A Safer Four Percent Withdrawal Rule

By Robert Huebscher
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Financial planners cite few principles as often as the "4% rule." Originally developed by William Bengen in 1994, it argues that investors can safely withdraw 4% from a retiree's balanced stock/bond portfolio in the first year, and then adjust that dollar amount upward each year for inflation. This withdrawal rate has proven to be sustainable over every 30-year period since 1926, sometimes just barely, sometimes leaving the heirs with many millions of additional dollars.

Under current market conditions, however, investors can adopt a superior approach.

By constructing a portfolio consisting of municipal bonds and Treasury Inflation Protected Securities (TIPS), an investor can sustain a 5.60% withdrawal rate if current inflation rates (2.0%) persist over 30 years. A less aggressive 4% withdrawal rate would be necessary only if inflation averaged 7.09% over this period, more than twice the average inflation rate over the past quarter century.

Background

Bengen approached the problem of determining the safe withdrawal rate from an equity-centric perspective – he used bonds to fill in whatever portion of the portfolio was not invested in stocks. He studied portfolio mixes ranging from 50% to 75% stocks, and concluded that such portfolios "should be safe" for investors making year-end inflation-adjusted withdrawals. The starting withdrawal amount is equal to 4% of the initial portfolio balance. Bengen recommended an equity allocation "as close to 75% as possible" based on historical data going back to 1926.

Subsequent research suggested the sweet spot is closer to 60% in equities. The research varies, but the general consensus seems to be somewhere between 40% and 75%, depending on the data set and some of the underlying assumptions.

In 1998, Cooley, Hubbard, and Waltz quantified Bengen's definition of "safe," reporting a 95% success rate for a 50/50 portfolio.

In a 2008 paper, Nobel laureate William Sharpe and two co-authors noted that several major fund companies (e.g., Vanguard, Fidelity, and Schwab) advocate

the 4% rule, citing success rates between 85% and 90%. These fund companies offer equity-oriented mutual funds to support this investing discipline.

Michael Kitces, publisher of The Kitces Report, showed in a 2008 study that safe withdrawal rates in a balanced portfolio depend on market levels. Using S&P 500 P/E ratios calculated with earnings based on 10-year moving averages, he showed that withdrawal rates in excess of 4% are possible when valuations are depressed. The 10-year moving average, popularized by Yale professor Robert Shiller, smoothes earnings over business cycles.

The market's current 10-year moving P/E ratio is 12.03, which, according to Kitces, indicates the market currently straddles the line between "fairly valued" and "undervalued." Using Kitces' guidelines, retirement investors could adopt a "safe" withdrawal rate of 5.0%.

The methods examined in these studies share several important features with Bengen's original, equity-centric approach:

- Validation using historical data for equity and bond returns and inflation levels
- Certainty of success is not possible. Under the traditional safe withdrawal rate approach, success is measured as a withdrawal strategy that succeeds in 100% of the historical scenarios. (Though, of course, you could have a future scenario worse than any historical precedent.)
- As any 2007 retiree can tell you, success depends greatly on the timing of equity market returns. Critically, the greatest risk is severe market underperformance at the beginning of the retirement period, leaving the retiree with capital that may be permanently depleted and diminished opportunity to return to the workforce.

Researchers have shown that the "average" successful withdrawal rate for a traditional portfolio is approximately 6.5%, but a more conservative 4% rate is necessary to survive the worst adverse conditions, based on historical data. Nonetheless, if those adverse conditions occur at the beginning of the retirement period, and they exceed historical norms, the retiree is still left without options.

An all-bond portfolio, based on current market conditions, offers retirees far more certainty of success, and depends only on forecasted inflation rates. Moreover, an all-bond portfolio is less sensitive to the timing of returns; in fact, only the timing of inflation matters. Inflation is far more predictable than equity market returns and can be efficiently hedged using TIPS.

The all-bond portfolio is insulated from the risk of historically unprecedented adverse market conditions near the beginning of the retirement period. The risk of failure in the all-bond portfolio – which arises solely from underestimating the rate of inflation – occurs later in the retirement period, not at the beginning. As in the traditional portfolio, retirees have time to adjust allocations or spending habits before principal is depleted. But adjustments to the all-bond portfolio will be less severe, since the possibility of losses due to extreme market movements is eliminated.

Safe Withdrawal Rates in an All-Bond Portfolio

For my analysis, I use a portfolio consisting of 50/50 municipal bonds and TIPS. The actual mix should be based on forecasted inflation rates.

As of March 19, 2009, AAA-rated 30-year general obligation (GO) municipal bonds yield 4.99%, equating to a taxable-equivalent yield of 6.93% (based on a 28% tax bracket).

No AAA-rated state issuer has defaulted in modern history, so I will ignore default risk. A more conservative approach, which I will leave to future researchers, would assume a non-zero default rate and a recovery rate in the event of default.

Skeptics may point out that many states, such as California, face fiscal challenges. I agree, however, with Tom Doe of Municipal Market Advisors, who argues that it is "virtually impossible" for a state to default, since state governments have many options to raise revenue to meet debt payment obligations, and the Federal government has a strong incentive to prevent defaults by states.

