

Rethinking Retirement

Sustainable Withdrawal Rates for
New Retirees in 2015



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INTRODUCTION

Retirement income planning has emerged as a distinct field in the financial services profession, though it is still in its early stages and is undergoing growing pains.

Though not yet recognized by all players, one matter is very clear, and it is that the financial circumstances facing retirees differ dramatically from pre-retirees. Retirees face reduced flexibility to earn income in the labor markets as a way to cushion their standard of living from the impact of poor market returns. Retirees are also seeking specifically to create an income stream from their assets, and this is an important constraint on their investment decisions. Retirees now experience heightened vulnerability to sequence of returns risk once they are spending from their investment portfolio: poor returns early in retirement mean that the sustainable withdrawal rate from a portfolio may fall well below what is implied by average portfolio returns over the whole retirement period. Retirees have reduced risk capacity relative to pre-retirees. Their standard of living is more vulnerable to market volatility and extra caution is warranted.

Because retirement income planning is still a relatively new field, rifts remain about the best approach for building a retirement income plan. One side is closely linked to traditional wealth management with investments. William Bengen initiated formal study in this area of “safe withdrawal rates” with an article he published in the *Journal of Financial Planning* (Bengen, 1994). His research responded to more simplistic approaches related to plugging a fixed return assumption into a spreadsheet. For instance, if one assumes a fixed return of 7% a year, then 7% can serve as the safe withdrawal rate without even tapping into principal. And an 8% withdrawal rate would even work if principal is allowed to be spent down over the subsequent 30 years. Bengen recognized that it is

naïve to assume fixed returns for such calculations, as this masks significant underlying financial market volatility.

In the process, he uncovered the concept of sequence of returns risk as it applies to the financial planning profession. Though this risk is related to general investment risk and market volatility, sequence of returns risk differs from general investment risk. The average market return over a 30-year period could be quite generous, but if negative returns are experienced in the early stages when someone has started to spend from their portfolio, sequence of returns risk manifests through the fact that the early portfolio decline creates a subsequent hurdle that cannot be overcome even if the market is offering higher returns later in retirement.

In 1994, Bengen considered 30 years to be a reasonably conservative planning horizon for a 65-year-old couple. He then looked at all the different rolling 30-year periods of financial market returns in the U.S. historical record since 1926 (i.e. 1926-1955, 1927-1956, and so on, up to 1985-2014 for the most recent 30-year period available today). For a hypothetical retiree beginning retirement at the start of each year, he tested what was the highest sustainable spending rate as a percentage of retirement date assets, such that the subsequent spending amounts could be adjusted for inflation and the portfolio would survive for precisely 30 years. For a 50 to 75% allocation to the S&P 500, with the remainder placed into intermediate-term government bonds, he found that the 1966 hypothetical retiree could withdraw just

over 4% of their retirement date assets and sustain this spending level over 30 years. That was the worst-case scenario from the U.S. historical record.

Naturally, Bengen could use many simplifying assumptions in his research, since his aim was to show how sequence risk should temper client expectations downward from loftier numbers like 7%. But the idea of the 4% rule took hold in the popular consciousness for advisors and consumers alike.

// THE 4% RULE IS OVER-SIMPLIFIED FOR RESEARCH PURPOSES, AND MAY NOT REFLECT REALITY.

The 4% rule is really just meant to be a simplification for research purposes which should be separated from real-world practice. It includes a number of overly simplified assumptions which do not reflect reality:

- / International market data suggests there is no reason to believe that the U.S. experience can provide confidence about what is a true worst-case scenario.
- / The low interest rate and high stock market valuation levels facing today's retirees are extremely rare in the U.S. historical record, lending further credence to the previous point.
- / Real world investors must unavoidably pay investment management fees which can be expected to lower their net returns.
- / As longevity continues to improve, 30 years is no longer a conservative planning horizon for 65-year old couples working with financial advisory firms.

