

Active is: Improving Investment Outcomes through Dynamic Asset Allocation



Herold C. Rohweder, PhD
Global CIO Multi Asset

Executive summary

While stock markets have recently risen to all-time highs, stock market volatility has fallen toward all-time lows. Taken together, it would appear that investors have become too complacent. But at nine years into one of the longest bull markets on record, investors have to be prepared for sharp reversals in both valuations and volatility. When valuations and volatility start to revert toward their mean, the typical Static approach to asset allocation, which maintains a fixed target allocation between equity and fixed-income assets, is likely to struggle. As shown in this paper, by switching to a Dynamic approach, which has much more flexibility in allocations and actively takes advantage of market momentum, we believe investors could improve their investment outcomes. Dynamic Asset Allocation seeks to help investors to participate in rising markets while preserving principal to a greater degree during market downturns. And when the current bull market eventually reverses course, it's a Dynamic approach that has the potential to keep investors moving forward.



Michael Z. Stamos, PhD, CFA
Senior Portfolio Manager
Director of Research,
Multi Asset

Key takeaways

- A traditional Static approach to asset allocation, which relies solely on diversification, may not play out as planned in the current market environment. A better way of reacting to potential new market challenges may be to adopt a Dynamic approach, which is designed to maintain the benefits of diversification while also being able to take decisive action in response to market moves.
- This study shows that the momentum effect, which is the empirically observed tendency for rising asset prices to rise further, and falling prices to keep falling, may serve as a source of additional return and downside risk reduction.
- We believe that the decision to stick to a static approach to asset allocation might ignore and forego the valuable benefits of a dynamic allocation strategy.
- Our analysis showed that the momentum effect is structural. Our analysis showed that in more than 90 percent of all monthly rolling 10-year periods since 1951 momentum factors have led to outperformance.
- Instead of focusing solely on the Sharpe Ratio, we argue that downside risk-adjusted performance measures may be used to understand the success of momentum-related strategies. The reason is that dynamic allocation portfolios may have the same volatility as a static portfolio but much less downside risk.
- To be clear, a Dynamic approach does not require a forecast of when a crisis will hit. Rather, it relies on well-documented empirical market patterns that have worked over time.



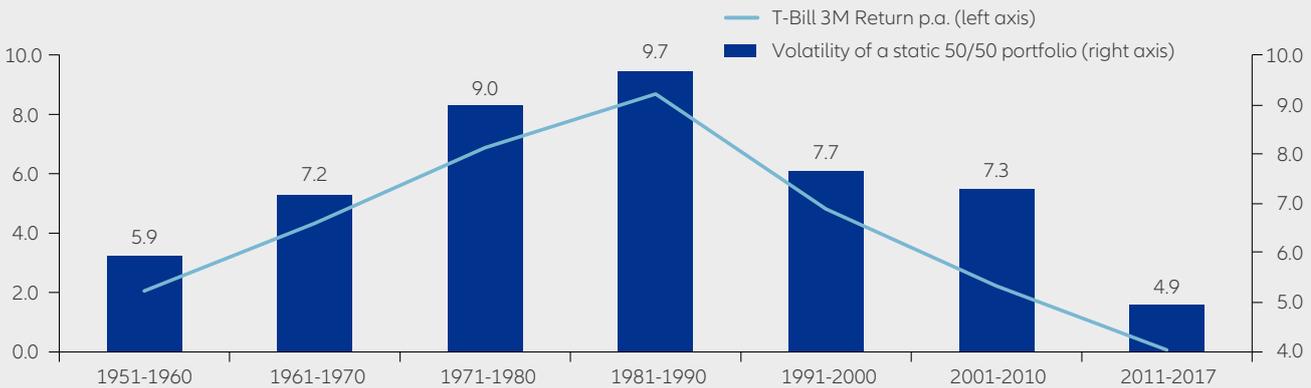
Thomas J. Zimmerer, PhD
Global Head of Product
Specialists Multi Asset

Zero interest rate policy has led to low volatility and high performance

A look at the volatility of a static investment portfolio in which 50% of the assets are allocated to equities and 50% to government bonds, reveals that volatility, during the past six years has been lower than in any decade since the 1950s. In the current decade of 2011–2017, the realized volatility has been 4.9 percent. The lowest volatility decade so far was the post-war decade of 1951–1960, in which a Static 50/50 Portfolio had a volatility of 5.9 percent. After that, the volatility gradually rose to 9.7 percent in the decade 1981–1990, and then dropped to today's 4.9. It is striking how closely this hump-shaped movement aligns to the return of short-term interest rates.

