

The Retirement Portfolio



How portfolio distributions (should) change investing



NATE BYERS, CPA/PFS

Nate@CalcWealth.com

Calculated Wealth

Last updated: October 2022

TABLE OF CONTENTS

Introduction.....	3
What everyone wants from their portfolio	4
Committing to your investment process.....	6
Confident cash flow	7
What is a safe withdrawal rate?	8
Buy-and-Hold Investing and Safe Withdrawal Rate Research.....	9
What are the factors that influence safe withdrawal rates?	10
Accumulation vs. Distribution	11
Public Enemy #1	12
Volatility Tax.....	13
Early Drawdowns	15
A historical example illustrating a sequence of returns	16
What would happen if they took withdrawals?	17
The Butterfly Effect	18
Risk Management for Buy-and-Hold investing	20
Actively managed asset allocation	22
A Risk Management Alternative.....	24
Moving Average vs. Momentum	27
Dual momentum.....	28
Trend Can be our Friend.....	30
How trend following enhances portfolios.....	33
Trend-following and Safe Withdrawal Rates	35
Possible sections for future editions.....	36
CAPE Ratio – A Measure of Market Risk	36
Trend following and the CAPE ratio.....	36
Risks of SWR Research	36
Global asset allocation	36
Market Regimes.....	36
Summary	37
Disclaimer.....	38

INTRODUCTION

The purpose of this whitepaper is to uncover the inefficiencies of conventional retirement portfolio advice. Conventional investment advice doesn't separate savers from retirees. I believe this conventional approach is dangerous to retirees.

The facts within this whitepaper illustrate why **a retirement portfolio must be treated different**. The rules you used to build your wealth need to be reconsidered when nearing and in retirement.

I conclude the whitepaper with my preference for managing retirement portfolio risk. However, I do not suggest this is the only way to manage the risk.

It's up to you on how you choose to manage the risk. How you choose to invest your money is ultimately your responsibility. You need to be aware of the risks inherent within your strategy and stick to that strategy.

There are no perfect investment strategies. All investment strategies involve risk, including the loss of principal.

Nothing is guaranteed. We must live with uncertainty.

You only have one shot at retirement. Increasing your knowledge will boost your confidence.

Greater confidence empowers you to stick to your investment plan.

You won't find my actual investment strategy within this whitepaper due to industry regulations. Instead, the strategy within this whitepaper is a publicly available strategy that represents the idea behind the strategies that I use.

This should not be construed as investment advice. Complete your due diligence on what's best for you to manage your retirement portfolio.

Happy investing!

WHAT EVERYONE WANTS FROM THEIR PORTFOLIO

“RICH PEOPLE ARE JUST POOR PEOPLE WITH MONEY”
- ANONYMOUS

Throughout my career I've been blessed with great experiences. Most of these experiences come from the nature of my job. As an “advisor” I get a seat at the table to talk about life's taboo topic... money.

My role as an “advisor” has changed throughout my career. It first started as a tax advisor to small business owners then evolved to a wealth advisor. The first part of my career was spent as a tax advisor. In this role, I mostly worked with business owners.

I was lucky to work with many business owners who transitioned from building their wealth to living on their business success.

The financial success of our business owners varied significantly. Some would transition to retirement with some investments plus Social Security. A few would harvest generational wealth by selling a business or real estate. Most would harvest enough for themselves plus an inheritance.

I loved working with families transitioning to retirement. I found the quantitative and qualitative aspects of this transition to be fascinating.

Eventually, this fascination led me to transition from tax advisor to wealth advisor. After making this transition I was able to connect with families at a deeper level. A few years after focusing on wealth advising I sought out an opportunity at a local Private Bank. During the first year at the Private Bank, I worked with 127 different families. What was great about this is that I was able to exponentially increase my sample size of retired families.

It was somewhere within my 2nd year at the big bank where I had an epiphany.

Everybody wants the same thing from their retirement portfolio.

Whether I was working with a family who retired with a small investment account and Social Security or working with a business owner after a \$40 million business sale... everybody wanted the same things from their retirement portfolio.

And no... it's not just “more money.” 😊

Everybody wants their retirement portfolio to:

- **Maximize Cash Flow early in retirement**
- **Maintain consistent cash flow throughout retirement**
- **Minimize short-term drawdowns (aka portfolio losses)**

It didn't matter if they had a little, a lot, or something in the middle. Everyone who was financially independent wanted the same thing from their retirement portfolio.

This realization has shaped everything I do in wealth planning. Building your wealth isn't the same as living on your wealth.

Living on your wealth requires different financial and emotional solutions. These are the solutions that are outlined in this whitepaper.

COMMITTING TO YOUR INVESTMENT PROCESS

Each year Dalbar runs a survey of individual investment returns versus market returns. The survey finds a stunning gap between investors' underperforming market returns.

This gap is known as the behavior gap.

My belief is that this gap exists because there is a lack of commitment to a process. This lack of commitment is likely due to a misunderstanding of the process.

The proper investment process requires you to believe in and commit to that process.

Selecting an investment process is like a wedding vow:

“I take thee to be my wedded husband/wife, to have and to hold, from this day forward, for better, for worse, for richer, for poorer, in sickness and in health, to love and to cherish, till death do us part, “

Traditional wedding vow

The advantage of marriage is that you get to date before you commit. This test drive might give you an idea of whether it's worth sticking with that person through good times and bad.

With investing, we don't have to “date” different investment processes. With investing, we have the benefit of a large data set and history whitepapers. We can look at the past to understand market dynamics.

This look into what's happened in the past helps create a framework for what might work in the future. History never repeats but it sometimes rhymes. These lessons can be leveraged for making better decisions in the future.

Understanding history can go a long way in committing to your investment process. If you're not sure how your strategy has reacted to certain market conditions, then how can you be confident when you hit a rough period?

As an individual you might become another statistic of the behavior gap if you don't understand your retirement income portfolio's philosophy.

In the end, you might choose to hire an investment manager to implement a strategy. However, delegating portfolio management is still risky if you don't understand the philosophy.

CONFIDENT CASH FLOW

The happiest retirees have a confident cash flow plan. A confident cash flow plan doesn't mean it's bulletproof. The future is unknowable. Uncertainty is never eliminated.

Throughout our careers, we become accustomed to a consistent paycheck. Certain professions and business owners might experience some spending volatility, but overall, there is a bit of consistency attached to it. Business owners who live their life with volatile cash flows from the business are typically OK with it because they control it.

Volatile or "lumpy" paychecks are a lot different when you know your future action will create some future payment. We may not like it, but when we're in control we accept it.

Many retirees feel a loss of control once their cash flow comes from their portfolio. Our desire for consistent cash flow is what makes certain annuities, rental real estate, pensions, and Social Security so attractive.

Since the annuity industry is filled with a lot of bad information, most sophisticated investors are skeptical including them as a valid option. Annuities are outside the scope of this whitepaper, but they do serve a valid purpose... when done correctly.

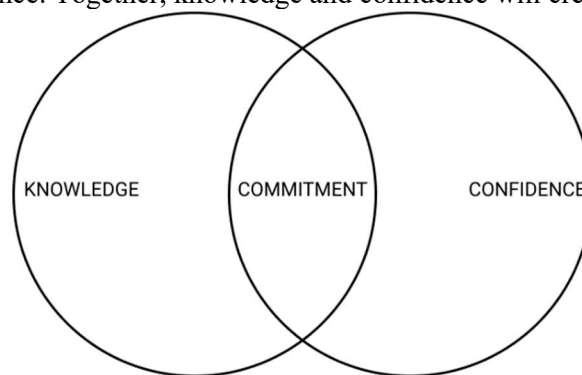
Business owners often gravitate to rental real estate. This is primarily because they are familiar with real estate and understand it. It's also because they are seeking cash flow and don't have access to pensions just like most professionals and executives.

Every worker is entitled to Social Security. However, Social Security isn't sufficient to fund most families' entire lifestyles.

In the end, you're most likely going to need a retirement portfolio if you've successfully accumulated wealth. Knowing this, you must be prepared to convert your retirement portfolio into a confident cash flow.

Confident cash flow in retirement is difficult since most families built their wealth because of their unrelated skills and/or luck. The good news is that you can create a confident cash flow plan in retirement. To create a confident cash flow plan, you need knowledge.

Knowledge creates confidence. Together, knowledge and confidence will create commitment.



WHAT IS A SAFE WITHDRAWAL RATE?

Most retirees believe it's safe to create their retirement paycheck from dividends and interest. Living off the income is intuitive. It's like rental real estate paying you monthly rent while leaving the value of the building to appreciate.

Unfortunately, living off dividends and interest is not a sufficient withdrawal plan. First of all, at the time of this whitepaper, dividend yields, and interest rates are near record lows. Creating a meaningful cash flow plan on dividends and interest would require substantial assets.

Even if you have substantial assets, maximizing the yield on the portfolio introduces concentration risk. A portfolio of dividend stocks clusters the group of stocks into a smaller subset of companies, which are subject to specific company risk versus broad market risk.

Concentration risk leads to larger portfolio drawdowns, which as you'll learn later is public enemy #1 of a retirement portfolio.

Sustainable safe withdrawal rates are based on the total return of a portfolio. The total return of a portfolio is the combination of dividends, interest, capital gains, and return on principal.

The idea of safe withdrawal rates was discovered through safe withdrawal rate research. The goal of safe withdrawal rate research was to answer the question:

How much can I spend in retirement without running out of money?

To answer this question, researchers needed to find the "worst date in history" to retire. From that date, they looked at how much a hypothetical retiree could have withdrawn each year before running out of money.

Bill Bengen is the original safe withdrawal rate researcher. He intuitively understood retirees wanted to maintain consistent cash flow. This meant finding an initial withdrawal and providing inflation increases each year. Bill's research uncovered the famous rule of thumb – the 4% rule.

What this meant is if someone retired with \$1,000,000, they could take a \$40,000 withdrawal in year 1. Then in the following years, they would increase the prior year's withdrawal by the inflation rate.

Here is a quick example using a \$1,000,000 starting balance:

- Year 1: \$40,000
- Year 2: \$40,000 + Inflation (ex: 2.3%) = \$40,920
- Year 3: \$40,920 + Inflation (ex: 3.1%) = \$42,189

Bill's research sprung a lot of interest in the topic. There are dozens, if not hundreds of papers with various iterations.

One of Bill's iterations increased the safe withdrawal rate closer to 4.5%. However, there are some indications that "today's" safe withdrawal rates are closer to 3%.

To keep things simple, I'm going to use a safe withdrawal rate of 5% throughout most of the analysis within this whitepaper. The reason I selected 5% is that it is a reasonable withdrawal rate for most of the data set in our research.

A 5% withdrawal rate is not a recommendation.

If you want a deep dive into the various research, consider Wade Pfau's book, [How Much Can I Spend in Retirement](#).

Buy-and-Hold Investing and Safe Withdrawal Rate Research

Safe withdrawal research brought attention to a subject that is critically important to a retiree's success in retirement.

Most safe withdrawal rate research tests fixed and variable withdrawal rate methods.

Fixed withdrawals provide consistent cash flow for retirees. It's also easy to understand and implement.

