Develop Business/Financial Planning

How to Calculate Perpetual Withdrawal Rates

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If you stay in this business long enough, sooner or later, someone—a friend from church, an acquaintance at a foundation, or even a concerned HNW client—will ask you, "How much can we distribute from our capital in perpetuity?" Here's some help in answering that question.

One of the challenges of distribution planning is to estimate the proper amount of withdrawals such that market risk, longevity risk, and the inflation risks are covered for the given time horizon.

In this article, we are considering a perpetual time horizon, which makes the outcome significantly more sensitive to the remaining two risk factors: market and inflation risks. Assets must be large enough to finance not only the distributions, but also provide sufficient cushion to overcome the effects of these two risk factors in perpetuity.

Sustainable withdrawal rates

If you are a retirement income specialist, then you already know about the concept of sustainable withdrawal rate (SWR). For example, when preparing a retirement plan, say from age 65 to age 95, you might say something like, "the sustainable withdrawal rate for a 30-year time horizon is 3.5%."

What that means is if the clients have $1 million earmarked to finance their retirement expenses, then they can withdraw $35,000, indexed to CPI annually, and the chances are at age 95 they would still have income.

The perpetual withdrawal rate (PWR) is similar to SWR. The only difference between sustainable and perpetual is that the SWR is for a specific time period. On the other hand, the PWR has no time limit attached to it.

In theory, it should last forever. Mathematically, forever is too long a time horizon so we define it as the following:

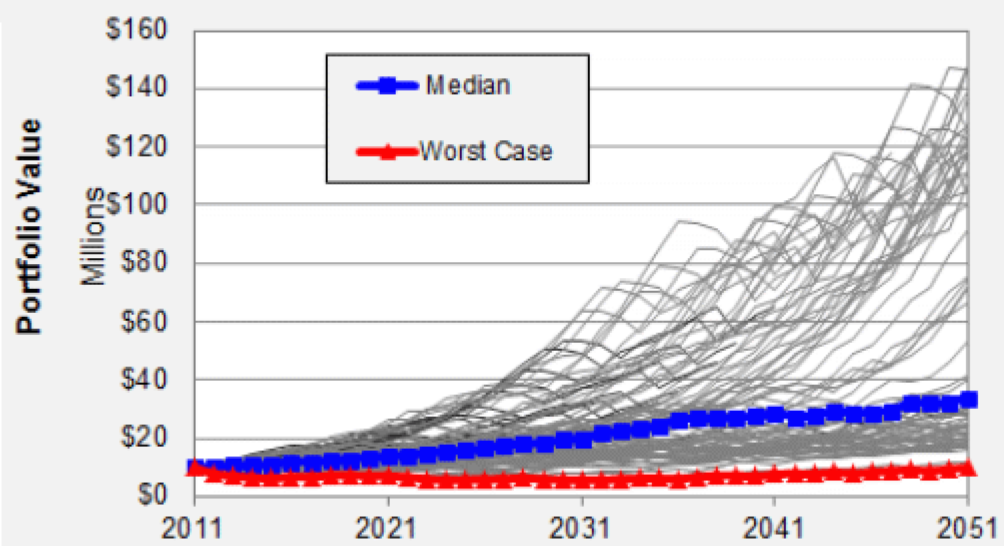
> *A portfolio is considered perpetual if, after 40 years, the asset value of the worst-case portfolio is not lower than its starting amount and no portfolio depletes during this 40-year time horizon.*

Calculating PWR

We use the actual market history to calculate the perpetual withdrawal rates. We call this methodology "aftcasting." It reflects the actual sequence of returns (stocks, interest rates, and inflation), the actual correlation between stocks, interest rates, and inflation, and actual volatility as they occurred historically.

It displays the outcome of all historical asset values of all portfolios on the same chart (thin gray lines), as if a scenario starts in each of the years between 1900 and 2000. It gives a bird's eye view of all outcomes. It also provides the success and failure statistics with exact historical accuracy, as opposed to man-made simulation models. Figure 1 depicts an example of an aftcast.

Figure 1: Aftcast of Perpetual Portfolios



Source: Retirementoptimizer.com

On the aftcast chart, we also see worst-case and median lines. The red line indicates the worst-case portfolio performance. We use this line as our design criteria for the definition of "perpetual." The last red point on the chart (at year 2051) must not be lower than the first red point (at year 2011). The blue line indicates the median outcome where half of the scenarios are better and half are worse.

Keep in mind, while this is a perpetual portfolio as defined earlier, the aftcast shows that in extreme cases, the drawdown can be as much as 50% of the initial portfolio value throughout this 40-year time horizon.

Your client might have one of several different objectives for the capital and for the distributions. Each one might be in nominal dollars or in real dollars (indexed to CPI).