Exhibit 1: The rise and fall of volatility

A hypothetical balanced portfolio's volatility over time

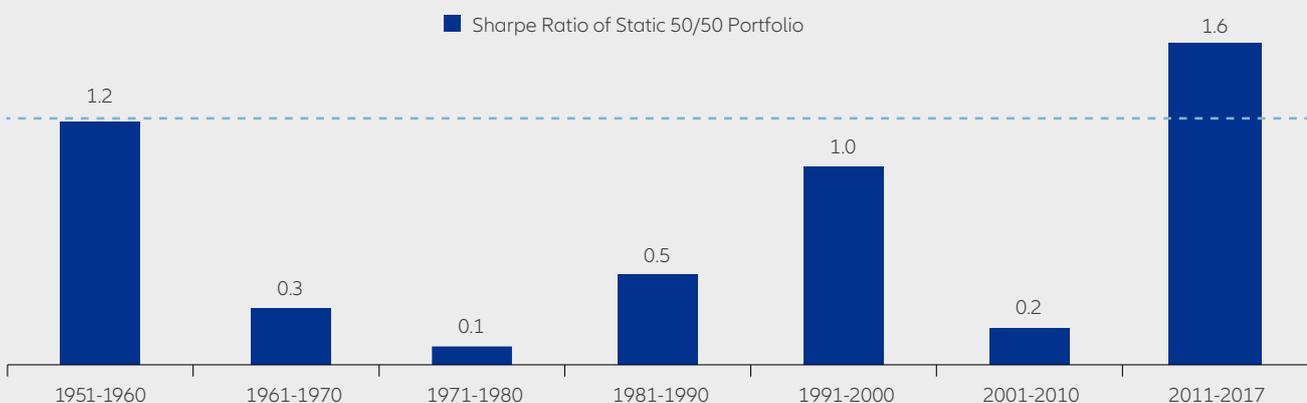


Source: Allianz Global Investors; Ibbotson. Based on monthly returns. The 50/50 portfolio represents a hypothetical portfolio comprised of 50% equity and 50% fixed income. The equity portion of the static portfolio is represented by the S&P 500 and the bond portion of the static portfolio is represented by the Bloomberg Barclay's Capital Aggregate Bond Index.

The combined effect of low cash returns and low volatilities has boosted the Sharpe Ratio of a Static 50/50 Portfolio. The 2011–2017 Sharpe Ratio of 1.6 is more than twice as high as the historical long-term average of 0.57 over the period 1951–2017, and higher still than the Sharpe Ratio in any other decade since the 1950s. Our belief is that investors should not get used to these high risk-adjusted returns of simple static portfolios because multiple factors have aligned in a way that could result in lower expected returns and higher volatility.

Exhibit 2: Sharpe Ratio reaches new heights

Steep rebound from the previous decade's historic low



Source: Allianz Global Investors. Based on monthly returns. The equity portion of the static portfolio is represented by the S&P 500 and the bond portion of the static portfolio is represented by the Bloomberg Barclay's Capital Aggregate Bond Index. See important disclosure regarding the use of back-tested and hypothetical performance at the end of this presentation including a description of the back-test methodology.

After nine years of ultra-easy central bank policy in the US and globally, recent actions by the Federal Reserve Bank show that the beginning of the end of abundant liquidity is in sight. So far, Fed tightening has pointed to more volatility for risk-adjusted investment returns, which have been generated in a market environment characterized by four key factors:

1. Bond yields are at unprecedented lows
2. Price-earnings ratios (PE-ratios) are at multi-decade highs
3. Equity market volatility is at historical lows
4. Equity-bond correlation is at historical lows

If these four factors revert to their long-term average levels, which is more than likely at some point sooner rather than later, future investment outcomes may end up lower than hoped. We believe that investors should not get too accustomed to these high risk-adjusted returns. When the market does shift in terms of valuations and volatility, a dynamic approach to asset allocation may help to offset some of those challenges and may lead to improved investment results.

Harnessing the momentum effect

In facing up to those challenges in a constructive way, we believe that more than before, available potential return contributions should be tapped and prior asset allocation decisions may be revisited. One way of doing so is to challenge the decision that a static portfolio allocation is enough to create an attractive and efficient risk-return trade-off. We believe that the decision to stick to a static approach to asset allocation might ignore and forego the valuable benefits of a dynamic allocation strategy. For instance, it can be shown that the momentum effect, which shows that asset prices follow trends over periods of time,

leads to attractive risk and return features that are described in more detail below.

