Retirement Risks

By Wade Pfau, Ph.D, CFA

Building a retirement income strategy requires careful risk management. This collection investigates key retirement risks related to market volatility (with a list of the biggest stock and bond market drops around the world), the life-time impact of sequence of returns risk , arguments about whether stocks are less risky or more risky in the long run, and the dangers of investing for income.

Introduction

I'm Wade Pfau, the Retirement Researcher. I'm the Professor of Retirement Income at The American College, which educates financial planners. I'm also the Director of Retirement Research for McLean Asset Management and inStream.

I earned a Ph.D. in economics from Princeton University in 2003 with a dissertation about Social Security reform, and I became a CFA charterholder in 2011.

People are living longer. Corporate pensions from shifting away from traditional defined-benefit frameworks (where employers bear the responsibility to fund pension promises) to defined-contribution frameworks (where workers need to figure out their own retirement planning strategy).

Folks are now increasingly responsible to figure out how much to save while working and how to convert their savings into sustainable income for the rest of their lives. Making the right decisions is an exceedingly complicated task. But the job is not insurmountable.

The purpose of RetirementResearcher.com is to provide you with useful information to help guide you along the path toward a successful and sustainable retirement.

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Table of Contents

Risks in Retirement

Monday, June 11, 2012

I'm back home from Chicago, where I attended an interesting forum on retirement income. One point I heard which helped clarify what I was already thinking is that when talking about retirement, it is important to consider:

—Retirement goals

—Risks that might prevent meeting those goals

—Retirement income building blocks and how they may be combined in a personalized way to best meet one's goals and protect against the risks

The interesting detail I heard added to this list is that prospective retirees want to consider all of the retirement risks in one sitting. Get the pain out of the way. Sounds reasonable. I'd like to start exploring this here.

My main source for this discussion is the list of 15 risks created by the Society of Actuaries in their publication, [Managing Post-Retirement Risks: A Guide to Retirement Planning](http://www.soa.org/files/research/projects/post-retirement-charts.pdf). That publication provides a lot more detail. I'm just looking to provide an overview. I'm also going to list these in a different order from their publication in order to try to group the risks into two broad categories.

MACROECONOMIC / POLITICAL / SOCIETAL RISKS

1. Sequence-of-returns risk: Financial market returns near the retirement date matter a great deal. Even with the same average returns over a long period of time, retiring at the start of a bear market is very dangerous because your wealth can be depleted quite rapidly and little may be left to benefit from any subsequent market recovery.

2. Inflation risk: retirees face the risk that inflation will erode the purchasing power of their savings as they progress through retirement. Even with just 3% average annual inflation, the purchasing power of a dollar will fall by more than half after 25 years.

3. Interest rate risk: Decreasing interest rates may provide capital gains for a bond portfolio, but they also lead to lower annuity payout rates and lower interest payments on reinvested funds. Increasing interest rates, on the other hand, may result in capital losses for a bond portfolio, though annuity payout rates and interest on reinvestments will grow.The risk here is if the duration of one's assets does not match the duration of their liabilities.

4. Credit Risk/Business Risk: Fears here include defaults by bond issuers, an insolvent annuity provider, a corporate pension plan which reneges on its promises, and the danger of holding one's employer's stocks in a 401(k).

5. Public Policy Risk: The government could change the rules. Possibilities include increased taxes, reduced benefits from Social Security or Medicare and Medicaid, increased contributions to Medicare, changing rules about IRAs, and so on.

PERSONALIZED IDIOSYNCRATIC RISKS

1. Longevity Risk: You don't know how long you will live and while it is great to live longer, it is also more costly and a bigger drain on your resources.

2. Employment Risk: There is a risk of losing one's job involuntarily before the planned retirement date, or being unable to maintain desired part-time employment in retirement.

3. Loss of Ability to Live Independently: This one is self explanatory.

4. Change in Housing Needs: Retirees may need housing with greater accessibility or with ease of access by some caregivers.

5. Death of a spouse: This is a tough one, especially if the deceased spouse handled most of the family finances or had pensions/annuities which do not continue to the survivor. Two items worth reading about this include Jennie Phipps' ["When Tragedy Strikes"](http://www.bankrate.com/financing/retirement/when-tragedy-strikes/) and Bob Seawright's["Typically Boyish and Socially Unacceptable."](http://rpseawright.wordpress.com/2012/03/28/typically-boyish-and-socially-unacceptable/)

6. Other Change in Marital Status: A divorce can completely change the picture for retirement income strategies.

7. Unexpected Health Care Needs and Costs: Health care prices tend to grow faster than consumer inflation, and it is hard to know how to plan for distant health care costs.

8. Lack of Available Facilities or Caregivers: Providers may not be available in the local area, couples may need to be split when one spouse requires greater care, and a subpar caregiver may be chosen.

9. Unforeseen Needs of Family Members: Retirees may find unexpected demands to help other family members, including parents, children, and grandchildren.

10. Bad Advice, Fraud, or Theft: As cognitive abilities decline with continued aging, retirees are increasingly at risk of becoming victims of fraud, even from family members.

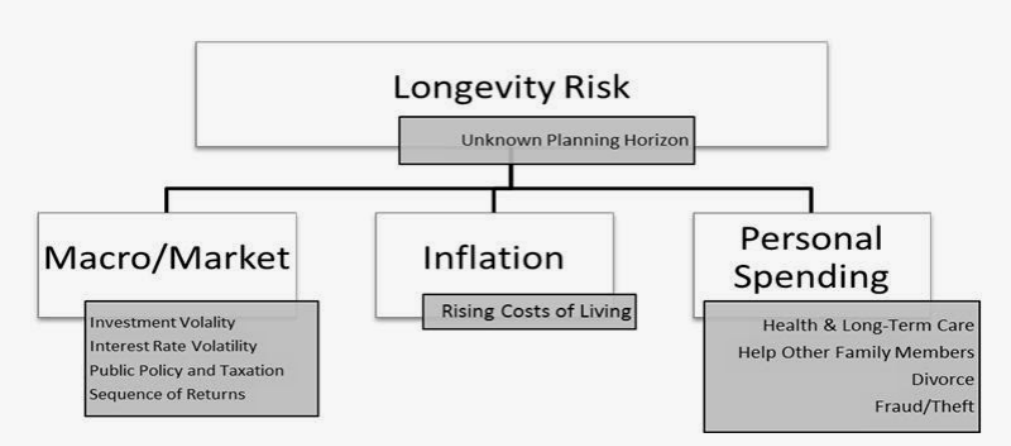
One more which doesn't appear to be on the Society of Actuaries' list is the risk that a retiree makes a plan and then fails to stick to it by overspending.

Kind of depressing, but that is a basic list of risks. Can you think of anything else? Any tips on how to prepare for these risks, especially the one's not really related to a retirement income strategy?