The downside of fixed withdrawals is that it may lead to the depletion of retirement portfolios earlier than desired. It also doesn't address the retiree's desire to maximize cash flow early in retirement.

Variable withdrawals provide a rule set for maximizing cash flow early in retirement.

The downside of variable spending is that it's more difficult to understand and implement. It likely assures a change in spending at some point. This isn't necessarily bad, as there is research around natural changes in spending over time. See the "go-go, slow-go, and no-go" retirement research.

Beyond choosing between fixed and variable withdrawal rates, some papers test changes to asset allocation. This research looks at varying the buy-and-hold portfolio's mix of stocks and bonds (i.e., 30/70, 60/40, 70/30, etc.).

The research focused on changes in asset allocation to maintain a US stock and bond mix. The idea is that adjusting the stock and bond mix at different times may increase the safe withdrawal rate.

The reason researchers focus exclusively on only buy-and-hold of equities and bonds is because it's much more controlled and straightforward.

You might be wondering, what is buy-and-hold investing? According to Investopedia:

Buy and hold is a passive investment strategy in which an investor buys stocks (or other types of securities such as ETFs) and holds them for an extended period regardless of fluctuations in the market. An investor who uses a buy-and-hold strategy actively selects investments but has no concern for short-term price movements and technical indicators.

The average buy-and-hold portfolio is built on a 60% allocation of US Stocks and a 40% allocation of US Bonds.

In 2012, Michael Kitces summarized [20 years of research](#) on safe withdrawal rates. This included papers on fixed and variable spending as well as adjustments to asset allocation.

The article combines the different factors that influence a safe withdrawal rate. This creates a “layer cake,” leading to a safe withdrawal rate.

Michael caveat’s this summary the best by stating:

“...many of the factors discussed here were evaluated in separate research studies, and it is not necessarily clear whether they are precisely additive.”

Even with that caveat in mind, there is a ton of value in understanding how each factor influences your cash flow in retirement.

What are the factors that influence safe withdrawal rates?

1. Controllable → *You 100% control these decisions.*
 - Fees net of expected investment outperformance
 - Buy and hold vs. Tactical Asset Allocation
 - Single country bias vs. Globally diversified portfolio
2. Preference → *Your preference for prioritizing inevitable trade-offs.*
 - Spending flexibility
 - Legacy/Longevity hedge
3. Facts → *These are your facts. You have limited to no control over it.*
 - Tax drag on taxable investments
 - Time horizon
 - Valuation environment

If we focus only on the controllable decisions, what do we see?

Vanguard’s founder, John Bogel, said it best “we get what we precisely don’t pay for.” Lower your fees and increase the amount you can spend on everything else.

The next bullet point includes “fees net of expected investment outperformance. This is also known as “alpha.” To receive alpha, an investor must use an active trading strategy. Investors who choose a passive buy-and-hold strategy cannot receive alpha. The objective of buy-and-hold investing is to receive market returns before fees. Therefore, expecting alpha is only valid if you’re using a sound investment plan.

The final two factors are

- Buy and hold vs. Tactical Asset Allocation
- Single country bias vs. Global diversification

Which choices increase your withdrawal rate?

- Tactical Asset Allocation – 0.20%
- Global diversification – 0.50%

Why do these choices increase your withdrawal rate?

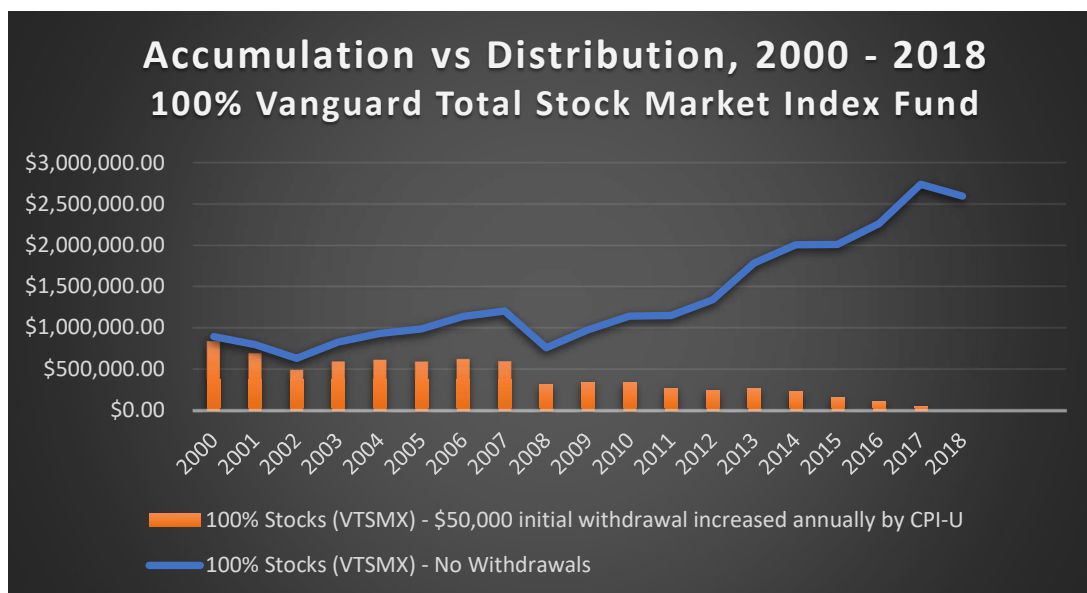
The answer lies in the detailed understanding of the nature of sequence of returns risk.

ACCUMULATION VS. DISTRIBUTION

How portfolio distributions (should) change investing is the subtitle of this whitepaper. I insert the word “should” because today’s popular investment wisdom doesn’t separate the two. According to academics, the media, and many practitioners, the only way to invest is through low-cost, buy and hold index funds.

They make no effort to separate accumulation from distribution. However, taking distributions from a portfolio changes the math.

To illustrate this point, here is an example of two hypothetical portfolios, each starting with \$1,000,000. The next three charts are inspired by James Sandidge, JD’s work in Chaos and Retirement Income.



Source: Portfolio Visualizer (see FAQs for data sources). For illustrative and educational purposes only. This chart is being presented to show the impact of distributions on a portfolio. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

US Stocks are represented by Vanguard Total Stock Market Index Fund (VTSMX). CPI-U represents the Consumer Price Index provided by the Bureau of Labor and Statistics. Inspired by James Sandidge – Chaos and Retirement Income

The blue line shows a hypothetical portfolio of 100% stocks represented by the Vanguard Total Stock Market Index Fund before taking distributions. The bars show the same investment taking an initial \$50,000 distribution. The distribution is then increased annually by the Consumer Price Index inflation rate. Both investors had the exact same returns.

What the investor in the orange bar lost was the benefit of time as a risk management tool. When accumulating wealth, you can count on time to recover from market losses.

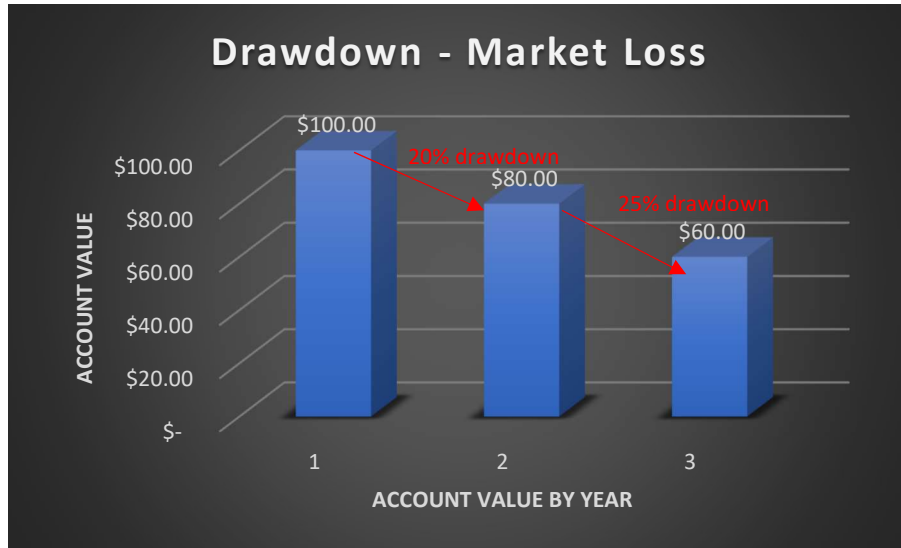
When distributing wealth, time may not be a sufficient risk management tool.

Time as a risk management tool is what buy-and-hold investing is built on.

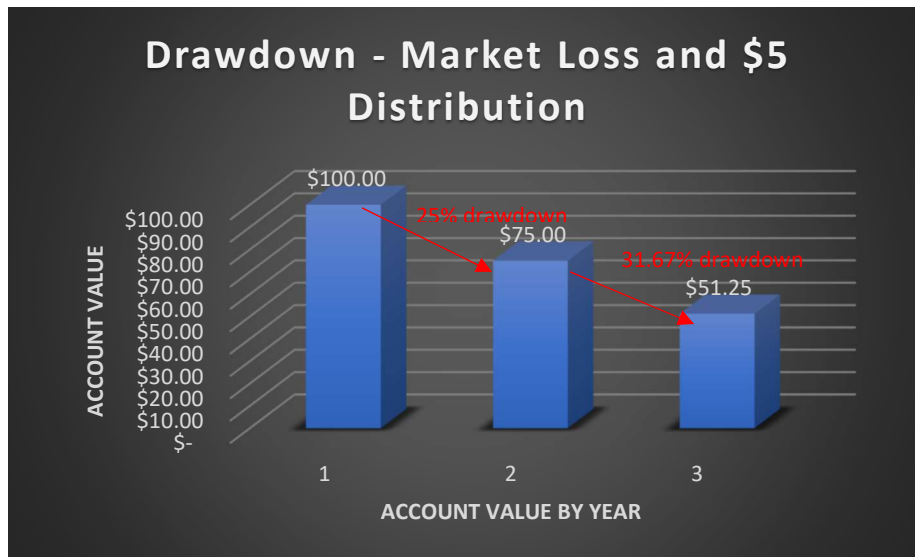
PUBLIC ENEMY #1

Drawdowns are public enemy #1 for retirement portfolios. Drawdowns affect the growth of a portfolio. Drawdowns also affect investor psychology.

What are drawdowns? It's the amount an account falls from its previous high point.

