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# Summary and Paper Outline

# The Challenge of Being a Passive Investor

- Investors face the prospect of poor expected long-term returns making buying and holding less desirable for both equity and bond holders
- Given that bond yields are so low, investors are being forced to hold risky assets such as equities to earn sufficient returns. This forces passive investors to have to tolerate substantial volatility.
- Passive investing is more suitable for younger investors that contribute regularly since they dollar cost average over time which mathematically benefits from higher volatility. The reverse is true for investors in retirement that withdraw regularly over time and therefore their portfolios mathematically suffer from higher volatility.
- Passive investing is also psychologically unrealistic for "average investors" which is supported by evidence that they constantly underperform their comparable passive benchmarks by a significant margin.

# Is there a better solution?

- Dynamic or tactical asset allocation strategies are some of the most effective forms of active management. They are especially useful to investors in retirement because they implicitly have a systematic methodology for managing risk.
- The primary purpose of these methods is to shift the efficient frontier to lower portfolio risk for the same level of return as a comparable passive approach.

# Dynamic or tactical asset allocation has four potential benefits for investors in retirement:

- 1) it can make the ride a lot more comfortable, thus preventing poor decision-making;
- 2) it can reduce the risk of ruin
- 3) it can increase the sustainable withdrawal rate
- 4) it can boost returns and hence increase the final value of your portfolio

#### **The Experiment**

We compared several conventional passive strategies versus a number of different popular dynamic or tactical asset allocation approaches for investors in retirement. Using mathematical simulation we investigate whether dynamic or tactical asset allocation offers superior benefits to investors in retirement than a conventional passive approach.

#### **Results of the Study**

- The results show that the average active strategy has more than 3x the Gain to Pain Ratio (sustainable withdrawal rate/maximum drawdown) as the average passive strategy. Active strategies such as dynamic/tactical asset allocation have offered retirees a superior trade-off in terms of the level of sustainable income versus their expected maximum risk or worst case scenario.
- The results show that the average active strategy has less than half the risk of ruin or odds of running out of money as the average passive strategy. In other words, active strategies can help retirees reduce the risk of running out of money versus employing a passive strategy
- The results show that the average active strategy has more than double the sustainable withdrawal rate as the average passive strategy



The Importance of Managing Risk in Retirement: Part II

# Can You Afford to be a Passive Investor?



Optimism means expecting the best, but confidence means knowing how to handle the worst. Max Gunther

In Part 1: "**The Importance of Managing Risk in Retirement**" we showed that volatility is a key factor in determining the risk of ruin and the sustainable withdrawal rate for investors in retirement. Holding returns constant, higher volatility increases the risk of ruin, and reduces the level of retirement income that investors can draw safely over time. Therefore, managing volatility is critical to helping investors achieve their financial goals and improve their standard of living in retirement.

# Poor Expected Long-Term Returns Change the Rules of the Game

"The Future Isn't What it Used to Be" Yogi Berra

The bread and butter solution from most financial advisors to manage volatility is to create a passive asset allocation that changes gradually to become more conservative as the investor ages over time. A classic rule of thumb is that the percentage of stocks in your portfolio should equal to 100 minus your current age and the remainder should go into bonds. For example, an investor at retirement that is 65 years old should have 65% in bonds and 35% in stocks. Other things being equal, this heuristic dictates increasing bond exposure as an investor gets older. But there are problems with this basic approach. Holding a high percentage in bonds to mitigate volatility might have been reasonable advice when interest rates were much higher, and life expectancy was shorter. Unfortunately, in the current environment, bond yields offer very low future returns. The current generation of investors are also living much longer than ever before and therefore require more equity exposure than standard recommendations suggest.

# Investors Are Being Forced to Hold Risky Assets

Global central bank easing around the world is forcing investors to chase higher risk assets in order to make a return. Some countries even have negative interest rates which means that you are paying the government to hold onto your money. This makes stocks that pay dividends a lot more attractive if you can stomach the volatility. For younger investors that are not withdrawing income from their portfolios this is a viable solution. The challenge for investors in retirement is that higher exposure to a risky asset class mathematically increases the risk of ruin (the risk of running out of money) and lowers the sustainable withdrawal rate-- or the safe level of income that they can



withdraw from their portfolio. An unlucky investor that has a high equity allocation and decides to retire at the beginning of a bear market may never be able to recover. What investors really need is the ability to capture a portion of the higher returns offered by equities or other higher returning asset classes while still managing volatility. This is the central goal of a dynamic asset allocation approach.

