for retirement across households between 63 and 65 years of age. The figures in Table 1 are based on the results from the 2013 SCF which were weighted by using the SCF sampling weights in order to generate nationally representative statistical estimates. The information in Table 1 is based on financial information for married couples and it is also important to note that the home equity and retirement savings levels reported above are generally higher than aggregate levels reported in the Federal Reserve and academic literature since Table 1 is based on financial information for married couples that own a home, whereas aggregate statistics include single individuals and families that do not own a home. Panel A is further restricted to households that reported having some retirement savings, whereas Panel B includes both households with and without retirement savings.²

First, the descriptive figures in Panel A of Table 1 show that median home equity is roughly equal to or greater than median retirement savings for the households ranked in the bottom 50th percent of retirement savings. Said differently, home equity tends to be a more significant resource, in relative terms when compared to retirement savings, for households in the bottom half of the retirement savings distribution. In addition, although the relative importance of home equity to retirement savings diminishes as retirement savings increases, home equity continues to be a significant resource for many households across all levels of retirement savings. The results in Panel B reveal a similar pattern exhibited by those in Panel A in that the relative importance of home equity diminishes with retirement savings and that home equity continues to represent a significant resource for many households across the distribution of retirement savings categories.

Panels A and B in Table 2 are based on the same sample criteria used for Table 1. The figures in Table 2 represent the distribution of retirement savings, home equity and home value in isolation unlike the medians in Table 1 that were based on the percentile ranking of retirement savings. In short, home equity has and continues to be a significant resource for many retirees.

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1. The 2013 survey is the most recent survey conducted and the SCF is widely used by the Federal Reserve and academics to examine families’ financial information. The data for Table 1 was retrieved from the Board of Governors of the Federal Reserve System website: http://www.federalreserve.gov/econresdata/scf/scfindex.htm by using the statistical coding provided at: http://www.federalreserve.gov/econresdata/scf/files/bulletin.macro.txt

2. Retirement savings is defined as the summation of balances in individual retirement accounts, Keogh plans, 401k plans, thrifts, and pension plans as specified by the equations shown in the statistical coding found here: http://www.federalreserve.gov/econresdata/scf/files/bulletin.macro.txt that was provided by the Federal Reserve Board.
The HECM program

The HECM (home equity conversion mortgage) program provides reverse mortgages that are federally insured by the FHA, and HUD administers the program. Under the program, a lender provides a benefit to the owner based on current home equity, and there are a variety of options for applying home equity to pay down the loan when the home is vacated. Borrowers may also choose to prepay loan amounts. The benefit to the owners through the program includes a line of credit, tenure payments for life, or term payments for a specified period. The only requirements to obtain a reverse mortgage are that the reverse mortgage must be the primary and only mortgage, and the homeowners, or those on the title, must be aged 62 or older. Currently, one borrower may be under age 62, but at the death of the older borrower benefits cease to the younger borrower though the loan is not due. In addition, a formal HUD counseling session must be undertaken before closing the loan. Once the loan has been established, ongoing requirements to keep the loan in good standing are paying taxes and insurance, maintaining the home, and living in the home, although homeowners can be out of the home for up to 365 consecutive days. The loan becomes due upon sale of the home, death of the surviving borrower, or the home remaining unoccupied for more than the allowable limit. At this time the loan must be repaid up to the value of the home. The FHA insurance provides a non-recourse feature to the loan where the homeowners or heirs are only responsible for debt up to the sales price of the home; the heirs can pay 95% of the appraised value, or the estate can give the lender a deed in lieu of foreclosure to satisfy the debt.

Reverse mortgage considerations

Reverse mortgages may have substantial setup costs, and these costs will weigh heavily if little is borrowed or the reverse mortgage is used only for a brief period. The National Reverse Mortgage Lenders Association (NRLMA) provides a calculator that can be used to estimate fees, and for a $400,000 home, the estimated setup fees are $10,826. Amounts that can be borrowed, called “initial principal limits,” are a function of the borrower’s age (or the youngest member in the case of a couple), interest rates, and the lender margin, which is the portion of the total interest rate the borrower pays that is akin to the annual percentage profit margin the lender charges. For a couple where the husband is 65 and the wife is 63 in a $400,000 home, the estimated setup fees are $10,826. Amounts that can be borrowed, called “initial principal limits,” are a function of the borrower’s age (or the youngest member in the case of a couple), interest rates, and the lender margin, which is the portion of the total interest rate the borrower pays that is akin to the annual percentage profit margin the lender charges. For a couple where the husband is 65 and the wife is 63 in a $400,000 home, the initial principal limit based on August 2015 interest rates would be $211,000. The setup costs of $10,826 would equal 5.1% of the maximum amount that could be borrowed. (Note that this particular example will be basis for the case analysis that follows.)

Closing costs covered by the fees include loan origination and mortgage insurance. These fees can be added to amounts borrowed rather than paid in cash, but if financed in this way, they reduce the total amount that can be borrowed. The mortgage insurance premium is currently 0.5% of the home value as long as less than 60% of the net proceeds are used in the first year; if over this limit the up-front premium increases to 2.5%.

In today’s environment closing costs can vary widely by lender, some offering low cost lines of credit in exchange for accepting a higher borrowing rate and subsequent lower borrowing limit. Such flexibility in setting up the loan structure can be used to improve financial outcomes when the intended use of the reverse mortgage is determined in advance. For example, because the principal limit
factor table has break points, it may be possible to increase tenure payments or the LOC growth rate with an increase in the lender margin, without reducing the loan amount available. There may be other opportunities to improve financial results by adjusting the tradeoff between up-front costs and lender margin. Or it may be advantageous to compare reverse mortgages that use different indexes for the base loan rate. So it pays to be aware of the options, their effects, and to work with an experienced loan provider who can explore tradeoffs.

The outcomes shown in the remainder of this paper will be based on the example from the NRLMA calculator. Those outcomes could likely improve slightly based on choosing the optimal structure available in the market for each particular reverse mortgage use examined.

Comparing SPIAs versus the tenure option

A borrowing couple choosing to utilize the tenure option for this example would be able to obtain $1,130.36 per month. These payments could be continued until neither member of the couple continued to live in the home. These monthly payments could be continued even in the event that the loan value grew to an amount greater than the home value, and, because of the non-recourse nature of the loan, loan amounts in excess of home value would be forgiven at settlement. For this example, the amount available for borrowing, assuming the setup fees were financed, would be $201,174 ($212,000 – $10,826), so the annual rate of payment would be 6.74% ($1,130.36 * 12 / $201,174).

By comparison, a SPIA purchased with $201,174 that provided level monthly payments to the couple in the example, with payments continuing until the last member of the couple died, would pay $955.21 per month based on market rates as of August 2015 for SPIAs sold directly. So the SPIA annual payment rate would be 5.70%. The SPIA advantage is that payments continue until both members of the couple are dead, whereas tenure payments only continue until the home is vacated. For couples who can put plans in place to utilize home care if needed and keep their home as long as possible, the tenure option can be expected to provide payments for a duration similar to a SPIA.

It’s worth understanding the difference between how tenure payments and SPIA rates are calculated. Deriving the tenure payment calculation is based on an interest rate that is the sum of the annual Mortgage Insurance Premium (1.25%) and the HECM Expected Rate (4.80% in our example). This HECM Expected Rate is the sum of the 10-year LIBOR swap rate, which was 2.30% as of August 2015, and a Lender’s Margin, which may vary by lender but is set at 2.50% in the NRMLA calculator. The duration of payments used in the tenure calculation assumes that the youngest borrower occupies the home to age 100. So for the example in this study, the monthly payment of $1,130.36 calculated based on a present value of $201,174, a duration of (100 – 63) * 12 = 444 months, and a monthly interest rate of 6.05% / 12.

SPIA pricing, on the other hand is based on realistic estimates of life expectancy and interest rates that insurers can afford to credit. If we assume that the last member of a husband/wife 65/63 lives an additional 27 years, the SPIA payout above would be consistent with an interest rate of about 3.80%. So the tenure payment calculation uses a higher expected duration than the SPIA, which would lower the payout rate, but a higher interest rate, which would raise the payout, and the interest rate more than offsets the duration. So based on current pricing, tenure payments ($1,130.36) will exceed SPIA payments ($955.21) when the SPIA purchase amount is set equal to the HECM Net Principal Limit.

The LOC option

In considering a reverse mortgage LOC, a key issue is when to establish it—at the earliest possible age (62 for an individual or youngest borrower in a couple) or later when funds may actually be needed during retirement. Most people choose to wait to avoid or delay incurring substantial setup fees, but a better choice may be to set up the LOC early. Principal limits are a consideration. There are tables for the HECM program that specify principal limit factors (applied to home values up to $625,500) as a function of age and current interest rates. The limits are higher for older ages, and lower for higher interest rates. A principal limit factor of .531, based on interest rates as of August 2015, applies for the example being analyzed. For comparison, if the couple in this case study delayed 10 years and interest rates increased by 2% the factor would decrease to .438.

There is a further, although subtle, rationale for early set up of an LOC. The interest charge on borrowings (either LOC borrowings or tenure payments) is based on a variable rate equal to the sum of the one-month LIBOR SWAP rate, the yearly mortgage insurance premium, and the lender’s margin (0.191% + 2.50% + 1.25% = 3.941% in this example.
based on August 2015 and the NRMLA calculator). But there is also a guarantee under the HECM program that any unused LOC balance will increase at this same interest rate. In the case being studied, the unused LOC balance will increase at a 3.941% rate, and will grow faster under a scenario where short-term rates rise above today's levels. As with the tenure option, if the LOC grows to a level in excess of the home value, the excess debt will be forgiven at settlement.

Tomlinson (2015) noted the benefits of early establishment of an LOC that have been pointed out by other researchers. Sun, Treist, and Webb (2007) provided the earliest reference, although their analysis was in reference to the earlier HECM program prior to 2013. Pfeiffer, Schaal, and Salter (2014) produced an in-depth study showing the advantage of “now” instead of “last resort” if interest rates stay level, and increased benefits under a scenario where interest rates rise after initial set up. Pfau (2014) demonstrated the likelihood of unused LOC availability growing to exceed the value of the home later in retirement, and thereby generating a windfall gain (although taxes on any loan forgiveness, discussed later, may reduce the amount of any such windfalls).

Despite the strong argument for early establishment of an LOC, planners still face the issue of incorporating the LOC in asset allocation decisions. Sun, Treist, and Webb (2007) proposed that an LOC can be considered a unique fixed income asset class. How this works can be demonstrated based on the example we are analyzing. Start with an initial LOC of $201,174 based on the borrowing limit, and consider this amount being left to increase as an unused line of credit. Available funds from the LOC will then grow at a variable rate that is initially 3.941%. In regard to monies available for retirement spending, the unused LOC grows like fixed income savings that earn interest. The unused LOC can be considered akin to a money market fund that earns 3.75% more than the one-month LIBOR SWAP rate. Indeed, this is an extremely attractive return for such an asset class.

For clients primarily focused on retirement income rather than leaving a bequest, both LOC and tenure can be useful options, but they operate somewhat differently. The liberal monthly payments using the tenure option and the relatively high interest rate on borrowing (3.941% in the example) will net against a significant amount of home value, but may even provide after-tax funds in excess of the home value due to the nonrecourse feature if the home value is exceeded. With the LOC, the best strategy is to minimize early borrowings and allow the LOC to grow, while withdrawing funds from regular asset classes that provide less attractive risk/return characteristics than the available LOC. The LOC can be tapped late in life if needed and may also grow to a large enough value to exceed the home value.

Comparing the options

This analysis can now move on to showing how the reverse mortgage options and SPIAs, separately or together, can be integrated with systematic withdrawals to improve retirement outcomes. This example assumes a retired married couple where the husband is age 65 and the wife is 63. They have a home worth $400,000 and no mortgage, and have $1,000,000 in tax deferred savings. Their Social Security income is $30,000 which will increase each year for inflation, and is assumed to reduce to $20,000 in real dollars when either member of the couple dies. It is also assumed that their savings are allocated 60/40 stocks/bonds and rebalanced to this allocation annually. The average stock return is 7.25% nominal and bonds average 2.30% (the same as the ten-year LIBOR SWAP interest rate from the HECM calculations). The assumed standard deviations of returns are 20% for stocks and 5.5% for bonds, and stock and bond returns are assumed to be uncorrelated. For the initial analysis, average bond rates are assumed to remain level, and next a scenario is run where interest rates rise.

The general inflation rate is assumed to be 1.7%, based on the yield spread between Treasury bonds and TIPS as of August 2015, and future home inflation is assumed equal to the general inflation rate. Monte Carlo simulations are used to model investment returns on savings and also to model longevity for the husband and wife. The average life expectancy for the husband is assumed to be 23 years (to age 88) and 27 years (to age 90) for the wife. The home is expected to remain occupied until the last member of the couple dies.

This is an after-tax analysis and assumes a 15% marginal income tax rate. Withdrawals from tax deferred savings are taxed at this rate, and income payments from SPIAs are taxed at this rate as well, since they would be purchased with tax deferred funds. There is no tax on LOC buildup or withdrawals since an LOC represents borrowing rather than income. Any tax deduction for reverse mortgage interest is assumed to occur at the time of settlement after the death of the higher earner.

3. Although the assumption is that the couple is beginning Social Security payments immediately, a better approach would likely be to delay claiming to age 70 for the highest earner. If such an approach were being followed, the assumption would be that savings in addition to the $1,000,000 were being used to provide the $30,000 per year until full Social Security begins.
of the last member of the couple. Tenure payments are also treated as loans.

Table 3 shows outcomes for various options for generating retirement income based on average interest rates staying at today's level. The base case scenario uses systematic withdrawals only—no reverse mortgage or SPIA. Moving down the chart, outcomes are shown for reverse mortgage LOC and tenure options, a SPIA option, and then SPIA and reverse mortgage combinations. Each line of the chart is based on outcomes from 10,000 Monte Carlo simulations. Figures are in real dollars, discounted for future inflation, unless otherwise noted.

### Performance measures

The following performance measures are used in Table 3 and subsequent tables:

- **Median consumption level**—For each of the 10,000 Monte Carlo simulations, the average consumption over the variable lifetime (last to die for the couple) is calculated and the median of the 10,000 results is shown on the chart. Consumption consists of after-tax values of the combination of Social Security income, withdrawals from savings, LOC withdrawals, tenure payments, and SPIA payments (some of which may be zero depending on the scenario). The method for calculating withdrawals is described in the next section.

- **5th percentile consumption**—This is the same as the median calculation above, but selects the 5th percentile outcome rather than the median. This shows the amount by which consumption falls at the 5th percentile, and thus provides a risk measure.

