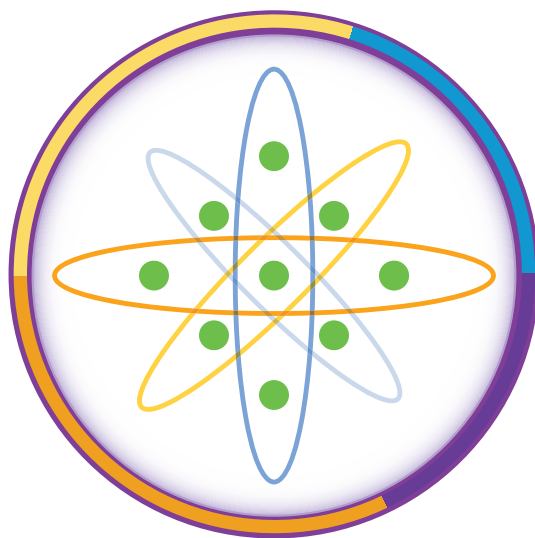


A PASSIVE CORE IS **NOT** ENOUGH

By Timothy Hanna, CFA, CFIP; and Jerry C. Wagner (October 2019)



Summary

We examine the practical options for portfolio construction across the spectrum of portfolio management—from a passive portfolio of equally weighted asset classes to a portfolio that holds and actively weights multiple dynamically risk-managed strategies. Our study analyzes each methodology’s advantages and issues. We conclude that a multi-strategy core approach addresses the issues present with other portfolio construction methodologies, which include a lack of consideration of risk, the loss of diversification benefits during crisis periods, and risk concentration in single strategies.

Acknowledgments

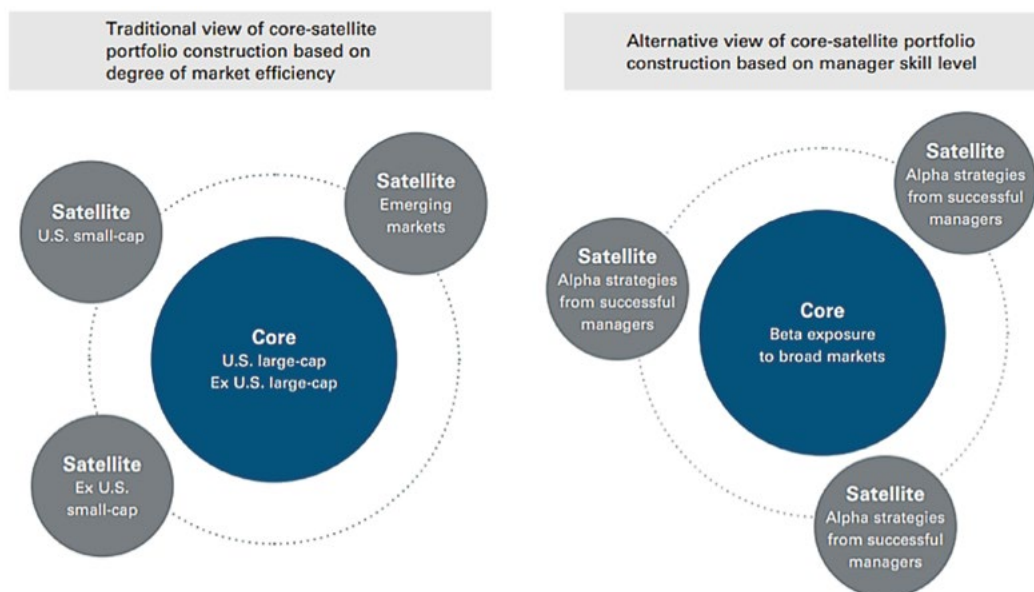
The authors want to thank the members of the Flexible Plan Investments Research team, including Research Director Jason Teed, CFA; Ansh Chaudhary; and Daniel Poppe, for their analytical and data-preparation skills in producing this white paper. Additional thanks go to William Hubbard, CFA, for his review and comments regarding the final draft and to the Flexible Plan Investments Marketing team for editing and production.

The essential core

The most important part of an investor's portfolio is the core. Morningstar puts it this way: "'Core holding' and 'exciting' don't go together. But what core holdings lack in thrills, they make up for in importance. A core holding is just what it sounds like: It's the central part—or maybe even the only part—of your portfolio. The core requires investments that will be reliable year in and year out. They're the solid foundation for the rest of a portfolio."¹

In practice, most portfolios constructed by financial professionals recognize this and allocate more than half of a client's investment dollars to a core portfolio and the rest to various "satellite" or "explore" investments. This is usually accomplished with either index mutual funds or exchange-traded funds (ETFs); however, it can also be done with actively managed varieties of the same.

Figure 1 Traditional and Alternative Core-Satellite Portfolio Constructions

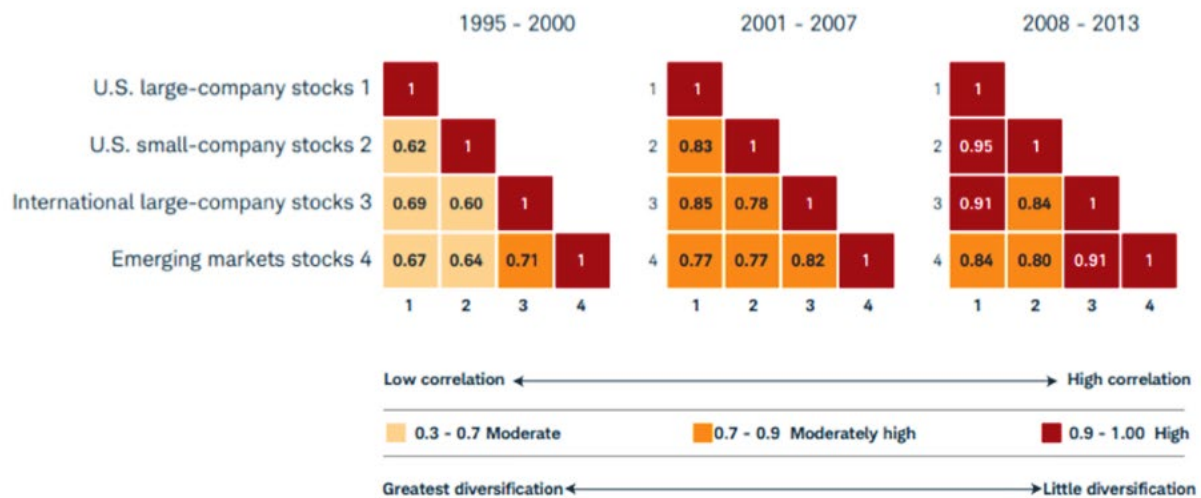


Source: Vanguard. 2010. "Building a global core-satellite portfolio." <https://www.vanguard.com/pdf/icrcs.pdf>

The selection of explore and/or satellite investments is beyond the scope of this paper. As for the core, we can state that there are two key goals for a core portfolio:

1. It should provide beta (return) exposure to asset classes that have provided positive investment returns over the long haul (multiple decades).
2. It should lower the risk of holding the equities (the top-returning asset class over the last 120 years).

The first goal is achieved by the careful selection of the included asset classes. The second has historically been sought after by the use of diversification. Yet, over time, we have seen that diversification is not enough.

Figure 2 Equity Correlations Have Been Rising

Source: Charles Schwab Investment Advisory Inc. and Morningstar Direct

Financial advisers and their clients have learned firsthand that while diversification was once achievable during bear markets, in more recent crisis periods, it has failed them when they needed it most.

To achieve the two goals of a core portfolio, a methodology must be employed (1) to choose the assets for inclusion in the portfolio and (2) to achieve the desired risk reduction over the dramatic losses experienced by buy-and-hold investors in equity bear markets.

It is the underlying premise of this paper that there are multiple ways to achieve these goals.

The methodologies available to construct the essential core portfolio are limited only by the imagination of practitioners. In this paper, we will explore core construction methodologies across the spectrum, from passive to enhanced active approaches to portfolio management.

What is the spectrum of portfolio management?

Since the introduction of mean-variance optimization in the 1950s, advisers have thought of portfolio management as a simple exercise of applying its principles and creating the ubiquitous pie chart of investment asset classes. Yet the conventional mean-variance, passive portfolio is just one approach available to financial advisers. Today there are so many styles of portfolio management that they create a whole spectrum of portfolio construction opportunities.

We define the spectrum of portfolio management as a scale between passive and active management, visually represented by Figure 3. In this paper, we will discuss each type of portfolio management along the spectrum, highlighting the advantages, issues, and potential solutions of each.

Figure 3 Spectrum of Portfolio Management

Source: Flexible Plan Investments Research

For this study, we use the universe in Table 1 for our traditional strategic asset-allocation examples. Our study period is from January 3, 2000, to April 30, 2019. A 1.6% fee is included in all “active balanced” and “enhanced active balanced” examples, which assume the use of hypothetical results of strategies using proprietary funds and the application of appropriate fee credits.

No fee is applied to “passive” and “enhanced passive” examples. Although practitioners using passive strategies likely charge fees, they vary widely. Similarly, expense ratios and taxes are not addressed as they also vary and may be minimized by the adviser in many different ways. Quarterly rebalancing is employed in all of the studies with the exception of our Multi-Strategy Core (enhanced active), which is more active in nature and rebalances monthly.

For the cases that do not use hypothetical results of strategies employing proprietary funds, the diversified universe of Lipper Fund Indexes shown in Table 1 is used. These indexes are used to reflect the reality of having to invest in funds to implement any strategy. Indexes are not investable without some cost. Using no-load mutual fund indexes eliminates the trading cost that would be incurred with ETF investments, and it extends the available history of the elements necessary to represent a diversified portfolio over multiple market cycles (which include the bear markets beginning in 2000 and 2007).

Table 1 Diversified Universe of Lipper Fund Indexes

Exposure	Name	Lipper Symbol
Equity	Lipper Large-Cap Growth	LI-LCGE
Equity	Lipper Large-Cap Value	LI-LCVE
Equity	Lipper Mid-Cap Growth	LI-MCGE
Equity	Lipper Mid-Cap Value	LI-MCVE
Equity	Lipper Small-Cap Growth	LI-SCGE
Equity	Lipper Small-Cap Value	LI-SCVE
Equity	Lipper Emerging Markets	LI-EM
Equity	Lipper International	LI-IF
Bonds	Lipper General Bond	LI-GB
Bonds	Lipper General US Government	LI-GUS
Bonds	Lipper Short-Intermediate Investment Grade	LI-SII
Bonds	Lipper Short-Intermediate US Government	LI-SIU
Alternative	Lipper Natural Resources	LI-NR

Source: Flexible Plan Investments Research

Passive: Equal weight

This is the easiest method, but how much does it consider risk?

On the far left of the spectrum of portfolio management (Figure 3) is “passive.” This methodology uses no weighting optimization and is often called “1/n” naïve diversification or “equal weight.” An example of the quantitative results of creating a diversified portfolio using such an approach is shown in Figure 4.

Advantages

Investing among various asset classes usually achieves risk reduction via diversification. It is easy to equally weight to each fund within the universe and rebalance periodically.

Issues

Equal weight does not consider the risk of the individual assets within the portfolio universe. For example, say Fund A within the portfolio has a risk of 30% and the others have a risk of 10%. Even though Fund A contributes three times as much risk as the other funds, this approach gives them all equal weight within the portfolio.

Analysis

Passively equally weighting the universe from Table 1 produces the results shown in Figure 4.

