Health State and the Savings Required for a Sustainable Retirement

W. V. Harlow
Empower Retirement
One Post Office Square
Boston, MA 02109
(617) 535-8997
E-mail: van_harlow@empower-retirement.com

Keith C. Brown
University of Texas
Department of Finance, B6600
Austin, TX 78712
(512) 471-6520
E-mail: keith.brown@mccombs.utexas.edu

Current Draft: December 2, 2016

JEL Classification: G11, G17, I19

Key Words: Retirement Savings, Individual Health State, Sustainable Spending, Healthcare Expense

* We are grateful for the comments of Josh Crockett and Leonard Glynn. The opinions and analyses presented herein are those of the authors and do not necessarily represent the views of Empower Retirement.
Health State and the Savings Required for a Sustainable Retirement

Abstract

Life expectancy varies widely with health conditions, but very rarely is this information incorporated into retirement investment planning. This is surprising given that the vast majority of households (i.e., 80 percent) have one or more adverse health conditions entering into retirement. We show that the amount of savings required to fund a successful retirement can differ by as much as 26 to 33 percent relative to that required for a healthy individual (females and males, respectively). Similarly, the amount of savings required to fund healthcare expenses in retirement can vary as much 29 to 39 percent. Importantly, for different health states, the interactions of projected health costs and associated mortality projections have interesting but counter-intuitive effects on retirement planning. For example, the higher retiree healthcare expenses associated with conditions like diabetes and tobacco use are offset by reduced life expectancies. The net effect is that, in certain health states, less savings are required for healthcare than would be necessary for a healthy individual.

JEL Classification: G11, G17, I19

Key Words: Retirement Savings, Individual Health State, Sustainable Spending, Healthcare Expense
Health State and the Savings Required for a Sustainable Retirement

One of the interesting facets of the retirement planning models typically deployed by the financial services industry is the lack of flexibility in determining the planning horizon of a retirement. Most models currently in use make income projections based on the assumption that everyone lives to a particular age, like 88 or 92 years old. The reality, of course, is that there is a remarkably wide distribution of mortality ages for retirees. An individual might only be retired for a year before passing away or she could live in retirement for another four decades. While it impossible to know the exact length of someone’s life on the day she retires, and hence how long she would need to plan for retirement, the state of a person’s current medical condition (i.e., health state) does provide a window on her mortality. With this information, however, we are in a better position to make a more informed decision regarding the level of savings that would be required to achieve a successful retirement.

Presumably, one of the reasons why health state has been overlooked variable in retirement investment planning is the complexity of the problem. In particular, as shown in Harlow and Brown (2016a, 2016b), there are myriad factors involved for an individual considering the required level of savings that would need to be amassed by retirement to support a sustainable level of spending for the rest of her life, including the asset allocation strategy, the stochastic nature of future asset returns, the investor’s risk tolerance, projected mortality rates, and desired annual spending goals. Naturally, what makes this analysis particularly challenging is the fact that several of these variables are highly inter-related; for instance, Finke, Pfau, and Blanchett (2013) and Blanchett, Finke, and Pfau (2014) document the impact that asset class expected return projections can have on sustainable spending levels for a given asset allocation strategy.

1 Starting with Samuleson (1969) and Merton (1969), a major focus of the retirement literature has been on the appropriate asset allocation strategy, given the other parameters of the investor’s problem; see also Farhi and Panageas (2007), Schleef and Eisinger (2007), and Stout (2008).
2 More recently, a significant emphasis of the retirement management literature has been on establishing the sustainable withdrawal rate, including the work of Bengen (1994), Pye (2000), Guyton (2004), Scott, Sharpe, and Watson (2009), Blanchett, Kowara, and Chen (2012), and Kenigsberg, Mazumdar, and Feinschreiber (2014). In a closely related study, Ho, Mozes, and Greenfield (2010) examine the sustainability of the standard 4-5 percent annual spending rate for university endowment funds.
An innovation in Harlow and Brown (2016a) is the integration of both stochastic asset return dynamics and stochastic mortality conditions into the same retirement asset allocation model. However, the results of that study were generated using just two representative projections of mortality probabilities—one for males and one for females—which make them appropriate for the “average” retiree of each respective gender. In this study, we extend that earlier analysis by allowing the mortality risk projections in the retirement investment process to be tailored to the specific health conditions faced by the retiree. Our main findings indicate that there is indeed a considerable amount of variation in the financial implications across individuals with different health and retirement circumstances. We explicitly integrate the costs associated certain health states with the mortality data associated with these conditions. This allows us to not only estimate the savings needed to fund retirement expenses but to also calculate the mortality-adjusted healthcare expenses that are based on health state.