- **Certainty equivalent consumption**—This measure is based on a utility function that assumes diminishing marginal utility of consumption, so increases in consumption do not have as much impact on utility as decreases. The certainty equivalent measure effectively reduces the average consumption measure to reflect year-to-year variability of consumption (assuming that individuals prefer steady rather than varying consumption). This measure captures the risk associated with such variability that the 5th percentile measure doesn’t pick up.\(^4\)

- **Median total bequest**—This includes the remaining value of savings (after taxes) and the home value reduced any reverse mortgage loan amount (again after tax effects are accounted for). The amount of home value flowing through to the bequest is reduced by 10%, primarily for sales commissions, plus other out-of-pocket costs associated with a home sale. (For simplicity, this same assumption was used regardless of how the home might be disposed of, e.g. sold by owners or heirs versus turned back to the lender as might happen if the loan amount exceeds the home value.) It is assumed that there are no capital gains taxes on the sale.

- **Median remaining savings**—This splits out the after-tax remaining savings from the total bequest.

- **Median ending LOC**—This measures the LOC value at end of life to provide an indication of late-in-life liquidity that would have been available from the LOC if needed.

- **Income from tenure and SPIA**—This is the annual income provided by either tenure payments, SPIA payments or both. It is a nominal measure (not inflation-adjusted) since these payments do not increase for inflation.

- **Income from SS**—This is the real annual income provided by Social Security.

### Withdrawal method

Withdrawals are calculated using a consumption smoothing approach. Withdrawal percentages are

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4. The particular utility function used assumes constant relative risk aversion (CRRA) and takes the form \( U = C^{1-R} / (1 - R) \) where \( U \) is utility, \( C \) is consumption, and \( R \) is the risk aversion coefficient. \( R = 6 \) is used in the analysis to represent higher than average risk aversion, given that it’s possible for consumption to drop below a level that would cover basic living expenses. The certainty equivalent is calculated as the inverse of this function.
developed for each year of the projections based on the assumed real bond return (nominal average return minus inflation) and remaining expected life. The expected remaining life for each of the years in the projections depends on current ages and whether both or only one member of the couple is still alive. The objective of the calculation is to produce level real withdrawals until the last member of the couple dies assuming that returns each year equal the assumed average bond return. Of course, returns on savings will vary each year so withdrawals will need to adjust up or down, but the aim is to smooth withdrawals as much as possible over the course of retirement. (This withdrawal method has not been formally documented elsewhere; it was suggested to one of the co-authors in an email exchange with British economist David Blake.)

These withdrawal percentages are similar to required minimum distribution (RMD) factors in that they increase each year to recognize the shortening of remaining life expectancy, but these are somewhat more aggressive. The withdrawal percentages are applied to the combination of remaining tax deferred savings plus LOC if any. Withdrawals are taken first from savings and then from the LOC after savings are depleted, recognizing the earlier mentioned superior risk/return characteristics of the LOC compared to regular investments.

This withdrawal method can be thought of as a dynamic approach in that withdrawals will adjust depending on investment performance and the growth or shrinkage of the underlying portfolio. Such an approach is different from static approaches such as the well-known 4% rule, where inflation-adjusted withdrawals are set at the beginning of retirement and don’t vary with emerging investment performance.

**Comments on Table 3**

The use of either reverse mortgage option—LOC or tenure—increases consumption compared to relying on systematic withdrawals only. Median bequests decrease as a result of mortgage debt being incurred to increase retirement spending. The composition of bequests is different for LOC versus tenure. Because of the assumption that withdrawals are taken from savings before tapping the LOC, the LOC option depletes savings but leaves some home value. The tenure option depletes the home value more and leaves remaining savings. Overall the tenure option does somewhat better than the LOC in terms of both consumption and bequest measures. This reflects tenure not depleting savings and thereby leaving more money invested in stocks, the potentially highest return asset.

SPIA utilization in the example is based on a level-pay SPIA generating payments that equal those under the tenure option, $13,564 per year. Because the tenure option pays out at a higher rate than the SPIA, it is necessary to allocate $238,061 for SPIA purchase compared to the $201,174 borrowing limit used to generate tenure payments. Use of an SPIA leaves median consumption about the same, but does reduce consumption risk as is shown by higher 5th percentile and certainty equivalent results compared to systematic withdrawals alone. With the SPIA option, the home value is preserved for late-in-life needs or a bequest. If the goal is to maximize consumption without a bequest concern, the reverse mortgage options win out over the SPIA. If bequests are important, the decision requires evaluating tradeoffs between consumption and bequests.

As shown in the bottom two lines of Table 3, the main benefit from combining SPIAs and reverse mortgage options is risk reduction—5th percentile consumption increases, while median consumption stays about the same. Certainty equivalent consumption also increases slightly.

**If interest rates increase**

Table 4 is the same as Table 3 except average interest rates increase after initial setup to a level more in line with historical averages. All interest rates are assumed to increase by 1.7% (to 1.891% for the one month Libor SWAP rate and to 4% for bond returns) and inflation increases to 2%, which moves the real bond interest rate to 2%. It is artificially assumed that the allocation to bonds occurs after interest rates increase so no principal losses are incurred. Stock returns are assumed to stay the same.

The LOC option now produces consumption outcomes close to those for the tenure option. The unused LOC grows faster at a higher interest rate, while tenure payments remain the same because they were established at inception. The tenure option still does better on bequest value, because savings are not used up so there is money left in stocks over the full course of retirement. Again, if consumption takes priority over bequests, the reverse mortgage options win out over other options.

Note that the median bequest where an LOC is used comes out negative. What happens here is that at higher interest rates the LOC grows faster and is more likely to exceed the home value as forecast in Pfau (2014). The negative bequest reflects taxes paid on debt forgiveness at settlement. For these situations, the particulars of how the amount of debt forgiveness is calculated and how the paid interest deduction is determined may depend on wording the reverse mortgage contract. This example used simplifying assumptions that forgiven debt was equal to...
the amount of debt minus the estimated sales proceeds assumed to be 90% of the home value, and forgiven debt was assumed to be principal rather than interest.

Raising the stock allocation

Table 5 is the same as Table 3 except the stock allocation is raised from 60% to 80%. The result of such a change is quite uniform across all the options. Bequest values increase for all choices of options. Median consumption increases and 5th percentile consumption decreases, indicating some greater downside risk with a higher stock allocation. The certainty equivalent consumption increases but not as much as average consumption, indicating some increase in the variability of annual consumption. Additional testing, not shown in the table, indicated that going to even higher stock allocations than 80% left the certainty equivalent consumption at about the same level, so 80% appeared to be a practical maximum allocation worth considering.

This analysis, based on particular stock and bond return assumptions, indicates that higher stock allocations up to 80% may improve financial outcomes regardless of the strategy employed. Given such a high stock allocation, the degree of client tolerance to withstand stock market volatility may be more important in deciding on an asset allocation recommendation than pure financial considerations.

More guaranteed lifetime income

Table 6 shows the options involving SPIAs, with SPIA amounts doubled from those in Table 5. The additional allocation to SPIAs basically raises the overall fixed income allocation. Not surprisingly, bequest values decrease for all three options shown, because savings that would be...
heavily invested in stocks are being diverted to SPIAs, which are basically fixed income investments. Median and certainty equivalent consumption change very little, but 5th percentile consumption improves for all three options, indicating that a higher level of floor income has been introduced with the additional SPIA purchases.

**Conclusions**

Reverse mortgages provide a means to generate more retirement income than can be obtained from retirement savings alone. The tenure option does so in a direct way by providing monthly payments that last as long as at least one member of the borrowing couple continues to occupy the home. The income generation is more indirect utilizing an LOC in the manner described in this analysis. What happens is that a dynamic withdrawal method is applied to the sum of remaining savings and the available LOC balance, which generates more retirement income than applying this withdrawal method to the savings alone.

If interest rates remain at today’s levels over the foreseeable future, the tenure option produces superior results compared to the LOC option. However, if a reverse mortgage is set up in the current interest rate environment and rates increase in the next few years, the LOC option roughly matches the tenure option in income generation.

By contrast with the reverse mortgage options, purchasing a SPIA improves the security of retirement income, but does not increase the income. Combining SPIAs with reverse mortgages provides a way to gain additional retirement income security, but without much impact on the overall level of retirement income.

Based on the particular investment assumptions used in this study, high stock allocations (in the 80%) range produce the most favorable results regardless of the approach used to generate retirement income. This result partly reflects the use of a dynamic withdrawal method, which adjusts withdrawals based on emerging investment experience. A potential area for future research would be to utilize methods other than a stock allocation, such as the use of options, to generate equity exposure. A problem with relying on stock allocation alone, particularly with the LOC approach, is that the savings get depleted and the remaining income generation relies on the LOC, which is in essence a fixed income investment.

This is the beginning of a research effort that examines options for generating retirement that previously have been looked at separately. Besides the need for more research, there will also be a need for planning software capable of handling combined analysis of reverse mortgages, annuities, and systematic withdrawals on a customized basis for financial planning clients.

**References**


Roth Conversion: An Analysis Using Breakeven Tax Rates, Breakeven Periods, and Random Returns

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Abstract

The Roth IRA, created in 1998, denied access to high-income individuals. Tax law changes that were enacted in 2005 and later have made the benefits of a Roth IRA available to nearly everyone regardless of income levels through possible conversions of deductible/non-deductible IRAs. This paper develops a multi-dimensional decision framework. The framework includes a metric to compare to the expected marginal tax rate at withdrawal of funds, as well as, the minimum investment horizon needed to breakeven in terms of expected after-tax future values of the alternatives. Also, we analyze the impact of random variability in the expected returns on these metrics. Roth Conversion would benefit investors with long investment horizons and those who do not expect any significant reduction in their marginal tax rates. Possible tax law changes represent the greatest uncertainty for anyone considering conversion.

Introduction

Tax law changes in recent years have made more investment choices available for retirement. One of the more significant changes includes the provision made in 2010, which brought a Roth IRA within reach of everyone regardless of income. While contributions to a Roth IRA are still subject to income limits, anyone can now convert his/her traditional, tax deductible IRA or non-deductible IRA to a Roth IRA. The conversion would, of course, attract immediate taxation of the converted IRA amount. This paper analyzes the conversion decision by looking at the tax implications, the after-tax future values and the advantageous features available to a Roth IRA.

The conversion decision is usually analyzed by financial planners and advisors as a trade-off between paying tax now on the converted amount against future tax savings on all withdrawals from the IRA. This approach involves computing the after-tax future value of the investment dollars for the two options. The choice though, is far from simple or obvious because of the number of factors involved in the trade-off and the uncertainties surrounding them. This paper analyzes the conversion decision using the framework developed by Krishnan and Lawrence (2001) and Horan and Peterson (2001).
The after-tax future value of the unconverted deductible IRA is compared to the after-tax future value of the Roth IRA. The decision metric computed is the *breakeven tax rate* for withdrawals from the deductible IRA. This is the tax rate at the time of withdrawal that would leave the investor indifferent between the choices. If the investor’s expected marginal tax rate at withdrawal is higher than the breakeven tax rate, conversion to Roth would yield a higher after-tax value. We also compute the *breakeven period*, which is the number of years, for a given set of assumptions for tax rates and expected rate of return, that give equal after-tax future values for the two alternatives. The reliability of this estimate is tested using simulation exercises for random variability in returns.

This paper is organized as follows. The next section provides an overview of the extant literature on retirement investment avenues with differential tax treatment. The following section describes the analytical framework and the metrics—*breakeven tax rate* and *breakeven period*—for the conversion decision. We calculate these for a range of scenarios. We also conduct simulations to study the impact of the random variability in the investment rates of return on these metrics. This section also discusses the various features that make the Roth more attractive than the deductible IRA. The final section summarizes the findings of the paper and offers some concluding comments.

**Overview of Literature**

Tax-deferred investments for retirement have attracted considerable research interest in the past. Early works include Burgess and Madeo (1980) who analyzed the impact of the withdrawal penalty on premature withdrawals from IRAs and computed breakeven investment horizons for optimal withdrawals using simulation. O’Neil, Saftner and Dillway (1983) incorporated the tax law changes of 1981 into their analysis of withdrawals from IRAs and found the impact of the premature withdrawal penalty made non-IRA investments better for short-time investors. Randolph (1994) compared the non-deductible IRA with open, taxable investments and found that the former dominates the latter. Randolph however, did not allow for possible lower taxation of the open investments with capital gains. Scholes and Wolfson (1992) used lower capital gains tax rates and found that optimal choice is a function of investment horizon and percentage of return that is taxed at the lower rate.

The Tax Relief Act (1997) created the Roth IRA and spawned additional research, which evaluated the benefits of Roth IRA vis-à-vis the traditional, tax-deductible IRA. These include Crain and Austin (1997), Horan, Peterson and McLeod (1997), Shanney-Saborsky (1999), Butterfield, Jacobs and Larkins (2000), and Kutner, Doney and Trebby (2001).

Crain and Austin (1997) evaluated deductible IRAs, Roth IRAs, non-deductible IRAs, and open taxable investments assuming the applicable tax treatment of mutual funds. The authors assumed equal before-tax investments in the different investment vehicles and showed that deductible IRAs and Roth IRAs would produce identical future values if the investor’s tax rate does not change. The investor would be better off with a deductible IRA if he expected to see a lower tax rate in the future. Conversely, a Roth IRA would be better if the investor expected an increase in his tax rate. Their results showed that the Roth IRA and deductible IRA would dominate non-deductible IRA and taxable investments. The choice between non-deductible IRAs and taxable investments would depend on the rate of return and the percentage of income taxed at a lower capital gains rate.

Butterfield, Jacobs and Larkins (2000) used an approach similar to that of Crain and Austin (1997) and reported similar results. Kutner, Doney, and Trebby (2001) used equal after-tax investments to compare the investment performance of the deductible IRA with that of the Roth IRA and concluded that the investor’s marginal tax rates at the times of investment and withdrawal, affect the relative performance of the two types of IRAs.

Krishnan and Lawrence (2001) compared one dollar invested in the Roth IRA with one dollar invested in the deductible IRA after fully accounting for the tax savings from the latter. This approach compared equal after-tax investments and allowed the investor to analyze the full potential of the tax advantages up to the limit permitted by the tax laws. This framework involved three tax rates: 1) the tax rate at the time of investment, 2) the tax rate at the time of withdrawals, and 3) the tax rate at which the taxable investments are taxed. The last rate may change during the investment period and may be two different rates—one for income treated as capital gains and the other for income treated as ordinary income. Krishnan and Lawrence assumed a uniform tax rate.
The authors developed the concept of breakeven tax rate for withdrawals. The breakeven tax rate is the tax rate at the time of withdrawal of funds for which alternate modes of investment will give exactly the same future value for a given investment horizon and rate of return. Horan and Peterson (2001) modified the uniform tax rate for taxable investments assumption. They used the mutual funds return approach developed by Crain and Austin (1997) and applied separate tax rates for the capital gains and ordinary income and prorated the return into capital gains and ordinary income.

Thus, their derived formula for the breakeven tax rate involved more terms. The results of Horan and Peterson (2001) were qualitatively similar to that of Krishnan and Lawrence (2001). In essence, the breakeven tax rate tells the investor how low their tax rate has to be at the time of withdrawal of funds in order for them to benefit from investment in the deductible IRA in preference to the Roth IRA. The Roth IRA becomes more attractive at higher rates of return and longer investment horizons.