Figure 4 Passive, Equally Weighted Portfolio

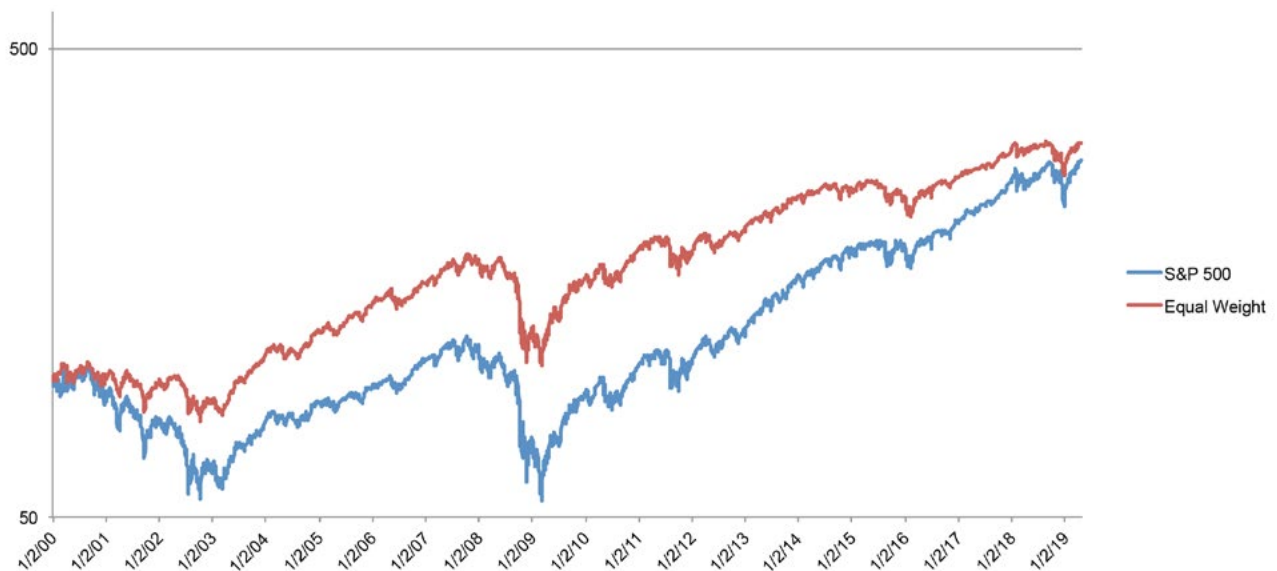


Figure 4 Passive, Equally Weighted Portfolio (Continued)

Year	S&P 500	Equal Weight
2000	-9.10%	-0.04%
2001	-11.87%	-2.94%
2002	-22.10%	-9.77%
2003	28.67%	26.85%
2004	10.87%	13.53%
2005	4.91%	11.11%
2006	15.78%	12.98%
2007	5.49%	12.21%
2008	-36.99%	-30.10%
2009	26.47%	29.30%
2010	15.09%	15.80%
2011	2.09%	-1.92%
2012	15.99%	12.22%
2013	32.36%	19.02%
2014	13.65%	2.88%
2015	1.38%	-4.31%
2016	11.93%	10.19%
2017	21.80%	13.98%
2018	-4.39%	-7.53%
2019	18.23%	13.48%

Method	S&P 500	Equal Weight
CAGR	5.70%	6.15%
Risk	19.06%	12.74%
Sharpe	0.30	0.48
Max DD	55.24%	42.66%
MAR	0.10	0.14

Source: Calculations are by Flexible Plan Investments Research. Returns are hypothetical and backtested. Returns are gross of all fees, transaction costs, and taxes. Returns assume the reinvestment of all distributions. Sharpe ratios are calculated with return and risk numbers corresponding to each specific method over the full study period. For example, the S&P 500 Sharpe ratio uses the return and risk of the S&P 500 Total Return Index from January 3, 2000, to April 30, 2019. Max drawdown and MAR reflect daily drawdowns during the period shown. You cannot invest in an index. Past performance is no guarantee of future results. The chart in this figure uses a logarithmic scale.

In this case, passively investing in a diversified universe results in reduced risk and drawdown when compared to a portfolio that is concentrated in the S&P 500. Despite the perceived benefits of passive portfolios, they are still susceptible to extreme market fluctuations resulting in equity-like drawdowns of more than 42% during the maximum drawdown period.

Enhanced passive: Markowitz mean-variance optimization, risk parity, and balanced funds

These approaches consider risk, but should diversification be your only risk-management tool?

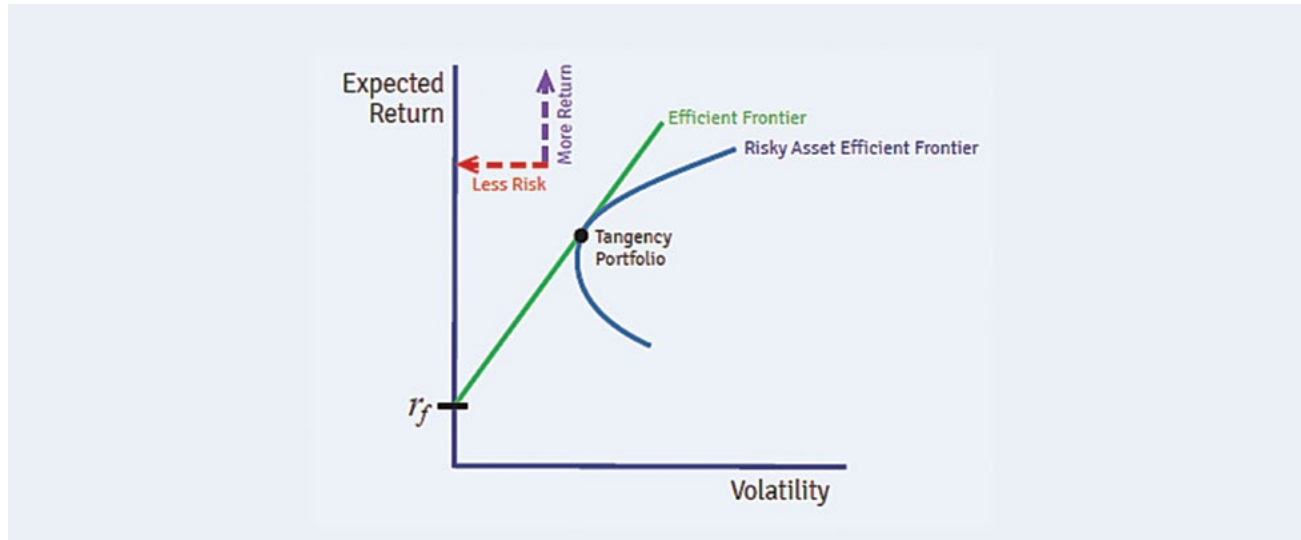
Enhanced passive asset allocation introduces a weighting component to the portfolio-management process. We present three common approaches used within the investment-management industry: Markowitz mean-variance optimization, risk parity, and balanced funds.

Markowitz mean-variance optimization

Markowitz mean-variance optimization is based on the premise that investment opportunities can be measured in terms of mean return and variance of return. The optimization process weighs risk (variance)

against expected return. The tangency portfolio is the asset-allocation portfolio that has the lowest risk for a given level of return (Figure 5).

Figure 5 Tangency Portfolio



Source: P. Hecht, "Evaluating Hedge Funds—Alphas, Sharpe Ratios & the Underappreciated Appraisal Ratio," *Hedge Fund Insight*, December 18, 2014, <http://www.hedgefundinsight.org/evaluating-hedge-funds-alphas-sharpe-ratios-the-underappreciated-appraisal-ratio/>.

Adherents to the technique, which is also known as modern portfolio theory, believe that one can diversify away unsystematic risk by reducing the correlation between the returns from the securities in the portfolio. Simply put, having lower correlation between assets in a portfolio helps protect against losses given the theory's assumption that not everything will go down in tandem with the same severity during drawdown periods in the markets.

In this study, we optimize weights quarterly and use a 10-year rolling lookback for mean and variance input calculations. We target a balanced portfolio using assets from Table 1 on the efficient frontier for mean-variance optimization. We are not using the tangency portfolio since it is "bond-like" due to its goal of maximizing return per unit of risk across the frontier. We also include the Lipper Balanced Index and the commonly used Vanguard Balanced mutual fund for comparison throughout this section. Balanced funds are a real-world implementation of enhanced passive methods. For that reason, we have included the results of funds based on their precepts.

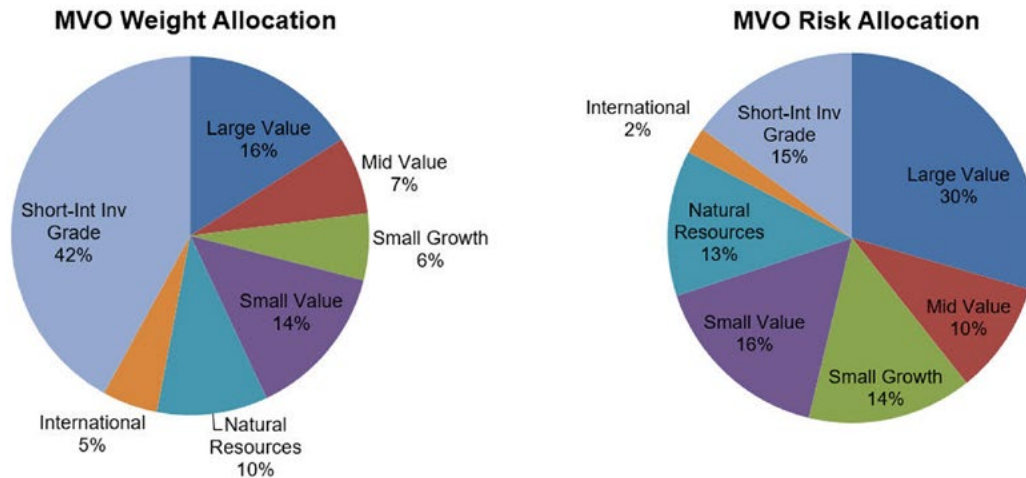
Risk parity

Risk parity, like mean-variance optimization, addresses the risk issue that arises with equal-weight diversification—but does so using a different method. Mean-variance optimization finds the optimal mix of assets based on their expected returns, risks, and correlations to each other. Risk parity focuses only on equalizing the risk contributions of each asset, without considering expected returns.

Comparison of enhanced asset-allocation methodologies

The chart on the left in Figure 6 (left chart) shows the resulting weights of a mean-variance optimized portfolio using the universe from Table 1. It is diversified by asset class; however, because it is weighted using mean-variance optimization, risk is not equalized. The allocations viewed by the risk of each asset within the portfolio are presented in the chart on the right in Figure 6.

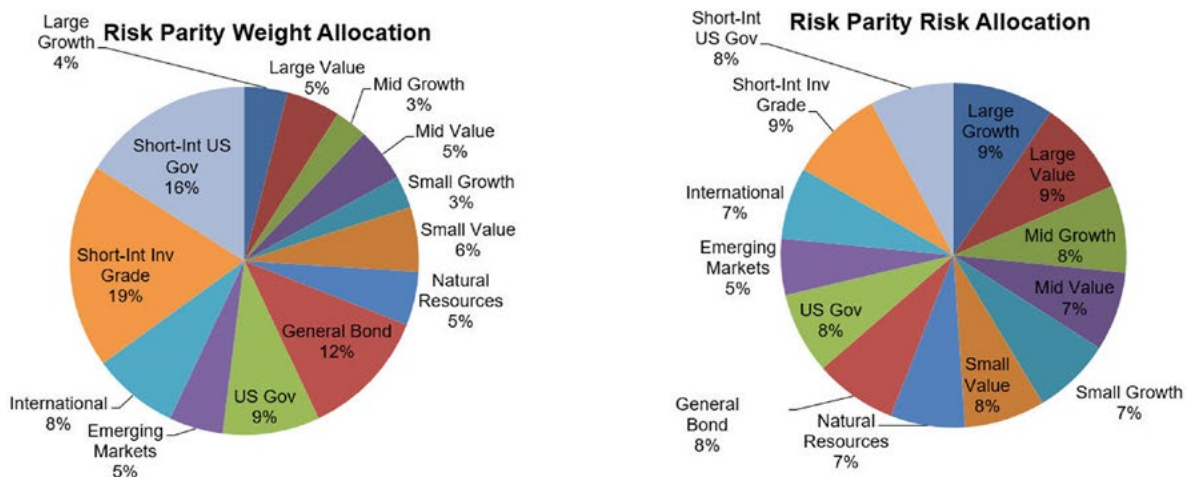
Figure 6 Mean-Variance Optimized Portfolio



Source: Calculations are by Flexible Plan Investments Research. Returns are hypothetical and backtested. You cannot invest in an index.

Figure 7 shows how the strategic asset allocation of the same portfolio looks if risk parity is used instead and the contribution to risk is equalized. As you can see, risk parity results in equal risk allocation from each asset (chart on the right), whereas mean-variance optimization weights typically result in non-equal allocation of asset risk. The chart on the left in Figure 7 shows the allocation weights to each asset using risk parity.

