Investment Strategy

STRATEGY INSIGHTS SPECIAL EDITION | FOURTH QUARTER 2023

Stick to the Plan

Balancing dynamic markets and our investment process foundation

PNC

As we approach the end of 2023, we are taking stock of the financial market landscape and certain structural shifts that are coming to the fore. Over the past 15 years, the pendulum has swung from one extreme to another, bookended on either side by the global financial crisis and the pandemic. A protracted period of near-zero interest rates has been replaced with the steepest Federal Reserve (Fed) tightening cycle on record. Almost nonexistent inflation has been replaced with persistent, generationally high inflation. Both phases saw bank failures and bouts of extreme market volatility. All the while, markets have carried on, mostly producing hefty, positive returns. Although the economy appears to be humming along for now, we are likely on the precipice of a recession.

Given the fundamental changes to the market backdrop, certain assumptions that support our long-term return and volatility expectations have changed. Every year we revisit our underlying assumptions around risk and return across asset classes and provide updated long-term estimates that inform our asset allocation process. While updating this year's long-term market estimates, we took the opportunity to also reaffirm the building blocks of our investment process, which became the genesis of this special edition of our Strategy Insights publication.

In our typical Strategy Insights, we provide in-depth views into various challenges, opportunities and trends within the current market environment. However, in this edition, we decided to flip the script and instead highlight how we remain moored through the market's perpetual shifting tides and choppy seas. In this publication, we share a behind-the-scenes view of how we analyze, construct and monitor investment portfolios on behalf of our clients. This foundation is what we believe gives us the optimal chance of helping clients achieve their investment goals, regardless of the market environment.

> Our holistic approach to analyzing markets enables us to distill structural market changes from short-term noise and glean actionable insights within the context of a given market environment.

Marc Dizard CFA, CFP®
Chief Investment Strategist

PNC

Multi-asset Portfolios: Built for Whatever Comes Next

Designing and implementing multi-asset investment portfolios is the core of our mission in the PNC Investment Office. Navigating the complex process of determining appropriate asset allocations, selecting investment managers and products, and building portfolios can be daunting — we are here to help.

Our clients span a wide spectrum, from individuals and families to corporations and institutions. While key investing principles hold regardless of the investor, our clients' goals are as unique as fingerprints or DNA. Our process is oriented around a goals-based approach that considers each client's investment objectives, constraints and values.

In investing, we believe having a plan is essential, one that is formed from guidelines and guardrails but can also be nimble enough to capture opportunities as they arise. We walk clients through a process of developing an investment policy statement, designing a long-term strategic allocation, selecting managers and building a portfolio, and then making tactical adjustments as market conditions change. This rigorous, yet flexible, approach underpins our ability to meet clients where they are and support them in their long-term investing goals.

In this publication, we explore our process for designing our clients' long-term strategic asset allocations and making shorter-term tactical portfolio adjustments. Additionally, we explore how our risk-focused approach keeps our clients' goals squarely within our sights.

Our Investment Philosophy — a Primer

With so many options and permutations, the North Star for any investment decision is the investment philosophy. Investors without a philosophy can find themselves making choices that are misaligned with objectives, possibly failing to address their original purpose. An investment philosophy framework enables investors to set priorities among the various tradeoffs that present themselves when allocating assets.

OUR PHILOSOPHY

We believe markets can be inefficient and investment opportunities are ever changing. A thorough understanding of the past, combined with rigorous analysis of the present, gives us insight into possible future outcomes.

Our investment philosophy starts with the core belief that markets can be inefficient, and that understanding the past is a key element of success for the future. Additionally, humans make errors — they herd, panic and get greedy, and humans can interpret the same set of information differently[1].

We believe deep analysis of current market conditions through an understanding of past market behavior helps us identify opportunities to capitalize on market inefficiencies. Based on rigorous analysis of quantitative and qualitative measures, we identify patterns, trends and relationships that are relevant to the asset allocation process. We approach this analysis with a long-term orientation while also acknowledging new information is constantly flowing into the market. Our holistic approach to analyzing markets enables us to distill structural market changes from short-term noise and glean actionable insights within the context of a given market environment.