Kutner, Doney, and Trebby (2001), argued that most individuals’ contribution tax rates are higher than their withdrawal tax rates because: 1) they have lower income during retirement, 2) they may work in states with higher tax rates and then move to states with lower tax rates after retirement, 3) they time their IRA contribution decision to when they have higher income, 4) they also time the withdrawals to lower income, and 5) they expect future tax rates to decrease for various reasons. Therefore, they concluded that a traditional IRA is preferred. It is quite likely that one or more of these arguments are subject to the individual investor’s income and family profile and any change in one or more of the above would mean a very different conclusion.

Horan (2006), developed withdrawal strategies using a uniform tax-rate structure and a progressive tax-rate structure. He suggested that the best results occur when withdrawals are taken from a traditional IRA (when tax rates are lower) and from a Roth IRA (when rates are higher). Also, Hrung (2007) determined that individuals make deductible contributions to IRA’s when contribution tax rates are higher and those with more liquidity contribute to Roth IRA’s.

Horan and Zaman (2009) considered all sources of retirement income as well as progressive tax rates for a range of incomes and contributions to IRAs and 401k plans. They considered employer contributions to 401k plans and ran simulations for a wide range of scenarios and compared the investment choices between the tax-deductible IRA and Roth IRA. They found that high-income and high saving individuals may find Roth IRAs more attractive.

Adelman and Cross (2010) examined theoretical and practical assumptions of client behavior when comparing a traditional IRA and a Roth IRA. They found that those individuals following their theoretical assumptions would choose the traditional IRA while the Roth IRA would be the choice for those following practical assumptions. These assumptions are based on the effects of one’s tax bracket, minimum distribution requirements, and how Social Security benefits might be impacted by withdrawals.

While most of the previously cited research deals with investing in deductible and Roth IRAs rather than converting a deductible IRA into a Roth IRA, the principles, models and trade-offs involved can be easily extended to the conversion problem. Many financial services providers have pamphlets and web articles explaining the advantages of conversion. Spiegelman (2009) gave hypothetical examples of the advantages of conversion and came to the qualified conclusion that conversion is beneficial if the expected future tax rate is higher or equal to the investor’s current tax rate. Spiegelman suggests that investors most likely to benefit are the ones in the $100,000 to $250,000 income levels because investors in the higher income levels may not benefit because their tax rates are less likely to go up. Anderson and Hulse (2007) showed that converting to a Roth IRA is most advantageous when a longer investment horizon exists, one’s tax rate at retirement is high, tax rate at conversion is low, their IRA basis is high, and when outside sources are used to pay taxes at conversion.

Analysis by Dammon (2009) suggested that a Roth Conversion is most beneficial when non-IRA assets are used to pay the conversion tax, one has a longer time until retirement so no early withdrawal penalties, and one does not expect future income tax rates to decline prior and during retirement. In addition, conversion is preferred for those who want to reduce estate taxes when their non-IRA assets are less than the estate tax exclusion and total assets are greater than the estate tax exclusion.

Clayton, Davis, and Fielding (2012) used breakeven analysis (years) and simulations to explore the decision of converting a tax-deductible IRA to a Roth IRA. They determined that when an individual’s expected future marginal
income tax rate will be higher, they should convert to a Roth IRA. However, when future rates are expected to be lower or are uncertain, the decision to convert is not as straightforward. Also, time to breakeven and the portfolio mix must be considered.

When exploring the decision to convert from an existing tax-deductible IRA to a Roth IRA or to make a contribution to a new Roth IRA, Shynkevich (2013) found the decision may be different under different circumstances. He determined that in a progressive tax environment, contributions to a Roth IRA would be preferred rather than a traditional IRA if an individual has a shorter retirement period and if he is optimistic about his investment returns.

Coombes (2014), suggested in the Wall Street Journal, that individuals need to consider certain issues when deciding to convert to a Roth IRA for the benefit of their heirs. Roth IRAs are advantageous if your heirs' tax rates upon distribution would be the same rate as the investor's tax rate at conversion. However, if an individual's tax rate is higher than their heirs' tax rate will be when distributed, a Roth Conversion would not be advantageous because a portion of the inheritance would be paid in taxes at conversion.

Cellucci (2014) examined several situations and strategies to help determine when a Roth Conversion is optimal. He concluded that the advantages to conversion occur when: 1) one expects they will be in the same or higher tax bracket upon retirement, 2) income from the IRA is not needed, 3) one wants to provide for their heirs with legacy assets, and 4) the conversion tax can be paid with funds outside of the IRA.

**Analysis of the Conversion Decision**

We extend the analytical framework developed by Krishnan and Lawrence (2001) to evaluate the conversion. We use the after-tax accumulated future value of the tax deductible IRA and the converted Roth IRA for the evaluation of the optimal choice. The individual invests in the same type of investments for all investment modes and earns the same before-tax annual rate of return. The decision will be affected by a number of factors. We use the following notations:

- \( R \) = Rate of return (before tax) on investment, assumed to be same for all investments.
- \( T_0 \) = Marginal tax rate of the investor at the time of conversion.
- \( T_1 \) = Marginal tax rate for the investor on all taxable investments during the investment period.
- \( T_2 \) = Marginal tax rate of the investor at the time of withdrawal of funds from the deductible IRA at the end of the investment period.
- \( N \) = Investment period or the number of years for which the funds remain in the IRA.

We use the concept of breakeven tax rate as the metric to evaluate the conversion decision. The breakeven tax rate, \( T^* \), is defined as the tax rate at the time of withdrawal of funds for which the accumulated after-tax value of the unconverted deductible IRA is equal to the accumulated value of the Roth IRA, which results from the conversion. We assume all of the IRA accumulation has come from pre-tax dollars making the entire amount liable to be taxed at conversion.

Before considering conversion, the investor has to decide how they would pay the taxes owed that would be due on conversion. If the investor has to pay the taxes due from the funds in the deductible IRA, the amount converted into Roth IRA will be reduced to \( 1 - T_0 \) for each dollar of pre-conversion IRA. The after-tax future value of the Roth IRA would then be \( (1 + R)(1 - T_0)(1 + R)^N \). This should be compared to the after-tax future value of the unconverted deductible IRA: \( (1 + R)^N (1 - T_2) \). The breakeven tax rate in this case would obviously be \( T_0 \). In other words, the investor will benefit from conversion only if he expects his future tax rate to be higher than his tax rate at the time of conversion. This conclusion, which is the conventional wisdom, is valid only when the taxes are paid out of funds from the IRA. It should also be mentioned that taking money out of the IRA to pay taxes could involve premature withdrawal penalty if the investor is younger than 59 ½ years, making conversion even less attractive.

The more interesting and worthwhile case to consider is when the investor has funds available outside the IRA to pay the taxes due. If the investor decides against conversion, he will have for each dollar of the deductible IRA an additional amount equal to the tax saved, \( T_0 \). The deductible IRA and the taxable investment of \( T_0 \) would accumulate to an after-tax value of:

\[
(1+R)^N (1-T_2) + T_0 (1+R(1-T_1))^N
\]
This should be compared to the converted Roth IRA accumulation, which would simply be: $(1+R)^N$

Equating the two and solving for $T_2$ gives the breakeven tax rate.

$$T^* = \text{Breakeven rate} = \frac{T_0(1+R(1-T_g))}{(1+R)^N}$$

If the investors expect their tax rates at the time of withdrawal to be lower than the breakeven rate they would be better off not converting. If they expect it to be higher than the breakeven tax rate, they would be better off converting their deductible IRA to Roth IRA. It can be seen that the breakeven tax rate will always be lower than $T_0$. If $T_1$ is greater than zero and the investment return is positive. The investor has to have a lower tax rate at the time of withdrawal for the deductible IRA to perform better than the Roth IRA. It can also be seen that the breakeven rate decreases with higher rates of return, longer investment horizon, and higher values for $T_1$. Of course, $T_1$ can be lower than $T_0$. This happens when the return on the taxable investment is in the form of dividends and/or long-term capital gains. If $T_1$ is zero, then the breakeven tax rate will be $T_0$, the investor’s tax rate at conversion. This is the same result that you get when the taxes due on conversion are paid from the IRA funds.

A special case to consider is the situation where the entire investment return from the taxable investment is in the form of long-term capital gain realized only at the time of withdrawal of the IRA.

$$(1+R)^N (1-T_2) + T_0 (1+R)^N (1-T_g) + T_0 T_g = (1+R)^N$$

Solving for $T_2 = T^* = \text{Breakeven tax rate} = T_0(1-T_g) + T_0 T_g / (1+R)^N$.

For large value of $N$, this would reduce to $T_0(1-T_g)$. The breakeven tax rate in this case would be independent of both the investment horizon and the rate of return.

We compute the breakeven tax rates for different rates of return and the investor’s current marginal tax rates ($T_0$) scenarios. For the tax rate on the taxable investments ($T_1$), we assume applicable the highest tax rate levied on long-term capital gains. This rate is 15 percent for investors with marginal tax rates lower than 33 percent and 20 percent for investors with marginal tax rates higher than 33 percent. The results are presented in Tables 1 through 3.

5. The breakeven tax rate decreases as the investment horizon and the rate of return increase. We calculated the breakeven tax rates for horizons up to 40 years, which is a possibility for someone who is in her thirties. A long investment horizon is also relevant for those who expect to pass on at least some of their IRA funds as inheritance.

### Table 1: Breakeven Tax Rate $T_0 = 39\%$ $T_1 = 20\%$

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<td>40</td>
<td>20.0% 20.0% 20.0% 20.0%</td>
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### Table 2: Breakeven Tax Rate $T_0 = 35\%$ $T_1 = 20\%$

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<tr>
<td>35</td>
<td>17.9% 16.0% 14.4% 13.0%</td>
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</tbody>
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### Table 3: Breakeven Tax Rate $T_0 = 28\%$ $T_1 = 15\%$

<table>
<thead>
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Breakeven tax rate is the value for the tax rate at the time of withdrawal of funds ($T_2$) for which the future value of deductible and Roth IRAs are equal. Shaded areas show breakeven rates lower than the rate one step below $T_0$. If expected value of $T_2$ is lower than the breakeven tax rate, one should not convert.

As stated before, in all cases, the breakeven tax rate is below the tax rate at the time of conversion and several percentage points lower as the investment horizon increases. An investor with a 15-year investment horizon, a current marginal tax rate of 39 percent, and expecting a rate of return of 7 percent would be better off converting her deductible IRA, unless her withdrawal tax rate is expected to be lower than 32 percent. The conventional wisdom needs to be modified to say: “Conversion is likely to be beneficial unless your expected tax rate at the time of withdrawal is several percentage points lower than your current tax rate.”

**Breakeven Period**

We now present a different metric to evaluate the conversion decision. The *breakeven period* uses the same analytical framework as above, but solves for the number of years that gives equal after-tax future values for the two choices for a given set of tax rates and return assumptions. If the investor expects an investment period greater than the breakeven period she would be better off converting to Roth. Table 6 gives the estimated breakeven periods for selected tax rate and rate of return scenarios. The breakeven period enables the investor to decide based on the expected investment horizon and future marginal tax rate based on the investor’s income projections. The breakeven period is lower as the rate of return increases. Our computations assume a tax rate at the time of withdrawal that is one step lower than the investor’s current marginal tax rate. For any positive investment returns, the breakeven period will be zero if the investor’s expected tax rate at withdrawal equals her current marginal tax rate. The breakeven period increases as the investor’s marginal tax rate at withdrawal decreases.
Table 7: Breakeven Tax Rates with Random Variability in Returns

<table>
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<tr>
<th>Years</th>
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<th>Returns = 9%</th>
<th>Returns = 11%</th>
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<td>Constant</td>
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<td>20.7%</td>
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Taxable investments taxed each year at the lowest capital gains tax rate applicable.

The standard deviations assumed are: 12.7 percent, 16.4 percent and 20 percent respectively for returns of 7 percent, 11 percent, and 20 percent.

Variability in Investment Returns

The expected rate of return is a key factor in the conversion decision. The results in Tables 1 through 6 assume constant, deterministic investment returns. We now present an analytical framework that accounts for potential variability in investment returns. We assume that the returns follow a random normal distribution. Using an Excel spreadsheet, we generate random returns for a given mean and standard deviation. This framework can be used to study the impact of variable returns on the breakeven tax rate or the breakeven period. Table 7 presents the results of median values of breakeven tax rates estimated from thirty simulations for three different expected rates of return. We assume a standard deviation of 20 percent for an expected return of 11 percent based on the return history for the S&P 500 Index. We also compute the breakeven tax rates for two lower expected rates of return with proportionately lower standard deviation. The table shows the breakeven rates for the constant (in shaded columns) and random variable returns side-by-side for easy comparison. The breakeven tax rates shown for the variable returns are the median values from thirty simulations. The variability in returns generally causes the breakeven tax rates to be higher. The impact, however, does not appear to be major.

The same framework can be used to study the impact of the variability in returns on the breakeven period as well as the overall impact on the expected after-tax future value of the converted Roth IRA. This analysis compares the accumulated future values for the converted Roth IRA to the accumulated after-tax future value of the deductible IRA plus the accumulated value of tax paid invested in the same securities. We run simulations for various sets of assumptions—with a given withdrawal tax rate—and estimate median breakeven periods and as well as the ratios of the after-tax future values of the two choices for different investment periods. The results are presented in Table 8 for six different sets of assumptions—two different sets of three rates of return. The shaded rows in the table show the breakeven periods and future value ratios for the deterministic rates of return. The results for the random simulations are in the following rows. The simulation breakeven periods are longer than the periods calculated with constant rates of return. The simulated ratios of future value are lower compared to the values with constant rates of return.

Implications of our analysis

Our results suggest that conversion to a Roth IRA deserves serious consideration unless one expects a significant reduction in the marginal tax rate at the time of withdrawal. The simulation results indicate that one has to be rather conservative before deciding to convert as the average breakeven years, and the breakeven tax rates are usually higher than the one calculated with the constant rate of return. The expected future value benefits also appear to be lower with variable returns. This happens
because the effective geometric mean return realized is less than the assumed expected return.

The variability in future rates of return would probably not pose a significant problem if the investment horizon were long. A primary requirement is the availability of funds outside the tax deferred plans to pay the taxes due on conversion. An uncertainty that does not lend itself to our analytical framework is the possibility of significant future changes in the tax structure. If one expects a major reduction in marginal rates across the board, conversion to a Roth IRA would not make sense. Any major change in the benefits structure of the tax-deferred or tax-advantaged plans also needs to be considered separately.

IRAs in general can be very useful and efficient estate planning tools. Schmidt (1999) and Lederman and Cole (1999) discuss a number of issues relating to the use of IRAs as estate planning tools. We suggest that the Roth IRA is an even better tool because it has all the features of the deductible IRA, except the current tax deduction, and has far greater flexibility and options than the deductible IRA.

One is allowed tax-free withdrawals of all contributions anytime and the converted amount five years after conversion. First-time homebuyers are permitted tax-free withdrawals of earnings after five years. A major plus for Roth IRA is that it does not require any minimum distribution during the investor’s lifetime. This allows one to pass on the entire Roth IRA to one’s heirs. This feature is particularly attractive to investors who require estate planning or anyone who considers leaving an inheritance.