Of particular note, we show that life expectancies vary widely as a function of health state. Adverse health conditions like cancer, diabetes, and tobacco use have the most dramatic impact on shortening life expectancy. However, cardiovascular disease, high blood pressure, and high cholesterol, although clearly significant medical concerns, are seen to only slightly reduce life expectancy as these conditions can be managed effectively with medication and other treatments.

Based on the mortality information that we incorporate into our retirement income modeling approach, we find large differences in the required saving amounts for the several retiree health states we examine. For instance, we show that while a healthy (i.e., no acute or chronic medical conditions) 65-year old female will need to have amassed approximately $1,950,000 at the time of her retirement in order to generate $100,000 per year in real post-retirement income, an otherwise similar female with diabetes would only require about $1,450,000—or just under 67.0 percent of the “healthy” portfolio—to fund the same retirement goal. Likewise, a healthy 65-year-old male needs $1,820,400 to fund the same level of income while an otherwise comparable man who is a tobacco user would only require a portfolio worth about $1,430,000 at the time of retirement (i.e., 78.6

---

3 Specifically, Harlow and Brown (2016a) use mortality risk statistics generated by the U.S. Social Security Administration’s period life tables, which express the annual probabilities that someone aged 65 will live to between one and 45 years into the future.
percent of the healthy amount). Of course, the source of this funding “discount” for the impaired health states is the shorter projected life-span that those individuals will experience relative to their healthy counterparts.

With regard to retirement healthcare expenses, impaired medical conditions like cancer, diabetes, cardiovascular disease, and high cholesterol require markedly different medical costs each year under the Medicare insurance program. Yet in terms of the impact on the required savings at the time of retirement, we find that these higher treatment expenses are offset by shorter life expectancies. Ironically, individuals in excellent health may face the highest level of overall medical expenses since they have the longest projected live-spans. For example, the savings required for a 65-year-old female to confidently fund healthcare expenses for the remainder of her life range from a low of $111,000 for someone with Type II diabetes to $156,000 for someone in good health, even though the average annual costs are higher for the diabetic. Clearly, incorporating health state into retirement planning decisions can dramatically revise the outlook on the savings required to sustain any desired level of spending in retirement.

The remainder of the study is organized as follows. In the next two sections, we briefly summarize the findings of a recent survey regarding the health conditions and retirement planning statuses of a broad cross-section of American workers and then demonstrate how those differential health states translate in disparate levels of mortality risk. In Section 4, we describe how we integrate different health state-specific mortality projections, along with asset class return projections, into our retirement present value (RPV) model for determining the amount of savings required at the time of retirement to support any given annual spending goal. Section 5 then documents what those savings levels are for a variety of health state conditions assuming a base case level of required annual real spending and a given asset allocation strategy. Sections 6 and 7 examine the impact that healthcare expenses can have in the context of the retirement planning process and the adjustment to required savings that would be necessary to fund those expenses. The discussion in the final section concludes the paper.
THE HEALTH STATE OF RETIREES

As a part of our analysis in this study, in January 2015 we retained Brightwork Partners to survey over 4,000 working Americans, aged 18 to 65, for an assessment of a variety of issues associated with their overall retirement preparedness. In addition to assembling substantial financial information, the survey also gathered the current health conditions of the two primary members of each responding household. Specifically, survey questions asked if one or both members of the household were healthy or if one or both members had any of six impaired health conditions: diabetes, cancer, high blood pressure, high cholesterol, cardiovascular disease, or tobacco use. Exhibit 1 depicts, by age group, the incidence rates for each of these health states.

What is immediately clear from this graph is the increasing unhealthiness of this representative sample of Americans as it gets progressively older. Strikingly, roughly 40.0 percent of individuals suffer from either high blood pressure or high cholesterol (or both) by the time they are in the immediate pre-retirement group at age 60-to-65, which is significantly higher than the proportions experienced by the younger cohorts in the sample. By contrast, diabetes, cancer, and cardiovascular disease occur in this same age pre-retirement cohort at a rate of 12.5, 8.0, and 7.1 percent, respectively. Another interesting finding in the survey is that tobacco use is relatively consistent across all age groups, with the proportion in the pre-retirement age group remaining relatively high at 25.0 percent.