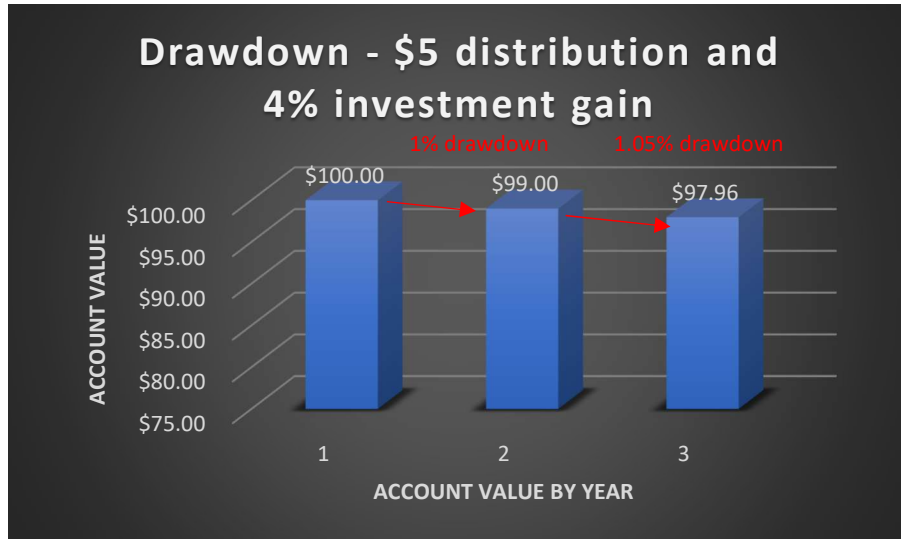


c



Year 1 = 20% investment loss.
Year 2 = 25% investment loss

Example 2: Drawdowns can also occur in positive markets when investment gains are less than portfolio withdrawals.



Year 1 = 4% investment gain.
Year 2 = 4% investment gain

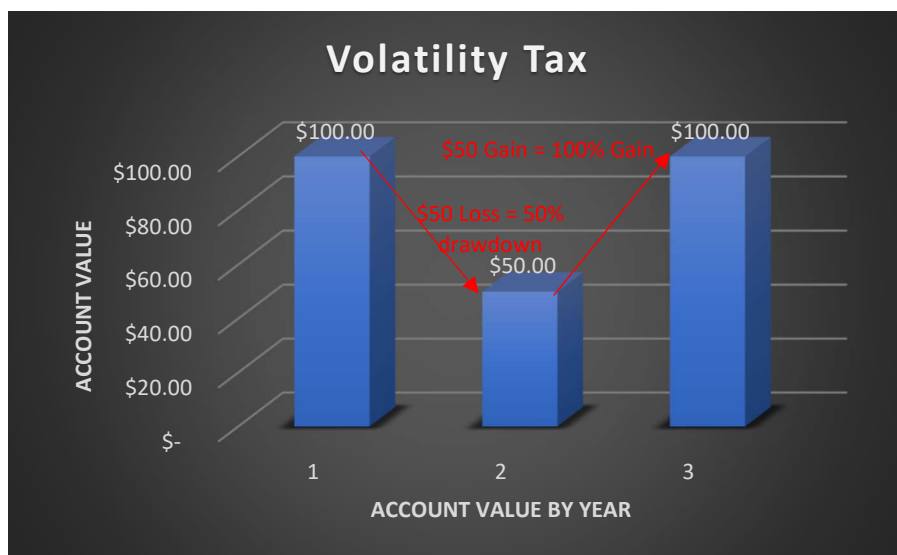
Drawdowns caused by investment losses when accumulating wealth slow the growth of your portfolio.

Drawdowns caused by investment losses and distributions during the distribution phase, could lead to reduced cash flow or running out of money.

With this understanding of drawdowns, we need to look at the next issue.

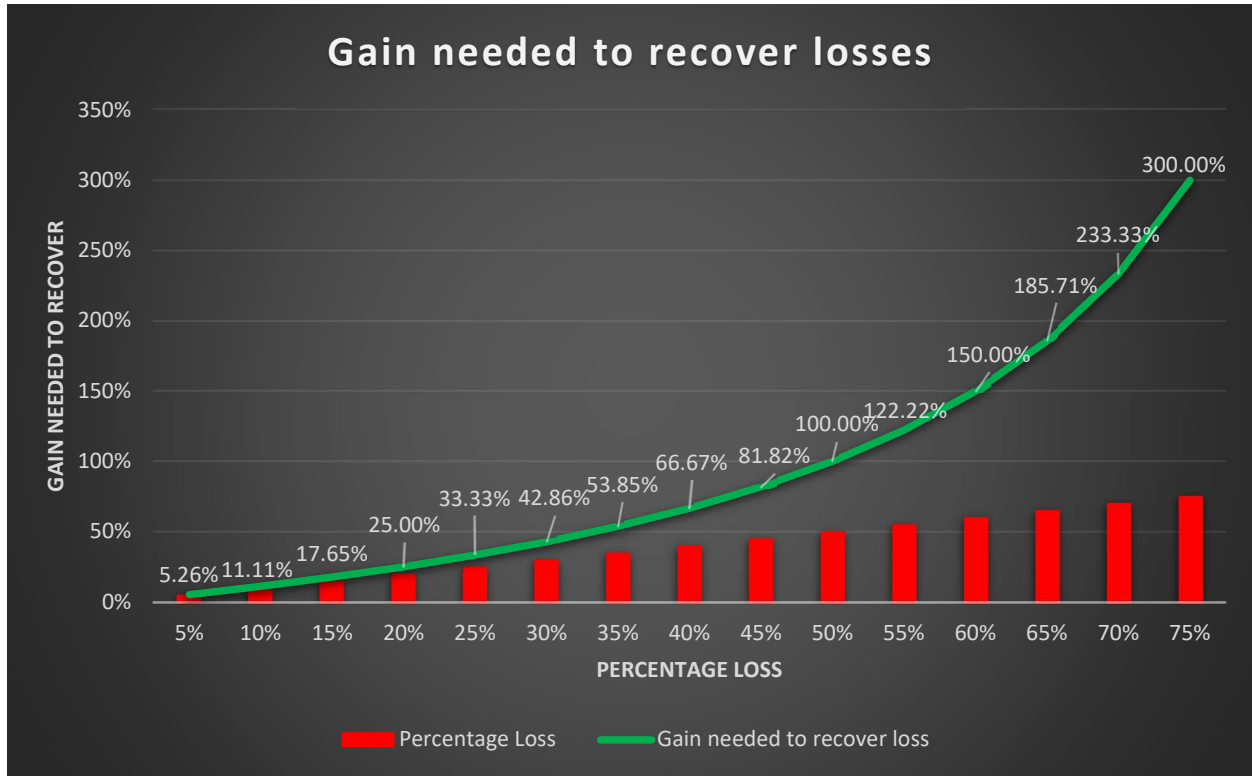
Volatility Tax

Volatility tax is a function of the math of gains and losses.



A loss of 50% requires a gain of 100% to get back to even. In the example above, there was a 50% loss (i.e., \$50 loss) in year 1. To get back to even, it needed a \$50 gain (i.e., 100% gain).

The math of gains and losses is “nonlinear.” This means that as the loss gets bigger, the needed gain to recover the loss increases at an increasing rate.



Remember this. We’ll dig into it more as we move along.

Next, let’s talk about the timing of drawdowns. And why when you experience drawdowns matters.

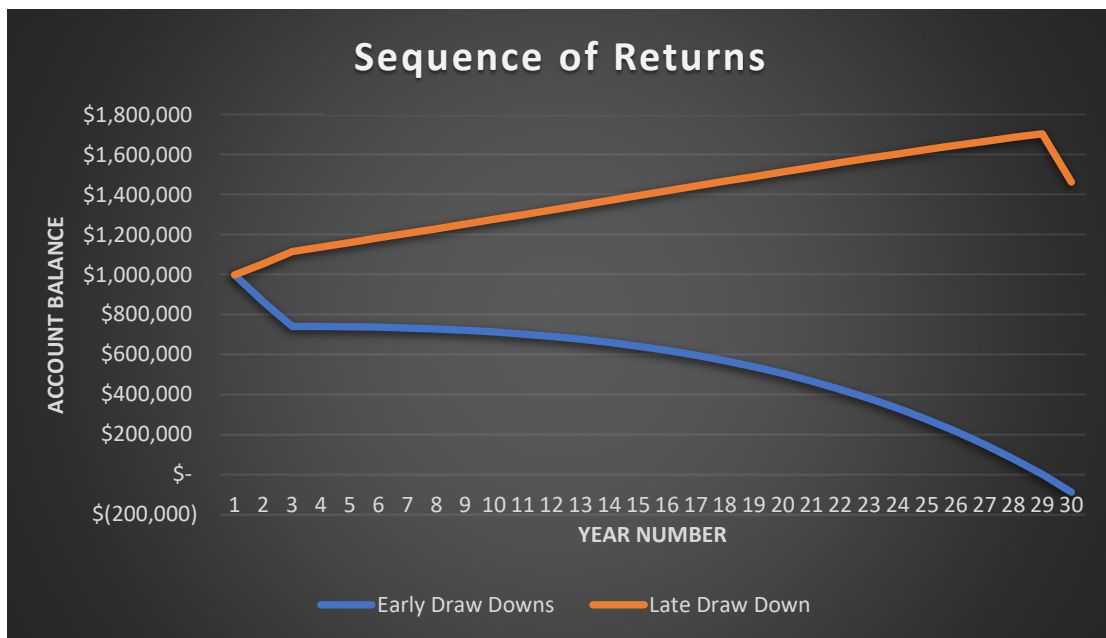
EARLY DRAWDOWNS

Sequences of returns risk is the risk of receiving lousy investment returns early in retirement. Bad investment returns could be:

- Large portfolio losses early in retirement (see example 1 above)
- Portfolio returns that don't support withdrawals (see example 2 above)

Here is a simple 30-year example:

- The Orange and Blue lines both:
 - Start with a \$1,000,000 balance
 - Withdraw \$50,000 in year one, then increase by 2.25% each year after
 - Grow by 8.5% in years 3 through 28
- The Blue line starts with a 10% **loss** in years 1 and 2. In years 29 and 30, it grows by 10%.
- The Orange line starts with a 10% **gain** in years 1 and 2. In years 29 and 30, it declines by 10%.



No market indices, index funds, or actual investments were used in this analysis. The rate of return and inflation rate was created for illustrative purposes only.

As you can see, the results are dramatically different. Both portfolios averaged 7.37% returns.

One portfolio ended with more than it started. The other went negative before year 29.

The example above uses simple, hypothetical returns to set the framework. Unfortunately, the sequence of returns risk isn't just a cute academic exercise.

A historical example illustrating a sequence of returns

Rita and Chase each have \$1 Million. They don't need to spend it since they plan on living on their pension and Social Security income.

Rita has never liked the ups and downs of the market. Even though she's not planning on spending the money she still chooses to use a less volatile strategy.

Rita is smart and has researched different investment strategies. She understands the importance knowledge plays in committing to an investment strategy.