Figure 7 Risk Parity Portfolio



Source: Calculations are by Flexible Plan Investments Research. Returns are hypothetical and backtested. You cannot invest in an index.

It is evident from the charts that while the risk-parity approach equally distributes the risk, it typically results in an overweighting to low-risk assets. This results in lower risk than a traditional portfolio of diversified asset classes—but also lower return. This happens because, in order to equalize risk, the lowest-risk asset (theoretically, also the lowest return) must be overweighted to achieve equal risk within the portfolio. In practice, leverage may be used to make the return or risk of the lower-risk asset classes equal to the level of risk appropriate for the client based on a suitability assessment. For the purpose of this study, we do not employ leverage to highlight how the approach handles drawdowns and risk.

Advantages of enhanced passive allocation

Markowitz mean-variance optimization and risk parity both address the area where equal-weight diversification can fall short: its failure to consider the risk of assets in the portfolio-allocation decision. Each handles it differently, and each is readily available for creating core strategies using asset allocation.

Issues of enhanced passive allocation

Markowitz mean-variance optimization

The Markowitz mean-variance optimization theory makes a number of assumptions that do not apply to the real world of investing, including the following:

- The level of return is always directly related to the level of risk undertaken.
- Expected returns for all assets are known and persistent.
- The variance and covariance of all asset returns are known and persistent.
- There are no transaction costs or taxes.
- Mean returns and variance are stationary.

The CFA Institute lists the following six criticisms of mean-variance optimization²:

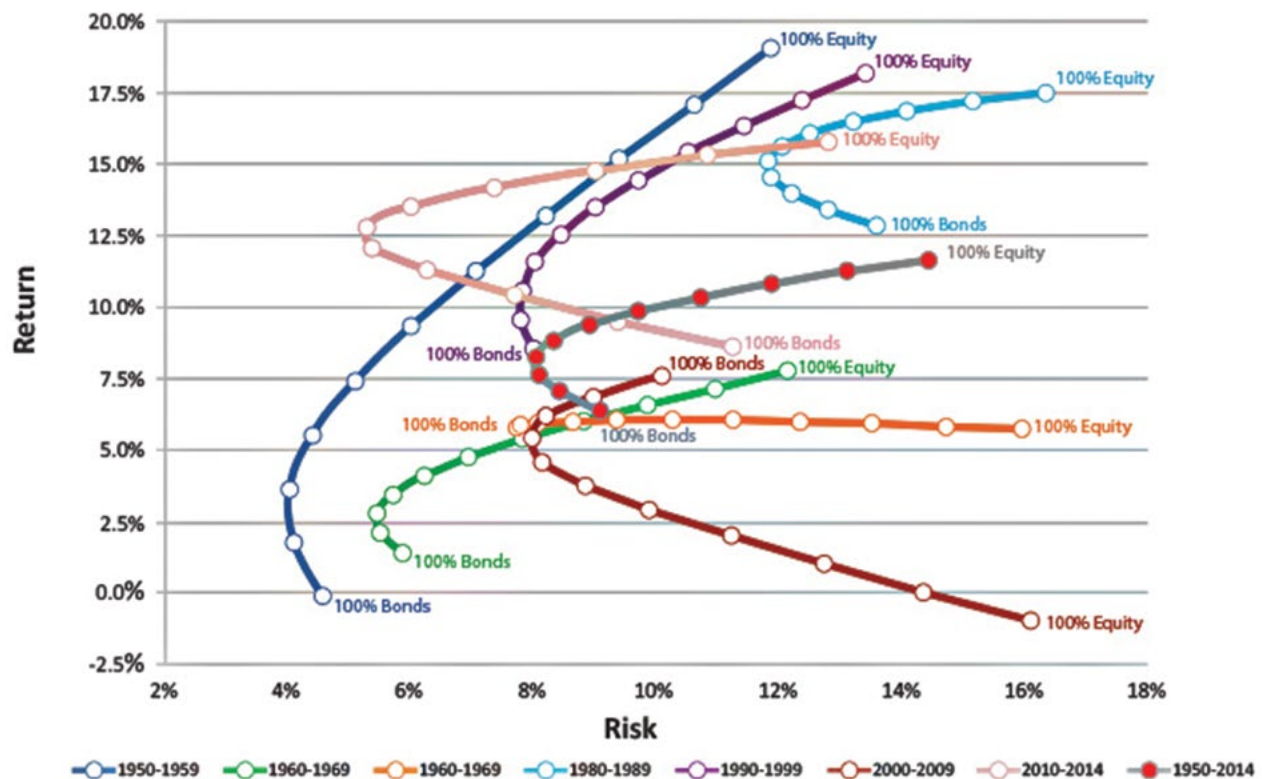
1. The outputs (asset allocations) are highly sensitive to small changes in the inputs.
2. The asset allocations are highly concentrated in a subset of the available asset classes.
3. Investors are often concerned with characteristics of asset-class returns such as skewness and kurtosis that are not accounted for in mean-variance optimization.

4. While the asset allocations may appear diversified across assets, the sources of risk may not be fully diversified.
5. Mean-variance optimization allocations may have no direct connection to the factors affecting any liability or consumption streams.
6. Mean-variance optimization is a single-period framework that tends to ignore trading/rebalancing costs and taxes.

To address some of these criticisms and present the enhanced passive testing with an added layer of stability, we perform our optimization on a walk-forward basis quarterly using a 10-year lookback.

Another issue with mean-variance optimization is that an investor's allocation will depend greatly on the time period used to estimate the input variables. Figure 8 reflects third-party, multi-decade research, demonstrating the instability of the efficient frontier decade by decade. As the figure shows, the frontiers look very different over the seven, decadelong time periods. If a financial adviser had optimized based on the previous decade, in most cases, the investor client would likely be disappointed with the results when compared with those of the current decade's efficient frontier.

Figure 8 7 Time Periods, 7 Different Frontiers



Sources: Rydex Investments, Flexible Plan Investments Research

Risk-parity asset-allocation concerns

The main issue with risk parity is that it results in a portfolio with large weighting exposures to low-risk assets. Risk parity focuses too much on equalizing risk and not enough on return. In practice, risk parity is often used by hedge funds with leverage to match the portfolio to the desired degree of risk and return.

Investment & Pensions Europe highlights the following problem associated with risk parity: “Historical values of volatility and correlations are dependent on the time periods chosen and tend to ignore events that have not occurred frequently or recently. Second, having no view on future returns means that asset classes can be included that may have zero or even negative risk premiums. Commodities are a case in point; government bonds are potentially another example—Inker, along with many others, believes that the risk premium on bonds may be negative for an inconveniently long time.”³

In terms of performance for the typical investor, Jonathan Cooper, a contributor to Seeking Alpha, points out that portfolios will end up overweighting bonds, which over time will produce returns that are not on par with a typical passive 60/40 allocation.⁴

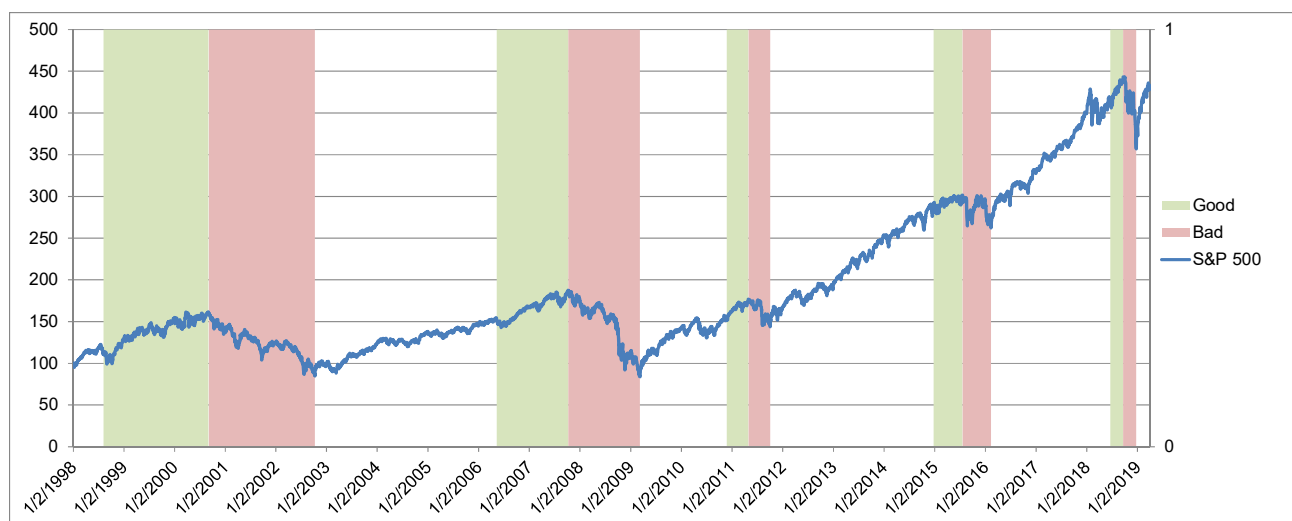
Warning: Diversification is the only risk-management tool

A substantial problem with both mean-variance optimization and risk parity is that they only make use of one risk-management tool: diversification. Diversification is the first line of defense when it comes to managing investment risk. Unfortunately, it may not be enough for all situations, especially in times of crisis.

Studies show asset correlations tend to go to +1 in crisis periods. According to an article published by investment manager Two Sigma, “For all four asset classes [equities, fixed-income, commodities, alternatives], correlations spiked at the onset of the financial crisis in late-2008 after a decade of relative stability. Pairwise equity correlations reached nearly 70 percent from a pre-crisis level of approximately 40 percent.”⁵

This tendency, commonly known as “crisis correlation,” can be modeled separately. Over long periods of time, low correlations exhibit diversification benefits. During times of market crisis, the correlation benefit isn’t the same because asset correlations increase.

To appreciate this, we compared the asset-class correlations during drawdown periods for the S&P 500 (referred to as “Bad” market environments in the following figures and tables) to the correlations for the same number of days as the drawdown period before the start of the drawdown (referred to as “Good” market environments). Figure 9 shows the start and end for each of these environments since the late 1990s, as well as the number of days studied in that environment.

Figure 9 “Good” and “Bad” Market Environments Since the Late 1990s

“Good” Market Environments		
Start Date	Peak	#Days
8/7/1998	9/1/2000	525
5/12/2006	10/9/2007	355
11/24/2010	4/29/2015	108
12/23/2014	7/20/2015	143
6/20/2018	9/20/2018	65

“Bad” Market Environments		
Peak	Trough	#Days
9/5/2000	10/9/2002	525
10/10/2007	3/9/2009	355
5/2/2001	10/3/2011	108
7/21/2015	2/11/2016	143
9/21/2018	12/24/2018	65

Source: Flexible Plan Investments Research

For brevity, Tables 2 and 3 show the correlations between the asset classes during the most recent period illustrated in Figure 9—first in the “good” environment followed by the related “bad” environment using the asset classes from the Table 1 portfolio. Correlations that become more positive, closer to +1 between assets, are shaded red during the “bad” environment. Green highlighting signifies that the correlations became less positive during the period.

During the most recent bad environment, emerging markets, international, some fixed-income exposure, and natural resources all experienced an increase in correlations during the fourth quarter of 2018. Yet these are precisely the asset classes that the enhanced passive methodologies would have invested in to achieve risk diversification.

Results for the other time periods in Figure 9 are shown in the Appendix. In each set of good and bad environments, we see the same pattern play out: Correlations between asset classes increase during each of the bad environments. In other words, it is not likely that the diversification would have reduced risk when an investor needed it to the most—namely, in a crisis.

What is very concerning is the increase in correlation between equities and short-term bonds that we see in both the 2011 and 2015 bad environments. If this increase were to occur during the next major bear market (which could occur in a rising-rate environment instead of the declining-rate environment of the last 20 years), it could be disastrous for a strategically allocated asset-class portfolio.

