The G-Factor – The Equity 4%: Safe Withdrawal Amount, Not Rate

Executive Summary

The G-Factor method calculates amounts that can be safely withdrawn from a portfolio invested in the S&P 500 index, with the monthly withdrawal amount remaining level or increasing on an inflation-adjusted basis. Tested with U.S. stock market data since 1870, with any starting or ending date, there are many parameter sets that are stable during all historic periods. The approach also cannot be gamed. The withdrawal amount for a given current asset balance is the same regardless of when one began withdrawals, whether it was 1871, 1971, last year, or yesterday.

About the Author

Jay Giess retired as Chief Actuary of the MedAmerica Insurance Companies in 2026. He has experience with defined benefit pension plans, health insurance, and long-term care insurance. He has a BSE in Electrical Engineering and Computer Science from Princeton University and an MBA, with a concentration in Finance, from the Wharton School of the University of Pennsylvania.

When planning for my own retirement, I wanted to develop a method that would calculate a withdrawal amount for the equity portion of my portfolio that would meet the following requirements:

1) A non-decreasing withdrawal amount. It would not go down when the market dipped.
2) For a given set of parameters, it would give the same withdrawal amount for a given balance at a given date regardless of retirement start date.

And it would recognize two assumptions:

1) There is reversion to the mean in long term stock market returns (Fama and French, 1988).
2) When the market is going up, investors are willing to delay some of the impact to provide downside protection (e.g. if the market goes up 50% in a year, an investor would be willing to accept an increase in spending that is less than 50%) (Kahneman and Tversky, 1979).

Calculation Method

Three parameters are chosen:

1) Base annual withdrawal percentage (W)
2) Maximum annual growth over inflation of withdrawal amount (MG)
3) Annual expense percentage (E)

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Using those parameters, a withdrawal amount is calculated for every month starting in January 1871, when the starting amount equals the base withdrawal percentage times an assumed December 1870 asset balance, and the full monthly withdrawal is assumed to be taken. Investment performance is modeled using stock market returns dividends, and inflation compiled by Robert J. Shiller (Shiller, 2000, 2005, 2015 updated), which uses S&P 500 returns, and similar data prior to the creation of the index. The withdrawal amount increases by inflation each month.

If greater, the withdrawal amount will increase to the base withdrawal percentage times the current asset value. However, the inflation-adjusted amount is never allowed to grow more rapidly than the maximum growth over inflation.

Investors will apply the percentage generated by the model for the next month, the G-Factor, to their current asset balance to get their current withdrawal amount. Note, the Shiller data uses the average value of the S&P during the month, so the percentage from the model would need to be multiplied by the average value divided by the month-end value to get the percentage that is applied to the month-end balance.

FORMULAS – For technically inclined readers

Assets = 100 (arbitrary starting amount)
SP = S & P Index value
CPI = Consumer Price Index (unadjusted)
SDF = Annual Dividend Factor from Shiller data

Starting in January 1871:

NPPG (Next Payment Pre-Growth Limit) = Assets x W / 12
NP (Next Payment) = NPPG
G-Factor (Annualized Withdrawal Rate) = NP * 12 / Assets

Following Months:

In 1871, MDF (Monthly Dividend Factor) = SDF / 12
After 1871, MDF = SDF – SDF previous month + MDF from 12 months previous
Assets = (Assets from previous month + MDF / SP previous month x Assets previous month – NP previous month – Assets previous month x E/12) x SP / SP previous month
NPPG = Greater of [Assets x W/12] or [CPI / CPI previous month x NP previous month]
NP = Lesser of [NPPG] or [NP previous month x (1 + MG) ^ (1/12) x CPI / CPI previous month]
G-Factor = NP * 12 / Assets

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Stable Parameter Sets

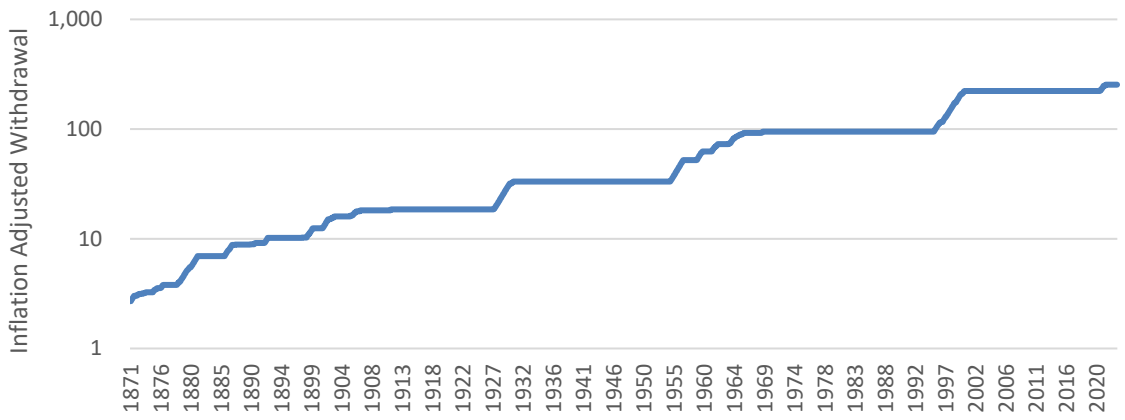
There are a variety of parameter sets that remain stable -- that is do not result in the funds being exhausted – for the entire period from 1871 to 2025.