Goals-based Investing

Goals-based investing is an exercise in balancing a return target with an investor's tolerance for risk. Goals vary widely, from outperforming a benchmark, to funding a special project or purchase, to long-term charitable giving programs, among many others. There are different financial and non-financial risks to achieving an investment goal.

> **When taking a goals-based approach toward balancing investment return and risk, we believe investors should seek to understand market volatility risk and shortfall risk.**

Market volatility risk is the fluctuation in market price of a security or portfolio. It is generally a short-term concern, but because it is observable in real-time, it has the potential to impact behavioral aspects of investment decisions.

Shortfall risk is simply the risk of not having planned funds when you need them. It is more difficult to conceptualize as it may take longer for the impact of key decisions to materialize. An awareness of shortfall risk is critical for goals-based investing, as it is a subtle challenge that may not become apparent until it is too late to recapture lost investment performance.

Our asset allocation process is built with these short- and long-term risks in mind. Not only does it lay the foundation for achieving long-term objectives based on extensive historical and forward-looking analysis (through strategic asset allocation), but it also enables clients to potentially benefit from opportunities created by shorter-term market fluctuations (through tactical asset allocation adjustments).

Strategic Asset Allocations

A client's strategic asset allocation is a baseline investment plan that outlines target weights for various asset classes. A strategic allocation is designed to balance desired return objectives with risk tolerances in the most efficient manner possible. Other considerations or constraints, including time horizon, taxes, legal/regulatory status and liquidity needs are also incorporated, much of which is typically outlined in a client's investment policy statement (IPS). An IPS is also used to inform benchmarking for performance and risk management evaluations. In addition to a client's IPS, strategic asset allocations are informed by two key analyses performed by our teams: long-term capital market assumptions and mean-variance optimization analysis.

Capital market assumptions (CMAs) quantify the expected return and risk of each asset class, typically over a projected period of 10 years, sometimes longer. We analyze asset classes in relation to one another to help maintain a consistent, cohesive view across our estimates. This helps align our capital market assumptions not only with forward-looking expectations relative to historical return averages, but also with risk/return expectations relative to each individual asset class. Finally, we perform a correlation analysis among asset class pairings to inform choices around diversification.

Mean-variance optimization (MVO) analysis is another core component of the strategic asset allocation process. MVO is a quantitative tool that allows investors to make allocation decisions by considering the trade-off between risk and return. The output of our MVO process is a range of target portfolios designed to maximize expected return for every incremental unit of risk.

We acknowledge that MVO has limitations, including that it relies on static assumptions and normal distributions. It is an important first step

in the process; however, without further refining, important risk considerations could be overlooked. To finely tune a preliminary strategic allocation plan, we calibrate the portfolio using three additional analyses: Monte Carlo simulation, stress testing and active risk assessment.

Monte Carlo Simulation

Monte Carlo simulation is a statistical method that provides probabilities for a range of possible investment outcomes. Our Monte Carlo simulations consider various asset allocations using key client specifications, such as time horizon, required/expected cashflows, taxes and inflation. This method helps specifically with goals-based investing analysis and understanding the trade-offs between balancing longer-term shortfall risk and shorter-term market volatility.

Consider an example for a nonprofit organization client. The organization must strike a balance between meeting its current financial needs and sustaining intergenerational equity for the future, an objective that requires balancing spending and portfolio growth. A Monte Carlo simulation can evaluate the range of real (inflation-adjusted) market values of various potential asset allocations over time with different spending policies and risk/return expectations.

Figure 1 shows four different high-level allocations of global stocks and bonds. Each has a different level of expected return and risk, with the Growth portfolio at one end of the spectrum, having the highest expected return and highest expected risk, and the Conservative portfolio at the other end, with the opposite.

Our nonprofit client in this example has a hypothetical target of distributing 4.5% of its portfolio value each year while keeping pace with inflation (assume 2.25% annual inflation rate). In this case, the expected growth rate of the portfolio would need to exceed 6.75% to meet that investment objective.