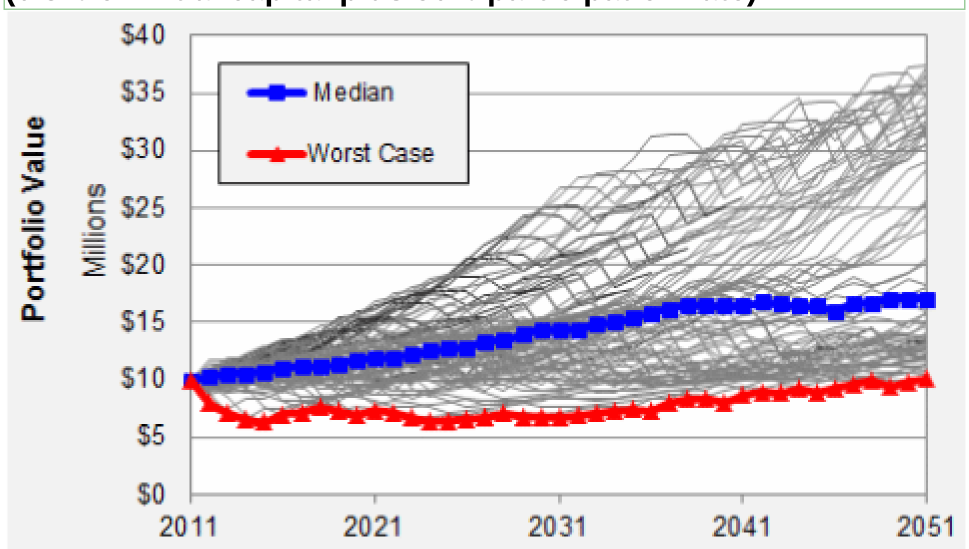
In addition, they might want to distribute part of the portfolio growth as well. This creates a natural tendency to "ring the cash register" when times are good. In this case, the annual distributions consist of a constant base amount and a fluctuating amount.

We call the percentage of the growth that we harvest and distribute each year the "participation rate." If portfolio growth is zero or negative in the preceding calendar year, then the fluctuating amount is zero and only the constant base amount is distributed for that year. However, the math shows that any degree of participation in the growth gives a higher total lifetime payout than having a constant distribution alone.

For example, using a 40/60 asset mix (equity/fixed income), $10 million starting capital (not required to be indexed), we calculate a PWR of $281,000 or 2.8% with no participation in growth. The aftcast is shown in Figure 1.

When we use a 50% participation rate, then the PWR is 0.8% of the initial capital *plus* 50% of the portfolio growth during the preceding year. Note that once you include part of the growth in the distribution, the upside of the portfolio's growth is much more limited because of larger amount of total distributions (see Figure 2).

Figure 2: Aftcast of PWR
(0.8% of initial capital plus 50% participation rate)



Source: Retirementoptimizer.com

Optimum participation rate

You might be tempted to use a high participation rate to harvest and distribute more of the growth. Resist that temptation and keep the participation rate between 15% and 25%. This lower participation rate makes the distributed dollar stream more reliable while still providing a sizeable participation in growth.

At the next periodic review, if you find that the portfolio value is higher (as a result of a larger retention of the growth or simply a good market trend), then simply recalculate the

PWR and start paying larger distributions from that point on.

If you want to smooth the floating component of the distributions over time, use a five-year moving average. Harvest the growth and place the money into a cash bucket. Each year, distribute one-fifth of this cash bucket (plus the constant portion). This allows a more even distribution over time without affecting the portfolio performance.

Optimum asset mix

Our earlier research indicates that for distribution portfolios, an asset allocation of 40% equity (DJIA) and 60% fixed income is *approximately* the optimum mix. Therefore, we used that as our asset mix in our calculations. If you allocate a larger portion of the portfolio to equities, then you will likely be forced to reduce distributions significantly in the future.

Table 1 displays the perpetual withdrawal rates for different scenarios with different participation rates. The last column, total lifetime distributions, indicates the total amount of distribution over a 40-year time horizon as a percentage of starting capital.