I assume a highly diversified portfolio of these bonds, which are typically callable in 10 years at 101 or 102.

For TIPS, I use the current yield to maturity (2.22%) on the 20-year issue on January 15, 2009, which carries a 2.5% coupon. I assume that these bonds can be purchased at par with a 2.22% coupon and that there is no risk of default.

I also assume that TIPS and municipal bonds are annually repriced based on their current spreads relative to the CPI index (i.e., a 100 basis point increase in the CPI index results in a 100 basis point increase in bond yields). For the municipal bonds, I price these bonds to maturity and to a call price of 101, and use the lower of the two prices. If a bond is called, I assume that new bonds are purchased at then-prevailing interest rates, adjusted based on changes in the CPI.

I assume that any excess returns (when income exceeds withdrawals) are reinvested in the portfolio and, conversely, that shortfalls are funded by selling assets. This is consistent with previous studies, although a more rigorous approach would take into account the reinvestment risk associated with these cash flows.

I have not included any advisory fees.

Aside from the possibility of the muni bonds being called, the cash flows from this portfolio are known with complete certainty. Only the rate of inflation must be forecast to determine the safe withdrawal rate.

I analyzed this portfolio under the following scenarios:

- Constant inflation rates of -2%, -1%, 0%, 2%, 3%, 4% and 5%
- Historical inflation rates from 1966-1996. Consistent with prior research, I chose 1966 as the starting point because it represents the start of the most severe period of inflation in US history. It was also the start of a secular bear market, so this scenario is the worst case based on empirical data
- Inflation equal to twice the previous scenario, in order to simulate a hyperinflationary environment
- The inflation rate necessary to allow for a 4% withdrawal rate

The average inflation rate since 1966 has been 4.60%. Most of that inflation, however, occurred in the 1970s and early 1980s. Since 1985, the average inflation rate has been 3.07%.

In each case, I determined the two "safe" withdrawal rates – one that eventually depletes the principal (analogous to Bengen and other studies) and one that retains the starting principal balance.

The results are as follows:

Assumed Inflation Rate	**Safe Withdrawal Rate (%) Depleting Principal**	**Safe Withdrawal Rate (%) Without Depleting Principal**
-2% (deflation)	8.69	4.48
-1% (deflation)	7.48	4.27
0%	6.49	4.07
1%	6.02	4.28

2%	5.60	4.38
3%	5.12	4.26
4%	4.75	4.13
5%	4.44	4.01
5.14%	--	4.00
7.09%	4.00	--
Historical inflation as of 1966	4.08	3.78
Historical inflation twice the 1966 rate	3.28	3.25

The results have several key implications:

- A retiree can replicate Bengen's "safe" withdrawal rate of 4% even with an inflation rate of 7.09%, more than twice the average inflation rate since 1985.
- Average inflation of 5% permits 4.01% withdrawal *without depleting principal.*
- Under the historical worst-case scenario – the inflationary environment of starting in 1966 – a 4.08% withdrawal rate remains possible.
- The portfolio performs exceptionally well in a deflationary environment (largely because the TIPS principal cannot go below par). Deflation is not unprecedented – the CPI declined 27% between 1929 and 1933.
- The true worst-case scenario is hyperinflation but, even assuming a 4% withdrawal rate and the last scenario above (twice the inflation rates starting in 1966), income from the portfolio exceeds withdrawals for the first nine years. Thus, the retiree has ample time to adjust allocations or reduce spending habits.

But these implications don't even account for the true value of this portfolio – it is invulnerable to unpredictable market crashes, particularly those that might occur at the beginning of the retirement period.

Kitces' research suggests that the safe withdrawal rate for a conventional equity-centric portfolio may be upwards of 5.5% if valuations slip a little further into the "undervalued" territory – and that's a 5.5% minimum, with an average of over 7%. Thus, in lower valuation environments, retirees who choose an all-bond portfolio may trade a lot of potential upside for a little more certainty.

In the event of rapid and severe inflation, the retiree could shift assets from TIPS to municipal bonds, locking higher fixed rates.

Inflation has not been kind to equity-centric portfolios. The only modern experience with high inflation in the US was the 1970s, when inflation averaged 7.1%. During that decade, stocks returned 5.8% annually on a nominal basis