Figure 1 — Asset Allocation Comparison Using Monte Carlo Analysis, Example

	Growth Allocation	Balanced Allocation	Moderate Allocation	Conservative Allocation
Expected Return	7.84%	7.00%	6.15%	5.31%
Expected Risk	14.48%	11.19%	8.08%	5.44%
Expected Growth *(objective: > 6.75%)*	6.76% ✔	6.33%	5.78%	5.10%
Probability that the portfolio will achieve a real minimum asset value of 4.5% distribution in year 10				
Monte Carlo Simulation	50.80% ✔	45.00%	35.70%	19.00%

Source: MSCI Wealthbench, PNC

In a Monte Carlo simulation, for this example, achieving the desired level of intergenerational equity may be expressed by a 50% probability (the median of the distribution). If the probability is lower than 50%, the analysis is suggesting there is greater shortfall risk, which could lead to asset depletion due to inflation and spending. Alternatively, a probability well more than 50% might suggest a more conservative spending policy, which prioritizes future beneficiaries over current beneficiaries.

The analysis shows the Growth allocation generates an expected growth rate of 6.8% and has a 50.8% probability of maintaining the real value of the portfolio while meeting the 4.5% annual distribution rate. The other allocation mixes fall short of the targeted objective and have probabilities lower than 50%. While the Conservative portfolio has the lowest expected market volatility risk, it also has the highest shortfall risk of the four sample allocations, with only a 19.0% probability of meeting the investment objective.

As we mentioned at the outset, investment goals vary widely among investors. Unlike our nonprofit example, not all clients have a defined spending policy. Instead, some clients may want to maintain the real value of a portfolio by generating a return to offset inflation and minimize volatility in the near term. Monte Carlo simulation can still be useful in this situation, but the emphasis shifts toward market volatility risk versus shortfall risk.

Stress Testing

For investors who prioritize market volatility risk, stress testing could help further understand how a prescribed asset allocation could perform in certain market environments. Portfolio stress testing requires a sophisticated risk-model to simulate performance of an asset allocation under different scenarios, allowing for one or more hypothetical factor shocks.

In **Figure 2**, we use the same sample asset allocation mixes from the previous example but change the objective from a shortfall target to generating a nominal return of 2.25% to keep pace with inflation. All four allocations have probabilities above 60%, but in this case, the Conservative allocation has the highest probability of meeting the nominal return as it has the lowest downside risk.

This is where stress testing becomes useful. In the two right columns of Figure 2, we illustrate a stress

Figure 2 — Asset Allocation Comparison Using Stress Testing, Example

Monte Carlo Simulation				
Probability of 2.25% Return (Year 1)	62.50% ✓	63.70% ✓	66.90% ✓	71.10% ✓
5th Percentile Return (Year 1)	-13.72%	-9.67%	-6.28%	-3.19% ✓
1st Percentile Return (Year 1)	-21.81%	-15.82%	-10.54%	-6.07% ✓
Stress Tests				
If S&P 500 drops 20%	-16.0%	-12.70%	-9.30%	-5.90% ✓
If 10-year UST increases 100 bps	-2.00% ✓	-2.60%	-3.30%	-3.90%

Source: MSCI Wealthbench, PNC

test for two scenarios: (1) If the S&P 500 declines 20%, or (2) if the yield on 10-year U.S. Treasuries increases by 100 basis points. Both analyses are based on a sample period of historical returns. When the S&P 500 declines 20%, the Conservative portfolio is expected to experience the lowest declines in portfolio value, due to its lower allocation to equities. In contrast, the Conservative portfolio is expected to underperform when the 10-year U.S. Treasury yield increases, due to its higher fixed income allocation.

Stress testing can be a useful tool to help set performance expectations. **Figure 3** poses a hypothetical suballocation to increase the return profile that includes small- and mid-cap equity, international developed and emerging market equity, high yield debt and emerging market debt. We believe this is important to highlight as including these additional asset classes changes the expected return and risk profile of the portfolio. In the event of market volatility, having an awareness of how the dynamics of the portfolio change under various conditions can provide assurance.