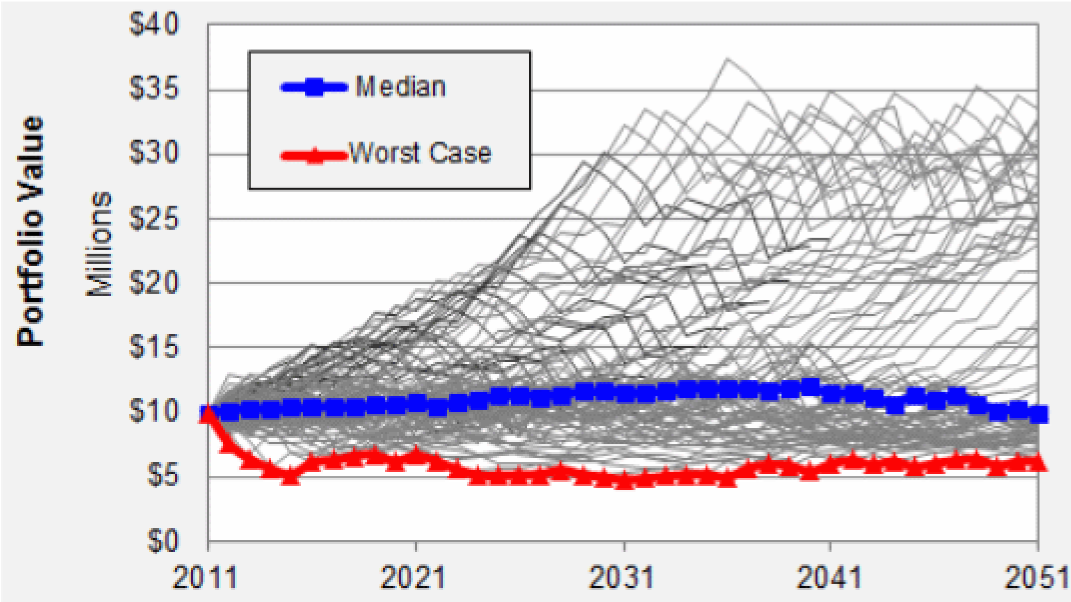
Table 1: Perpetual Withdrawal Rates

Scenario	Constant portion	Floating portion (participation rate)	Total lifetime distributions
Scenario 1 - Capital remains in today's nominal dollars - Distributions are not indexed to CPI	2.8%	0%	112%
	2.2%	15%	187%
	1.8%	25%	218%
	0.8%	50%	254%
	0%	63%	262%
Scenario 2 - Capital remains in today's nominal dollars - Distributions are indexed to CPI	2.3%	0%	193%
	1.9%	15%	243%
	1.6%	25%	259%
	0.6%	50%	266%
	0%	63%	262%
Scenario 3 - Capital grows indexed to CPI (worst-case) - Distributions are not indexed to CPI	2.0%	0%	80%
	1.2%	15%	165%
	0.6%	25%	203%
	0%	35%	230%
Scenario 4 - Capital grows indexed to CPI (worst-case) - Distributions are indexed to CPI	1.8%	0%	147%
	1.0%	15%	197%
	0.5%	25%	218%
	0%	35%	230%

Source: Retirementoptimizer.com

Another interesting scenario is that certain foundations and/or charitable trusts are required to distribute each year a minimum of 5% of the portfolio asset value of the preceding year. Figure 3 depicts the aftcast of Scenario 5.

Figure 3: PWR Aftcast
(minimum distribution rate 5% of the portfolio value at the preceding yearend)



Source: [Retirementoptimizer.com]

In this case, the worst-case portfolio value (red line) declines over time. This violates our definition of perpetual, which says the end value (2051) of the worst-case asset value must not be lower than its starting value (2011). We observe that even the median portfolio is barely flat.

To meet our definition of perpetual, we need to add cash to the asset pool over time. In this case, a minimum of 1.0% of the original capital plus any and all annual operating expenses must be added to the pool of investments each year.

Table 2 shows the PWR using a constant portion and a floating portion. In this scenario, neither distributions nor portfolio value are required to keep pace with CPI. The floating portion is the payout as a percentage of the portfolio value at the preceding yearend. We observe that once the floating portion exceeds 3% of the portfolio value, our definition of perpetuity is violated.

Keep in mind that just because this distribution strategy (i.e., withdrawing 5% of the asset value) does not meet *our* criteria of perpetuity, it does not mean it is not perpetual. When you take a fixed percentage of the current portfolio value each year and the portfolio never runs out of money, then it is perpetual. However, both the asset value and the dollar amount of distributions can shrink over time to a level that can be significantly lower than the starting amount.

Table 2: Summary of Perpetual Withdrawal Rates for Scenario 5

Constant portion (not indexed)	Floating portion (% of portfolio value)	Total distributions
2.1%	1%	176%
1.4%	2%	218%

0.6%	3%	243%

Source: Retirementoptimizer.com

Review of distributions

There are two trigger mechanisms for a review:

- **Periodic review.** It is essential to review the distribution numbers every five years. Recalculate the PWR anew and use this for subsequent distributions until the next review.

  Since our PWR tables are based on the worst-case scenario, portfolio assets should be likely larger, triggering larger distributions.