Given the extent to which the health fortunes in this representative sample appear to vary substantially by age, a natural question to ask would be just how many households will actually be considered healthy as they prepare to enter retirement? To address that concern, Exhibit 2 reorganizes the data from the Brightwork retirement survey by identifying those households in which both the main respondent and his or her spouse are experiencing none of the six adverse health states, making them “healthy” for the purposes of this analysis. As the display indicates, while over 50.0 percent of households were found to be healthy when they are in the 20-to-30 age group, this number steadily declines to the point that only 20.0 percent of them are healthy once they reach the 60-to-

---

4 The full results of this survey are detailed in the study “Lifetime Income Score V: Optimism and Opportunity,” Empower Retirement, 2015 and are available upon request.
65 pre-retirement age group. Stated more plainly, as many as four-in-five households on the verge of entering retirement will have at least one person who is experiencing an impaired health condition of some kind. Consequently, understanding the interaction between an individual’s health state and the healthcare expenses that will be faced in retirement is extremely relevant for the vast majority of working Americans.

HEALTH STATE AND MORTALITY

Although the sizeable majority of households entering retirement face a variety of adverse health conditions, this would only be an issue for investment planning purposes if those alternative health states are associated with either markedly different mortality risks or annual projected healthcare costs. Accordingly, the next question to consider is the role that these health states have on the expected life-span of an afflicted individual and, by extension, the amount of savings that would be required to successfully fund that individual’s retirement spending needs.

As a starting point, Exhibit 3 provides a comparison of the mortality curves for a healthy 30-year old male compared to a similar individual with health conditions that have a large influence on mortality risk: cancer, diabetes, and tobacco use.\(^5\) It is apparent from the exhibit that these three health impairments in particular have a significant impact on life expectancy. For instance, the healthy 30-year old male can expect to live until the age of 90, but a 30-year old man afflicted with either cancer, diabetes, or tobacco use will, on average, only live to age 60, 78, or 82, respectively. Further, the year-to-year survival probabilities are greatly impacted by these adverse health states, with cancer showing the most severe possibility of an early demise.

On the other hand, there are different chronic health conditions for which the prognosis for life expectancy is not nearly as dire. Exhibit 4 documents a similar comparison of the year-to-year probability of survival for a healthy 30-year old man versus a counterpart who suffers from cardiovascular disease, high cholesterol, or high blood pressure. As indicated, for these three impaired health states, there is only a very

---

\(^5\) The health state-specific mortality probabilities represented in Exhibits 3 and 4 were obtained from HealthView Services Inc. HealthView is a commercial provider of health state-specific cost and mortality data based on their work with insurance companies, actuarial firms, and medical professionals.
slight reduction in life expectancy, with the respective projections for the three conditions being 87, 87, and 89. The primary reason for the longer life expectancy for these three diseases relative to the prior three is the fact that there are medications that can effectively manage the former health conditions.

SOLVING FOR THE SAVINGS REQUIRED TO SUSTAIN RETIREMENT SPENDING

In order to determine the amount of savings required to fund a successful retirement, we need to capture the mortality effects associated with different health states as well as the uncertainty around investment returns earned by a retirement portfolio. As described in Harlow and Brown (2016a), a straightforward way to accomplish this is through the use of a method known as retirement present value, or RPV, analysis. This technique views the retirement plan as consisting of both current and future assets and liabilities. Under this approach, savings contributions are treated as both assets and flows into the portfolio. Naturally, the value of these assets fluctuates with variable and uncertain investment returns over time. Retirement expenses, conversely, are both current and future liabilities reflected through outflows from the portfolio.

The RPV method is simply an expression of the financial value of a stream of cash flows in today’s dollars. It captures both mortality risk and the uncertainty around investment returns by discounting the adjusted cash inflows and outflows of the retirement plan in the appropriate manner. The calculation of the RPV measure is straightforward and merely an adaptation of the familiar method of determining the discounted present value of a series of future cash flows. Mathematically, the equation for the probability-weighted discounted retirement cash flows is:

$$\text{RPV} = \sum_{t=0}^{\infty} \frac{P_t \cdot CF_t}{(1+R_t)^t}$$

(1)

where:

$$t = \text{years into the future},$$

---

6 The RPV analysis summarized below can viewed as a generalized version of the continuous-time, closed-form model of Milevsky and Robinson (2005) and which can be adapted to a variety of user-specific conditions, such as individualized health states.
\[ p_t = \text{probability of being alive at time } t, \]
\[ CF_t = \text{cash flow at time } t, \text{ and} \]
\[ R_t = \text{the risk-adjusted discount rate.} \]