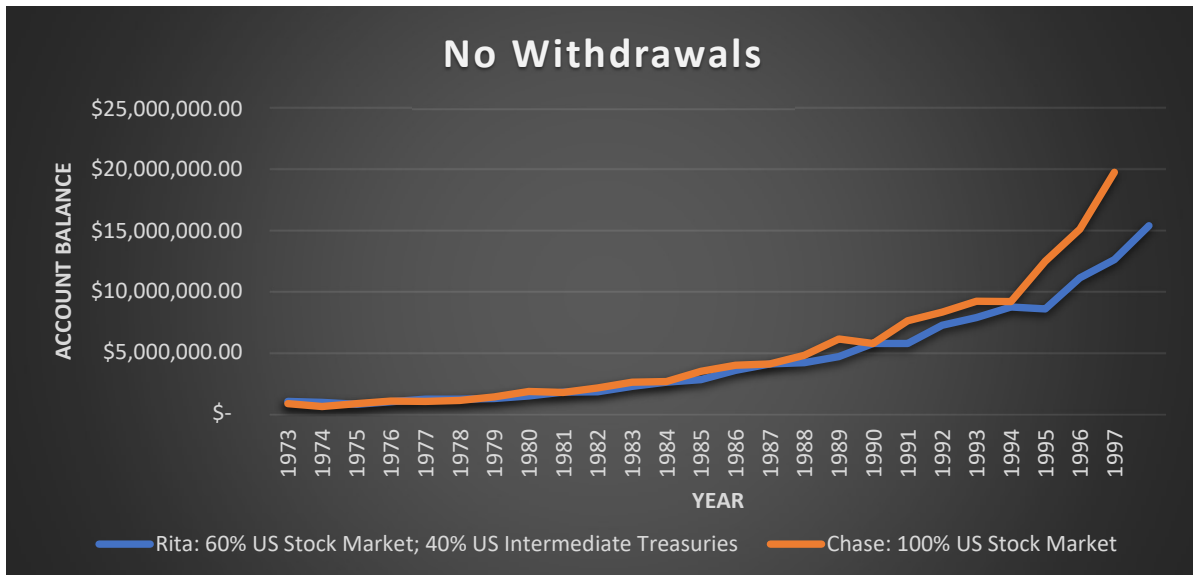
She decides that a strategy that combines stocks and bonds is best for her. She's willing to sacrifice the growth of her portfolio since she knows the combination will reduce the downside.

Chase has built his wealth using his favorite stock fund and has an iron stomach to stick through down markets.

He chooses to invest his money just like he did throughout his career.

Chase's bet pays off. His average return is 1.88% more than Rita's.

Rita receives 12.07% while Chase receives 13.95%. This bet earned him over \$4 million more than Rita.



For illustrative and educational purposes only. This chart is being presented to show the results of two hypothetical portfolios from January 1973 to December 1997. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

US Stock Market is represented by AQR US MKT Factor Returns 1972-1992 (AQR Data Sets) and Vanguard Total Stock Market Index Fund (VTSMX) 1993+. US Intermediate Treasuries are represented by FRED Interest Rate Data (5-year maturity) 1972-1991 and Vanguard Intermediate-Term Treasury Fund (VFITX) 1992+.

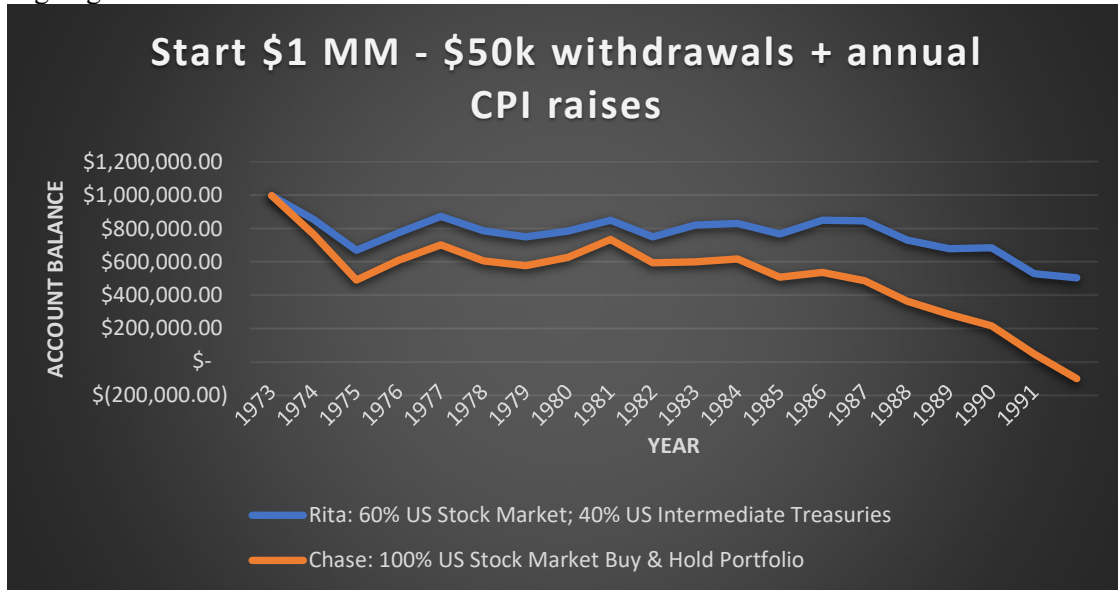
Chase's annual return was also higher than Rita's return, 16 out of 25 years return. He won nearly two out of every three years. Congrats Chase!

The results here align with the basis of classical portfolio management. Accepting more risk is required to receive maximize long-term wealth.

What would happen if they took withdrawals?

Now let's assume Rita and Chase need to withdraw from their portfolio. Rita will keep her portfolio that averaged 12.07%. Chase will keep his portfolio that averaged 13.95%.

Who is going to win?



For illustrative and educational purposes only. This chart is being presented to show the results of distributions on two hypothetical portfolios from January 1973 to December 1997. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

US Stock Market is represented by AQR US MKT Factor Returns 1972-1992 (AQR Data Sets) and Vanguard Total Stock Market Index Fund (VTSMX) 1993+. US Intermediate Treasuries are represented by FRED Interest Rate Data (5-year maturity) 1972-1991 and Vanguard Intermediate-Term Treasury Fund (VFITX) 1992+. Distributions taken at the end of the period and adjusted by inflation. Inflation is represented by Bureau of Labor and Statistics Consumer Price Index (CPI-U)

When you take distributions from a portfolio, the math completely changes.

Rita and Chase still experience the same average return as before. However, Chase experiences larger drawdowns early in the sequence.

Because large drawdowns happened early in retirement, Chase's account drops and never recovers enough to outpace Rita.

After taking distributions, Rita beat Chase by nearly \$500,000!

Chase averaged 1.88% more than Rita over that time frame. He also had a better return than her 2 out of every 3 years. Wow!

If you were given a crystal ball, would you be able to pass up the portfolio that would yield 1.88% more and outperform over 60% of the time?

THE BUTTERFLY EFFECT

For the skeptics out there you might be questioning my example above. With that example, I used an all-stock portfolio versus a balanced asset allocation. For the skeptics out there, you might be thinking... nobody invests in an all-stock portfolio.

This risk is overblown.

Well, one of my favorite retirement researchers, James Sandidge, squashes that with a historical example. In his example, he demonstrates how the butterfly effect impacts a retirement portfolio.

The butterfly effect gets its name from the idea that a butterfly flapping its wings in Brazil could trigger a sequence of events that creates a Tornado in Texas. The idea is that minor differences early can have a significant impact later.

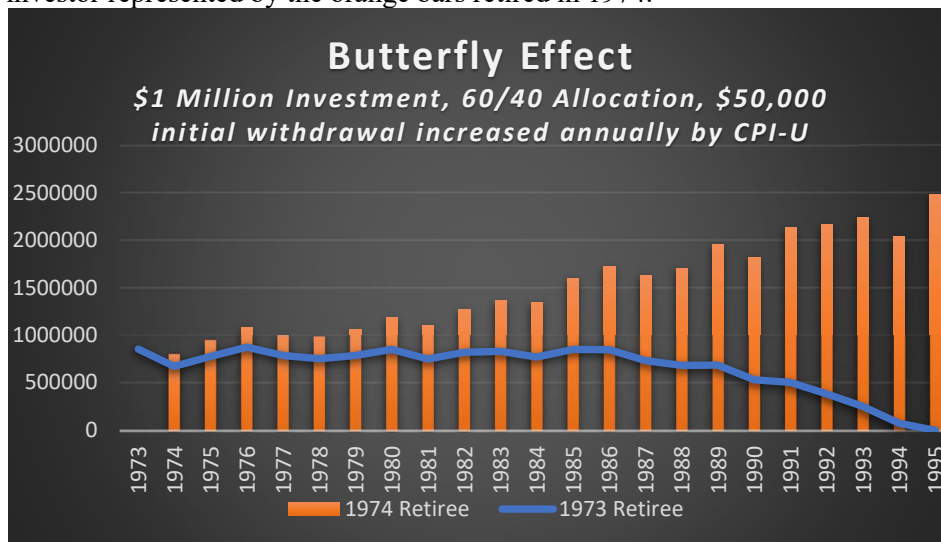
What do butterflies have to do with retirement portfolios?

The idea is that small changes early in a complex system can have a major impact later.

Another way to look at it is that a small loss early can have a major impact over the long run.

Below is an example where we compare two hypothetical investors:

- Both have a \$1 Million portfolio
- Both invest it 60% Vanguard Total Stock Market Index Fund and 40% Vanguard Intermediate-term Treasury
- Both take a \$50,000 initial withdrawal that is increased annually by CPI.
- The investor represented by the blue line retired in 1973.
- The investor represented by the orange bars retired in 1974.



Source: Portfolio Visualizer (see FAQs for data sources). For illustrative and educational purposes only. This chart is being presented to show the impact of the sequence of returns on a portfolio. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

US Stocks are based on the Vanguard Total Stock Market Index Fund (VTSMX) and US Bonds are based on Vanguard Intermediate-Term Treasury Fund (VFITX). Inspired by James Sandidge – Chaos and Retirement Income

Our first reaction is that the 1973 retiree had a worse sequence of returns.

This is true only to a point. What's important to note is that the two investors had the same sequence for 22 of the 23 years before the bars ran out of money.

The sequence of returns is a relevant issue. However, the true problem is the butterfly effect.

Small losses early in retirement are terrible.

This is why risk management needs to be prioritized for your retirement portfolio.

Benjamin Graham said it best:

*“The essence of investment management is the management of risks,
Not the management of returns. Well-managed portfolios start with this
precept.”*

Benjamin Graham

RISK MANAGEMENT FOR BUY-AND-HOLD INVESTING

So far, we've focused on the basic 60/40 buy-and-hold portfolio. This is partially due to the ease of the analysis as well as the popularity of the strategy.

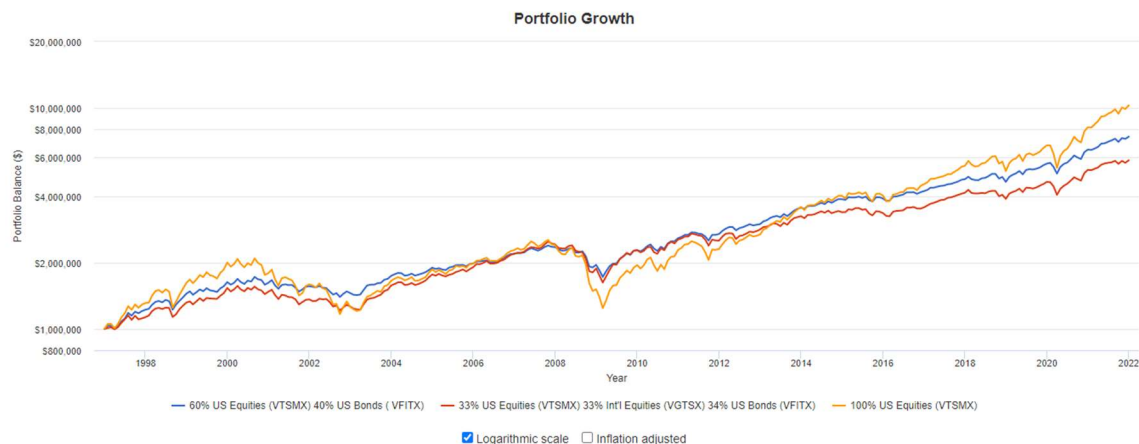
The popularity of the 60/40 buy-and-hold strategy is based on good investing principles. It's been right so long that its validity as a strategy cannot be ignored.

