The Power of Dynamic Asset Allocation

Diversification plays an important role in investing and the implementation of diversification within a portfolio can be a powerful tool that mitigates risk. However, diversification itself may not always be enough to achieve an investor's goals and, in some instances, can even stand in the way. We believe a dynamic approach to portfolio construction that improves upon traditional asset allocation methodologies can offer better risk-adjusted returns.

A Traditional Approach to Asset Allocation

A common approach to asset allocation seeks to identify a set number of investable asset classes for inclusion in a portfolio. Once asset classes are selected, restrictions are then placed on each asset class, in essence, creating a minimum and maximum allowable weighting. Next, a portfolio manager will generate assumptions for risk, return, and correlations between each asset class and input these assumptions into an asset allocation tool that implements a mean-variance optimization process (MVO). These inputs can be derived from forward-looking models or historical risk, return, and correlation data, or a combination of the two. The MVO then derives asset mixes that produce the highest level of projected return for a given level of risk based on these inputs. Assumptions used for the risk, return, and correlation inputs are typically updated on an annual basis.

The results of this process are graphed to illustrate the different levels of risk and return generated through various asset allocation combinations. Plotting portfolio risk along the x-axis and portfolio return along the y-axis produces an upward sloping line representing what is referred to as the efficient frontier. The resulting efficient frontier, with an example illustrated in Chart A, represents the highest attainable return for a level of risk, given the underlying assumptions and restrictions placed on each asset class.

As an example, let us devise a simple asset allocation simulation using two broad asset classes, equity and fixed income. Table A provides a list of the sub-asset classes and corresponding weightings that will be used as the base case 60/40 portfolio. For this example, the 60/40 portfolio outlined will be referred to as the Blended Portfolio, containing 60% equities, including domestic and international; and 40% fixed income.

> **❝** The resulting efficient frontier represents the highest attainable return for a level of risk, given the estimates provided in the underlying risk and return assumptions and allocation restrictions placed on each asset class. **❞**

Table A

Broad Asset Class	Sub-Asset Class	Representative Index	Blended Portfolio
Equity	Large Cap	S&P 500®	33.6%
	Mid Cap	Russell Mid Cap®	6.3%
	Small Cap	Russell 2000®	2.1%
	Developed Markets	MSCI EAFE®	14.4%
	Emerging Markets	MSCI EM®	3.6%
Fixed Income	Treasuries	Bloomberg U.S. Treasury	18.0%
	Investment Grade Corporate Bond	Bloomberg U.S. Corp Bond	10.0%
	Mortgage-Backed Securities	Bloomberg U.S. MBS	12.0%

Chart A

Illustrative Efficient Frontier — Return Assumption vs. Risk (Standard Deviation), with Blended Portfolio point marked.
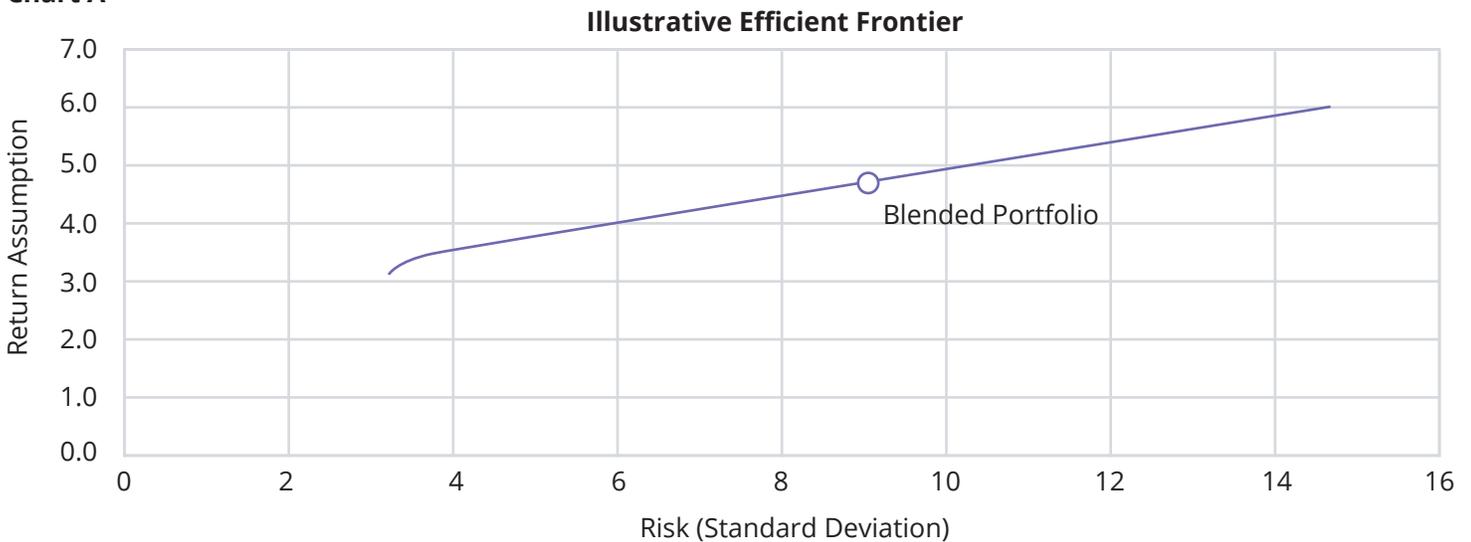
Table B shows the annual returns of each sub-asset class listed in Table A along with the annual returns of the Blended Portfolio. Annual returns in the table below are sorted by highest to lowest.