After explaining more about how these previous points impact sustainable spending rates, we use Monte Carlo simulations to estimate sustainable spending rates for retirements beginning in January 2015. In doing so, this article draws from elements from my previously published research articles in order to create a more comprehensive and consolidated

analysis of sustainable retirement spending rates. It is the first to include fees for both financial advice and fund management, while also incorporating the heightened sequence of returns risk facing retirees in the current low-yield world and the reality that 30 years is increasingly not a conservative planning horizon for 65 year olds. The simulations will reflect the current market environment at the start of retirement, while also providing mechanisms for market returns to gravitate, on average, toward their historical averages over the retirement horizon. This is also a more realistic approach to Monte Carlo simulations, which moves beyond the capabilities of most commercially available financial planning software packages. These simulations will include realistic fees to cover the expenses related to working with a financial advisor and to pay underlying mutual fund expenses, and we also show the differences in sustainable spending rates over 30 and 40 year horizons.

As a preview of the findings, we estimate that a 40% stock allocation and a 30-year planning horizon would support a 2.1% sustainable initial spending rate, provided one is willing to accept a 10% chance for failure [with a volatile investment portfolio, there is no such thing as a guaranteed spending rate]. Extending the horizon to 40 years, with the same asset allocation and acceptable failure probability, drops the sustainable spending rate to 1.49%. A more realistic assessment of sustainable spending from a volatile investment portfolio does suggest that the 4% rule-of-thumb for retirement spending is considerably more risky than many realize. These numbers may seem low, and it is true that there is still upside potential for these strategies to end up doing better with the investments in the volatile portfolio, but this is the reality for clients self-managing market and longevity risks, paying fees, and entering retirement in the current market environment. Bengen's historical simulations do not fully reflect the risks currently associated with the strategy.

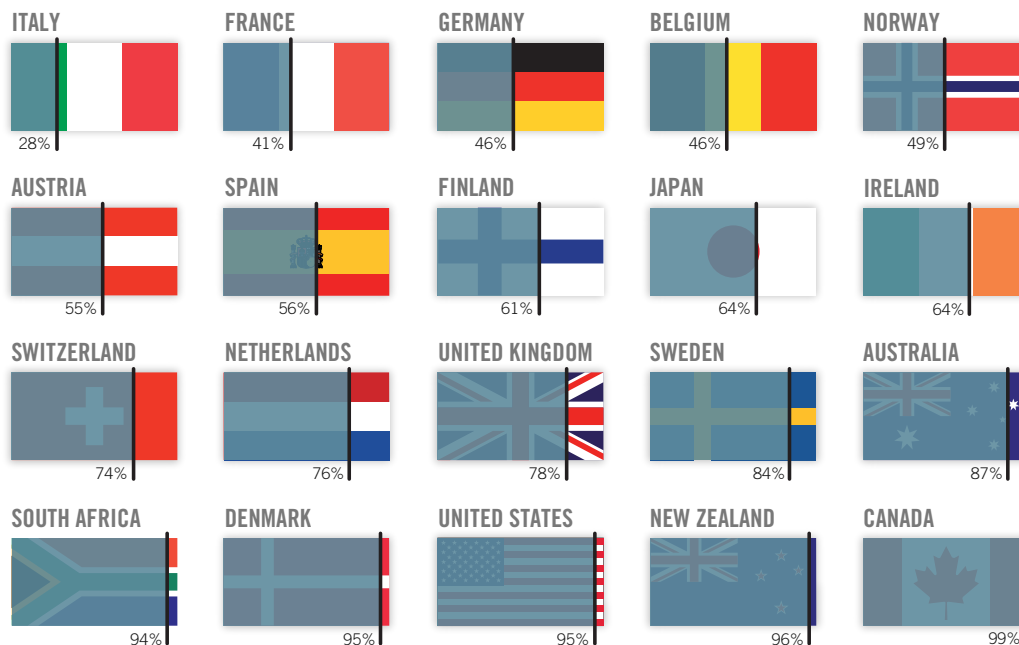
OUR LIMITED HISTORICAL EXPERIENCE

The U.S. historical experience does not provide a broad enough set of potential outcomes to be confident about 4% as a worst-case spending rate. This time period is when the U.S. grew to become the world's leading superpower, and it is not pessimistic to consider that future financial market outcomes might become more muted and more aligned with the past international experience. The 4% rule has not worked nearly as well in most other developed market countries for which we have sufficient financial market data to create such a test (Pfau, 2010). While it seems reasonable to focus on U.S. historical data, who is to say whether the future experience of American retirees will be similar to our past or whether it will be more reflective of situations experienced in other countries?