However, the math of portfolio distributions cannot be ignored.

Along with the 60/40's success, there have been major portfolio drawdowns.

Here is a comparison of three hypothetical portfolios. The comparison runs from January 1998 through December 2021. The analysis is capped because of the return history for the international portion of the middle portfolio.

Portfolio	Initial Balance	Final Balance	CAGR	Stdev	Best Year	Worst Year	Max. Drawdown
60% US Equities (VTSMX) 40% US Bonds (VFITX)	\$1,000,000	\$7,425,724	8.35%	8.95%	22.18%	-16.89%	-27.97%
33% US Equities (VTSMX) 33% Int'l Equities (VGTSX) 34% US Bonds (VFITX)	\$1,000,000	\$5,804,009	7.29%	9.96%	24.46%	-22.25%	-34.77%
100% US Equities (VTSMX)	\$1,000,000	\$10,291,795	9.77%	15.76%	33.35%	-37.04%	-50.89%



Source: Portfolio Visualizer (see [FAQs](#) for data sources). For illustrative and educational purposes only. This chart is being presented to show the returns of three hypothetical strategies from January 1998 through December 2021. The strategy of 60% VTSMX and 40% VFITX and 33% VTSMX, 33% VGTSX, and 34% VFITX is rebalanced annually. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

US equities are Vanguard 500 Index Fund Investor Shares (VTSMX). Int'l Equities are represented by Vanguard Total International Stock Index Fund (VGTSX). US Bonds are represented by Vanguard Total Bond Market Index Fund Investor Shares (VFITX).

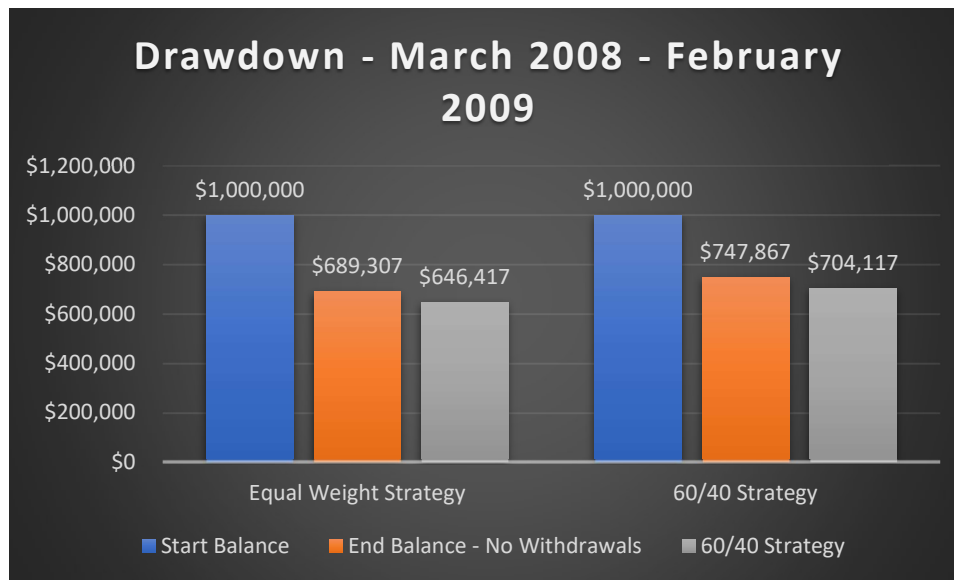
The blue line represents a standard US 60/40 portfolio. The red line represents a more globally diversified portfolio split evenly between US Stocks, International Stocks, and US Bonds. Lastly, the yellow line represents 100% US stocks.

The 60/40 portfolio experienced a 27.97% drawdown. The globally diversified portfolio experienced a 34.77% maximum drawdown. And coming in last, the 100% stock investor suffered a 50.89% drawdown.

Popular investment wisdom tells us to ignore drawdowns. Grin and bear it. The market will bounce back. We know that's not true in retirement. Retirement portfolios must be treated differently. Optimism is a requirement for investing. Yet, optimism without any sense of realism seems ignorant.

Let's take a deeper look at the hypothetical portfolios above by reviewing the most recent worst-case scenario.

In this analysis, I limited the period analyzed to the 12-month period of March 2008 through February 2009.



Source: Portfolio Visualizer (see FAQs for data sources). For illustrative and educational purposes only. This chart is being presented to show the impact the March 2008 – February 2009 drawdown for three hypothetical portfolios. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

Assets Traded: Vanguard Total Stock Market Index Fund (VTSMX); Vanguard Total International Stock Index Fund (VGTIX), and Vanguard Intermediate-Term Treasury Index Fund (VFITX). The 60/40 Buy and Hold strategy is represented by 60% VTSMX and 40% VFITX. The Equal Weight strategy is represented by 33% VTSMX, 33% VGTIX, and 34% VFITX. The Vanguard Total Stock Market Index is represented by VTSMX.

The Blue bars show the Starting Balance of \$1,000,000. The Orange bars show the impact of the market decline on the portfolio. The grey bars represent the market decline plus a \$50,000 withdrawal.

The equal weight portfolio suffered a 37.16% drawdown in 2009. If we think back to the earlier chapter that discussed volatility tax, what is the gain we would need to receive to get back to even?

59.13%. Woofa. The math of gains and losses cannot be overlooked.

To paraphrase Todd Tressider of FinancialMentor.com:

If unmanaged market volatility never caused large losses exceeding 15%-20% then there wouldn't be any problem to solve. Passive index asset allocation would be the logical solution.

The only reason there's a problem to solve is because the math of large losses proves it. The stock market is a wild roller-coaster that can quickly drop 30%, 40%, 50%, or more. Losses that large, even if only temporary, make a permanent dent in how your wealth compounds.

If you don't believe Todd or me, then check out [Universa Investments'](#) analysis on volatility tax.

In their study, they showed the importance of the volatility tax using a 20-year span of S&P 500 history where there were only two losses (both temporary) greater than 15%. Limiting just those two losses each to 15% increased your compound return from 7.2% to 11.08% and increased your arithmetic return from 8.81% to 11.77%.

The point of this is that passively owning a buy-and-hold portfolio exposes retirees to significant market risk. This is shown through history. History that some believe favored the 60/40 more than what is statistically likely going forward.

Please remember, that the future is completely unknowable. While there are statistical reasons to believe the 60/40 portfolio will have large losses in the future, that doesn't mean it will happen soon or at all. It's all probabilistic.

Now let's get back to the most recent historical worst-case drawdown of various buy-and-hold portfolios.

Since those massive drawdowns occurred the market has experienced tremendous returns.

Even if you knew that, would you be able to stick with a strategy that lost nearly 30%-40% of its value in 12 months? If you retired at the beginning of that drawdown, how would you feel?

The psychology of large market drawdown with buy-and-hold portfolios cannot be overlooked.

So what could you do about it?

Actively managed asset allocation

If you're committed to a buy-and-hold portfolio, it's worth considering active management of your asset allocation over time. James Sandidge provides an interesting take on how to implement this in his paper, *Chaos and Retirement Income*.

The short of it is to start retirement with a 30/70 stock to bond allocation. Then throughout retirement increase equities to protect against longevity risk.

The sequence of returns risk, the butterfly effect, and volatility tax all point towards the necessity of the strategy.

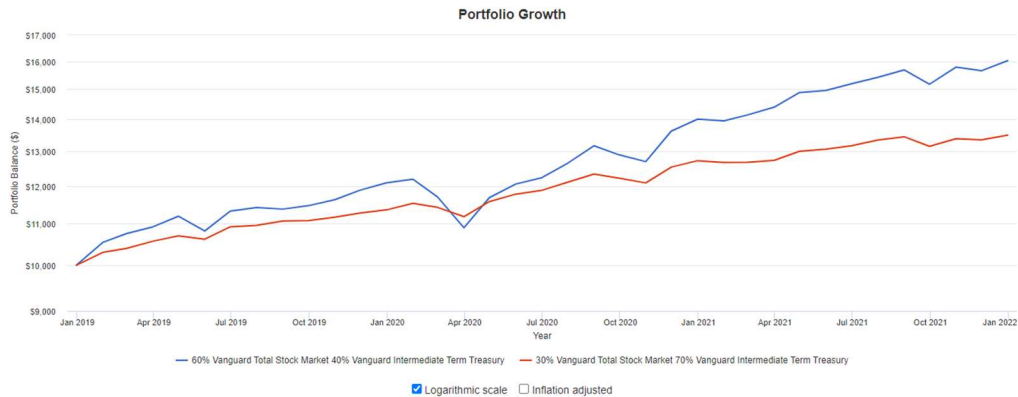
Where things get shaky is applying this in the real world.

Human psychology is tough to manage. If you retire during a big market downturn, you'll probably be happy with the larger bond allocation.

If you retire during a sharp market increase, you would probably be disappointed in missing out on all the gains.

Let's compare the January 2019 – December 2021 period.

Portfolio	Initial Balance	Final Balance	CAGR	Stdev	Best Year	Worst Year	Max. Drawdown
60% Vanguard Total Stock Market 40% Vanguard Intermediate Term Treasury	\$10,000	\$16,023	17.02%	10.16%	20.90%	14.44%	-10.58%
30% Vanguard Total Stock Market 70% Vanguard Intermediate Term Treasury	\$10,000	\$13,496	10.51%	4.79%	13.60%	6.07%	-3.02%



Year	Inflation	60% Vanguard Total Stock Market 40% Vanguard Intermediate Term Treasury		30% Vanguard Total Stock Market 70% Vanguard Intermediate Term Treasury	
		Return	Balance	Return	Balance
2019	2.29%	20.90%	\$12,090	13.60%	\$11,360
2020	1.36%	15.81%	\$14,001	12.01%	\$12,724
2021	7.04%	14.44%	\$16,023	6.07%	\$13,496

Source: Portfolio Visualizer (see FAQs for data sources). For illustrative and educational purposes only. This chart is being presented to show the January 2019 – December 2021 returns for two hypothetical portfolios. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

The Vanguard Total Stock Market Index is represented by Vanguard Total Stock Market Index Fund (VTSMX). The Vanguard Intermediate-Term Treasury is represented by Vanguard Intermediate-Term Treasury Index Fund (VFITX).

Intentionally de-risking a portfolio before a strong bull market creates some great mental conflict. This is a great example of why you must commit to your investment process. You must stick with it through the good and bad.

We don't know what the future holds, but what would be coming up for this hypothetical investor is a rising equity glide path.

