KENNESAW STATE UNIVERSITY
COLES COLLEGE OF BUSINESS
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Commentary

Title:

"The Economics of Retirement: A Primer (Part 1)"

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Saving and investing for retirement is a daunting prospect. How much do I need to retire comfortably? What should I invest in? When can I retire? What if I live longer than I planned? These are just a few of the questions that keep many awake at night as they contemplate the future that is rushing to meet them. In this three part series we will help you think through these issues, and others, as you plan for retirement.[1] We will not be able to cover the subject exhaustively, but will be able to get you thinking seriously about the issues. Once you see what is involved in getting financially ready for retirement, we recommend that you consult with a financial professional versed in this subject.

In Part 1 of this three part series, we make the case for saving and investing over a long time period to accumulate significant assets. In Part 2 we will examine what kinds of investments will generate the necessary returns to accomplish the goal of retiring well. In particular, we will examine stocks and bonds as the best alternative for most people. In Part 3 we will examine ways to determine how much income you need in retirement and, therefore, how much you need to accumulate by your retirement date. We will discuss strategies for choosing that retirement date and the different amounts of assets necessary to make your chosen date a reality.

Why you need to Save and Invest

Many people, young and old, are concerned that when they retire they won't have enough income and wealth to live comfortably until they and their spouse reach the end of life. Many have heard that Social Security is going bankrupt and that there will not be anything in the system left to finance their retirement.[2] The *good* news is that Social Security will not go bankrupt in the traditional sense, due to the fact that its income stream comes from ongoing payroll taxes. As long as there are people working, Social Security collects money that it can then pay out to retirees. The *bad* news is that with a rapidly aging population that is living much longer, the number of workers per retired person is falling. So, Social Security is collecting less than it pays out, and this cannot go on indefinitely without major modifications to the system. We don't know what compromises (e.g., decreased benefits for retirees, an older retirement age, etc.) will be made to restore long-term solvency to Social Security, but it would be wise to plan for some kind of cut or delay in expected future payments. In this article we examine what you can do privately to protect your economic future in retirement, whatever changes are made to the Social Security System.

Every adult should have a plan to accumulate assets during their working life that they can then liquidate, or turn into cash, to pay their bills in retirement. In Figure 1 below we have a stylized representation of this process for the "typical" person. While many find it morbid to consider their own death, it is crucial to face certain facts. You only have so many years to live. You don't want to spend your "golden years" working to pay your bills, so that means you have a limited number of years to work and accumulate assets by saving and investing. The following scenario will help us to visualize the issue plainly. Let's assume you start your career at 25 years of age, work until you are 65, retire, and then die at 75. This scenario gives us 40 working years to accumulate assets which will then be liquidated and spent over the 10 years of retirement. Assume that you save an average of $10,000 per year for those 40 years with the money earning

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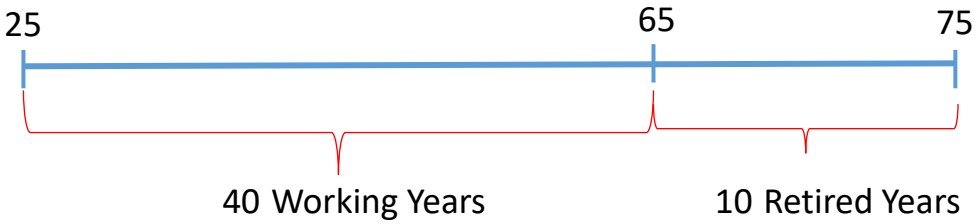
[1] This series of articles are for educational purposes only, and do not serve as a solicitation for making any investment. For advice on particular investment vehicles please see a Registered Investment Advisor or a Certified Financial Planner.

[2] *https://www.cnbc.com/2020/12/01/why-social-security-may-run-out-of-cash-really-soon.html*.

no interest or profit.[3] You will have accumulated assets worth $400,000 which would then permit you to spend $40,000 per year in retirement before you exhaust your net worth. This amount will not permit a luxury lifestyle, but if your car and home are paid off (and you get something from Social Security) you could get by.

Figure 1



However, if you saved less, or lived longer, your resulting nest egg will not provide you with a comfortable lifestyle in retirement. Consider two simple variations: (i) you only save $5,000 per year or (ii) you live to 85 years of age. In either alternative taken separately, you would have to cut your spending to $20,000 per year to stay on budget. Under both changes together, you would have to cut back your retirement spending to $10,000 per year.[4] Obviously, you would now face the poverty in old age that many people fear.