Table 1 shows withdrawal rates for three sets of stable parameters:

Table 1: G-Factor for Sample Stable Parameter Sets			
	Parameter Set 1	Parameter Set 2	Parameter Set 3
Base Withdrawal Percentage (W)	2.50%	2.70%	2.80%
Maximum Growth over inflation of Withdrawal Amount (MG)	15%	25%	40%
Annual Expenses (E)	0.10%	0.10 %	0.10%
G-Factor (Annualized Withdrawal Rate)			
Average, 1870 – 2025	3.11%	3.76%	4.34%
January, 2009	5.27%	6.88%	7.24%
January, 2018	2.36%	3.47%	3.77%
January, 2026	2.39%	2.70%	2.80%

As can be seen in Figures 1 and 2, this results in high variation in the withdrawal *percentage* each month, but a stable pattern of withdrawal *amounts*, and stability in the *amount* is what is important to most retirees.

Figure 1: Inflation Adjusted Annualized Withdrawal (1870 Assets = 100)



Parameter Set 2: W = 2.70%, MG = 25%, Expenses = 0.10%

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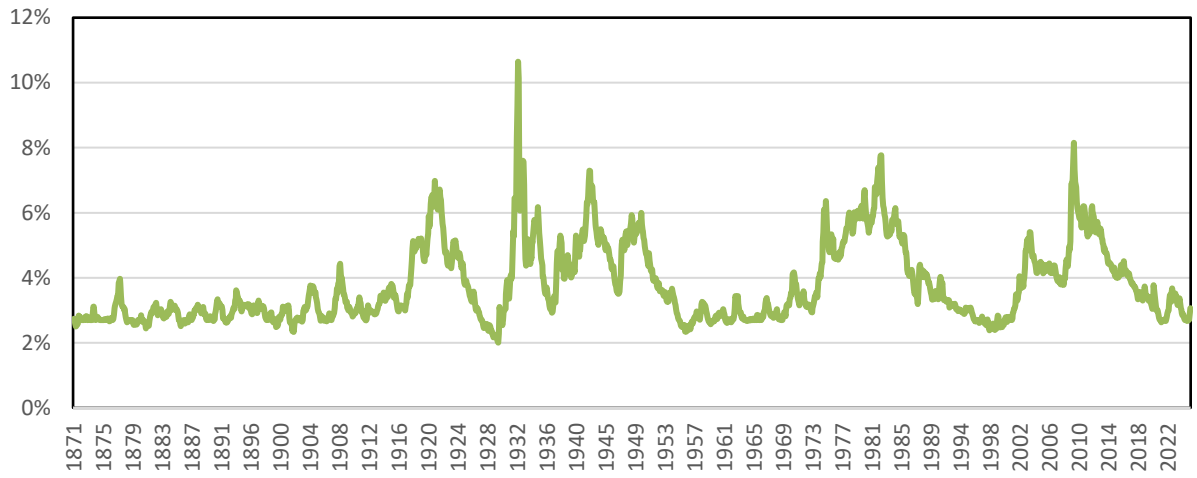
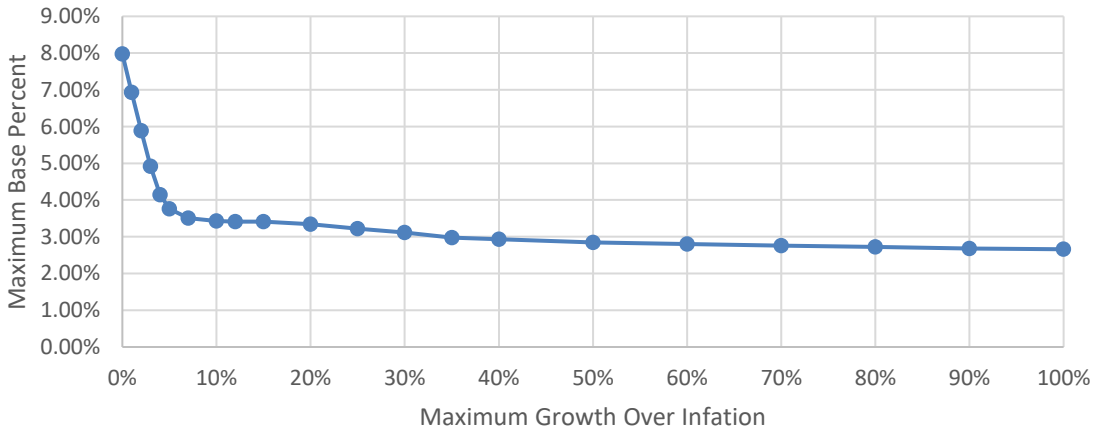
Figure 2: G-Factor (Annualized Withdrawal Rate)