These options and flexibility should make the Roth IRA more attractive than the deductible IRA for many investors (Slesnick and Suttle 2000).

Summary and Conclusion

The year 2010 may end up being known as the Year of the Roth as virtually anyone can get access to a Roth IRA by converting an existing deductible (or non-deductible) IRA into a Roth. This paper analyzes the conversion decision using the concepts of breakeven tax rate and breakeven investment period. The breakeven tax rate is the tax rate at the time of withdrawal of funds that would make the investor indifferent between the two choices. The breakeven period is the investment horizon that would give, for a set of assumptions, equal after-tax future values for the two alternatives.

The optimal decision is a function of the individual’s investment horizon, rate of return for the investment and three different marginal tax rates. We assume that the investor has funds available outside the IRA to pay the taxes due on conversion. Given this, and assuming that the investor pays taxes on her taxable investments, for any positive returns the breakeven rate is always less than the investor’s tax rate at the time of conversion and a decreasing function of:
1) the rate of return on the investment, 2) the investment horizon, and 3) the tax rate on the taxable investment.

The investor has to have a significantly lower tax rate at the time of withdrawal than the tax rate at the time of conversion in order to benefit from the deductible IRA. The

<table>
<thead>
<tr>
<th>Tax Rates</th>
<th>Rate of Return</th>
<th>Breakeven Period Years</th>
<th>After-tax Future Value Ratio Roth/Deductible IRA at the end of</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>T1</td>
<td>T2</td>
<td>Mean</td>
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<tr>
<td>39%</td>
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<td>35%</td>
<td>7.0%</td>
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<td>7.0%</td>
</tr>
<tr>
<td>39%</td>
<td>20%</td>
<td>35%</td>
<td>9.0%</td>
</tr>
<tr>
<td>39%</td>
<td>20%</td>
<td>35%</td>
<td>9.0%</td>
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<tr>
<td>39%</td>
<td>20%</td>
<td>35%</td>
<td>11.0%</td>
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<tr>
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<td>20%</td>
<td>35%</td>
<td>11.0%</td>
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<td>15%</td>
<td>25%</td>
<td>7.0%</td>
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<tr>
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<td>15%</td>
<td>25%</td>
<td>7.0%</td>
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<tr>
<td>28%</td>
<td>15%</td>
<td>25%</td>
<td>9.0%</td>
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<tr>
<td>28%</td>
<td>15%</td>
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<tr>
<td>28%</td>
<td>15%</td>
<td>25%</td>
<td>11.0%</td>
</tr>
</tbody>
</table>
random variability of investment returns tends to increase the breakeven tax rates and the breakeven period without significantly affecting the basic conclusions of our analysis.

Most investors with long investment horizons would probably be better off converting. This would be even truer for individuals who want to pass on all or most of their IRA to their heirs. Generally, a Roth IRA would make a better estate planning tool than the deductible IRA. A major uncertainty that is not addressed in this paper is the possibility of changes in tax laws that would lead to dramatically lower tax rates across the board or changes in the benefits of tax advantaged retirement plans.

The simulation framework incorporates random investment returns into the analysis. This is a very general model to evaluate the conversion decision and can be easily modified for changes in any of the key variables impacting the decision. Investors or their financial planners can customize the analysis to suit individual preferences and expectations.

References


Measuring the Financial Consequences of IRA to Roth IRA Conversions

James S. Welch, Jr., Senior Application Developer for Dynaxys, LLC.

Abstract

The tax code permits the conversion of IRA funds to a Roth IRA provided that personal income taxes are paid on the IRA distributions. Common motivations for IRA to Roth IRA conversions are to increase retirement disposable income, insure against future tax increases, and allocate retirement savings to minimize combined taxes for retirees and their heirs. This paper quantitatively assesses the financial consequences of making conversions with respect to these motivations.

Our laboratory was a linear programming retirement planning calculator that, given a set of assumptions and constraints, computes retirement cash flow that maximizes disposable income by minimizing taxes and maximizing compounded asset returns. Disposable income is our metric for evaluating different assumptions, such as doing or not doing conversions.

Our results are that partial conversions early in the optimal plan increase disposable income by around 1 percent in most situations. Conversions reduce total income taxes paid by 19 percent as they shift taxes from later in retirement to early in retirement. Pre-positioning savings for inheritance purposes can be accomplished with minor reductions in disposable income.

Keywords: retirement planning, Roth IRA, tax-deferred savings, linear programming, optimal spending plan, retirement spending, retirement disposable income, IRA to Roth IRA conversions

Acknowledgements

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Introduction

The objective of retirement planning is to maximize disposable income from all sources—Social Security benefits, pensions, sale of illiquid assets, and the distribution of retirement savings (liquid assets)—while staying within the confines of tax law. Retirees have little control over Social Security benefits and pension income because they are fixed at the start of retirement. In contrast, retirement savings distributions are at the retiree's discretion. It is in the retiree's interest to maximize disposable income by minimizing personal income taxes on savings distributions while maximizing compounded returns on retirement savings. Because tax-deferred account distributions are subject to personal income taxes a suboptimal distribution schedule will decrease disposable income.

We assume three retirement savings accounts:

1. **Tax-deferred account (IRA)** contributions from wages are exempt from personal income taxes. Distributions are taxed as personal income. After age 70½ IRA distributions are forced by the IRS's required minimum distribution (RMD). The RMD is designed to distribute the IRA evenly over retirement and enable the IRS to collect taxes on those distributions. The RMD is recomputed annually as a function of the IRA balance on December 31 and the IRS estimate of the life expectancy of the retiree.

2. **Roth IRA (Roth)** contributions from wages are subject to personal income taxes. Asset returns and distributions are not taxed. The Roth has no RMD.

3. **After-tax Account** contributions can be from any source and are assumed to be already taxed as appropriate. Profits are taxed as incurred. Distributions are not taxed (i.e., distributions are after-tax). The literature frequently uses the term taxable account for what we call the After-tax Account. In our view all accounts are taxable because they are taxed either as money enters the accounts or as it is distributed.

**Retirement savings** are the sum of the account balances for these three accounts.

Federal and state tax codes permit the IRA to Roth conversion of funds provided that personal income taxes are paid on the IRA withdrawals that are converted to Roth savings.

Motivations for making IRA to Roth conversions include:

1. increasing retirement disposable income
2. prepositioning savings in the retiree's estate to reduce the heirs' personal income tax liability
3. preserving tax advantaged savings for heirs by circumventing the IRA's RMD
4. insuring against personal income tax rate increases during retirement

This paper focuses on motivations 1 through 3. Motivation 4 is not considered because future personal income tax changes are likely to be rate increases in the upper brackets which are not a factor in our scenarios where taxable income is in the lower brackets. For planning purposes projecting the current progressive tax structure into the future is a valid assumption.

We are reporting on computational experiments, each with two components:

1. **No Conversion Option (NCO)** is a retirement plan in which IRA to Roth conversions are not enabled.
2. **Conversions Enabled Option (CEO)** is a retirement plan in which partial IRA to Roth conversions are allowed during retirement.

We compare the difference in annual retirement disposable income between NCO and CEO.

Our laboratory was the **Optimal Retirement Planner (ORP)**, a linear programming (LP) based retirement cal-

---

1. Disposable income is the money available for personal consumption after taxes have been paid.
2. We refer to the collection of tax-deferred accounts as the IRA.
3. We use the term "Roth" to designate the Roth IRA savings account.
4. What we are calling the After-tax Account is referred to as the taxable account in some sources. We prefer After-tax because all three accounts are taxed; during accumulation, during compounding, or during distribution.
5. This simplifying assumption is more accurate for mutual funds than common stocks. Mutual funds owners pay capital gains annually whereas capital gains on stocks are paid when the stocks are sold. Since the After-tax Account is the first to be depleted in most optimal plans we assume the difference is not significant in the overall retirement picture.
6. RMD: The required minimum distribution is an amount that the IRS requires be withdrawn from the IRA annually beginning at the age of 70½. It is computed as the IRA balance on December 31 of the previous year divided by a life expectancy value taken from an IRS published table. The RMD is recomputed annually with a different (shorter) life expectancy divisor. By IRS regulation IRA distributions in excess of the RMD may be converted to the Roth.
7. ORP is available on the Internet without registration or fee at www.i-orp.com.
culator that maximizes retirement disposable income by minimizing income taxes on savings account withdrawals and other sources of income. ORP maximizes disposable income for the first year of retirement and, by the constant income assumption, subsequent income values are this value indexed to compounded inflation. ORP computes the values of several variables which are pre-specified assumptions by the simulators more commonly used in retirement planning. These assumptions include the number, size, and timing of partial conversions.

ORP schedules partial conversions early in retirement at a level and duration that maximizes disposable income. Conversions increase taxes in the year in which they occur but reduce taxes paid later in retirement when Roth distributions provide disposable income. ORP will include conversions only when they increase disposable income. For example, ORP will pursue conversions if the Roth rate of return (ROR\textsuperscript{9}) is greater than the IRA ROR and avoid conversions if the opposite is true. A onetime conversion of the entire IRA during the first year of retirement is technically feasible, sometimes practiced, but rarely part of an optimal plan.

We find that in comparing two optimal plans, differing only in whether or not conversions are allowed, that there is in the neighborhood of a 1 percent improvement in the conversion plan's disposable income compared to the non-conversion plan. In the next section we review the literature concerned with quantitative evaluation of conversions. We begin our evaluations by examining the details of a typical conversion and its effect on the big picture. Then a sensitivity analysis compares the disposable income consequences of varying plan assumptions. Next we study the financial consequences of prepositioning account balances for inheritance purposes. We conclude with some summary remarks.

**Literature Review**

The literature and popular press are rife with advice on how and when to do IRA to Roth conversions. There is very little published that quantifies the consequences of conversions.

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8. As a simplifying assumption we do not model conversions before retirement begins.

9. ROR: The rate of return is the profit on an investment expressed as a percentage of investment's nominal value

Clayton, Davis and Fielding (2012) developed a simulator that applied the Monte Carlo method to determine the break-even age of conversions using randomized RORs. They conclude that the conversion decision is a function of current vs future tax rates. If future tax rates are less than current tax rates, then conversions offer no advantage. If future tax rates are projected to be greater than current tax rates then conversions should be considered.

LP is a useful method of modeling retirement cash flow. The computation of progressive federal income taxes and the RMD is a natural fit for an LP model. LP schedules withdrawals from the three savings accounts in a manner that minimizes income taxes while at the same time maximizing asset return compounding. The retirement planning LP models in the literature maximize final total account balance (FTAB\textsuperscript{10}) for a specified level of disposable income. In other words, disposable income is fixed and the FTAB is used to measure the performance of the model.

Ragsdale, Seila and Little (1993) modeled retirement cash flow with an LP model. They demonstrated that their LP optimal withdrawal plan is superior to two heuristic withdrawal methods. Their model fixed the withdrawal rate and maximized the FTAB. They computed personal income taxes on withdrawals, met the RMD, minimized the excess distribution penalty (no longer a feature in the tax code), and minimized estate taxes. They modeled two IRAs with different RORs and concluded that distributing the lower performing IRA first is optimal.

Coopersmith and Sumutka (2011) developed an LP retirement planning model that scheduled withdrawals from the IRA and After-tax Account in a tax efficient way that maximized the FTAB. They found that the LP results were superior to the common practice, which is to deplete the After-tax Account first, deplete the IRA next, and finally the Roth. Their implementation computed personal income taxes on IRA withdrawals plus Social Security benefits, satisfied the RMD, transferred RMD distributions in excess of spending to the After-tax Account, and minimized estate taxes. They showed improvement over common practice for situations where the After-tax ROR is greater than the tax-deferred ROR, the initial After-tax balance is greater than 10 percent of total retirement savings, and itemized deductions are greater than the standard deduction. Their paper includes the equations that comprise their LP implementation.

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10. Final total account balance is the sum of all three savings accounts at the planning horizon. FTAB is the planned estate at the plan’s end.
In an earlier paper, Welch (2015) we reported an LP implementation (ORP) that extended this prior work by:

- fixing the FTAB and maximizing disposable income
- modeling all three retirement savings accounts
- implementing IRA to Roth conversions
- adding other sources of taxable income to the model, such as pensions and earnings from post retirement employment

We showed that the LP approach computed disposable income schedules that were 3 percent to 34 percent larger than a common practice simulator. We demonstrated the implementation’s credibility by showing its internal consistency and by comparing its income schedules to those published by other researchers using the Monte Carlo method.

**Baseline Scenario**

In this section we define our baseline scenario (Baseline), solve it for NCO and CEO, and examine the details of the optimal plans generated by the LP.

**Baseline Definition**

The Baseline is for a single, 66-year-old retiree, just beginning retirement, with one million dollars in savings. The IRA contains $750,000 and the After-tax Account balance is $250,000. There is no initial Roth balance. The only restriction on creating a Roth IRA account for conversions is the minimum initial contribution required by some companies (Kitces 2015).

The retiree has a $23,000 Social Security primary insurance amount (PIA)\(^1\). The retiree plans to begin Social Security benefits at her full retirement age (FRA)\(^2\) of 66, her current age. Eighty-five percent of Social Security benefits are subject to personal income taxes.

We assume a 6 percent ROR on all savings accounts, 2.5 percent inflation, age 92 planning horizon, and a zero FTAB (i.e., savings will be depleted, at the planning horizon). We used the 2015 federal income tax tables.

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\(^1\) The principle insurance amount (PIA) is the amount of Social Security benefits for which the retiree is eligible at FRA.

\(^2\) Full retirement age (FRA) is the age at which a person first becomes entitled to full or unreduced Social Security benefits. Benefits begun before the FRA are penalized by .5% per month. Benefits begun after the FRA receive an 8% per year bonus.
**Baseline Evaluation**

We solved Baseline formulated as an LP model with no conversions (NCO) and with conversions enabled (CEO) to measure the economic advantage of doing IRA to Roth conversions. We examine the resulting distribution schedules to compare the dynamics of the optimal solutions for the two cases.

**Distributions and Income**

The Baseline results are that NCO’s maximum initial disposable income is $69,541 vs $70,004 for CEO. Initial disposable income is the maximum amount available for personal consumption in the first year of retirement. This gives a 0.7% economic advantage to enabling conversions. Lifetime NCO disposable income was $2,504,275 compared to $2,520,975 for CEO.

Figure 1 charts the savings account balances over retirement with and without conversions.

The NCO panel reflects but does not closely follow the common practice of depleting the After-tax Account before distributing the IRA. In the beginning, disposable income requirements are satisfied from the After-tax

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**Figure 2: Baseline Income and Distributions**

<table>
<thead>
<tr>
<th>Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Baseline, same test as Figure 1</td>
</tr>
<tr>
<td>- Y-axis is in thousands of dollars ($000)</td>
</tr>
</tbody>
</table>

---

**Discussion**

- The upper panels show disposable income and the optimal schedule of savings distributions.
- Social Security benefits are shown indirectly as the gap between savings distributions and income. CEO’s IRA withdrawals exceed disposable income when taxes are paid out of IRA distributions.
- The lower panels show income subject to income taxes (IRA withdrawals plus 85% of Social Security benefits) distributed across the Federal income tax brackets. The tax brackets are shown to the right.
- Before age 70, while the after-tax account is meeting disposable income needs, the CEO panels show IRA distributions for conversions plus Social Security benefits to be in the $100,000 range.
account plus Social Security while the IRA continues to appreciate through the compounding of IRA assets.