Table 2 Correlations of Asset Classes During the Most Recent Good Environment

	6/20/2018	9/20/2018	Good Environment										
	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.691	1.000											
Mid Growth	0.897	0.657	1.000										
Mid Value	0.632	0.915	0.734	1.000									
Small Growth	0.815	0.553	0.963	0.685	1.000								
Small Value	0.591	0.754	0.754	0.912	0.796	1.000							
Emerging Markets	0.616	0.737	0.492	0.637	0.391	0.506	1.000						
International	0.559	0.795	0.441	0.693	0.324	0.524	0.882	1.000					
General Bond	-0.087	0.025	-0.093	0.060	-0.153	-0.032	-0.033	0.118	1.000				
General US Gov	-0.269	-0.332	-0.228	-0.237	-0.239	-0.250	-0.334	-0.264	0.873	1.000			
Short-Int Inv Grade	-0.297	-0.319	-0.283	-0.246	-0.302	-0.276	-0.276	-0.222	0.838	0.936	1.000		
Short-Int US Gov	-0.354	-0.440	-0.327	-0.354	-0.312	-0.334	-0.391	-0.335	0.735	0.920	0.946	1.000	
Natural Resources	0.388	0.617	0.389	0.653	0.359	0.601	0.547	0.665	0.137	-0.127	-0.123	-0.171	1.000

Source: Flexible Plan Investments Research

Table 3 Correlations of Asset Classes During the Most Recent Bad Environment

	9/21/2018	12/24/2018	Bad Environment										
	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.884	1.000											
Mid Growth	0.963	0.889	1.000										
Mid Value	0.872	0.961	0.919	1.000									
Small Growth	0.935	0.849	0.988	0.906	1.000								
Small Value	0.827	0.900	0.900	0.969	0.913	1.000							
Emerging Markets	0.810	0.746	0.798	0.753	0.787	0.743	1.000						
International	0.844	0.834	0.858	0.855	0.851	0.841	0.903	1.000					
General Bond	-0.001	-0.070	-0.006	-0.046	0.014	-0.063	0.082	0.069	1.000				
General US Gov	-0.270	-0.395	-0.293	-0.376	-0.282	-0.376	-0.203	-0.304	0.806	1.000			
Short-Int Inv Grade	-0.347	-0.374	-0.346	-0.366	-0.322	-0.358	-0.255	-0.289	0.808	0.823	1.000		
Short-Int US Gov	-0.414	-0.458	-0.427	-0.461	-0.412	-0.459	-0.335	-0.417	0.628	0.812	0.910	1.000	
Natural Resources	0.695	0.805	0.705	0.778	0.693	0.748	0.714	0.783	0.111	-0.272	-0.238	-0.358	1.000

Source: Flexible Plan Investments Research

Analysis

Comparing the results of an equal-weight investing approach to an enhanced passive approach as represented by Markowitz mean-variance optimization (targeting a 60/40 balanced allocation risk) and risk parity produces the results in Figure 10 using the universe from Table 1.

Figure 10 Passive vs. Enhanced Passive

Method	S&P 500	Equal Weight	Enhanced Passive MVO	Enhanced Passive Risk Parity	Enhanced Passive Lipper Balanced	Enhanced Passive Vanguard Balanced
CAGR	5.70%	6.15%	5.60%	5.94%	5.23%	5.86%
Risk	19.06%	12.74%	11.90%	4.62%	10.99%	11.12%
Sharpe	0.30	0.48	0.47	1.29	0.48	0.53
Max DD	55.24%	42.66%	43.08%	9.37%	39.13%	35.90%
MAR	0.10	0.14	0.13	0.63	0.13	0.16

Year	S&P 500	Equal Weight	Enhanced Passive MVO	Enhanced Passive Risk Parity	Enhanced Passive Lipper Balanced	Enhanced Passive Vanguard Balanced
2000	-9.10%	-0.04%	-2.76%	7.27%	2.39%	-2.03%
2001	-11.87%	-2.94%	1.37%	4.93%	-3.24%	-2.95%
2002	-22.10%	-9.77%	-5.82%	4.91%	-10.69%	-9.47%
2003	28.67%	26.85%	26.75%	8.14%	19.94%	20.02%
2004	10.87%	13.53%	13.86%	4.73%	8.99%	9.37%
2005	4.91%	11.11%	9.39%	3.47%	5.20%	4.79%
2006	15.78%	12.98%	12.07%	5.47%	11.60%	11.06%
2007	5.49%	12.21%	10.05%	6.71%	6.53%	6.31%
2008	-36.99%	-30.10%	-31.51%	1.98%	-26.18%	-22.12%
2009	26.47%	29.30%	32.65%	5.91%	23.35%	20.11%
2010	15.09%	15.80%	13.02%	5.09%	11.90%	13.29%
2011	2.09%	-1.92%	-6.06%	17.08%	0.74%	4.29%
2012	15.99%	12.22%	13.77%	12.54%	11.94%	10.76%
2013	32.36%	19.02%	5.01%	6.44%	16.39%	17.49%
2014	13.65%	2.88%	2.76%	0.87%	7.21%	9.99%
2015	1.38%	-4.31%	-1.99%	-6.47%	-0.42%	0.51%
2016	11.93%	10.19%	6.45%	3.90%	7.20%	8.77%
2017	21.80%	13.98%	16.14%	7.69%	14.10%	13.89%
2018	-4.39%	-7.53%	-3.30%	3.59%	-4.68%	-2.86%
2019	18.23%	13.48%	14.05%	12.29%	11.05%	12.19%

Source: Calculations are by Flexible Plan Investments Research. Returns are hypothetical and backtested. Returns are gross of all fees, transaction costs, and taxes. Returns assume the reinvestment of all distributions. Sharpe ratios are calculated with return and risk numbers corresponding to each specific method over the full study period. For example, the S&P 500 Sharpe ratio uses the return and risk of the S&P 500 Total Return Index from January 3, 2000, to April 30, 2019. Max drawdown and MAR reflect daily drawdowns during the period shown. You cannot invest in an index. Past performance is no guarantee of future results. The chart in this figure uses a logarithmic scale.

Figure 10 demonstrates the power of simple equal-weight investing. By ignoring risk, it outperforms, simply on a return basis, all other options (including the return of the S&P 500). But its disregard for risk causes it to generate drawdowns almost as great as the unmanaged S&P 500 Index. Still, the Sharpe ratio and MAR measures of risk-adjusted return for the passive index are higher than the unmanaged index.

Traditional mean-variance optimization is the most often used method by financial advisers, yet it fared the worst in this study. It has the lowest return and experiences a drawdown comparable to equal-weight investing and the unmanaged index. As the focus of modern portfolio theory is superior risk-adjusted return, it is worth noting that mean-variance optimization does exceed the unmanaged index (though not the equally weighted portfolio) on these measures.

Risk parity performs significantly better than the other methodologies. Although falling short of equal weighting in the return measurement, it achieves a better return than the S&P 500 unmanaged index while generating clearly superior results for risk and risk-adjusted return.

Unfortunately, the methodology achieves its results based on just a few superior years. Most years, risk parity is the worst performer of the methodologies tested. This calls into question an investor's ability to stick with the method during the multi-year stretches of subpar returns.

Given the active versus passive debate that exists in financial circles, it is interesting to note that the balanced fund benchmarks do provide equal or better risk and risk-adjusted return than the S&P 500 Index and the equal-weight portfolio. They do not, however, outperform the performance measures of the risk parity portfolio.

Adding active management into the equation: Investing in dynamically risk-managed funds

Until now, we have applied established asset-allocation methodologies (equal weight, Markowitz, and risk parity) to passive asset-class investments (Lipper mutual fund indexes). In our next step, we apply these same routines to dynamically risk-managed mutual funds. This potentially provides two levels of risk management. The first would be *within* the "actively" managed funds. The second would be by allocating *among* the funds.

Advantages

Active management within mutual funds seeks to achieve higher returns and/or less risk. Until the 21st century, actively managed funds offered to the public were, in general, strictly limited by their prospectuses to a certain number of asset classes and to a very limited level of activity. Tactically managed funds were rare, as were global macro strategy funds that could seek out investments in multiple asset classes.

Tactical and global macro management strategies have traditionally been offered in the form of hedge funds or separately managed accounts. While many investors believe such strategies are principally for "beating the

market” in the short term, studies show their primary purpose is to deliver better risk-adjusted returns over a complete market cycle, which encompasses both a bull and a bear market.

According to “Why Market Timing Works,” published in the Journal of Portfolio Management,

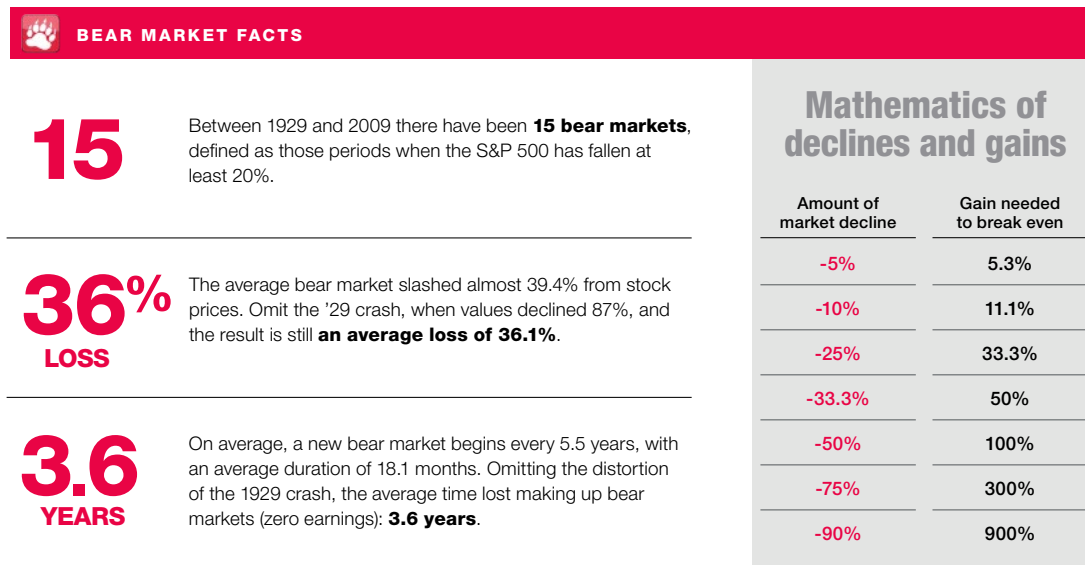
There are a growing number of timers who consistently outperform the market over a full market cycle—both bull and bear. When risk-adjusted return is used as the standard to measure performance—as dictated by modern portfolio theory—even the average market timer outperforms the market by a notable margin (see Wagner, Shellans, and Paul [1992] and Hulbert [1993]).

A study of twenty-five market timers by Wagner, Shellans, and Paul [1992] looks at the level of risk and returns achieved by the timers during the period 1985 to 1990, which includes the bear market of 1987 and the market’s three-month decline in 1990. During this period, the level of risk assumed by the average timer was 40% to 60% below the S&P 500, even after subtracting fees. Even adjusted for relative market exposure (57% in stocks, 43% in cash), the average timer’s risk-adjusted return premium remains considerable.⁶

There are many advantages of dynamic risk management, including the following:

1. It can help avoid the mediocre returns inherent in a diversification-only risk-management approach.
2. It has the ability to respond to the market environment.
3. It addresses the difficulty of persuading investors to add to losing positions and reduce winning positions (as is required by mean-variance optimization).
4. It can take advantage of short-term opportunities to achieve higher profit and to avoid risk and volatility.

The mathematics of losses (Figure 11) demonstrates how important it is to manage risk during downturns.

Figure 11 Mathematics of Investment Losses

Source: Flexible Plan Investments Research

Next, we examine the results of combining the traditional allocation approach with dynamically risk-managed funds (instead of passive asset classes).

As the funds themselves have not been available for the period of our previous studies, we allocate among six hypothetical, backtested funds that seek to replicate strategies currently used in the affiliated funds listed in Table 4, which are subadvised by Flexible Plan Investments. Employing a cloning technique, we hypothetically extend the subadvised strategies employed by the funds over a period exceeding the actual lifetime of the funds (see Disclosures). Therefore, these results are not represented to be those of the actual funds listed in Table 4.

We will apply mean-variance optimization as the allocation approach using the results of the cloned, hypothetical fund strategy. Flexible Plan Investments offers a managed account strategy that actually does this called Dynamic Fund Profiles, which supports five suitability-based portfolios.