Suballocations can impact the overall risk and return profiles of a portfolio. Stress testing is a useful tool to identify how allocations respond to market events.

Figure 3 — Sub-Asset Allocation Comparison Using Stress Testing, Example

	Allocation A	Allocation B
Expected Return	7.5%	7.9%
Expected Risk	13.7%	14.7%
Expected Growth Rate	6.5%	6.8%
Stress Test *S&P 500 drops 20%*	-16.5%	-16.1%
Stress Test, Asset-Class Level Impact		
Large-Cap Core	-20.0%	-20.0%
Mid-Cap Core	-	-22.3%
SmallCap	-	-22.6%
Intl Large-Cap Core	-	-17.6%
Intl Small Cap	-	-19.6%
Emerging Markets Equity	-	-15.3%
Core Bond	-2.5%	-2.5%
High Yield	-	-8.9%
Emerging Markets Debt	-	-6.9%

Source: MSCI Wealthbench, PNC

Active Risk Assessment

Finally, we evaluate active risk (as defined by tracking error) to measure the potential volatility of a portfolio's excess return relative to a benchmark. Active risk is driven by asset allocation and manager selection and can be assessed using historical returns (ex-post) as well as on a predicted risk basis (ex-ante). This type of risk analysis can highlight the effect on risk of over- or underweighting certain asset classes relative to a market benchmark. Active risk is also useful in sizing allocations to certain asset classes that might not be captured through MVO.

For example, consider a recommendation from the MVO process that suggests an allocation to small- or mid-cap stocks that is much larger than the market. While these asset classes may have higher risk-adjusted returns, the active risk from these allocations might not be suitable for investors that place a higher emphasis on shorter-term market volatility and performance relative to a market benchmark.

It is important to note, while strategic asset allocations are designed with long-term investment horizons, they are not static over the life of the portfolio. The strategic allocation process is iterative and should be revisited as structural market conditions and client circumstances change.

Implementing the Strategic Asset Allocation

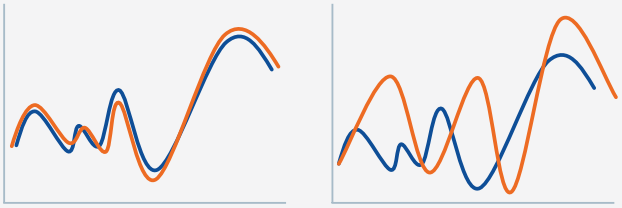
Up to this point, the strategic asset allocation is not an investable portfolio. Our initial evaluation, analysis and design use the asset class indices that inform our capital market assumptions. Now we are ready to consider investment manager/product selection to fulfill our desired asset class allocations.

While asset allocation is the key driver of risk and return, product or manager selection plays a significant role in the risk/return profile of a

Tracking Error Explained

What is it?

Tracking error measures the degree to which a portfolio's price performance deviates from its benchmark over time, or the *consistency* of excess returns.



Low tracking error *High tracking error*

What does it mean for my investment?

Tracking error helps investors gauge *how much* their investment is expected to outperform or underperform the benchmark over time. Importantly, for a portfolio to perform differently from its benchmark, it must have tracking error.

Assuming a normal distribution of returns, investors can use tracking error to estimate the probability of *how often* their investment is expected to perform within that range.

The example below shows a normal distribution of excess returns. If this investment has a tracking error of 1%, you should expect performance to be approximately...