Table 1 summarizes the international experience on the topic of “safe withdrawal rates.” The table provides historical success rates for the 4% rule using financial market data for 20 countries since 1900. Results can vary when using different datasets and asset allocations. In this case, with a fixed allocation of 60% stocks and 40% bonds, the 4% rule worked in 95% of the rolling historical periods with the U.S. data. Success rates were also over 90% for the local stock and bonds data in Canada, Denmark, New Zealand, and South Africa. In the other 15 countries, results varied dramatically. The historical success rates for the 4% rule were as low as 28% for Italy, 41% for France, and 46% for Belgium and Germany. This is an important point for advisors to reflect upon when advising clients on sustainable spending rates from volatile investment portfolios.

// TABLE 1: INTERNATIONAL SUCCESS RATES FOR THE 4% RULE

For a 60/40 Asset Allocation to Stocks & Bonds



NOTE: Assumptions include a 30-year retirement duration, no administrative fees, constant inflation-adjusted withdrawal amounts, and annual rebalancing. SOURCE: Own calculations from Dimson, Marsh, and Staunton (1900 - 2013) Global Returns Data.

TODAY'S MARKET ENVIRONMENT

It is a fallacy to conclude that just because the 4% rule worked in the U.S. historical data, it can be expected to continue to work just as well for today's retirees.

Aside from what we just observed with international data, the general problem with attempting to gain insights from the historical outcomes is that future market returns and withdrawal rate outcomes are connected to the current values for the sources of market returns.

Future stock returns depend on dividend income, growth of the underlying earnings, and changes in the valuation multiples placed on those earnings. If the current dividend yield is below its historical average, then future stock returns will also tend to be lower. When price-earnings multiples are high, markets tend to exhibit mean reversion and relatively lower future returns should be expected.

Returns on bonds, meanwhile, depend on the initial bond yield and on subsequent yield changes. Low bond yields will tend to translate into lower returns due to less income and the heightened interest rate risk associated with capital losses if interest rates rise.

Sustainable withdrawal rates are intricately related to the returns provided by the underlying investment portfolio. And with sequence of returns risk, the returns experienced in early retirement will weigh disproportionately on the final outcome. Current market conditions are much more relevant; but unfortunately many financial planning software programs still default their Monte Carlo simulations to higher historical average returns.

And so we must question the relevance of conclusions which base their analysis on what worked in the past. The U.S. historical record is relatively short to determine how much can be safely withdrawn from a rather aggressive investment portfolio. Particularly, past outcomes may have little relevance if the situation facing today's retirees is different. And the combination of low bond yields and high stock market valuations suggest that the situation is different now. Today we are dealing with a situation in which Shiller's cyclically adjusted price-to-earnings ratio (PE10) is well above historical averages, while bond yields are at historic lows.

Table 2 demonstrates how today's high-valuation/low-yield situation has been quite rare in U.S. history, indicating that we are in uncharted territory when trying to determine if the 4% rule will remain a safe strategy. Historical simulations don't analyze this possibility, but with Monte Carlo simulations we can adjust our capital-market expectations to better account for the types of returns that are more likely to be experienced in the future (for more on the research aspects of this matter, see Blanchett, Finke, and Pfau 2013 & 2014; Finke, Pfau and Blanchett, 2013; and Pfau, 2011).

