

How much can you safely withdraw from your retirement portfolio?

(2nd Edition)

John P. Greaney, PE

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1. The history of safe withdrawal studies

One of the most vexing questions for an early retiree is "How much can I safely withdraw per year from my retirement assets?" If you've been lucky enough to retire in your 30's or early 40's you could easily live another 60 or 70 years. Miscalculating could result in an involuntary return to the workforce, or the estate-planning headache of distributing a large net worth.

Few researchers have investigated this question.

While there isn't a great deal of research in this area (most analysts devote their time to the question of accumulating capital, not spending it), there have been a few studies on "safe" withdrawal rates. Most use data from Chicago consulting firm Ibbotson Associates showing returns from stocks, bonds, and cash since 1926 as the basis for their analysis. Even though the average annual rate of return over the past 70 years for the S&P 500 is over 10% per annum, you can't reliably withdraw an amount that large because of inflation and the ups and downs of the stock market. Reputable studies on "safe" withdrawal rates attempt to answer the question, "If I invested my whole retirement account at the market top, just before the stock market crash of 1929, how much could I withdraw per year and still not run out of money."

The Harvard study.

In 1973, Harvard University did a study to determine how much they could safely withdraw from their endowment fund without eroding the principal. Assuming a portfolio of 50% stocks and 50% bonds and cash, Harvard's analysts calculated they could withdraw 4% the first year and then adjust the subsequent year's withdrawals for inflation. For example, with 10% inflation, the second year's withdrawal would be 4.4% of the initial (i.e., first year) asset value.

The severe inflation of the mid-1970's revealed that a 50% bonds, 50% stock portfolio is far from the "efficient frontier" for longer pay out periods. Further research showed that portfolios weighted more heavily

towards equities actually supported higher “100% safe” inflation-adjusted withdrawal rates.

The Bengen study

Wall Street Journal columnist Jonathan Clements reported on a study by San Diego based financial planner William Bengen.¹ Bengen looked at year-by-year returns since 1925 for a 50/50 stock/bond portfolio. He assumed half the portfolio was in the S&P 500 and half in intermediate term government bonds. Using a 30-year holding period, he calculated that a 4.1% withdrawal rate would allow you to survive the worst market declines.²

The 7% Percent Fiasco

Perhaps the most astonishing moment in the history of safe withdrawal studies was the 1995 article by Fidelity’s legendary fund manager Peter Lynch entitled “Fear of Crashing.”³ In the article, Lynch asserted that it was possible to safely make an annuity withdrawal of 7% per year from a 100% stock portfolio since stocks offer a long-term total return of about 11% per annum.

Dallas Morning News financial columnist Scott Burns quickly wrote an article⁴ showing that you didn’t have to travel all the way back to the Great Depression to find problems with a 7% withdrawal rate. A retiree with a portfolio invested in the Dow Jones Industrial Average would have depleted his 100% stock portfolio during at least one 15- year pay out period since 1960.

To his credit, Mr. Lynch withdrew the “Fear of Crashing” article shortly after Burns published his rebuttal and hired Burns as a columnist for *Worth* magazine. Most financial professionals only study the process of accumulating assets. The very different rules for effectively

¹ Clements, Jonathan, *Wall Street Journal*, February 27, 1997, page C1.

² Bengen, William P, “Determining Withdrawal Rates Using Historical Data”, *Journal of Financial Planning*, October 1994, pp 171-180, Volume 7, Number 4.

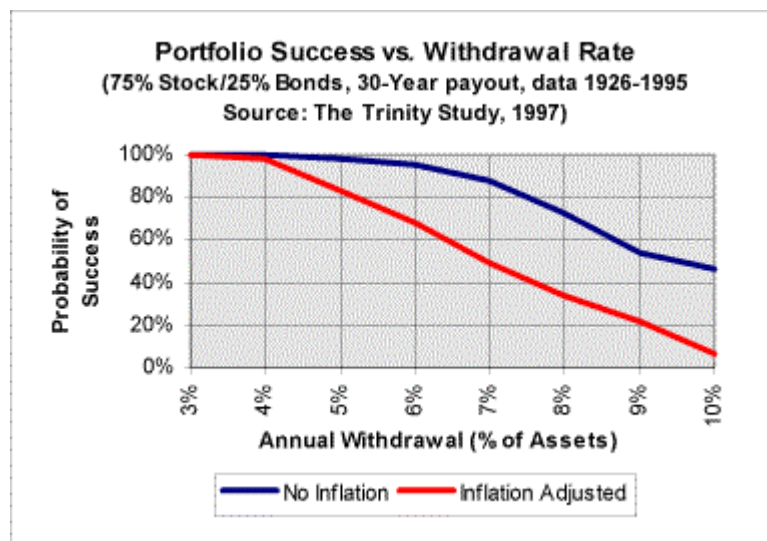
³ Lynch, Peter, “Fear of Crashing” *Worth* magazine, September 1995

⁴ Burns, Scott, “Dangerous Advice from Peter Lynch”, *Dallas Morning News*, Sunday October 1, 1995

managing distributions can trip up even a bona fide investment celebrity like Peter Lynch.

The Trinity study

Three Trinity University (San Antonio, TX) researchers⁵ measured the "success rate" of various portfolios from 1926 to 1995. The "success rate" is the percent of time a retiree could sustain a given withdrawal rate without depleting his retirement assets. They also calculated success rates while adjusting withdrawals for inflation/deflation, much like the Harvard study. This analysis showed, that of the portfolios considered, the optimal asset mix is a portfolio of 75% stock and 25% long-term corporate bonds. For a 30-year payout period and a 4% withdrawal rate, this mix had a 98% success rate. At a 3% withdrawal rate, the 75/25 mix had a 100% success rate. Interpolating these results would give you a "safe" withdrawal rate of slightly less than 4%, virtually identical to the Harvard study.



⁵ "Cooley, Philip L., Hubbard, Carl M., Walz, Daniel T., "Retirement Savings: Choosing a Withdrawal Rate That Is Sustainable", *AAIL Journal*, February 1998, pp 16-21.

The Jarrett/Stringfellow Study

San Antonio, Texas-based financial planners Jaye Jarrett and Tom Stringfellow completed a study in 1999 using the annual market indices from Ibbotson Associates covering the years 1926-1998.⁶ They calculated withdrawal rates for several scenarios including maintaining the inflation-adjusted value of the portfolio principal. Their calculation for “Portfolio Ending Market Value Greater Than Zero Based On Withdrawal Increases by Inflation Every Year” most closely matches the Retire Early study below. The “100% Safe” inflation-adjusted withdrawal for a portfolio of 75% S&P500 index and 25% bonds was 4.00% assuming investment expenses of zero. Substituting small-cap stocks for the S&P500 index increased the “100% Safe” withdrawal to 4.05%.

Jarrett also combined Large and Small cap stocks in the portfolio for one set of calculations. A portfolio of 37.5% S&P500 index, 37.5% Small Cap stocks, and 25% bonds, yielded a “100% Safe” withdrawal of 4.21%. This is the first study to combine three asset classes using data prior to 1929. It’s a welcome addition to the research in this area.

Other “Safe” Withdrawal Studies/Calculators

There have been numerous other “safe” withdrawal studies based on more limited data series. For instance, in 1999 the Motley Fool posted its Real Money Retirees Portfolios based on Foolish Four history for the years 1961 through 1998. Any withdrawal strategy that hasn’t been back tested prior to 1929 should be used with caution. As prominent fee-only financial planner Frank Armstrong writes, “Pretending that the stock crash of ’29 could never repeat is an exercise in delusion”⁷

Today, just about every financial web site and “money magazine” has a retirement calculator of one type or another. Most require users to

⁶ Jarrett, Jaye C., Stringfellow, Tom, “Optimal Withdrawals From an Asset Pool” 1999, see <http://jjarrett.home.texas.net/resOptWD/paper.htm>

⁷ Armstrong, Frank, “Retirement Planning – Making It Last Forever”, Morningstar.com, Jan. 8, 1999, See link: <http://news.morningstar.com/news/MS/ifk/990108farmstrong.html>

make assumptions on investment returns and inflation rates. This has some chance of providing useful results while you are accumulating retirement assets, but can yield to dangerous conclusions as to the safe withdrawal rate during retirement. During retirement, retirees must also concern themselves with the variability of both investment returns and inflation. Using “straight-line” averages won’t do that.

Among the few retirement calculators that do a good job estimating retirement withdrawals are the FinancialEngines.com (FE) web site and T Rowe Price’s Retirement Income Manager. Both use a Monte Carlo simulation to determine the probability of success for a given retirement withdrawal.

One disadvantage of the Financial Engines software is the fact that the program assumes that the retiree liquidates his portfolio and buys an immediate lifetime annuity on the day he retires. (The inadvisability of this course of action will be discussed later in this report.) Financial Engines’ CEO Jeff Maggioncalda says that better “retirement-planning tools are being developed.”⁸

Monte Carlo simulation is very sensitive to the range of input values employed in the analysis. A Monte Carlo program that told you that more than a 4% withdrawal rate was safe for a 40-year pay out period is ignoring the Crash of 1929 and its aftermath. A program advising limiting withdrawals to 3% is assuming something worse than the Crash of 1929. There’s nothing wrong with that, but most people are looking for an excuse to withdraw more than 4%, not less.

2. The Retire Early Study on Safe Withdrawal Rates.

The *Retire Early* study makes three improvements on earlier research: the use of a longer data series, the ability to measure the effects of investment expenses on safe withdrawal rates, and the ability to identify portfolios at the “efficient frontier.” The Excel spreadsheet used

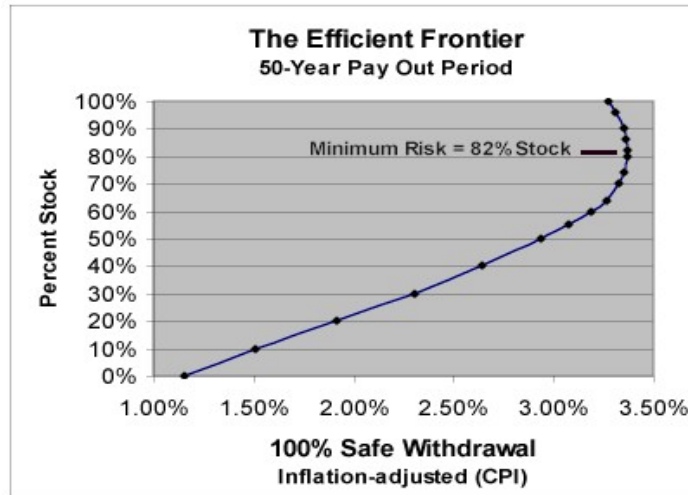
⁸ Hube, Karen, “Monte Carlo Simulator May Help in Planning”, *Wall Street Journal*, April 27, 2000.

to perform the study can be downloaded at the Retire Early Home Page web site.

The *Retire Early* study uses a data series compiled by Professor Robert J. Shiller of Yale University that tracks stock market returns from 1871 to 2000.⁹ The maximum "100% safe" withdrawal rates were calculated for 10, 20, 30, 40, 50, and 60-year pay out periods. The terminal portfolio values and optimal stock allocation (i.e., the "efficient frontier") for each pay out period were also determined.

What is the Efficient Frontier?

The efficient frontier is the mix of assets that offers the highest investment return with the least amount of risk. Harry M. Markowitz first described this concept in the early 1950's.¹⁰ He won the Nobel Prize in Economics in 1990 along with William F. Sharpe and Merton Miller for his work on diversification and investment returns.



⁹ Shiller, Robert J., *Irrational Exuberance*, Princeton Univ. Press, 2000. p. 235.

¹⁰ Markowitz, Harry M., *Portfolio Selection – Efficient Diversification of Investments*, Yale University Press 1959

In the context of retirement withdrawals, the optimal point along the efficient frontier yields the maximum 100% safe withdrawal. For example, for a 50-year pay out period, the maximum inflation adjusted withdrawal using the CPI to index inflation is 3.86%. This withdrawal rate is achieved with a portfolio of 82% stock and 18% fixed income securities.

The efficient frontier is not a mathematical or physical constant like π (3.14159) or the speed of light c (3×10^8 meters/sec). It's merely an observation of past history. The efficient frontier for a given pay out period going forward will likely vary somewhat from the recent past. For example, the following table shows the efficient frontier stock allocation for the three worst 50-year pay out periods from 1871-2000. The efficient frontier for the second and third worst periods differs slightly from the 50-year pay out period beginning in 1929.

50-Year Pay Out Period Beginning (Year)	Maximum 100% Safe Inflation-Adjusted Withdrawal	Efficient Frontier (% Stock)
1929	3.86%	82%
1910	3.93%	83%
1930	3.97%	79%

This also has an impact on annual portfolio rebalancing. There's really no need to get your portfolio allocations exact. As long as you come within 1% to 2% of the efficient frontier, you are likely to do as well as a neighbor slavishly maintaining the exact allocations.

Study Results

The table below assumes a \$1,000 initial portfolio value and shows the **maximum initial inflation adjusted annual withdrawal** (as a percent

of assets) that allows the portfolio to survive to the end of all pay out periods examined. Annual investment expenses were assumed to be 0.20% of assets, duplicating what an investor would pay for a low cost S&P 500 index fund. The percentage of stocks in the portfolio was varied to determine the asset allocation that maximized the "safe" withdrawal rate. Finally, the range of terminal values for the initial \$1,000 portfolio for each pay out period was determined. The **terminal value** is the value of the portfolio after the final annual withdrawal is taken at the end of the pay out period.

Survivability is the probability that there will be funds remaining in the portfolio at the end of the pay out period. For example, a survivability of 100% means every terminal value was positive. If we examined 100 pay out periods and found the terminal value of the portfolio was negative in 25 out of the 100 pay out periods, we would say that withdrawal rate was "75% survivable." The **maximum 100% survivable withdrawal rate** is the highest annual withdrawal rate where all terminal values are positive for the pay out periods examined.

The **pay out period** is the length of time you require the retirement payments to continue. Retirees may want to add a margin of safety to their life expectancy to ensure they don't outlive their assets. For example, a 53-year-old with a life expectancy of 30 years to age 83 might want to use a 40-year pay out period.

The **terminal values** shown in the table below are ordered from highest to lowest. For example, there were 100 thirty-year pay out periods examined. With a "100% safe" inflation-adjusted withdrawal rate of 3.81%, the maximum terminal value was \$11,133 for an initial portfolio of \$1,000 and the minimum was \$1. The 25% "Terminal Value" of \$2,591 means that in 75 of the 100 pay out periods examined a "100% safe" withdrawal rate resulted in a higher terminal value.