The set of cash flows of the retirement plan, \{CF_t\} in equation (1), represent savings inflows into the portfolio prior to retirement age and the outflows from living expenses (i.e., retirement spending needs) deducted after retirement. CF\(_0\) in the RPV analysis represents the individual’s current savings at any desired time \(t=0\). The probability of being alive at future time \(t\), \(p_t\), can be obtained in a variety of ways: case histories for individuals with similar health states, directly from aggregated actuarial tables, or through standard mathematical models specified to approximate the actual probability values. Thus, it is through the selection of \(\{p_t\}\) for any individual investor that the mortality risk associated with his or her specific health condition can be expressed.

In order to determine the discount rate applicable at each time \(t\), \(R_t\), the returns on the retirement fund investment portfolio available in each year are used. Forecasts of these returns, denoted \(r_t\), can be obtained from historical time series or through Monte Carlo simulation. Assuming for convenience (but without loss of generality) that the asset classes included in the investment portfolio are stocks, bonds and cash equivalents, the discount rate can be expressed:

\[
(1+R_t)^t = (1+r_1)(1+r_2)(1+r_3) \ldots (1+r_t) \tag{2}
\]

where:

\[
r_t = (w_{S} x r_{St}) + (w_{B} x r_{Bt}) + (w_{C} x r_{Ct}). \tag{3}
\]

In equations (2) and (3), we have the following definitions: \(w_{S}\), \(w_{B}\), and \(w_{C}\) are the portfolio weights in stocks, bonds and cash, respectively; \(r_{St}\), \(r_{Bt}\), and \(r_{Ct}\) are the returns on stocks, bonds and cash at time \(t\), respectively. In the context of this specification, the selection of the asset class investment weights, \(\{w\}\), represents the investor’s asset allocation decision. We assume that stock, bonds, and cash have real returns of 6.0, 3.0,
and 1.0 percent, respectively, as well as having respective volatilities of 16.0, 7.0, and 2.5 percent.\footnote{We also assume that real stock returns have a correlation with those of bonds and cash of 0.20 and 0.15, respectively, and that the correlation of real bond returns with real cash returns is 0.35. These assumptions, as well as the expected returns and volatilities, are generally consistent with historical trends in the United States capital markets since 1946.}

For the sake of clarifying the main issues regarding the impact that health state has on the retirement investment problem, in this study we will only consider retirement expenses and we will fix the values of \( w_S, w_B, \) and \( w_C \) to be 0.4, 0.6 and 0.0, respectively.\footnote{Although we only report in the subsequent analysis findings for our base case assumptions, we have replicated these results for a wide range of alternative specifications, particularly regarding the initial asset allocation strategy that the investor adopts and the desired post-retirement spending goal. These supplementary findings, which do not alter our main conclusions with respect to the effect that impaired health states have on required retirement savings, are available upon request.} These simplifications will allow us to focus exclusively on the interaction of health state and retirement costs. Further, we assume that the individual is already at the point of retirement and so all future cash flows, \( \{CF_i\} \), are negative. Said differently, we do not allow for any period of accumulation of retirement savings following the date of retirement itself.

Finally, as discussed in Harlow and Brown (2016a), the RPV model also requires a representation of retirement risk to frame the optimization process. For the analysis herein, we represent this risk as the probability of ruin, which can be expressed as a zero-order, lower-partial moment of the distribution of RPV outcomes about a target value of zero as follows:

\[
\text{Probability of ruin: } \quad LPM_0 = \sum_{\text{RPV}_j < \tau} \frac{\tau - \text{RPV}_j}{n-1}
\]

where \( \text{RPV}_j \) = the \( j^{th} \) RPV outcome from the set of \( n \) observations from (1), (2), and (3), as generated from return simulations and \( \tau = \) target value of zero.\footnote{Although the probability of ruin is a popular way of describing retirement failure—see, for example, Milevsky and Robinson (2005), Stout (2008), and Rook (2014)—there other ways of expressing the downside risk nature of this investment problem in a more expansive manner. These include expected shortfall and semi-deviation, which can be viewed as the first- and second-order lower partial moment functions, respectively.}

Based on the preceding modeling design, the optimal level of savings required to fund the retirement spending goal (i.e., \( \{CF_i\} \)) for an individual with a given health state-linked mortality risk projection (i.e., \( \{p_t\} \)) can be obtained by optimizing the amount of savings required over the horizon.
accumulated savings, $C_{F_0}$, in equation (1) so that the probability of ruin remains at or below a fixed percentage. To be consistent with conventional practice, we set this probability of ruin threshold at 10.0 percent as our initial assumption.