Table B

2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	10 year		
										Return	STD Deviation	Sharpe Ratio
38.8%	13.7%	1.5%	21.3%	37.3%	1.0%	31.5%	20.0%	28.7%	-11.8%	12.6%	19.3%	0.82
34.8%	13.2%	1.4%	13.8%	25.0%	0.9%	30.5%	18.4%	22.6%	-12.5%	11.0%	16.7%	0.67
32.4%	7.5%	0.8%	12.0%	21.8%	-2.5%	25.5%	18.3%	14.8%	-14.5%	9.2%	16.5%	0.64
22.8%	7.1%	-0.2%	11.2%	18.5%	-4.4%	22.0%	17.1%	12.3%	-15.6%	6.4%	14.8%	0.50
16.3%	6.1%	-0.7%	6.9%	15.1%	-4.8%	20.3%	12.4%	11.3%	15.8%	4.7%	14.8%	0.33
-1.4%	5.1%	-0.8%	6.1%	14.6%	-9.1%	18.4%	9.9%	-1.0%	17.3%	2.0%	9.1%	0.21
-1.5%	4.9%	-2.4%	1.7%	6.4%	-11.0%	14.5%	8.0%	-1.0%	-18.1%	1.4%	6.2%	0.12
-2.6%	-2.2%	-4.4%	1.0%	2.5%	-13.8%	6.9%	7.8%	-2.3%	-20.1%	0.7%	4.2%	0.00
-2.7%	-4.9%	-14.9%	1.0%	2.3%	-14.6%	6.4%	3.9%	-2.5%	-20.4%	0.6%	3.7%	-0.03

S&P 500	Russell Mid Cap	Russell 2000	MSCI EAFE	MSCI EM	Bloomberg U.S. Treasury	Bloomberg U.S. Corp Bond	Bloomberg U.S. MBS
Blended Portfolio							

The results in Table B show the power diversification can provide to a portfolio. Across the previous ten years, the Blended Portfolio produced a smoother return than any of the individual asset classes. While this methodology provides a general base for understanding diversification, in practice, markets are more complicated, and we believe investors should consider a more active and dynamic approach to portfolio construction.

Dynamic Asset Allocation

The dynamic asset allocation approach seeks to improve upon the traditional "blended portfolio" approach in two distinct ways. The first recognizes that risk and return assumptions are constantly challenged by changes in market dynamics. As such, dynamic asset allocators do not view return, risk, and the relationship between asset classes as static assumptions. Secondly, as opposed to maintaining a minimum allocation weight to each sub-asset class for the sake of diversification, a dynamic allocation will effectively set minimum allocation ranges for sub-asset classes to zero. This allows an investment manager to avoid allocating to sub-asset classes that they believe may have unfavorable risk and return profiles, or said differently, sub-asset classes that the manager deems are, or will be, out of favor moving forward.