For illustration only

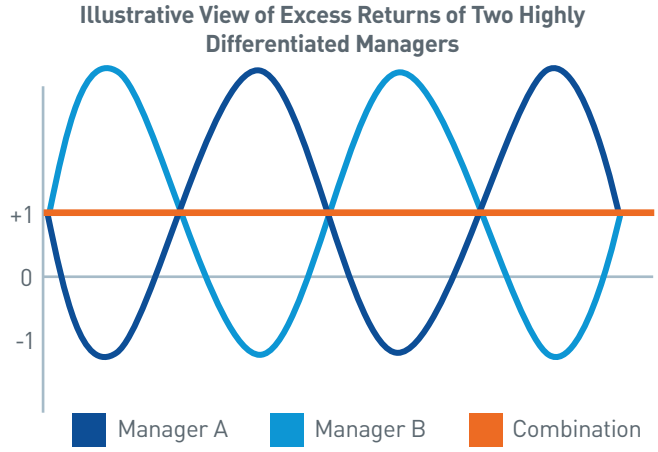
portfolio. Our Investment Advisor Research team is responsible for identifying and vetting a platform of third-party mutual funds, ETFs, separately managed accounts and alternative investments through rigorous investment and operational due diligence. We believe examining these managers' operational qualities helps limit exposure to uncompensated risk, while our investment due diligence seeks to ensure we invest with active managers we deem to have demonstrated investment skill.

When we begin implementing a strategic asset allocation, our first step is to evaluate and consider whether or where to use active management, which introduces active risk. For most investors, we tend to favor a balance of active and passive exposures. For certain asset classes, such as fixed income and select equity asset classes, we generally prefer active management. Other asset classes may have characteristics that lend themselves more to passive management. For example, in U.S. large-cap equity, we believe it is difficult for active managers to outperform, and we view the asset class as mostly efficient. Therefore, we prefer a passive approach. (*For additional insights into our active-versus-passive approach, see our detailed white paper on the process.*)

For active managers to outperform, their portfolio must deviate from the designated index. This differentiation leads to tracking error and potentially to periods of significant relative performance variation. In our active allocations, we strive to combine high-caliber managers that have differentiated strategies, but we seek to do it in such a way as to lower the portfolio's overall tracking error at the asset class level. We believe combining managers with varying approaches can help mitigate active risk. Sometimes managers will have a low, or even negative, correlation of excess returns to their respective benchmarks, and thus in combination with other strategies, it can lead to a portfolio with an overall low tracking error despite including managers with higher tracking errors.

Our process for combining active managers has both quantitative and qualitative considerations. From a qualitative perspective, we leverage the insights of our Investment Advisor Research team. Our goal is to identify a combination of mangers whose investment processes and philosophies complement one another in such a way that they are expected to outperform and underperform their respective benchmarks at different times. Next, we perform a quantitative analysis of manager combinations by reviewing the correlations of excess returnst o confirm the relationship between when each manager is expected to out- or underperform, as well as each manger's tracking error and the combined asset class tracking error. **Figure 4** illustrates an example of this process using a U.S. small-cap equity allocation.

Figure 4 — Manager Pairing Effect on Tracking Error, Example



For illustration only

For the five-year period ending 6/30/2023

Excess return correlation vs. Russell 2000	**-0.57**
Excess return correlation vs. style benchmarks	**0.00**

Segment	Manager	Tracking Error
Small-Cap Growth *Russell 2000 Growth*	Manager A	6.26%
Small-Cap Value *Russell 2000 Value*	Manager B	5.86%
50/50	Portfolio	4.27%

Source: Morningstar, Inc., PNC

For equity managers, our quantitative analysis also includes a review of any managers biases from factors, sectors or historical return environment scenarios. Our review of fixed income managers is similar, as we seek to understand each manager's historical positioning and any biases they might have toward sectors or duration management. We perform this process for each asset class where we implement an allocation using active managers.

Once we have identified the investment strategies to fulfill our strategic asset allocation, we evaluate the various risks and exposures relative to a market benchmark to understand whether biases are present. We do this for the total portfolio as well as for the broad domestic equity, international equity and fixed income asset classes. Our goal is to understand the drivers of risk so we can adjust the portfolio, if needed, to fit our prescribed risk profile. To mitigate unintended risks, we may select a new manager for a particular allocation or adjust allocation proportions.

Tactical Allocation Adjustments

After carefully designing a long-term strategic asset allocation and implementing a client's portfolio, our investment process continues. Our investment philosophy and approach hinge on a key characteristic of financial markets: they continuously evolve. That is not to say we advocate endless adjustments based on short-term market movements.