With many people living to 85 and beyond, even saving $10,000 per year (or $833 per month), consistently for 40 years (assuming the money earns no interest) will not keep you out of poverty. Yet for most of us, saving that amount sounds daunting, especially when we are young. This is where investing your savings at interest over a long period of time comes to your rescue. Due to the "miracle" of compound interest, even a small sum invested annually over a significant time-period will grow to a much larger sum than just the principal amount saved.[5] In Figures 2 and 3 we calculate the accumulated nest eggs possible under various rates of return and time-periods for saving.

The Benefits of Investing at Interest

In Figure 2 below we assume that you save and invest only $5,000 annually ($417 per month) for 40 years. This money is invested at 4 different possible rates; 0%, 2%, 5%, and 7%. The end results show a staggering difference in the amounts accumulated, from a low of $200,000 at a 0% rate to a high of $1,094,547 if invested at 7%.[6] From this chart we can immediately grasp

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[3] This simplifying assumption makes the math in this problem easy to understand. Later in this article we modify the example to introduce growth at compound rates of return.

[4] $5,000 per year saved x 40 years = $200,000 accumulated. This amount divided by 10 years = $20,000 per year. Alternatively, $10,000 per year saved x 40 years = $400,000 accumulated. This amount divided by 20 years of retirement = $20,000 per year. Lastly, only $200,000 accumulated divided by 20 years in retirement = $10,000 per year.

[5] If an investor invests the interest/profit from an investment back into new investments instead of spending the gains, he or she will earn a profit on previous profits. This leads to compound, or exponential, growth. In Figure 2 we see the resulting accumulations from reinvesting investment earnings with compound growth under three different positive interest rates (2%, 5%, and 7%), compared to the no growth (0%) case considered thus far. The computations for exponential growth are beyond the scope of this article.

[6] Author's calculations. I have provided a table at the end of this article with numerical results computed for each of the specified interest rates and for every 5 year time period up to 40 years.

two important points about saving for retirement: start saving early and invest with interest. Even without investment returns a saver will still end up with $200,000 at retirement if they invest only $5,000 per year and start while they are young. While not a fortune, it is certainly better than having no savings at all! However, the second point is the dominant one: investing with a significant rate of return allows for a significant accumulation of real wealth. As you can see, if two individuals save the same $5,000 amount annually for 40 years, the one who invested wisely becomes a millionaire while his friend who saved but did not invest ends up in financial straits.

Figure 2 $5,000 Invested Annually at Various Rates

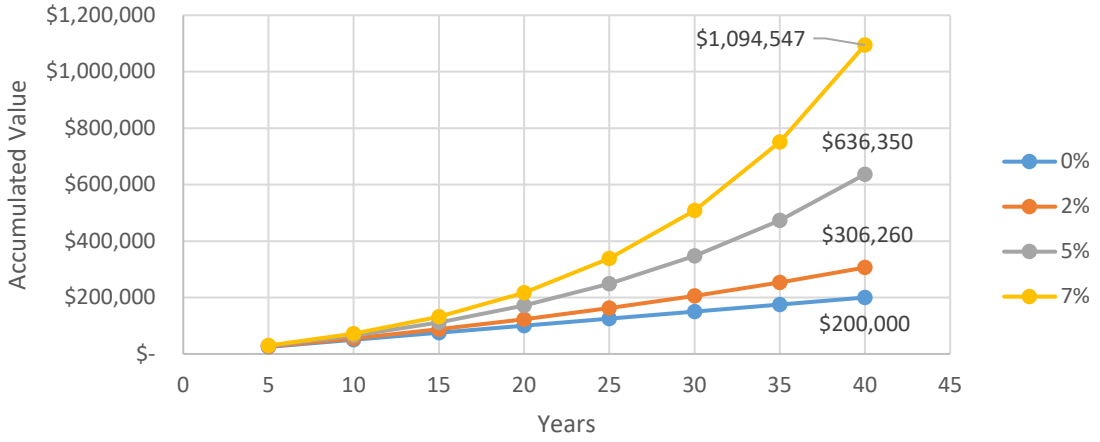
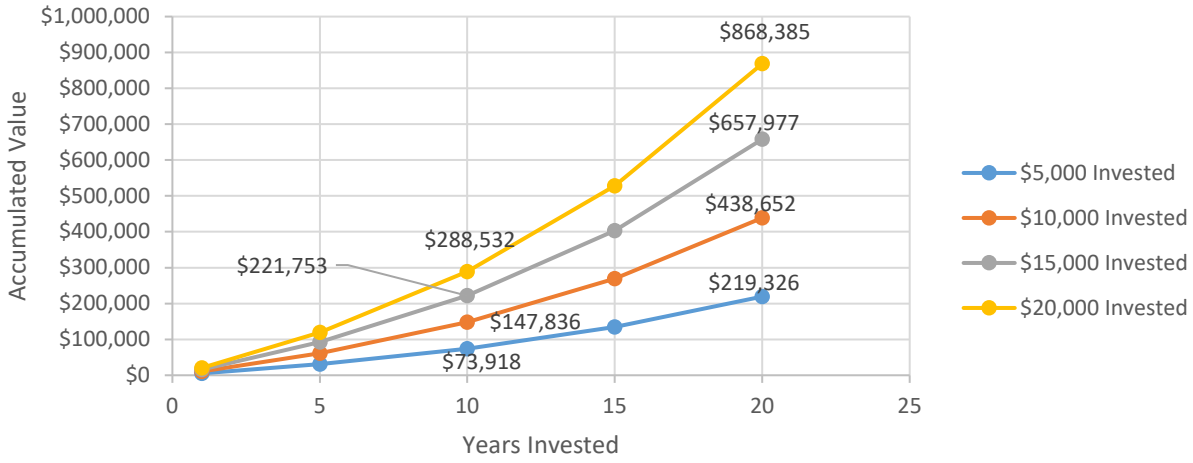