# Passive Investing Is For The Young Robo-Advisory Crowd

There is nothing inherently wrong with a passive investing approach. Buying low cost funds and diversifying across asset classes is is a good solution for younger investors that have a working income and rarely pay attention to their portfolios. This is the whole premise for the so-called "Robo-Advisory" business that targets younger investors. But there is an advantage that young investors have that changes the math of investing in their favor. By contributing new money over time on a regular basis they are able to take advantage of market volatility by dollar cost averaging through bull and bear cycles over time. Higher volatility is beneficial and can allow young investors to earn a positive return even if the market is falling or flat. This is because a fixed contribution each month will buy more when prices are low, and buy less when prices are high. Since their initial portfolios in retirement: you sell a greater percentage of your portfolio when prices are low, and less when prices are low.

# Passive Investing Is Psychologically Unrealistic for Average Investors

We think that the traditional idea of buying and holding a diversified portfolio of assets as being the optimal solution for retirement planning is incredibly naïve. Putting aside whether or not this solution is optimal from a mathematical perspective (it isn't for retirees), there is a big difference between theory and the reality of execution under fire. Behavioral factors cast doubt on the expectation that investors can ride out financial storms by waiting for smoother sailing. It is one thing to calmly review the history of market returns on paper and make a theoretical commitment to stay focused on the long run when the next crisis strikes. But the emotional pressure that arises in the heat of the moment, when the markets are tanking and the news is terrible every day is another thing entirely. Imagine giving someone with no training a few simple tips and then sending them into the ring with a professional boxer. **The old saying is that everyone has a plan until they get punched in the face, and it is perhaps even more painful to watch your life savings go down substantially during bear markets. It is no wonder that most investors tend to sell at or near cyclical market bottoms, which effectively renders the possibility of a recouping losses during a subsequent recovery (assuming there is a recovery) next to impossible.** 

Many people are now familiar with the DALBAR studies that show that the average investor does not achieve the results of passively holding their underlying benchmarks. This is because they make emotional decisions to buy or sell at the wrong times. This negates all of the benefits and performance advantages being touted by experts in passive investing. The S&P500 and 60/40 portfolios are essentially "phantom" benchmarks-- they don't really exist because the average person does not achieve those quoted returns.

#### **Investors Are Real People With Unique Goals**

There is another issue with the standard approach: it is designed to work *on average* over long periods of time. But investors are not endowments, they are individuals that have a finite time horizon. As the economist John Maynard Keynes famously quipped: "In the long run, we're all dead." Creating strategies that work *on average* across 10,000 people makes no difference to one



individual that will start their retirement at their own unique time in market history with their own unique set of circumstances.

Failure, in short, isn't an option in retirement planning. Investors rarely have the ability to wait years or even decades to rebuild wealth after the fallout from the periodic crashes and corrections that inevitably take a toll on their portfolios. This is magnified even more for a retired investor that is relying heavily on investment income. Even for that rare individual who can muster the steely discipline to sit through a long and painful correction or bear market, the mathematics of withdrawing money during a bout of volatility provides a sobering reality check.

# Case Study: Joe Smith

The best way to illustrate the challenges for passive investors and the importance of managing volatility is to draw an example of a very realistic situation. Let's take a fictitious investor- Joe Smith-- who is 65 and about to enter the withdrawal phase of their retirement. Joe starts at the end of 2006 with \$1,000,000 in retirement savings. He plans to draw \$60,000 per year to support his lifestyle with his wife Betty. On the recommendation of his financial advisor, Joe holds a diversified low-cost portfolio of ETFs with roughly 60% in equities-- 35% domestic (VTI) and 25% international (EFA) and 40% in bonds (AGG). He seems comfortable with his equity exposure, especially since the market has been doing very well since 2003. His advisor tells him that as long as he "stays the course" he will make about 6%-8% per year and do very well. Here is how Joe's portfolio actually performed net of withdrawals *assuming he stays the course*:



# Joe Smith retires at 65 with \$1,000,000 and withdraws \$60,000 per year with conventional passive portfolio (35% Domestic Equity, 25% International, 40% Bonds)

Joe certainly had some bad luck - he started his retirement just one year before the credit crisis in 2008. It looks like he would have recouped a fair portion of his losses during 2008 if he had stayed the course and not made any changes to his portfolio. But this is not what Joe actually did in practice

- after all, investors don't have the benefit of hindsight. Around March of 2009, Joe's portfolio would have hit a low of just over \$600,000 or about a 40% capital loss. At this point it is hard to imagine that Joe would be feeling really good about his chosen portfolio allocation. Joe is in fact under a lot of stress, he can't seem to be able to sleep and he wonders if he will be able to afford retirement. The economy seemed terrible, and it looked like a lot of companies were going out of business. His wife Betty heard that one of her friends had 70% in bonds and didn't lose nearly as much money. After having a long discussion with Betty, Joe decides that he will contact his financial advisor about changing his portfolio to be more conservative. His advisor tries to push back, but at the same time wants Joe and Betty to feel comfortable. They compromise on raising fixed income exposure to 60% from 40%, and shift to 25% in domestic equities and 15% in international equities. Here is what happens *after they change their asset allocation and are not able to stay the course*:



Joe Smith gets nervous and changes asset allocation in March 2009 to 60% in fixed income from 40%

This is a more realistic picture of what might have actually happened in this situation and this is supported by studies of investor behavior (see Dalbar). Joe had bad luck by deciding to retire in late 2006, but his losses were compounded by poor decision-making. *By changing his asset allocation during a bear market, Joe managed to damage his nest egg by almost \$200,000* (\$649,387.17 vs \$840,636.09) *versus staying the course*.

# Is There A Better Mousetrap for Investing in Retirement?

But is there a better way to ride out the market volatility and improve the chances that Joe will be able to stick with his portfolio? Fortunately, there is a better way to ride out market turbulence. It turns out that the key is to manage volatility itself -- to tame the beast so to speak. History teaches that one of the most effective risk-management systems for surviving and thriving through a full market cycle is developing a plan to manage risk during the worst downturns. This means having a systematic rules-based or quantitative approach that makes smart decisions on your behalf when the going gets rough. This avoids having to make tough decisions under stress when you don't have



a roadmap. Passively diversifying across asset classes is an important part of managing risk, but as we have shown it's an incomplete strategy. In periods of extreme market stress, the diversification benefit of owning a broad set of asset classes tends to break down, as investors like Joe learned the hard way during 2008. Dealing with the fearsome and unpredictable "Mr. Market" requires that we address the true realities of managing money across multiple business cycles.

# Enter Dynamic or Tactical Asset Allocation

There is an entire research field dedicated to investigating asset allocation methods that can improve risk-adjusted returns. Dynamic or tactical asset allocation strategies can use a wide variety of methods to improve the risk profile of a static or passive asset allocation scheme. The methods can range from creating dynamic diversification, minimizing risk, identifying regimes with high expected downside risk, to maximizing risk-adjusted returns.

The methodology used to create dynamic asset allocation schemes can range from the simple to the sophisticated. Some of the asset allocation methods employ mathematical formulas based on portfolio theory while others use heuristic optimization or simple rules-based methods. The reason why these methods should work is that different asset classes do well at different times. Furthermore, the risk of any single asset class can change substantially at certain times, which requires changing exposure.

By actively managing risk, dynamic and tactical strategies are a much cheaper alternative to buying portfolio insurance or hedging portfolios using options (this also includes buying segregated funds and structured products). The empirical research strongly supports this contention: in Faber's seminal paper "A Quantitative Approach to Tactical Asset Allocation" he shows that a simple tactical asset allocation model using five asset classes over several decades of history had roughly the same return as buy and hold but reduced portfolio volatility by roughly 33%. Wesley Gray of Alpha Architect did a study from 1976-2014 on five major asset classes such as the S&P500, REITs, Commodities, Treasuries and International Equities. The study compared two simple tactical model variations -- a moving average/trend-following approach and time-series momentum to buy and hold on each asset class individually. The study shows that the simple tactical approaches do not always beat buy and hold, but in each case they reduce drawdowns and improve risk-adjusted returns.