Parameter Set 2: W = 2.70%, MG = 25%, Expenses = 0.10%

Figure 3 shows the parameter horizon of W and MG (assuming expenses at 0.10%). This is the frontier of the parameter sets that have been stable since 1870. With maximum growth over inflation at 35% or greater, the base withdrawal rate is largely unaffected, being at 2.98% for a 35% maximum growth down to only 2.66% for a maximum growth rate of 100%. If an investor is willing to limit the annual growth over inflation to 10% or less, a W of well over 3% can be assumed.

Figure 3: Maximum Base Percent for Maximum Growth over Inflation



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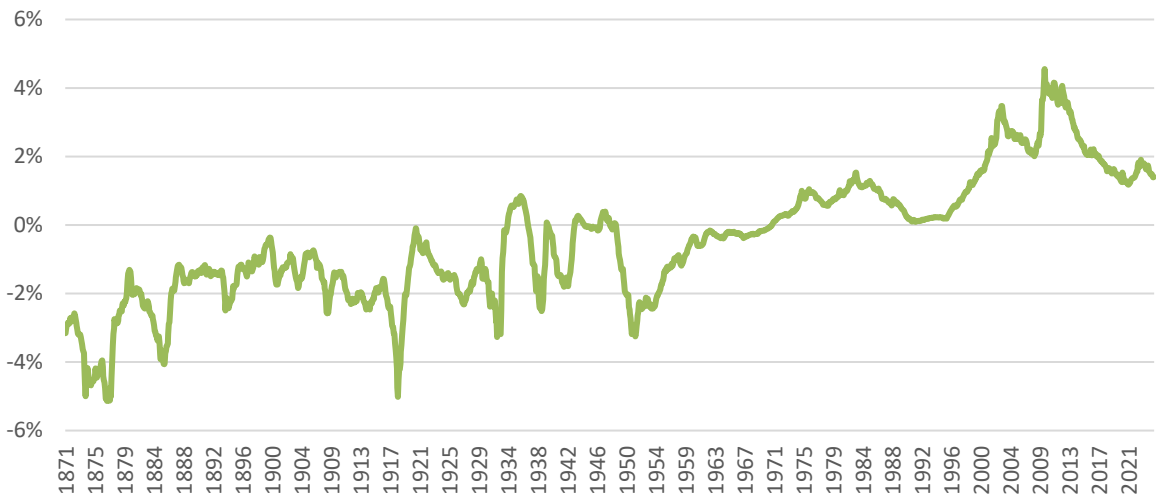
Historical Patterns

Prior to 1970, the withdrawal rate for stable parameter sets was generally less than the dividend yield, bolstering the assumption that this approach could be maintained without risk of failure. Starting in the 1970s, as companies reduced the portion of profit that was released for dividends, principal would need to be tapped (see Figure 4). Although the approach continues to work, the risk of failure may have increased.

Figure 4: Principal Withdrawal Rate



Parameter Set 2: W = 2.70%, MG = 25%, Expenses = 0.10%

Value of the G-Factor Approach

This approach builds on the work of others to determine an appropriate amount to withdraw from one's portfolio during retirement. It lacks the simplicity of the 4% rate from the seminal work of Bengen (Bengen, 1994) but has the advantage over that method and others that during the accumulation phase, the withdrawal amount will only go up, even if an investor pauses in putting money in, because money not taken will effectively be re-invested. Even during retirement, if market performance is sufficiently favorable, withdrawals will increase by more than inflation.

Unlike the 4% method, the G-Factor approach is not intended to be a complete portfolio approach, as bonds and/or annuities could be an additional part of a retiree's portfolio, for example to bridge the time between retirement and the starting date for Social Security or as a base payment that will often have a greater starting withdrawal percentage than the G-Factor.