Would this same investor be OK if they increase equities into a long-term bear market? Don't get me wrong, I think actively managing the allocation is important for retirement portfolios. My point is that these decisions are difficult. It's not as easy as the research shows it to be. You must manage normal human emotions with retirement portfolio math.

Dynamically adjusting the allocation of bonds and stocks to match retirement portfolio risk seems smart, but there will be trade-offs.

This is what leads us to a different type of risk management.

A RISK MANAGEMENT ALTERNATIVE

Many academics and practitioners believe the only way to reduce risk is to add more bonds or add other asset classes. Some research focuses on dynamically adjusting the stock and bond allocation through retirement.

The next level of risk management is through trend following. Trend following is a systematic, rules-based trading strategy. It trades based on a mathematical discipline. It's also known as tactical asset allocation. For the rest of the whitepaper, I will use "trend-following" as the primary term.

Trend following is primarily the systematic approach to buying rising trends and selling falling trends. The most common rules to determine a trend are Moving Averages and Momentum.

The 200-day Moving Average is the easiest to understand and a good place to start. The 200-day moving average compares the historical price from 10 months ago to the end of month price. If the current price falls below the moving average, conditions aren't favorable, and the position will be sold.

Here is an example of applying the moving average to the Vanguard Total Stock Market Index fund (VTSMX). In this illustration, VTSMX and cash are the only two assets in the investment universe.

Portfolio	Initial Balance	Final Balance	CAGR	Stdev	Best Year	Worst Year	Max. Drawdown
Moving Average Model	\$10,000	\$177,371	10.82%	10.89%	35.79%	-6.99%	-17.57%
Buy & Hold Portfolio	\$10,000	\$168,756	10.62%	15.22%	35.79%	-37.04%	-50.89%



Source: Portfolio Visualizer (see FAQs for data sources). For illustrative and educational purposes only. This chart is being presented to show the impact of using a simple moving average trend following strategy on a portfolio from January 1994 to December 2021. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

Moving average strategy results from Jan 1994 to Dec 2021 are based on 10 calendar month simple moving average of each portfolio asset. The tactical asset allocation strategy is invested in US stocks as represented by the Vanguard Total Stock Market Index Fund (VTSMX) when the adjusted close price of VTSMX is greater than or equal to the moving average, otherwise, the specific portfolio allocation is invested in Cash (CASHX). Tactical asset allocation strategy trades are executed using the end-of-month close price each month based on the end-of-month signals. The time period was constrained by the available data for Vanguard Total Stock Mkt Idx Inv (VTSMX) [May 1992 - Apr 2022].

The blue line represents flipping the assets between VTSMX and cash whenever the moving average for VTSMX is below its 200-day price. In other words, when VTSMX is at or above the 200-day moving average, it holds VTSMX. Whenever it's below its 200-day moving average, it holds cash.

This rules-based strategy returned 10.82% while buying and holding the VTSMX returned 10.62%. This is before transaction costs and taxes.

If the investment was held in a tax-favored account like an IRA, then the net tax result would be the same between the two options. In the sample tested it averaged up to 1.5 trades per year so it would have had minimal trading costs.

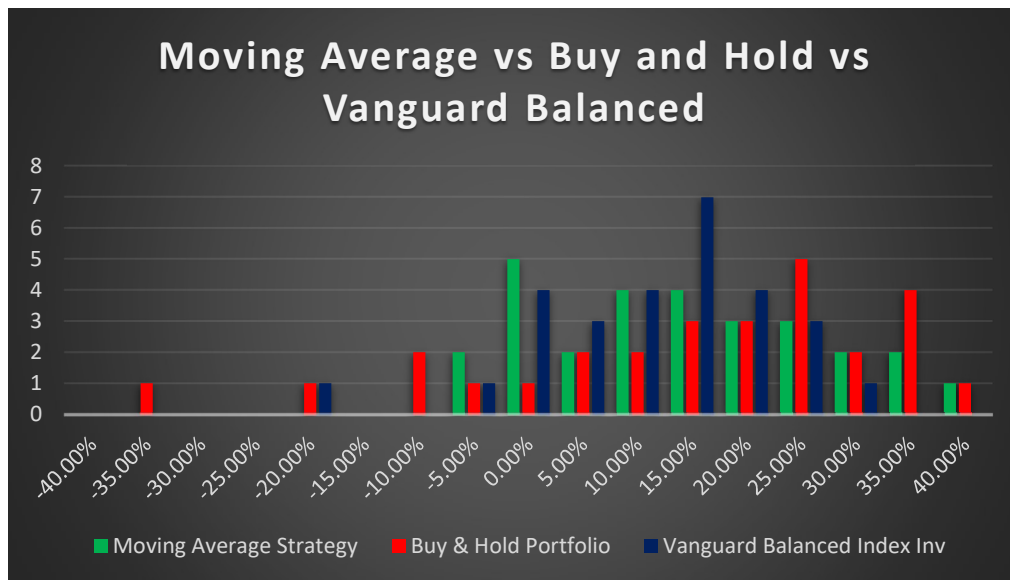
What you get is a similar return with less than half the drawdown.

By applying this simple rule, the drawdown of the moving average strategy limited the drawdown to 17.57%. The buy-and-hold investor suffered a 50.89% drawdown.

Knowing that drawdowns matter, this is an interesting result.

In fact, applying the 200-day moving average to this single equity fund limited the drawdown better than a balanced portfolio.

The chart below compares the US Total Stock Market Index Fund with a 200-day moving average strategy to the US Total Stock Market using a buy and hold system against the Vanguard Balanced Index Fund (VBINX). *VBINX was used in this analysis due to Portfolio Visualizer software limiting VBINX as the "benchmark" portfolio. VBINX is a reasonable proxy for the 60/40 portfolio we've used throughout this whitepaper.*



US Total Stock Market Moving Average		US Total Stock Market Buy & Hold		Vanguard Balanced	
Annualized Return	Annualized Volatility	Annualized Return	Annualized Volatility	Annualized Return	Annualized Volatility
10.82%	10.89%	10.62%	15.22%	8.61%	9.21%
Biggest Loss	-17.57%		-50.89%		-32.57%
Starting Balance (1/1/1994)	\$ 10,000		\$ 10,000		\$ 10,000
Ending Balance	\$ 177,371		\$ 168,756		\$ 101,124

Source: Portfolio Visualizer (see FAQs for data sources). For illustrative and educational purposes only. This chart is being presented to show the results of three hypothetical strategies. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

Moving Average strategy results from Jan 1994 to Dec 2021 are based on 10 calendar month simple moving average of each portfolio asset. The tactical asset allocation strategy is invested in US stocks as represented by the Vanguard Total Stock Market Index Fund (VTSMX) when the adjusted close price of VTSMX is greater than or equal to the moving average, otherwise, the specific portfolio allocation is invested in Cash (CASHX). Moving average strategy trades are executed using the end-of-month close price each month based on the end-of-month signals. The time period was constrained by the available data for Vanguard Total Stock Mkt Idx Inv (VTSMX) [May 1992 - Apr 2022].

US Total Stock Market - Buy and hold strategy results are based on the Vanguard Total Stock Market Index Fund (VTSMX). Vanguard balanced results are represented by the Vanguard Balanced Index Fund (VBINX).

What do we see?

This simple trend-following strategy achieves a similar return as its buy-and-hold counterpart. It also provided greater downside protection than a standard balanced portfolio.

Combining stocks and bonds is not the only way to reduce portfolio drawdown risk.

MOVING AVERAGE VS. MOMENTUM

Moving average is the most straightforward approach to understanding trend following signals. Momentum is essentially a variation of the moving average. The difference between the two is that moving average focuses on the price while momentum focuses on returns.

Unless you're creating quantitative models, that difference doesn't matter. Corey Hoffstein, a popular quant investor, shares how they are mathematically linked.

For our purposes, we'll treat these terms as similar enough.

There are two types of momentum.

1. Relative momentum compares performance to our peers
2. Absolute momentum compares performance to ourselves

The combination of these two rules creates dual momentum.

Don't worry about remembering these definitions.

If anything, remember that momentum is persistence in performance. An object in motion stays in motion.

It works because it cuts your losses and lets your winners run.

It does not time market bottoms or market tops. By its nature you won't sell until the market starts to trend down, and it won't buy until the trend starts to point up.

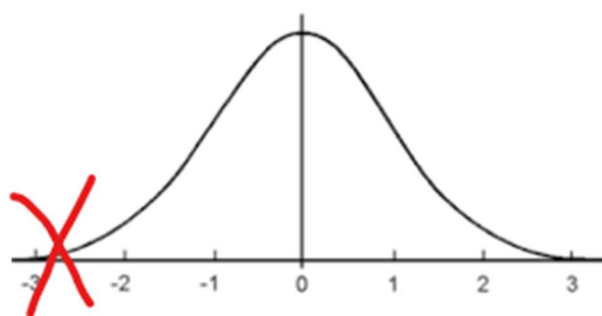
DUAL MOMENTUM

An excellent place to start on what makes a good trend following system is through Gary Antonocci's work on Dual Momentum. I view Dual Momentum as critically important to a good trend following approach. However, I do not invest my money, nor do I recommend that my clients invest in Gary's traditional Dual Momentum strategy.

But Gary's publicly available book and research on dual momentum is a great place to start to learn the benefits of trend following.

The primary reasons trend following is beneficial are:

1. It cuts off the left tail in the distribution of returns while having a negligible impact on the right side of the curve.



2. In simple terms... it cuts losses early to reduce drawdowns but lets winners ride to get most of the upside.

The best way to understand the value of dual momentum is through Gary's historical performance.

Gary breaks down the performance of this strategy on his website DualMomentum.net.

Currently, his backtest runs from January 1950 – to September 2018 ([article here](#)):

	Gary	S&P 500
CAGR	15.8%	11.4%
Annual Std Dev	11.5%	14.2%
Sharpe Ratio	0.96	0.52
Worst Drawdown	-17.8%	-51.0%
Worst 6 Months	-15.7%	-41.8%
Worst 12 Months	-17.8%	-43.3%
% of Profit Months	69%	64%

Earlier I mentioned that trend following cuts off the left tail of distributions.

Left tail returns are typically from Bear Markets.

According to Gary this is how his strategy performed in all bear markets that occurred from January 1950 – to September 2018:

BEAR MARKETS	S&P 500	GARY
Jan 1962-Jun 1962	-22.8%	-15.7%
Dec 1968-Jan 1970	-29.3%	4.3%
Jan 1973-Sep 1974	-42.6%	15.1%
Dec 1980-Jul 1982	-16.5%	16.0%
Sep 1987-Nov 1987	-29.6%	15.1%
Sep 2000-Sep 2002	-44.7%	14.9%
Nov 2007-Feb 2009	-50.9%	-13.1%
AVERAGE	-33.8%	0.9%

Results are hypothetical, are NOT an indicator of future results, and do NOT represent returns that any investor attained. Indexes are unmanaged, do not reflect management or trading fees, and one cannot invest directly in an index.

Remember ... investing always involves risk, including loss of principal. Past results are not indicative of future performance.