Retire Early Safe Withdrawal Study - (1871-2000)						
Pay Out Period	10 Yrs	20 Yrs	30 Yrs	40 Yrs	50 Yrs	60 Yrs
Optimal Stock Allocation	48%	66%	74%	77%	82%	85%
Investment Expenses	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
Inflation Index	PPI	PPI	PPI	PPI	PPI	PPI
100% Safe Rate	8.47%	4.78%	3.81%	3.54%	3.35%	3.24%
Survivability	100%	100%	100%	100%	100%	100%
Periods Examined	120	110	100	90	80	70
Terminal Values (Initial Portfolio Value = \$1,000)						
Max	1,826	8,301	11,133	38,759	181,388	231,174
95%	1,416	4,477	8,836	29,080	118,388	184,882
90%	1,277	3,465	7,834	24,664	75,186	120,288
75%	970	2,055	5,403	18,738	39,217	78,830
Median	690	1,509	3,977	7,777	16,434	42,697
25%	440	1,050	2,591	5,132	10,833	23,898
10%	181	702	1,607	2,856	9,099	16,609
5%	79	493	1,313	2,465	6,311	13,926
Min	0	1	1	44	9	27

Maximum "100% Safe" Inflation Adjusted Withdrawal Rates.

The maximum "100% safe" withdrawal rate decreases as the pay out period increases. Using the Producer Price Index (PPI) to index withdrawals, a 20-Year pay out period allows for a 4.78% first year, inflation adjusted withdrawal, while a 60-Year pay out period requires that the first year withdrawal be reduced to 3.24% to remain 100% safe. Using the Consumer Price Index for All Urban Consumers (CPI-U) increases these "100% safe" withdrawal rates by about 50 basis points. The chart below illustrates these results.

3. Why is inflation so important?

Inflation is probably the biggest threat to a retiree taking annual withdrawals from an investment portfolio. Even the 2% annual average for the period from 1871 to 2000 would double a retiree's living expenses in 35 years. There have been 30 and 40-year periods with much higher average inflation rates. The following table shows the distribution of actual inflation rates for holding period from 10 to 60 years using the CPI data series compiled by Prof. Robert J. Shiller.

Average Annual Inflation Rates

Consumer Price Index (CPI) 1871-2000

	10 Year	20 Year	30 Year	40 Year	50 Year	60 Year
MAX	8.67%	6.38%	5.41%	4.65%	4.62%	4.25%
95%	7.32%	6.27%	5.29%	4.50%	4.37%	4.11%
90%	6.35%	5.91%	5.03%	4.44%	4.29%	4.09%
MEDIAN	2.55%	2.78%	2.47%	1.97%	2.28%	2.34%
10%	-2.40%	-1.18%	-0.06%	1.12%	0.93%	0.54%
5%	-2.77%	-2.37%	-0.83%	-0.23%	0.68%	0.33%
MIN	-3.25%	-2.91%	-1.59%	-0.81%	0.51%	-0.01%

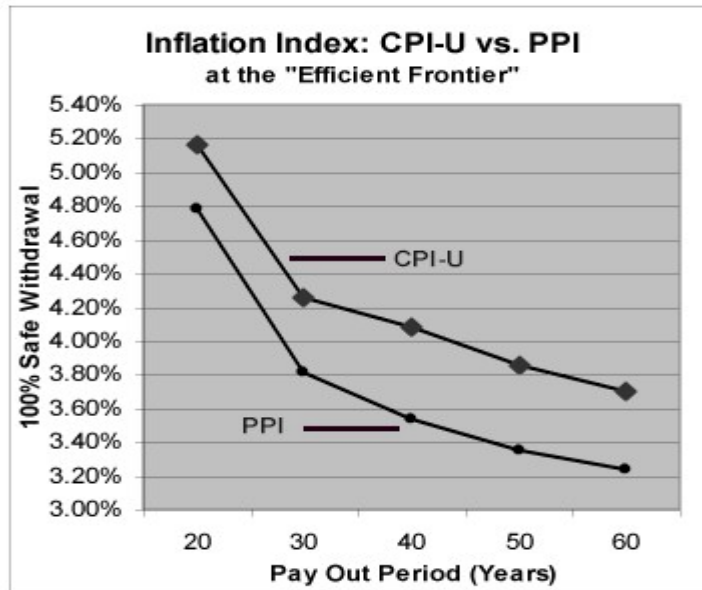
Many people are surprised to learn that in 10% of the 30-year holding periods examined, the CPI actually declined, signifying an extended period of **deflation**. All of the extended periods of deflation occurred when the US was on the gold standard. This limited the ability of the Federal Reserve to take action under these circumstances.

Which Inflation Index to Use?

The earlier version of the Retire Early Safe Withdrawal Calculator used the PPI to adjust annual withdrawals for inflation. Prof. Shiller switched to the CPI-U in his most recent monthly data series. Shiller explains, "In the past, there was not much difference between the PPI and the CPI, except for short-run oscillations, but since the mid-1980's the levels of the series have diverged substantially."

Retire Early Safe Withdrawal Study - (1871-2000) - CPI vs. PPI						
Pay Out Period	10 Yrs	20 Yrs	30 Yrs	40 Yrs	50 Yrs	60 Yrs
Optimal Stock Allocation	48%	66%	74%	77%	82%	85%
Investment Expenses	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
Withdrawals indexed with the PPI						
100% Safe	8.47%	4.78%	3.81%	3.54%	3.35%	3.24%
98% Safe -	8.48%	4.80%	4.01%	3.77%	3.59%	3.44%
95% Safe -	8.71%	5.26%	4.33%	4.45%	3.81%	3.78%
90% Safe -	9.35%	5.62%	4.78%	4.82%	4.50%	4.23%
Withdrawals indexed with the CPI-U						
100% Safe	8.84%	5.16%	4.26%	4.08%	3.86%	3.70%
98% Safe -	9.00%	5.32%	4.40%	4.12%	3.93%	3.83%
95% Safe -	9.27%	5.51%	4.52%	4.25%	3.99%	3.92%
90% Safe -	9.78%	5.70%	4.71%	4.56%	4.29%	4.08%

One interesting anomaly between the CPI and the PPI is that even though inflation as measured by the CPI is actually higher than the PPI (CPI = 2.04% annual average from 1871-2000, PPI = 1.66% annual average over the same 130 year period) the annual “100% safe” inflation-adjusted withdrawal using the CPI as the inflation measure is also higher. Of course, one would expect that higher inflation would result in a **lower** withdrawal rate. How can this be?



The answer is in the variability of the year-to-year changes in the inflation rate as measured by the two indices. The PPI showed greater inflation in a few years that the stock market experienced severe declines. This had the effect of significantly reducing the resulting “100 safe” withdrawal rate. It also points out the folly of using “average values” to determine retirement withdrawals.

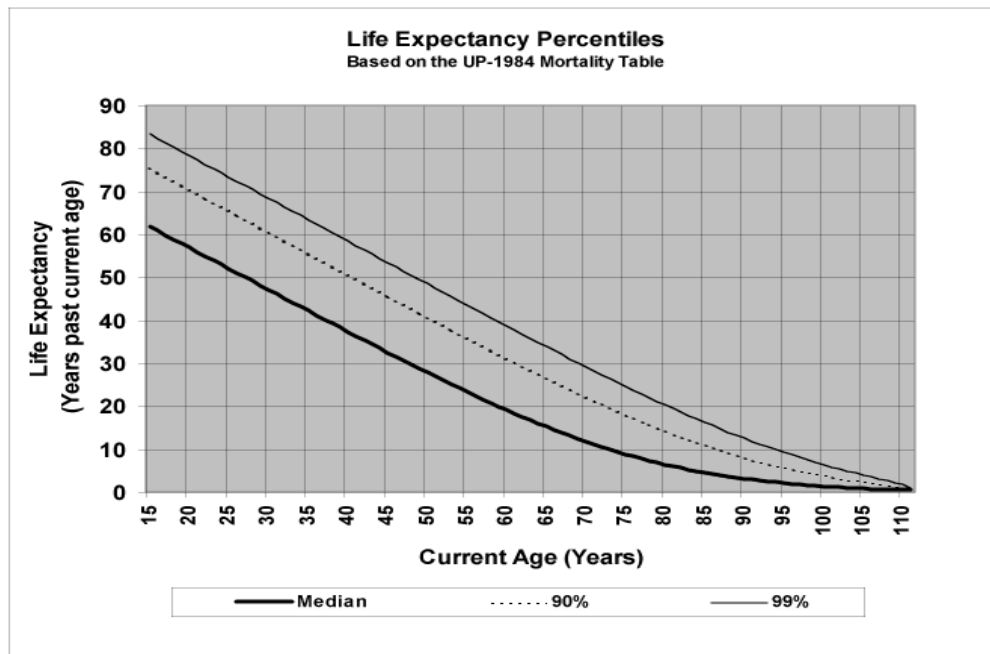
The real question isn’t “What inflation index to use?” It’s “What is your personal inflation rate?” The CPI under estimates inflation for many

older Americans – largely because of health care costs. For that reason alone, wary retirees might want to consider using the index that results in smaller annual withdrawals.

4. How do I select my Pay Out Period?

Most people don't realize that actuarial tables and most of the calculators on the Internet show you the "average" or "median" life expectancy. That means there is a 50/50 chance you'll live longer, but how much longer?

The chart below plots the life expectancy for several probabilities from "median" to the "99th percentile" (the latter means there's only a 1% chance you'll live longer.) When selecting your pay out period for determining your safe withdrawal rate in retirement, it might be wise to

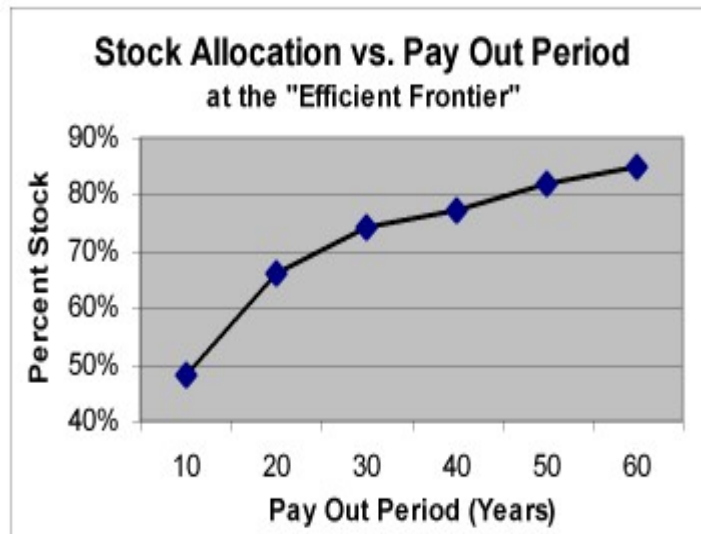


choose something higher than the "average value." This will allow for a factor of safety in your calculations.

For example, a 40-year-old has a median life expectancy of living an additional 37 years to age 77. The 99th percentile value of nearly 60 years means there is a 1% chance our 40-year-old will make it to almost 100 years of age. Advances in health care appear to hold the promise we'll all be living longer. Assuming you'll reach 100 years of age may not be as bold as once thought.

Optimal Asset Allocation

Confirming modern portfolio theory, our study shows that longer pay out periods favor portfolios with heavy concentrations of equities. Readers familiar with the concept of "efficient frontiers" will recognize that the optimal stock allocation for each pay out period closely matches the data from *Stocks for the Long Run* by Professor Jeremy J. Siegel. The results are shown below.



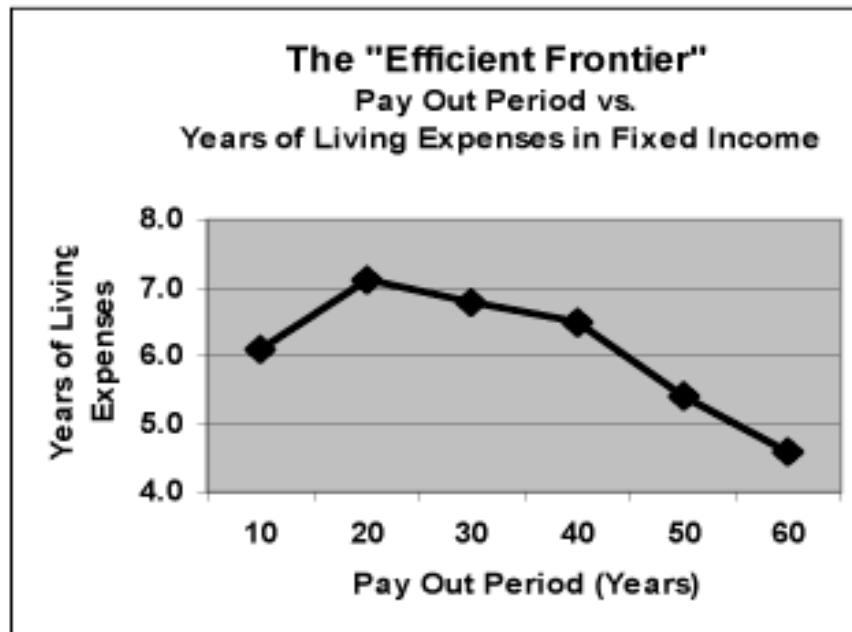
How many years' worth of expenses in cash or CDs?

One interesting result of investing at the efficient frontier is that it confirms the conventional advice to keep "3 to 7 year's worth of living

expenses in cash or CDs.” The table below shows the relationship between “100% safe” withdrawal rates and “years’ worth of cash”

Years of Living Expenses at the Efficient Frontier Retire Early Study (1871-2000) \$1,000 initial value, 50 year pay out period 82% stock/18% fixed income, rebalanced annually annual withdrawal adjusted for inflation (PPI)			
Pay Out Period (Years)	Maximum 100% Safe Withdrawal	Efficient Frontier (% Fixed Income)	Years of Living Expenses
60	3.24%	15%	4.6
50	3.35%	18%	5.4
40	3.54%	23%	6.5
30	3.81%	26%	6.8
20	4.78%	34%	7.1
10	8.47%	52%	6.1

As the following graph indicates, longer pay out periods result in the need to maintain lower fixed income allocations. Investing at the efficient frontier actually supports holding less than 5 years worth of living expenses for pay out periods in excess of 50 years.