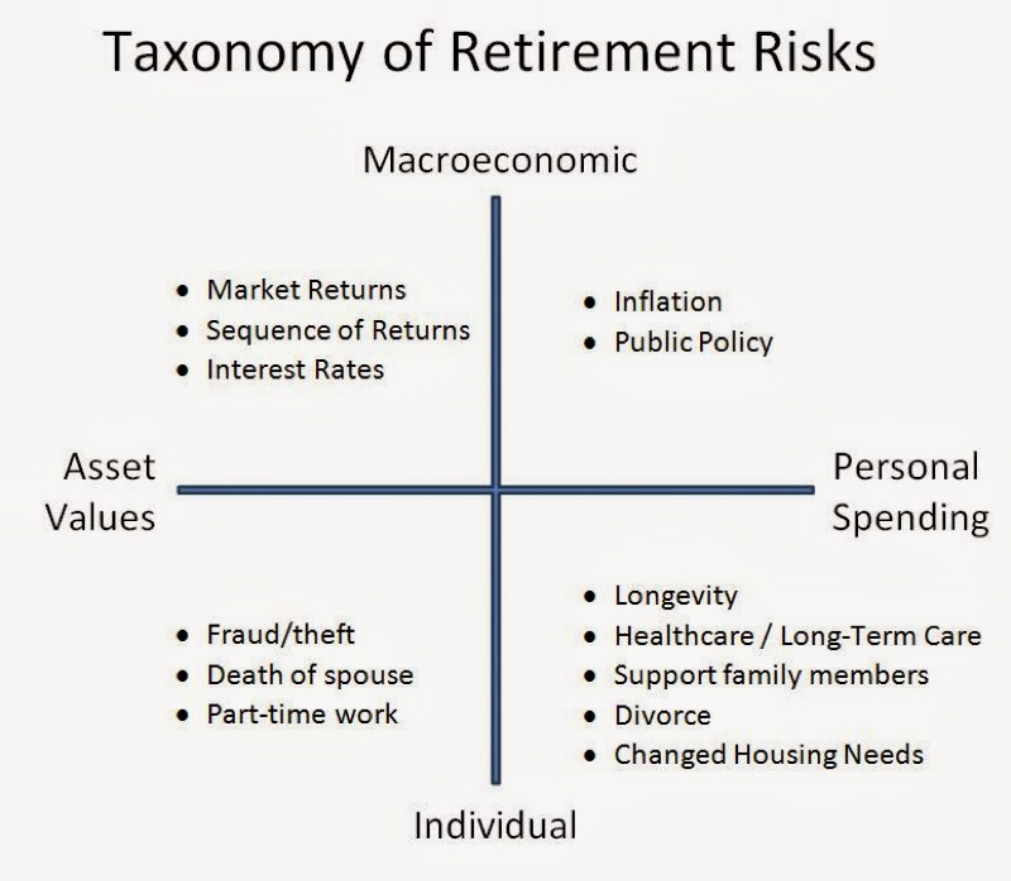
Retirement Risks

Monday, March 24, 2014

This week I've made two posts about different ways to think about risks in retirement. The first post ([“Retirement Risks: It all starts with Longevity”](http://www.forbes.com/sites/wadepfau/2014/03/18/retirement-risks-it-all-starts-with-longevity/)) is at_Forbes_ and treats longevity risk as the overarching risk facing retirees, since the longer retirement lasts, the more exposed retirees are to other risks. The other main categories I described there are related to macro/market risks, inflation risk, and personal spending.



The second post (["Breaking down retirement risks"](http://www.marketwatch.com/story/breaking-down-retirement-risks-2014-03-24)) is at RetireMentors. In this post I distinguish risks with regard to whether they are risks to the asset (wealth) or liability (spending needs) side of the household balance sheet, and whether they are macroeconomic (impacting everyone simultaneously) or individual specific. The second post (["Breaking down retirement risks"](http://www.marketwatch.com/story/breaking-down-retirement-risks-2014-03-24)) is at RetireMentors. In this post I distinguish risks with regard to whether they are risks to the asset (wealth) or liability (spending needs) side of the household balance sheet, and whether they are macroeconomic (impacting everyone simultaneously) or individual specific.



Greatest Hits

Monday, June 11, 2012

This short post provides an updated and revised version of a March 2012 post I wrote about how low the stock market can go.

We must remember that the stock market is risky and can experience extended downturns for long periods of time. To get a sense of this, I've tallied up all the cases of stock market drops greater than 50% in inflation-adjusted terms for the 20 countries included in the Dimson, Marsh, Staunton Global Returns Dataset. The final entry in the table is for a GDP-weighted "world" portfolio diversified across these 20 countries. These calculations are based on annual data, and the drawdowns from peak to trough may be even bigger with monthly data, had that data been available. The data provides total market returns, which includes reinvested dividends. Though World War I and II account for some of these significant market drops, there are still plenty of other examples from more peaceful times.

The table shows the country name, years (beginning of the first listed year to end of the second listed year), and the percentage drop in real terms for the stock market over that period. I also provide the year that the real stock market value would again exceed the level prior to the market drop, as well as the number of years it took for this to happen.

The Greatest Hits:
Real Stock Market Losses Larger than 50%

Country	Time Period	Market Drawdown	Year Market Returned to Pre-Drawdown Level	Wait Time (Years)
Australia	1970-74	-66%	1985	(15)
Austria	1914-25	-96%	2003	(89)
	1947-50	-87%	1960	(13)
	1962-68	-61%	1989	(27)
	2007-08	-61%	Still Waiting	
Belgium	1914-18	-80%	1927	(13)
	1929-34	-69%	1972	(43)
	2007-08	-52%	Still Waiting	
Canada	1929-32	-55%	1935	(6)
Finland	1917-21	-85%	1935	(18)
	1943-48	-73%	1959	(16)
	1974-77	-62%	1983	(9)
	1989-91	-60%	1996	(7)
	2000-02	-61%	Still Waiting	
	2008	-53%	Still Waiting	
France	1943-50	-87%	1985	(42)
Germany	1914-31	-84%	1958	(44)
	1948	-91%	1955	(7)
	2000-02	-58%	2007	(7)
Ireland	1973-74	-63%	1985	(12)
	2007-08	-75%	Still Waiting	
Italy	1913-21	-68%	1924	(11)
	1944-45	-85%	1959	(15)
	1974-77	-74%	1985	(11)
Japan	1943-47	-98%	1969	(26)
	1990-02	-71%	Still Waiting	
Netherlands	2000-02	-53%	Still Waiting	
New Zealand	1987-90	-73%	2003	(16)
Norway	1917-21	-74%	1935	(18)
	1974-78	-73%	1985	(11)
	2008	-54%	Still Waiting	
South Africa	1919	52%	1923	(4)
Spain	1936-50	-55%	1955	(19)
	1974-82	-84%	1996	(22)
Sweden	1917-20	-68%	1936	(19)
	2000-02	-54%	2006	(6)
Switzerland	1915-20	-73%	1927	(12)
	1973-74	-56%	1985	(12)
United Kingdom	1973-74	-71%	1983	(10)
United States	1929-31	-60%	1936	(7)
	1972-73	-52%	1983	(11)
GDP-Weighted World Portfolio in US Dollars	1913-20	-51%	1924	(11)
	1928-31	-50%	1935	(7)

Source: Own calculations from Dimson, Marsh, and Staunton Global Returns Dataset (1900-2012). Of the 20 countries in the dataset, only Denmark avoided having an entry in the above table.

Greatest Hits Part 2: The Bond Market

Monday, January 13, 2014

My previous post tallied up all the cases of stock market drops greater than 50% in inflation-adjusted terms for the 20 countries included in the Dimson, Marsh, Staunton Global Returns Dataset.

Since then, I've come to realize that it is important to show the same type of table for bonds. This is a reminder about William Bernstein's idea of [deep risk](http://wpfau.blogspot.com/2013/11/william-bernstein-on-deep-risk-shallow.html) as bond investments can also cause a permanent loss of capital (as, for instance, German bond holders in 1899 would still be waiting for their investment to provide as much inflation-adjusted wealth as they held at that time).

The Greatest Hits:

	Real Stock Market Losses Larger than 50%				Real Bond Market Losses Larger than 50%			
Country	Time Period	Market Drawdown	Year Market Returned to Pre-Drawdown Level	Wait Time (Years)	Time Period	Market Drawdown	Year Market Returned to Pre-Drawdown Level	Wait Time (Years)
Australia	1970-74	-66%	1985	(15)				
Austria	1914-25	-96%	2003	(89)	1914-22	-99.9%	Still Waiting	
	1947-50	-87%	1960	(13)	1931-32	-73%	Still Waiting	
	1962-68	-61%	1989	(27)	1945-48	-99%	Still Waiting	
	2007-08	-61%	Still Waiting					
Belgium	1914-18	-80%	1927	(13)	1910-18	-85%	2012	(112)
	1929-34	-69%	1972	(43)	1937-43	-79%	1993	(56)
	2007-08	-52%	Still Waiting					
Canada	1929-32	-55%	1935	(6)	1914-20	-60%	1930	(16)
Denmark					1912-20	-58%	1927	(15)
Finland	1917-21	-85%	1935	(18)	1915-20	-91%	Still Waiting	
	1943-48	-73%	1959	(16)	1939-51	-84%	2004	(65)
	1974-77	-62%	1983	(9)				
	1989-91	-60%	1996	(7)				
	2000-02	-61%	Still Waiting					
	2008	-53%	Still Waiting					
France	1943-50	-87%	1985	(42)	1910-26	-79%	Still Waiting	
					1936-51	-94%	2004	(68)
Germany	1914-31	-84%	1958	(44)	1900-21	-96%	Still Waiting	
	1948	-91%	1955	(7)	1948	-95%	Still Waiting	
	2000-02	-58%	2007	(7)				
Ireland	1973-74	-63%	1985	(12)	1906-20	-74%	1932	(26)
	2007-08	-75%	Still Waiting		1935-52	-54%	1996	(61)
					1955-81	-63%	1988	(33)
Italy	1913-21	-68%	1924	(11)	1914-21	-75%	Still Waiting	
	1944-45	-85%	1959	(15)	1935-47	-97%	Still Waiting	
	1974-77	-74%	1985	(11)	1973-81	-51%	1993	(20)
Japan	1943-47	-98%	1969	(26)	1916-20	-53%	1927	(11)
	1990-02	-71%	Still Waiting		1937-53	-99.5%	Still Waiting	
Netherlands	2000-02	-53%	Still Waiting		1911-20	-53%	1925	(14)
					1939-73	-69%	1996	(57)
New Zealand	1987-90	-73%	2003	(16)	1970-84	-57%	1991	(21)
Norway	1917-21	-74%	1935	(18)	1910-20	-77%	1930	(20)
	1974-78	-73%	1985	(11)	1950-81	-61%	1993	(33)
	2008	-54%	Still Waiting					
South Africa	1919	52%	1923	(4)	1915-20	-52%	1926	(11)
					1970-85	-57%	1999	(29)
Spain	1936-50	-55%	1955	(19)	1962-80	-65%	1995	(33)
	1974-82	-84%	1996	(22)				
Sweden	1917-20	-68%	1936	(19)	1915-20	-50%	1922	(7)
	2000-02	-54%	2006	(6)	1939-80	-68%	1996	(57)
Switzerland	1915-20	-73%	1927	(12)	1914-20	-59%	1926	(12)
	1973-74	-56%	1985	(12)				
United Kingdom	1973-74	-71%	1983	(10)	1910-20	-70%	1930	(20)
					1947-74	-73%	1993	(46)
United States	1929-31	-60%	1936	(7)	1940-81	-63%	1991	(51)
	1972-73	-52%	1983	(11)				
GDP-Weighted World	1913-20	-51%	1924	(11)	1911-20	-70%	1932	(21)
Portfolio in US Dollars	1928-31	-50%	1935	(7)	1935-48	-59%	1986	(51)