The CEO panel shows the Roth playing a significant role in the plan. The IRA balance falls right from the start as funds are converted to the Roth while the After-tax Account is distributed. The After-tax Account is fully depleted by age 70 but the Roth is available to supplement IRA distributions.

Figure 2 demonstrates savings distribution schedules for Baseline with and without conversions.

Early in retirement, in the NCO panels, disposable income and IRA distributions are optimized to put taxable income at the top of the 15 percent bracket but no higher. At age 79, when the After-tax Account is depleted, IRA distributions are increased to keep taxable income at the top of the 25 percent tax bracket, but no higher.

The CEO panels show IRA and After-tax total distributions to be twice disposable income. At the age of 70, when accelerated distributions deplete the After-tax Account, parallel distributions from the IRA, Roth and Social Security benefits maintain constant income.

In Figure 2, NCO shows significantly more money being taxed in the 15 percent bracket than does CEO because tax bracket upper bounds are indexed to inflation.

Despite rearranged IRA distributions and differences in taxes paid, NCO and CEO have similar disposable income graphs across retirement. This is consistent with initial income difference being less than 1% and the constant income assumption.

### Taxes Paid

Figure 3 compares NCO and CEO taxes paid annually and cumulative.

Before age 77, both options support income from the After-tax Account, where distributions are not taxed. NCO has smaller IRA distributions and thus lower taxes. CEO is paying higher taxes because of conversions. At age 77, for NCO, the IRA is the principal income provider and taxes go up accordingly. CEO IRA distribution and taxes are reduced as the Roth begins distributions.

NCO and CEO cumulative taxes take two different paths with trajectories changing at age 77. NCO total taxes paid end up 19 percent higher than CEO.

### Sensitivity Analysis

Sensitivity analysis is the changing of one Baseline assumption at a time and measuring the effect that the change produces on income.

Table 1 summarizes a set of trials each with a different Baseline assumption value changed. Each trial computes NCO and CEO maximum disposable incomes in thousands of dollars ($000).
of dollars and compares the percent difference shown in the Benefit column.

ORP makes conversions so long as the marginal benefit of increasing the Roth balance exceeds the marginal cost of slipping into the next higher income tax bracket.

**Pre-Positioning of Savings in Retirement Accounts**

A common motivation for employing IRA to Roth conversions is to arrange savings so that the retiree and heirs pay a minimum of combined income taxes. A second violist in the Dayton Symphony is going to have a low income relative to his sister (the cosmetic surgeon) in Beverly Hills, or even to the retiree. The violist’s portion of retiree’s bequest is best left in the IRA because his distributions will fall into his low tax bracket, as compared to the retiree. His sister, the surgeon, is better off receiving a Roth from the estate with the retiree bearing the income tax burden of conversion while the surgeon’s subsequent distributions are tax free according to Potts and Reichenstein (2015).

Modeling the heirs’ income taxes is beyond the scope of our study. Assuming that the retiree knows how she wants to divide up her bequest, our interest is to measure the financial consequences of shifting part of the FTAB from the IRA, where the optimal solution will normally leave it to the Roth for the heirs’ benefit.

We address this issue by specifying a minimum roth balance (MRB) that is carried in the Roth throughout retirement and to the FTAB. The MRB and FTAB are indexed to inflation. Since the After-tax Account is distributed early in retirement, normally only the IRA will contain any remaining FTAB balance. Leaving the FTAB in the IRA is optimal, from the retiree’s perspective, because it defers the paying of income taxes on IRA distributions to the heirs.

### Table 1: Single Retiree Sensitivity Analysis

<table>
<thead>
<tr>
<th>Assumption</th>
<th>NCO</th>
<th>CEO</th>
<th>Benefit</th>
<th>Description of Modified Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>70</td>
<td>70</td>
<td>0.7%</td>
<td>Baseline: 6% ROR, 2.5% inflation, 0 FTAB</td>
</tr>
<tr>
<td>Accounts</td>
<td>67</td>
<td>67</td>
<td>0.0%</td>
<td>$1M IRA, 0 Roth, 0 After-tax</td>
</tr>
<tr>
<td>Accounts</td>
<td>74</td>
<td>74</td>
<td>0.0%</td>
<td>$400K IRA, $350K Roth, 250K After-tax</td>
</tr>
<tr>
<td>Earned Income</td>
<td>85</td>
<td>86</td>
<td>0.3%</td>
<td>Earn $100,000 annual income until age 70</td>
</tr>
<tr>
<td>FTAB</td>
<td>68</td>
<td>68</td>
<td>0.8%</td>
<td>$100,000 final total account balance</td>
</tr>
<tr>
<td>Illiquid Asset</td>
<td>79</td>
<td>79</td>
<td>0.4%</td>
<td>$400,000 house sold at age 85</td>
</tr>
<tr>
<td>Inflation</td>
<td>83</td>
<td>83</td>
<td>0.4%</td>
<td>0% inflation rate</td>
</tr>
<tr>
<td>Inflation</td>
<td>41</td>
<td>41</td>
<td>0.5%</td>
<td>10% inflation rate</td>
</tr>
<tr>
<td>Large Savings</td>
<td>157</td>
<td>158</td>
<td>0.6%</td>
<td>Initial savings $3M</td>
</tr>
<tr>
<td>Large Savings</td>
<td>283</td>
<td>285</td>
<td>0.8%</td>
<td>Initial savings $6M</td>
</tr>
<tr>
<td>Large Savings</td>
<td>442</td>
<td>449</td>
<td>1.6%</td>
<td>Initial savings $10M</td>
</tr>
<tr>
<td>Longevity</td>
<td>92</td>
<td>93</td>
<td>0.4%</td>
<td>Plan ends at age 80</td>
</tr>
<tr>
<td>Longevity</td>
<td>63</td>
<td>64</td>
<td>1.0%</td>
<td>Plan ends at age 100</td>
</tr>
<tr>
<td>Pension</td>
<td>127</td>
<td>127</td>
<td>0.3%</td>
<td>$100,000 annual pension</td>
</tr>
<tr>
<td>Retire Early</td>
<td>53</td>
<td>53</td>
<td>1.0%</td>
<td>Retire at the age of 55</td>
</tr>
<tr>
<td>ROR</td>
<td>53</td>
<td>53</td>
<td>0.3%</td>
<td>2% rate of return on retirement savings</td>
</tr>
<tr>
<td>ROR</td>
<td>89</td>
<td>90</td>
<td>0.6%</td>
<td>10% rate of return on retirement savings</td>
</tr>
<tr>
<td>Soc Sec</td>
<td>61</td>
<td>62</td>
<td>1.1%</td>
<td>Begin Social Security at age 62</td>
</tr>
<tr>
<td>Soc Sec</td>
<td>70</td>
<td>71</td>
<td>0.6%</td>
<td>Begin Social Security at age 70</td>
</tr>
<tr>
<td>State Tax</td>
<td>65</td>
<td>65</td>
<td>0.7%</td>
<td>$4,300 exemption and 9% state tax rate</td>
</tr>
</tbody>
</table>

**Discussion**

- The NCO and CEO columns contain disposable income in thousands of dollars ($000)
- Benefit values are the percent difference between CEO disposable income over NCO disposable income. (CEO income – NCO income)/NCO income. Benefits are computed using dollars.
Due to the uncertainty as to when the retiree's last will and testament will actually be read the retiree's estate at any age is the total of all three savings accounts. The MRB will be part of that estate throughout retirement.

To establish the MRB, the initial IRA to Roth conversion is made during the first year of retirement. Additional partial conversions may cause the Roth balance to rise substantially above the MRB during the course of the plan. Roth distributions cannot take the Roth balance below the MRB.

Positioning funds for the FTAB reduces disposable income during retirement, because income taxes on the one-time initial conversion reduces disposable income.

### Comparison of Prepositioning Plans

In this section we evaluate the results of applying different FTAB Options through manipulation of the MRB. With MRB as the independent variable we consider four cases: the Baseline plus three FTAB options:

1. **Baseline**: The FTAB is fixed at $100,000. IRA to Roth conversions are not allowed. There is no MRB.
2. **All-IRA**: The MRB is zero, conversions are enabled, and the Roth balance can take on its optimal level. The All-IRA option is the same as FTAB case in Table 1.
3. **50%-Roth**: The MRB is $50,000, or 50% of the planned $100,000 FTAB. ORP leaves the remainder in the IRA.
4. **All-Roth**: The entire $100,000 FTAB will be in the Roth and there will be no IRA balance in the FTAB.

All three FTAB options allow conversions as part of retirement cash flow as well as funding the Roth.

Table 2 summarizes initial disposable income and taxes paid by the options as compared to the Baseline.

The All-IRA option makes use of conversions to increase disposable income but there is no Roth IRA component to its FTAB. The FTAB stays in the IRA to avoid taxes on distributions.

The lower two rows of the income column show that there is a cost to forcing the MRB into the FTAB. Adjusting the composition of the FTAB forces the solution away from the true optimum by increasing taxes paid, thereby reducing maximum disposable income. The additional cost is born by the retiree, every year of retirement in the form of reduced disposable income.

The tax percentages are negative (i.e., total taxes paid by the options are less than for the Baseline). Conversions early in retirement reduce the size of the IRA, which in turn lowers IRA asset return compounding, which further reduces IRA distribution, which, in the end reduces the IRA distribution taxes even further. Conversions increase the size of the Roth, whose distributions are not taxed. The large tax reductions are consistent with the 19 percent reduced taxes shown in Figure 3.

### Conclusion

1. The CEO distribution of savings schedule is radically different from NCO's. An NCO pays taxes late in retirement and a CEO pays them early (Figure 2).

### Table 2: Cost of MRB, Baseline vs Alternative Options

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Option</th>
<th>Income</th>
<th>Taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All IRA</td>
<td>0.8%</td>
<td>-28.6%</td>
</tr>
<tr>
<td></td>
<td>50% Roth</td>
<td>0.3%</td>
<td>-26.7%</td>
</tr>
<tr>
<td></td>
<td>All Roth</td>
<td>-0.1%</td>
<td>-25.0%</td>
</tr>
</tbody>
</table>

**Discussion**

- **Option** identifies the allocation of the Roth balance in the FTAB.
- **Income** is the percent difference of the Option's initial disposable income and the Baseline's initial disposable income. A positive income value indicates increased disposable income.
- **Taxes** are the percent difference of the Option's total taxes and the Baseline's total taxes. A negative value indicates that the Option reduces total taxes paid.
- The IRA to Roth conversion that funds the MRB occurs in the first year of retirement.
2. Sensitivity analysis (i.e., modifying base scenario assumptions) shows that IRA to Roth conversion increases disposable income by zero to 1.5 percent (Table 1).

3. IRA to Roth conversions protect against future tax increases by reducing the portion of retirement savings subject to income taxes later in retirement (i.e., the IRA). The open issue is how much of a projected tax increase and to which tax brackets, warrant conversions.

4. Directing savings to the Roth with the intention reducing the tax burden for the heirs incurs a reduction in the retiree’s annual disposable income. (Table 2)

5. The decision to convert or not to convert may be influenced by external factors beyond maximizing disposable income. If the retiree is retiring into a down stock market it would intuitively seem a prudent time to make large IRA withdrawals in spite of paying income taxes. The state of the market is of course reflected in the depressed retirement savings account balances. It would seem desirable to convert when asset prices are depressed because there is less tax paid and the state of the market is amenable to a recovery. Following the same logic, converting when asset prices are inflated would seem imprudent.

References


Author

James S. Welch, Jr. has been implementing Linear Programming Systems since 1964. His particular interests are in matrix description languages, high performance optimizers and pre solving models prior to optimization in order to speed the solution process. Since 1996, Mr. Welch has been the web master for the Optimal Retirement Planner website, a linear programming application. Mr. Welch is currently a Senior Application Developer for Dynaxys, LLC.

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Making Your Money Work: Tax Refunds to Debt Reduction

Norma B. Coe, Assistant Professor, University of Washington and NBER

Timothy Clegg

Abstract
Financial education and literacy, especially among low-income households, have become popular policy and research topics. This qualitative study combined information from tax preparation services with credit counseling services at a volunteer income tax assistance (VITA) site, and documents the existence of low-income, high-debt, over-withholding households. A subgroup of these clients who also predicted stable tax situations for the upcoming year were selected to receive additional information and tools to change their withholding and pay down their debt, to help achieve the broader goal of improving their financial security. This study suggests that this combining of tax preparation and credit counseling services may provide a promising avenue to help individuals change their financial security.

Key words: financial education, financial literacy, financial security, debt reduction, withholding

Introduction
Some households have federal taxes withheld despite knowing that they will get back all the money in the next year’s tax refund. This behavior can be particularly expensive if the same individuals also are paying interest and late fees on bills and/or postponing paying down credit card debt. While the existence of debt-burdened overwithholders has been hypothesized, there has been little-to-no documentation of this subgroup’s size or characteristics. Further, little is known about how to encourage this subgroup to take better control of its finances. This qualitative project has three goals: (1) to identify debt-burdened overwithholders among a low-income population; (2) to perform a simple information intervention that links withholding to debt levels and encourages individuals to change their withholding and pay off their debt; and (3) to follow-up with a survey one year later to gauge the potential effectiveness of the information intervention.

The authors conducted this intervention at a free volunteer income tax assistance (VITA) site in Boston, one of 64 that offer free tax preparation to low-income residents who do not itemize their tax returns. All individuals using the tax preparation
services have the option of also receiving credit counseling, which includes getting a free credit report, credit score, and information on how to improve their credit rating. These services are typically done in isolation—often in different rooms and with different trained volunteers for each service. For this qualitative study, after the credit counseling session, the credit counselor examined the tax return for the clients receiving both services. This examination led to the identification of debt-burdened overwithholders. If these clients with high debt levels and large refunds also had predictable earnings for the next year, they received additional information explicitly linking their overwithholding status and debt levels. Volunteers offered to help prepare new W-4 forms to increase their take-home pay and explained methods the individuals could use to improve their financial security. Follow-up telephone interviews almost one year later suggest that linking withholding policy and debt reduction could have a positive impact on the financial well-being of these clients.