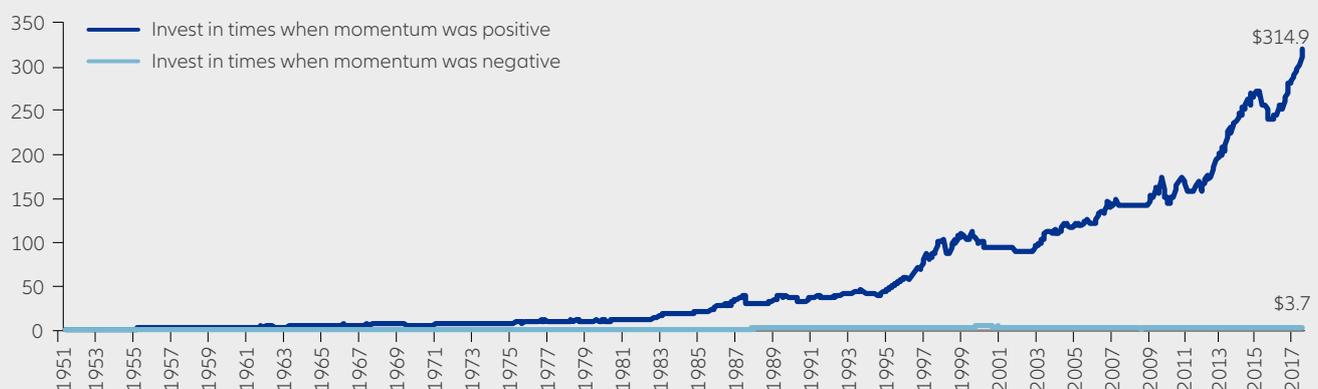
A static approach to asset allocation is appropriate for investors who believe in the so-called random walk model. This model assumes that expected returns, correlations, volatilities are constant over time. Yet, historical data suggests the random walk model may only be a simplifying approximation of real market behavior. To name a few examples, it is well established that in the long-run interest rate levels affect bond returns, and P/E ratios affect equity returns, as well as that volatility is predictable to some extent.

One of the strongest contenders to the random walk model is known as the momentum effect, which describes the tendency for asset prices to follow trends over long periods of time. According to this way of thinking, past high or low returns are followed by future high or low returns. This implies that expected returns are exhibiting a cyclical behavior with times of above long-term average returns and times of below long-term average returns.

To explain how the value of the momentum effect can be quantified, let's look at the final value of two strategies: the positive momentum strategy invests only in a US equity index if its trailing momentum is positive, and the negative momentum strategy invests only when its momentum is negative, both start with 1. The result over the 67 years from 1951–2017 is that the negative momentum strategy achieved a terminal value of 3.7. The positive momentum strategy, however, achieved a value of 314.9 – over 80 times more. Exhibit 3 shows the momentum effect has an overwhelming impact on the result of how successful investing in US Equities was over the period.

Exhibit 3: Backtested performance of the growth of 1 invested from January 1951–December 2017

How the momentum effect drives further stock market gains



The dark blue line represents performance after the proprietary indicator was positive and equity (as represented by S&P 500 Index) was overweighted. The light blue line represents performance after proprietary indicator was negative and equity was under-weighted. See important disclosure regarding the use of back-tested and hypothetical performance at the end of this document including a description of the back-test methodology. Source: Allianz Global Investors.

Momentum's impact on Sharpe Ratio and volatility

Sharpe Ratio and volatility are the quantifiable factors that help determine asset allocation decisions. Our research shows that momentum has a considerable impact on both measures. For instance, in the case of US Equities, our calculations in the 1951–2017 time frame indicate that positive momentum leads in the next month to an above-average Sharpe Ratio of 0.67 and to a volatility of 13.0 percent. This is a rather attractive risk return profile and hence may warrant high allocation to equities.

Conversely, in the months with negative momentum, the following Sharpe Ratio is a mere 0.08 – one eighth of the positive momentum Sharpe Ratio – but resulting volatility is almost 50% higher with 18 percent. This result suggests that equity allocations should be low in situations in which past returns in equity returns have been low. Interestingly, this may contradict the general idea that investors should try to buy when markets are down. The study shows that this has not been really rewarded.