Table 4 Affiliated Fund List

Exposure	Ticker	Name
Equity	QACFX	Quantified All-Cap Equity Fund
Equity	QSTFX	Quantified STF Fund
Equity	QMLFX	Quantified Market Leaders Fund
Income	QBDSX	Quantified Managed Income Fund
Alternative	QALTX	Quantified Alternative Investment Fund
Alternative	QGLDX	The Gold Bullion Strategy Fund

Source: Flexible Plan Investments Research

Note: The funds are each risk managed by a multitude of dynamic strategies, while the gold fund (which is sub-advised by Flexible Plan Investments, Ltd., but is not a part of the Quantified Fund family) simply tries to produce daily returns consistent with those generated by gold bullion.

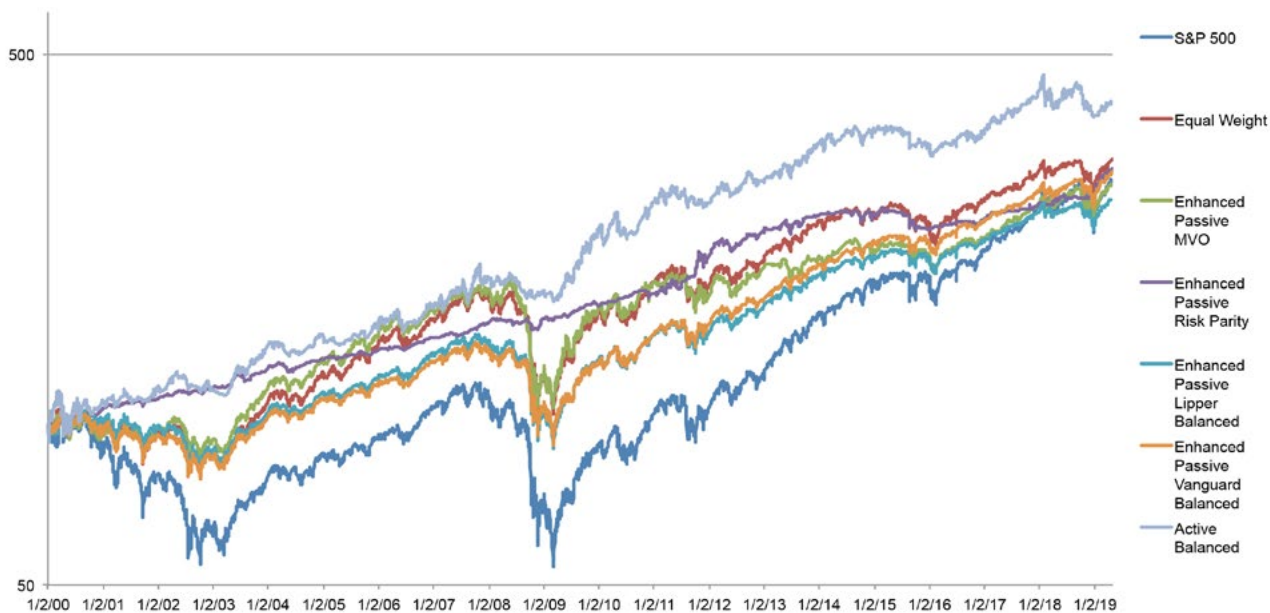
Analysis

An allocation methodology applied to actively managed funds should reduce risk and drawdown significantly without sacrificing returns, which we saw when mean-variance optimization was applied to passive asset classes.

This is exactly what the research shows. Figure 12 demonstrates the benefits of applying active risk management at the investment level: returns increase, risk decreases, and the risk-adjusted measures substantially improve. The risk reduction is especially evident in 2008: Losses using actively managed investments were reduced to below 5.77%. Compare that to the 42.66% loss experienced using equal weight in Figure 12. And the enhanced mean-variance optimization approach does even worse by this measure.

Most notable is the improvement in the MAR ratio (return/max drawdown), going from 0.14 for passive mean-variance optimization to 0.42 for the active balanced approach. The max drawdown is reduced from 42.66% (passive mean-variance optimization) down to 18.07% (active), while return after max fees outperforms passive mean-variance optimization by 1.42% on an annualized basis.

Figure 12 Benefits of Active Management at the Investment Level



Method	S&P 500	Equal Weight	Enhanced Passive MVO	Enhanced Passive Risk Parity	Enhanced Passive Lipper Balanced	Enhanced Passive Vanguard Balanced	Active Balanced
CAGR	5.70%	6.15%	5.60%	5.94%	5.23%	5.86%	7.57%
Risk	19.06%	12.74%	11.90%	4.62%	10.99%	11.12%	10.62%
Sharpe	0.30	0.48	0.47	1.29	0.48	0.53	0.71
Max DD	55.24%	42.66%	43.08%	9.37%	39.13%	35.90%	18.07%
MAR	0.10	0.14	0.13	0.63	0.13	0.16	0.42

Figure 12 Benefits of Active Management at the Investment Level (Continued)

Year	S&P 500	Equal Weight	Enhanced Passive MVO	Enhanced Passive Risk Parity	Enhanced Passive Lipper Balanced	Enhanced Passive Vanguard Balanced	Active Balanced
2000	-9.10%	-0.04%	-2.76%	7.27%	2.39%	-2.03%	11.48%
2001	-11.87%	-2.94%	1.37%	4.93%	-3.24%	-2.95%	4.03%
2002	-22.10%	-9.77%	-5.82%	4.91%	-10.69%	-9.47%	-0.11%
2003	28.67%	26.85%	26.75%	8.14%	19.94%	20.02%	21.89%
2004	10.87%	13.53%	13.86%	4.73%	8.99%	9.37%	4.89%
2005	4.91%	11.11%	9.39%	3.47%	5.20%	4.79%	2.31%
2006	15.78%	12.98%	12.07%	5.47%	11.60%	11.06%	9.99%
2007	5.49%	12.21%	10.05%	6.71%	6.53%	6.31%	13.77%
2008	-36.99%	-30.10%	-31.51%	1.98%	-26.18%	-22.12%	-5.77%
2009	26.47%	29.30%	32.65%	5.91%	23.35%	20.11%	29.20%
2010	15.09%	15.80%	13.02%	5.09%	11.90%	13.29%	13.24%
2011	2.09%	-1.92%	-6.06%	17.08%	0.74%	4.29%	0.22%
2012	15.99%	12.22%	13.77%	12.54%	11.94%	10.76%	9.88%
2013	32.36%	19.02%	5.01%	6.44%	16.39%	17.49%	18.71%
2014	13.65%	2.88%	2.76%	0.87%	7.21%	9.99%	4.56%
2015	1.38%	-4.31%	-1.99%	-6.47%	-0.42%	0.51%	-6.75%
2016	11.93%	10.19%	6.45%	3.90%	7.20%	8.77%	6.33%
2017	21.80%	13.98%	16.14%	7.69%	14.10%	13.89%	18.36%
2018	-4.39%	-7.53%	-3.30%	3.59%	-4.68%	-2.86%	-8.87%
2019	18.23%	13.48%	14.05%	12.29%	11.05%	12.19%	6.89%

Source: Calculations are by Flexible Plan Investments Research. Returns are hypothetical and backtested. Equal-weight and enhanced passive returns are gross of all fees, transaction costs, and taxes. A 1.6% fee is included in all active and enhanced active cases; this assumes use of hypothetical results of strategies employing proprietary funds and thus is after the application of fee credits. No fee is applied to passive or enhanced passive strategies. Returns assume the reinvestment of all distributions. Sharpe ratios are calculated with return and risk numbers corresponding to each specific method over the full study period. For example, the S&P 500 Sharpe ratio uses the return and risk of the S&P 500 Total Return Index from January 3, 2000, to April 30, 2019. Max drawdown and MAR reflect daily drawdowns during the period shown. You cannot invest in an index. Past performance is no guarantee of future results. The chart in this figure uses a logarithmic scale.

Issues

As good as these results are, both absolutely and when compared with the results of restricting one's investments to passive asset classes or index funds, it is important to note that Dynamic Fund Profiles is just one strategy. By investing in a single dynamic strategy, you are still putting all of your eggs in one strategy's basket.

Studies show that different strategies are better suited for different market environments. For example, hedge fund manager Ray Dalio of Bridgewater Associates states that "any single approach to investing—e.g., investing in any asset class, investing via any investment style (such as value, growth, distressed), investing in anything—will experience a time when it performs so terribly that it can ruin you."⁷

Investing in a single strategy exposes you to strategy-specific risk that can be largely diversified away by using a multi-strategy approach, as presented in the next section.

Enhanced active: Dynamic risk management of dynamic strategies (the Multi-Strategy Core)

Dynamic risk management of dynamic strategies adds a third layer of risk management to the two benefits that can be achieved through asset allocation of dynamically managed funds. It also solves the problem of putting all of your eggs in one strategy's basket.

This method uses different core allocation strategies that can be created to use the actively managed funds. It then dynamically invests among multiple core strategies that use these funds. Since the method allocates among multiple core strategies, it provides strategy and asset-class diversification and eliminates the concentrated risk that arises when investing in a single strategy.

Advantages

This enhanced active methodology provides diversification of strategies using dynamic allocation. Its portfolio creation process is designed to add multiple layers of turnkey risk management for the benefit of the investor, as detailed in the following section.

Multi-Strategy Core

To further test the efficacy of this new approach, we will examine the hypothetical results of Flexible Plan Investments' Multi-Strategy Core applied over the study period. Multi-Strategy Core blends Flexible Plan Investments' suitability-based Quantified Fee Credit (QFC) core strategies to produce portfolios designed to be robust in changing market conditions. Based on over 20 years of experience in creating portfolios employing multiple strategies, the process of combining actively managed strategies is designed to provide additional layers of portfolio defense and return potential.

The goal of the Multi-Strategy Core process is to deliver three levels of risk management:

1. The dynamic risk management employed *within the funds* used in each strategy.
2. The active management *among the funds* required by the strategies themselves.
3. The dynamic allocation employed *among the strategies* by Multi-Strategy Core itself.

To further manage risk, Multi-Strategy Core provides five risk-based profiles (conservative, moderate, balanced, growth, and aggressive) based on investor answers to a suitability questionnaire.

As explained previously, the strategies used by Multi-Strategy Core are predicated on hypothetical results of strategies employing affiliated funds that pay Flexible Plan Investments as subadvisor. Flexible Plan Investments returns all of those fees to investors as a dollar-for-dollar fee credit.

How Multi-Strategy Core works

- Multi-Strategy Core draws from a universe of core strategies that are designed to contend with volatility and deliver superior risk-adjusted returns.
- Multi-Strategy Core monitors and reallocates among these core strategies automatically for the investor.
- Each strategy uses funds that are designed to deliver dynamic, risk-managed performance and fee credits to offset advisory fees.

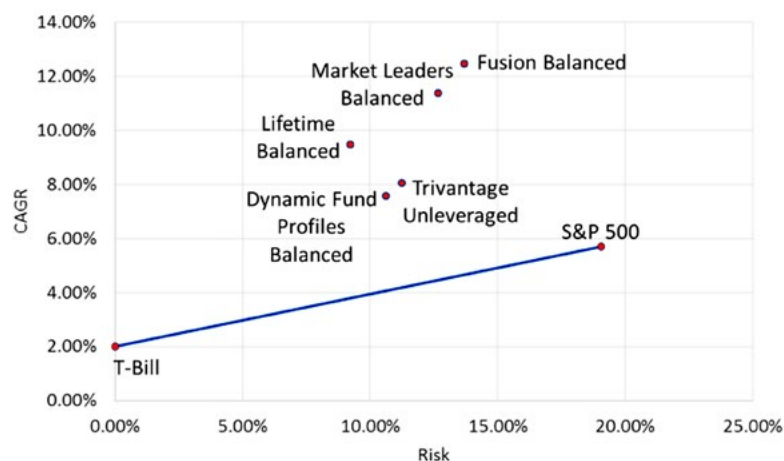
Asset classes currently represented in these QFC strategies are presented in Table 5. Inverse and leveraged positions in such asset classes may also be employed.

