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UNIVERSITY**

COLES COLLEGE OF BUSINESS  
*Bagwell Center for the Study of Markets  
and Economic Opportunity*

# Commentary

**Title:**

*"The Economics of Retirement: A  
Primer (Part 3)"*

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In Part 3 of this three part series on the economics of getting ready for retirement we will examine how to determine the amount of wealth that must be accumulated to retire comfortably, as well as choosing the optimal retirement date.<sup>1</sup> In Part 1 of this series we examined the benefits of saving and investing over a long period of time, and in Part 2 we examined what kinds of investments generate the necessary returns to accomplish the goal of retiring well.

We have saved the most difficult question for the end of this three part series. In one sense the choice of a retirement date is an easy question to answer: in a free country you can retire anytime you want! However, for most of us, that question is conditioned by the desire to maintain a materially decent standard of living while doing so. What makes this question difficult is that there are several variables in play. How much income in retirement do I need in order to live well? How many more years should I work? How long will I live? How much should I be saving and investing? How much do I need in my retirement account before I retire? If I retire early, how will it affect my retirement spending? Can I leave a legacy for my children or favorite charity? All of these questions interact and need to be answered at the same time since the answer to one is the necessary pre-condition to answering another.<sup>2</sup> Let's get started.

The first place to start is to figure out how much income you will need to cover your living expenses. There is no single dollar amount that is correct for all scenarios. If you like working with numbers and spreadsheets you can calculate a retirement budget by specifying all the items that you will need to purchase in retirement such as utilities, food, clothing, travel, transportation, etc. Make sure to include enough for extra medical care as you age. Few of us, however, enjoy budgeting. Luckily there is an easier (but less precise) way. Since most people want to maintain the lifestyle that they currently have, it is easier for most of us to think of retirement spending as a percentage of working years spending. As a rule-of-thumb, Investopedia recommends that you plan to replace 80% of your working income with retirement income.<sup>3</sup> For instance, if you make \$100,000 per year now, plan to have a retirement income of \$80,000. If you earn \$50,000 you need \$40,000, and if you earn \$150,000 you need \$120,000 in retirement to maintain your lifestyle.<sup>4</sup>

Now that you have a target amount for annual income in retirement, you can calculate how much you have to have accumulated by retirement to fund that retirement. This is where the problem becomes especially difficult due to the interaction of four variables: (1) how long will you live? (2) how early will you retire? (3) what rate of return will your investments be earning? (4) what level of risk are you willing to accept that you might outlive your assets? We will examine each factor separately below and then offer a solution that will work for most people.

As we discussed in Part 1 of this series, our goal is to save and invest during our working years to build our nest egg of assets, and then spend down those assets during our retirement years. In figure 1 below we examine the impact of life expectancy on two variables: (1) the permissible

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<sup>1</sup> This series of articles are for educational purposes only and do not serve as a solicitation for making any investment. For advice on particular investment vehicles please see a Registered Investment Advisor or a Certified Financial Planner.

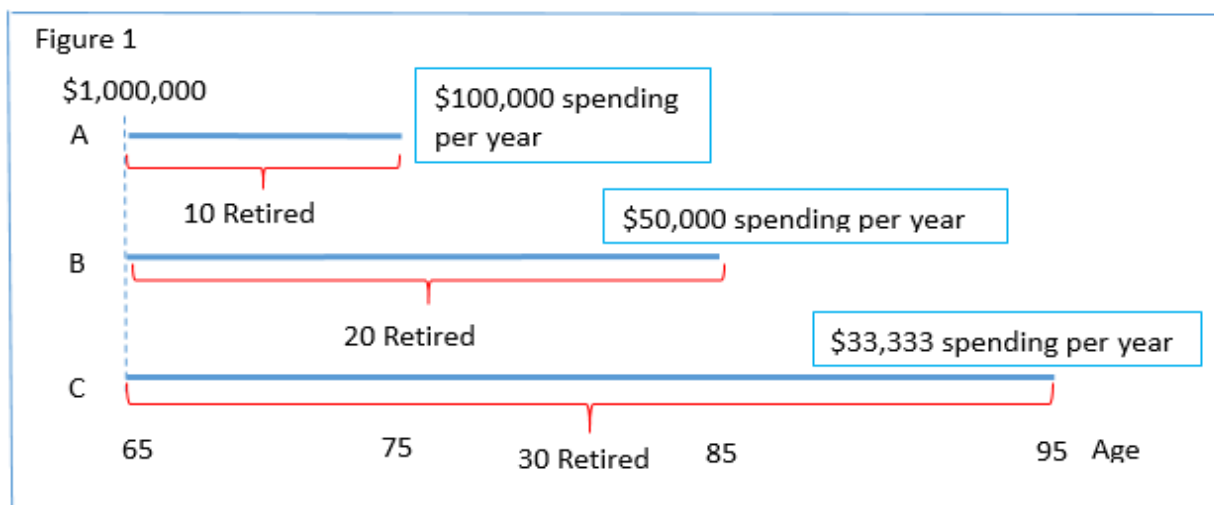
<sup>2</sup> In answering these questions we will make several simplifying assumptions that will cover a broad number of people, but may not closely fit your individual situation. These suggestions will get you started, but you should consult a Certified Financial Planner or other financial advisor to get advice tailored to your specific needs.