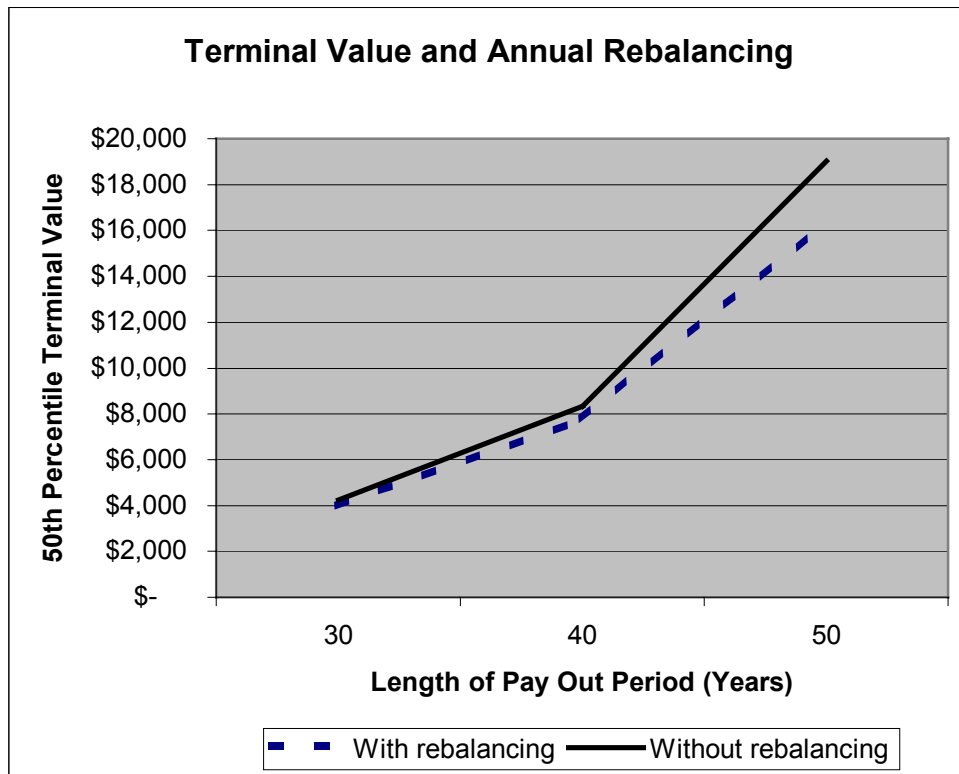


Annual Portfolio Rebalancing

The *Retire Early* study assumes that the portfolio is rebalanced each year. Failure to rebalance the portfolio results in a slightly reduced maximum "100% safe" withdrawal rate. The table below shows the effect of rebalancing for pay out periods from 10 to 60 years using either the PPI or CPI-U as the inflation measure.

Retire Early Safe Withdrawal Study - (1871-2000) – Portfolio Rebalancing						
Pay Out Period (Yrs)	10	20	30	40	50	60
Stock Allocation	48%	66%	74%	77%	82%	85%
Investment Expenses	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
100% Safe Withdrawals indexed with the PPI						
With Annual Rebalancing	8.47%	4.78%	3.81%	3.54%	3.35%	3.24%
Without Rebalancing	8.35%	4.44%	3.62%	3.42%	3.26%	3.17%
100% Safe Withdrawals indexed with the CPI-U						
With Annual Rebalancing	8.84%	5.16%	4.26%	4.08%	3.86%	3.70%
Without Rebalancing	8.70%	5.18%	4.18%	3.95%	3.77%	3.64%

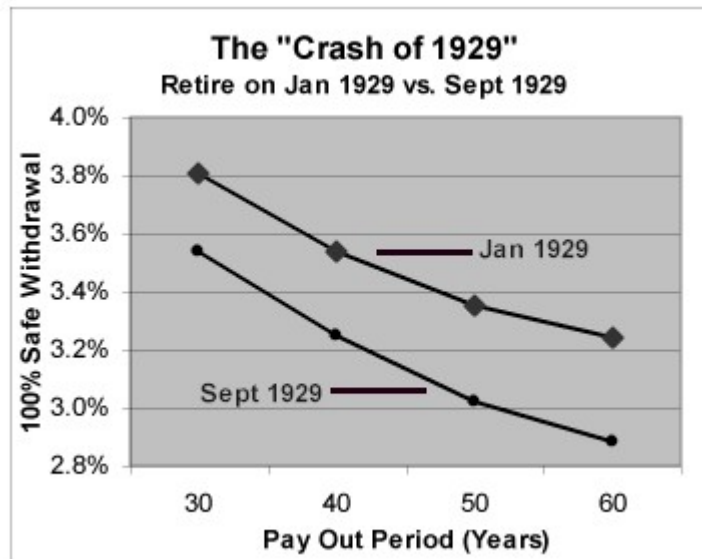
One positive aspect of forgoing annual rebalancing is that the **terminal value** of the portfolio (i.e., the amount of money left in the account at the end of the pay out period) is improved for all but the minimum case. The chart below illustrates this phenomenon for pay out periods from 30 to 50 years. Longer pay out periods show greater improvement in terminal value. Because equities have historically grown faster than fixed income securities, a portfolio that is not rebalanced will increase its equity allocation over time. An equity allocation in excess of the efficient frontier slightly reduces the safe withdrawal rate due to higher volatility while the higher average returns increase the terminal value of the portfolio.



The Crash of 1929 and The Great Depression.

While the *Retire Early* study uses the December 31st portfolio balance to calculate withdrawals, readers frequently ask, "What would happen if I retired right before the "Crash of 1929" rather than December 31st?" Replacing the December 1928 S&P500 value of 24.86 with the September 1929 value of 31.30 allows us to calculate the "100% safe" withdrawal rate for pay out periods starting the month before the October 1929 Crash. For longer pay out periods, a September 1929 start reduces the "100% safe" withdrawal by about 25 basis points. The following graph illustrates this result using the PPI as the inflation measure.

Here's a table comparing "100% safe" withdrawal rates for retirees using December 1928 vs. September 1929 portfolio values.



Withdrawal rates were calculated using both the PPI and CPI as inflation measures.

Retire Early Safe Withdrawal Study - (1871-2000) - CPI vs. PPI						
Pay Out Period (Yrs)	10	20	30	40	50	60
Stock Allocation	48%	66%	74%	77%	82%	85%
Investment Expenses	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
100% Safe Withdrawals indexed with the PPI						
Retire on 12/1928	8.47%	4.78%	3.81%	3.54%	3.35%	3.24%
Retire on 09/1929	8.48%	4.67%	3.54%	3.25%	3.02%	2.88%
100% Safe Withdrawals indexed with the CPI-U						
Retire on 12/1928	8.84%	5.16%	4.26%	4.08%	3.86%	3.70%
Retire on 09/1929	8.84%	4.92%	3.81%	3.50%	3.25%	3.10%

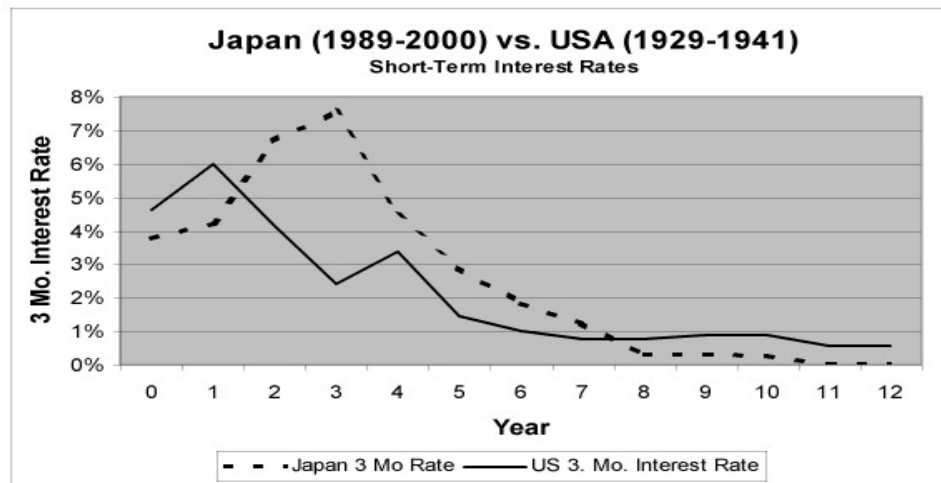
5. What's the Deal With Japan?

With the Japanese stock market piercing 16 year lows on the downside, many skittish retirees are asking, "Could that happen here?" The good news is it's unlikely, but researchers who've studied the markets in detail advise caution. For retirees, the most important question is what would happen to a portfolio undergoing retirement withdrawals if the Japanese experience were repeated in the US. Ignoring worst-case scenarios in your retirement planning is "an exercise in delusion."

The Nikki 225 index (the Japanese equivalent of the S&P500) peaked at a value of 38,915.87 in December of 1989. It's close to 12,000 today, a decline of some 70%. In comparison, the Crash of 1929 in the United States saw the Dow Jones Industrial Average drop from its Sept 1929 peak of 381.17 to a low of 79.93 in September 1932 -- a drop of 79% over three years. The initial market collapse in the US from 1929-1932 was much sharper than the long, slow decline in Japan.

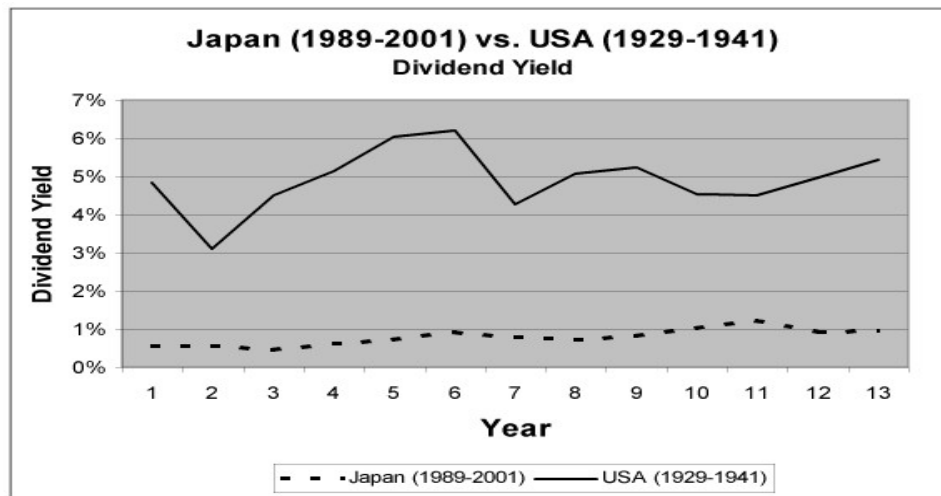
Japan (1989-2001) vs. USA (1929-1941)

Let's compare conditions in Japan over the last 12 years with what happened in the US during the Crash of 1929 and the Great Depression. Specifically, we'll look at short-term interest rates, dividend yields on stocks and inflation -- then show their effect on retirement withdrawals and a retiree's portfolio balance. Let's start with interest rates.

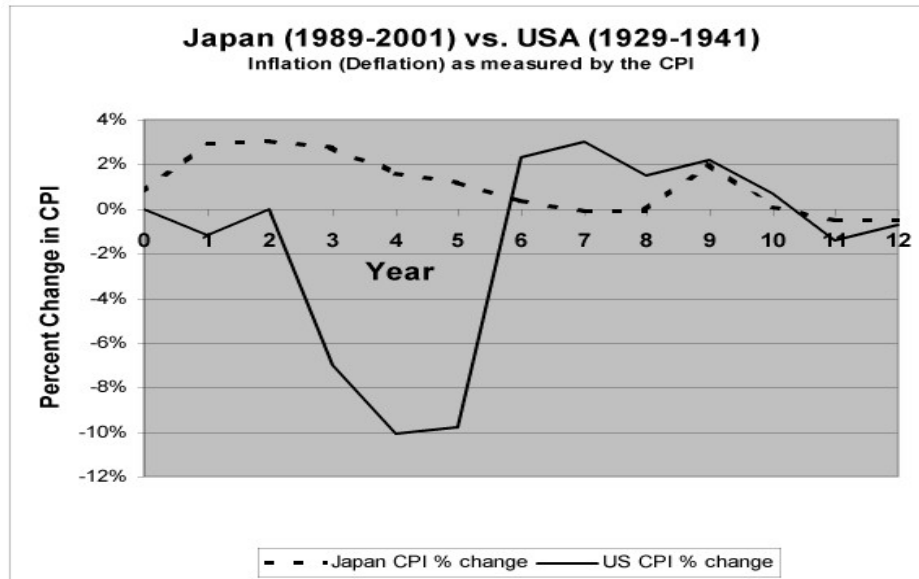


Nominal interest rates in Japan were higher than US rates in the early part of the 12-Year period of comparison, but slightly lower in the latter years. Interest rates in Japan are close to zero today.

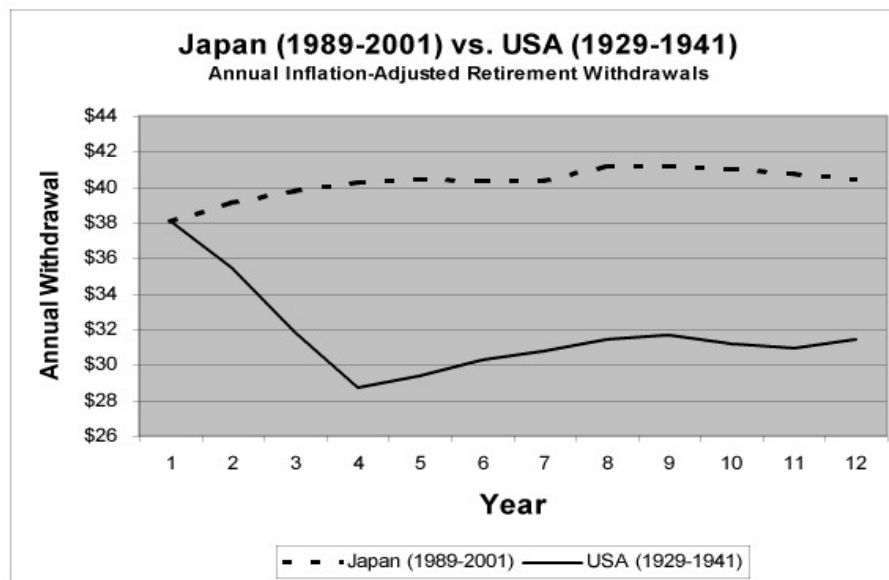
The dividend yield on stocks in the US hovered around 5% during the Great Depression. In Japan, historically dividend yields have been low. During the past 12 years, they've averaged just about 1% or less.



Inflation marks the biggest difference between the two periods. While folks decry the fact that Japan is actually seeing some **deflation** today, it's nothing like the collapse in consumer prices in the US during the Great Depression. By the fourth year after the Crash of 1929 there was about 10% annual deflation. It only cost 75 cents to buy what cost \$1.00, pre-Crash. This had a dramatic effect on retirement withdrawals.