**REQUIRED RETIREMENT SAVINGS AND HEALTH STATE**

Based on the RPV approach described above, we estimate the amount of savings (i.e., the level of assets held in the investor's portfolio at the time of retirement) required to fund $100,000 per year in real income through life expectancy with a 90 percent confidence rate (i.e., a 10 percent probability of ruin). Exhibit 5 shows that the optimal retirement savings amount required for a healthy male, age 65, is $1,820,400. The table then compares that base case funding level to the initial savings that would be required for an otherwise comparable man under alternative health conditions. Once again, all of these optimal savings amounts are generated using a fixed asset allocation strategy of 40.0 percent stocks, 60.0 percent bonds, and 0.0 percent cash.

Given that all adverse health states are associated with life expectancies that are shorter than that for a healthy individual—even if only slightly so in some cases—all of the health-impaired savings amounts are less than $1,820,400. Clearly, this is due to the fact that the individual will be funding, on average, the $100,000 per year spending requirement for a shorter retirement period. In fact, those health conditions having a minimal impact on life expectancy will see only small reductions in the required savings amounts relative to the healthy individual. The male sample, for example, indicated the following changes: high blood pressure (3.9 percent reduction), high cholesterol (6.6 percent), and cardiovascular disease (7.5 percent). Conversely, for those impaired health states with larger life expectancy impacts for men, the size of the required savings fund is reduced substantially more: tobacco use (21.4 percent reduction), cancer (21.8 percent), and diabetes (33.1 percent).

Exhibit 5 also provides a similar set of comparisons for the retirement savings amounts that would be required of a 65-year old female under a variety of health states. One important general factor to understand in this case is that due to the longer life expectancies that women enjoy relative to men, on average, the initial savings portfolio for a woman in a healthy condition will necessarily be larger than that for a healthy male.
of the same age. Indeed, for this representative female, the amount required to sustain the same real retirement spending goal is $131,000 larger, or $1,951,400. Given this higher base case for a healthy female retiree, however, the relative adjustments required for the alternative health states are similar to those shown in the second and third columns of the exhibit for the male sample. In particular, health states with small influences on life expectancy reduce the savings portfolio levels to a far lesser extent: high blood pressure (3.3 percent reduction), cardiovascular disease (3.9 percent), and high cholesterol (6.1 percent). As before, those health states reducing life expectancies to a greater degree will also see the required level of retirement savings decline by a larger amount: tobacco use (18.7 percent reduction), cancer (25.9 percent), and diabetes (25.7 percent).

HEALTHCARE COSTS: AN OVERVIEW

There is perhaps no issue in American life that generates a higher level of anxiety than rising healthcare costs. Without question, the Medicare and Medicaid programs are the prime cost drivers of another national concern: soaring federal deficits. For their part, American employers worry not only about how government-sponsored health policies will impact their businesses but also about how a cross-section of their workforce may be impacted by the threat of losing their healthcare coverage. Beyond that, nearly everyone who is approaching retirement age is very likely worried about whether they have saved enough to cover their healthcare costs once they stop working.

In the Brightwork Partners survey discussed above, only 12.0 percent of working Americans admitted to having taken future healthcare costs into account in any form when doing their retirement planning. This is in spite of the fact that four out of five Baby Boomer-aged respondents cited uncovered health expenses and the risk of becoming ill as the two primary financial concerns they are likely to face in retirement. Surprisingly, though, more than half of those in the survey also indicated that they knew virtually nothing about the costs associated with participating in the Medicare program.

----

10 In addition to the fact that healthy women, on average, require a larger retirement savings portfolio than do healthy men, it is also generally the case that the percentage reduction in this healthy base case amount of savings is lower for health-impaired women than for health-impaired men. The one notable exception is for the cancer health state, where males actually experience a smaller reduction (21.8 percent) in required savings than do women (25.9 percent).
This strange mixture of anxiety and inaction is further compounded by the lack of knowledge about potential health costs in retirement that most Americans suffer. However, even though health costs remain one of the greatest fears among people near or in retirement, the retirement services industry has made minimal progress toward addressing those concerns.