Naturally, this leads to a greater allocation, or overweighting, to the other sub-asset classes that the manager believes to be more in favor for the given market environment.

The goal of a dynamic asset allocation portfolio is to generate returns equal to or greater than those of the constrained portfolios produced by a traditional approach while assuming similar to less risk. To pursue these returns, dynamic allocations deviate from the constrained portfolios generated through the traditional approach by either avoiding/underweighting sub-asset classes that are represented in constrained portfolios or by allocating to sub-asset classes that are not represented in the constrained portfolios.

In this paper, we will analyze the risk/return impact on asset allocations using three hypothetical portfolios:

Dynamic Portfolio

Hypothetical allocation that avoids the worst-performing sub-asset class each year.
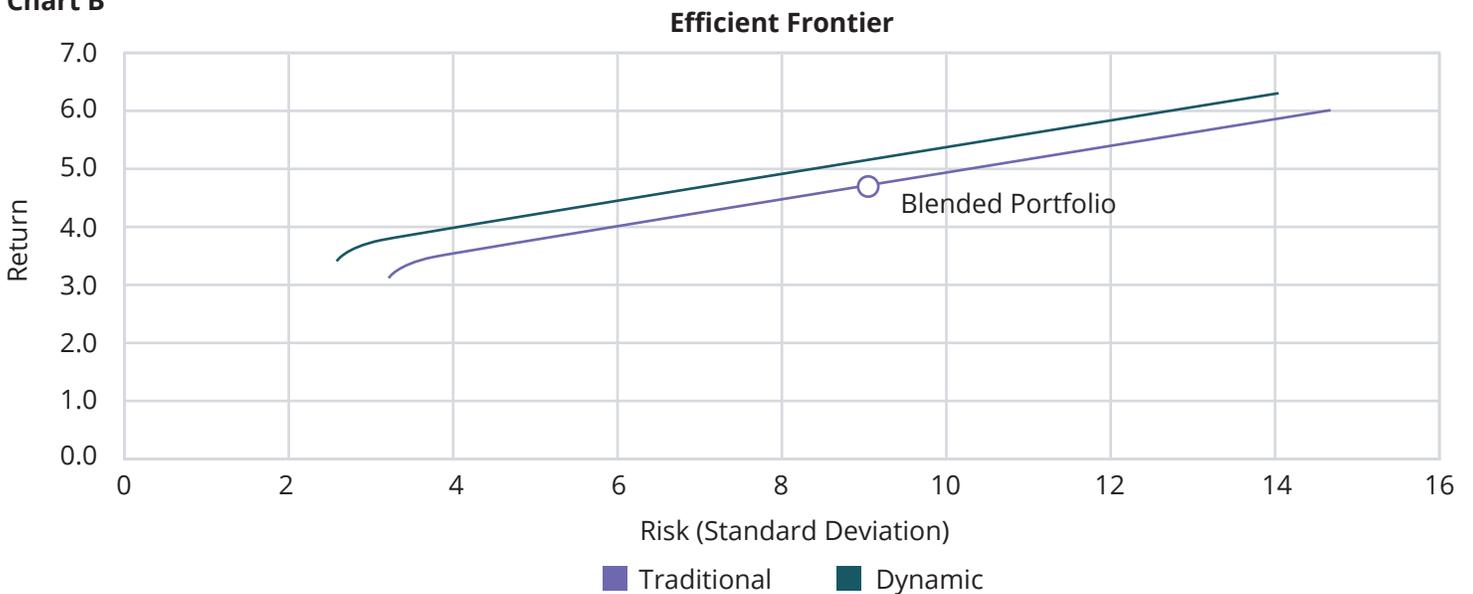
Blended Portfolio

Hypothetical allocation that includes all sub-asset classes.

Sub-Optimal Portfolio

Hypothetical allocation that avoids the best-performing sub-asset class each year.