This project builds on existing literature in behavioral finance and economics that illustrates the difficulty individuals have making sound financial decisions (e.g., Madrian and Shea, 2001; Choi et al., 2002, 2003; Thaler and Benartzi, 2004; Munnell and Sundén, 2004). This literature has contributed to the development of numerous financial devices that simplify saving, such as automatic enrollment and sensible default options in 401(k) plans, life-cycle mutual funds, Save-More-Tomorrow (Thaler and Benartzi, 2004), automatic 401(k)s (Gale et al., 2005), and directing tax refunds to savings bond purchases (Tufano et al., 2005). While most previous work focused on creating wealth through increasing savings, this qualitative study focuses on increasing wealth by decreasing debt. Tackling this pathway to financial stability is important for several reasons. First, unlike saving, paying down debt is often already a goal for low- and moderate-income households. They do not need to be convinced of its importance, which could lead to higher participation rates. Second, for households carrying debt, the immediate payoff of redirecting excess withholding toward their debt, which may be accruing in excess of 15 percent interest, is higher than what they would earn in most saving vehicles. Thus, decreasing debt has the potential to provide a higher immediate payoff than increasing saving. Finally, converting excess withholding to debt repayment does not involve any changes to the individual's daily budget constraints since the money was being withheld from their paycheck already. The fact that spending habits do not need to change may make the plan more appealing than plans that require people to give up something today for increased savings/lower debt levels later.

This paper also contributes to the relatively sparse financial education and counseling literature. The impact of financial counseling remains uncertain, partly because of the variety of interventions people have studied, the difficulty in evaluating the interventions, the different populations studied, or the evaluation methods used (Collins and O'Rourke, 2010; Collins, 2010a). Further, any conclusions that might be drawn from the existing literature might not be applicable to this population because very little research has been done on modifying the financial behavior of lower-income individuals. The most relevant study is Collins (2010b), which measures the effect of a mandatory financial education class on low-income clients with housing vouchers. While our study’s target population is broader, the descriptive statistics suggest, on average, they have very similar characteristics. Collins finds a large improvement in credit scores, savings account balances, and financial knowledge due to the program, but does not measure impacts on attitudes or perceptions. Unlike Collins (2007) or Collins (2010b), the intervention studied is not a full-fledged financial counseling program, but a simple, 20- to 30-minute intervention emphasizing the relationship between debt and withholding policies, and how this money could be put to better use.

This paper continues as follows. The first section describes the characteristics of low-income tax filers opting to use a VITA site for tax preparation, the universe from which our sample was drawn, and identifies debt-burdened overwithholders. The second section presents details about the information intervention that links withholding to debt levels, and sample characteristics of the eligible population. The third section discusses the one-year follow-up survey. The fourth section concludes the two main points from this research: (1) over withholding and high debt levels are prominent in this population, and (2) simple informational interventions may help households recognize and use withholding as a source of income to combat debt reduction.

Taxes and Low-Income Tax filers at a VITA Site

After taking into account deductions and exemptions, the tax returns of low-income taxpayers often show very little taxable income. Further, those with head-of-household
filing status are eligible for refundable credits that, under the American Recovery and Reinvestment Act (ARRA), can be as high as $8,000 for the 2009 tax year. In such cases, individuals have no legal obligation to have money withheld, and withholding simply defers receipt of earned income until the tax refund comes. While the total income received annually is the same, delaying receipt of the money could have costly financial consequences. When unnecessary withholding decreases take-home pay below the taxpayer’s cost of living, monthly shortfalls often result in late fees and interest that can cost hundreds of dollars over the year.

Tax Filers

Data for VITA taxpayers in the Boston area for the 2008 and 2009 tax years (filed in 2009 and 2010), shown in Table 1, describe the population from which the sample for this study was drawn. To be eligible to visit the VITA site in 2009, households needed to have less than $49,000 in earnings and not itemize their taxes (which excludes most homeowners and a few small business owners). Table 1 shows that the average adjusted gross income (AGI) was almost $16,000 in 2008, much less than the income limit set by the tax sites. Based on that AGI, the tax liability was $676, on average. The earned income tax credit (EITC) is then applied to the tax liability, leaving less than $100, on average, than would need to be withheld to cover the tax bill.

However, for these taxpayers, the average amount withheld was $1,355, the equivalent of pre-paying a bill by 1,360 percent. This relationship was especially striking among heads of households, primarily due to the more generous EITC; these taxpayers withheld an average $1,639 despite being due a refund without any withholding.

Despite the declining economy and increasing unemployment, the 2009 tax statistics indicate that average earnings were higher for households getting their taxes prepared at this VITA site. The higher average income would typically mean higher tax liabilities, but because ARRA gave additional EITC credits to families with a third child, the average EITC was higher in 2009. The average withholding increased along with the higher earnings, indicating that overwithholding was even more prevalent in 2009. For these taxpayers, the average withholding was more than $1,500, for an average net tax liability of $90.

Tax Clients who Voluntarily Receive Credit Counseling

All individuals coming to the VITA site are offered credit counseling services. These services include getting a copy of their credit report free of charge, and a trained volunteer credit counselor provides helpful tips on improving their credit score. In total, credit reports and scores were pulled for 39 tax clients between February and April 2010.

It is important to note that the credit counseling clientele is not a random draw from the overall VITA tax clientele. Many were current college and graduate students interested in getting their credit reports, either for first-time home buying or student loan applications. Other households used this service as a first step to making sure their finances were in order before the birth of their child. Finally, most likely due to the economic downturn, there was a lot of turnover at the VITA site between 2009 and 2010. The new tax clients did not have the same history with the VITA volunteers or with the community center, and were more hesitant than returning clients to participate in the add-on credit counseling services.

Despite these known differences between overall VITA tax clients and those self-selecting to get their credit reports, their tax situations are surprisingly similar, as illustrated in Table 2. The average AGI is higher for tax clients also receiving credit counseling services than for those opting only to have their tax returns prepared ($22,708 vs. $20,315), but the difference is less than $2400. The higher earnings translates into higher tax liability and higher withholding.

For all filing statuses combined, only the average refund is significantly different between the tax clients and the tax and credit counseling clients (at the 10-percent level). For heads of households, both the average tax liability and the average refund are different between tax clients and the tax and credit counseling clients (at the 5-percent level). Larger refunds may have made clients more willing to face the full financial picture presented in their credit report.

During the credit counseling sessions, it became clear that almost all clients had student loan debt. This is likely related with higher education and could be why the credit counseling clients had slightly higher AGI, on average. It also stresses that bankruptcy is not an option for releasing the debt burden for many of these clients.
Are there debt-burdened overwithholders?

The first aim of this paper is to identify if there are debt-burdened overwithholders. We define debt-burdened overwithholders as having debt-levels that they assessed could not be paid within one year, had income withheld from their paychecks for income tax purposes, and had at least $1,000 tax refunds in 2009.

Of these 39 individuals with credit score and tax return data, 35 individuals could be classified debt-burdened overwithholders. Only four did not qualify: one client had no debt, one had no excess withholding, one was going to eliminate his debt with the current year’s refund, and one owed money for back taxes so his wages and refund already were being garnished.

Withholding to Debt Reduction Information Intervention

Sample

Not all debt-burdened overwithholders are considered good candidates for changing their withholding to redirect funds towards debt repayment. Employment and tax situation stability was also required before a client was considered eligible for the information intervention. This criteria disqualified 13 clients from receiving the information intervention. They expressed job insecurity or other changes coming in the 2010 tax year, such as a new baby or plans to buy a house. This left a pool of 22 intervention-eligible households, representing a 52-percent eligibility rate. A priori, there was not an expected eligibility rate because this was the first time anyone had tried to link tax withholding and credit score data.

The Information Intervention—Linking Withholding to Debt

The 22 individuals received explicit information linking their excess withholding to their debt loads. This information included statistics on how quickly their debt would decline with $10- or $20-per-paycheck contributions, highlighting that they were giving an interest-free loan to the government, and totaling how much individuals were paying in late fees and interest charges on their debt. The credit counselor offered to help them fill out a new W-4 form to take to their employers to implement their lower withholding plan.

As anticipated, clients receiving the information expressed anxiety about changing their withholding and concern that having more money in their pocket would lead to increased spending. When asked if they were not simply spending the same amount via their credit card and using their refund to pay off debt, many admitted that this was the case. Some made the point that excess withholding puts them in control of their money and forces them to save, whereas taking more money home does not.

The other major concern clients expressed was fear of owing taxes in 2011 (2010 tax year), despite reassurances to the contrary. Some clients expressed an “it’s not broke, so don’t fix it” attitude in regards to changing their W-4 form or reluctance in having to turn in forms to their employers. One client used her refund to help support her mother in a different country and was not willing to change the amount in order to help her own financial situation.

Despite the challenges, the intervention was relatively successful at getting individuals to change their W-4 forms. Of these 22 individuals, four changed their W-4 forms at the site, representing a one-in-six take-up rate. Experience working with this population suggests that simple appointments have a 25–50 percent compliance rate, so this was viewed as a reasonable-to-high take-up rate. This success was primarily driven by younger clients who did not seem to have the same fear as some older clients of approaching their employers or human resources departments.

Individuals who did not have a financial system were very hesitant to change their W-4 forms without additional assistance with what to do with the extra take-home pay. Oftentimes, their tax forms, credit report, and personal stories indicated complicated financial problems, such as HUD subsidies, family issues, or child-care relationships. Their financial difficulties were not limited to one debt account or one collection account, but oftentimes they faced complicated financial problems across numerous banks, credit cards, and family members. These individuals were very receptive to enrolling in a financial coaching program, which included more in-depth and sustained assistance in getting their financial house in order, in addition to changing their W-4 forms. Two clients who changed their W-4 forms also enrolled in a one-on-one financial coaching course.
The setting seemed to play a role in getting individuals to change their withholding behavior. When tax preparers pointed out overwithholding during the tax preparation service, no one opted to change his or her W-4 form, often citing fear of owing taxes in the next year as a reason. However, once the focus turned to their credit scores and debt burden, the credit counselor did get clients to think about their withholding as another mechanism to combat debt. Because the credit counselors were also tax preparers on different dates, it was likely not due to a counselor-specific effect (i.e., a particularly persuasive person). Instead, we hypothesize that the response is driven by the change in framing, away from taxes and towards debt and financial security, even if only 20 minutes had elapsed. However, this hypothesis was not rigorously tested, but points to directions for further research.

Sample Characteristics

Table 3 shows credit statistics for the entire population who received their credit information (n=39), the eligible debt-burdened overwithholders (n=22), and those who changed their W-4 forms (n=4). The average credit score was between 595 and 630, on a scale between 300 and 850. The average American credit score was 692, with 13 percent of the nation’s population having scores above 800 and roughly 15 percent below 550 (Experian, 2011). A good credit score is anything above 700, a rating achieved by 58 percent of the American public generally. Not surprising, the rate is much lower in this target population: 11 percent of all credit and tax clients, 18 percent of the eligible debt-burdened overwithholders, and only 1 of the 4 people who changed their W-4 form.

Clients had to earn less than $49,000 to use the VITA tax site, which puts the debt amounts into perspective. The average debt load represents 74 to 138 percent of the average AGI for these populations. It is easy to see how these numbers could be intimidating to individuals trying to get their finances in order.

One Year Later

Between December 2010 and January 2011, the authors conducted a follow-up telephone survey, attempting to reach all 22 eligible debt-burdened overwithholders. Five had changed their phone numbers, 10 did not respond, and three refused to participate. Four provided in-depth interviews.

One complication for the analysis is the change from FICO to FICO-08 scores that occurred during 2010. The goals of the new rating system were to (1) decrease the impact of one or two late payments and (2) better predict bad risks. The system assigned lower weight to minor delinquencies (less than $100) and higher weight to the ratio of available credit to used credit, and individuals could no longer piggyback on someone else’s credit by opening a joint account (myFICO.com). The new system increased the credit score dispersion, but because the formula is a well-guarded secret, it is impossible to know exactly what the clients’ FICO scores would have been before the reweighting system was in place. Therefore, changes in credit scores between Spring 2010 and January 2011 may be due to the changes in reporting, so the focus of the study relies more on the program’s impact on total debt loads.

While it can be difficult to quantitatively assess the efficacy of financial advice (Collins, 2010), the in-depth interviews reveal promising trends. Both individuals in the follow-up survey for whom new W-4 forms were given did follow through and hand the forms to their employer. Below are detailed notes for the four follow-up cases. Mark and Sonia changed their W-4 forms, and Cecelia and Tinesha did not. All four case studies earned approximately $30,000 in 2009, and all received the extra information linking their withholding, taxes, and debt in a coherent picture. All four show signs of improving their financial security despite adverse financial events that happened during the year.

Mark: Single, graduate student. His W-4 form was changed to dramatically decrease his withholding to reflect the education credits for which he is eligible. He opted to take this reduced withholding as an increase in take-home pay, directly deposited into his existing credit union bank account. His credit score decreased by 30 points between February 2010 and January 2011 due to higher student loan balances and one late payment. However, he also has managed to use the extra take-home pay to virtually eliminate his credit card balances, from more than $2,000 to less than $300 in 11 months.

Sonia: Married, with two dependents. Her W-4 was changed to reflect the EITC payments for which her family is eligible. She started a very aggressive debt pay-down schedule with the extra take-home pay. However, she suffered three financial setbacks during the year. First, HUD reduced her housing subsidy, leading to higher rent. Second, a daughter lost her job, which led Sonia to provide
additional financial support for the daughter and her children. Finally, Sonia quit her second job in April 2010 (hoping to restore her higher housing subsidy), decreasing her income. Her credit score dropped by 60 points due to a few late payments on a credit card and the lower income. However, despite all the unexpected financial drains, she still managed to pay down $500 of credit card debt. This means that her aggressive pay-down plan was working before the crises occurred, and she still was in a better position debt-wise than she was in February 2010.

Cecelia: Head of household, with two dependents. She already had promised her tax refund to help support other family members, so she did not wish to make any adjustments to her W-4. However, she says getting her credit report pulled changed her view on credit cards. She stopped using them in the intervening year, and has made aggressive pay-down plans, despite no change in income, expenses, or withholding. Over the course of the year she cut her total debt by almost $6,000, a 35-percent decrease, and increased her credit score by 18 points.

Tinesha: Head of household, with two dependents. She exemplified some concerns expressed throughout the pilot when she refused to give out enough personal information on the phone to allow the authors to pull her credit report again in January 2011. However, she reports that she has enrolled in a credit monitoring service because of a fraudulent item on last year’s report. She reports that she was in the “A” range for her credit score, which is within the same range as she was in February 2010. She reports that she will get a credit report pulled again when she gets her taxes done at the VITA site this year.

Another potential result of the intervention is encouraging individuals to seek financial assistance or seek that assistance sooner. We collected credit information from individuals who enrolled in a credit counseling course during December 2010 and January 2011 in the same community center, most of whom were mandated to attend. We then compared the credit scores between the two intervention-recipients who voluntarily enrolled in the class to those who were directed to the class by an outside source. The average credit score of the two individuals who sought one-on-one financial coaching after the intervention was higher than the average credit scores of the coaching class overall. If the information intervention led these individuals to seek financial assistance earlier, it may be easier to reverse their financial situation.

Conclusions and Further Directions

This study found that 90 percent of low-income individuals who volunteered to get their credit reports pulled had high debt loads and were overwithholding. This was heretofore unknown, since tax data and credit data are not matched or collected together. Further, volunteers offered these clients information to link taxes, withholding, and debt reduction in their minds and wallets. Households are already thinking about their finances because it is tax-time, and most are getting substantial refunds. Linking the withholding to their debt load provided a tool for individuals who were serious about improving their financial situation. For those who had confidence in their own methods of dealing with their finances, the intervention offered new W-4 forms and highlighted this new opportunity. For those at wit’s end, the intervention opened the door for further financial assistance and more take-home pay to address their financial problems. Overall, this connection among taxes, withholding, and reducing debt should be explored further, as it seems to be a very promising avenue for improving the financial security of a relatively low-income population.