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However, this method has many advantages. For example, it does not depend on the time horizon for retirement because it works in perpetuity, so like annuities it can protect against longevity risk. This will, of course, result in legacy assets available at death in most circumstances. For some retirees, this may be an objective, and the remaining G-Factor assets could be those designated for heirs.

Finally, because the withdrawal rate does not depend on the starting date for withdrawals, the G-Factor method also provides some psychological benefit compared to other methods. For example, under the 4% rule, a retiree withdraws 4% of the starting asset amount. Should the market be down when an aggressive investor retires, they might just "assume" they retired when the market was at its peak rather than at the current date and increase their withdrawal amount to greater than 4% – they may also increase their withdrawal amount again if the market reaches a new high. This is counter to the assumptions under the 4% rule and results in an increased probability of running out of money. On the other hand, an anxious investor might continually reset their withdrawals downward so that it never exceeds 4% should the market go down. This would increase the likelihood the retiree does not run out of money but also could result in the investor underutilizing their money. The G-Factor method avoids these potential deviations as it produces the same withdrawal amount regardless of one's starting date.

Robustness Concerns

It would be prudent for an investor to select a parameter set that is below the parameter horizon, to provide some buffer from the future being less favorable than the previous 150 years. However, a retiree who is willing and able to reduce their spending should an unusual pattern of unfavorable returns result can be more aggressive in selecting parameters.

One way to test the robustness of a set of parameters is to assume that the historical inflation was higher and test whether the revised history would still support the set of parameters. Figure 5 illustrates the results of an annual increase in inflation of 1% (which would have a similar effect as assuming that rates of return were 1% lower) on the payment pattern for Parameter Set 2. Note that Parameter Set 3 fails this test.

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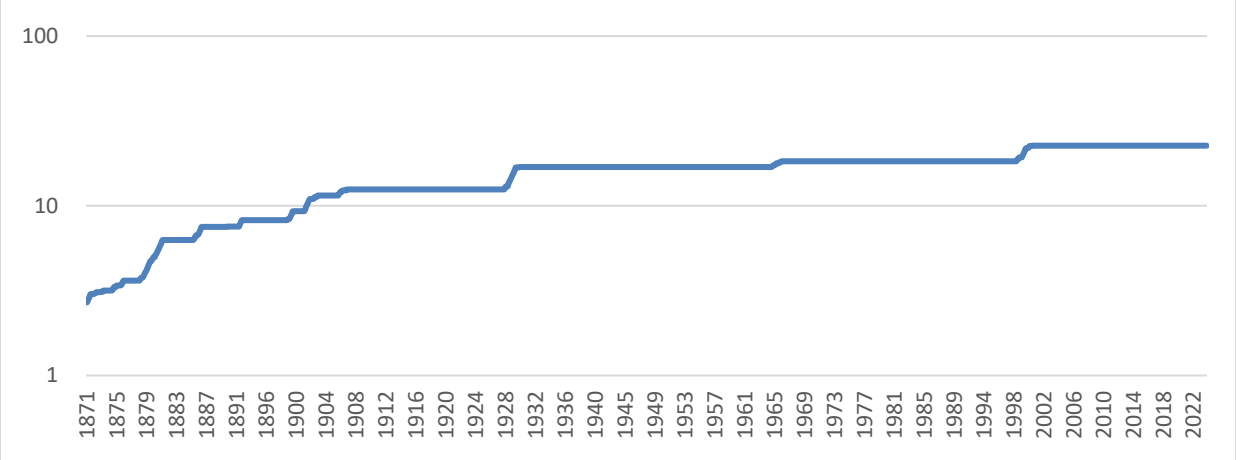
Figure 5: Inflation Adjusted Withdrawal (1870 Assets = 100, Annual Inflation + 1% over actual)



Parameter Set 2: W = 2.70%, MG = 25%, Expenses = 0.10%

Future Research

Future research could consider sets of parameters that would be stable for other stock market indices. No doubt, certain parameters would work even for the Japanese stock market which had it's big run up in the late 1970s and 1980s, when the market went up for twelve consecutive years. A low maximum growth over inflation would likely be required, which would have resulted in a very low withdrawal percentage in 1990, but there is a reasonable set of parameters that would have held up to the present.

Conclusion

In coordination with Social Security, pensions, cash, bonds, and other investments, the G-Factor approach is a tool that provides a stable source of inflation-protected income while offering psychological benefits during the asset accumulation phase and a high degree of certainty that the investor will not run out of money after retirement, as unlike most other methods, it never fails in any historical scenarios.

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