#### Case Study 2: Joe Smith Uses a Simple Dynamic Approach to Manage Risk

One of the simplest ways to dynamically manage risk is to manage portfolio volatility. This concept works because volatility tends to trend or "cluster" in quant nerd-speak -- this means that low volatility tends to be followed by low volatility and vice versa. The fact that volatility is predictable is well-documented in academic research. So let's apply the simple strategy of applying a logical risk target for Joe's portfolio of about 10% annualized - somewhere in the middle between bonds and stocks. Using a 10-day portfolio standard deviation, we will hold portfolio exposure equivalent to 10% divided by measured portfolio volatility. We will assume that Joe cannot use leverage, and **so we will simply reduce portfolio exposure when volatility rises and return to cruise control when volatility falls back in line with our target level**. The portfolio allocation is exactly the same as for the passive strategy: 35% Domestic Equity, 25% International, and 40% in Bonds.



#### Joe Smith uses a simple risk management strategy: portfolio annual volatility target of 10%

As you can see from the chart, if Joe was able to stick to the strategy, he would have actually had a larger ending portfolio value (about \$25,000 more) versus staying the course with a passive strategy. More importantly, the ride was not nearly as rough as for the passive strategy.

But what would Joe have done in the middle of the crisis? Would he have changed his portfolio allocation?

As we know, Joe was not able to stay the course with a passive strategy, but given that the drawdown of the simple risk management strategy is considerably lower (roughly 26% vs 40%) it is more likely that he would have been able to stick with his asset allocation. This simple risk management strategy is far from being the optimal strategy, but it helps to illustrate the value of a dynamic asset allocation approach.

# The Benefits of a Dynamic or Tactical Asset Allocation Approach

Managing risk has multiple potential benefits for retirement portfolios:

1) it can make the ride a lot more comfortable, thus preventing poor decision-making;

- 2) it can reduce the risk of ruin;
- 3) it can increase the sustainable withdrawal rate;
- 4) it can boost returns and hence increase the final value of your portfolio.

Critics of tactical or dynamic asset allocation assume that the primary purpose of dynamic or tactical asset allocation is to generate higher returns, but this is false. The primary purpose of these methods is to shift the efficient frontier to lower portfolio risk for the same level of return as a comparable passive approach. By doing so, you can capture the first three, and most important

benefits mentioned above which are most relevant for investors in retirement. One prominent tactical manager Mebane Faber confirms this viewpoint:

"Many market-timing approaches work not by massively increasing returns, but rather by reducing volatility and drawdowns. This is one reason many think that market timing isn't possible – all they do is focus on returns when basic market timing works potentially by not doing really dumb things, such as buying into bubbles and holding during long bear markets. But remember, playing defense is just as important to long term investment survival as offense!"

This statement also reflects the common view among tactical managers that there is always the possibility of catastrophe in financial markets that is not captured in historical return data. The expected returns to buy and hold is a backtest that is only centuries old. We cannot know whether a passive investor will earn a long-term return or not with certainty. Consider that the Dinosaurs ruled the earth for millions of years until weather conditions changed substantially and they went extinct. It is impossible to know how far and how long a market can go down and whether or not it will ever recover.

Passive buy and hold investors are optimists- they hope for the best and if things don't work out they will pay the price. In contrast, tactical investors are cautious yet confident - they plan for the worst and if things turn out well then they are happy to participate in the good times. Essentially, tactical strategies are trying to capture a portion of the buy and hold returns to risk assets while ensuring that they do not go broke in the process- they explicitly manage the risk of financial ruin.

# Stress-Testing Active Versus Passive Strategies in Retirement

In the first example we showed a case study using historical data over one market cycle along with a simple risk management approach to represent active management. To get a better sense of the value of active versus passive asset allocation on retirement outcomes we need to compare a broader set of common passive strategies against a broader set of common active or tactical strategies. There are so many different active and passive strategies, we chose to represent the select strategies that we felt were the most relevant and commonly used in the field. To reach valid conclusions we also conducted the mathematical equivalent of a comprehensive simulation. We wanted to see how different strategies would have performed in a randomized environment with multiple possible future paths. Finally we compare these strategies using various metrics relevant to an investor in retirement.