Table 5 Asset Classes Represented in the QFC Strategies

Money Market	Government Bonds
Large-Cap Equities	Corporate Bonds
Mid-Cap Equities	High-Yield Bonds
Small-Cap Equities	International Bonds
Growth Equities	Emerging Markets
Value Equities	Alternatives
International Equities	Sectors

A capital market line chart of the core balanced strategies drawn upon by Multi-Strategy Core is shown in Figure 13. The chart makes clear that while each dot represents a core strategy, even within the Balanced category, results can be very different when measured on both a return and risk continuum

Figure 13 Capital Market Line of Core Balanced Strategies

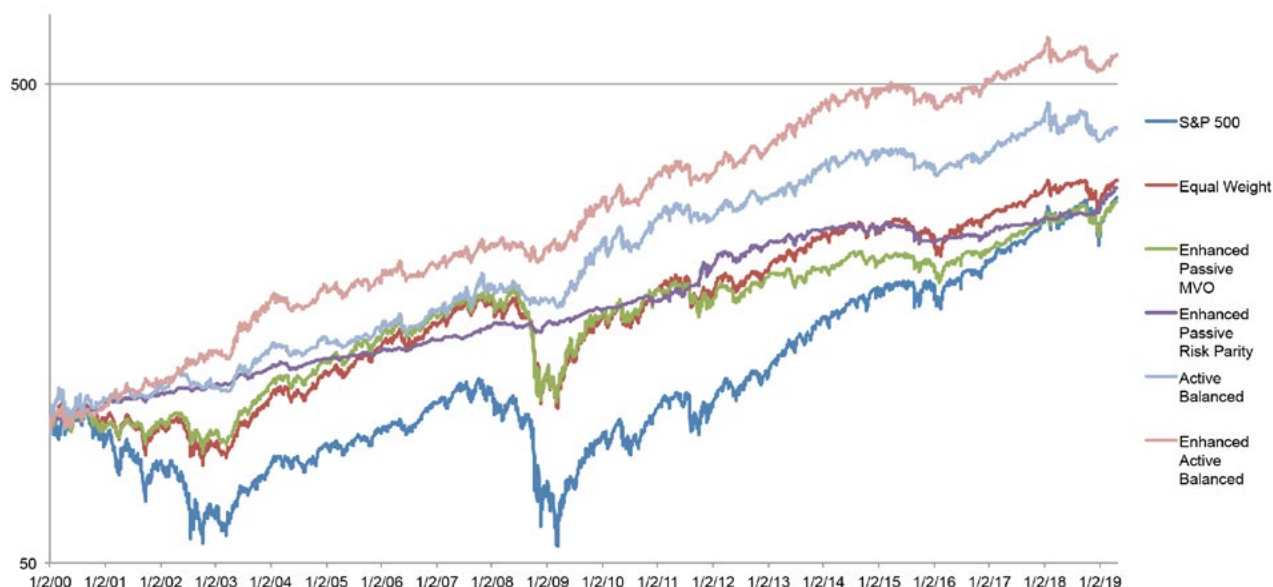


Source: Flexible Plan Investments Research

Analysis

Figure 14 shows the benefits of using this multi-strategy approach. Risk and drawdown are reduced even further versus the single-strategy active method. The Sharpe ratio improves from 0.71 to 0.94, and the MAR increases from 0.42 to 0.64.

Figure 14 Benefits of a Multi-Strategy Approach



Method	S&P 500	Equal Weight	Enhanced Passive MVO	Enhanced Passive Risk Parity	Active Balanced	Enhanced Active Balanced
CAGR	5.70%	6.15%	5.60%	5.94%	7.57%	9.54%
Risk	19.06%	12.74%	11.90%	4.62%	10.62%	10.18%
Sharpe	0.30	0.48	0.47	1.29	0.71	0.94
Max DD	55.24%	42.66%	43.08%	9.37%	18.07%	14.80%
MAR	0.10	0.14	0.13	0.63	0.42	0.64

Year	S&P 500	Equal Weight	Enhanced Passive MVO	Enhanced Passive Risk Parity	Active Balanced	Enhanced Active Balanced
2000	-9.10%	-0.04%	-2.76%	7.27%	11.48%	6.97%
2001	-11.87%	-2.94%	1.37%	4.93%	4.03%	10.62%
2002	-22.10%	-9.77%	-5.82%	4.91%	-0.11%	16.48%
2003	28.67%	26.85%	26.75%	8.14%	21.89%	28.06%
2004	10.87%	13.53%	13.86%	4.73%	4.89%	7.97%
2005	4.91%	11.11%	9.39%	3.47%	2.31%	0.99%
2006	15.78%	12.98%	12.07%	5.47%	9.99%	8.63%
2007	5.49%	12.21%	10.05%	6.71%	13.77%	10.00%
2008	-36.99%	-30.10%	-31.51%	1.98%	-5.77%	-0.16%
2009	26.47%	29.30%	32.65%	5.91%	29.20%	23.33%
2010	15.09%	15.80%	13.02%	5.09%	13.24%	13.59%
2011	2.09%	-1.92%	-6.06%	17.08%	0.22%	0.45%
2012	15.99%	12.22%	13.77%	12.54%	9.88%	12.24%
2013	32.36%	19.02%	5.01%	6.44%	18.71%	26.23%
2014	13.65%	2.88%	2.76%	0.87%	4.56%	5.55%
2015	1.38%	-4.31%	-1.99%	-6.47%	-6.75%	-4.39%
2016	11.93%	10.19%	6.45%	3.90%	6.33%	9.07%
2017	21.80%	13.98%	16.14%	7.69%	18.36%	14.76%
2018	-4.39%	-7.53%	-3.30%	3.59%	-8.87%	-7.79%
2019	18.23%	13.48%	14.05%	12.29%	6.89%	8.81%

Source: Calculations are by Flexible Plan Investments Research. Returns are hypothetical and backtested. Equal-weight and enhanced passive returns are gross of all fees, transaction costs, and taxes. A 1.6% fee is included in all active and enhanced active cases; this assumes use of hypothetical results of strategies employing proprietary funds and thus is after the application of fee credits. No fee is applied to passive or enhanced passive strategies. Returns assume the reinvestment of all distributions. Sharpe ratios are calculated with return and risk numbers corresponding to each specific method over the full study period. For example, the S&P 500 Sharpe ratio uses the return and risk of the S&P 500 Total Return Index from January 3, 2000, to April 30, 2019. Max drawdown and MAR reflect daily drawdowns during the period shown. You cannot invest in an index. Past performance is no guarantee of future results. The chart in this figure uses a logarithmic scale.

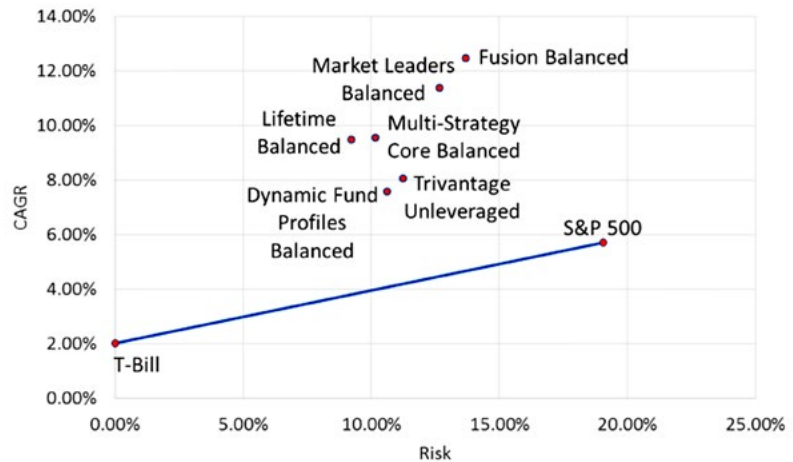
Investing using this enhanced active approach helps diversify away the concentration risk that can be experienced when investing in one single strategy. This is the case whether that strategy is a passive strategy, such as mean-variance optimization, or an active strategy, such as Dynamic Fund Profiles.

In Figure 15, Multi-Strategy Core (Balanced) is able to achieve a Sharpe ratio of almost 1 by allocating among the core strategies available at Flexible Plan In-

vestments. Since no single strategy has a tendency to outperform in perpetuity, Multi-Strategy Core has an advantage over single-strategy allocation by dynamically allocating to strategies believed to be in-favor during rebalance periods. Historically, asset classes and strategies fall in and out of favor with changing market conditions. Overall selection risk can be reduced by using a systematic multi-strategy allocation approach such as Multi-Strategy Core.

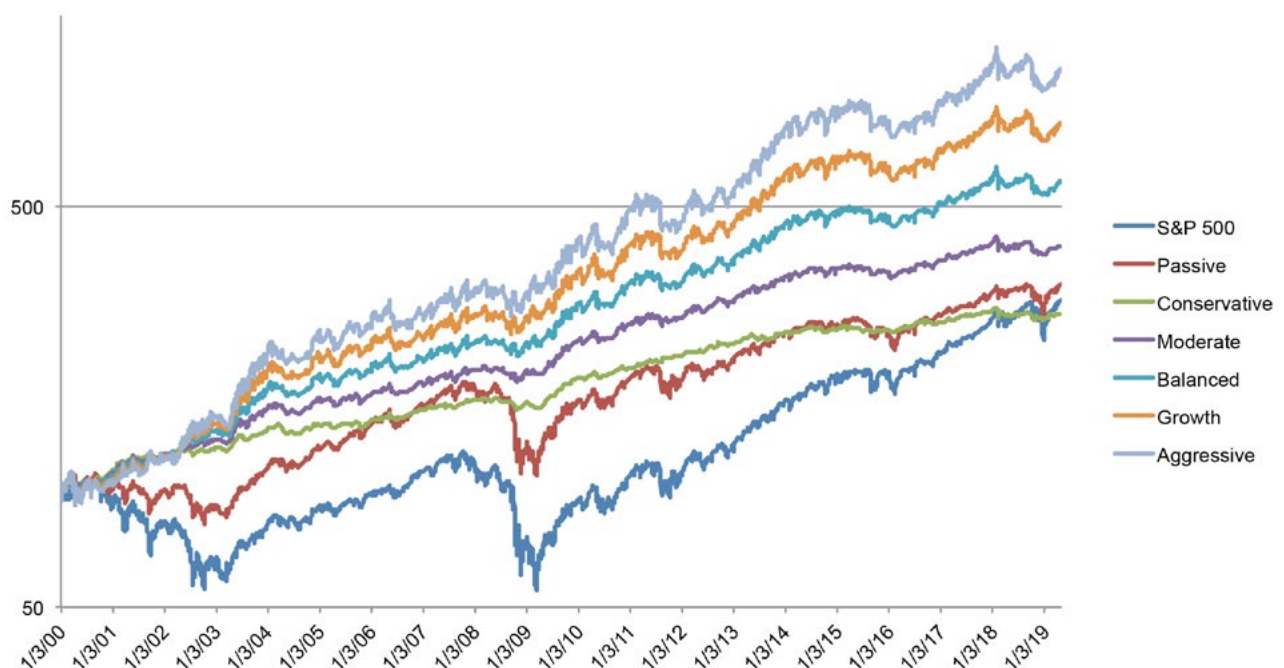
Flexible Plan Investments offers other risk profiles for Multi-Strategy Core beyond the balanced approach highlighted previously. Figure 16 shows the hypothetical performance across these risk profiles after fees.