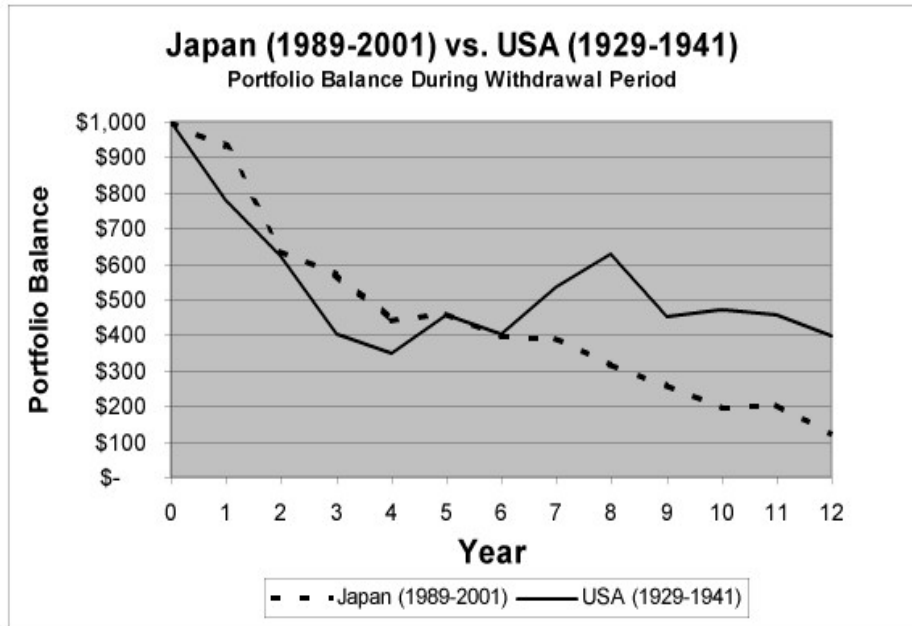


The collapse in consumer demand and accompanying deflation actually helped retirees in the Great Depression. Inflation adjusted withdrawals in the US were about 16% lower by the end of the period, whereas they increased slightly in Japan.



The

final chart below illustrates what would have happened to a Japanese retiree who began his retirement in Dec 1989 at their market peak and compared it with an American retiring in October 1929. Both retirees start with \$1,000 portfolio, 74% stock/26% cash, 30-Year pay out period, and a 3.81% inflation-adjusted withdrawal rate (which is the "100% safe" rate for the US retiree.) Investment expenses were assumed to be 0.20% of assets per annum.



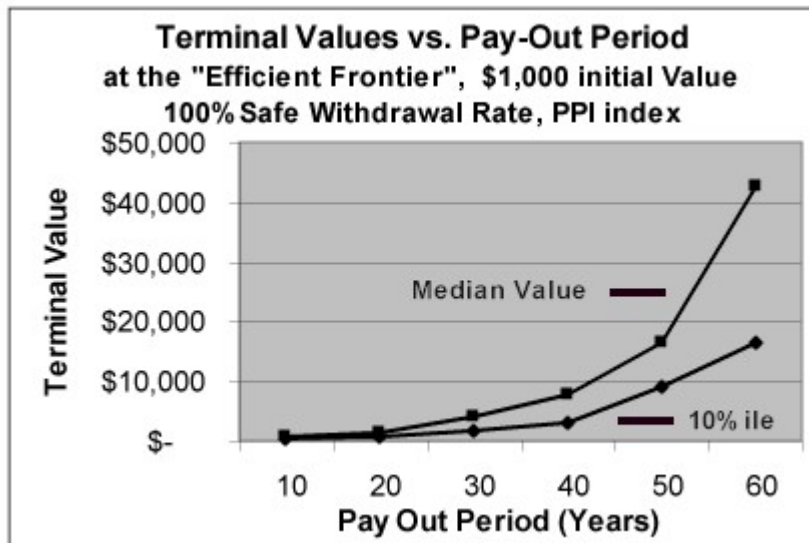
An American retiring in 1929 would have seen his \$1,000 portfolio decline to \$349 by 1933 (the 4th year of his pay out period, recover to \$628 by 1937 only to see it decline to \$397 by 1941 (the 12th year of the 30 year pay out period.)

Our 1989 Japanese retiree would have been ahead of the American at Year 4 (\$440 vs. \$349), but the continuing slow market decline and low interest rates would have caused his portfolio to decline to \$121 by this year, the 12th year of his retirement. Our Japanese friend, while still

intact, is likely very nervous. The 30-Year survivability of his portfolio is certainly in doubt.

Terminal Portfolio Value

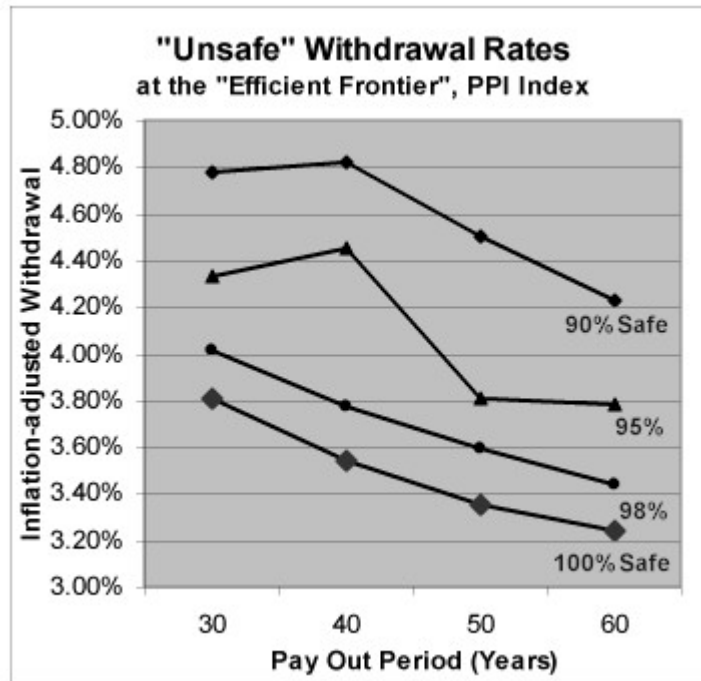
Limiting your annual withdrawals in retirement to the "100% safe" level results in a significant portfolio at the end of all pay out periods. For a retiree starting with \$1 million and a 50-year pay out period, there is a 50/50 chance of winding up with a portfolio of more than \$16 million. That's \$16 million after making annual inflation adjusted withdrawals for 50 years. Indeed, there is a 90% chance our retiree will have more than \$9 million after 50 years. These surprising results appear in the following chart.



What about "unsafe" withdrawal rates?

If you are willing to accept a little uncertainty, you can dramatically increase your annual retirement withdrawals -- especially if you have a

50 or 60-year pay out period. For example, for a 50-year pay out period moving from the "100% safe" withdrawal rate to the "90% safe" rate increases your annual withdrawal from 3.35% to 4.50% (using the PPI as the inflation measure.) That's a 34% increase in your retirement income. A chart of several "unsafe" withdrawal rates is shown below.



Methuselah withdrawal rates

Safe withdrawal pioneer William Bengen recently published on study on so called "Methuselah" withdrawal rates.¹¹ (Methuselah is the biblical character reputed to have lived in excess of 900 years.) Using a variant of the Ibbotson data, and the CPI as the inflation measure,

¹¹ Bengen, William P., "Making the Money Last", Financial Advisor Magazine, Nov/Dec 2000
http://www.financialadvisormagazine.com/artciles/nov_dec_2000_moneylast.html

Bengen concluded that the safe withdrawal rate for pay out periods 75 years or longer appears to be about 3.5% of the initial portfolio value for an asset allocation of 63% large cap stocks and 37% intermediate-term government bonds.

The Retire Early Study using Shiller's 1871-2000 database indicates that you may be able to improve on Bengen's 3.5% withdrawal rate with a slightly higher allocation to equities. The efficient frontier for a 60-year pay out period is 85% stock. That allocation yields a 3.70% safe withdrawal rate. Longer pay out periods favor heavier allocations to equities.

6. Increasing retirement withdrawals -- limiting the Terminal Value of your portfolio

Once people learn that low, "safe" withdrawal rates will likely result in a huge net worth when they're age 90 they often ask, "How can I spend more while I'm still young?" There are two strategies that one can employ to accomplish this.

Declare the "start" of a "new" pay out period.

If you started your withdrawals in 1997, and your portfolio grew by 20% in 1998, you could decide to use your December 31, 1998 portfolio balance to start a new pay out period. This would result in a higher inflation adjusted annual withdrawal. If your portfolio had lost value during the year, you would base your annual withdrawal on your "all-time high" December 31st portfolio value, plus an inflation adjustment. Adopting this practice greatly reduces the likelihood that you'll have a large net worth at the end of the pay out period.

This safe retirement withdrawal strategy is called the **Pay Out Period Reset (POPR)** method. It results in an **increase** in the "Sum of the Annual Withdrawals" and is accompanied by a **decrease** in the Terminal Value of the portfolio. The following table shows the results for the "100% safe inflation adjusted withdrawal rate" for pay out periods from 10 to 50 years invested at the "efficient frontier." Annual investment expenses were assumed to be 0.20% of assets. (About the

cost of a Vanguard S&P500 index fund.) The PPI was used as the inflation index.

There is much good news in the following table.

Pay Out Period Reset (POPR) Method vs. Ordinary Inflation Adjusted Withdrawals (OIAW)					
Pay Out Period	...10 Years	...20 Years	...30 Years	...40 Years	...50 Years
% Stock	44%	66%	74%	77%	82%
"100% Safe" Withdrawal	8.47%	4.78%	3.81%	3.54%	3.35%
----Percent Increase in Sum of Withdrawals----					
Max	47%	179%	271%	342%	362%
95%	20%	93%	147%	175%	218%
90%	17%	76%	128%	161%	200%
75%	5%	41%	82%	127%	151%
Median	0%	17%	34%	59%	103%
25%	0%	4%	14%	40%	75%
10%	0%	0%	2%	28%	49%
5%	0%	0%	0%	22%	26%
Min	0%	0%	0%	0%	0%
-----Percent Decrease in Terminal Values-----					
Max	0%	0%	0%	0%	0%
95%	0%	0%	0%	-32%	-45%
90%	0%	0%	-9%	-39%	-57%
75%	0%	-6%	-22%	-45%	-63%
Median	0%	-18%	-33%	-56%	-68%
25%	-6%	-31%	-49%	-63%	-74%
10%	-15%	-52%	-70%	-80%	-84%
5%	-25%	-58%	-76%	-84%	-84%
Min	-40%	-86%	-79%	-87%	-87%

A retiree with a 50-year pay out period has a 50/50 chance of more than doubling (i.e., a 103% increase) his retirement withdrawals above an inflation adjusted annual withdrawal. There's a 90% probability his withdrawals over the 50-year pay out period will increase by at least 49% above the inflation-adjusted withdrawal.

While the **Pay Out Period Reset (POPR)** method doesn't increase the initial "100% safe" inflation adjusted withdrawal, it does show that the retiree has a high probability of being able to take increasing retirement withdrawals over his lifetime. It's just that we can't tell exactly when or how much in advance. Many retirees will see "raises" in retirement that exceed what they enjoyed while employed.

7. Investment Expenses -- why no one mentions the effect of fees and commissions.

High fees and commissions can place a big drag on the performance of your investments. If your investment expenses are too high, they may even prevent you from retiring at all.

Investment advisors and mutual fund managers have an incentive to charge as much as they can for their services. Regrettably, there is no evidence that paying high fees and commissions improves investment performance.

The table below shows **the maximum 100% survivable inflation adjusted annual withdrawal**, for various levels of investment expenses for a 50-year pay out period. This analysis is based on historical stock market returns from 1871 to 2000 collected by Shiller. The study assumes a 50-year pay out period and a portfolio of 82% stock and 18% fixed income securities, rebalanced annually. The annual withdrawals are adjusted annually for inflation / deflation. The table also shows the median and 25th percentile terminal values of the portfolio at the end of the 50-year pay out period. (Note: The 25th percentile terminal value is the value that is exceeded by 75% of the 50-year pay out periods considered.)

Effect of Investment Expenses on Withdrawals Retire Early Study (1871-2000) \$1,000 initial value, 50 year pay out period 82% stock/18% fixed income, rebalanced annually annual withdrawal adjusted for inflation (PPI)			
Total Investment Expenses	Maximum 100% Safe Withdrawal	Median (50/50) Terminal Value	25th Percentile Terminal Value
0.02%	3.44%	\$18,043	\$11,882
0.20%	3.35%	\$16,434	\$10,833
1.43%	2.74%	\$8,991	\$5,792
2.50%	2.25%	\$5,293	\$3,341
4.50%	1.46%	\$1,840	\$1,156

An expense ratio of **0.02%** would only be achievable on a "do-it-yourself" basis. This would mean using direct purchase FDIC-insured bank CDs or US Treasury securities for the fixed income portion of the portfolio and a diversified collection of 15 to 20 S&P500 stocks bought through a deep discount broker for the stock allocation. You should have an account value of at least \$100,000 before attempting this strategy. Less than that, and an index fund would have lower fees and fewer headaches.

Using a low fee mutual fund provider such as Vanguard, USAA or TIAA-CREF should allow you to assemble a portfolio with an expense ratio approaching **0.20%**. A short to intermediate term US Government bond fund could be used for the fixed income portion while the popular S&P500 index fund would be a good choice for the stock portion. Even

retirees with sizeable portfolios (i.e., more than \$200,000) may prefer this approach since it requires little ongoing maintenance.

The latest Morningstar data shows that the average mutual fund has an expense ratio of **1.43%**.¹² If you're paying anything close to this you should seek out some of the low fee alternatives. Not only will this allow you to increase your "100% survivable" annual withdrawal, but the terminal value of your portfolio will be higher as well. If you started with \$1 million, you have an even chance of being over \$7 million richer at the end of 50 years if you use an index fund with a 0.20% expenses ratio rather than an actively managed fund with a 1.43% expense ratio.

High fees and commissions really hurt.

You would probably have to have a variable annuity, a "wrap account" with a full service broker, or a financial planner charging a fee of 1% of assets in addition to your mutual fund management fees to reach an expense ratio of **2.50%** or more. You'll also need to be very wealthy if you expect to retire. These types of fee arrangements will easily reduce your "100% survivable" annual withdrawal by 1% or more. As the table shows, that's a 25% to 50% reduction in retirement income compared to what you could have safely withdrawn from an index fund. The terminal value of your portfolio will also be far lower under this scenario.

If anyone tries to sell you any of these high fee "investment products" - **RUN!** If you're already in a variable annuity (VA), surrender charges and the tax consequences of switching out of the VA may mean you're trapped. If the surrender period has elapsed, you might consider a "1035 exchange" to a VA with lower expenses. Consider putting any new retirement savings in a low fee alternative. If you're in a "wrap account" or have a financial advisor charging 1% of assets rather than an hourly fee, you really need to evaluate the wisdom of that arrangement.

¹² Kelly, Erin, "Fund Fees: How Much Is Too Much?", *Fortune*, May 15, 2000, p. 462.

What's the most reasonable interpretation of this data?