Source: Own calculations from Dimson, Marsh, and Staunton Global Returns Dataset (1900-2012).

The table below shows all the cases in which stocks and bonds lost more than 50% of their value in inflation-adjusted terms. It's hard to quantify whether stocks or bonds were "more risky" based on the table, but there were plenty of cases in which investors took significant hits with both types of investments. Historically, there have been some very severe bond bear markets.

A major problem for bonds in the past world experience was inflation. And a valid question remains, will inflation-protected bonds now available to investors help to solve this problem? Though I have written in the past about concerns that [TIPS are not a completely safe investment](http://www.advisorperspectives.com/newsletters11/Are_TIPS_Really_Safe_and_Worry-Free.php), my personal bond investments are split between

I-bonds and Vanguard's TIPS mutual fund. The TIPS ladders for retirement income would also seemingly help investors avoid the types of bond losses highlighted in the table below.

The table shows the country name, years (beginning of the first listed year to end of the second listed year), and the percentage drop in real terms for the stock or bond market over that period. I also provide the year that the real stock or bond market value would again exceed the level prior to the market drop, as well as the number of years it took for this to happen.

The Greatest Hits:
Real Losses Greater than 50% for 50/50 Balanced Portfolio of Stocks and Bonds

Country	Time Period	Market Drawdown	Year Market Returned to Pre-Drawdown Level	Wait Time (Years)
Australia	1970-74	51%	1986	(16)
Austria	1914-22	-98%	1997	(83)
	1945-48	-81%	1985	(40)
Belgium	1914-18	-81%	1985	(71)
	1937-43	-65%	1972	(35)
Finland	1917-20	-84%	1936	(19)
	1937-48	-73%	1970	(33)
France	1913-20	-67%	1941	(28)
	1943-50	-88%	1986	(43)
Germany	1911-22	-87%	1985	(74)
	1948	-93%	1968	(20)
Ireland	1911-20	-66%	1928	(17)
	1973-74	-54%	1985	(12)
Italy	1913-21	-70%	1934	(21)
	1940-47	-88%	1998	(58)
	1974-77	-58%	1986	(12)
Japan	1917-20	-56%	1927	(10)
	1943-48	-98%	1999	(56)
Norway	1917-20	-70%	1930	(13)
	1974-78	-51%	1985	(11)
Spain	1973-80	-71%	1993	(20)
Sweden	1914-20	-60%	1927	(13)
Switzerland	1914-20	-65%	1926	(12)
United Kingdom	1914-20	-58%	1924	(10)
	1973-74	-58%	1982	(9)
GDP-Weighted World Portfolio in US Dollars	1912-1920	-61%	1926	(14)

Source: Own calculations from Dimson, Marsh, and Staunton Global Returns Dataset (1900-2012). Of the 20 countries in the dataset, several avoided table entries as losses never exceeded 50%. These countries include Canada, Denmark, the Netherlands, New Zealand, South Africa, and the United States.

Finally, let me add another table rather than extending this discussion into a third blog post. This table shows the results for 50/50 annually rebalanced portfolios of stocks and bonds in all of these countries. As can clearly be noted, diversification does help! Nonetheless, relying solely on volatile investments of stock and bonds funds does still pose threats. Risk is real.

You Can't Control When You're Born... Revisiting Sequence of Returns Risk

Friday, September 20, 2013

My aim is to put together some thoughts based on reading Dirk Cotton's recent posts on sequence of returns risk at his ["The Retirement Cafe"](http://theretirementcafe.blogspot.com/2013/09/clarifying-sequence-of-returns-risk_20.html) blog, William Bernstein's excellent e-book [The Ages of the Investor](http://www.amazon.com/dp/B008CM2T2A/ref=as_li_ss_til?tag=pensretiplana-20&camp=213381&creative=390973&linkCode=as4&creativeASIN=B008CM2T2A&adid=15F9WWS7VM7EE3G5B060&&ref-refURL=http%3A%2F%2Fwww.retirementresearcher.com%2Fbooks%2F), as well as some of the issues I discussed in my article on ["safe savings rates"](http://www.fpanet.org/journal/CurrentIssue/TableofContents/SafeSavingsRates/) and a follow-up about ["getting on track for retirement"](http://www.fpanet.org/journal/CurrentIssue/TableofContents/GettingonTrackforaSustainableRetirement/) from a few years back.

Dirk Cotton clarifies that sequence of returns risk is something which can apply both in pre-retirement and post-retirement. Two investors may enjoy the same average return on the investments in their portfolio, but may still experience very different outcomes if they experience a different sequence for when these returns arrive. This can impact both those who are saving and contributing to their portfolio over time, and those who are withdrawing a constant stream of cash flows from their portfolio during retirement.

Let's illustrate this in a simplified world to make this vulnerability very clear and prominent. Americans are a very self-reliant people who believe if you work hard and do what you are supposed to be doing, then things are going to work out. So let's consider some hypothetical individuals who are doing everything absolutely right (based on our state of knowledge) with regard to their retirement planning. When retirement is still 30 years off in the horizon, they begin saving 15% of their salary at the end of each year.

In our simplified world, these folks don't have to worry about health risks, disability, or economic shocks to Main Street which might cause them to lose their jobs. They are able to continue work over the subsequent 30 years earning a constant inflation-adjusted salary.

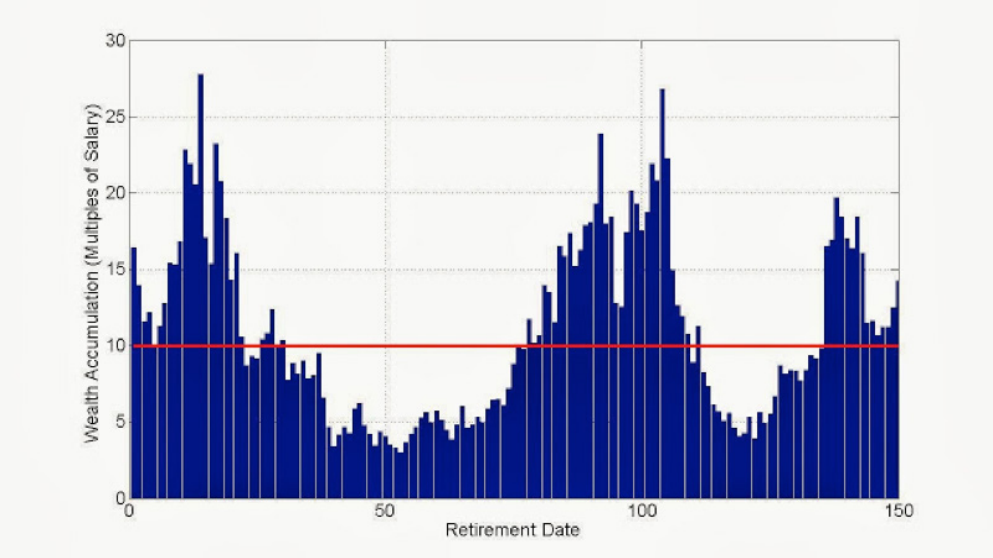
As well, unlike in real life, there is no uncertainty with regard to investing. There is risk, but this risk is understood. Each year the market provides a 7% real return on average, but the actual return is going to fluctuate

around this real return with a standard deviation of 20%. So while one does not know what the year-by-year returns will be, they do know that returns will fluctuate around 7%, and with 30 years of returns the average (arithmetic) return each investor earned over their career will be somewhere close to 7%. Their wealth will not compound at this rate, as with volatility a given percentage drop in the portfolio requires a larger percentage gain to get back to where they started, and the math shows that the compounded growth they can expect for their portfolio is 5% (7% - 0.5 * (20%)^2).