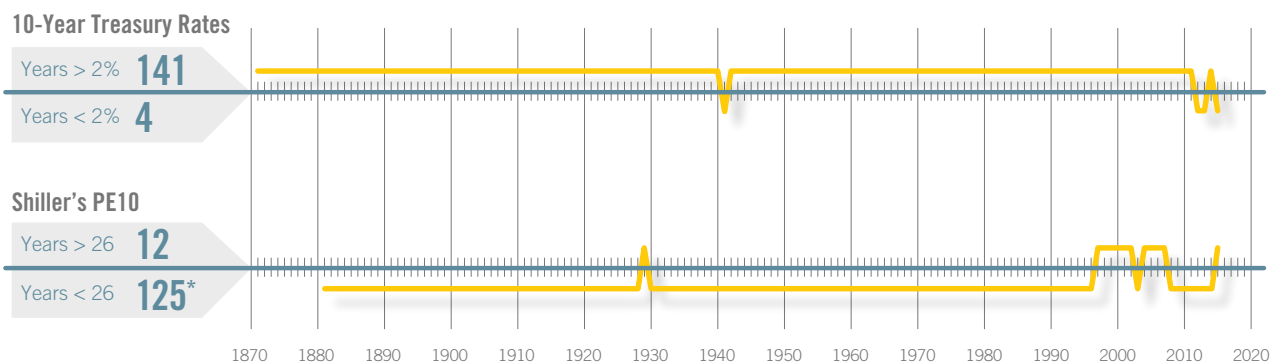
In January 2015, the 10-Year Treasury rate was 1.88%. This is about 2.8 percentage points less than the historical average of 4.7% (see Table A1 in the appendix). Today's retirees will be more strained to spend principal to achieve a 4% sustainable withdrawal rate. Even if we assume that the historical risk premium for stocks and other asset characteristics remain the same, but we adjust the

average return on stocks and bonds downward to reflect today's lower bond yields, we will obtain higher failure rates for the 4% rule. But we must also consider that Shiller's PE10 registered a value of 26.67 in January 2015. This is quite high, and a statistical regression of the subsequent 10-year average for the equity premium over bonds provides a prediction that the equity premium will average 1.55% for the next 10 years when starting from this PE10 value.

Given that we require 30 years of data to calculate past sustainable withdrawal rates, 1941 is the only starting year with such low interest rates and 1929 is the only year with such lofty stock market valuations for which we can know the subsequent outcomes. There have been no past years with both of these rare events happening simultaneously, and so the outcomes from the historical record are of little relevance for today's retirees. Again, this is uncharted territory.

// TABLE 2: 145 YEARS OF U.S. FINANCIAL MARKET HISTORY

Financial Market Environment at the Start of the Year, 1871-2015



*PE10 can only be calculated since 1881, since the years 1871-1880 are required to calculate smoothed earnings
 CHART SOURCE: Own calculations from Robert Shiller's financial market data <http://www.econ.yale.edu/~shiller/data.htm>

AMERICANS ARE CONCERNED ABOUT OUTLIVING THEIR WEALTH

// FEES AND FUND EXPENSES

The 4% rule is based on an assumption that investors precisely earn the underlying indexed market returns with annual rebalancing. Clients who pay investment fees or who otherwise underperform the indices because of either poor timing or asset selection decisions cannot rely on 4% working for them. Generally, a 1% fee lowers the sustainable spending rate by about 0.5%-0.6% (see Pfau, 2012, for more on these estimates). This must not be forgotten when estimating sustainable spending rates for clients.

// PLANNING HORIZON AND LONGEVITY RISK

Americans are concerned about outliving their wealth. The greater this concern, the less they are able to spend with an investment solution, in order to spread their spending over an increasingly lengthy period of time. With investments, this risk can only be self-managed through a conservative income plan based on spreading assets over a longer period than life expectancy. The 4% rule is based on a planning horizon of 30 years. In 1994, William Bengen felt that this was a reasonably conservative assumption for the longest living member of a 65-year old couple. Today this is increasingly not the case for the more highly educated and higher income individuals who typically work with financial advisors. The Society of Actuaries routinely publishes estimates about life expectancies for such individuals. For their 2000 numbers, they estimated a 31% probability that at least one member of a 65-year old couple will live beyond their 95th birthday. For their 2012 update, this probability rose to 43%. And with their projected mortality improvements, a 65-year old couple in 2028 can expect a 50% chance that at least one of them will make it to 95 (source: own calculations from Society of Actuaries data). A 30-year horizon is becoming the life expectancy, and it is no longer a conservative number. As such, we also provide sustainable spending estimates for 40 year horizons as well.