Minimizing expenses is one of the surest paths to investment success. Since most mutual fund managers and "financial advisors" underperform the S&P 500, it doesn't make sense to pay a lot for their "expertise." Even a 0.50% management fee costs a lot in terms of reduced retirement income and the eventual size of your estate. Spending the small amount of time required to study about financial markets and managing your own retirement assets should reap significant rewards.

- **A 100% survivable withdrawal rate is very conservative. You could choose a higher rate with little additional risk.**

This study is based on historical data. The fine print here should read, "Past performance does not guarantee future results." While there is every reason to believe that investment returns in the next 125 years will be similar to the previous 125 years, there's little chance it will be EXACTLY the same. To say that 3.89% is a "safe" withdrawal rate and that 4.00% will leave you broke implies a measure of accuracy in the forecast that just isn't there. It may make more sense to say that the "safe" withdrawal rate going forward lies somewhere in the range of 3.25% to 4.25%. Even a 5.00% inflation adjusted withdrawal rate has about a 90% survivability.

- **Low withdrawal rates will leave you with a large estate.**

While a 4.0% withdrawal rate protects you against running out of money, it leaves you a very good chance of accumulating a large net worth. For someone starting with a \$1.0 million account, 75% stocks/25% fixed income, 0.20% investment expenses, a 30-year payout period and a 4% inflation adjusted withdrawal rate, there is a 75% chance your account will be worth at least \$2.4 million at the end of 30 years. Indeed, the authors of the Trinity study admit low "safe" withdrawal rates "cause a sub-optimal exchange of present consumption for future consumption." Using the Pay Out Period Reset (POPR)

Method will give you a high probability of increasing your retirement withdrawals above the rate of inflation over time. This will reduce the terminal value of your portfolio.

- **It's interesting to compare these results to what economists call "the wealth effect."**

The wealth effect is the phenomenon that people tend to spend a portion of the increase in their accumulated capital each year. Economists estimate that the wealth effect is 3% to 5%. In other words, after a \$100,000 increase in one's stock portfolio, the average person would spend \$3,000 to \$5,000. This percentage is remarkably similar to the "safe" withdrawal rate. It seems wealthy folks intuitively know to limit their spending increase to a sustainable level. Perhaps it's the reason they're wealthy.

- **Surprisingly, even high investment expenses average out over time.**

One interesting finding of this study was the fact that a 1.00% increase in investment expenses resulted in only about a 0.50% reduction in the 100% safe annual withdrawal rate. Why doesn't it reduce the "safe" withdrawal by the full 1.00%? The answer is that when investment expenses are calculated as a percent of assets, the dollar amount collected annually by the financial advisor decreases as the account balance declines. The 100% maximum safe withdrawal rate is the rate that causes the account balance to approach near zero at the end of 30 years. So our financial advisor is also collecting a negligible advisory fee in the final year. Even the highly trained minds on Wall Street have yet to devise a way to draw blood from a turnip. A retiree with a \$1.0 million account paying a 1.00% management fee would pay \$10,000 in fees the first year and almost nothing the last year when the account balance reached zero. Over 30 years the annual fee collected by the advisor would average out to be about 0.50% of the original \$1.0 million account balance.

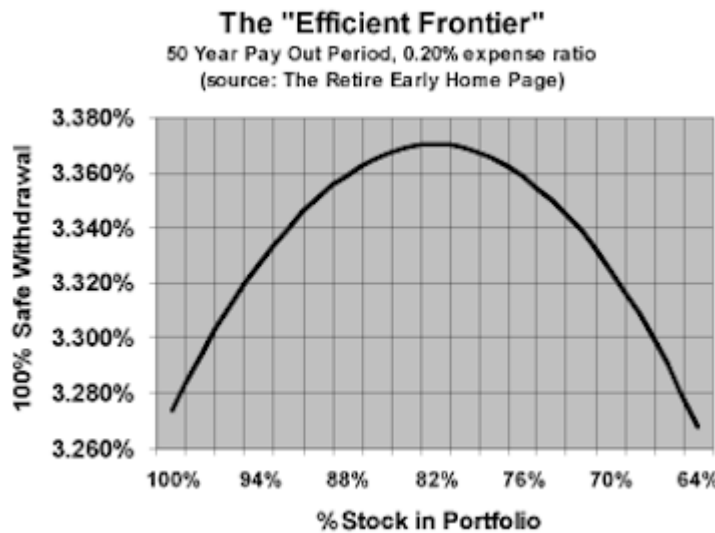
- **There may be a place for financial advisors, but watch the costs.**

If you decide you need professional advice, it's often cheaper to pay by the hour. Avoid arrangements that charge a "percentage of assets" under management. A 1% fee on a \$500,000 account is \$5,000 per year. Even an hour or two with a planner that charged \$250 an hour would be a small fraction of that. Any savings in investments expenses effectively boosts your returns and increases your 100% survivable annual withdrawal in retirement.

8. Safe Withdrawal Alternatives

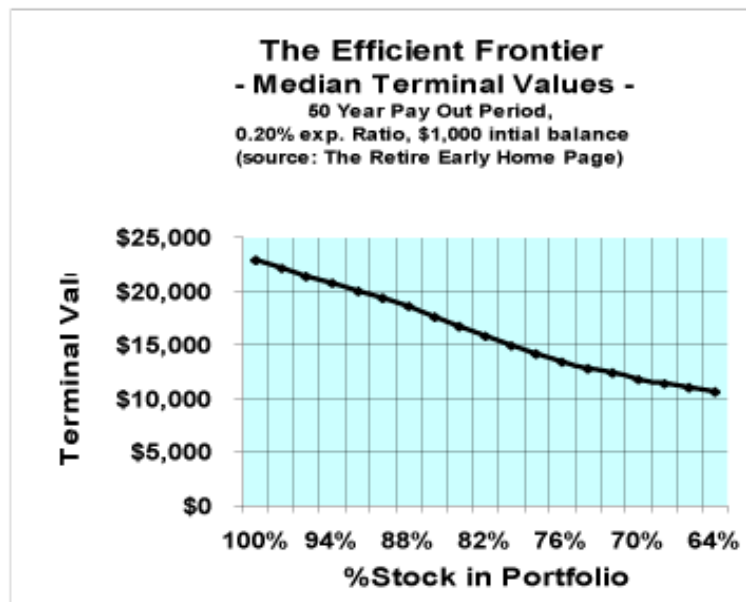
Bonds are for Bozos

Many people think that holding fixed income securities is the “safe” thing to do. The Retire Early study refutes this little piece of well-worn conventional wisdom. The plot below shows the effect of decreasing the stock allocation of a portfolio on the “100% safe” withdrawal rate for a 50-year pay out period.



The maximum “100% safe” inflation adjusted withdrawal occurs with a portfolio of 82% stock. This is the “sweet spot” of the portfolio’s “efficient frontier.” It also interesting to note that a portfolio of 100% stock has about the same “100% safe” withdrawal rate as a portfolio 64% stock and 36% fixed income securities. Does this mean that retirees should feel equally comfortable at either end of the curve? Probably not – the terminal value of a 100% stock portfolio is much higher than a 64/36 portfolio of stocks and fixed income securities.

The following chart shows the relationship between the terminal value of the portfolio and asset allocation. While a 64%/36% stock/fixed income portfolio has the same risk (and 100% safe withdrawal rate) as a 100% stock portfolio, it’s terminal value is much lower. Indeed, a retiree holding a 100% stock portfolio has a 50/50 chance of ending a 30 year pay out period with a portfolio value more than twice that of a 64%/36% stock/fined income portfolio.



What about Treasury Inflation Protected Securities (TIPS)?

The first United States Treasury Inflation Protected Security (TIPS) was auctioned on January 29, 1997, so there is not much in the way of historical performance data for these securities. However, it is possible to simulate what would have happened if TIPS were available during the entire 1871-2000 Shiller data series by assuming a coupon rate for TIPS and adding that to the annual inflation rate (CPI-U) to determine an annual yield for the security. It's also possible to determine the minimum TIPS coupon rate that would make it attractive to replace the 4 – 6 month commercial paper in the Retire Early study with TIPS. These “minimum attractive TIPS coupon rates” appear in the table below.

Pay Out Period	Minimum Attractive TIPS Coupon Rate
10 Years	0%
20 Years	0.77%
30 Years	1.90%
40 Years	1.66%
50 Years	1.82%
60 Years	1.72%

TIPS are indexed for inflation using the CPI-U published by the Bureau of Labor Statistics. The current quote on the latest 30-year inflation bond maturing in April 2029 is 3.92%.¹³ This 3.92% real return on US Government bonds is historically very high. The compounded annual real return for long-term US Government bonds has averaged 2.80%

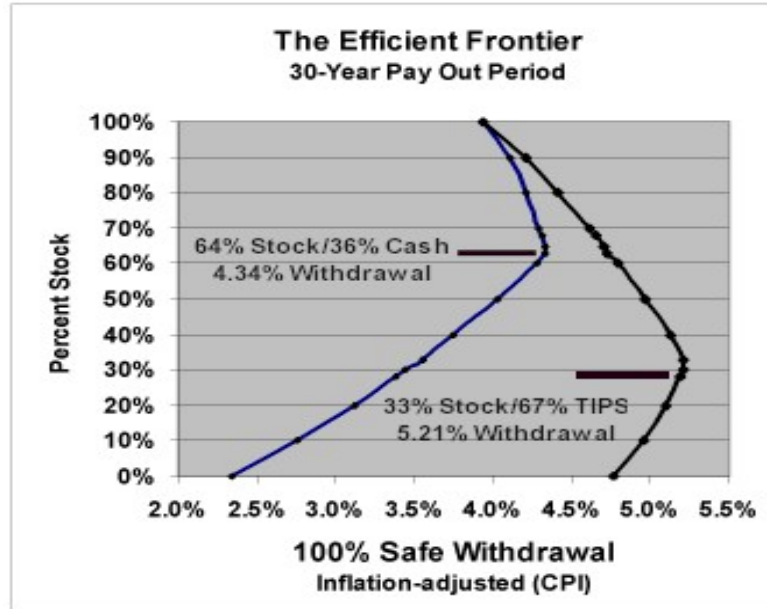
¹³ Wall Street Journal, May 17, 2000.

over the past 125 years (1871-1997).¹⁴ If you have more than a 30-year pay out period, there is a good chance that when you rollover your 30-Year TIPS at maturity, you'll receive a lower inflation adjusted yield. Still, 3.92% is very attractive and will improve the maximum 100% safe inflation-adjusted withdrawal rate – though at some cost to the terminal value of the portfolio.

The following chart depicts the advantage of replacing the 4–6 month commercial paper used in the Retire Early study with TIPS at a 3.92% coupon rate. The “sweet spot” on the efficient frontier for a portfolio of stocks and cash (i.e., 4-6 month commercial paper) is 64% stock/ 36% cash. (Note: this differs slightly from the 74%/26% optimal stock allocation in the Retire Early study. The difference is due to the substitution of the CPI-U for the PPI as the inflation index.) A retiree would enjoy a 4.34% inflation adjusted withdrawal with this allocation. Substituting TIPS for the cash significantly improves the 100% safe withdrawal rate. The “sweet spot” in this scenario resides at 33% stock/ 67% TIPS and results in a 100% safe inflation-adjusted withdrawal of 5.21%. This increase in the safe withdrawal rate comes at some reduction in the terminal value of the portfolio. The median terminal value for the 64% stock/36% cash portfolio is \$2,551 for an initial portfolio value of \$1,000. The median terminal value drops to \$1,268 for the 33% stock/67% TIPS portfolio.

A portfolio of 100% TIPS yields a lower 100% safe withdrawal rate (4.76% vs. 5.21%.) Retirees willing to limit their annual withdrawal to the 3.92% coupon are guaranteed the return of their \$1,000 principal, plus an inflation adjustment. Looking at all the 30-year periods from 1871-2000 the median average inflation rate (as measured by the CPI-U) is 2.47%. That means that a \$1,000 30-year inflation bond would grow to a value of \$2,079 when it matures. The worst 30-year period of inflation since 1871 had a 5.41% per annum rate. Under these conditions, the 30-year inflation bond would be worth \$4,858 at

¹⁴ Siegel, Jeremy J., *Stocks for the Long Run*, New York: McGraw-Hill 1998, page 15.



maturity. Of course, the US Treasury guarantees the return of your principal at maturity, even if there is deflation during the term of the bond. At a minimum, you'll receive your initial \$1,000 investment.

How about an immediate annuity?

Another alternative for providing retirement income is a single premium immediate annuity (SPIA). These contracts sold by life insurance companies provide a monthly benefit for the duration of the retiree's lifetime. While this looks attractive at first glance, several disadvantages appear upon close inspection. Insurance companies typically invest heavily in fixed income securities. With portfolio allocations so far removed from the "sweet spot" on the efficient frontier, their investment returns lag those achieved by investors favoring equities. The following analysis by a sophisticated annuity purchaser (an actuary) illustrates this point:

"I was interested in having benefits cover the anticipated effects of inflation, so I examined annuities that provide increasing benefits at a compounded annual rate of 6 percent [i.e., a 6% COLA.] I

derived the rates of return that I could realize during my lifetime, assuming death at various points in time.

Using the IRS annuity tables as a gauge of life expectancy, I found I could expect to survive 33.1 years. [50 year-old life expectancy] With recent improvements in mortality and a personal perception of my own longevity as being better than average (even when compared with a cohort of annuitants who have above-average chances of survival), I felt this a conservative estimate of my likely life expectancy. Nevertheless, calculating a yield for 33.1 years, I determined that the annuity I eventually purchased would generate a compounded pre-tax rate of return of about 7.15% In addition, the projected annual yield would rise about 0.4 percent for every year I outlived the anticipated life expectancy. At the time, **alternative investments with a comparable degree of safety could generate only about 6 percent average compounded yield.**¹⁵

The “6 percent average compounded yield” mentioned in the excerpt above is characteristic of fixed income investments. The returns for portfolios dominated by equities are higher. The average annual compounded returns for various stock/fixed income allocations over a 30-year holding period are shown in the following table.

Inflation is a very large consideration for an annuity purchaser. Over time, inflation will erode the purchasing power of your “guaranteed” month benefit payment. There are annuities available with a COLA (i.e., cost of living adjustment) that provide a lower initial monthly benefit, however, annuities that are actually tied to the CPI (much like the TIPS discussed earlier) are not offered by insurers. Pick the median inflation rate (i.e., 2.47% for a 30-year pay out period) and there is still a 50/50 chance your retirement income will lose ground to

¹⁵ Zinzow, Lee A., “Now Is the Time for True Annuities”, *Contingencies*, September/October 1999, pp. 54-59.