As a launching point for understanding these costs, it is useful to begin with a very broad overview of some of the cost components of the Medicare program. More importantly, it is worth exploring how these expenses might vary based on the particular health state of the individual. The core feature of Medicare, as set out in the 1965 Medicare Amendment to the Social Security Act that was signed into law by President Lyndon Johnson, is referred to as Part A. This insurance provision covers stays in nursing facilities and hospitals, beginning at age 65. The coverage is free, provided that an individual paid the FICA tax for 40 quarters during his or her working career. (The 2015 premium for Part A is currently $407 per month if an individual never worked or did not pay the FICA tax.)

Medicare Part A covers a hospital stay of 100 days. The first 60 days are fully reimbursed, the next 30 days require a co-payment of $315 per day, with a charge of $630 being levied per “lifetime reserve day” after day 90. The coverage also includes a 100-day stay in a nursing facility, of which the first 20 days are fully covered and the next 80 days requiring a co-payment of $157.50 per day.

Another component of the Medicare program is Part B. Part B is general medical insurance that covers outpatient care such as doctor visits and diagnostic tests. It covers 80 percent of the costs, with the individual bearing the remainder. There is also a $147 per year deductible. Currently, the base premium for Part B is $104.90 for individuals earning $85,000 per year or less. For incomes above that level, there is a premium surcharge. The maximum premium for Part B is $335.70, which applies to individuals having incomes in excess of $214,000 per year.

Part D of Medicare covers prescription drugs. This insurance provision can be obtained by adding a Medicare Prescription Drug Plan or by getting a Medicare Advantage Plan through an HMO or PPO that offers Medicare prescription drug coverage. For individuals earning $85,000 or less, there is no income surcharge. The
maximum premium is the individual’s plan premium plus a $70.80 surcharge for those with incomes in excess of $214,000.

Supplemental (Medigap) policies are sold by private companies to help pay for expenses not covered by Medicare, such as copayments, coinsurance, and other deductibles. An individual must have Part A and Part B of the Medicare program to purchase a Medigap policy. Other expenses such as vision, hearing aid, and dental care are not covered at all by Medigap policies.

To get a sense of the overall healthcare costs for a retiree, Exhibit 6 compiles the costs of Medicare premiums and out-of-pocket costs, such as co-payments and deductibles. In the display, these aggregate costs are also differentiated by health condition. The exhibit is based on a 65-year old female and represents the monthly costs in the first year of retirement for a woman with an income of $85,000 or less (i.e., an income level for which there are no surcharges). Notice that the monthly costs are significant, with totals ranging by health state from approximately $450 (Healthy) to more than $600 (Cancer). Generally speaking, the highest monthly healthcare costs are associated with medical conditions such as diabetes, cancer, and cardiovascular disease due to the higher out-of-pocket expenses those illnesses demand.

Exhibit 7 provides a similar view of the monthly healthcare costs for a 65-year old male with a yearly income at or below $85,000. Interestingly, these expense amounts are slightly smaller than for a female of comparable age and medical condition, with cost differentials in the range of about $9 to $25 per month, depending on health state.

As a final observation regarding healthcare costs in the first year of retirement, Exhibit 8 shows the impact of the maximum income surcharge on the Medicare Part B and Part D premiums. These surcharges, which are based on the experience of a 65-year old woman in various states of health, hit their top tier for annual retirement incomes in excess of $214,000. For these individuals, total costs range from about $700 to $870 per month. It is worth recalling, though, that these are only first-year costs. Healthcare inflation, which historically has outpaced general inflation, could quickly make these expenses a rapidly increasing burden on retirement savings.
SAVING FOR RETIREMENT HEALTHCARE EXPENSES

Given the preceding exploration of the links between an individual’s health condition and the healthcare costs he or she will likely bear, it is useful to extend our earlier analysis to consider the retirement savings portfolio that would be required to fund these costs throughout the remainder of an individual’s life. We can adapt our RPV approach in equation (1) to that purpose by replacing the annual retirement income distributions with the projected annual healthcare costs as the annual future cash flows (i.e., \( \{ CF_t \} \)) in the model, while still including the health-specific life expectancy projections. As before, we are then able to determine the amount of savings (i.e., \( CF_0 \)) at age 65 that would be necessary to fund an individual’s projected healthcare expenses at a 90 percent confidence rate (i.e., probability of ruin). The second column of Exhibit 9 shows this required savings level to be $143,800 for a healthy 65-year old male, and then compares that base case scenario to those required for alternative health conditions.\(^{11}\) All of these respective healthcare savings amounts are based on health expenses reflecting no income surcharges, i.e., for individuals with retirement income levels of less than or equal to $85,000 per year.