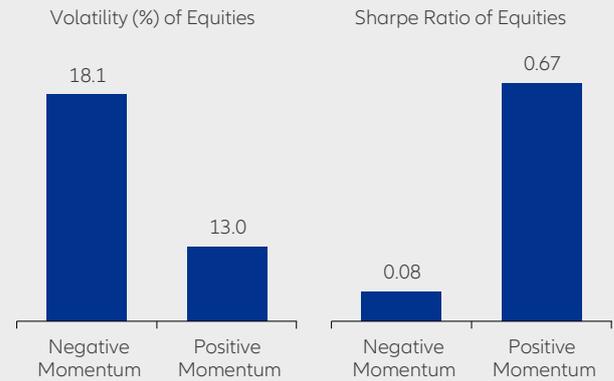
After all, assuming that Sharpe Ratios are constant and that allocations should be static might be expensive as it ignores and foregoes the benefits of exploiting the momentum effect.

Modeling momentum-based Dynamic Asset Allocation

Investors might consider the following approach: We simulate a Dynamic Allocation Portfolio that has on average an allocation of 50 percent equities and 50 percent bonds (which are represented respectively by the S&P 500 Index and the Bloomberg Barclays Capital Aggregate Bond Index). Yet the equity portion is allowed to shift anywhere between 10 and 70 percent, and the bond portion is fixed

Exhibit 4: Shifts in momentum may lead to shifts in risk

Sharpe Ratio and volatility



Source: Allianz Global Investors; January 1951-December 2017
Based on the hypothetical monthly returns from Exhibit 3.

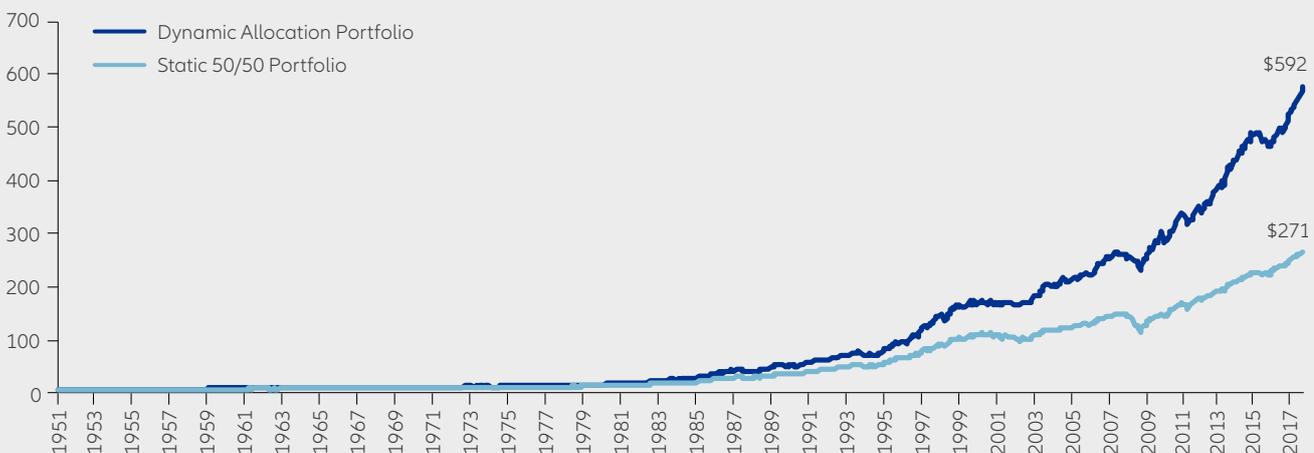
at 50 percent. We assume that the equity allocation can be changed on a monthly basis and that transaction costs are subtracted from performance that amount to 5 basis points of the traded amount.

Thereby the equity allocation is set according to our momentum signal that measures the direction and strength of trailing momentum. We expect that this Dynamic Allocation Portfolio may have a better risk and return profile compared to a static 50/50 portfolio in the long-run if markets continue to exhibit momentum patterns.

The hypothetical simulation from 1951–2017 confirms that the Dynamic Allocation Portfolio would have a 1.3 percent

Exhibit 5: Backtested performance of the Dynamic Allocation vs. Static

Growth of 1 invested, January 1951-December 2017



Source: Allianz Global Investors. Based on monthly returns. Dynamic Allocation Portfolio performance computed based on proprietary indicators which determine the equity position in the portfolio. Static 50/50 is described earlier in this document. See important disclosure regarding the use of back-tested and hypothetical performance at the end of this document including a description of the back-test methodology.