Chart B

Efficient Frontier

> " The goal of a dynamic asset allocation portfolio is to generate returns equal to or greater than those of the constrained portfolios produced by a traditional approach while assuming similar to less risk. "

Using the previous broad asset classes and eight sub-asset classes represented in the Blended Portfolio as a starting point, Table C illustrates how the dynamic approach to asset allocation looks to improve upon the traditional approach. In this exercise, let us assume that the lowest performing sub-asset class in each of the broad asset classes is successfully avoided each year. Next, the remaining sub-asset classes are re-weighted proportionately to their relative exposures at the broad asset classes represented in the Blended Portfolio. For the purpose of this example, the new portfolio will be referred to as the Dynamic Portfolio. While dynamic managers may attempt to improve upon traditional asset allocation, at times, they can also fail to allocate to the best performing sub-asset class, which can be detrimental to returns. So, we will also include a third hypothetical portfolio (Sub-Optimal Portfolio) to illustrate the impact on returns if the best performing sub-asset class is missed each year.

Table C

2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	10 years Annualized		
										Return	STD Deviation	Sharpe Ratio
38.8%	13.7%	1.5%	21.3%	37.3%	1.0%	31.5%	20.0%	28.7%	-11.8%	12.6%	19.3%	0.82
34.8%	13.2%	1.4%	13.8%	25.0%	0.9%	30.5%	18.4%	22.6%	-12.5%	11.0%	16.7%	0.76
32.4%	9.9%	0.8%	12.0%	21.8%	-2.5%	25.5%	18.3%	14.8%	-14.5%	9.0%	16.5%	0.67
22.8%	7.5%	0.6%	11.2%	18.5%	-4.2%	22.0%	17.1%	13.4%	-15.2%	7.7%	14.8%	0.64
17.7%	7.1%	-0.2%	9.0%	15.6%	-4.4%	21.1%	14.4%	12.3%	-15.6%	6.4%	14.8%	0.50
16.3%	6.1%	-0.7%	6.9%	15.1%	-4.8%	20.3%	12.4%	11.3%	-15.8%	4.7%	9.2%	0.42
15.9%	5.1%	-0.8%	6.1%	14.6%	-7.7%	18.4%	11.9%	6.7%	-16.4%	4.3%	9.1%	0.33
-1.4%	4.9%	-1.9%	6.1%	14.2%	-9.1%	17.0%	9.9%	-1.0%	-17.3%	2.0%	8.9%	0.21
-1.5%	2.5%	-2.4%	1.7%	6.4%	-11.0%	14.5%	8.0%	-1.0%	-18.1%	1.4%	6.2%	0.12
-2.6%	-2.2%	-4.4%	1.0%	2.5%	-13.8%	6.9%	7.8%	-2.3%	-20.1%	0.7%	4.2%	0.00
-2.7%	-4.9%	-14.9%	1.0%	2.3%	-14.6%	6.4%	3.9%	-2.5%	-20.4%	0.6%	3.7%	-0.03

S&P 500	Russell Mid Cap	Russell 2000	MSCI EAFE	MSCI EM	Bloomberg U.S. Treasury	Bloomberg U.S. Corp Bond	Bloomberg U.S. MBS
Blended Portfolio	Dynamic Portfolio	Sub-Optimal Portfolio					

Table C illustrates that while diversification can be useful, diversification generated through static assumptions and constraints assumed by the traditional approach to asset allocation can be detrimental to performance. By avoiding the weakest performing sub-asset class within each of the broader asset classes each year, the Dynamic Portfolio outperforms the Blended Portfolio in each period. We understand that this is an extremely simplified example

to show the effect of eliminating holdings requirements. The risk to this approach is, of course, not owning the asset that outperforms the others, which would drop the portfolio's returns well below the Blended Portfolio, as demonstrated by the Sub-Optimal Portfolio.

To illustrate the dollar impact dynamic allocations can have on portfolios, Chart C shows the hypothetical growth of $100,000 invested in each portfolio over the past ten years. Please note that this is a hypothetical representation that does not include taxes, transaction costs, or fees.