So these folks play by the rules, do everything right, don't experience any health or unemployment issues, and understand the underlying return process that affect their portfolios. Saving 15% at the end of each year and with wealth compounding at 5%, they fully expect to reach retirement with a portfolio equal to 10 times their salary.

Where do they actually end up?

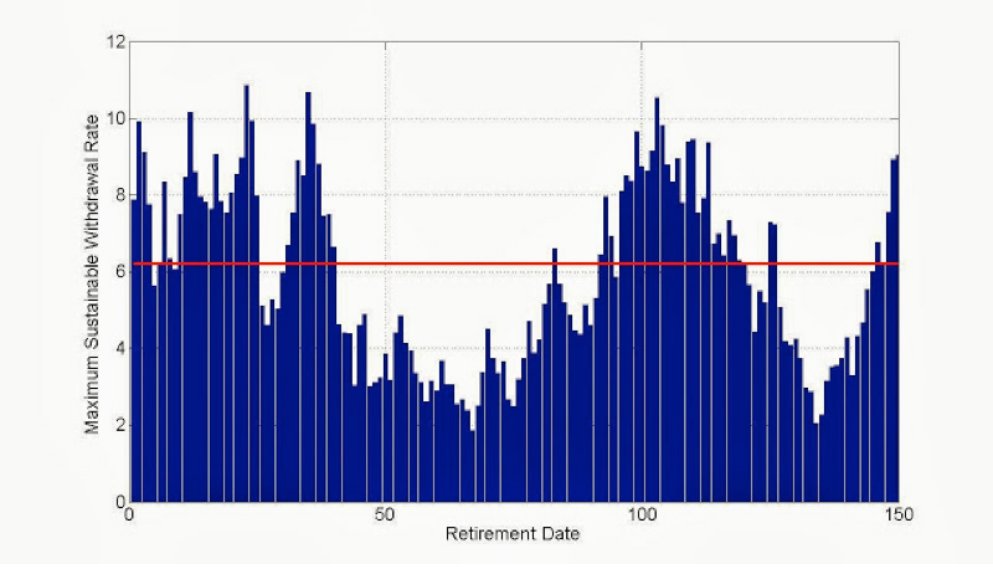
The following figure shows a Monte Carlo simulation of a time series chart for 151 hypothetical investors who work and save for 30 years and get 30 years of market returns, but who differ only in which 30 year period they worked and saved in this 180 year simulated historical time frame.



Though they could expect wealth equal to 10x their salary, the outcomes ranged from a minimum of 2.98x to a maximum of 27.7x. The median accumulation was 9.9x and the mean was higher at 11x. **These are very different outcomes for people who otherwise behaved exactly the same.** What's more, we see cases like how 10 years after the person retired with 27.7x, the subsequent retiree only had 8.7x. This is despite the fact that 20 years of their respective careers overlapped. What's more, the person retiring only one year later than the fellow with 27.7x only had 17x their salary. This despite the fact that 29 years of their 30-year careers overlapped with one another. With William Bernstein's idea of waterfalls, some of those folks with the lower wealth accumulations might have just missed their chance to reach their wealth target after 30 years, and might find that they don't get to where they had hoped to be with even 50 or 60 years of work.

This is sequence of returns risk! People are more vulnerable to the returns experienced when their portfolios are larger because a given percentage change has a bigger impact on absolute wealth. A big portfolio drop at the end could possibly wipe out all of the portfolio gains from the first 25 years of one's career.

The problem also applies in retirement, perhaps even more strongly, if retirees are using a constant inflation-adjusted withdrawal strategy. With compounded returns of 5%, a retiree could expect to withdraw 6.2% of their retirement date assets, adjust this for inflation, and have their wealth last for precisely 30 years. But again, the actual maximum sustainable withdrawal rates experienced vary greatly over time due to the sequence of returns risk as illustrated below. For these 151 retirees, the actual maximum sustainable withdrawal rates experienced over 30-years ranged anywhere from 1.9% to 10.9% for reasons beyond one's control reflected simply by the luck of when they retired.



These hypothetical folks were all very hardworking and industrious, but they experienced very different outcomes based on the very random factor of when they were born and which years comprised their working period and retirement period. As Dirk Cotton notes, sequence of returns risk is a risk which is not rewarded by the markets and which individuals cannot diversify away on their own.

So what are the solutions? Here are some ideas:

—First, as a society, let's hold on to our defined-benefit pensions, including Social Security. Ideas to convert some of Social Security to defined-contribution could be dangerous on a societal level. Defined-benefit pensions are essentially a separate asset class which all investors should find very valuable to diversify into. Their most prominent characteristic of relevance here is that they allow for risk-sharing between different birth cohorts which eliminates some of the sequence of returns risk stemming from the uncontrollable factor of when one is born. Everyone can get the same benefit from the same work effort regardless of what their individual wealth accumulations might have been with their individual sequence of returns. The problems we have with defined-benefit pensions come from politicians and businesses overpromising on what is feasible, and so they should be adjusted… not eliminated.

—A point that Dirk Cotton emphasizes is that sequence of returns risk in retirement comes from strategies to withdraw a constant inflation-adjusted amount. There is no sequence of returns risk for someone using a constant percentage of remaining portfolio withdrawal strategy. A lot of research (including some of [my own](http://ideas.repec.org/p/pra/mprapa/39169.html)) has now shown that a constant inflation-adjusted spending strategy from a volatile portfolio is just about the most inefficient way to approach retirement. Someone can't expect constant spending from volatile portfolio. Those who want upside (and, thus, volatility) should be flexible with their spending and should make adjustments.

—Alternatively, sequence of returns risk is a function of volatility. Spending could be kept constant if the portfolio is de-risked. To really get constant spending, one should be looking to hold fixed income assets to maturity or use risk-pooling assets like annuities. The inefficiencies of a constant spending strategy using volatile assets may be explained because of the added sequence of returns risk which offers no reward to investors.

—Other approaches which reduce the downside risk (volatility in the undesired direction) could also be considered. Financial derivatives can be used to put a floor on how low a portfolio may fall by giving up some of the upside potential for the portfolio. Another possibility is a stand-alone living benefit rider like those offered by Aria Solution's with the Retir-

eOne program, which can be applied to portfolios of mutual funds and ETFs. They behave like income guarantee riders for variable annuities in that they provide the potential to annuitize and get a guaranteed income stream from a portfolio's high watermark level.

—Another approach which Michael Kitces and I have offered in a new article discussed in [last Saturday's New York Times](http://www.nytimes.com/2013/09/14/your-money/turning-the-conventional-stock-buying-wisdom-for-retirees-on-its-head.html?smid=tw-share&_r=0) (and which we will both have specific blog posts about next week) is to use a rising equity glidepath in retirement with an even lower than typically recommended (at least in the safe withdrawal rate research literature) equity allocation at the start of retirement. This reduces vulnerability to early retirement stock market declines which cause the most harm to retirees.

—A final idea is to consider is my "safe saving rate" approach which focuses on using a consistent savings strategy and eliminates the need to worry about wealth accumulations and withdrawal rates. This strategy works better if there is a tendency for mean reversion in the markets, which we have observed historically with regard to the cyclically-adjusted price earnings ratio. Low sustainable withdrawal rates tend to follow bull markets, and high sustainable withdrawal rates tend to follow bear markets, and by linking pre- and post- retirement together the mean reversion cancels out some of the sequence of returns risk.