<sup>3</sup> Experts recommend that you plan to replace between 55% and 100% of your working income depending on lifestyle choices and income levels. For more details on what percentage best fits your situation see: <https://www.investopedia.com/retirement/how-much-you-should-have-saved-age/>.

<sup>4</sup> To calculate the retirement income number, multiply your working income by .80 to get needed retirement income. For example, \$50,000 x .80 = \$40,000.

spending rate and (2) the length of time your assets will last. To simplify the math we assume no investment income in retirement (we will add in investment income later). The saved nest egg is assumed to be \$1,000,000 and is spent at a certain rate consistently over time until the money is exhausted.

As we can see in Figure 1 below, if you plan to retire at 65, live 10 years and reach 75 years of age, you can spend \$100,000 per year out of \$1,000,000 saved. For most of us this will provide a comfortable retirement. But, if you live 30 years and reach 95 years of age, the same \$1,000,000 retirement nest egg can only provide \$33,333 per year in retirement.<sup>5</sup> Not quite as comfortable. In order to spend the same \$100,000 per year, and do so until 95 years of age, will require \$3,000,000 saved, not \$1,000,000.



Another way to think about this issue is to consider what happens if all three “retirees” in our example choose to spend, for example, \$75,000 per year. Retiree “A” dies with \$250,000 left in her account to leave to her heirs. Retiree “B” runs out of money in year 13 and lives off of relatives for the remaining 7 years of life. Retiree “C” also runs out of money in year 13, but has 17 years of destitution to face. Knowing how long you expect to live will have a huge impact on how much must be saved by your retirement date and how much you can safely spend.

As I am sure you are aware, longevity is increasing rapidly. The Centers for Disease Control and Prevention estimates that if you are 65 years old you can expect to live 19.4 years more years, reaching 84.4 years of age on average.<sup>6</sup> This does not mean that a 20 year planning horizon is a safe bet, however. The CDC’s life span is true on average, but many people live either shorter or longer lives than average. Living a shorter life than average adds no risk to running out of retirement funds, but living longer than average does. The Society of Actuaries shows that a 65 year old man retiring today has a 14% chance of living to 95 and a woman has a 23% chance. This means that even a 30 year planning horizon, while conservative, is not 100% guaranteed to cover your life span.<sup>7</sup>

<sup>5</sup> To calculate the permissible spending rate, divide assets at retirement (the nest egg) by years of life expectancy. For example,  $\$1,000,000 / 10 \text{ years} = \$100,000$ , and  $\$1,000,000 / 30 \text{ years} = \$33,333$ .

<sup>6</sup> National Vital Statistics Report, Volume 68, Number 7, pages 10-11 ([https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68\\_07-508.pdf](https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_07-508.pdf)).

<sup>7</sup> Actuaries Longevity Illustrator: <http://www.longevityillustrator.org/>.

Since it is literally impossible to know when each of us will die, it becomes very difficult to plan a retirement spending level that is guaranteed to be sustainable to our natural end. We will discuss several strategies that can alleviate the fear of outliving our financial resources. The first method is a do-it-yourself approach where you keep full control over your investment funds. We will also assume that the investment funds earn no rate of return to make the math simple and intuitive. Then we will work out the problem assuming you are investing your funds at some positive rate of return.

We can use the math that generated Table 1 to give us a first approximation on how much we can spend in retirement or how much we need to save before retirement to hit a certain spending goal. We will take a relatively conservative approach and assume a 30 year lifespan in retirement if we retire at 65 (if you retire earlier you can just add the number of early retirement years to 30).<sup>8</sup> Use the following formulas to calculate:

- 1) What I need to Save = (Desired Spending per Year) x (Years of Life Remaining)
- 2) What Can I Spend Sustainably = (\$ of Savings at Retirement) / (Years of Life Remaining)

In formula #1 we assume we know what we want to spend in retirement, and then calculate how much we need to have saved before we retire. For example, assume you want to spend \$60,000 per year in retirement for 30 years. You need to have saved \$60,000 x 30 years = \$1,800,000. A considerable sum, but certainly not impossible given the investment strategies discussed in our previous articles. In formula #2 we assume that we know how much we have saved and then calculate how much of it we can sustainably spend per year for our chosen number of years (assumed to be 30). For example, assume you have accumulated \$1,400,000 in savings. How much can you spend every year for 30 years? In this case divide your savings by the number of years in retirement. This would be \$1,400,000 / 30 = \$46,667 per year of spending for 30 years.<sup>9</sup>