Exhibit 6: Hypothetical risk and performance metrics, January 1951–December 2017

	Static 50/50 Portfolio	Dynamic Allocation Portfolio
Excess Return over Cash	4.4	5.7
Volatility	7.7	8.1
Worst 12-Month Loss	-21.9	-12.0
12 Month Value at Risk (5%)	-5.1	-2.8

Source: Allianz Global Investors. See important disclosure regarding the use of back-tested and hypothetical performance at the end of this presentation including a description of the back-test methodology.

higher annualized return than the static 50/50 portfolio while exhibiting approximately the same volatility. Furthermore, the 12-month downside risk measured by the 5% Value-at-Risk (VaR) is reduced from 5.1 to 2.8 percent, which implies a downside risk mitigation of approximately one-third. The risk-adjusted return measured by the Sharpe Ratio improves from 0.57 to 0.70.

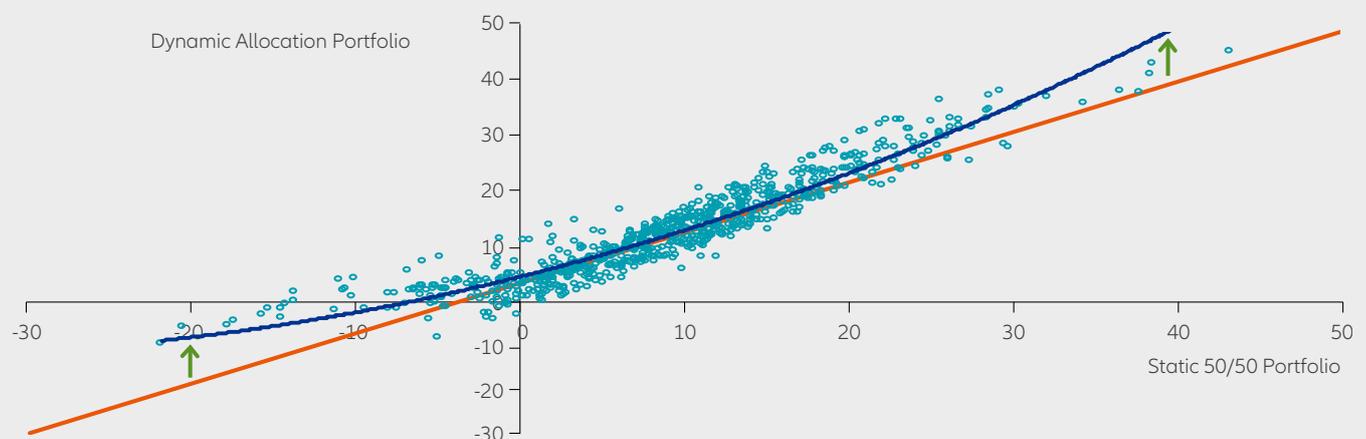
Momentum creates a convex performance profile

Momentum strategies are related to option-based strategies as momentum strategies tend to create a convex performance profile. Convexity is generally a desirable outcome because it typically leads to a reduction in downside risk and to an improved up-side versus a static portfolio. The main difference to option-based strategies is that momentum strategies don't actually require buying put and call options but rather rely on dynamically adjusting the asset allocation over time. This can be considered an advantage because option premiums are expensive – due to the fact that implied volatilities are typically higher than realized volatilities – and because options are often not tradeable for all asset classes in a portfolio.

The scatterplot of trailing 12-month returns of the Static 50/50 Portfolio against the Dynamic Allocation Portfolio visualizes the described convexity profile. The relative advantage of a Dynamic Allocation Portfolio is likely to be larger with bigger movement of the Static 50/50 Portfolio. The reason is that larger moves in markets have likely been generated by strong momentum so that a momentum-based approach might create a higher value-added. Dynamic Asset Allocation tends to play out its outperformance potential well when trends are pronounced and stable. In times of less extended market moves and volatile sideways markets, the momentum-based approach faces volatility costs and may underperform the static portfolio.

Exhibit 7: Creating convexity in returns: Dynamic vs. Static

Hypothetical 12-month rolling returns



Source: Allianz Global Investors. Based on 12 month rolling relative returns over the period January 1951- December 2017 of the hypothetical Dynamic Allocation Portfolio versus the Static 50/50 Portfolio described earlier. The orange line represents the average returns of the Static portfolio of the period and the blue line represents the average returns of the Dynamic Allocation portfolio over the period. See important disclosure regarding the use of back-tested and hypothetical performance at the end of this presentation including a description of the back-test methodology.

What is the appropriate risk-adjusted performance measure?