SIMULATING SUSTAINABLE SPENDING RATES IN 2015

We now put all of this together to develop Monte Carlo simulations estimating sustainable spending rates for retirees at the start of 2015. Details about the underlying assumptions for these simulations are provided in the appendix. These initial spending rates are specifically calibrated to include a 3% annual cost-of-living adjustment (COLA), rather than having spending adjust precisely with the realized inflation experienced over retirement. Table 3 provides the results for these simulations.

We observe that sustainable spending rates are noticeably lower than 4% when we include fees and account for today's low bond yields and high stock market valuations. As well, extending the retirement horizon from 30 to 40 years does also make a significant difference for the results. A 10% failure rate (or, conversely, a 90% success rate) is usually considered as a decent acceptable baseline for Monte Carlo analyses of sustainable spending rates, and over a 30-year horizon the highest sustainable spending rate is 2.12%. That is with a 20% stock allocation. Over a 40-year horizon, the highest rate is sustained with 40% stocks, though this spending rate has fallen to 1.55%.

// TABLE 3: SUSTAINABLE SPENDING RATES

For Retirements Beginning on January 1, 2015

		Stock Allocation					
		0%	20%	40%	60%	80%	100%
30-YEAR RETIREMENT HORIZON							
Failure Rate	5%	1.87%	2.00%	1.89%	1.70%	1.45%	1.19%
	10%	1.95%	2.12%	2.10%	1.97%	1.77%	1.53%
	20%	2.07%	2.30%	2.36%	2.33%	2.21%	2.04%
	30%	2.17%	2.42%	2.56%	2.59%	2.56%	2.45%
	50%	2.34%	2.66%	2.92%	3.11%	3.23%	3.28%
40-YEAR RETIREMENT HORIZON							
Failure Rate	5%	1.21%	1.38%	1.37%	1.26%	1.10%	0.90%
	10%	1.28%	1.49%	1.55%	1.49%	1.36%	1.19%
	20%	1.39%	1.65%	1.78%	1.80%	1.74%	1.62%
	30%	1.48%	1.77%	1.96%	2.05%	2.06%	1.99%
	50%	1.66%	1.99%	2.29%	2.53%	2.68%	2.74%

NOTE: See appendix for explanation about the methodology for these calculations.

Generally, accepting a higher chance for failure, with its accompanying downside risks, allows for more opportunity to seek the equity premium through a higher stock allocation. Nonetheless, with the 50% failure rate we can observe the actual best guess about the sustainable spending rate without building in any conservatism for the estimate. With 100% stocks, it is 3.38% over 30 years, and 2.74% over 40 years. Of course, those worried about outliving their assets will want to spend less initially so that they do not have a 50% chance to run out of retirement funds. Even though the retirement horizon is long, stocks have less opportunity to demonstrate a long run equity premium because of the sequence risk that causes the early market returns to weigh disproportionately on the ultimate retirement outcomes. Low interest rates, high stock market valuations, and financial advisory fees all contribute to lower sustainable spending rates than implied by the 4% rule.

CONCLUSION

The dual impacts of sequence and longevity risk create a very real possibility with investments that one cannot support their desired lifestyle over their full retirement. These are risks which a retiree cannot be compensated for taking, though the risks can be easily pooled. Investment approaches seek to manage sequence and longevity risk by having the retiree spend conservatively. Retirees spend less as a way to avoid depleting their portfolio through a bad sequence of returns in early retirement, and they also spend less

because they must plan to live well beyond their life expectancy. The U.S. historical record has been used to estimate that 4% is a reasonably conservative initial spending rate to self-manage these risks. However, the analysis included herein has suggested this is not the case, and that the 4% rule is significantly more risky for today's retirees who face fees, low bond yields, high stock market valuations, and increasing longevity expectations. The "safe withdrawal rate" is considerably lower for new retirees in 2015.