The approach used above is quite conservative since it assumes no investment income (i.e., a 0% rate of return). The good news is that you should be able to have a higher standard of living given a certain sized investment portfolio at retirement if the balance of that money is growing, even as you are spending part of it each year. The calculation of this formula is beyond the scope of this article, but luckily, most banks and investment companies provide free annuity calculators for this calculation on their websites. An annuity is the amount that can be withdrawn, either monthly or annually, from a known original investment, growing at an assumed interest rate, for a fixed amount of time. You can build your own annuity or purchase a “pre-packaged” one from an investment company.

Using the data from the example for formula #2 above, but now assuming a 5% rate of return on our investments, we could spend \$89,812 per year from our \$1,400,000 nest egg for 30 years before we exhausted the money. This is a huge increase over the \$46,667 spending rate that our formula assumed with a 0% investment return.<sup>10</sup> This is one more example of the power of compound interest.

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<sup>8</sup> Very few people live past 95, but it is not impossible. In the following strategy we will deal with the problem of extra-long life.

<sup>9</sup> You can adjust the formulas to fit your own situation by changing the spending amount, the savings amount or the years of life in retirement, or all three. Try several scenarios to see the results.

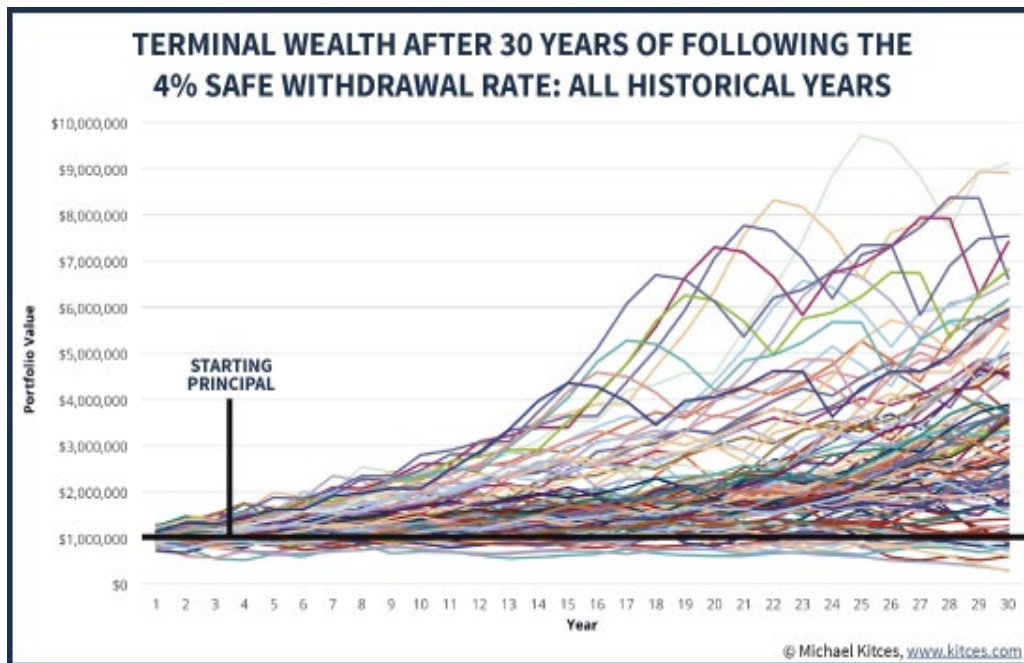
<sup>10</sup> See the annuity calculator provided by Charles Schwab at the following address: <https://www.schwab.com/annuities/fixed-income-annuity-calculator>. You can also use the calculators provided by other firms. This calculator was chosen for your convenience. No endorsement of Charles Schwab is implied.

This do-it-yourself approach leaves you in full control of your assets, but it forces you to make assumptions about the rate of return that is earned on the investment and forces you to choose the number of years until death. For many of us this only compounds the worry we feel about our financial state in retirement!

Another approach, pioneered by William Bengen, was to use historical data to search for the highest withdrawal rate that is possible from an investment portfolio and still leave a positive amount in your account after 30 years of spending. Instead of trying to guess how well your stock and bond portfolio will do over the next 30 years he researched what would have happened historically to the amount remaining in your account if you started with \$1,000,000 at retirement and then withdrew a certain percentage each year. He tested several different withdrawal rates against every possible 30 year period from before the Great Depression to the 1990's. What he came up with has come to be known as the "4% Rule."