Lifetime Sequence of Returns Risk

Friday, September 27, 2013

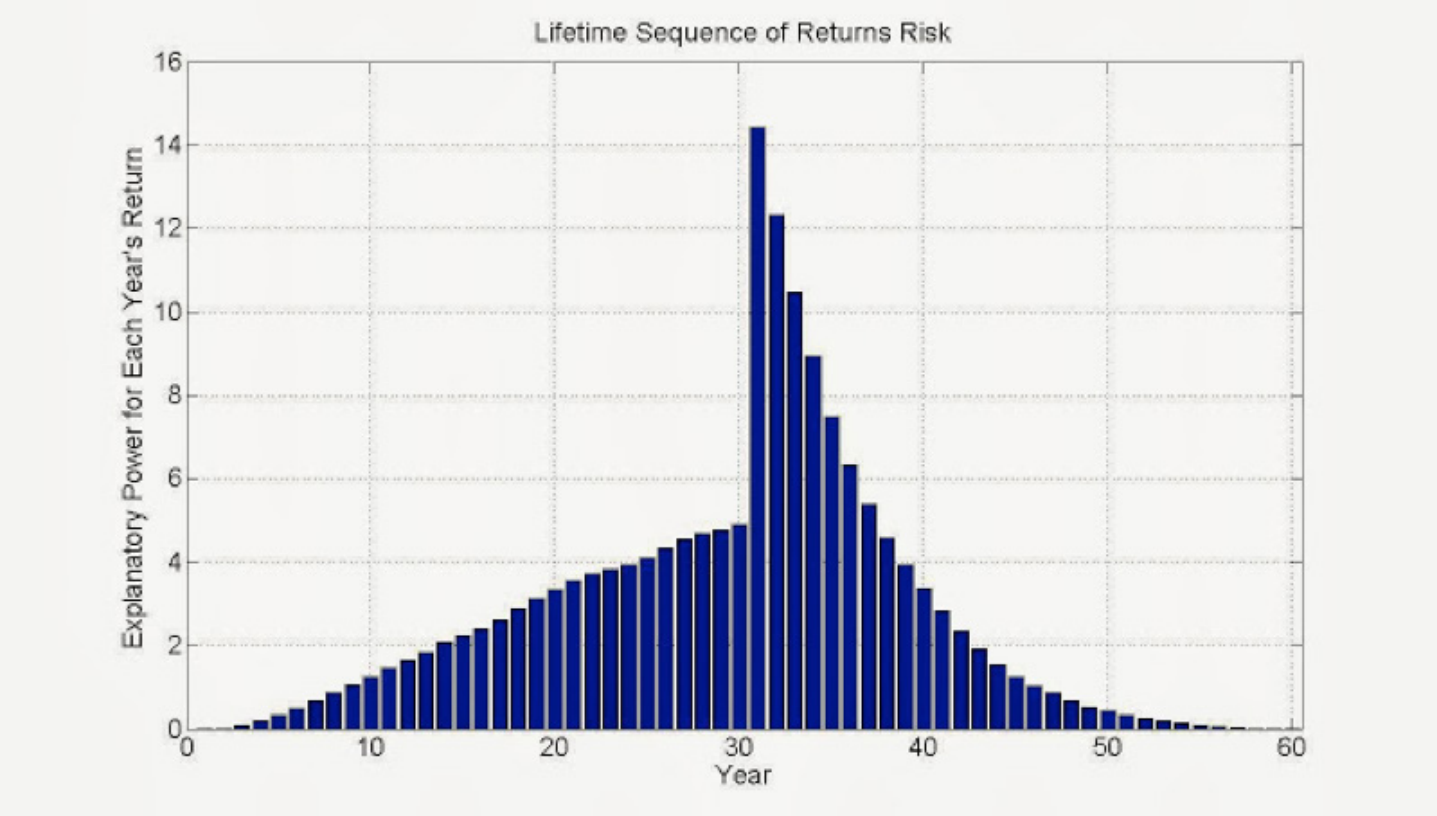
Individuals face sequence of returns risk throughout their investing lifetimes. Though one may invest over a 60 year period, for example, the returns they experience in each of those years will have different impacts on their lifetime financial outcomes.

This is a short blog post which picks up on the themes of my recent post about how ["You Can't Control When You Are Born."](http://wpfau.blogspot.com/2013/09/you-cant-control-when-youre-born.html)

In this example, someone earns a constant inflation-adjusted salary and saves a constant percentage of this salary each year over a 30-year period. In retirement, they withdraw a constant inflation-adjusted amount over a 30-year period. The lifetime investing cycle lasts 60 years. The analysis is based on Monte Carlo simulations with 100,000 60-year periods with returns averaging 7% with a 20% standard deviation.

What the following figure shows is how much each year's return impacts the financial planning outcomes. For the first 30 years, what we see is the percentage of the final wealth accumulation at the retirement date which can be explained by the investment return experienced in years 1-30. What we observe is that with wealth so low at the beginning, the early returns have very little impact on the final result. A given percent change in the portfolio value does not have much impact on the absolute amount of wealth accumulated at the end. It is the returns experienced at the end of the 30-year period which have the biggest impacts on the final wealth accumulation, as this is when a given percentage change in the portfolio value has the biggest impact on absolute wealth. Individuals are especially vulnerable to these returns as they approach their retirement date.

For years 31-60, we switch from accumulation to distribution, and I am showing the impact of each year's return on the maximum sustainable withdrawal rate experienced by retirees. The return in year 31 is the return for the first year of retirement, and the result in this first year explains more than 14% of the final outcome for retirees. Retirees are very vulnerable to what happens just after they retire. This result holds even more so in the real world when we consider how human capital plummets at the retirement date, as it becomes increasingly difficult to return to the workforce. Sustainable withdrawal rates are disproportionately explained by what happens in the early part of retirement. The returns experienced in the last 10 years (years 51-60) have very little impact on how much one could sustainably withdraw over retirement.

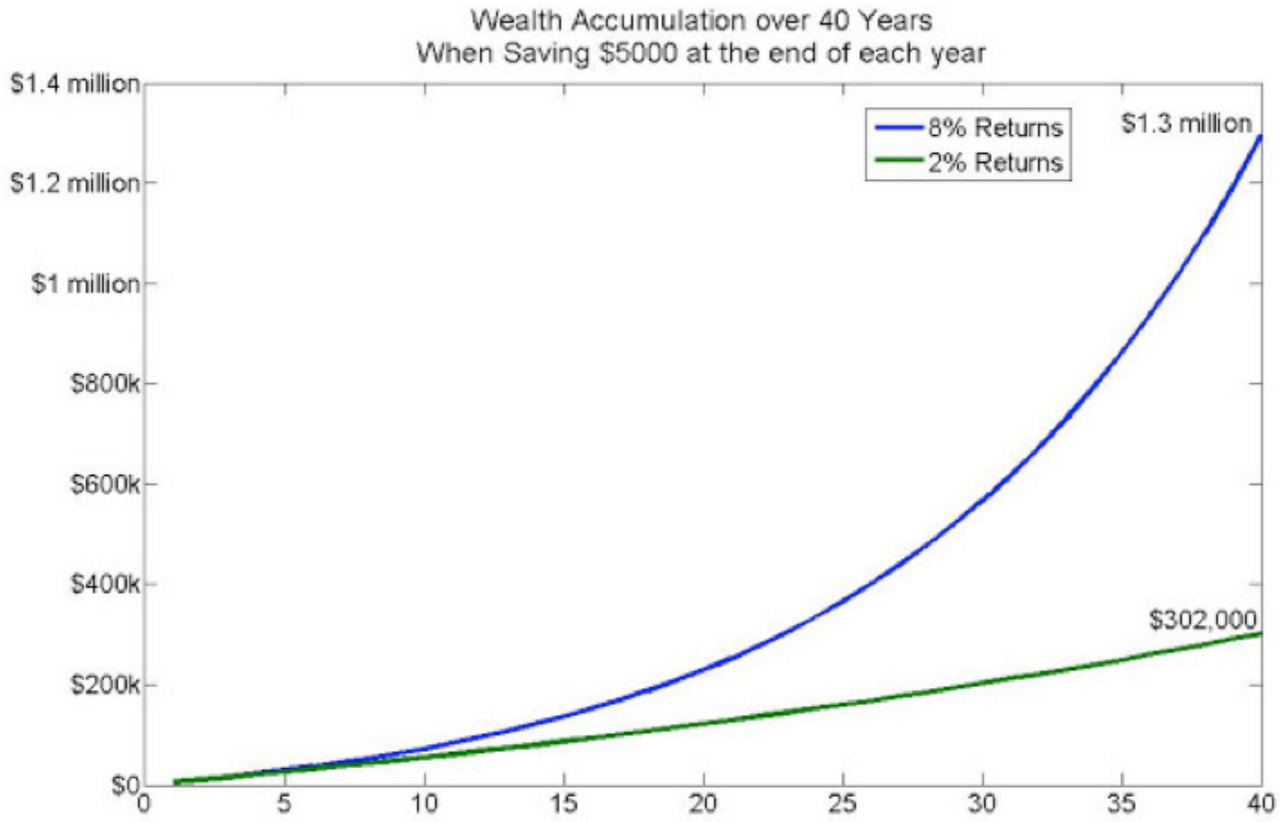


And so with this figure, we can see a clear demonstration of the lifetime sequence of returns risk.

Compound Interest and Wealth Accumulation: It's Not As Easy As You Think

Thursday, February 21, 2013

THE MAGIC(?) OF COMPOUND INTEREST



One of the very basic staples of personal finance is the idea that by starting save when young, one can become very wealthy watching their investments multiply over time. I surely agree that starting to save young is ideal, but a lot of the personal-finance literature can take things way too far.

For example, and I don't mean to single out anyone out in particular (though the title of the book sets itself up for overinflated expectations), I recently read *I Will Teach You To Be Rich* by Ramit Sethi. In the book, he likes to use 8% as a portfolio growth rate assumption when providing examples about the power of compounding interest. Surely, if someone can earn 8%, getting rich becomes a lot easier. But let's try to break this assumption down a bit.