Although Exhibit 7 documented that all of the adverse health conditions for a 65-year old man have annual healthcare expenses larger than that for a unimpaired person, it is interesting to note that some of these impaired health states are associated with required savings funds that are actually lower than $143,800. For example, the shorter life expectancies linked to adverse conditions such as cancer (5.8 percent reduction), diabetes (38.6 percent reduction), high cholesterol (9.2 percent reduction), and tobacco use (20.1 percent reduction) more than offset the higher annual costs these diseases require. In other words, while individuals in these health states have higher annual healthcare expenses, they do not have to bear those costs for as long a period of time. On the other hand, health states like cardiovascular disease (2.6 percent increase) and high blood pressure (1.1 percent increase), while having higher annual expenses, do not have as substantial of a mortality offset. Thus, the required savings at the time of retirement to

\(^{11}\) A study by the Employee Benefit Research Institute (2015) estimated the savings required to fund retirement health expenses for an average male (not health-state based) to be $124,000 at a 90 percent confidence level. For an average female, the savings amount was $140,000.
fund the expenses for these conditions end up netting to a slightly higher level than that for a healthy individual.

The final two columns of Exhibit 9 provide a comparable analysis of the required healthcare savings for a 65-year old female across the various health states. The base case savings amount for the healthy individual is $156,300, more than for a comparable male due to both the higher annual healthcare costs for woman as well as her longer life expectancy within each health condition.\(^\text{12}\) Taken together, the results in Exhibit 9 highlight the significant impact that certain health states have on the amount of healthcare expenses that individuals will have to pay during retirement. In particular, the effects from diabetes and tobacco use are especially large, as the shortened life expectancies associated with both of those diseases dramatically reduce the savings levels required to fund the total expenses they generate.

**CONCLUSION**

Planning for retirement requires an understanding of several sources of uncertainty, such as future investment returns as well as the life expectancy of the individual in question. While most retirement planning models incorporate investment return expectations and volatility dynamics into their projections, few use a personalized view of the retiree’s mortality risk and planning horizon.

We demonstrate that a person’s health condition provides an important insight into his or her projected life expectancy. This is particularly relevant for most retirees, given the fact that 80 percent of households nearing retirement (i.e., the 60-to-65 age range) can be considered unhealthy in the sense that one or both members of that living unit face at least one adverse health condition, including diabetes, cancer, high blood pressure, high cholesterol, cardiovascular disease, or tobacco use.

When incorporated into projections of retirement income or into the savings required to fund a specific amount of income, a person’s particular health state can have a large impact on the optimal outcome. For example, we document that a healthy, 65-year

\(^{12}\) As with the health state-dependent retirement expense funding levels discussed above, females generally experience less of a decrease (or even more of an increase) in required healthcare savings levels than do men. Once again, though, the cancer health state is an exception, with the decline relative to the healthy base case being 11.8 percent for females and only 5.8 percent for males.
old male would be required to have a savings portfolio of $1,820,400 at the time of his retirement in order to fund income distributions of $100,000 per year in real income. However, for a man of the same age who is a tobacco user, the amount of this required savings fund would shrink to $1,430,600, or 21.4 percent less than that for his healthy counterpart. Other health states, such as cancer and diabetes, were shown to have even larger impacts.

With respect to funding future healthcare expenses in retirement, we demonstrated the surprising outcome that excellent health can actually raise an individual’s lifetime health spending needs, due to the likelihood that healthy 65-year-olds will live much longer than someone facing an impaired health condition. By contrast, the initially higher healthcare expenses confronting a retiree who is dealing with issues like cancer or diabetes are statistically likely to be offset by his or her earlier mortality.

We also showed that these variations in retirement and healthcare expense funding levels can be dramatic. For instance, we calculated that a healthy 65-year old male will need approximately $144,000 in savings to fund out-of-pocket healthcare expenses in retirement with a 90 percent level of confidence, while a similar male who suffers from diabetes will likely need just over $88,000 to achieve the same goal. Actual individual experience, of course, will vary from these general statistics, making it nearly impossible to predict precisely a specific person’s healthcare costs across what may be decades of retirement. We contend, however, that the impossibility of achieving total precision should be no excuse for inertia; doing nothing to address retiree health cost needs should no longer be a viable alternative.