Chart C

Hypothetical Growth of $100k
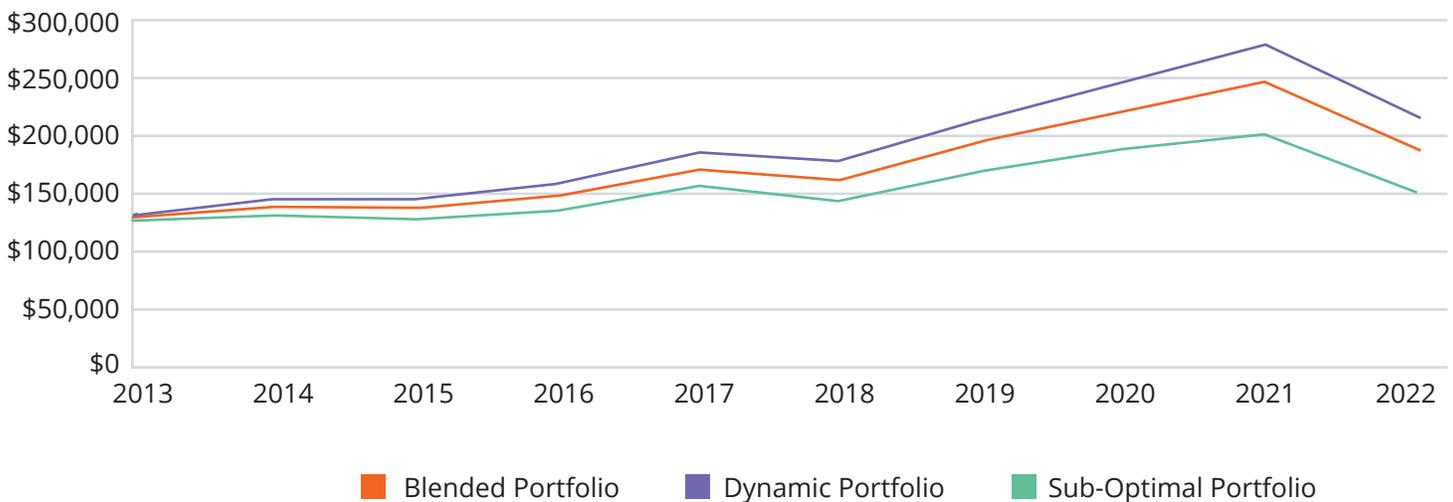
While the above illustration is oversimplistic and hypothetical, we believe it demonstrates an important differentiator to portfolio construction, as the traditional, static, "set-it and forget-it" approach is commonplace across multi-asset portfolios. Through a dynamic approach, the manager seeks to generate both strong absolute and risk-adjusted returns and, specific to this example, looks to achieve this through winning by not losing.

> " Asset allocation portfolios mandated to allocate a minimum weight to for diversification purposes would have experienced this relative underperformance as a drag on returns, while a dynamic approach would have the flexibility to avoid or underweight the sub-asset class. "

Real World Example

Turning from the hypothetical examples outlined thus far, let us turn to a realistic example. A common asset class that gained popularity in asset allocation portfolios over the last 15-20 years is emerging market equities. As an asset class, emerging market equities have exhibited periods of strong absolute and relative performance, however not consistently as the asset class ranks amongst the lowest of the equity sub-asset classes on an annualized basis over the past 10 years.

While static portfolios commonly hold allocations to emerging markets equities, the most recent ten years have not been favorable to emerging markets. Asset allocation portfolios mandated to allocate a minimum weight to for diversification purposes would have experienced this relative underperformance as a drag on returns, while a dynamic approach would have the flexibility to avoid or underweight the sub-asset class, allowing for a greater allocation into asset classes that the manager believes will provide more attractive and favorable risk and return characteristics.

This is not to say an investment manager using a dynamic approach will not allocate to emerging markets in the future; rather, a practical example of how a dynamic approach to asset allocation can be implemented.