You can track Gary's performance in real time at his website:

<https://www.optimalmomentum.com/global-equities-momentum/>

TREND CAN BE OUR FRIEND

Gary's Dual Momentum strategy provided some interesting results. While these results are intriguing, we shouldn't base any investment decision purely on its backtest. The benefit of a backtest is that it can help shape expectations.

In the case of a retirement portfolio, what do backtests tell us about trend following?

Many trend-following investment strategies seek to control drawdown risk. When I look for smart strategies, I seek out ones that have shown the potential to limit drawdowns before including distributions to around 20%. Gary's strategy has done this through his sample period.

If we think back to the math of gains and losses, a loss of 20% requires a 25% gain to recover back to even. Compare that to a 25% loss where you need a 33.33% return to recover.

The point of this whitepaper is to emphasize the importance of risk management for retirement portfolios. Drawdowns are public enemy number one. The benefit of trend following is that it cuts off the left tail of the distribution curve. The rules within the strategy de-risk the portfolio when the trend is no longer positive.

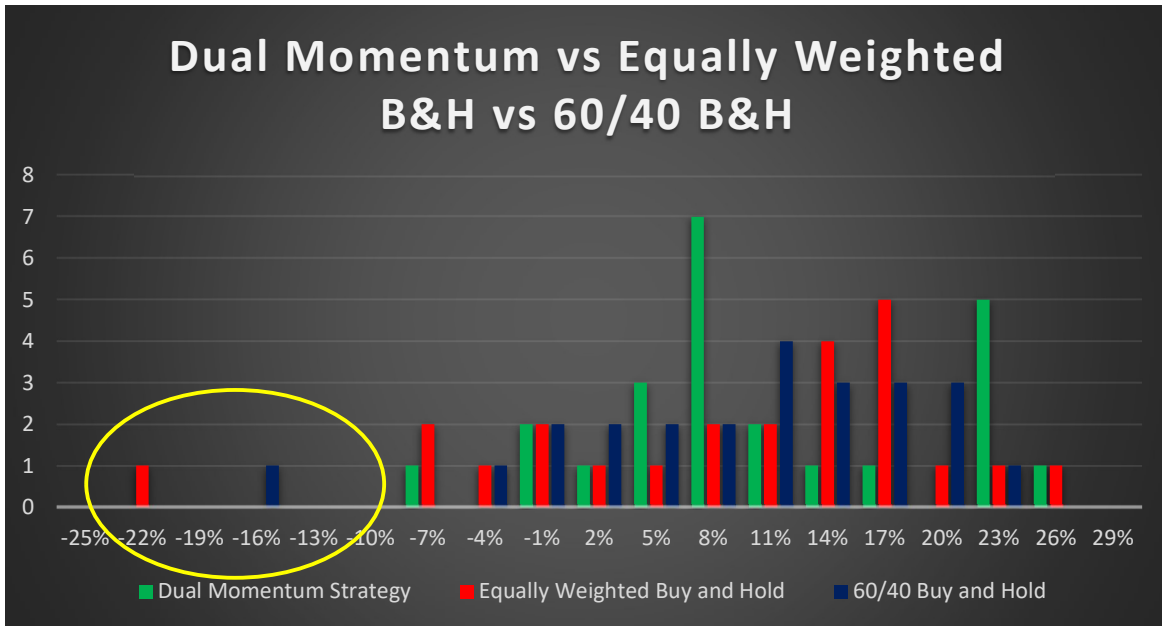
To illustrate this, we can test it out using [Portfolio Visualizer](#). Doing this yourself is a great test to help your understanding. Feel free to try it yourself or just read through it.

Here is a scenario:

- Dual Momentum strategy
- Year-to-Year comparison
- Start: January 1998; End: December 2021
 - Data period is constrained by available data for all assets listed below
- Starting balance: 1,000,000
- Cashflow: Withdraw \$50,000 per year inflation-adjusted using annual CPI-U
- Asset selection:
 - Vanguard Total Stock Market Index Fund (VTSMX)
 - Vanguard Developed Markets Index Fund (VGTSX)
 - Vanguard Intermediate-Term Treasury Index Fund (VFITX)
 - Cash (CASHX)
- Trading rules: Based on standard practices
 - 10-month timing period
 - Excluding the previous month in the return calculation
 - Trade at end of month

Using the facts above we compare the results between the Dual Momentum strategy and the equally weighted portfolio. The equally weighted portfolio holds 33% VTSMX, 33% VGTSX, and 34% VFITX through the testing period. This portfolio is then rebalanced back to target at year-end.

Here are the results:



Source: Portfolio Visualizer (see FAQs for data sources). For illustrative and educational purposes only. This chart is being presented to show results of three hypothetical portfolios. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

Assets Traded: Vanguard Total Stock Market Index Fund (VTSMX); Vanguard Developed Markets Index Fund; Vanguard Total Bond Market Index Fund. Date analyzed – January 1998 – December 2021. The results of the dual momentum strategy are based on holding the top 2 best performing assets. Absolute momentum-based trend following filter is used to switch any selected assets that have a negative excess return over the risk-free rate to Cash (CASHX). The strategy uses a single performance window of 10 calendar month(s). Most recent month in each lookback window is excluded in momentum calculations. Trades are executed using the end of month close price each month based on the end of month signals. The Equal Weight strategy owned 33% VTSMX, 33% VGTSX, and 34% VFITX. The 60/40 strategy is represented by 60% VTSMX and 40% VFITX rebalanced annually.

Above is a chart that compares the following:

- Red bars are the Vanguard Total Stock Market Index Fund on a buy and hold basis
- Blue bars are split evenly between the Vanguard Total Stock Market Index Fund, Vanguard Developed Markets Index Fund, and Vanguard Total Bond Market Index fund. These three funds are rebalanced annually to their equally weighted buy and hold strategy.
- The green bars represent the same three funds in the blue bars. However, the dual momentum rule set drives the decision to hold the asset. At any given time, the hypothetical portfolio will own 2 of the three funds. It might own one fund and will never own all three funds.

Observe how the left side of the chart doesn't include any dual momentum results. The strategy successfully cut off the left tail of returns in the sample tested. Next, see how the green bars are clustered tightly in the middle returns ranging from 2 – 17%.

The red bars spread the widest between the highest and lowest return years. Buy and hold sits in the middle. Much less extreme than the red bars but still shows that nasty downside of -25%.

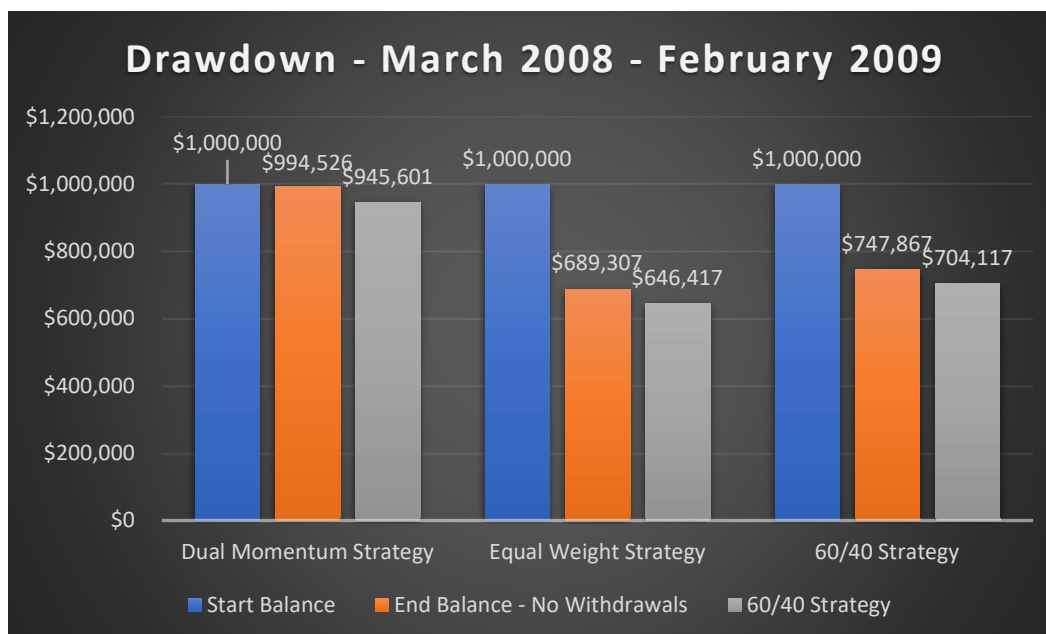
You're thinking, OK, cool, but who had the best return?

	Dual Momentum Strategy	Equal Weight Strategy	60/40 Strategy
Start Balance	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000
End Balance - No Withdrawals	\$7,940,681.92	\$5,135,422.86	\$6,077,650.00
End Balance - \$50k Withdrawals + Annual inflation increases	\$3,287,504.76	\$1,258,805.06	\$889,595.80
No Distribution Rate of Return	9.02%	7.06%	7.81%
\$50k Distribution Rate of Return	5.08%	-1.31%	-0.49%
Maximum Drawdown (including distributions)	-21.32%	-41.94%	-38.82%

Each portfolio starts with \$1,000,000. We compare the ending balance with no withdrawals against \$50,000 annual withdrawals adjusted each year for inflation.

Without withdrawals, the ending portfolio value of the dual momentum strategy is 1.5x the equal weight portfolio. When accounting for withdrawals, the ending portfolio value is 2.6x more significant than the equivalent weight portfolio. If you run this same test and go to bonds instead of cash, the results are even greater.

Don't get caught up in the results for no withdrawals. Focus on the results when there are withdrawals. This is what I believe is the key to a successful retirement income portfolio. To expand that analysis, let's look at the most recent 12-month worst-case drawdown scenario of March 2008 to February 2009.



Source: Portfolio Visualizer (see FAQs for data sources). For illustrative and educational purposes only. This chart is being presented to show the impact the March 2008 – February 2009 drawdown for three hypothetical portfolios. It does not represent the performance of any Calculated Wealth portfolio or investment strategy. Returns assume the reinvestment of all distributions and do not reflect trading costs, transaction fees, commissions, or actual taxes due on investment returns. Investing involves risk, including possible loss of principal. Past performance is not indicative of future results. Nothing herein should be interpreted as personalized investment advice.

Assets Traded: Vanguard Total Stock Market Index Fund (VTSMX); Vanguard Total International Stock Index Fund (VGTSX), and Vanguard Intermediate-Term Treasury Index Fund (VFITX). The results of the dual momentum strategy are based on holding the top 2 best performing assets. Absolute momentum-based trend following filter is used to switch any selected assets that have a negative excess return over the risk-free rate to Cash (CASHX). The strategy uses a single performance window of 10 calendar month(s). Most recent month in each lookback window is excluded in momentum calculations. Trades are executed using the end of month close price each month based on the end of month signals. The Equal Weight strategy owned 33% VTSMX, 33% VGTSX, and 34% VFITX. The 60/40 strategy is represented by 60% VTSMX and 40% VFITX rebalanced annually.

HOW TREND FOLLOWING ENHANCES PORTFOLIOS

Trend following is a rules-based risk management technique. One of the most exciting aspects of this is that it doesn't require any big brain thinking. If we think back to risk management with a buy-and-hold portfolio, we see that we need to use our big brain to determine when to increase or decrease our stock to bond ratio.