Alpha, volatility, and Sharpe Ratio come to mind when trying to evaluate the success of achieving the goals of an investment strategy. While these numbers are certainly conveying valuable information of the strategy's success, we believe that the risk measures that go beyond volatility might be considered as well – especially when measuring the performance of strategies that create a convex performance profile. Hence, we would propose to use the measure called Risk-adjusted Return on Capital (or RAROC) which is calculated as:

$$\frac{\text{Excess Return over Cash p.a.}}{\text{12-Month Value at Risk (5\%)}}$$

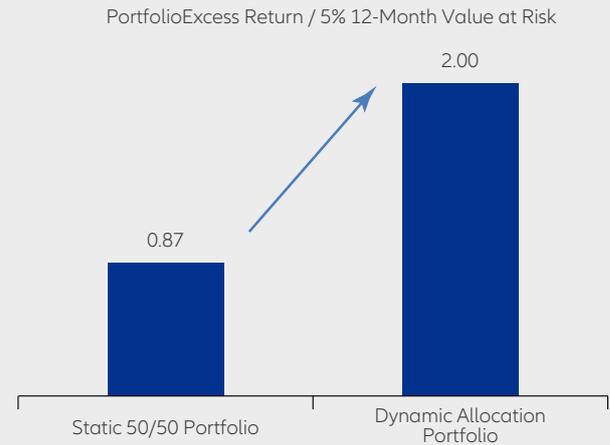
The only difference to the Sharpe Ratio is that instead of dividing by volatility, this measure divides by the Value at Risk measure. We believe this consideration is important in order to capture the benefit of the downside risk reduction of the Momentum strategy.

A 12-Month Value at Risk can only be calculated with a long track-record of multiple years. To address this, instead of dividing by the 12-Month Value at Risk, one can divide by the maximum drawdown over 12 months. Here as well, one needs a full market cycle with bull and bear market to be able to evaluate the performance of the strategy meaningfully. Exhibit 8 shows that the RAROC improves from 0.87 to 2.00 in the dynamic allocation portfolio in the period 1951 to 2017.

What is the appropriate investment horizon?

To better measure risk and return, our general belief is that a full market cycle is ideal. However, there is no exact definition

Exhibit 8: Improvement of risk-adjusted hypothetical performance, January 1951-December 2017

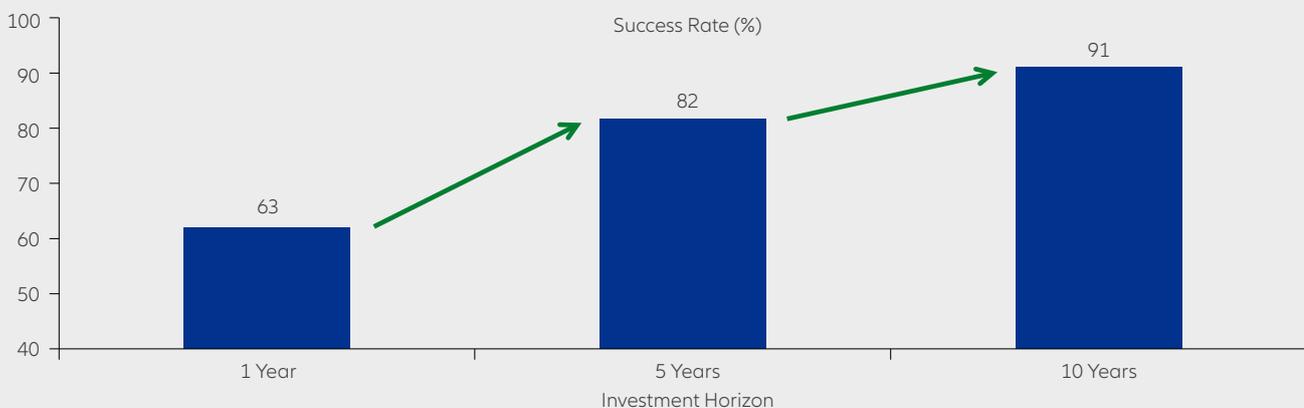


Source: Allianz Global Investors. Based on the hypothetical relative returns shown in Exhibit 6. See important disclosure regarding the use of back-tested and hypothetical performance at the end of this document including a description of the back-test methodology.

of what a full market cycle means in terms of number of years. The reason is that the length of a market cycle varies. The most reasonable definition seems to be that a full market cycle spans a full business cycle with full multi-year upswings and a recession.

Across a full market cycle, this ensures that the momentum approach may be to demonstrate the ability to pick up the positive trends in the bull market and the negative trends in a bear market. The reason is that with a longer investment horizon there is a higher chance that trends manifest that are exploitable by a momentum approach.