Historical Data

The 8% number is seemingly derived from US historical data. Using historical averages is pretty popular both for savings and for studying safe withdrawal rates in retirement. One key resource about the historical data is Morningstar and Ibbotson Associates SBBI database. From it, we can learn that the S&P 500 on average since 1926 earned an 11.8% return, while intermediate term government bonds earned 5.5% on average. However, these are not the numbers we should be using.

Inflation

For starters, when talking about wealth accumulation over a long period of time, we should be removing inflation from the numbers in order to make the results is more meaningful. We should be looking at wealth accumulation in today's dollars, not future dollars. Sethi, in particular, makes this mistake on page 170 when talking about historical returns. He provides nominal returns and seemingly gets it backwards by saying that the numbers do not include inflation, when in fact they do. Step #1 is to remove inflation from these numbers so that we can talk about them in terms that we can understand: today's dollars. Having $1 million in 40 years will not mean the same thing as it does today. I'm a multimillionaire in Japanese yen, but that won't get me so far when lunch costs 1,000 yen.

With inflation removed, the historical average stock return is 8.6%, and it is 2.6% for bonds.

We are not finished yet.

Compounding Growth over Long Periods

The next step is that we need to switch to compounded returns rather than arithmetic returns. These historical averages represent a possible best guess about what you can earn over the next year. But when talking about accumulated wealth over a long period of time, we cannot use these single period returns. We have to account for portfolio volatility. Sometimes the portfolio grows and sometimes it shrinks.

The way to understand this point is to consider what happens if your portfolio loses 50% of its value. How much does it need to gain in order to get back to its original starting point? The answer is not 50%. It is 100%. The portfolio needs to double to get back to where it started.

To make this more clear, suppose your portfolio is worth 100. Losing 50% means that the portfolio value drops to 50. The next year suppose your portfolio gains 50% in value. Well, 50% of 50 is 25 and so your portfolio would only grow to 75. The portfolio would need to grow by 50 to get

back to 100 and that represents a 100% growth rate on top of its current value of 50.

This asymmetry must be incorporated into the analysis when talking about compounded returns over a long period of time. Stocks are volatile, and even though they earned 8.6% after inflation historically, with volatility one's wealth would've only grown at a rate of 6.5%. Bonds are less volatile and so their hair cut is smaller, but still the compounded returns for bonds falls from 2.6% down to 2.3%.

Asset Allocation

Another issue to consider is one's asset allocation. Back to that 8% assumption that is so popular to use, I don't know what the discussant has in mind for the asset allocation. Let's be charitable and say they are talking about it as a growth rate for stocks after removing inflation. Historically that was 8.6%, and perhaps the person is a bit conservative and reducesit down to 8%. Is this where the assumption comes from?

Nonetheless, this assumes that a person will hold 100% stocks over their entire working lifeand into retirement! Someone may start their career with a more aggressive asset allocation, but by the time they are approaching retirement and their wealth is hopefully grown to its largest value, where a given percentage return has the biggest effect in terms of dollars, the person is probably going to have an asset allocation far removed from 100% stocks.

In trying to choose one asset allocation to represent an entire lifetime, it's not exactly clear what to assume, but we do need to put more weight on what the asset allocation will be around the retirement date. That is when a given return will have the biggest overall impact on the portfolio. And that is when the asset allocation is likely to be more conservative and less weighted to stocks. Since bonds have a lower compounded return, this pulls the compounded return away from its loftiest values.

Adjusting for Current Market Conditions

There is one more adjustment we must make. It is that in today's current market environment, it borderlines on ridiculous to assume that the US historical averages will still apply in the future. Today bond yields are very low, and they are the best predictor of subsequent returns for bonds. That assumption of 2.3% inflation-adjusted compounded returns is really way too high, especially for those close to retirement who will be drawing down their portfolios.

As for stocks, even if they can provide the same risk premium over bonds as they have historically, the low starting position for bonds implies lower

returns for stocks as well. Likewise, stocks are still considered overvalued by the cyclically adjusted price-earnings ratio, and that further implies lower future returns than average.

Joseph Tomlinson recently [investigated these issues](http://www.advisorperspectives.com/newsletters13/Predicting_Asset_Class_Returns-Recommendations_for_Financial_Planners.php) at Advisor Perspectives, and he found that popular software packages had assumed compounded inflation-adjusted returns for a 50/50 portfolio of 2.95%, while Tomlinson's own estimates for this portfolio are 1.13%.

Personally, I use a **2% compounded and inflation-adjusted return assumption** in my own planning spreadsheet. I could always change the assumption to 8%, and this would let me imagine that I will be very rich, indeed, when I reach my 60s. But it would just be an illusion and I would need to prepare myself for becoming very disappointed.

I don't think that 8% assumption was all that well thought out. I do know that is not a good assumption.

Potential Dangers of Investing for Income

Monday, November 19, 2012

I've mentioned before that the American College is in the process of building a great resource of interviews about retirement income topics for its new [Retirement Income Certified Professional (RICP)](http://www.theamericancollege.edu/ads/ricp) designation program, which it is slowly rolling out as a part of its he [New York Life Center for Retirement Income] (http://www.theamericancollege.edu/retirement-income-center). I'm very fortunate to have the opportunity to provide the world premiere for some of these videos. I could probably spend a year doing this daily, but I will try to be selective.

Recently, I've seen a lot of references to people interested in using a strategy to invest for income and live off of their income in retirement.

Today's video is an interview with Colleen Jaconetti, a senior investment analyst at Vanguard, in which she describes some of the potential pitfalls of income investing. This is not to say that no one should try it, but just to make sure that you are clear about the risks you are taking. Anyone interested in investing for income should take the 20 minutes needed to watch this interview.

The issue is that your retirement income strategy can be based on a **total returns perspective, or based on investing for income**.

First of all, in some cases, these strategies can be the same. If your asset allocation is designed from a total returns perspective and you are able to live off the income provided by the portfolio and other income sources from outside the portfolio (Social Security, etc.), then everything is fine.

The problem is what to do in the case that the total returns portfolio does not provide as much income as you like.

[The video shows a shocking graphic about how the income provided from a total returns portfolio has fallen so dramatically in recent years so that this may be a bigger problem now than it ever was before, see the analysis beginning at 2:20 in the interview]

With the total returns perspective, what you do is maintain your strategic asset allocation but also consume some of your principal.

With the income perspective the last thing you want to do is consume some of your principal, so you instead re-arrange your investments so

that they provide enough income that you don't have sell any assets to meet spending needs. In other words, you chase for higher yields.Often this means either shifting to higher yielding dividend stocks, or shifting bond holdings in the direction of greater maturity or increased credit risk.

No one is saying that you should not do these things, but there are risks involved and you need to be aware of what you are doing, and whether you might ultimately be better off by using a total returns investing approach.

RISKS FOR DIVIDEND STOCKS:

—Makes portfolio less diversified relative to total stock market.

—Understand that dividend stocks are not bonds, the value of a portfolio is still highly correlated with the stock market and a stock downturn can still decimate the portfolio value.

—Dividend approaches tend to overweight value stocks relative to the broad market.

—Portfolio becomes more concentrated: the top 10 holdings in a dividend fund take up a much higher percentage of the total fund

—Dividend stocks are currently priced rather high relative to future earnings and so have more potential to drop.

There is a misconception that higher dividends means higher returns. The value of the portfolio drops by the amount of the dividend. Total wealth is not affected by a dividend payment. But the dividend may be taxed at a higher income tax rate rather than the capital gains rate. Higher yielding dividend stocks have historically provided about the same total return as low dividend stocks.

RISKS FOR HIGHER YIELDING FIXED INCOME:

Switching to higher yielding longer-term bonds leaves investor more exposed to capital losses if interest rates increase. Long-term bonds are more volatile.

With current low yields, a small increase in interest rates will result in capital losses that cancel out the higher interest income. See the amazing chart at 13:45, which shows, for instance, that a 0.23% increase in long-term interest rates would wipe-out the benefit of holding them instead of holding Treasury bills. Note: this is a really scary aspect about holding a long-term bond mutual fund today.

Switching to higher yielding corporate bonds leaves investors more exposed to default risk; if the stock market drops then corporate bonds also tend to drop as increased default risk works its way into interest rates

MORE GENERAL RISKS

The income approach is less tax efficient, as where to take income with a total returns perspective is based more on tax considerations and allows for offsetting capital losses and capital gains

As she says: **In essence, investors are trading higher current income for a higher risk to future income**

[Video Link](http://wpfau.blogspot.com/2012/11/potential-dangers-of-investing-for.html)

Risk and Retirement Finances

Friday, November 16, 2012

In my last blog post, I [described](http://wpfau.blogspot.jp/2012/11/hogan-and-miller-explaining-risk-to.html) a recent article by Paula Hogan and Rick Miller about different approaches to financial planning.