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APPENDIX ON CAPITAL MARKET ASSUMPTIONS AND FEES

The capital market expectations connect the historical averages from Robert Shiller’s dataset together with the current market values for inflation and interest rates. The equity premium is also muted for the first 10 years to reflect the current PE value. This makes allowances for the fact that interest rates, inflation, and PE10 are currently far from their historical averages, but it also respects historical averages and does not force returns to remain low for the entire simulation.

// TABLE 1A: SUMMARY STATISTICS FOR U.S. RETURNS AND INFLATION DATA

1890-2013

	Correlation Coefficients									
	Arithmetic Means	Geometric Means	Standard Deviations	Stocks Returns	Risk Premium	Bond Yields	Bond Returns	Home Prices	Bills	Inflation
Stock Returns	10.7%	9.1%	18.3%	1	0.99	0.04	0.06	0.17	-0.09	0.06
Risk Premium	6.1%	4.4%	18.3%	0.99	1	-0.09	-0.01	0.15	-0.20	0.03
Bond Yields	4.7%	---	2.4%	0.04	-0.09	1	0.52	0.12	0.85	0.22
Bond Returns	4.9%	4.7%	6.7%	0.06	-0.01	0.52	1	-0.06	0.33	-0.09
Home Prices	3.3%	3.0%	7.4%	0.17	0.15	0.12	-0.06	1	0.03	0.37
Bills	4.5%	---	3.0%	-0.09	-0.20	0.85	0.33	0.03	1	0.14
Inflation	2.9%	2.8%	5.4%	0.06	0.03	0.22	-0.09	0.37	0.14	1

Source: Data from Robert Shiller’s webpage. The U.S. S&P 500 index represents the stock market, 10-year Treasuries represent the bond index, the Shiller-Case home price index for homes, 6-month Treasuries for bills, and the Consumer Price Index for inflation.

Table A1 provides summary statistics for the historical data, which guides the Monte Carlo simulations for investment returns. The returns represent total returns without any fees, including dividends, interest, and capital gains. A Cholesky decomposition is performed on a matrix of the normalized values for the risk premium, bond yields, home prices, bills and inflation. A Monte Carlo simulation is then used to

create error terms for these variables, which preserve their contemporaneous correlations with one another. Then the variables are simulated with these errors using models that preserve key characteristics about serial correlation. Though home prices and bills are not used in this article, I present the complete model which also takes them into account.

With the correlated error terms, inflation is modeled as a first order autoregressive process starting from 1.58% inflation in 2013 and trending toward its historical average over time with its historical volatility. Bond yields are similarly modeled with a first order autoregression with an initial value of 1.88% (the 10-year Treasury rate in January 2015). Bond returns are calculated from bond yields and changes in interest rates, assuming a bond mutual fund with equal holdings of past 10-year Treasury issues. Stock returns are calculated as the sum of bond yields and the equity premium over yields. To reflect the high market valuation levels, Monte Carlo simulations fluctuate around an equity premium of 1.55% for the next 10 years, reflecting the best estimate based on the past relationship between PE10 and the subsequent 10-year average equity premium, and then the equity premium fluctuates around its historical average of 6.1% for years 2025 and beyond.

Regarding fees, we assume a typical financial planning client who pays their advisor 1% of assets under management for comprehensive financial planning services, and who invests in average expense mutual funds using Morningstar's estimates for 2013. Morningstar (2014) reports that the average asset-weighted management fee in 2013 for U.S. stock funds is 0.67%. It is 0.6% for the average U.S. taxable bond fund. This reflects the most recent available data. As larger funds are able to lower their costs through economies of scale, these asset-weighted averages are significantly lower than the simple averages across all funds (1.25% for stocks and 1% for bonds). To operationalize these combined advisory and fund fees with the simulated annual market returns, we apply a total fee of 1.67% to stocks and a total fee of 1.6% to bonds at the end of each year before rebalancing.