Figure 15 Core Balanced Strategies vs. Multi-Strategy Core



Source: Flexible Plan Investments Research

Figure 16 Multi-Strategy Core Profiles Performance



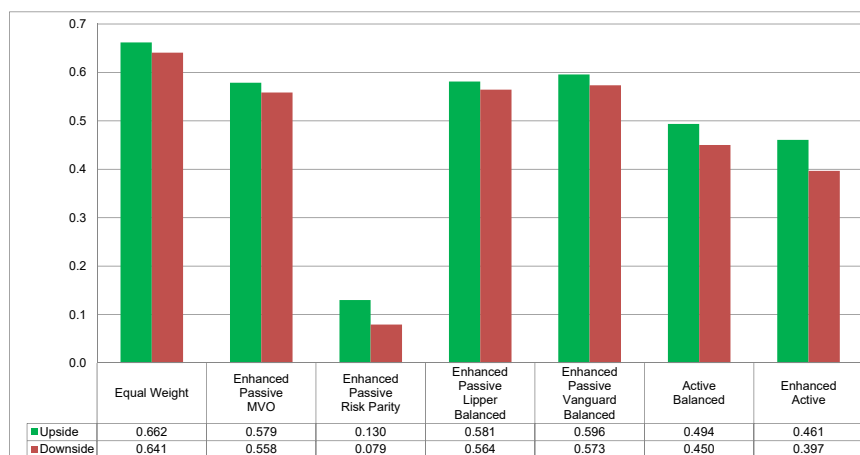
Method	S&P 500	Equal Weight	Conservative	Moderate	Balanced	Growth	Aggressive
CAGR	5.70%	6.15%	5.32%	7.49%	9.54%	11.47%	13.27%
Risk	19.06%	12.74%	4.08%	6.76%	10.18%	13.80%	17.49%
Sharpe	0.30	0.48	1.30	1.11	0.94	0.83	0.76
Max DD	55.24%	42.66%	8.57%	11.32%	14.80%	18.35%	21.86%
MAR	0.10	0.14	0.62	0.66	0.64	0.63	0.61

Year	S&P 500	Equal Weight	Conservative	Moderate	Balanced	Growth	Aggressive
2000	-9.10%	-0.04%	9.65%	8.40%	6.97%	5.35%	3.54%
2001	-11.87%	-2.94%	8.65%	9.69%	10.62%	11.44%	12.14%
2002	-22.10%	-9.77%	4.46%	10.43%	16.48%	22.56%	28.65%
2003	28.67%	26.85%	11.76%	19.76%	28.06%	36.64%	45.49%
2004	10.87%	13.53%	3.02%	5.51%	7.97%	10.40%	12.80%
2005	4.91%	11.11%	0.36%	0.71%	0.99%	1.20%	1.34%
2006	15.78%	12.98%	7.87%	8.29%	8.63%	8.89%	9.07%
2007	5.49%	12.21%	5.35%	7.73%	10.00%	12.16%	14.20%
2008	-36.99%	-30.10%	-1.03%	-0.49%	-0.16%	-0.06%	-0.17%
2009	26.47%	29.30%	14.42%	18.92%	23.33%	27.63%	31.81%
2010	15.09%	15.80%	6.59%	10.12%	13.59%	16.97%	20.25%
2011	2.09%	-1.92%	7.87%	4.18%	0.45%	-3.29%	-7.04%
2012	15.99%	12.22%	5.87%	9.06%	12.24%	15.39%	18.51%
2013	32.36%	19.02%	7.33%	16.47%	26.23%	36.63%	47.70%
2014	13.65%	2.88%	1.35%	3.50%	5.55%	7.47%	9.26%
2015	1.38%	-4.31%	-0.55%	-2.42%	-4.39%	-6.45%	-8.60%
2016	11.93%	10.19%	5.04%	7.09%	9.07%	10.96%	12.75%
2017	21.80%	13.98%	6.69%	10.70%	14.76%	18.84%	22.94%
2018	-4.39%	-7.53%	-4.79%	-6.23%	-7.79%	-9.46%	-11.25%
2019	18.23%	13.48%	4.62%	6.71%	8.81%	10.94%	13.09%

Source: Calculations are by Flexible Plan Investments Research. Returns are hypothetical and backtested. Equal-weight and enhanced passive returns are gross of all fees, transaction costs, and taxes. A 1.6% fee is included in all active and enhanced active cases; this assumes use of hypothetical results of strategies employing proprietary funds and thus is after the application of fee credits. No fee is applied to passive or enhanced passive strategies. Returns assume the reinvestment of all distributions. Sharpe ratios are calculated with return and risk numbers corresponding to each specific method over the full study period. For example, the S&P 500 Sharpe ratio uses the return and risk of the S&P 500 Total Return Index from January 3, 2000, to April 30, 2019. Max drawdown and MAR reflect daily drawdowns during the period shown. You cannot invest in an index. Past performance is no guarantee of future results. The chart in this figure uses a logarithmic scale.

To study whether asset diversification or strategy diversification provides more risk reduction, in Figure 17 we attempt to quantify the effect by calculating the upside and downside capture ratios for passive, strategic asset-allocation approaches; a single actively managed strategy; and the Multi-Strategy Core approach. All capture values are relative to the S&P 500 and cover the same time period as previous tables and figures.

Figure 17 Capture Ratios vs. the S&P 500



Source: Flexible Plan Investments Research

Asset diversification using a passive (equal-weight) asset-allocation approach captures roughly 65% of the S&P 500 on both the upside and downside. An active balanced strategy is able to achieve better risk-adjusted performance versus passive with an upside capture of 0.49 and a downside capture of 0.45. Using a Multi-Strategy Core to build an enhanced active portfolio improves the risk-adjusted performance even further with a slightly lower upside capture ratio of 0.46 (versus 0.49 for the active balanced approach) but a greatly reduced downside capture ratio of 0.40 (versus 0.45 for the active balanced approach).

This means that on positive days in the S&P 500, Multi-Strategy Core is able to capture almost 50% of the S&P 500's return. On down days, it is only subject to around 40% of the loss experienced by the S&P 500. While this can cause the balanced strategy to lag the S&P 500 Index in sustained up periods (in fact, all allocations lag the S&P 500 in such periods), the mathematics of losses discussed earlier (Figure 11) suggests that the strategy with the greatest risk reduction—be it in the passive world (risk parity) or the active world (Multi-Strategy Core)—generates the best returns over the last 20 years. The results of the research in this white paper confirm this.

To address the crisis correlation analysis discussed earlier, we examined the return performance of the enhanced active (Multi-Strategy Core) and passive (equal-weight) methodologies. Using the same good/bad market environment periods as in the correlation study, we have provided the return performance of the passive (equal-weight) and enhanced active methods during good and bad market environments (Tables 6 and 7).

Table 6 Return in Good Market Environments

Start Day	Peak	#Days	Equal Weight	Enhanced Active	Differential
5/12/2006	10/10/2007	355	15.06%	9.16%	-5.89%
11/24/2010	5/2/2011	108	14.25%	12.38%	-1.87%
12/23/2014	7/21/2015	143	3.43%	1.41%	-2.02
6/20/2018	9/21/2018	65	2.57%	2.17%	-0.40%

Source: Flexible Plan Investments Research

Table 7 Return in Bad Market Environments

Peak	Trough	#Days	Equal Weight	Enhanced Active	Differential
10/10/2007	3/10/2009	355	-47.95%	-1.05%	46.90%
5/2/2011	10/4/2011	108	-18.96%	-9.17%	9.79%
7/21/2015	2/12/2016	143	-16.34%	-9.38%	6.96%
9/21/2018	12/26/2018	65	-17.59%	-9.57%	8.02%

Source: Flexible Plan Investments Research

Leading up to peaks, the equal-weight methodology slightly outperforms enhanced active. This is expected since equal weight has more exposure to the equity markets and takes on more risk than enhanced active.

Conversely, during bad times, enhanced active significantly underperforms the equal-weight methodology.

During severe bear markets like the one experienced in 2008, the differential in the loss sustained is substantial, with an almost 50% reduction in loss by being actively allocated rather than invested on an equal-weight basis.

According to Two Centuries Investments, “If you buy and hold S&P 500 for the long-run, you are mostly exposed to the underlying asset risk. The strategy in this case is very simple, and the only way it breaks is if you don’t stick with it. On the other hand, the asset risk is huge. Will S&P repeat its stellar 20th century performance during the 21st century? Will it also repeat its maximum drawdown of -84%? Is there a small chance that it will go to zero before recovering again? That’s the asset risk.”⁸

Conclusion

This paper was a quest to find the best portfolio methodology for creating the essential core of investors’ portfolios. We examined the practical options and problems associated with portfolio construction across the spectrum of portfolio management—from a passive portfolio of equally weighted asset classes to a portfolio that holds and actively weights multiple dynamically risk-managed strategies.

We presented the advantages and issues of each methodology, including performance analysis and comparison between the different methods of allocating assets.

In doing so, we introduced the Multi-Strategy Core approach, a turnkey, “strategy of strategies” approach that attempts to address issues present in other portfolio construction methodologies, which include a lack of consideration of risk, the loss of diversification benefits during crisis periods, and risk concentration in single strategies. Multi-Strategy Core (the enhanced active methodology) was able to effectively outperform a passive methodology by a large margin. It also did so during “bad” or downtrending market environments while retaining strong relative performance leading up to multiple peak periods during the study time range.

This type of portfolio creation process is designed to add multiple layers of risk management, providing diversification and eliminating the concentrated risk associated with investing in one single strategy. The research supports the effectiveness of Multi-Strategy Core, which blends Flexible Plan Investments’ suitability-based core strategies to produce portfolios designed to be robust to changing market conditions.

Appendix

Correlations of Asset Classes During the Good and Bad Environments Shown in Figure 9

	8/7/1998		9/1/2000		Good Environment								
	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.876	1.000											
Mid Growth	0.869	0.659	1.000										
Mid Value	0.831	0.854	0.822	1.000									
Small Growth	0.812	0.634	0.966	0.837	1.000								
Small Value	0.731	0.743	0.785	0.933	0.814	1.000							
Emerging Markets	0.477	0.444	0.533	0.532	0.534	0.534	1.000						
International	0.449	0.394	0.507	0.503	0.517	0.493	0.754	1.000					
General Bond	0.237	0.259	0.182	0.218	0.167	0.194	0.041	0.108	1.000				
General US Gov	0.013	0.043	-0.019	0.009	-0.024	0.002	-0.124	-0.052	0.932	1.000			
Short-Int Inv Grade	-0.024	0.003	-0.051	-0.031	-0.055	-0.041	-0.160	-0.084	0.903	0.968	1.000		
Short-Int US Gov	-0.007	0.019	-0.040	-0.020	-0.045	-0.035	-0.155	-0.079	0.895	0.966	0.988	1.000	
Natural Resources	0.267	0.443	0.238	0.506	0.282	0.472	0.226	0.193	0.003	-0.073	-0.091	-0.091	1.000

	9/5/2000		10/9/2002		Bad Environment								
	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.891	1.000											
Mid Growth	0.938	0.800	1.000										
Mid Value	0.903	0.944	0.891	1.000									
Small Growth	0.917	0.811	0.976	0.912	1.000								
Small Value	0.843	0.886	0.862	0.958	0.910	1.000							
Emerging Markets	0.530	0.516	0.517	0.550	0.541	0.514	1.000						
International	0.565	0.629	0.541	0.632	0.566	0.591	0.715	1.000					
General Bond	0.052	0.078	0.025	0.050	0.035	0.050	0.064	0.068	1.000				
General US Gov	-0.309	-0.314	-0.301	-0.339	-0.306	-0.327	-0.209	-0.216	0.859	1.000			
Short-Int Inv Grade	-0.320	-0.314	-0.313	-0.339	-0.318	-0.330	-0.217	-0.208	0.823	0.946	1.000		
Short-Int US Gov	-0.351	-0.365	-0.344	-0.392	-0.352	-0.381	-0.279	-0.264	0.791	0.954	0.969	1.000	
Natural Resources	0.422	0.607	0.438	0.579	0.465	0.577	0.283	0.433	0.058	-0.176	-0.167	-0.215	1.000

	5/12/2006		10/9/2007		Good Environment								
	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.953	1.000											
Mid Growth	0.965	0.912	1.000										
Mid Value	0.959	0.962	0.964	1.000									
Small Growth	0.936	0.880	0.975	0.943	1.000								
Small Value	0.925	0.915	0.943	0.965	0.964	1.000							
Emerging Markets	0.762	0.750	0.793	0.765	0.741	0.705	1.000						
International	0.833	0.840	0.844	0.841	0.805	0.782	0.914	1.000					
General Bond	0.169	0.160	0.183	0.171	0.185	0.180	0.126	0.219	1.000				
General US Gov	-0.107	-0.105	-0.108	-0.104	-0.098	-0.097	-0.137	-0.048	0.840	1.000			
Short-Int Inv Grade	-0.141	-0.141	-0.139	-0.136	-0.124	-0.122	-0.158	-0.071	0.814	0.971	1.000		
Short-Int US Gov	-0.243	-0.252	-0.234	-0.241	-0.210	-0.222	-0.244	-0.177	0.738	0.935	0.947	1.000	
Natural Resources	0.705	0.706	0.777	0.745	0.723	0.710	0.718	0.708	0.111	-0.129	-0.156	-0.213	1.000