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**Measuring Risk Tolerance: A Review of Literature**

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**Abstract**

This paper provides a review of literature on the theory and measurement of risk preferences. The manuscript begins with a discussion on the origin of risk aversion and the evolution of prospect theory. We explore how risk perceptions alter household financial decision making, the effect cognitive ability has on risk preferences and the extent to which risk preferences change over time. Next, we examine ways to measure investor risk preferences and provide insight into the construction of risk assessment questionnaires. We conclude with a discussion on advisor compensation models and how they may affect the risk level of client portfolios.

**The Economic Origin of Risk Tolerance**

In 1738, Daniel Bernoulli published an article describing the St. Petersburg paradox that described a simple game in which a bet was made on a succession of coin flips (Bernoulli, 1954). The winner of the game would receive twice the initial bet each time a head appeared. The expected value of the game was infinite, since in an improbable sequence of coin flips heads would appear many times in a row and the gambler would become a multi-millionaire. But half of the time you'd lose on the first bet. How much would you pay to play the game?

The St. Petersburg paradox led to the idea that investors were not just wealth maximizers. They consider the probability and magnitude of outcomes, and value risky bets according to their so-called risk aversion (or its inverse, risk tolerance). The concept of risk aversion exists because we tend to get a little less enjoyment from each additional dollar spent. Because of this, we will prefer spending $50,000 with perfect certainty over the remote possibility of spending $1 million coupled with a very high possibility of spending only $1,000.

The St. Petersburg paradox and subsequent empirical evidence reveals that humans tend to experience decreasing marginal utility of spending. To a teenager earning low wages, a $500 annual raise means far more than a $500 raise as a mid-career professional. The decrease in marginal utility per dollar spent is illustrated in Figure 1, with dollars spent on the horizontal axis and utility on the vertical axis.

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Definitions of risk concepts

Risk aversion: The unwillingness to accept variation in consumption. As willingness to accept variation in consumption declines, risk aversion rises.

Risk tolerance: The willingness to accept variation in consumption. As willingness to accept variation in consumption increases so does risk tolerance.

Loss aversion: The tendency of investors to overweight disutility (dissatisfaction) from losses below an arbitrary reference point, such as their last quarterly brokerage statement.

Risk capacity: An objective measure of risk-taking based on an investor’s level of financial and non-financial assets (e.g. human capital).

Risk composure: The ability to reflect on market volatility and avoid an impulsive response.

Risk perception: An investor’s subjective assessment of the risk/return tradeoff.

Mathematically, risk aversion is the slope of the utility function or, more precisely, the marginal change in slope of the utility function at your current level of wealth. In other words, how much additional happiness would you get from an extra $500 raise right now? Those who are more risk averse receive less additional utility from a gain in spending and the risk tolerant get more enjoyment from an increase in spending. Risk in investments is equivalent to risk in spending because risk implies a greater variation in future investment payouts. Greater risk, which can be measured as the standard deviation of investment payouts, implies the possibility of either higher future spending or lower future spending. A safer portfolio will result in less variation in spending, which is preferred by someone who gets less utility from a good outcome and more utility from a bad one (implied by the steeper slope of the utility function).

The great advantage to the traditional economic concept of risk tolerance is its ability to incorporate individual preferences into models of investment choice and asset pricing (Kritzman, 1992). The Capital Asset Pricing Model drawn from Modern Portfolio Theory illustrates how, a) the aggregate risk tolerance of investors determines the market risk premium (the excess return we expect to receive from stocks over risk-free investments), and b) the individual’s risk tolerance determines the optimal mix of risky and risk-free assets in an individual’s portfolio. A more risk-averse individual should optimally select a portfolio that holds a greater percentage of risk-free assets.

There are two important points related to risk tolerance assessment to be drawn from the neoclassical utility model. The first is that, all else being equal, a more risk-averse worker will receive less marginal utility from a $500
raise than another worker with the same income who is less risk averse. These workers have different utility functions, and different general preferences for taking risk. The same worker who may have a higher salary later in his career will receive less marginal utility from a $500 raise than he did earlier in his career. In economics, this is related to a concept known as absolute risk aversion. As our wealth increases we become more willing to accept risk for the same dollar value of an investment.

Financial advisers often refer to this concept as risk capacity. Clients with more wealth are able to take greater risk because a loss will have less of an impact on expected lifetime spending. Wealth may be defined in terms of existing financial wealth, or more accurately by including the present value of expected pensions, human capital (future earning ability), and characteristics that affect near-term budget flexibility such as debt and insurance coverage (Samuelson, 1969).

Intuitively, an adviser may defend the concept of risk capacity by noting that, say, a 20% loss to an investor with a $5 million portfolio will still leave that investor with $4 million. The investor is still wealthy enough to meet his or her financial goals. To an investor with a $100,000 portfolio, the consequences of losing $20,000 are more severe. This example is inconsistent with the concept of constant relative risk aversion, which states that two individuals with the same utility function should feel the same disutility from a 20% loss in total wealth. In other words, it is unimportant how large their initial wealth is—what matters is the percent of that wealth subject to investment risk.

Empirically, this is often difficult to sort out. In surveys that include questions which elicit economic risk tolerance preferences, wealthier households are significantly more tolerant to investment risks. Figure 2 shows average responses by wealth level in the 2010 Health and Retirement study in response to a question asking respondents how willing they are to take investment risk. The higher the bar the more ‘risk-averse’ the household is, or the lower their risk tolerance.

In a multivariate analysis with income, education and other household control variables, the predicted level of risk aversion remains significantly lower for those with more wealth. When wealth is controlled, income is not a significant predictor of risk tolerance. Interestingly, higher education has a positive relation with risk tolerance (Sung & Hanna, 1996; Grable, 2000) even though there is not a theoretical basis for this effect.
Prospect Theory

Perhaps the most important theoretical contribution to our understanding of how individuals respond to investment risk is presented in Kahneman & Tversky’s (1979) prospect theory. There are a number of ideas presented in prospect theory that are relevant to risk assessment.

The first relevant feature of prospect theory is the so-called reference point. When assessing the riskiness of a strategy, we tend to focus on gains and losses from an arbitrary starting point. The emotional response to loss depends on whether the value falls beneath the reference point. This can be either the initial amount invested with a financial advisor or changes in the value of invested assets presented in periodic (quarterly, semi-annual) account statements.

The second feature of prospect theory is the concept of loss aversion. We tend to respond much more strongly to a loss than we do to a comparable gain. In general, the emotional response to loss has been shown to be twice as strong versus comparable gains (Tversky & Kahneman, 1992; Schmidt & Traub, 2002; Pennings & Smidts, 2003; Booij & Van De Kuilen, 2010).

Investors are not only loss averse, but they are also myopic. Myopic loss aversion predicts that an investor’s bond allocation should fall as their evaluation period lengthens and rise when negative investment returns occur. When investors evaluated their portfolios on a monthly basis, they allocated 59.1% of their holdings to a bond fund versus 30.4% given an annual evaluation period (Thaler, Tversky, Kahneman & Schwartz, 1997). In a similar study where investors were unable to view short-run returns, equity allocation increased and they became less likely to chase returns (Shaton, 2014). The results of the studies described above are consistent with the finding that a one-year evaluation period for an investment portfolio is utility maximizing (Benartzi & Thaler, 1995).

Prior gains and losses also influence risky choice. Investors display a break-even effect, in which outcomes that offer a chance to break even are especially attractive in the presence of prior losses (Sullivan & Kida, 1995; Thaler & Johnson, 1990; Weber & Zuchel, 2005). Investors also exhibit a “house money effect,” in which they increase risk-seeking behavior given the presence of a prior gain (Ackert, Charupat, Church & Deaves, 2006; Gertner, 1993; Thaler & Johnson, 1990). Barberis, Huang & Santos (2001) illustrated that prior gains cushion subsequent losses, which reduces investor loss aversion and, conversely, that prior losses exacerbate investors’ levels of loss aversion.

Prospect theory assumes that stochastically dominant prospects, where one gamble can be ranked as superior to another gamble, have already been ruled out in the decision-making process (Tversky & Kahneman, 1992). Prospect theory is also not expandable to prospects with more than two outcomes (Tversky & Kahneman, 1992). Cumulative prospect theory (CPT) relaxes these two assumptions and also applies different probability weighting functions to the gain and loss domains. CPT assumes that people overweight small probabilities and underweight large probabilities. This has important implications for individual risk preferences. For gains with large probabilities and losses with small probabilities, this means that people will be risk averse. For gains with small probabilities and losses with large probabilities people will be risk seeking.

Risk Perception

One of the subjective factors associated with a client’s willingness to accept risk is financial knowledge and experience. The importance of education in the analysis presented earlier is noteworthy because education, independent of income and wealth, should not necessarily be a strong theoretical predictor of risk tolerance. To understand why education may be a significant predictor of risk tolerance, it is important to consider the concept of risk perception. Financially literate individuals are consistently more willing to accept financial risk. This may be because they are better able to understand basic principles of financial risk, anticipate the possible variation in performance over time, and recognize the benefit of taking more financial risk as a means of achieving long-term financial goals.

When accepting investment risk, investors must be aware of the distribution of potential outcomes (Dow & da Costa Werlang, 1992). Less education, financial literacy or investment experience may result in less certainty about the risk of stock investing. In the face of investment risk, we tend to exhibit ambiguity aversion. This means that when faced with a risky choice, we tend to reject choices in which the consequences are ambiguous.
This may be one of the explanations for the stock ownership puzzle, in which Campbell (2006) noted that “all households, no matter how risk averse, should hold some equities if the equity premium is positive.” About half of Americans do not own stocks, and the strongest predictors of a failure to own equity are education and a complete unwillingness to accept any investment risk. Individuals who were less financially literate were more likely to sell stocks during the Great Recession (Bucher-Koenen & Ziegelmeyer, 2013). Not knowing much about stocks, investment theory, or the mathematics of standard deviation means that we really have no idea how much risk we are taking by investing in stocks. Financial literacy, and in particular knowledge of concepts such as diversification, is among the strongest predictors of stock ownership (Van Rooij, Lusardi & Alessi, 2012).

Figure 3 illustrates the concept of risk perception. An investor with less financial knowledge may perceive that the variation in long-run investment outcomes is greater than the historical reality. For example, a naïve investor may believe that a short-run drop in the stock market will result in an extreme loss of retirement lifestyle, while an investor with more financial knowledge may realize that long-run risk will likely result in a narrower range of retirement outcomes.

Greenwood & Shleifer (2014) documented a strong negative correlation between investor expectations of stock returns and recent returns for the S&P 500. Investors appear to change their expectations of the reward from taking risk based on recent changes in stock market returns. This time-varying change in perception of the risk/return tradeoff will reduce demand for investment risk following periods of recent negative performance. Investors may be just as willing to invest in risky assets, but they may no longer be confident that the risk premium from owning stock is large enough to make equity investment attractive. It is important for financial planners to recognize the tendency of their clients to perceive themselves to be more risk tolerant in years when market returns are higher and, conversely, to perceive they are less tolerant during market downturns (Yao & Curl, 2011).

The effect of cognitive ability on risk preferences

People with lower cognitive ability do not need to realize losses, rather, just perceive a loss, for it to affect subsequent risky choice (Guillemette, Browning & Payne, 2015). However, cognitive ability affects risk taking for realized losses as well. A laboratory study of Chilean high school students showed that small-stakes risk aversion is less common among those with higher standardized test scores (Benjamin, Brown & Shapiro, 2013). There is also growing evidence that lower cognitive ability is associated with great levels of risk aversion among adults (Dohmen, Falk, Huffman & Sunde, 2010; Boyle, Yu, Buchman, Laibson & Bennett, 2011). The effect of cognitive ability on risk preferences is not just limited to risk aversion. The anchoring effect, which is linked to loss aversion, decreases with
higher cognitive ability (Bergman, Ellingsen, Johannesson & Svensson, 2010).

If risk aversion and loss aversion increase as cognitive ability declines, we would expect people with lower cognitive ability to hold less risky assets. The propensity to invest in stocks, including direct stock market participation and indirect participation through mutual funds and retirement accounts, is associated with cognitive abilities (Christelis, Jappelli & Padula, 2008). Lower cognitive ability is related to allocations away from stock for older households. Compared to those with the lowest levels of cognitive ability, people with higher cognitive ability were 40% less likely to reduce their stock allocation by 50% or more during the Great Recession (Browning & Finke, 2015). Cognitive ability also affects investment returns. Investors with greater cognitive decline earned 3% lower risk-adjusted returns (RAR) and the performance differential among investors with greater cognitive decline increased to 5% lower RAR for those who hold larger portfolios (Korniotis & Kumar, 2011).

Measuring risk preferences

Since the economic definition of risk tolerance is a variation in future spending, many economists use questions that measure income volatility over time in order to assess risk tolerance. These questions are theoretically correct, but their performance as predictors of actual investment behavior during volatile stock market periods was mediocre (Guillemette, Finke & Gilliam, 2012). An example of an income risk question from a popular risk tolerance assessment test is “If you had to choose between more job security with a small pay increase and less job security with a big pay increase, which would you pick?” Responses for this question ranged from “definitely more job security with a small pay increase” to “definitely less job security with a big pay increase” (as cited in Guillemette, Finke & Gilliam, 2012, p. 39).

In a multivariate analysis of preference for portfolio allocation between a range of high risk, medium risk and low risk assets, income risk questions are associated with investment portfolio preference in a manner that is consistent with conventional utility theory (Guillemette, Finke & Gilliam, 2012). The income risk questions were also significant predictors of whether respondents shifted their portfolio to cash during the financial crisis (which may be of greater interest to financial advisors). Other questions, however, including a self-assessment of willingness to take risk and questions that focus on behavioral responses to risk were stronger independent predictors of both actual portfolio preference and response to an investment loss. Linciano & Soccorso (2012) noted that less financially literate individuals may not be able to provide an accurate assessment of willingness to accept investment risk, but this has not been tested empirically.

The importance of questions that elicit behavioral responses to investment risk can explain the weakness of economic risk tolerance variables as predictors of risk-related behavior in US national data sets. Kimball, Sahm & Shapiro (2008) noted that responses to a question about income risk in a national survey had only a 0.27 correlation between survey years in a longitudinal sample, and generally have not predicted investment preference in cross sectional analyses well. Grable & Lytton (2001) found that a financial risk assessment instrument available in a large national data set correlated weakly with sets of questions that related to choice gambles involving the possibility of a loss. This suggests that a risk profile may exist in more than one dimension—in this case, preferences related to rational portfolio allocation and emotional response to loss.

An advantage of behavioral questions is that they identify investors who may have a more emotional response to risk (Loewenstein, Weber, Hsee & Welch, 2001). The influential dual-self model of decision making points to neuroeconomic research that suggests a dual system of rational cognitive decisions formed in the prefrontal cortex and more emotional responses formed in the limbic system (Fudenberg & Levine, 2006).