Madison's Approach to Asset Allocation

Madison's Mosaic Series portfolios focus on allocating into asset classes that we deem to have favorable risk and return characteristics while leveraging our flexibility to avoid asset classes with unfavorable characteristics. We believe this active and dynamic approach can produce returns similar to our blended benchmarks and peer groups while assuming less risk.

| **Patrick Ryan, CFA** Head of Multi-Asset Solutions, Portfolio Manager	**David Hottman, CFA, CPA** Portfolio Manager/Analyst	**Stuart Dybdahl, CFA, CAIA** Portfolio Manager/Analyst

About Mosaic by Madison Investments

Madison's Mosaic Series offers investors a suite of globally diversified portfolios designed to meet a range of investment needs. Across the risk spectrum, each strategy is managed with a focus on risk management over the unrestrained pursuit of returns. Our mission is to build portfolios that strive to protect principal in down markets while strongly participating in up markets. To pursue this goal, we employ active asset allocation that considers both a top-down macro view complemented with a fundamental bottom-up valuation-based view to inform asset allocation decisions.

Active asset allocation

Active and dynamic portfolios express real-time convictions. Asset allocations are based on fundamentals rooted in story and price (valuations).
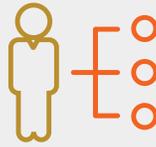
Active risk management

Following our Participate and Protect® investment philosophy, we use a number of disciplines and controls to actively manage risk. We believe this allows us to participate in rising markets and protect capital during downturns.
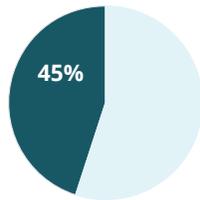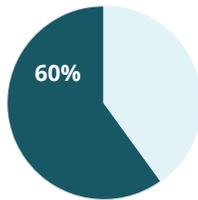
Adaptive to changing markets

Strategic long-term core holdings are complemented with tactical medium-term allocation changes in response to changing market conditions.
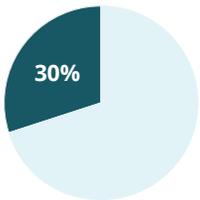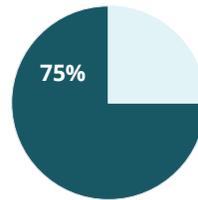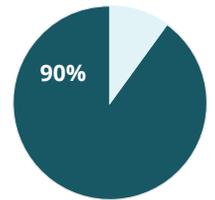
30%	45%	60%	75%	90%
Conservative	Moderate	Moderate Growth	Growth	Aggressive

Target Equity Exposure

INDEX DEFINITIONS

Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only, and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance.

Russell 2000® Index measures the performance of the 2,000 smallest companies in the Russell 3000® Index, which represents approximately 11% of the total market capitalization of the Russell 3000® Index.

The Russell Midcap® Index measures the performance of the 800 smallest companies in the Russell 1000® Index, which represent approximately 35% of the total market capitalization of the Russell 1000® Index. As of the latest reconstitution, the average market capitalization was approximately $3.7 billion; the median market capitalization was approximately $2.9 billion. The largest company in the index had an approximate market capitalization of $10.3 billion.

Russell Investment Group is the source and owner of the trademarks, service marks and copyrights related to the Russell Indexes. Russell® is a trademark of Russell Investment Group.

The S&P 500® is an unmanaged index of large companies and is widely regarded as a standard for measuring large-cap and mid-cap U.S. stock-market performance. Results assume the reinvestment of all capital gain and dividend distributions. An investment cannot be made directly into an index.

The MSCI EAFE (Europe, Australasia & Far East) Index is a free-float adjusted market capitalization index that is designed to measure developed market equity performance, excluding the U.S. and Canada.

The MSCI Emerging Markets Index captures large and mid cap representation across 24 Emerging Markets (EM) countries. With 1,138 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

The Bloomberg U.S. Mortgage Backed Securities (MBS) Index tracks agency mortgage backed pass-through securities (both fixed-rate and hybrid ARM) guaranteed by Ginnie Mae (GNMA), Fannie Mae (FNMA), and Freddie Mac (FHLMC). The index is constructed by grouping individual TBA-deliverable MBS pools into aggregates or generics based on program, coupon and vintage.

The Bloomberg U.S. Treasury Index measures US dollar-denominated, fixed-rate, nominal debt issued by the US Treasury. Treasury bills are excluded by the maturity constraint, but are part of a separate Short Treasury Index.