This rule states that if you calculate 4% of your initial retirement investment amount, you can safely spend that amount (plus an increase for inflation) through thick and thin for the next 30 years. For example, according to the rule, if you have \$1,400,000 at retirement you can safely spend  $(\$1,400,000 \times .04, \text{ or } 4\%) = \$56,000$  per year. This is true whether you retired in 1930 before the start of the Great Depression when stocks fell a cumulative 89% or in the year 2000 when the "tech-bubble" burst and the Nasdaq lost 78% of its value.

In every possible 30 year period the market has recovered enough that even with these kinds of setbacks an investor has been able to spend that original calculated amount and not run out of money in 30 years. In the graph below Michael Kitces has updated Bengen's original work by extending the start dates both back in time and also brought up to current times.<sup>11</sup>



As you can see, this 4% rule has never resulted in a \$0 balance, and in two-thirds of the cases it has left the retiree with more than double his initial investment (sometimes a great deal more)! While many investment advisors are calling this 4% rate into question as we go forward

<sup>11</sup> <https://www.kitces.com/blog/how-has-the-4-rule-held-up-since-the-tech-bubble-and-the-2008-financial-crisis/>.

in our currently low interest rate environment, it has held up well historically.<sup>12</sup> This rule generated a conservative spend rate of \$56,000 per year while our “do-it-yourself” investor picked an \$89,812 spend rate from the same size original investment amount because she assumed a 5% rate of return on her portfolio. While that 5% investment return is quite reasonable given the long-run average return of investment portfolios, depending on the luck-of-the-draw, she might have retired when we are entering a significant “bear market” where stocks drop precipitously for some time. At a spend rate of \$89,812 she could run out of money before the market comes back, but during most 30 year periods she would have been fine. The much more conservative 4% rule is designed to prevent the possibility of running out of funds too early, but at the cost of a much less luxurious retirement.

Lastly, we will discuss the most conservative approach to retirement planning by examining the pros and cons of purchasing pre-packaged annuities from an investment company. You can eliminate all of the guess work about rates of return and years of life by choosing a Life Annuity from a reputable company. When you buy an annuity the investment company (often a life insurance company) takes the “nest-egg” you have saved for retirement and in return promises to pay a certain sum to you until you die, no matter how long you live (you can even buy an annuity that covers your spouse’s life as well). If you die early they keep the balance.

This shifts the investment risk and the length of life risk to the annuity company. The length of life risk is actually the easiest for the company to handle. As we discussed earlier, any individual’s lifespan is impossible to determine perfectly, but the average lifespan of a large group of people can be predicted with great accuracy. The company makes the payments to those who live unexpectedly long lives with the money not paid to those who die soon after they purchased their annuity.<sup>13</sup> By this method the investment company eliminates the possibility that you will outlive your money, which the previously examined methods suffer from.

With an annuity, the investment company also takes on the investment risk that is inherent in the previously discussed methods. Remember, even if you predict your lifespan in retirement perfectly you still have the problem that you might start your retirement at the beginning of a huge bear market that does not give you the anticipated long-run average rate of return. Then your previously chosen spend rate could exhaust your funds too early. Since the investment company has promised to pay you a set sum every month, they have to come up with any short fall in funds, not you. Now your only risk is choosing the right investment company and avoiding one that could go bankrupt because of poor investment decisions. Choose your annuities from conservatively run, well respected companies. These companies are rated on their financial strength, so ask your annuity provider for an independent rating of their quality.

I am sure you know the saying: “If something sounds too good to be true, it usually is.” All of this security comes at a price. The payout from an annuity has traditionally been low compared to the potential payouts realizable from the previous methods we have analyzed. But, you do get to sleep well at night with the annuity. The other methods are not guaranteed. Your financial advisor should be able to get multiple quotes from several respected companies and then help you to compare them to what you could achieve on your own. Then you have to make the personal decision about the tradeoff between risk and return.

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<sup>12</sup> <https://www.fool.com/investing/2020/09/27/retirement-investors-time-to-stop-using-the-4-rule/>.

<sup>13</sup> Since many people recoil at the idea of losing all of their investment if they die early, investment companies offer policies where heirs get some percentage of the original investment amount returned to them. Of course, this is not free. See an investment advisor to discuss the details.

## **Conclusion**

Saving and investing for retirement, and then choosing the withdrawal rate from your savings in retirement, can be so daunting that many of us do nothing. Hopefully, the three articles in this series have given you the confidence to get started. It is better to start when young, but it is always a good idea to save and invest at any age. In this third installment in the series we have tried to demystify the decisions you need to make to have a comfortable and secure retirement. While the underlying principles involved are timeless and generally applicable, every individual situation is somewhat unique. There are many complex financial decisions, many with tax implications that we did not have time to address, that must be dealt with. The constant prodding to “see your investment advisor” should be seen as an invitation to develop a relationship with a good advisor who can help you work through the many decisions that you will have to make. The good news is that you should now be motivated to act and are equipped to ask the right questions and understand your advisor’s recommendations.