# Methodology

We tested both active and passive strategies on a global asset class universe that contains most of the core liquid markets used by institutions and wealth managers to construct portfolios. To stay consistent with a passive approach, we use low-cost exchange traded funds for asset class representation. The only exception is TGBAX which is a mutual fund that is commonly used by advisors to gain exposure to global fixed income which has the benefit of having a long daily return history. The ETFs are extended with indices or mutual fund data proxies so that we have data from 1995-2015.



#### **Global Asset Class ETF/Fund Universe**

Name	Symbol	Name	Symbol
Domestic Large Cap	SPY	Intermediate Treasurys	IEF
Domestic Small Cap	IWM	Corporate Bonds	LQD
International Equity / Foreign Developed Markets	EFA	High Yield Bonds	HYG
Emerging Markets	EEM	Emerging Markets Bonds	EMB
Real Estate	ICF	International Bonds	TGBAX
Commodity	DBC		

# **Active Strategies**

**Momentum**: This is widely considered the most robust and thoroughly tested strategy for investing. The basic premise is that winners continue to win and losers continue to lose when looking back over the last 1-12 months of performance history. It has been endorsed by Nobel Prize winners and used successfully by top-performing hedge fund managers. To learn more about momentum and time-series momentum read our whitepaper: Dynamic Asset Allocation Part 2: The Case for Momentum in Portfolio Management. For this strategy we buy the top quintile of our asset class universe by 1-year/12 month return and rebalance monthly.

**Time Series Momentum**: This method is related to conventional momentum and the term was coined by Moskowitz from AQR. Antonacci also calls this "absolute momentum," which is a popular term in quantitative circles. Both are directly related mathematically to "trend-following" using moving averages which have been used for decades successfully by hedge funds and CTAs. A time series momentum strategy is essentially just a momentum strategy that compares the total return of a given asset versus a cash asset and chooses the winner. In other words, if the asset you are looking at is outperforming the cash asset then you would be long that asset, if not you would be short the same asset or instead could hold a position in cash. For this strategy we hold an equal weight position in each asset in the universe. We then compare each asset's 1-year/12 month return to the return of cash-in this case SHY- the 1-3 year Treasury - and if the return is greater than the cash return then we hold a position in that asset, if not we hold cash. We rebalance this portfolio monthly.

**MPT/Maximum Sharpe/Tangency Portfolio:** This method is a new twist on an old methodology. Markowitz introduced Modern Portfolio Theory (MPT) which was designed to find "efficient" portfolios that had the highest return for a target level of risk. This is called the efficient frontier. This mathematical algorithm can also identify the single portfolio that has the highest ratio of return versus risk or sharpe ratio (the tangency portfolio). Traditionally this approach has been applied using long-term data to generate a set of portfolio weights that are applied to static or passive portfolios. Each portfolio has the maximum return for a given level of risk or minimum level of risk for a given level of return. Many practitioners and academics have pointed out that the performance of applying this method has been disappointing. In contrast, new research shows that applying this approach on a dynamic basis is a lot more interesting since it can capture the momentum effect while still managing risk and promoting diversification. In the paper "Momentum and Markowitz," Keller, Butler and Kipnis show that the MPT algorithm performs well and is robust over a century of data on a broad asset class universe using a shorter-term input lookback of 1-year/12 months. For this strategy we will also use a 1-year/12-month lookback to calculate the maximum sharpe portfolio and rebalance monthly.

**Dual Momentum:** The concept of Dual Momentum was introduced by Gary Antonacci and is a logical combination of momentum and time series momentum (called "absolute momentum" by Antonacci). The general idea is to hold the top performing assets as long as they are outperforming cash. The purpose is to get the benefits of holding the higher returning assets from the momentum



strategy while getting the risk reduction benefits of a time series momentum strategy. To test this strategy we use our global asset class universe and select the top quintile of asset classes using 1-year/12-month momentum and compare their 1-year/12-month returns to cash/SHY. If the assets are outperforming cash they are held, if not then we hold cash/SHY. We rebalance this portfolio monthly. No re-leveraging is performed if only one asset class is outperforming cash. In other words the maximum position size any asset class can have is 50% with the exception of cash.