The dual-self model has important implications for creating a risk profile. First, when we are anticipating how we will react to a risk in the future, we tend to over-project our ability to subvert an emotional response to loss with reason. The conflict between reason and emotion has been compared to a rider and an elephant; the rider may feel like she is in control most of the time, but when the elephant feels like going in a different direction there’s not much the rider can do. This is analogous to an investor who claims to understand that equity investment involves accepting volatility, but who ultimately sells risky assets during a bear

1. Age 50 and older
market because she cannot withstand the emotional toll of mounting losses.

It has been suggested that behavioral responses to risk can be predicted through questions that elicit a respondent’s willingness to reflect on information (such as a market decline) and employ an analytic process to evaluate the information rather than acting on instinct or emotion. An empirical analysis of prospect theory preferences found that subjects who scored high on a 3-question cognitive reflection test were far less likely to exhibit preferences consistent with prospect theory (Frederick, 2005). It may be possible to use these three questions or a subset of these three questions to predict a concept that can be referred to as ‘risk composure’, or the ability to reflect on market volatility and avoid an impulsive response.

Nonetheless, Guillemette, Finke & Gilliam (2012) found that responses to questions from a popular risk tolerance assessment tool, such as “when faced with a major financial decision, are you more concerned about the possible losses or the possible gains?” (p. 39), are much stronger predictors of how investors responded during the Great Recession (about 40% stronger in terms of predictive power than income risk questions).

Guillemette & Nanigian (2015) analyzed scores from a common risk assessment survey within the time frame that includes the Great Recession (2003–2010) in order to determine to what extent relative consumption differences and loss aversion explain variation in the scores. Findings from the study revealed that relative consumption differences accounted for approximately zero variation in risk assessment scores, whereas loss aversion accounted for 38.51% of the variation. Investor sentiment was controlled for in the analysis as well, and accounted for 13.21% of the variation.

If loss aversion is important when assessing investor risk preferences, it is also important to understand which risk assessment questions may capture loss-averse preferences. Guillemette, Yao & James (2015) analyzed the correlations between loss aversion, using actual monetary gains and losses, and a variety of risk assessment questions. The combination of the following questions yielded the highest statistically significant correlation (0.4793) with monetary loss aversion:

1. A question that asks about someone’s preference for job security versus a pay raise. The five choices range from definitely more job security with a small pay raise to definitely less job security with a big pay raise.
2. A question that asks someone about how much insurance coverage they have in the following domains: theft, fire, accident, illness and death. The four choices range from very little to complete coverage.
3. A question that asks someone how her personal investments have changed in recent years. The five responses range from always toward lower risk to always toward higher risk.
5. Suppose you have owned a stock for several years that has a long-run expected annual return of 8%, but 4% was from appreciation, and you had received a check every quarter that made up the other 4%. If the market, and your stock, was down 30% this year but the quarterly dividend checks were continuing as before, how likely would you be to sell it?
   a. I would definitely sell the stock
   b. I would probably sell the stock
   c. I would probably not sell the stock
   d. I would definitely not sell the stock

It appears that measuring an investor’s willingness to accept consumption variation is useful when trying to capture loss-averse preferences. For example, Question 1 measures an individual’s willingness to accept less job security for the possibility of a larger increase in income. Question 2 can be linked to both risk aversion and loss aversion, as insurance protects against a decline in consumption during periods of higher marginal utility of consumption. Self-assessment questions, such as Question 3, may be useful when developing a risk assessment questionnaire (Roszkowski & Grable, 2005). Questions 4 and 5 can be linked to the concept of loss aversion.

Investors can, to some extent, predict whether they will respond emotionally to a loss, and a risk assessment question can capture this more emotional response. ‘Self-assessment’ questions were also excellent predictors of actual response to financial losses (Guillemette, Finke &
Gilliam, 2012), although Grable, McGill & Britt (2009) found that younger subjects tended to overestimate their risk tolerance.

A second aspect of the dual-self model is that we tend to respond to gains without invoking the emotional parts of the brain, but when losses occur we are more likely to respond emotionally. In fact, since we are responding emotionally to losses when the market is falling, we may indicate a lower willingness to take investment risk on an assessment instrument during periods of market turbulence. Guillemette & Finke (2014) found that the correlation between a popular risk tolerance assessment score and the S&P 500 was 0.90 during the January 2007 through March 2009 bear market, but then only 0.01 between the remainder of 2009 through April 2012. A review of scores from a 3-question risk tolerance instrument given to employees participating in Morningstar’s Managed Account program shows a similar correlation between S&P values and measured risk tolerance in Figure 4. (Note: Since Figure 4 graphs risk aversion as opposed to risk tolerance, correlation between the series will appear as one line going up and the other going in the opposite direction).

There are a number of important implications of prospect theory preferences and the dual-self model. The first is that some investors respond to risk in a manner that reflects an emotional response to loss. This reflects the tendency to respond to market sentiment (Baker & Wurgler, 2007), which can lead to poor financial decisions when risk preferences vary over time. Some investors like investing in risky portfolios when the market is doing well, and they do not like the idea of taking risk when markets are doing poorly. This creates added complexity when assessing the quality of a risk assessment instrument. Are questions whose responses do not vary during bull and bear markets of higher quality? If the goal is to identify investors who may be more vulnerable to a behavioral response to investment risk, then the instrument should be able to capture loss-averse preferences.

The second important implication of the dual-self model is that financial advisors can add value by helping a client reduce behavioral responses to inevitable fluctuations in

Figure 4: Risk aversion and the stock market

Source: Blanchett, Finke and Guillemette, 2014
portfolio values. For example, Winchester, Huston & Finke (2011) found that clients who had a written financial plan were less likely to move investments away from equities during the Great Recession. Helping clients articulate an investment policy that is consistent with their risk preference score, elicited using a risk assessment instrument while in a rational cognitive state, may be seen as the first step. Once clients have selected an ideal asset allocation, an advisor can help a client maintain her equity allocation by reducing emotional anxiety and pointing to the written long-run investment goals. In this sense, the risk assessment instrument provides insight into how a client should optimally behave and the advisor helps a client remain focused on her investment goals.

According to a recent study from the UK (Blake & Haig, 2014), “more than half (52%) of respondents would prefer to miss their savings goals than take investment risk, with only 12% not prepared to do this. This highlights reluctance by a majority of savers to take the investment risk needed to achieve their savings goals. This has been referred to as reckless conservatism. The only alternative, if savings goals are to be achieved on time, is to reduce spending and save more. Yet this trade-off is preferred by less than one third (30%) of respondents” (p. 6). Although there was a clear relationship between risk tolerance and investment risk a consumer was prepared to assume, “there is no relationship between attitude to risk and the respondents’ savings goals or the amount of savings risk (in terms of a shortfall from savings goals) they are willing and able to take” (Blake & Haig, 2014, p. 6).

Advisors may be able to improve a client’s ability to select an appropriate amount of investment risk by working to enhance his financial awareness of the consequences of risk. For example, advisors can help clients understand the trade-off required by reduced probability of meeting goals, or having to cut back on current lifestyle to save more, by helping them imagine and articulate a willingness to accept a certain percentage loss in their investments and then coach them into focusing on goals rather than on changes in value from a reference point.

Risk assessment instruments that include questions that elicit emotional response to loss appear to be effective predictors of how individuals actually behave during periods of market turbulence. Behavioral response to risk, however, leads to suboptimal investment choices that compromise long-run goals. Advisors may respond to indications of behavioral preferences either by constructing a safer portfolio or selecting products that provide downside protection or income guarantees that are appropriate for a client’s goals.

Building risk assessment questionnaires

Hanna, Waller & Finke (2008) proposed a model by which an individual’s risk profile may be viewed as a combination of objective factors observable to a financial advisor and subjective preferences that may only be captured through a risk assessment tool. Characteristics that may be related to an objective risk profile are earnings volatility (or more accurately risk characteristics of a client’s human capital such as the covariance with capital markets and standard deviation) and future annuitized income and budget flexibility. Age and/or time horizon are often included as an objective measure of ability to withstand investment risk, although Bodie (1995) provided a compelling argument that time horizon is theoretically unrelated to optimal portfolio allocation unless it is considered in the context of a person’s human capital. An understanding of subjective risk preferences involves estimating the curvature of an individual’s utility function in both the gain and loss domains. The process of risk profile assessment should include both objective and subjective household characteristics. Two households with identical objective risk characteristics, but with different subjective preferences, will have different amounts of investment risk that will affect utility.

The objective of a financial advisor is to create an investment plan that is both appropriate for a client, given his goals, and that provides a level of investment risk consistent with his willingness and ability to take risk. While questionnaires meant to develop risk profiles are reasonably consistent in their assessment of objective risk, there is wide variation in how they attempt to elicit subjective risk. This variation leads to large potential differences in optimal portfolio strategies. A client could receive a recommendation of a lower risk portfolio after taking one test, and a higher risk portfolio after taking another.
Objective measures of risk assessment are essential. As stated previously, studies have found an association between investment risk tolerance and factors such as wealth, education, investment experience and time horizon. Other objective characteristics such as gender and race have been shown to be less consistent predictors of investment risk tolerance in multivariate analyses when other household factors are held constant (Gutter, Fox & Montalto, 1999).

The most important criticisms of individual questions on risk assessment tests relate to their ability to reliably measure the underlying construct—the willingness to accept investment risk. For example, questions that elicit risk preference outside the context of investment risk may do a poor job of predicting the preference for risky assets. While many empirical studies suggest that investment knowledge and experience strongly predict the willingness to take investment risk, many investors are unable to accurately assess their own financial sophistication.

Analyses of the predictive power of individual questions suggest that behavioral preferences such as loss aversion and the ability to moderate emotional response to investment volatility are particularly useful. Questions which assess actual response to investment volatility in the past can avoid the tendency to over-project the ability to moderate emotional response following a loss.

There is enough research on investor risk assessment to suggest that a carefully constructed instrument can reveal important characteristics that affect optimal investment choice. At the same time there does not appear to be significant research into how these ‘characteristics’ can best be combined to arrive at a risk profile. One recent study (Carr, 2014) on the relation between the various risk factors and how they account for a consumer’s attitude towards the aggregated risk profile, showed that ‘risk need’ accounted for over 35% of the model, while ‘risk tolerance’ accounted for 20% and ‘risk perception’ accounted for 15% of the variance in the model.

Research also suggests that in the absence of an instrument, advisors do a poor job of assessing a client’s risk preferences on their own; advisor’s assessment of their client’s risk tolerance only had a 0.4 correlation to a psychometric risk tolerance questionnaire (Roszkowski & Grable, 2005).

### Agency Issues

Clients hire a financial advisor to help select investments that are appropriate in the sense that they improve the client’s overall well-being. Ross (1973) introduced the theory that underlies the selection of an agent (an advisor) to assist in making decisions on behalf of the principal (the client).

This agency relationship can lead to suboptimal recommendations that are not consistent with the preferences of the individual. In some cases, the advisor may have an incentive to recommend a portfolio that is too risky. Any resulting loss is often the focus of complaints to regulators and litigation. An equally important risk, and one that is arguably more significant in terms of aggregate welfare loss among clients, is the temptation to take too little portfolio risk. Advisors may have an incentive to recommend excessive safety if they believe that a client is more likely to discontinue the advising relationship if they experience a loss. Both costs are discussed briefly in this section.

There are two primary compensation models in the financial advising profession. Advisors compensated with asset fees are generally paid a fixed percentage based on assets under management. Advisors compensated with commissions are generally paid a commission upon the sale of a financial product as well as a modest asset-based income trail (on some products like mutual funds). These two models will result in different investment recommendation incentives in response to a client risk tolerance assessment test.

In general, fee-compensated advisors hope to maximize the revenue they receive from a client. Over the long run, this may produce an incentive to recommend a portfolio that is as heavily weighted toward equities as possible without risking the possibility that a client will move to another advisor after a significant loss. To this end, advisors have a strong incentive to recommend a riskier portfolio and then work closely with the client during a bear market to help her maintain her optimal allocation. In this sense, the interest of the advisor and the client are aligned. A 50% loss in the portfolio value of all clients will result in a 50% drop in advising income.
Commission-compensated advisors receive compensation primarily at the time of purchase and sale. They are motivated to recommend financial products that the client wants at the time of purchase. Where a fee compensated advisor may try to convince a reluctant client not to sell equities during a recession, a commission compensated advisor may be tempted to accede to a client’s increasing risk aversion by recommending the sale of an equity fund in order to buy a bond fund (Anagol, Cole & Sarkar, 2013).

Regulators must be very careful to acknowledge these vested interests. For example, is a fee compensated advisor harming his client by not immediately agreeing to move a portfolio into a safer asset mix when a client becomes more risk-averse during a recession? Is the commission-based advisor looking out for her client’s best interests by more frequently responding to changes in a client’s risk tolerance in order to recommend investing in a new safer or more risky product? In either case, the long-run best interests of the client may not be well served by simply assuming that responses to a risk tolerance assessment tool are a static indication of an investor’s willingness to take risk.

The importance of ambiguity aversion and financial literacy begs the question of whether financial literacy assessment instruments function solely to assess preferences or to initiate a discussion about investments that might enable financial coaching. Many financial professionals (Evensky, 2011) view the risk assessment instrument as an opportunity to craft a discussion about client goals and the creation of an investment policy that is consistent with those goals. For example, a client with a long-term goal may be unwilling to accept investment risk because of limited experience. An adviser can help the client understand the tradeoffs of taking no or little investment risk in achieving long-term investment goals. In many cases, assessing risk preferences provides an avenue to developing an investment policy that is consistent with a client’s true preferences—but one that may not have been consistent with his initial responses to a risk questionnaire.

Conclusions

Risk assessment instruments can provide an effective means of evaluating an investor’s subjective risk profile. Creating an appropriate client risk profile involves collecting information about a household’s objective risk factors—for example, their income and wealth—as well as their subjective risk preferences, which include attitudes toward risk and susceptibility to behavioral preferences. Not all investors with the same objective characteristics will prefer the same investment portfolio, and there is evidence that advisors cannot accurately assess subjective risk preferences on their own.

A simple risk assessment instrument should include questions that assess ability to accept risk within the context of financial assets. A number of behavioral factors, in particular the reaction to a loss, predict how a client will respond to investment volatility. The validity of questions should be judged based on evidence of their ability to predict portfolio preference, and instruments used within the industry should provide a consistent evaluation of an investor’s risk profile. There is little use in requiring a risk assessment test that does not accurately measure the construct it was created to predict.

Emotional response to risk, compensation incentives and variation in financial sophistication mean that there is a role for advisors to help clients manage risk effectively rather than to simply select a single optimal portfolio that is consistent with a risk assessment score elicited at a single point in time. Advisors should evaluate a client’s risk preferences before providing a recommendation. However, advisors should also be given the flexibility to incorporate the risk assessment results in a comprehensive strategy that gives a client the best opportunity to meet long-run financial goals.

Bibliography


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