Portfolio Compounded Annual Growth Rate (CAGR) for various asset allocations, 30-year period Retire Early Study (1871-2000) Stock portion invested in the S&P500, fixed income is 4-6 month commercial paper, investment exp. = 0			
Stock/ Fixed Income	CAGR Minimum	CAGR Median	CAGR Maximum
100%/0%	5.13%	9.37%	13.40%
74%/26%	5.42%	8.07%	12.07%
26%/74%	3.90%	5.51%	9.24%
0%/100%	1.67%	4.72%	7.87%

inflation. Choose the highest inflation rate seen over the past 130 years (5.41% for a 30-year pay out period) and an immediate life annuity provides roughly the same initial withdrawal as a stock portfolio invested at the efficient frontier (4.29% vs. 4.26%.) These products clearly have difficulty providing lifetime income and inflation protection at a reasonable cost.

The following table below lists the annual annuity benefits for a 53-year-old male. A 53-year-old has roughly an 83-year life expectancy, equating to a 30-year pay out period.

For comparison purposes, the annual benefit for our 50-year-old sophisticated annuity purchaser was \$39,782 per year with a 6% COLA.

Single Premium Immediate Life Annuities with COLAs
 \$1,000,000 initial premium, 53-year-old male, no life contingency

COLA	1 st Year Benefit Payment	1 st Year Benefit (Percent)	Terminal Value
0%	\$91,600	9.16%	\$0
2.47%	\$63,000	6.30%	\$0
5.41%	\$42,900	4.29%	\$0

The most striking aspect of an immediate annuity is that it requires to retiree to relinquish the “Terminal Value” of the portfolio. For a retiree limiting his withdrawal to the “100% safe” rate, the terminal value of the portfolio can be substantial. Even retirees who want to “spend it all while we’re alive” may want to reevaluate the wisdom of buying an immediate annuity. Most people will find little difficulty in identifying a charity or some other non-profit organization more deserving of this windfall than an insurance company.

It’s important to note that retirees holding a stock portfolio at the “efficient frontier” have an excellent chance of increasing their withdrawals above and beyond inflation. Using the Pay Out Period Reset (POPR) Method, an individual with a 30-year pay out period has a 50/50 chance of withdrawing at least 34% more out of the portfolio than his inflation-adjusted withdrawals. Indeed there is a 75% chance he’ll be able to take out at least 14% more.

A comparison of "safe withdrawal" alternatives

\$1,000 initial portfolio balance, 30-Year pay out period,

Inflation index: CPI-U, 30-Year TIPS coupon = 3.92%

	Maximum 100% Safe Inflation- Adjusted Withdrawal	Terminal Value Minimum	Terminal Value Median	Terminal Value Maximum
Stock Portfolio 64%/36% Stock/FI	4.34%	\$0	\$2,551	\$7,056
Stock Portfolio 33%/67% Stock/TIPS	5.21%	\$0	\$1,268	\$4,258
100% 30-Year TIPS	4.76%	\$0	\$946	\$2,326
Immediate Life Annuity	4.29%	\$0	\$0	\$0

9. Concentrated Portfolios

An emerging trend sees investors fleeing mutual funds and purchasing individual stocks and bonds. While this often reduces fees and commissions, some investors are making the switch to place a concentrated bet on a few issues. Is this wise? Can anyone play this game, or should it be left to the young? What does the increased volatility of a concentrated portfolio do to "safe" withdrawal rates in retirement?

From the Motley Fool Bulletin Board:

Screw diversification

Took this slow learner many years to figure this one out. Of the top ten richest people in the US, three got there by holding Microsoft, one Dell Computer, one Berkshire Hathaway and five are from Wal-Mart.

No guts, no glory. Find the best stocks and place your bet.

Another poster observed, "diversification may preserve wealth, but concentration builds wealth." Warren Buffett himself said during an appearance at the University of Washington in 1998 that most people will only see 2 or 3 truly great investment opportunities in their lifetime. When a good opportunity arises, "it's not the time to be reading a textbook on diversification."

There's no question about it. Investing in an S&P500 index fund means you won't beat the market. Of course, you won't lag the market averages either, like 85% to 90% of professional money managers. But, if you want superior performance, you'll have to buy the lottery ticket of a concentrated portfolio.

Safe Withdrawal Rates for Concentrated Portfolios

The biggest problem that concentrated portfolios pose for retirees is increased volatility. Increased volatility adds risk for an individual looking to withdraw annual distributions from a retirement portfolio. A concentrated portfolio may have superior total returns, but the increased volatility means annual withdrawals must be reduced as a percentage of assets to ensure survivability. This is necessary to insure that a stock market drop doesn't prematurely deplete the portfolio.

Most of the studies on safe withdrawal rates in retirement have used the S&P 500 index as the proxy for the equity portion of the retirement portfolio. However, many retirees prefer to hold a portfolio of individual stocks instead of an S&P 500 index fund. Is it safe to hold a

concentrated portfolio in retirement? How does one calculate the "safe" withdrawal rate for a concentrated portfolio?

Diversification vs. Non-Market Risk

Nobel Laureate William F. Sharpe's 1972 paper on "Risk, Market Sensitivity, and Diversification" (Financial Analysts Journal, Jan/Feb 1972, pp. 74-79) appears to be the best place to start in evaluating the "safe" withdrawal rate for a concentrated portfolio. Sharpe derived the formula relating non-market risk to diversification:

$$\text{Non-Market Risk} = \frac{1}{\sqrt{D}}$$

where **D** = the effective diversification of the portfolio and,

$$D = \frac{1}{\sum (V \times R)^2}$$

where **V** = the relative value of each position in the portfolio, and

R = the relative non-market risk

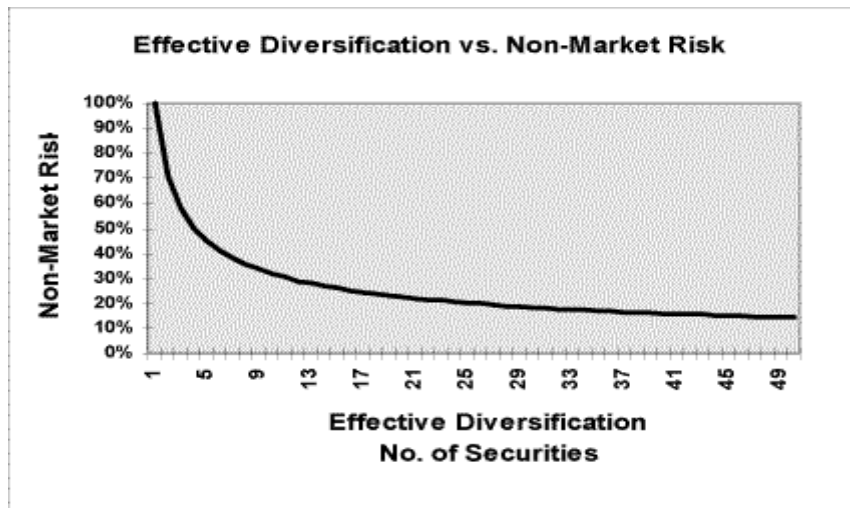
Beta vs. Non-market Risk

Relative non-market risk, R , is the ratio of the non-market risk of an individual security to the non-market risk of the typical security. Unlike beta values, there is no readily available source for the value of the non-market risk of an individual security. It seems reasonable to assume that securities with greater than average market sensitivity (beta) also exhibit more non-market risk than the typical security. For the purposes of this study, the relative non-market risk of a security is assumed to be equal to its "beta."

While this may seem to be a heroic assumption, "a number of inaccurate estimates for securities may combine to form an exceptionally accurate estimate for a portfolio, thanks to the law of large numbers." As the number of securities in a portfolio increases, so does the accuracy of our estimate of the effective diversification of the portfolio.

Beta values can be obtained from a variety of sources. The most convenient may be *The Value Line Investment Survey* available at many public libraries.

Some readers may be familiar with Sharpe's well-known plot relating non-market risk to number of securities. It's a graphical representation of $1/(\text{SQRT } D)$ and is reproduced below.



Sample Calculation

Using Sharpe's formulas, we can calculate the effective diversification, D , for a \$100,000 portfolio consisting of \$23,000 in a money market

fund and \$77,000 in four Dow stocks (i.e., a Motley Fool Foolish Four portfolio.)

Effective Diversification Calculation Motley Fool Foolish Four						
No.	Security	Current Value	(V) Relative Value	(R) Beta	(V x R)^2	Comments
1	VMMXX	\$23,000	0.2300	0.05	0.00013	Vanguard Money Market Fund
2	CHV	\$19,250	0.1925	0.67	0.01664	Chevron
3	XOM	\$19,250	0.1925	0.75	0.02084	ExxonMobil
4	EK	\$19,250	0.1925	0.50	0.00926	Eastman Kodak
5	GM	\$19,250	0.1925	0.88	0.02870	General Motors
-	Total	\$100,000	1.0000	-	0.07557	= Sum(V x R)^2

Effective Diversification, $D = 1/(\text{SUM}(V \times R)^2) = 1/(0.07557) = 13.2$

Non-market Risk = $1/(\text{SQRT}(D)) = 1/(\text{SQRT}(13.2)) = 27\%$

Beta value for Money Market Funds

Note that the non-market risk (which we're calling "beta") for the money market fund is estimated to be **0.05**. Some would argue that a money market fund has a non-market risk of zero since it approximates the "risk free rate." However, there is a small risk that a money market fund could suffer a loss independent of the direction of the market (i.e., the default risk), so a nominal beta of 0.05 was chosen.

Safe Withdrawal Rates for Concentrated Portfolios

In using this relationship to examine the safe withdrawal for a concentrated portfolio, four assumptions are made:

- **1)** The safe withdrawal rate for a portfolio with D=50 or more approximates the safe withdrawal from a portfolio at the "efficient frontier" using the S&P 500 index as a proxy for the equity allocation. See the table below.

Withdrawal Rates and Survivability				
for portfolios invested at the "Efficient Frontier" using an S&P500 index fund for the stock allocation of the portfolio. Fixed Income portion of portfolio invested in 4 to 6 month commercial paper. Annual expenses assumed to be 0.20% of assets. Survivability was calculated using over 125 years of data from 1871-2000. (From the Retire Early Study on Safe Withdrawal Rates.)				
-	-	Inflation Adjusted Annual Withdrawal (Survivability)		
Pay Out Period	Percent Stock	(100%)	(95%)	(90%)
50 yrs.	82%	3.35%	3.81%	4.50%
40 yrs.	77%	3.54%	4.45%	4.82%
30 yrs.	74%	3.81%	4.33%	4.78%
20 yrs.	66%	4.78%	5.26%	5.62%
10 yrs.	48%	8.47%	8.71%	9.35%

Note (1): A portfolio invested at the "**Efficient Frontier**" contains the mix of stock and fixed income securities that results in the maximum 100% survivable inflation adjusted withdrawal rate for the pay out period selected.

Note (2): **Survivability** refers to the chance that the portfolio will still contain funds at the end of the pay out period. For a 100% survivable withdrawal rate, there was no pay out period from 1871-1998 in which the portfolio was depleted. A portfolio is 90% survivable if 10% of the pay out periods examined from 1871-1998 resulted in the portfolio being depleted prior to the end of the pay out period.

- **2)** The safe withdrawal rate for a portfolio consisting of a single "high-beta" stock (e.g. "penny stock") approaches zero.

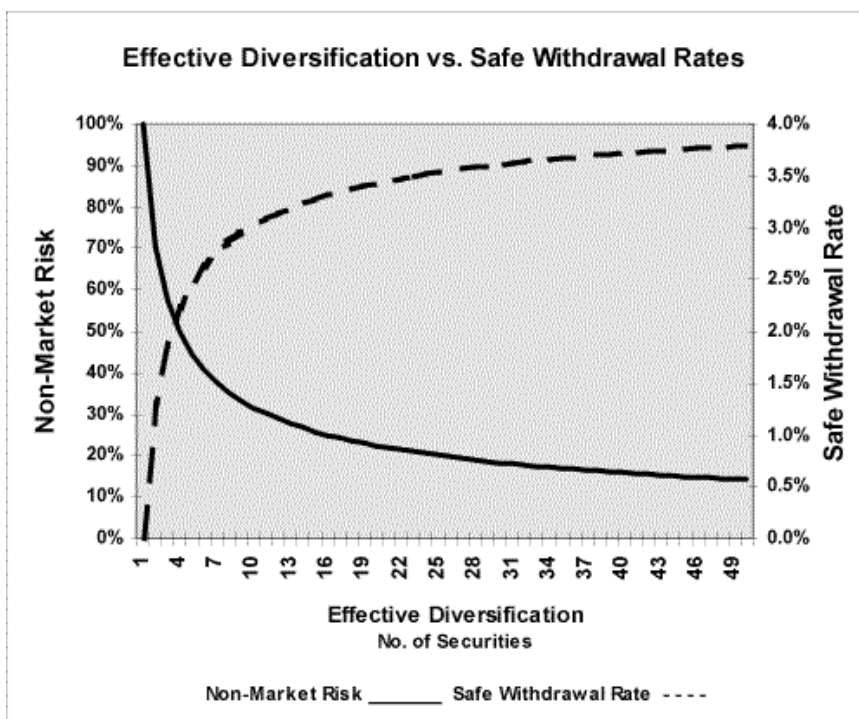
- 3) The relationship between non-market risk and the safe withdrawal rate is a continuous function.
- 4) The reduction in safe withdrawal rate is proportional to the increase in non-market risk.

Based on the four assumptions above, the equation for calculating the withdrawal rate for a concentrated portfolio is as follows:

$$W_{\text{Portfolio}} = W_{\text{S\&P500}} - \left(\frac{R_{\text{Portfolio}} - R_{\text{S\&P500}}}{R_{\text{max}} - R_{\text{S\&P500}}} \right) * W_{\text{S\&P500}}$$

- where $W_{\text{portfolio}}$ = the withdrawal rate for a concentrated portfolio and,
- $W_{\text{S\&P500}}$ = the withdrawal rate for a portfolio using the S&P500 as the proxy for the equity allocation of the portfolio and,
- $R_{\text{portfolio}}$ = the non-market risk for the concentrated portfolio and,
- $R_{\text{S\&P500}}$ = the non-market risk for a portfolio using the S&P500 as the proxy for the equity allocation of the portfolio and,
- R_{max} = the non-market risk for a portfolio of a single "penny stock." It approaches 100%.

This relationship is shown in the plot below. The left hand scale measures non-market risk while the right hand scale shows the corresponding "safe" withdrawal rate for that level of diversification.



Sample Calculation of Safe Withdrawal Rate for a Concentrated Portfolio

Exercise: Determine the "95% safe" withdrawal rate for a retiree holding the Motley Fool Foolish Four portfolio in the example above. Our retiree has a 40-year pay out period.