**Risk Parity (Basic and Equal Risk Contribution):** The concept of risk parity was initially introduced by Ray Dalio from Bridgewater Associates- the largest hedge fund in the world. The key insight was that the return/risk ratio or sharpe ratios of different asset classes is expected to be roughly the same, they just have different volatilities. To reduce your dependency on any one asset class you can leverage or deleverage asset classes so that they all have the same risk. For example, in a risk parity portfolio with just stocks and bonds, you would have to hold a much larger position in bonds in order to match the risk of stocks. This way you can theoretically make the same return from every asset class. This is an effective form of diversification since different asset classes will do well in different economic regimes. For this strategy we use the 1-year/12-month volatility and hold position sizes equivalent to the inverse of their volatility relative to the asset class universe. The portfolio is rebalanced monthly and new weights are re-calculated. To make the strategy realistic for most investors, we do not use leverage.

**Equal risk contribution (ERC):** is a variation on risk parity that was introduced by Maillard and Roncalli. A basic risk parity approach takes an equal-sized bet by adjusting for the unique volatility of each asset. An ERC portfolio takes an equal-sized bet by adjusting for the risk contributions of each asset to the portfolio. In other words each bet has the same impact on risk to the overall portfolio. This is effectively a more surgical risk management approach versus traditional risk parity. For this strategy we apply the algorithm to find the weights to apply across our asset class universe and rebalance monthly.

**Minimum Variance:** This concept originates with the original Markowitz algorithm in Modern Portfolio Theory. The Minimum Variance Portfolio is the portfolio allocation that has the lowest possible risk. This portfolio tends to hold low risk assets, but does not always have a high concentration in bonds. The allocation depends on the relative risk and diversification potential of different assets in the universe. For this strategy we use a 1-year/12-month lookback and rebalance monthly.

# **Passive Strategies**

**S&P500:** This is the market capitalization weighting index of domestic large cap companies and is represented by the ticker SPY.

**60/40:** This represents a portfolio with a 60% allocation to domestic large cap stocks and a 40% allocation to bonds which is passive investing legend John Bogle's preferred asset allocation and also the weighting for the Vanguard Balanced Index Fund. In this case we use the S&P500 index (SPY) for stocks and Treasurys (IEF) to represent bonds and rebalance monthly.

**Global Market Portfolio:** This is a proxy for a portfolio that is weighted by global market capitalization and is broadly diversified across asset classes. In theory a global market capitalization weighting is the optimal passive portfolio from a market efficiency standpoint. The same logic is applied to passive equity index benchmarks which are also weighted by market capitalization like the S&P500. The theory is that market cap weightings reflect the average views of all market participants and therefore the price of the index reflects current and future expectations. From that perspective it is the ultimate benchmark for asset allocation. It also implies that portfolios such as



60/40 and the S&P500 index are not truly passive since they represent an active bet on domestic stocks and bonds.



# **Global Market Portfolio**

# Results

To compare active and passive strategies, we need to look at metrics that are relevant to a person that is in retirement. The two most important criteria are minimizing the risk of financial ruin -- or running out of money -- and maximizing the sustainable withdrawal rate - or the level of retirement income that can be safely withdrawn without running a material risk of running out of money. Lastly, investors in retirement also want to maximize the terminal value of their portfolio or final nest egg in relation to the risk that they take. In other words, to use a sailing example, investors want to sail as far and as fast as they can while keeping the ride as comfortable and as safe as possible. We constructed a measure that captures this tradeoff called the retirement "Gain to Pain Ratio" which measures the sustainable withdrawal rate in relation to the maximum drawdown of the strategy. We consider this ratio the ultimate measure of a strategy for achieving retirement goals. Table 1 in the appendix provides a complete summary of the results including the retirement metrics, real returns, standard deviations, and maximum drawdowns.

For the first comparison, let's assume that an investor wants withdraw a safe level of annual return to have a 1% chance of ruin, or in other words a 99% confidence that they will not run out of money during retirement. We will also assume that our investor is 65 years old and has a future life expectancy of approximately 20 years. To make the simulation more realistic, we deducted the inflation rate or CPI from the strategy returns. Recall from the first paper that we are conducting the equivalent of a Monte Carlo simulation by using a methodology called the Stochastic Present Value method created by my former professor and world-renowned retirement expert Moshe Milevsky. This quantitative engine can calculate both the risk of ruin and the sustainable withdrawal rate given inputs such as life expectancy, assumed withdrawal rate, expected strategy return, and standard deviation.