	10/10/2007		3/9/2009		Bad Environment								
	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.974	1.000											
Mid Growth	0.983	0.960	1.000										
Mid Value	0.974	0.980	0.982	1.000									
Small Growth	0.956	0.940	0.980	0.972	1.000								
Small Value	0.933	0.944	0.948	0.971	0.977	1.000							
Emerging Markets	0.898	0.883	0.892	0.874	0.857	0.813	1.000						
International	0.928	0.922	0.915	0.910	0.882	0.850	0.948	1.000					
General Bond	-0.171	-0.153	-0.173	-0.159	-0.173	-0.160	-0.175	-0.119	1.000				
General US Gov	-0.354	-0.345	-0.358	-0.345	-0.351	-0.343	-0.319	-0.284	0.719	1.000			
Short-Int Inv Grade	-0.228	-0.224	-0.212	-0.202	-0.208	-0.211	-0.173	-0.139	0.656	0.802	1.000		
Short-Int US Gov	-0.444	-0.443	-0.443	-0.436	-0.425	-0.419	-0.406	-0.385	0.640	0.885	0.756	1.000	
Natural Resources	0.848	0.819	0.863	0.834	0.804	0.745	0.837	0.862	-0.146	-0.264	-0.126	-0.372	1.000

11/24/2010 4/29/2011 Good Environment

	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.934	1.000											
Mid Growth	0.964	0.894	1.000										
Mid Value	0.941	0.927	0.927	1.000									
Small Growth	0.929	0.858	0.982	0.904	1.000								
Small Value	0.909	0.905	0.944	0.928	0.955	1.000							
Emerging Markets	0.769	0.764	0.741	0.741	0.717	0.723	1.000						
International	0.821	0.847	0.766	0.770	0.716	0.738	0.849	1.000					
General Bond	-0.095	-0.090	-0.057	-0.042	-0.068	-0.081	-0.089	-0.052	1.000				
General US Gov	-0.370	-0.424	-0.343	-0.387	-0.332	-0.390	-0.268	-0.294	0.199	1.000			
Short-Int Inv Grade	-0.386	-0.429	-0.337	-0.390	-0.315	-0.349	-0.280	-0.280	0.232	0.811	1.000		
Short-Int US Gov	-0.401	-0.447	-0.362	-0.427	-0.350	-0.383	-0.276	-0.276	0.154	0.802	0.929	1.000	
Natural Resources	0.765	0.725	0.743	0.749	0.702	0.705	0.676	0.709	-0.074	-0.248	-0.279	-0.285	1.000

5/2/2011 10/3/2011 Bad Environment

	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.972	1.000											
Mid Growth	0.987	0.969	1.000										
Mid Value	0.975	0.990	0.985	1.000									
Small Growth	0.978	0.959	0.995	0.979	1.000								
Small Value	0.964	0.976	0.977	0.987	0.982	1.000							
Emerging Markets	0.879	0.900	0.884	0.898	0.876	0.882	1.000						
International	0.902	0.938	0.906	0.926	0.891	0.898	0.943	1.000					
General Bond	-0.396	-0.423	-0.406	-0.422	-0.392	-0.387	-0.345	-0.436	1.000				
General US Gov	-0.562	-0.596	-0.541	-0.573	-0.522	-0.556	-0.532	-0.562	0.603	1.000			
Short-Int Inv Grade	-0.370	-0.420	-0.356	-0.393	-0.342	-0.386	-0.296	-0.353	0.560	0.795	1.000		
Short-Int US Gov	-0.431	-0.491	-0.416	-0.460	-0.404	-0.455	-0.406	-0.438	0.480	0.802	0.895	1.000	
Natural Resources	0.944	0.938	0.951	0.947	0.940	0.929	0.902	0.903	-0.391	-0.530	-0.341	-0.417	1.000

12/23/2014 7/20/2015 Good Environment

	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.922	1.000											
Mid Growth	0.958	0.933	1.000										
Mid Value	0.904	0.972	0.956	1.000									
Small Growth	0.907	0.864	0.967	0.907	1.000								
Small Value	0.852	0.906	0.924	0.954	0.932	1.000							
Emerging Markets	0.699	0.726	0.708	0.721	0.641	0.676	1.000						
International	0.765	0.800	0.748	0.777	0.675	0.720	0.814	1.000					
General Bond	-0.061	-0.112	-0.110	-0.106	-0.121	-0.137	-0.011	-0.042	1.000				
General US Gov	-0.320	-0.361	-0.367	-0.363	-0.386	-0.408	-0.255	-0.244	0.665	1.000			
Short-Int Inv Grade	-0.191	-0.201	-0.224	-0.199	-0.256	-0.259	-0.085	-0.056	0.670	0.935	1.000		
Short-Int US Gov	-0.246	-0.242	-0.281	-0.242	-0.318	-0.305	-0.132	-0.083	0.609	0.898	0.960	1.000	
Natural Resources	0.505	0.658	0.548	0.654	0.473	0.579	0.544	0.551	-0.129	-0.249	-0.111	-0.129	1.000

7/21/2015 2/11/2016 Bad Environment

	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	Emerging Markets	International	General Bond	General US Gov	Short-Int Inv Grade	Short-Int US Gov	Natural Resources
Large Growth	1.000												
Large Value	0.921	1.000											
Mid Growth	0.963	0.936	1.000										
Mid Value	0.893	0.980	0.947	1.000									
Small Growth	0.933	0.894	0.980	0.916	1.000								
Small Value	0.858	0.938	0.925	0.968	0.928	1.000							
Emerging Markets	0.759	0.803	0.766	0.792	0.729	0.759	1.000						
International	0.827	0.876	0.849	0.865	0.805	0.813	0.887	1.000					
General Bond	0.019	0.026	0.038	0.056	0.029	0.031	0.159	0.094	1.000				
General US Gov	-0.385	-0.418	-0.395	-0.406	-0.383	-0.397	-0.324	-0.426	0.760	1.000			
Short-Int Inv Grade	-0.160	-0.160	-0.162	-0.143	-0.167	-0.167	-0.085	-0.142	0.853	0.864	1.000		
Short-Int US Gov	-0.386	-0.391	-0.399	-0.375	-0.396	-0.382	-0.347	-0.405	0.661	0.883	0.861	1.000	
Natural Resources	0.627	0.790	0.692	0.827	0.676	0.790	0.653	0.678	0.083	-0.345	-0.085	-0.237	1.000

6/20/2018														9/20/2018														Good Environment													
	Large Growth		Large Value		Mid Growth		Mid Value		Small Growth		Small Value		Emerging Markets		International		General Bond		General US Gov		Short-Int Inv Grade		Short-Int US Gov		Natural Resources																
Large Growth	1.000																																								
Large Value	0.691		1.000																																						
Mid Growth	0.897		0.657		1.000																																				
Mid Value	0.632		0.915		0.734		1.000																																		
Small Growth	0.815		0.553		0.963		0.685		1.000																																
Small Value	0.591		0.754		0.754		0.912		0.796		1.000																														
Emerging Markets	0.616		0.737		0.492		0.637		0.391		0.506		1.000																												
International	0.559		0.795		0.441		0.693		0.324		0.524		0.882		1.000																										
General Bond	-0.087		0.025		-0.093		0.060		-0.153		-0.032		-0.033		0.118		1.000																								
General US Gov	-0.269		-0.332		-0.228		-0.237		-0.239		-0.250		-0.334		-0.264		0.873		1.000																						
Short-Int Inv Grade	-0.297		-0.319		-0.283		-0.246		-0.302		-0.276		-0.276		-0.222		0.838		0.936		1.000																				
Short-Int US Gov	-0.354		-0.440		-0.327		-0.354		-0.312		-0.334		-0.391		-0.335		0.735		0.920		0.946		1.000																		
Natural Resources	0.388		0.617		0.389		0.653		0.359		0.601		0.547		0.665		0.137		-0.127		-0.123		-0.171		1.000																

9/21/2018														12/24/2018														Bad Environment													
	Large Growth		Large Value		Mid Growth		Mid Value		Small Growth		Small Value		Emerging Markets		International		General Bond		General US Gov		Short-Int Inv Grade		Short-Int US Gov		Natural Resources																
Large Growth	1.000																																								
Large Value	0.884		1.000																																						
Mid Growth	0.963		0.889		1.000																																				
Mid Value	0.872		0.961		0.919		1.000																																		
Small Growth	0.935		0.849		0.988		0.906		1.000																																
Small Value	0.827		0.900		0.900		0.969		0.913		1.000																														
Emerging Markets	0.810		0.746		0.798		0.753		0.787		0.743		1.000																												
International	0.844		0.834		0.858		0.855		0.851		0.841		0.903		1.000																										
General Bond	-0.001		-0.070		-0.006		-0.046		0.014		-0.063		0.082		0.069		1.000																								
General US Gov	-0.270		-0.395		-0.293		-0.376		-0.282		-0.376		-0.203		-0.304		0.806		1.000																						
Short-Int Inv Grade	-0.347		-0.374		-0.346		-0.366		-0.322		-0.358		-0.255		-0.289		0.808		0.823		1.000																				
Short-Int US Gov	-0.414		-0.458		-0.427		-0.461		-0.412		-0.459		-0.335		-0.417		0.628		0.812		0.910		1.000																		
Natural Resources	0.695		0.805		0.705		0.778		0.693		0.748		0.714		0.783		0.111		-0.272		-0.238		-0.358		1.000																

Source: Flexible Plan Investments Research

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Quantified Managed Income Fund

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Contact Information

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Adviser may predicate some strategies on trading signals furnished by non-affiliated firms. In such instances, the non-affiliated firm is under contract to Adviser to provide, and in certain instances, implement management of Client accounts in such strategies. Flexible Plan by necessity relies on information, data, and software provided by third parties, the reliability of which, while believed to be accurate, cannot be guaranteed and losses may result from reliance upon them. These are normal risks for which Flexible Plan takes no responsibility beyond use of reasonable care in its selection of the third party.

For many strategies, Adviser provides suitability-based profiles with names such as, without limitation, Conservative, Moderate, Balanced, Growth and Aggressive or with numerical designations such as 25, 40, 60, 80 and 100. Clients should draw no conclusions from such titles. Rather, they are simply a way of designating the hierarchical ranking of Adviser's Profiles within a strategy. They are not meant to imply any ranking within some universal risk measure or benchmark, nor are they equivalent to a Client's subjective concept of the term.

Strategy and asset allocation decisions may not always be correct and may adversely affect account performance. The use of leverage may magnify this risk. Leverage and funds employing derivatives carry other risks that may result in losses, including the effects of unexpected market shifts, default and/or the potential illiquidity of certain derivatives.

Because Flexible Plan strategies make use of publically traded mutual funds and Exchange Traded Funds, investors should consider carefully information contained in the prospectus of these investments, including investment objectives, risks, charges and expenses. You can request a prospectus from your financial adviser. Please read the prospectus carefully before investing. Investment value will fluctuate, and shares, when redeemed, may be worth more or less than the original cost. Flexible Plan's strategies are actively managed and their characteristics will vary among strategies.

As a manager utilizing publically traded mutual funds and Exchange Traded Funds, the strategy is subject to the risks associated with the funds in which it invests. Mutual fund and Exchange Traded Fund values fluctuate in price so the value of your investment can go down depending on market conditions. International investing involves risks, including risks related to foreign currency, limited liquidity, less government regulation, and the possibility of substantial volatility due to adverse political, economic or other developments. These risks are often heightened for investments in emerging/developing markets or smaller capital markets. The two main risks related to fixed-income investing are interest-rate risk and credit risk. Typically, when interest rates rise, there is a

corresponding decline in the market value of bonds. Credit risk refers to the possibility that the bond issuer will not be able to make principal and interest payments. Asset allocation strategies do not assure profit and do not protect against loss. Non-diversification of investments means that more assets are potentially invested in fewer securities than if investments were diversified, so risk is increased because each investment has a greater effect on performance and there may be more correlation of the fewer investments used. Investing in leveraged or inverse funds entails specific risks relating to liquidity, leverage and credit of the derivatives invested in by such funds, which may reduce returns and/or increase volatility.

Active investment management may involve more frequent buying and selling of assets. The majority of FPI's strategies utilize no load mutual funds with no transaction charge. Best efforts are employed to avoid short-term redemption charges; however, actively managed strategies can still result in charges, especially when entering or exiting a strategy. Additionally, any commissioned investments will reflect the impact of more frequent buying and/or selling of assets. If investing within a non-tax-deferred investment, Investors should consider the tax consequences of moving positions more frequently. There is no guarantee that a diversified portfolio will enhance overall returns or outperform a non-diversified portfolio. Diversification cannot protect against all market risk.