While markets are ever-changing, we believe patient investors can capitalize on proven long-term trends. As markets shift, we incorporate new information into our backward- and forward-looking analyses, looking for deviations from long-term valuation levels or intra-market relationships. Short-term market fluctuations can be unpredictable and cause investors to make rash decisions based on emotions rather than sound investment rationale. We believe

While markets are ever-changing, we believe patient investors can capitalize on proven long-term trends.

emphasizing longer-term results allows us to focus on what we believe truly drives the market over time — corporate earnings and valuations.

We are valuation-oriented and seek to identify investment opportunities that are mispriced by the market. Assets can in fact stay mispriced for a long period, and valuation alone is unlikely to be the catalyst for correcting the mispricing. Finding investment opportunities with compelling, long-term secular drivers at a fair price should benefit performance over time.

To routinely identify these shorter-term opportunities, we have a rigorous, repeatable analysis process in place. Our portfolios are dynamic, seeking to enhance returns and mitigate risk through tactical asset allocation adjustments. Our analysis is based on three core components: the business cycle, valuations and technicals.

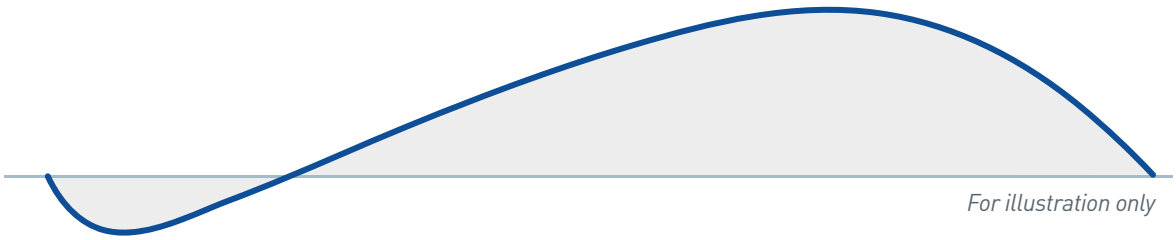
Business Cycle Analysis

The business cycle is the natural pattern of economic growth and contraction that occurs over time. We divide the business cycle into four stages: accelerating expansion, slowing expansion, contraction and recovery (**Figure 5**). Each stage of the business cycle is associated with different economic conditions, which can affect the performance of different asset classes.

During the accelerating expansion phase, for example, economic growth is strong, and corporate earnings are usually rising. This is often a good time to invest in risk assets, especially those in cyclical areas, which tend to perform well during periods of economic expansion. In contrast, during the contraction phase, economic growth slows, and investors may want to shift their allocations toward more defensive exposures.

Our analysis has shown certain market characteristics are consistent over time based on the phase of the business cycle. For example, quality companies — those that tend to have consistent earnings growth potential protected by strong competitive advantages — tend to start performing well in the later stages of a slowing expansion and into a contraction. However, these exposures start to lag during a recovery and into accelerating expansion, giving way to other exposures, like more cyclical equities.

Figure 5 — Business Cycle Analysis, Market and Economic Characteristics



	Contraction	Recovery	Accelerating Expansion	Slowing Expansion
Economy	Unemployment rising Inflation slows Credit tight Activity declines	Unemployment bottoming Inflation low Credit growth moderates Activity rebounds	Unemployment falling Inflation rising Credit growth rising Strong activity	Unemployment falling Wages rising Credit tighter Activity positive, but decelerating
Favorable Asset Class Positioning	Quality Long Duration Bonds	Cyclical Equity Small Cap	Growth Momentum	Large Cap Quality
Unfavorable Asset Class Positioning	Value High Yield Bonds	Defensive Equity Low Volatility	Long Duration Bonds Cash	Small Cap Cyclical Equity

Source: PNC

While certain characteristics tend to emerge during particular phases, business cycles are complex and influenced by a number of factors, such as fiscal and monetary policy, technological advancements and other structural economic shifts. Because the business cycle tends to drive market movements over shorter periods of time, it is an important emphasis of our tactical allocation adjustments. However, business cycle analysis alone does not paint a complete picture. For added context, we supplement business cycle analysis with a deep understanding of valuations.