The Bloomberg U.S. Corporate Bond Index is an unmanaged market-value-weighted index of investment-grade corporate fixed-rate debt issues with maturities of one year or more.

DEFINITIONS

Standard Deviation is a statistical measurement of dispersion about an average, which, for a portfolio, depicts how widely the returns varied over a certain period of time. Investors may use the standard deviation of historical performance to understand the range of returns for a portfolio. When a portfolio has a higher standard deviation than its benchmark, it implies higher relative volatility. Standard deviation has been calculated using the trailing monthly total returns for the appropriate time period. The standard deviation values are annualized.

Sharpe Ratio is a a statistic for measuring risk-adjusted return. It is calculated by using standard deviation and excess return to determine reward per unit of risk. The higher the Sharpe ratio, the better the historical risk-adjusted performance.

DISCLOSURES

"Madison" and/or "Madison Investments" is the unifying tradename of Madison Investment Holdings, Inc., Madison Asset Management, LLC ("MAM"), and Madison Investment Advisors, LLC ("MIA"). MAM and MIA are registered as investment advisers with the U.S. Securities and Exchange Commission. Madison Funds are distributed by MFD Distributor, LLC. MFD Distributor, LLC is registered with the U.S. Securities and Exchange Commission as a broker-dealer and is a member firm of the Financial Industry Regulatory Authority. The home office for each firm listed above is 550 Science Drive, Madison, WI 53711. Madison's toll-free number is 800-767-0300.

Any performance data shown represents past performance. Past performance is no guarantee of future results.

Non-deposit investment products are not federally insured, involve investment risk, may lose value and are not obligations of, or guaranteed by, any financial institution. Investment returns and principal value will fluctuate.

This report is for informational purposes only and is not intended as an offer or solicitation with respect to the purchase or sale of any security.

Our expectation is that investors will participate in market appreciation during bull markets and be protected during bear markets compared with investors in portfolios holding more speculative and volatile securities. There is no assurance that these expectations will be realized.

Please consult with your financial advisor to determine your risk tolerance and investment objectives. While Madison constructs portfolios for various risk tolerances, its Asset Allocation Team does not determine individual client's risk tolerance or investment objectives.

All investing involves risks including the possible loss of principal. There can be no assurance the asset allocation portfolios will achieve their investment objectives. The portfolios may invest in equities which are subject to market volatility. In addition to the general risk of investing, the portfolio is subject to additional risks including investing in bond and debt securities, which includes credit risk, prepayment risk and interest rate risk. When interest rates rise, bond prices generally fall. Securities rated below investment grade are more sensitive to economic, political and adverse development changes. International equities involve risks of economic and political instability, market liquidity, currency volatility and differences in accounting standards.

Each portfolio is subject to the risks and expenses of the underlying funds in direct proportion to the allocation of assets among the underlying funds.

The allocations described in this material are based on various indices and do not represent any Madison strategy or investment. They should not be considered indicative of Madison's investment advisory skills.

Our expectation is that investors will participate in market appreciation during bull markets and be protected during bear markets compared with investors in portfolios holding more speculative and volatile securities. There is no assurance that these expectations will be realized.

Large Cap investing is based on the expectation of positive price performance due to continued earnings growth or anticipated changes in the market or within the company itself. However, if a company fails to meet that expectation or anticipated changes do not occur, its stock price may decline. Moreover, as with all equity investing, there is the risk that an unexpected change in the market or within the company itself may have an adverse effect on its stock. Investing in growth-oriented stocks involves potentially higher volatility and risk than investing in income-generating stocks. The biggest risk of equity investing is that returns can fluctuate and investors can lose money.

Investing in small, mid-size or emerging growth companies involves greater risks not associated with investing in more established companies, such as business risk, significant stock price fluctuations and illiquidity.

Alternative investment values can be very volatile. They can be impacted by world or local events, government regulations and economic conditions. Investments in such products can lose value.

High yield bonds are considered lower-quality instruments known as "junk bonds." Such bonds entail greater risks than those found in higher-rated securities.

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