How Much Can You Withdraw Annually Without Running Out of Money?

Sustainable Withdrawal Rate for Active and Passive Investment Strategies (1995-2015)



The results show that strategy with the lowest sustainable withdrawal rate is the S&P500. In fact, we can draw nearly 80 basis points more annually from a 60/40 portfolio. This is counterintuitive because we always assume that we need high rates of return in order to maintain a high standard of living-- but the math shows that the volatility of the S&P500 makes it risky to withdraw a large amount per year. In other words, the math is saying that an investor that has bad luck will get severely punished in retirement. This is because the volatility of the S&P500 is very high in relation to the return that it offers.

The Global Market Portfolio is technically the optimal passive strategy and it has the second lowest sustainable withdrawal rate. In fact, with the exception of the Minimum Variance Portfolio, all of the active strategies have a higher sustainable withdrawal rate than the passive strategies. The active diversification portfolios such as Basic Risk Parity and Equal-Risk Contribution fall in the middle but generally do better than the passive benchmarks. The momentum strategies (momentum and dual momentum) have the highest sustainable withdrawal rates, with more than double the rate of the S&P500, and greater than 50% more than the 60/40 and Global Market Portfolio. Risk-managed momentum variants such as MPT/Maximum Sharpe and Time Series Momentum had the second highest withdrawal rates.



To compare active versus passive we took the average of the sustainable withdrawal rate for all active strategies and for all passive strategies. **The results show that the average active strategy has more than double the sustainable withdrawal rate as the average passive strategy.** In other words,



active strategies can help retirees increase their retirement income versus employing a passive strategy for the same level of risk.

Now let's look at the odds of running out of money (or risk of ruin) which is an investor's worst nightmare in retirement. We will use the same inputs as before, but this time we will assume that our investor has a 5% withdrawal rate from their portfolio after accounting for increases in the cost of living.



Once again the S&P500 shows the highest risk that the investor will run out of money in retirement, followed by the Global Market Portfolio. Both Momentum and Dual Momentum again come out on top with the lowest odds of running out of money. This is because both strategies tend to have higher returns with a relatively low risk.



To compare active versus passive we took the average of the risk of ruin for all active strategies and for all passive strategies. The results show that the average active strategy has less than half the risk of ruin or odds of running out of money as the average passive strategy. In other words, active strategies can help retirees reduce the risk of running out of money versus employing a passive strategy.

The last metric we will use to compare active versus passive strategies is what we call the retirement "Gain to Pain Ratio." This is essentially a measure of how much you can sustainably withdraw from a portfolio given a 1% expected risk of running out of money relative to the maximum peak-to-valley drawdown of the strategy. In some respects, this is the ultimate measure for retirees because it simultaneously captures how much they can live on versus the possible worst case scenario.



#### **Divided By Maximum Drawdown** Active versus Passive Investment Strategies (1995-2015) Time Series Momentum 24.68% MPT Maximum Sharpe/Tangency Portfolio 23.04% **Risk Parity - Equal Risk Contribution** 20.57% Dual Momentum Top Quintile 18.81% Momentum Top Quintile 18.36% Minimum Variance Portfolio 14.96% Risk Parity - Equal Risk Contribution 14.87% 60/40 8.37% **Global Market Portfolio** 6.75% S&P 500 3.97%

Gain to Pain Ratio: Sustainable Retirement Income

In this case, Time Series Momentum, Maximum Sharpe and Risk Parity-- Equal Risk Contribution have the highest Gain to Pain ratio because they tend to offer higher risk-adjusted returns/sharpe ratios than Momentum and Dual Momentum. In contrast, once again the S&P500 has the worst Gain to Pain ratio- nearly 6 times lower than a Time Series Momentum strategy. Buying and holding the S&P500 is certainly a viable strategy--but it can be a very uncomfortable ride emotionally relative to other strategies.