I'd to come back to an issue from that article related to risk management for retirement finances. They make a clear distinction between two risk concepts:

Risk tolerance: comfort in dealing with portfolio volatility (not being stressed out and losing sleep over the day's market events) and an ability to "stay the course" and not panic after a market drop.

Risk capacity: the ability to experience portfolio losses without suffering a major life setback or a major reduction to one's standard of living

These ideas also relate to other terms related to risk, such as the ability, willingness, and need to take risk. A variety of sources talk about this, and the source I have in front of me while writing this is Larry Swedroe's [The Only Guide You'll Ever Need for the Right Financial Plan: Managing Your Wealth, Risk, and Investments (Bloomberg)](http://www.amazon.com/gp/product/1576603660/ref=as_li_ss_tl?ie=UTF8&camp=1789&creative=390957&creativeASIN=1576603660&linkCode=as2&tag=pensretiplana-20).

Ability to Take Risk: This is risk capacity. Larry Swedroe indicates that this relates to four factors: investment horizon, stability of earned income, need for liquidity, and alternative options available if things go bad.

Willingness to take risk: This is risk tolerance.

Need to Take Risk: This one can get a little confusing. Simply, the higher expected return one needs to meet their goals, the higher amount of risk is needed. One clear implication is that, as William Bernstein says, if you've already won the game then stop playing. That is, if you are at the point where you are satisfied with your lifestyle, then the possibility of increasing your lifestyle by another 50% is not worth the risk of being forced to reduce your lifestyle by 50%. At some point be satisfied with what you have and don't be greedy.

The confusing part is when you haven't won the game. A strict interpretation is that you must increase your risk... make a Hail Mary pass

in an attempt to achieve your financial goal. This would be more in line with [probability](http://wpfau.blogspot.jp/2012/11/two-schools-of-thought-on-retirement_2.html)[-based ap](http://wpfau.blogspot.jp/2012/11/two-schools-of-thought-on-retirement_2.html)[pr](http://wpfau.blogspot.jp/2012/11/two-schools-of-thought-on-retirement_2.html)[oaches](http://wpfau.blogspot.jp/2012/11/two-schools-of-thought-on-retirement_2.html) in which the probability of failure counts more than the magnitude of failure.

But the safety-first approach would suggest that you revise your goals (save more, retire later, spend less in retirement) so that you do not need to take so much risk to achieve them. Even if you "need" more risk, you shouldn't take more risk than justified by your risk tolerance and risk capacity. In terms of risk capacity, it is not wise to put essential needs at risk.

APPLYING RISK TO RETIREMENT

In applying these ideas to retirement, what becomes increasingly clear is that **risk capacity** starts to diminish rapidly. Having "pensionized" sources of guaranteed income help to increase the risk capacity, but as returning to work becomes less of an option, so does the ability to take risk. The investment horizon is shorter, the ability to generate new income sources reduces, more liquidity may be needed for health expenses, and alternative options to reduce expenses or change lifestyle may decline with increasing age.

As **risk capacity** reduces, **risk tolerance** can really come to smack a retiree in the face. What risk tolerance really comes to mean for a retiree is understanding how well one can deal with the prospect of reducing their lifestyle. Being more aggressive in this case means understanding and accepting that lifestyle may have to be reduced if things don't go well. Aggressiveness can be manifested both by spending at a higher rate (in order to enjoy early retirement more) and by using a more aggressive asset allocation (to obtain more upside potential). Having larger amounts of guaranteed income sources to fall back on also supports greater risk tolerance.

For those with greater risk tolerance, spending well above the "safe withdrawal rate" could be perfectly acceptable. For those with less risk tolerance, spending conservatively, investing more conservatively (without overdoing it), and considering partial annuitization into guaranteed income sources are all alternatives.

Time Diversification

Sunday, February 26, 2012

This past week I was [appointed as the Curriculum Director](http://www.marketwire.com/press-release/retirement-income-industry-association-appoints-wade-d-pfau-phd-cfar-as-director-curriculum-1622633.htm) for the Retirement Management Analyst (SM) Designation Program operated by the Retirement Income Industry Association. I'm quite excited about this opportunity, as it will allow me to help build their curriculum by incorporating the latest research results on retirement planning and retirement income distribution strategies, much as I have been doing here at my blog.

As I have been [starting to discuss here recently](http://wpfau.blogspot.com/2012/01/safe-withdrawal-rates-have-i-been.html), there really is more to retirement planning than just deciding on a safe withdrawal rate. We can talk about Monte Carlo simulation with its thousands of trial runs and find a strategy that minimizes the probability of failure. But retirees only get one shot at retirement. If failure is something they view as catastrophic, then the objective becomes to eliminate the chances for failure, not just minimize them.

In considering how to best accomplish this, there are all sorts of tradeoffs that one must consider. Retirees want to maintain control of their assets, but also they want to obtain guaranteed income sources that often require relinquishing control. Retirees want to spend as much as possible to enjoy their retirement, but they also fear running out of wealth later in life.

The research I want to work on, and the research which I want to work hard to more fully incorporate into the curriculum, relates to how one can best balance all of these competing tradeoffs to find the most personally satisfying retirement income path that will work no matter what happens with financial markets during retirement.

The fundamental goal of retirement planning is to "first build a floor, then expose to upside." If you want to read more about what this means, it is the approach Moshe Milevsky has in mind when he recommends that you ["pensionize your nest egg"](http://www.amazon.com/Pensionize-Your-Nest-Egg-Allocation/dp/0470680997/ref=sr_1_1?ie=UTF8&qid=1326679668&sr=8-1) and it is the way that Zvi Bodie suggests you can ["risk less and prosper"](http://www.amazon.com/Risk-Less-Prosper-Guide-Investing/dp/1118014308/ref=sr_1_1?s=books&ie=UTF8&qid=1326679698&sr=1-1) in retirement.

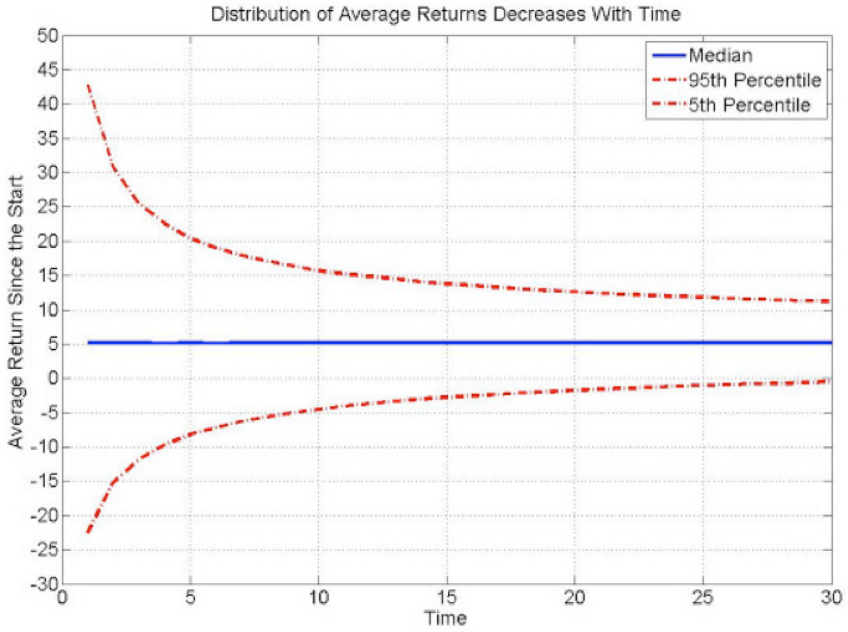
Also, over the weekend I read some articles on ["Modern Retirement Theory"](http://www.modernretirementtheory.com/) by Jason K. Branning

and M. Ray Grubbs. What they are doing also very much ties in with the ideas in the RMA Curriculum. A brief overview of "Modern Retirement Theory" can be found in this [special report supplement](http://www.fpanet.org/docs/assets/B29820FF-1D09-67A1-7A55854E489FF24A/SS_Branning.pdf) from the December 2010 Journal of Financial Planning.

That was a rather long lead-in to today's topic, time diversification, which is something that may have already been discussed to death at other places. But I just wished to run some simulations of my own about it, and I think it could be useful to share.