There is historical evidence that shows you can lower drawdowns without making any big-brained, macro-economic calls. You do this by following the rules.

Trend following rules have been tested back through 200+ years of market research.

The results from a Century of Evidence on Trend-Following Investing has shown significant consistency of returns throughout history.

This table shows the strategy's annualized excess returns (i.e., returns in excess of the risk-free interest rate) before and after simulated transaction costs, and gross and net of hypothetical 2-and-20 fees.

Time Period	Gross of Fee, Gross of Cost Excess Returns	Gross of Fee, Net of Cost Excess Returns	Net of 2/20 Fee, Net of Cost Excess Returns	Realized Volatility	Sharpe Ratio, Net of Fees and Costs	Correlation to U.S. Equity Market	Correlation to US 10-year Bond Returns
Full Sample							
Jan 1880-Dec 2016	18.0%	11.0%	7.3%	9.7%	0.76	-0.01	-0.03
By Decade							
Jan 1880-Dec 1889	12.1%	5.2%	2.6%	9.5%	0.27	-0.11	-0.04
Jan 1890-Dec 1899	17.4%	10.0%	6.5%	8.9%	0.73	-0.02	-0.15
Jan 1900-Dec 1909	15.3%	6.0%	3.3%	9.5%	0.34	0.02	-0.35
Jan 1910-Dec 1919	12.5%	4.1%	1.6%	12.6%	0.13	0.12	-0.01
Jan 1920-Dec 1929	20.8%	13.3%	9.2%	8.5%	1.09	0.15	0.06
Jan 1930-Dec 1939	15.4%	9.8%	6.3%	8.6%	0.74	-0.11	0.20
Jan 1940-Dec 1949	23.8%	14.8%	10.4%	10.6%	0.99	0.33	0.31
Jan 1950-Dec 1959	26.7%	17.6%	13.1%	9.1%	1.45	0.23	-0.19
Jan 1960-Dec 1969	21.0%	9.5%	6.0%	10.9%	0.56	-0.09	-0.37
Jan 1970-Dec 1979	27.4%	20.5%	15.1%	8.9%	1.70	-0.24	-0.25
Jan 1980-Dec 1989	20.1%	13.3%	9.1%	9.4%	0.96	0.18	-0.16
Jan 1990-Dec 1999	16.8%	12.3%	8.3%	8.4%	0.98	0.01	0.21
Jan 2000-Dec 2009	11.6%	9.9%	6.3%	10.3%	0.61	-0.34	0.27
Jan 2010-Dec 2016	7.6%	6.2%	3.3%	8.1%	0.41	-0.15	0.28

Past results are not indicative of future performance. However, statisticians believe in the Lindy Effect.

The Lindy Effect is the idea that the older something is, the longer it's likely to be around in the future.

Nassim Taleb discussed this in *Antifragile: Things that Gain from Disorder*. He describes it like this:

“If a book has been in print for forty years, I can expect it to be in print for another forty years. But, and that is the main difference, if it survives another decade, then it will be expected to be in print another fifty years. This, simply, as a rule, tells you why things that have been around for a long time are not ‘aging’ like persons, but ‘aging’ in reverse. Every year that passes without extinction doubles the additional life expectancy. This is an indicator of some robustness. The robustness of an item is proportional to its life!”

If this has been around for so long, you might be thinking, why haven't I heard of it?

The number one reason I can think of is that it's boring. It's a systematic approach to investing. It requires relentless execution to succeed.

As humans, we gravitate to stories. When we buy individual stocks, we are partial owners of a company. A company that creates a product or service that we use every day. The story we attach to this can carry a sense of pride.

Market gurus are usually individual stock investors or macro investors. We love the stories of investors buying an unknown company and receiving a 2000% return. We love stories like the Big Short where someone calls a market crash and makes billions.

Those stories are incredible.

The story of the investor who relentlessly executed a systematic strategy is boring.

While trend following might be boring, I believe all retirees want their portfolios to be boring.

They want consistency.

Along with all the good, there are certainly trade-offs.

Trend following using monthly trades are subject to mid-month drawdowns. If the market makes a sharp drop after the trading day, it won't adjust its allocation until the next month.

Another risk is with market whipsaws. The strategy signals might move the investment to cash only for the market to whipsaw upwards, leaving you without the initial upside.

Along with these trades comes larger trading costs and taxes when held outside of a tax-favored account like an IRA. These risks should be considered in your overall decision on what's best for you and your family.

Moving average and momentum strategies are not predictive. Each trade has no predictive value over what will happen in the short term.

This is a common trap for new investors to trend following.

Trend following will go through periods of relative underperformance. This means you'll go through periods where the monthly trades are doing worse than if you would have just stuck with buy-and-hold.

This requires clarity of commitment.

It takes us back to the beginning of the whitepaper about committing to your investment process. Bailing on an investment strategy when it's doing its worst could be a recipe for jumping ship just before it does great.

You must consider the good with the bad. You must understand the process.

TREND-FOLLOWING AND SAFE WITHDRAWAL RATES

The entire point of this whitepaper has been about developing a retirement portfolio. The purpose of a retirement portfolio is to enhance the sustainability of a portfolio that is taking distributions. Public enemy #1 of a retirement portfolio is drawdowns.

When we think about reducing drawdowns, we should be thinking about how this might enhance safe withdrawal rates.

We've tested the 200-day moving average using equities and cash as the only assets in the investment universe. We've also tested using dual momentum with US equities, non-US equities, US bonds, and cash. In those tests, we focused on the compound return and maximum drawdown.

We know those two factors are important in determining a safe withdrawal rate... but what did they do to the withdrawal rate? In the Dual Momentum strategy used on pages, 30 and 31 had a Safe Withdrawal Rate of 8.53%. The equally weighted buy-and-hold portfolio had a 6.63% Safe Withdrawal Rate during that same period.

This is only a small sample. Fortunately, four researchers, Clare, Seaton, Smith, and Thomas completed an expanded analysis in their paper titled "Can Sustainable Withdrawal Rates Be Enhanced by Trend Following?" Here are some of the paper's highlights:

- **Simple smoothing using trend following techniques, which removes the large drawdowns associated with market falls such as occurred in 2000 and 2008 allows a much better withdrawal rate experience.**
- **Retirees would be particularly concerned about the 'bad' outcomes in the left tail.** Trend following substantially reduces the probability of these for only a slight reduction in the likelihood of the 'good' products in the right seat. **The smaller dispersion in the trend following distributions also makes it easier to target sustainable withdrawal rates.**
- **The application of a trend following filter to the assets within each portfolio substantially improves the performance** by reducing volatility and maximum drawdown without any return loss. **This result is much less variable PWRs (Perfect Withdrawal Rates), mainly through eliminating many of the lowest PWRs, but without too much reduction in the chance of unusually high outcomes.**
- **Each of the standard portfolios has much larger tails than their trend following counterparts. Retirees would be particularly concerned about the bad outcomes in the left tail.** Trend following substantially reduces the probability of these for only a small reduction in the probability of the "good" outcomes in the right tail. **The smaller amount of dispersion in trend following distributions also makes it easier to target sustainable withdrawal rates.**
- The application reduces the probability of achieving a very low PWR.
- **The application of trend following sees returns increase by around 0.2% to 0.3% annually for the 60-40 and 30-70 portfolios and by nearly 0.8% for the multi-asset version.**

The evidence indicates that trend following can deliver tremendous value to your retirement portfolio.

POSSIBLE SECTIONS FOR FUTURE EDITIONS

CAPE Ratio – A Measure of Market Risk

Trend following and the CAPE ratio

Risks of SWR Research

Global asset allocation

Market Regimes



SUMMARY

Retirement portfolios must be treated differently. Low-cost buy-and-hold investing is being taught as the only way to invest. Within the literature on buy-and-hold investing you will find many brilliant and simple truths.

Where buy-and-hold investing goes wrong is that it assumes it's equally great for savers and retirees. The math of portfolio distributions and the math of gains and losses proves this a risk not worth taking.

My preference for managing this risk is through trend-following. When done right, trend-following has shown historical success in managing retirement portfolio math.

Trend-following eloquently protects downside risk without sacrificing much of the upside. In fact, the math of gains and losses indicates that it can enhance portfolio returns and extend the portfolio's longevity.

Executing these strategies doesn't require any big brain thinking. It requires relentless execution to be successful.

It's possible there are better investment strategies out there. Through my research I view trend following as the best strategy for retirement portfolios.

Whatever path you choose with your retirement portfolio, I wish you the best.

DISCLAIMER

- The information set forth in this document has been obtained or derived from sources believed by Calculated Wealth, LLC (“The Author”) to be reliable. However, The Author does not make any representation or warranty, express or implied, as to the information’s accuracy or completeness, nor do The Author recommend that the information serve as the basis of any investment decision.
- PAST PERFORMANCE IS NOT INDICATIVE OF FUTURE PERFORMANCE AND INVESTMENTS IN EQUITY SECURITIES DO PRESENT RISK OF LOSS.
- The strategies discussed in this presentation are not appropriate for all investors. The results shown in this presentation are hypothetical and do not represent returns that an investor actually attained.
- No representation is being made that any account will or is likely to achieve results similar to those shown.
- The content of this presentation is provided for informational purposes only, and nothing herein should be interpreted as personalized investment advice. Under no circumstances does this information represent an offer to sell, a solicitation to buy, or a recommendation regarding any securities transaction.
- None of the content in this presentation is guaranteed to be correct, and anything shown here should be subject to independent verification.
- You, and you alone, are solely responsible for any investment decisions that you make.
- The strategies discussed in this presentation are for educational purposes and are provided with the benefit of hindsight and may not perform in the future as they have historically. They do not reflect actual trading by the Author or any of the Author’s clients.
- There can be no assurance that any investment strategy or style will achieve any level of performance, and investment results may vary substantially from year to year or even from month to month. An investor could lose all or substantially all of his or her investment. Both the use of a single adviser and the focus on a single investment strategy could result in the lack of diversification and consequently, higher risk. The information herein is not intended to provide, and should not be relied upon for accounting, legal or tax advice or investment recommendations. Any investment strategy and themes discussed herein may be unsuitable for investors depending on their specific investment objectives and financial situation. You should consult your investment adviser, tax, legal, accounting or other advisors about the matters discussed herein. These materials represent an assessment of the market environment at specific points in time and are intended neither to be a guarantee of future events nor as a primary basis for investment decisions.
- Investors should understand that while performance results may show a general rising trend at times, there is no assurance that any such trends will continue. If such trends are broken, then investors may experience real losses. The information included in this presentation reflects the different assumptions, views and analytical methods of The Author as of the date of this document. The views expressed reflect the current views as of the date hereof and The Author should not be expected to advise you of any changes in the views expressed herein.
- This commentary has been provided solely for informational purposes and does not constitute a current or past recommendation or an offer or solicitation of an offer, or any advice or recommendation, to purchase any securities or other financial instruments, and may not be construed as such. This commentary should not be considered as investment advice or a recommendation of any particular security, strategy or investment product.
- This document does not reflect the actual performance results of any investment strategy or index currently run Calculated Wealth LLC or its affiliates.