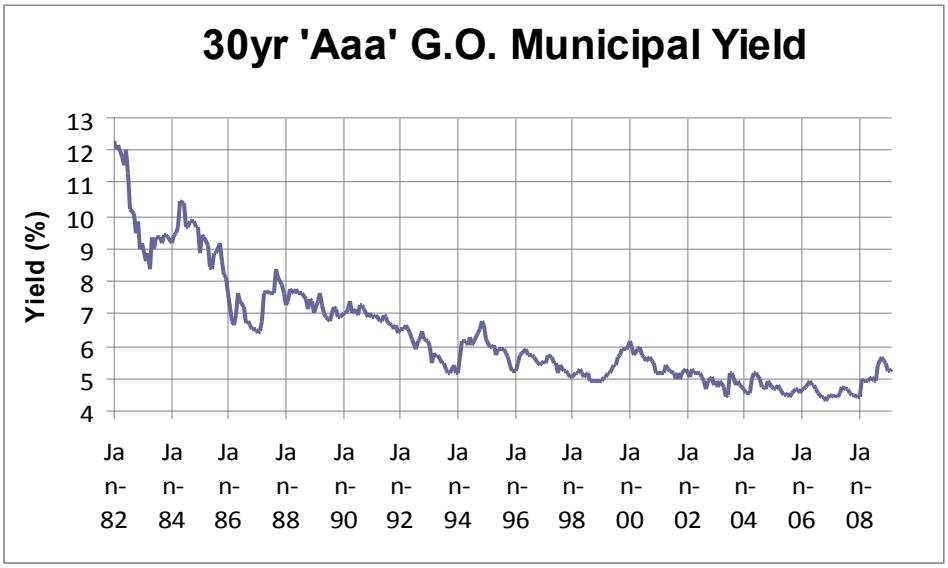
(including reinvested dividends), but they returned just -1.4% on an inflation-adjusted basis.

Today's retirees risk a similar environment in coming years, its likelihood amplified by each announcement of increased government deficits.

Implementation Concerns

Because investors must construct a diversified municipal bond portfolio with half their assets, this approach requires a minimum portfolio size of at least $2 million. For smaller portfolios, the investor must either sacrifice diversification or use an all-TIPS allocation.

The safe withdrawal rates from this portfolio are highly sensitive to current market conditions (specifically yields on municipal bonds). Yields on municipals are at an extraordinary level relative to Treasury bonds, but they are at an average absolute level, as shown below:



Since 1982, the average yield on AAA-rated municipals has been 6.32%, and in the past decade the average rate was 4.98%, exactly equal to current rates. Analogous to Kitces' research, investors can assume higher withdrawal rates when municipal bond rates are higher.

Instead of municipals, investors could construct a portfolio of investment grade "bullet" corporate bonds. The primary advantage is that these bonds are not callable, but that consideration is not relevant in an environment of increasing inflation. At today's rates, an investment grade portfolio consisting of issuers

such as Verizon, AT&T, Boeing, and IBM will yield approximately 6.00%, roughly the same as the taxable equivalent yield on AAA-rated munis, but with a greater risk of default.

As with previous studies, this analysis is conducted on a pre-tax basis. The use of TIPS introduces the issue of the "phantom tax" on the accrued principal value, which is taxed at ordinary income rates. For this reason, TIPS should be located in a pension account or similarly sheltered vehicle. The phantom tax issue arises in an inflationary environment, when the TIPS principal is accruing and the municipal bond values are declining. If a sheltered account is not used, up to $3,000 per year of the phantom tax could be offset against capital losses on the municipal bonds.

Only individual bonds should be purchased. Bond funds are not constructed to a fixed 30-year maturity, as is necessary in this approach. The expense ratio of a typical bond fund would impose a costly drag on the projected cash flows. For actively managed bond funds, the manager's incentives are not aligned with those of the investor. The investor seeks highly predictable cash flows over a 30 year period, whereas the bond manager is measured based on performance relative to a benchmark, usually over short time frames.

In practice, advisors may wish to construct a laddered maturity portfolio to reduce overall volatility. This would reduce the withdrawal rates I cite, assuming a rising yield curve. Depending on the interest rate environment, however, a portfolio could be constructed to support a fixed (e.g., 4%) withdrawal rate using only 20- and 30-year instruments.

Bengen and all subsequent researchers allow for the depletion of principal over the course of the 30-year period. But advisors must consider the psychological effect on retirees of watching their balance approach zero as they age. Advisors must also consider mortality risk and the possibility an investor may outlive his or her assets. For this reason, I show the safe withdrawal rates without the depletion of principal.

Some retirees may require (or desire) unrealistically high withdrawal rates. Under the equity-centric approach, planners could increase the equity allocation to 100% or, if that isn't enough, advise the client to take a trip to Las Vegas. Under the all-bond approach, planners can use increasingly risky bonds. Planners must then consider the risk of default and the introduction of excessive volatility. But these risks are quantifiable, making the approach far more preferable to the near-certain loss of principal from gambling one's savings in a casino.

Statistically, retirees are slightly more vulnerable to inflation than the rest of the population. Since 1982, the government has tracked a separate CPI index (the CPI-E) to measure the inflation that the elderly face. Over the last quarter century, the CPI-E has been 3.3%, versus 3.1% for the broad-based CPI-U (which is used for the TIPS calculation). But for wealthier retirees (i.e., those meeting the $2 million minimum portfolio criterion), inflation concerns diminish. Wealthier retirees have more options to cut back on expenses (e.g., by taking fewer vacations or buying fewer luxury goods). Overall, for less-wealthy retirees, a retirement strategy with an increased emphasis on hedging against unchecked inflation may be necessary.

If I were to retire today, this is the portfolio I would choose.

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