Exhibit 9: Probability of success rose with investment horizon



Source: Allianz Global Investors. Based on 1, 5, 10 year monthly rolling returns of the relative performance of the hypothetical Dynamic Allocation Portfolio and the Static 50/50 Portfolio described earlier. Success Rate represents the rolling returns in which Dynamic Allocation Portfolio outperformed the Static Portfolio. See important disclosure regarding the use of back-tested and hypothetical performance at the end of this presentation including a description of the back-test methodology.

Our analysis supports the hypothesis that the momentum effect is structural. In more than 90 percent of all monthly rolling 10-year periods since 1951 momentum factors have led to outperformance. A success rate of 82% of 5-year returns means that there can be rolling 5-year periods with negative alpha. With the benefit of hindsight, stopping momentum after a 5-year period of negative performance would have been the wrong decision because subsequent outperformance would have overcompensated prior underperformance. Similar as with investing in equities, the more patience investors have, the higher the probability of success might be.

Exhibit 10: Hypothetical outperformance over rolling 5-year periods



Source: Allianz Global Investors. Relative performance of the Dynamic Allocation Portfolio vs. Static 50/50 Portfolio over the period shown. See important disclosure regarding the use of back-tested and hypothetical performance at the end of this document including a description of the back-test methodology.

Conclusion

The current market environment with low equity market volatility, low interest rates and high Sharpe Ratios should not mislead investors to become complacent. To the contrary, this environment presents investors with challenges that need to be met by setting realistic expectations. More than before, available potential return contributions should be tapped and prior asset allocation decisions must be revisited and eventually revamped. The goal should be to increase the risk and return efficiency in order to improve potential investment outcomes.

We believe that investors who stay invested through a full market cycle are able to improve their investment outcomes when they apply a Dynamic approach to asset allocation that takes into account the momentum effect. Capturing momentum in asset classes tends to deliver a valuable contribution to portfolio returns and to reduce portfolio risks in down-trending markets.

Additional to momentum, investors may be able to improve their chances of success when they:

1. Increase their portfolio's diversification and add more asset classes
2. Apply the momentum strategy to more asset classes, than just to equities
3. Enhance the momentum strategy with counter-cyclical risk management
4. Include other predictive factors such as valuation and economic analysis
5. Add alternative risk premiums from style-based stock selection and bond selection

We believe that the decision to stick with a static approach for asset allocation could lead to suboptimal investment outcomes. By instead seeking an integrated solution that combines Dynamic Asset Allocation with the factors listed above, a portfolio could be more appropriately positioned for success. In the uncertain market environment in which investors must contend, this could make all the difference in improving investment outcomes.

About the authors

Herold C. Rohweder, Ph.D.

Managing Director, Global CIO Multi Asset

Dr. Herold Rohweder is a managing director and Global Chief Investment Officer Multi Asset with Allianz Global Investors, which he joined in 1989. He initiated the systematic asset-management effort for the firm's equity and multi-asset investments, and is a member of the firm's Global Executive Committee. Mr. Rohweder was previously a portfolio manager for the global balanced, European equity and European fixed-income strategies. He has 28 years of investment-industry experience. Mr. Rohweder has an M.A. in economics from Wayne State University and a Ph.D. in economics from the University of Kiel, Germany.

Michael Z. Stamos, Ph.D., CFA

Director, Senior Portfolio Manager, Director of Research, Multi Asset

Dr. Michael Stamos, CFA, is a Senior Portfolio Manager for the Multi Asset group at Allianz Global Investors managing Tactical Allocation, Managed Futures, and Risk Parity funds. Michael is responsible for quantitative research and product development in the areas of active asset allocation and risk management. Michael has 10 years of industry experience and 14 year of asset allocation research experience. Prior to joining the firm in 2007, Michael was a Research Assistant at Frankfurt University focusing on quantitative research in finance and investment. Michael received a PhD in Finance (summa cum laude) and holds the Chartered Financial Analyst designation. Michael has published various articles in practitioner and academic journals in the fields of asset allocation and pension finance.

Thomas J. Zimmerer, Ph.D.

Managing Director, Global Head of Product Specialists Multi Asset

Dr. Thomas Zimmerer is Managing Director and Global Head of Product Specialists Multi Asset with Allianz Global Investors, which he joined in 2014. As a member of the Multi Asset U.S. portfolio-management team, he focusses on the Firm's dynamic multi-asset strategies. Mr. Zimmerer has investment-industry experience since 1997. Before joining Allianz Global Investors, he was a professor of Finance and Investments at the University of Applied Science in Ansbach, Germany, and served as senior consultant for Alpha Portfolio Advisors, a German-based consulting firm, advising institutional investors. Prior, Mr. Zimmerer was a portfolio manager with Allianz Asset Management on active bond strategies and active protection strategies. He has a master's degree in Economics and Finance and a Ph.D. in Econometrics from the University of Regensburg, Germany.