- $W_{S\&P500}$ = the withdrawal rate for a portfolio using the S&P500 as the proxy for the equity allocation of the portfolio (see Table 2., above) = 4.45% = **0.0445**
- $R_{portfolio}$ = the non-market risk for the concentrated portfolio (i.e., Motley Fool Foolish Four portfolio) = 27% = **0.2749**

- $R_{S\&P500}$ = the non-market risk for a portfolio using the S&P500 as the proxy for the equity allocation of the portfolio. Assume $D=50$. Then, $1/(\text{SQRT } D) = 1/(\text{SQRT } 50) = \mathbf{0.1414}$
- R_{max} = the non-market risk for a portfolio of a single "penny stock." = 100% = **1.00**

Using the Retire Early Safe Withdrawal Formula for Concentrated Portfolios and substituting the known variables:

$$W_{\text{Portfolio}} = W_{S\&P500} - \left(\frac{R_{\text{Portfolio}} - R_{S\&P500}}{R_{\text{max}} - R_{S\&P500}} \right) * W_{S\&P500}$$

$$W_{\text{portfolio}} = (0.0445) - ((0.2749 - 0.1414) / (1.00 - 0.1414)) * (0.0445) = 0.0377 = \mathbf{3.77\%}$$

Safe Withdrawal Rates for Some Famous Portfolios

Using the Retire Early Safe Withdrawal Formula for Concentrated Portfolios the "100% safe" inflation adjusted withdrawal rate was determined for several "famous" portfolios. Here are the results.

**Safe Inflation Adjusted Withdrawal Rates
for Some Famous Portfolios**

A 40-year pay out period was assumed, 77% stock/23% fixed income. Fixed Income portion of portfolio invested in 4 to 6 month commercial paper. Annual expenses assumed to be 0.20% of assets. The 77% stock allocation is substituted for the portfolios listed, ranging from an S&P 500 index fund to MSFT stock.)

Click on Portfolio name to see details.

	Retire Early Portfolio S&P 500	Motley Fool Foolish Four	Motley Fool Rule Maker	Motley Fool Rule Breaker	Bill Gates' Portfolio MSFT
No. of Securities in Portfolio	500	4	14	12	1
Effective Diversification "D"	83.4	13.2	12.9	2.0	1.4
Initial Inflation Adjusted Annual Withdrawal					
"100% Safe"	3.54%	2.99%	2.98%	1.17%	0.63%
"95% Safe"	4.45%	3.75%	3.73%	1.47%	0.79%
"90% Safe"	4.82%	4.07%	4.05%	1.60%	0.86%

Note: The actual Motley Fool Foolish Four portfolio (and the Foolish Four portion of the Rule Maker portfolio) are **not** long-term buy and hold investments. The Foolish Four stocks are mechanically changed each year. This presentation does not reflect that yearly change. Also, the Motley Fool portfolios are virtually 100% stock. They do not match the "efficient frontier" mix of stock and fixed income investments used in this analysis.

The most striking result of this tabulation is the comparison of the Foolish Four Portfolio with the Rule Breaker Portfolio. Even though the Foolish Four has 4 stocks and the Rule Breaker portfolio has 12, the effective diversification for the Rule Breaker portfolio is a dismal 2.0. This is because America On-Line (AOL) and Amazon.com (AMZN) make up over 50% of the Rule Breaker portfolio and are high volatility stocks (i.e., "high beta".) The Foolish Four portfolio, in contrast, has low volatility Dow stocks which actually increase the effective diversification of the portfolio.

This table also illustrates the effect of diversification on safe withdrawal rates. Portfolios with large positions in volatile stocks suffer much lower "safe" withdrawal rates. Indeed, a portfolio with a single low volatility Dow stock (e.g., Chevron or Eastman Kodak) is more diversified and offers a higher "safe" withdrawal rate than a portfolio with equal weightings of 7 internet stocks with betas of 2.0 or more.

What are the reasonable conclusions to draw from this?

Diversification is important for a retiree making annual withdrawals from a portfolio. If you decide to maintain a concentrated portfolio in retirement, reduce your annual withdrawal. If you can't survive on the lower withdrawal rate, then you need to diversify.

However, this doesn't mean you should automatically sell all your winners and buy an index fund when you retire. When I ran this calculation on my own portfolio I got a $D = 1.8$ and a "95% safe" withdrawal rate of 1.27% for a 50 year pay out period. Since I'm spending less than that, I figure I'm O.K. If you can live comfortably on a 1.50% withdrawal rate and don't mind the risk, you can logically (if, perhaps, not safely) hold the Motley Fool Rule Breaker Portfolio in retirement.

10. How diversified do you need to be?

Limiting your retirement withdrawals to anywhere near the "100% safe" withdrawal rate leaves you with a very good chance of realizing portfolio growth well beyond your needs. For example, let's take a retiree with a 40- year pay out period and a 3.54% inflation adjusted withdrawal rate. Let us further assume an investment return of 13.67% (about the average for the S&P500 over the past 30 years) and inflation that averages 3.5% annually. The yearly portfolio values and the dollar amount of the annual withdrawals are shown in the table below.

Portfolio Growth vs. Effective Diversification, "D"

(Assumes 13.67% CAGR, 3.5% annual inflation,
40 year pay out period, \$1 million initial portfolio.)

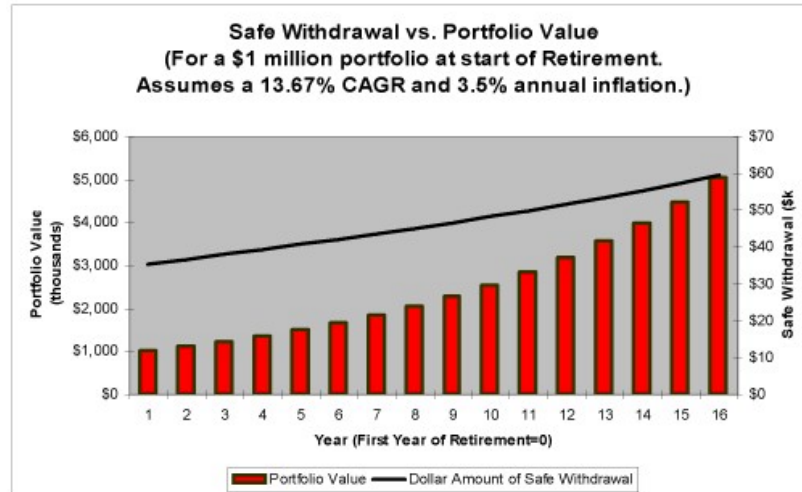
Year	0	1	2	3
Portfolio Value (\$k)	1000	1101.3	1215.2	1343.4
Dollar Amount of Safe Withdrawal	35.4	36.638	37.92	39.248
Growth Adjusted Withdrawal (GAW)	3.54%	3.33%	3.12%	2.92%
"D" that equals GAW	50.0	26.8	16.9	11.8

Year	4	5	6	7
Portfolio Value (\$k)	1487.8	1650.6	1834.2	2041.4
Dollar Amount of Safe Withdrawal	40.621	42.043	43.515	45.038
Growth Adjusted Withdrawal (GAW)	2.73%	2.55%	2.37%	2.21%
"D" that equals GAW	8.8	6.8	5.5	4.6

Year	8	9	10	11
Portfolio Value (\$k)	2275.4	2539.8	2838.8	3176.9
Dollar Amount of Safe Withdrawal	46.614	48.245	49.934	51.682
Growth Adjusted Withdrawal (GAW)	2.05%	1.90%	1.76%	1.63%
"D" that equals GAW	4.0	3.4	3.0	2.7

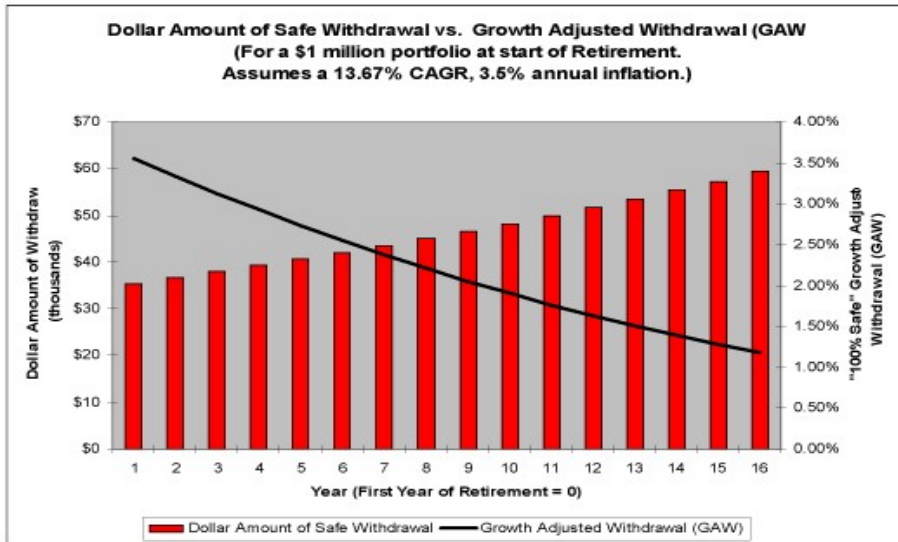
Year	12	13	14	15
Portfolio Value (\$k)	3559.5	3992.6	4483	5038.5
Dollar Amount of Safe Withdrawal	53.49	55.363	57.3	59.306
Growth Adjusted Withdrawal (GAW)	1.50%	1.39%	1.28%	1.18%
"D" that equals GAW	2.5	2.3	2.1	2.0

As the previous table illustrates, while the portfolio value has increased five-fold (i.e., from \$1 million to \$5.039 million), the annual inflation adjusted withdrawal has less than doubled (from \$35,400 to \$59,310.) These results are depicted in the following graph.

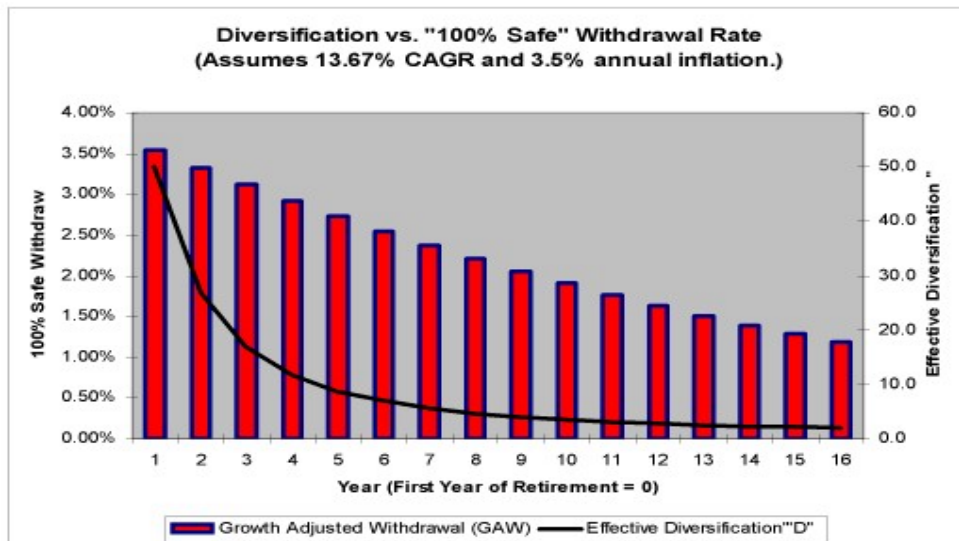


As the portfolio value increases, a retiree has several options:

- **1) Do nothing.** - If you have a well-diversified portfolio, or use index funds, there's no harm in staying the course -- especially if you are currently sleeping well at night.
- **2) Increase annual spending beyond the rate of inflation.** - Using the Pay Out Period Reset (POPR) Method allows this. However, if you are already doing everything in retirement that you desire, additional spending may not have any value to you.
- **3) Allow your portfolio to become more concentrated.** - If you follow the strategy of "let your winners ride", it is likely your portfolio will become more concentrated with the passage of time. As your portfolio value grows, the dollar amount of the "100% safe" withdrawal becomes a smaller percentage of the larger portfolio value. This decreasing percentage is called the **growth-adjusted withdrawal (GAW)**. The concept is illustrated in the following plot.



As your annual withdrawal as a percentage of assets decreases, so does the minimum **effective diversification** required for maintaining the "100% safe" withdrawal. In fact, the minimum effective diversification required drops rather dramatically. This phenomenon is shown in the graph



Effective diversification "D" is calculated using the relative value and non-market risk for each security in the portfolio. An S&P500 index fund would have an effective diversification of 50 or more. A portfolio consisting of 25% money market funds and 75% invested in the "Foolish Four" has an effective diversification of about 13. Replacing the 75% Foolish Four with a more volatile mix like the Motley Fool Rule Breaker portfolio reduces the effective diversification to a value of about 2 -- even though there are 14 securities in the portfolio!

There is ample evidence that holding a concentrated portfolio increases your chances of market beating investment returns. Unfortunately, it also increases your chances of under performing, or losing a large portion of your portfolio in a market downturn. Thus, this strategy should only be pursued by investors able to shoulder the risk, as evidenced by a low (i.e. 1% to 2%) withdrawal rate in retirement.

11. Safe Withdrawals for Three or More Asset Classes.

Most of the studies on retirement withdrawals such as the [Trinity Study](#) and the [Retire Early Study on Safe Withdrawal Rates](#) limit the investment mix to two asset classes (i.e., short-term fixed income securities and an S&P500 index fund). Several readers have asked, "Would adding more asset classes to my retirement portfolio increase the "safe" withdrawal rate?" Maybe it would. Unfortunately, there isn't much in the way of data going back to 1926 or so for many of the asset classes of interest, so it's difficult to know for sure.

One author who has done considerable work on asset allocation is William J. Bernstein, the creator of the [Efficient Frontier](#) web site. While not specifically addressing retirement withdrawals, a recent issue of Smart Money magazine had an article that detailed Bernstein's ideas on [a widely diversified 9-asset class portfolio](#).¹⁶ This model portfolio is reproduced in the table below.

¹⁶ Sturm, Paul, "Dr. Know", *Smart Money*, December 2000, Volume 9, Number 12

FUND	PORTFOLIO ALLOCATION (%)*	CORRELATION WITH S&P 500*	12-MO. RETURN (%)	5-YR. RETURN (%)	EXPENSE RATIO (%)	NET ASSETS (\$MIL)
Short-Term Corp. Bond (VFSTX)	40	0.47	6.2	5.9	0.25	6944
Total Stock Market (VTSMX)	15	0.93	20.5	22.3	0.20	19607
Small Cap Value (VISVX)	10	N/A	13.5	N/A	0.25	236
S&P Value (VIVAX)	10	0.83	9.2	18.6	0.22	3372
Emerging Markets (VEIEX)	5	0.50	11.7	2.2	0.58	1093
European Stock (VEURX)	5	0.51	10.4	17.9	0.29	5846
Pacific Stock (VPACX)	5	0.40	9.1	0.9	0.37	2144
REIT (VGSIX)	5	0.11	12.6	N/A	0.33	1068
Small Cap (NAESX)	5	0.38	27.4	14.6	0.25	3990
Overall portfolio (N/A)	N/A	0.60	11.9	11.0	0.27	N/A
S&P 500 index fund (VFINX)	N/A	1.00	16.5	24.0	0.18	89,400

Bernstein's study is based on data from 1973 to 1992. It's quite a leap to extrapolate these results back to 1929, the worst-case period identified in more comprehensive studies using longer data series. Also, while it's true that holding several asset classes reduces the standard deviation of the portfolio, it may also reduce your returns.