To compare active versus passive we took the average of the Gain to Pain Ratios for all active strategies and for all passive strategies. The results show that the average active strategy has more than 3x the Gain to Pain Ratio as the average passive strategy. Clearly active strategies have offered retirees a superior trade-off in terms of the level of sustainable income versus their expected maximum risk or worst case scenario.

# Conclusion

Dynamic or tactical asset allocation strategies are some of the most effective forms of active management. They are especially useful to investors in retirement because they implicitly have a systematic methodology for managing risk. In contrast, the conventional approach to passive asset allocation is effectively "short" volatility-- in other words, the typical investor is simply hoping that nothing bad will happen during their retirement. Managing volatility actually offers a mathematical advantage to investors in retirement. This can be true even if the dynamic or tactical strategies produce the same or lower return than a comparable buy and hold strategies. The results clearly show that active management strategies are superior to passive strategies on the dimensions that are important to retirees such as the risk of ruin, level of sustainable retirement income, and the Gain to Pain Ratio.



Interestingly, buying and holding S&P500 was by far the worst performing strategy using these metrics. Putting aside the active versus passive angle, this begs the obvious question: why should you ever care about the S&P500 returns if you are in retirement? Sure, the S&P500 can have some great years where it returns 20%-30%, but it can also have a lot of rough years. On balance the cold hard math shows that you can live a better standard of living and have a lower risk of running out of money by NOT investing in the S&P500. If you are an investor focused on achieving your financial goals rather than keeping up with the Joneses you are far better off ignoring the performance of the index. Unfortunately behavioral factors are always an issue for investors. The results clearly favor a dynamic or tactical approach in retirement.

But these advantages are impossible to achieve by being a fair-weather tactical investor. The reality is that a dynamic or tactical approach is not meant to be a "flavor of the month" choice but rather a lifelong solution for investors to maximize the chances of achieving their financial planning goals and to increase their sustainable retirement income. Advisors and investors need to strongly embrace the philosophy of active management as a mode of survival rather than constantly trying to benchmark their performance over short time horizons to a passive approach.

#### NOTES

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The strategies discussed in this material may not be suitable for all investors. We urge you to talk with your investment adviser prior to making any investment decisions.



# Appendix

# Table 1: Retirement Stress Tests and Summary Statistics for Active versus Passive Strategies

Strategy	Strategy Type	Return	Standard Deviation	Maximum Drawdown	Sustainable Withdrawal Rate 95%	Sustainable Withdrawal Rate 99%	Odds of Runniong Out of Money	Odds of Success	Gain to Pain Ratio
Momentum Top Quintile	Active	11.13%	13.53%	25.00%	6.78%	4.59%	1.45%	98.55%	18.4%
Dual Momentum Top Quintile	Active	10.88%	13.45%	-23.33%	6.53%	4.39%	1.74%	98.26%	18.8%
MPT Maximum Sharpe/Tangency Portfolio	Active	8.85%	9.40%	-18.23%	6.11%	4.20%	2.18%	97.82%	23.0%
Time Series Momentum	Active	6.59%	6.14%	-13.33%	4.92%	3.29%	5.31%	94.69%	24.7%
Risk Parity- Equal Risk Contribution	Active	5.74%	6.22%	-14.78%	4.57%	3.04%	6.93%	93.07%	20.6%
Basic Risk Parity	Active	5.81%	7.17%	-19.97%	4.49%	2.97%	7.28%	92.72%	14.9%
Minimum Variance Portfolio	Active	5.62%	7.68%	-18.78%	4.30%	2.81%	8.31%	91.69%	15.0%
Global Market Portfolio	Passive	5.98%	10.26%	-38.68%	4.12%	2.61%	9.21%	90.79%	6.7%
S&P500	Passive	6.82%	15.00%	54.45%	3.67%	2.16%	11.55%	88.45%	4.0%
60/40	Passive	6.22%	8.90%	35.00%	4.50%	2.93%	7.18%	92.82%	8.4%

\*Calculations from January 1, 1995 to October 1, 2015

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\*Calculations based on Professor Milevsky's spreadsheet, available at the web site of the Individual Finance and Insurance Decisions Centre in Toronto: www.ifid.ca/pdf\_cri\_lectures/Lecture8\_Sheet2.xls