Back-testings and hypothetical or simulated performance data have many inherent limitations, only some of which are described as follows:(i) They are designed with the benefit of hindsight, based on historical data, and do not reflect the impact that certain economic and market factors might have had on the decision-making process, if a client's portfolio had actually been managed. No back-testings, hypothetical or simulated performance can completely account for the impact of financial risk in actual performance.(ii) They do not reflect actual transactions and cannot accurately account for the ability to withstand losses.(iii) The information is based, in part, on hypothetical assumptions made for modelling purposes that may not be realised in the actual management of portfolios. No representation or warranty is made as to the reasonableness of the assumptions made or that all assumptions used in achieving the returns have been stated or fully considered. Assumption changes may have a material impact on the model returns presented. The back-testing of performance differs from actual portfolio performance because the investment strategy may be adjusted at any time, for any reason. Investors should not assume that they will experience a performance similar to the back-testings, hypothetical or simulated performance shown. Material differences between back-testings, hypothetical or simulated performance results and actual results subsequently achieved by any investment strategy are possible.

Source: Allianz Global Investors, data as at 31/12/2017.

Investing involves risk. The value of an investment and the income from it may fall as well as rise and investors might not get back the full amount invested. Investing in fixed income instruments may expose investors to various risks, including but not limited to creditworthiness, interest rate, liquidity and restricted flexibility risks. Changes to the economic environment and market conditions may affect these risks, resulting in an adverse effect to the value of the investment. During periods of rising nominal interest rates, the values of fixed income instruments (including short positions with respect to fixed income instruments) are generally expected to decline. Conversely, during periods of declining interest rates, the values of these instruments are generally expected to rise. Liquidity risk may possibly delay or prevent account withdrawals or redemptions. Past performance is not a reliable indicator of future results. If the currency in which the past performance is displayed differs from the currency of the country in which the investor resides, then the investor should be aware that due to the exchange rate fluctuations the performance shown may be higher or lower if converted into the investor's local currency. The views and opinions expressed herein, which are subject to change without notice, are those of the issuer companies at the time of publication. The data used is derived from various sources, and assumed to be correct and reliable, but it has not been independently verified; its accuracy or completeness is not guaranteed and no liability is assumed for any direct or consequential losses arising from its use, unless caused by gross negligence or wilful misconduct. The conditions of any underlying offer or contract that may have been, or will be, made or concluded, shall prevail.

For investors in Europe (excluding Switzerland)

This is a marketing communication issued by Allianz Global Investors GmbH, www.allianzgi.com, an investment company with limited liability, incorporated in Germany, with its registered office at Bockenheimer Landstrasse 42-44, 60323 Frankfurt/M, registered with the local court Frankfurt/M under HRB 9340, authorised by Bundesanstalt für Finanzdienstleistungsaufsicht (www.bafin.de). Allianz Global Investors GmbH has established branches in the United Kingdom (Allianz Global Investors GmbH, UK branch, 199 Bishopsgate, London, EC2M 3TY, www.allianzglobalinvestors.co.uk; subject to limited regulation by the Financial Conduct Authority, www.fca.org.uk), France (Allianz Global Investors GmbH, France branch, www.allianzgi.fr; subject to limited regulation by Autorité des Marchés Financiers, www.amf-france.org), Italy (Allianz Global Investors GmbH, Italy branch, via Durini 1, 20122 Milan; subject to regulation by the competent Italian Authorities in accordance with the national legislation), Spain (Allianz Global Investors GmbH, Spain branch; subject to limited regulation by Comisión Nacional del Mercado de Valores, www.cnmv.es), Luxembourg (Allianz Global Investors GmbH Luxembourg Branch; subject to limited regulation by Commission de Surveillance du Secteur Financier, www.cssf.lu) and the Netherlands (Allianz Global Investors GmbH-Netherlands Branch; subject to limited regulation by Autoriteit Financiële Markten www.afm.nl). Details about the extent of the local regulation are available from us on request.

For investors in Switzerland

This is a marketing communication issued by Allianz Global Investors (Schweiz) AG, a 100% subsidiary of Allianz Global Investors GmbH, licensed by FINMA (www.finma.ch) for distribution and by OAKBV (Oberaufsichtskommission berufliche Vorsorge) for asset management related to occupational pensions.