  However, we can never be sure that the extremes of the future will not be worse than the extremes of the past. Also, we cannot know ahead of time how the fund manager will perform relative to the benchmark.

  If the asset value is lower by more than 20% (excluding all cash flows) compared to the last review, a new (lower) PWR should be calculated and implemented. This is a very rare occurrence (historically, less than 1%), and each of these pay-cuts will likely be followed by a pay increase in the subsequent review. However, it is a pre-emptive measure to cover our uncertainty about the degree of future market extremes, nothing more.

- **Interim review.** An interim review should be undertaken when an unexpected cash flow that exceeds 10% of the current total asset value occurs. A new PWR should be calculated. If this new PWR is lower, it should be implemented immediately. If it is higher, then you have a choice of implementing immediately or waiting until the next periodic review.

Keep in mind: Market fluctuations do not trigger interim reviews, only significant cash flow events do so. If there is a significant fluctuation of the value of investment assets, stay the course and wait until the next review to recalculate the distribution amounts.

Economic assumptions and forecast

Since our analysis is entirely based on historical experience (aftcasting), there is no place to impose any assumptions of future portfolio growth rates or future inflation into our calculations. Furthermore, periodic reviews mitigate the effect of any deviations from the historical experience. Our entire analysis is free of any forward-looking economic assumptions.

Example: XYZ Foundation has $15 million in assets, allocated 45%

in stocks and 55% in fixed income. Annual administrative expenses (indexed to CPI) are $10,000. The foundation wants to distribute scholarships in perpetuity, but it is not necessary to index to CPI. It does not expect additional funding in the future. The administrator asks the following questions:

Planning for Boomers

1. What is the simplest distribution strategy?

The simplest strategy is to distribute a fixed amount each year (i.e., Scenario 1) with no growth participation.

Note on asset allocation: If your equity allocation is somewhere between 30% and 55%, then you can use the PWR indicated in this article. If the equity allocation is outside this range, then you will likely have a smaller PWR.

2. How much can be distributed?

First, calculate how much of the assets are required to finance the administrative expenses. Since they are CPI indexed, we look at Table 1, Scenario 2. The constant portion of the distributions is 2.3%. We calculate the capital required to generate this cash flow: $10,000 / 0.023 = $434,783.

Now, we have $14,565,217 capital available to distribute, calculated as $15,000,000 less $434,783. We read on Table 1, Scenario 1 that we can distribute 2.8%. Therefore we can distribute $407,826 each year (calculated as 2.8% of $14,565,217) until the next review.

3. Which perpetual distribution strategy would maximize total scholarship distributions over a 40-year time horizon? (Do not exceed 25% growth participation rate for Scenarios 1 through 4.)

Use the "Total Lifetime Distribution" from each scenario:

- Scenario 1 (Table 1): The total lifetime distribution without exceeding 25% participation rate is 218%.
- Scenario 2: (Table 1): 259%
- Scenario 3: (Table 1): 203%
- Scenario 4: (Table 1): 218%
- Scenario 5: (Table 2): 243%

Answer: Scenario 2 paying a CPI-indexed amount of $233,043 (calculated as

1.6% of the initial available portfolio asset value of $14,565,217) plus the dollar amount of 25% of the portfolio growth during each preceding calendar year would likely pay the highest amount of distributions until the next review.

4. Five years later, at the next periodic review, assets are $19 million. A new part-time assistant was hired, and the annual administrative costs jumped to $26,000.

A prospective fund manager claims he can beat the benchmark index by 3% if XYZ Foundation were to employ him to manage the investment portfolio. How much can they expect to distribute next year, using the results from question #3?

A fund manager consistently beating the index is generally a good thing. The assets can potentially grow larger faster. However, when calculating PWR, ignore any expected or past performance figures of any portfolio manager. If the fund manager indeed outperforms the benchmark, this will be reflected in the portfolio asset value, which in turn can result in higher distributions after the next periodic review.

First, we calculate how much of the assets are needed to pay the increased administrative expenses on an ongoing basis. Since they are CPI indexed, we look at Table 1, Scenario 2. The constant portion of the distributions is 2.3%. The required capital to generate this cash flow: $26,000 / 0.023 = $1,130,435. Now we have $17,869,565 capital available to distribute, calculated as $19,000,000 less $1,130,435.

XYZ Foundation can distribute $285,913 annually (1.6% of $17,869,565) plus the dollar amount of 25% of the portfolio growth during each preceding year until the next review.

In conclusion, the perpetual withdrawal rate is the twin brother of the sustainable withdrawal rate. The only difference between the two is the missing time horizon in the PWR. And because of that, the PWR is a lot lower than the SWR.

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