From an overall retirement planning perspective, integrating personalized time horizons based on health conditions into the analysis could have important consequences in the retirement investment decision-making process. As we have shown, an individual’s life expectancy is closely linked to whether he or she is prepared to retire or how much income he or she can reasonably expect to withdraw from a savings account each year. The tools that we have demonstrated in this study should allow for more informed judgments as well as lead individuals to have more confidence around the retirement decision.
REFERENCES


Employee Benefit Research Institute, 2015, “Amount of Savings Needed for Health Expenses for People Eligible for Medicare: Unlike the Last Few Years, the News is Not Good,” 36, No. 10.


Exhibit 1
Incidence Rates for Health States by Age Group

Source: Empower Institute and Brightwork Partners, 2015 retirement survey
Exhibit 2
Percentage of Healthy Households by Age Group

Source: Empower Institute and Brightwork Partners, 2015 retirement survey
Exhibit 3
Health Conditions with Large Impacts on Life Expectancy: 30-Year Old Male

Source: HealthView Services Inc.
Exhibit 4

Health Conditions with Small Impacts on Life Expectancy: 30-Year Old Male

Source: HealthView Services Inc.
Exhibit 5

Savings Required for 65-Year Old Male and Female to Fund $100,000 per Year in Retirement
(Allocation: \( w_s = 0.4, w_b = 0.6 \); Probability of Ruin: 10 Percent)

<table>
<thead>
<tr>
<th>Health Condition</th>
<th>Required Savings Male</th>
<th>Percent of Healthy Male</th>
<th>Required Savings Female</th>
<th>Percent of Healthy Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>$1,820,400</td>
<td></td>
<td>$1,951,400</td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td>$1,424,100</td>
<td>78.2%</td>
<td>$1,446,300</td>
<td>74.1%</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>$1,683,900</td>
<td>92.5%</td>
<td>$1,874,700</td>
<td>96.1%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>$1,217,700</td>
<td>66.9%</td>
<td>$1,449,200</td>
<td>74.3%</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>$1,749,100</td>
<td>96.1%</td>
<td>$1,887,100</td>
<td>96.7%</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>$1,699,900</td>
<td>93.4%</td>
<td>$1,832,900</td>
<td>93.9%</td>
</tr>
<tr>
<td>Tobacco user</td>
<td>$1,430,600</td>
<td>78.6%</td>
<td>$1,586,400</td>
<td>81.3%</td>
</tr>
</tbody>
</table>

Source: Empower Institute and HealthView Services Inc.
Exhibit 6
Monthly Healthcare Costs for a 65-Year Old Female: Income of $85,000 or Less

Source: HealthView Services, 2015
Exhibit 7
Monthly Healthcare Costs for a 65-Year Old Male: Income of $85,000 or Less

Source: HealthView Services, 2015
Exhibit 8
Monthly Healthcare Costs for a 65-Year Old Female: Income of More Than $214,000

Source: HealthView Services, 2015
## Exhibit 9

**Savings Required for a 65-Year Old Male and Female to Fund Medicare Expenses**

*(Allocation: \( w_s = 0.4, w_b = 0.6; \) Probability of Ruin: 10 Percent)*

<table>
<thead>
<tr>
<th>Health Condition</th>
<th>Required Savings Male</th>
<th>Percent of Healthy Male</th>
<th>Required Savings Female</th>
<th>Percent of Healthy Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>$143,800</td>
<td></td>
<td>$156,300</td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td>$135,400</td>
<td>94.2%</td>
<td>$137,800</td>
<td>88.2%</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>$147,600</td>
<td>102.6%</td>
<td>$169,100</td>
<td>108.2%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>$88,300</td>
<td>61.4%</td>
<td>$111,200</td>
<td>71.1%</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>$145,400</td>
<td>101.1%</td>
<td>$159,400</td>
<td>102.0%</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>$130,500</td>
<td>90.8%</td>
<td>$143,000</td>
<td>91.5%</td>
</tr>
<tr>
<td>Tobacco user</td>
<td>$114,900</td>
<td>79.9%</td>
<td>$130,000</td>
<td>83.2%</td>
</tr>
</tbody>
</table>

Source: HealthView Services Inc. and the Empower Institute