Each phase and cycle demonstrates distinctive nuances and may last variable amounts of time.

Valuation Analysis

Valuations refer to the price investors are willing to pay for an asset relative to its intrinsic value. When assets are overvalued, they are more likely to experience a correction, while undervalued assets may offer better potential long-term returns.

The goal of our valuation analysis is to identify asset classes that have better relative value versus an alternative. This analysis cuts both ways, not only allowing us to identify timely asset allocation opportunities, but also enabling us to avoid certain allocations at different parts of the business cycle.

The valuation metrics we tend to rely on for equities include cash flow analysis, price multiples of earnings, revenue or carrying value, as well as debt levels. For fixed income, yields and spreads help determine the attractiveness of different areas of the market. By gathering a variety of data, we form a mosaic that becomes the foundation of our investment thesis. One challenge with valuations is that they can remain extended or depressed for long periods of time, which is why they are important to calibrate with the business cycle and market expectations.

Technical Analysis

Technical analysis is a method of analyzing asset classes and markets by examining statistical trends and chart patterns, usually related to price and volume. While useful, it is the least-emphasized component of our process.

We use technical analysis to help confirm contemplated asset allocation changes that arise from our business cycle and valuation analyses. Technical analysis allows us to understand if the opportunity we have identified is likely to persist and to what magnitude. It can be used to gauge whether an undervalued asset has further downside potential to try to avoid buying too early. It can also be used to understand current tactical positions and whether they have run their course.

Implementing Tactical Allocations

Identifying the investment opportunity is only the initial phase of the tactical allocation process. Decisions around positioning and implementing the tactical trade involve a coordinated effort to ensure any adjustments fit within a portfolio's defined risk parameters.

Through our ongoing monitoring, we maintain an awareness of our risk exposures relative to our established guardrails. We pay particular attention to active risk, volatility and factor sensitivities.

As the thesis for a tactical change develops, multiple teams begin evaluating the allocation through risk and portfolio construction lenses. We must constantly be aware of the existence of risk and strive to mitigate its known outcomes. Our approach to risk management is a framework that balances quantitative and qualitative approaches. We attempt to answer two questions. First, does the intended exposure materialize in the portfolio in the way it is intended? Second, what risk does it introduce into the portfolio?

Using a heuristic approach, we seek to identify how an anticipated tactical change may affect portfolio positioning across a number of characteristics. We want to ensure metrics such as asset class allocation, market capitalization, sector allocation and duration, among others, remain within our designated boundaries relative to the market benchmark. This process enables us to identify sources of potential outsized risk, complementing the output from our risk model.

We generally evaluate changes through four lenses that are intertwined:

- Exposure Alignment
- Pre-Post Trade Analysis
- Scenario Analysis
- Tactical Trade Monitoring

Exposure analysis attempts to answer the question of whether a tactical positioning change will materialize in the portfolio in the way that is intended. Each tactical allocation adjustment requires a unique analysis that fits the nature of the proposed change. When we look at exposures for changes, we typically look at a proposed portfolio change relative to its current positioning, the tactical allocation (passive implementation), and the market benchmark allocation. This helps us understand the positioning of the portfolio and how it might perform in different environments.

For example, consider a tactical adjustment to increase "quality" in the domestic equity portion of the portfolio. In this case, the exposure analysis would be focused on equity quality characteristics that are measurable in the portfolio.

Figure 6 illustrates how the proposed portfolio with the tactical allocation change would be expected to exhibit higher quality relative to the current portfolio. This is shown through an increased allocation to the higher-quality quintiles.

Figure 6 — Quality Factor Exposure, Example

		Portfolio Allocation (%)			
	Quintile	Pre-trade	Post-trade	Change	Post-trade Relative to Benchmark Weight
Highest Quality	1	23.3	24.8	1.5	1.0x
	2	21.5	26.4	4.9	1.2x
	3	19.3	17.4	-1.9	0.9x
	4	19.2	17.2	-2.0	0.9x
Lowest Quality	5	14.9	12.6	-2.3	0.7x

Source: FactSet®. FactSet is a registered trademark of FactSet® Systems Inc. and its affiliates.