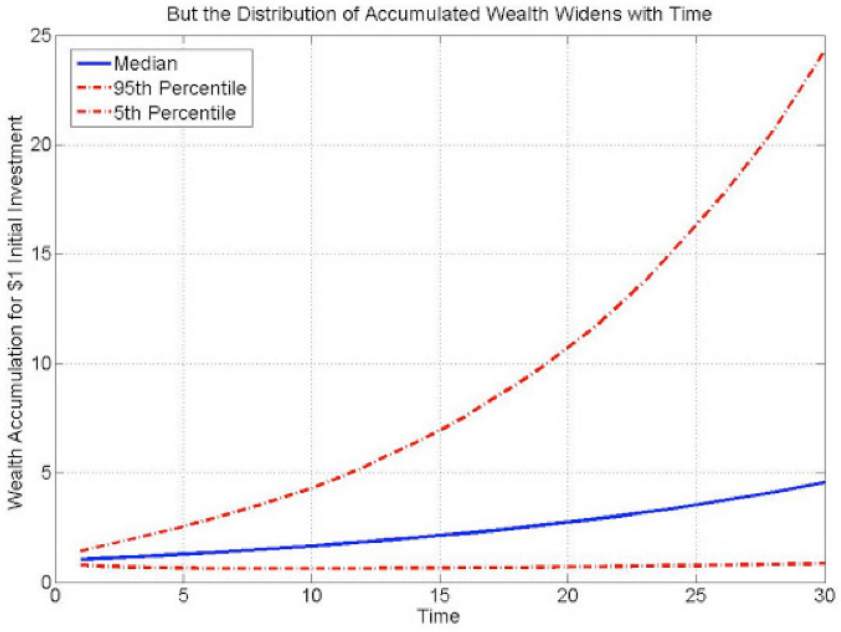
Consider someone who puts $1 into a portfolio of stocks and lets that dollar sit and grow for 30 years. I will look at 100,000 Monte Carlo simulations for what happens to this dollar over the ensuing 30 years. I'm doing things in real terms, assuming at the average annual real stock return is 7%, but that the standard deviation of annual returns is 20%. This means that the compounded real return for stocks is 5%.

The classic argument about time diversification is that the longer you invest, the more likely your average returns will match the compounded 5% average. The classic picture shown in support of time diversification looks like this:

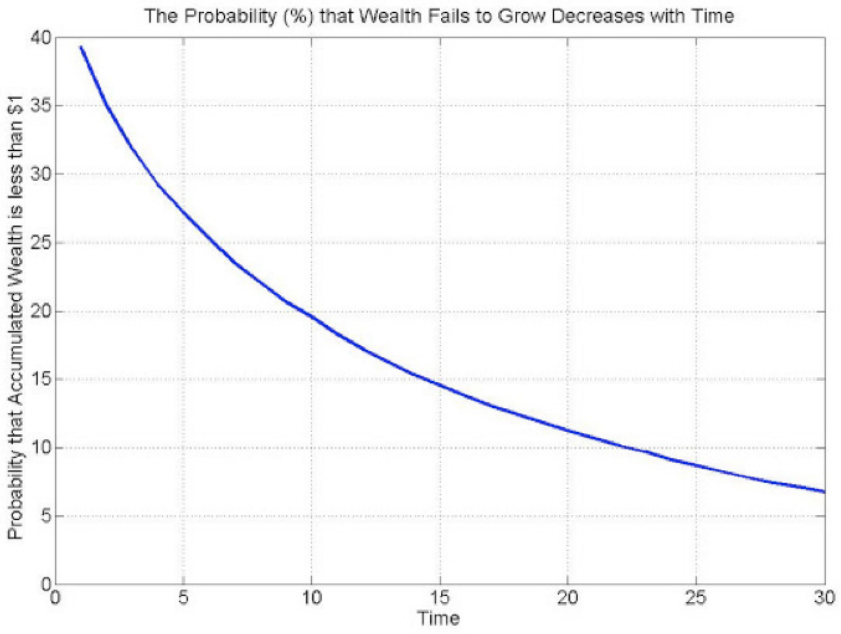


We can see that in the median case, we get the 5% compounded real return we expect. As time passes, the distribution of average returns also gets narrower to focus in more on the 5% return. I've shown a 90% confidence interval, meaning that 90% of the time we would get an average return falling within the red bands. 5% of the time the average return would be even higher than the top dotted red line, and 5% of the time it would be even less than the bottom dotted red line.

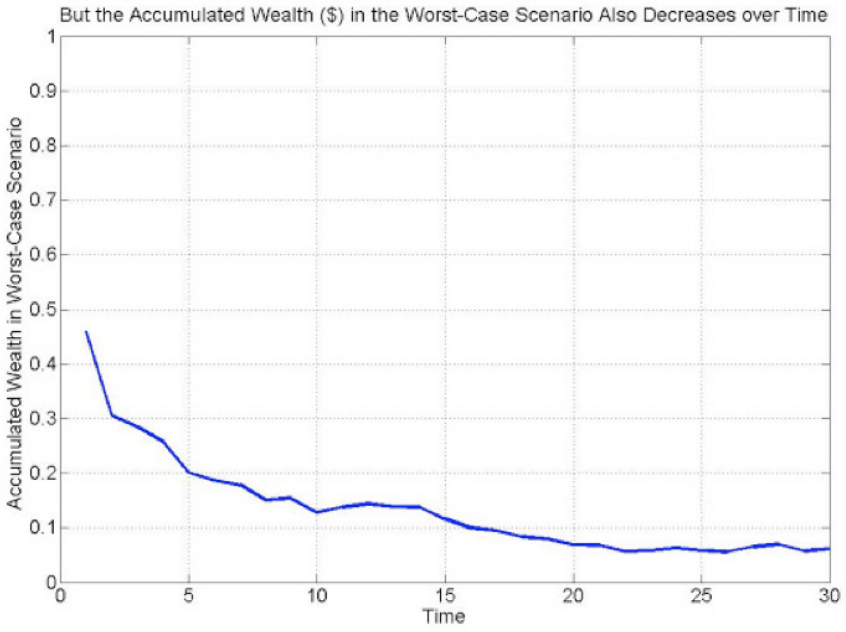
But that is not the whole story. People don't really care about these average returns. What they should care about is the money! How large will this dollar grow over the ensuing 30 years? That is what I show in the next picture. The distribution of wealth accumulations gets wider as time passes, not narrower. And not only that, but the distribution is not symmetric (it is a lognormal distribution). There are chances for extreme wealth, but don't let that obscure anything happening on the downside.



Let's look more at the downside. First, some good news. As more time passes, the probability of experiencing bad outcomes will decrease. Here I show the probability of having less than $1 (in inflation-adjusted terms) as time passes. That implies experiencing negative compounded growth over the whole time period. This probability does decline over time, but still there is about a 7% chance that your accumulated wealth will be less than $1 even after 30 years of experiencing 7% average real returns.



And finally, risk is not just the probability of bad outcomes. It is probability times magnitude. The final picture shows bad news, which is that as time passes, the wealth accumulation in the worst-case scenario falls even further. Even after 30 years of 7% expected growth, there are cases where the person only has about a nickel (5 cents) left. Remember, this is about accumulation and there are no portfolio withdrawals. Those losses are due to stock market losses.



People only get one simulation path for their own life. Despite the extreme potential upside seen in the second picture, people may reasonably wish to protect on the downside. Though I've just shown a simple example about wealth accumulation rather than retirement distribution, this is the basic idea behind "first build a floor, then expose to upside."

This example is also overly simplying in two ways, one that is good news and one that is bad news. First the bad news: I assume that the stock returns are normally distributed in this example, but a common complaint we hear about this is that there are fat tails. That means the chances of getting really bad stock returns are higher than the normal distribution implies. That would make things look even worse on the downside.

But the good news, I think there is some long-term mean reversion that can help protect on the downside. This Monte Carlo simulation assumes that each year has returns independent from the past. There is no notion of market valuations, which may get unrealistically low in some cases. But more generally, there is no notion such bad luck simulations would be met with such widespread social and economic problems (as everyone experiences this bad luck at the same time) that the issue of enjoying retirement may fall by the wayside no matter what. Just for some edification about Monte Carlo simulation, here are the returns experienced by the person who had the lowest wealth accumulation after 30 years out of 100,000 tries. Notice in particular the almost continuous series of negative returns experienced between years 11 and 20. Could things ever get that bad in the real world? I don't know, I can't predict the future.

Year	***Stock Return***		
1.00	-7.90	16.00	-17.89
2.00	-33.73	17.00	-42.85
3.00	16.68	18.00	-15.81
4.00	4.12	19.00	-4.48
5.00	-21.76	20.00	-27.38
6.00	-32.96	21.00	33.42
7.00	18.28	22.00	-30.39
8.00	34.97	23.00	-26.04
9.00	51.02	24.00	-8.59
10.00	4.68	25.00	-6.15
11.00	-11.90	26.00	-16.06
12.00	-12.97	27.00	-6.19
13.00	-23.53	28.00	6.63
14.00	-10.76	29.00	-16.84
15.00	0.20	30.00	5.56