Figure 3 Various Amounts Invested Annually at 7%



For many of us, given our age, this advice to start saving while in our twenties is moot. However, all is not lost! Let's consider investing over shorter time horizons and with different investment amounts. In Figure 3 above we assume that all savers are investing at a 7% rate of return, but are investing either $5,000, $10,000, $15,000, or $20,000 annually for 5, 10, 15, or 20

years.[7] As you can see when comparing the four lines in Figure 3 with the yellow line in Figure 2, the shorter time for compound interest to work leads to a less dramatic increase in value. While only $5,000 invested annually for 40 years at 7% was sufficient to surpass the million dollar mark, even $20,000 invested (a *four-fold* increase in the amount invested per year) at the same 7% rate for 20 years (*half* the time) will not!

However, we still get substantial savings accumulated if we increase our savings rate from the $5,000 level. If you start out when you are young you can get by with a low investment amount and still reach a significantly large nest egg, but if you wait until middle age or later, you really need to ramp up the savings and investing to reach a comfortable retirement nest egg. For most of us our income rises as we reach middle age, making this increased saving and investing possible. But, the earlier you start, the better off you will be. When should you start investing? Today would be a good day to start!

In Part 2 we will take on the task of making the investment decisions necessary to accomplish our goal.

[7] The author has provided a data table for the years in question at the end of this article. All calculations in the graphs and tables are the author's.

Appendix:

$5,000 Invested Annually for Various Years at Various Interest Rates

Years	0%	2%	5%	7%
5	$ 25,000	$ 26,291	$ 28,359	$ 29,854
10	$ 50,000	$ 55,344	$ 64,753	$ 72,176
15	$ 75,000	$ 87,450	$ 111,459	$ 132,173
20	$ 100,000	$ 122,930	$ 171,401	$ 217,226
25	$ 125,000	$ 163,138	$ 248,328	$ 337,800
30	$ 150,000	$ 205,466	$ 347,052	$ 508,728
35	$ 175,000	$ 253,347	$ 473,751	$ 751,040
40	$ 200,000	$ 306,260	$ 636,350	$ 1,094,547

Various Amounts Invested Annually for Various Years at 7%

Years	$5,000	$10,000	$15,000	$20,000	$30,000	$50,000
1	$ 5,350	$ 10,700	$ 16,050	$ 20,658	$ 32,100	$ 53,500
5	$ 30,766	$ 61,533	$ 92,299	$ 119,345	$ 184,599	$ 307,665
10	$ 73,918	$ 147,836	$ 221,753	$ 288,532	$ 443,508	$ 739,180
15	$ 134,440	$ 268,881	$ 403,320	$ 528,376	$ 806,642	$ 1,344,403
20	$ 219,326	$ 438,652	$ 657,977	$ 868,385	$ 1,315,955	$ 2,193,259