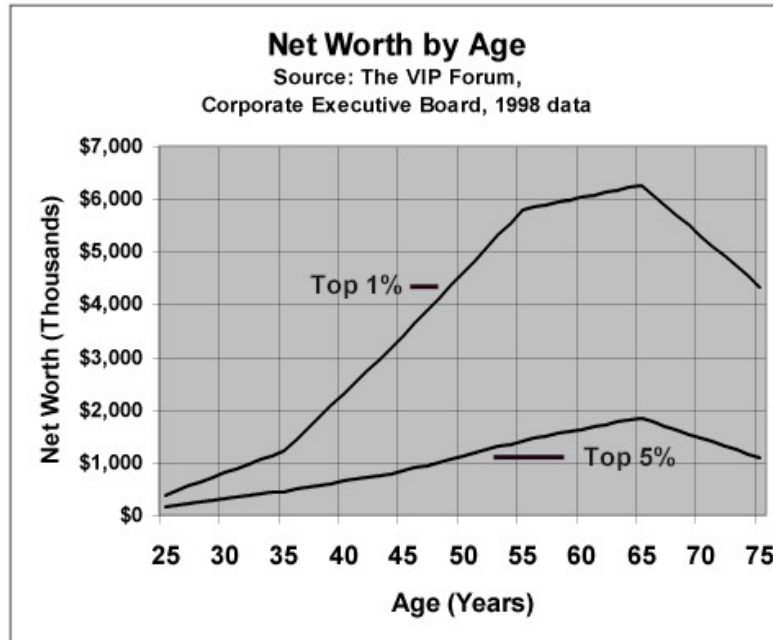
Bernstein's model portfolio had a 5-year compounded return of 11% per annum. A retiree holding an S&P500 index fund over the same period would have enjoyed a 24% average annual return and ended that 5-year period some 70% richer. Of course, past results don't guarantee future returns.

Texas-based financial planner Jaye Jarrett did a [retirement withdrawal study](#) in 1999 that considered three asset classes using a data series from 1926 to 1998. He showed that a portfolio of 37.5% S&P500, 37.5% small cap, 25% 5-year Gov't bonds, beat a portfolio of 75% S&P500 and 25% bonds. He calculated an increase of 21 basis points (4.21% vs. 4.00%) in the "100% safe" inflation-adjusted withdrawal rate for a 30-year pay out period. (Of course, that's 100 basis points short of the 5.21% you can get out of a two-asset class portfolio containing an S&P500 index fund and 30-Year TIPS) [Table 5](#) of Jarrett's report details the results for inflation-adjusted withdrawals using large and small cap stocks.

There's probably little risk in expanding the stock portion of your portfolio beyond the S&P500 as long as you're careful to keep management fees low. For example substituting the Vanguard Total Stock Market Index ([VTSMX](#)) for the S&P500 index fund ([VFINX](#)) would give you exposure to mid and small cap stocks (the market cap weighting of the Vanguard Total Stock Market Index fund is 73% S&P500, 18% mid-cap and 8% small cap) while only increasing the expense ratio by 2 or 3 basis points. More complicated strategies with higher management fees should be approached with caution.

12. Some Sobering Thoughts.

Perhaps the most troubling aspect of safe withdrawal rates is that very few folks will have the financial assets required to make use of this study. The following table shows the distribution of net worth by age for American families in 1998. While we're blessed to live in a rich and prosperous country, only a tiny sliver of the US population can comfortably retire on their savings alone.



In 1998 the median family income in the US was \$38,885 so using a fairly safe inflation-adjusted withdrawal rate of 4% would require nearly \$1 million in assets. Only 1% of the 33-year-olds in the US had a net worth of \$1 million or more. Since most folks acquire a bit more wealth as they age, about 5% of the 47-year-olds could boast \$1 million nest eggs in 1998. More worrisome, is the fact that few people with million dollar portfolios would be comfortable living on \$40,000 per year. Most feel that level of wealth should support a more expansive lifestyle. It doesn't, at least not safely.

What does the Year 2001 data look like? There is a very good chance the gap between the Top 1% and the Top 5% has widened. There's an old adage in wealth building, "The first million is the hardest. The second million usually comes a lot easier and quicker."

What's the biggest lesson one should learn from this retirement withdrawal study? To fund even a modest retirement, you'll need a significant wad of cash. Prudent folks will begin saving aggressively today!

13. Combining Safe Withdrawals with a Pension or Social Security.

This section explains how to combine safe withdrawals from a retirement portfolio with a pension or Social Security to ensure an annual income stream that meets your expenses. While many very early retirees ignore the value of Social Security benefits or a company pension at age 65 when making their retirement plans, older retirees, closer to the age when they can collect these benefits, include their value in their safe withdrawal calculations.

Case 1. Military or government retirees with inflation-adjusted pensions

By far the simplest case is that of a retiree with an inflation-adjusted pension benefit commencing on the planned date of retirement. For example, let's take the scenario of a 45-year-old retiree with annual living expenses (including tax payments) of \$50,000 per year, a \$30,000 per year military pension, and a 50-year pay out period. Our retiree's portfolio must provide \$20,000 per year in inflation-adjusted income to meet the goal of \$50,000 per year, total income. The "100% safe" withdrawal rate for a 50-year pay out period is 3.86% (indexed to the CPI) assuming a portfolio of 82% stock (S&P500 index fund) and 18% cash and CDs. Calculating the size of retirement portfolio required is a simple matter of dividing the \$20,000 first year portfolio withdrawal by the withdrawal rate:

$$\$20,000 / 0.0386 = \$518,135$$

Case 2. Early retiree expecting Social Security benefits in the future

A future income stream adds an element of complexity to the calculation. Let's look at a 52-year old expecting to collect a \$12,000 per year Social Security benefit at age 62. Like Case 1, our retiree requires \$50,000 per year in annual, pre-tax income but has decided on a 40-year pay out period.

The approach here is to split the portfolio into two parts. We need one portfolio to supply a \$38,000 per year inflation-adjusted withdrawal for 40 years and a second portfolio with a \$12,000 inflation-adjusted withdrawal for 10 years, until our retiree's Social Security benefits kick in at age 62.

The "100% safe" withdrawal rate for a 40-year pay out period is 4.08% using the CPI as the inflation measure. The required portfolio value to support a \$38,000 per year inflation adjusted withdrawal may be calculated as follows:

$$\$38,000 / 0.0408 = \$931,373$$

The "100% safe" withdrawal rate for a 10-year pay out period is 8.84%. Using the same formula for determining the size of portfolio required to supply \$12,000 per year until Social Security benefits start at age 62 yields the following result:

$$\$12,000 / 0.0884 = \$135,747$$

Our retiree needs a portfolio valued at over \$1 million (\$931,373 + \$135,747 = \$1,067,120) to meet his \$50,000 per year income requirement. If we ignored Social Security and calculated the portfolio required for a \$50,000 per year withdrawal over 40 years we'd get the following result:

$$\$50,000 / 0.0408 = \$1,225,490$$

Including Social Security benefits in our forecast reduced the size of the portfolio required by \$158,000. (\$1,225,490 - \$1,067,120 = \$158,370)

Younger retirees will see less of a savings. Look at the example of a 42-year-old collecting the same \$12,000 Social Security benefit at age 62. Since he's 10 years younger, we'll use a 50-year pay out period rather than 40.

First, we calculate the portfolio required to provide \$38,000 per year for 50 years. The "100% safe" withdrawal rate is 3.86%.

$$\$38,000 / 0.0386 = \$984,456$$

Next, a portfolio to provide \$12,000 per year for 20 years until age 62 when Social Security benefits commence. The 20-year “100% safe” withdrawal rate is 5.16%.

$$\$12,000 / 0.0516 = \$232,558$$

The sum of the two portfolios is (\$984,456 + \$232,558 = \$1,217,014). The portfolio required to produce the full \$50,000 per year for 50 years ignoring Social Security benefits is:

$$\$50,000 / 0.0386 = \$1,295,337$$

That’s a \$78,000 difference, about half of the \$158,000 we calculated for the 52-year-old.

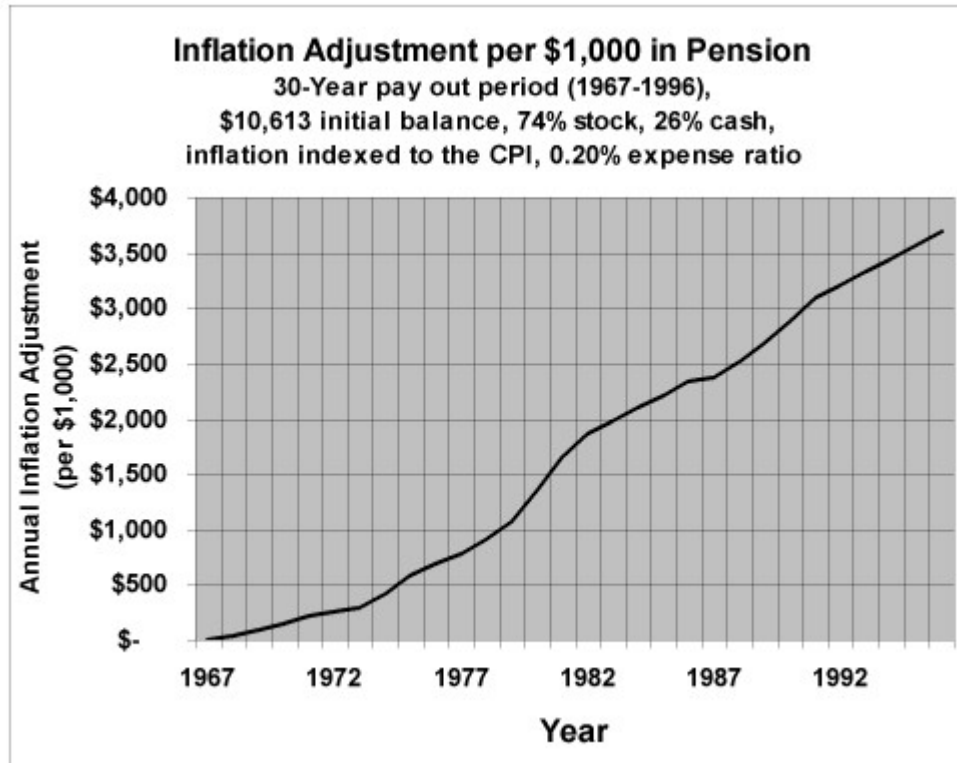
Case 3. Inflation proofing a company pension

While they are becoming more rare, many folks still get a considerable portion of their retirement income in the form of a pension. Few retirees outside of military or government service enjoy inflation-adjusted pensions, so most of us have to provide our own inflation adjustment by putting aside some savings. But how much do you need?

It’s possible to modify the Retire Early Safe Withdrawal spreadsheet to answer this question. How much do you have to set aside at the start of retirement to be “100% sure” you’ll be able to completely cover inflation for the desired pay out period? The table below shows the results. You multiply your annual pension benefit by one of the factors in the table to determine the amount of money required to “inflation-proof” your pension.

Retire Early Safe Withdrawal Study - (1871-2000)						
Pay Out Period	10 Yrs	20 Yrs	30 Yrs	40 Yrs	50 Yrs	60 Yrs
Optimal Stock Allocation	48%	66%	74%	77%	82%	85%
Investment Expenses	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
Inflation Index	CPI	CPI	CPI	CPI	CPI	CPI
Pay Out Periods Examined	120	110	100	90	80	70
Initial portfolio value required as a multiple of annual pension benefit.						
100% Safe	3.46	7.27	10.61	8.52	9.06	9.26
95% Safe	2.95	6.81	9.25	7.63	7.95	8.34
90% Safe	2.31	5.84	7.10	7.05	7.43	7.89
80% Safe	1.82	4.73	5.95	6.12	6.48	6.83

For example, a 55-year-old retiree who wanted to be "100% safe" that she'd have enough money to cover the inflation adjustment on a \$25,000 per year pension to age 85 (i.e., 30-year pay out period) would multiply \$25,000 by a factor of 10.61 for a minimum portfolio balance of \$265,000. This happens to be the amount of money required to weather inflation during the worst 30-year period on record (1967-1996). A retiree starting with a \$25,000 pension in 1967 would have to add \$92,325 to that in 1996 (for a total of \$117,325) to have the same spending power. The chart below shows the inflation adjustment per \$1,000 in pension benefits.



You could also adjust for inflation by saving part of your pension benefit each year. Instead of accumulating a \$265,000 "inflation fund" at the start of retirement, our retiree could simply put 46% of each year's pension benefit into an investment fund and draw the inflation adjustment from there. (That's what would be required to survive 1967-1996.) Of course, this 46% reduction drops the retiree's first year spending from \$25,000 all the way down to \$13,500. Could you live on that?

Why do I need to save less money for a 30-year pay out period than a 40-year pay out period? Seems like a free lunch.

Discerning readers will notice that the "100% safe" and "95% safe" factors for a 30-year period are higher than the corresponding factors

for 40-year pay out periods. Since you typically need a larger portfolio to survive a longer pay out period, this seems out of place. It's not a free lunch. It's the vagaries of the data series. The worst 30-year pay out period is 1967-1996. The worst 40-year pay out period is 1911-1950. When we have data through the year 2006, it's likely 1967-2006 will be the worst 40-year period on record and require a factor of greater than 10.61 to be "100% safe."

About the Author

John Greaney reached the high point of an engineering career spanning three continents when he told his boss “to go shove it”, quit his job with a Fortune 500 chemical company, and retired in 1994 at age 38. That’s the *Retire Early Home Page* version of the American Dream – to be able to tell your boss “to go screw himself” and be financially rewarded for your insight and good judgment.

Mr. Greaney began planning for early retirement at age 25, after he attended his second three-hour business meeting where 5 minutes of substantive discussions occurred. Shortly thereafter, he kicked his saving and investing into high gear and began studying financial markets and the economy. He learned that most of what people hear and read about investing is just an excuse to gouge them. The best thing to do is to limit what you pay in fees and commissions.

Greaney earned a B.S. in Civil Engineering from WPI, an MBA from Syracuse University, and is a Registered Professional Engineer in New York and Texas. He still does occasional consulting work in the field of engineering economics but limits his practice “to clients I like and projects that interest me.” He routinely declines over 90% of the assignments offered him.

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