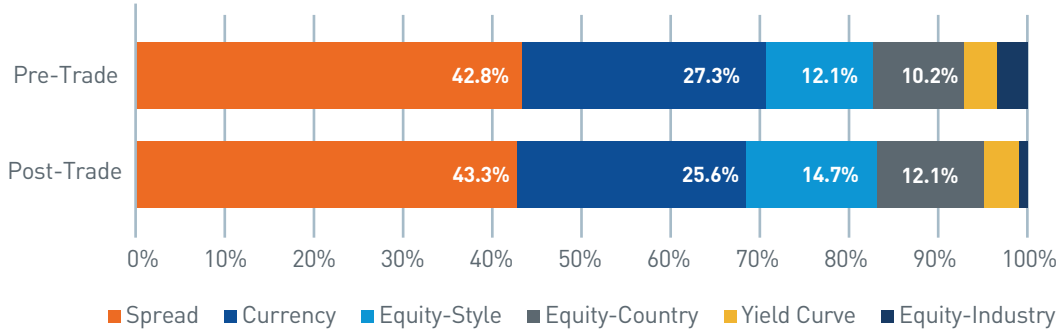
At the same time, our analysis showed the sector weights are expected to remain stable and within our targeted range relative to the benchmark (**Figure 7**). Additional analysis is used to confirm no significant changes in other risk factors (**Figure 8**).

Figure 7 — Pre- and Post-trade Comparison of Portfolio Sector Allocations, Example

	Portfolio Allocation (%)			
GICS Sector	Pre-trade	Post-trade	Change	Post-trade Relative to Benchmark
Communication Services	7.4	7.9	0.5	1.0x
Consumer Discretionary	10.6	10.2	-0.4	1.0x
Consumer Staples	6.5	6.5	0.0	1.0x
Energy	3.9	3.8	-0.1	0.9x
Financials	13.8	14.4	0.6	1.1x
Health Care	12.4	12.4	0.0	0.9x
Industrials	11.3	11.5	0.2	1.2x
Information Technology	24.8	24.1	-0.7	0.9x
Materials	2.7	2.6	-0.1	1.0x
Real Estate	2.6	2.6	0.0	0.9x
Utilities	2.8	2.7	-0.1	1.0x

Source: FactSet®, PNC

Figure 8 — Active Risk Factor by Type, Example



Source: FactSet®, PNC

Pre-post Trade Analysis

Pre-post trade analysis identifies changes in various risk attributes from a tactical allocation adjustment. **Figure 9** depicts a typical summary of this analysis. We can see from this example how a tactical allocation change can introduce different forms of risk, both relative to the benchmark and compared to the original portfolio. In this example, the tactical allocation to quality had limited impact on active risk.

When examining the proposed portfolio for sources of active risk, we not only look across the portfolio at a high level, but we also perform more detailed breakdowns of risk within each asset class. Our goal is to prevent any one factor from contributing an outsized portion of active risk. If there is a particular factor that is outsized, we confirm what is driving that factor and that it is consistent with our intended positioning. The active risk in our example appears spread among fixed income and equity risk factors.

Our goal is to prevent any one factor from contributing an outsized portion of active risk.

Figure 9 — Pre- and Post-trade Analysis Summary, Example

	Portfolio Allocation (%)	
Risk Metric	**Pre-trade**	**Post-trade**
Portfolio Total Risk	13.38%	13.37%
Portfolio Specific Risk	0.10%	0.10%
Portfolio Factor Risk	13.28%	13.27%
Benchmark Total Risk	13.80%	13.80%
Predicted Beta	0.97	0.97
Active Risk	1.08%	1.08%

Source: FactSet®, PNC

Scenario Analysis

Scenario analysis is an additional method to help uncover any vulnerabilities within the proposed portfolio and asses them under different market environments based on historical data. **Figure 10** depicts the proposed increase in quality equity under a variety of past scenarios. In this case, our analysis appears to confirm that in periods of market stress, the tilt toward quality tends to outperform portfolios without a quality allocation.

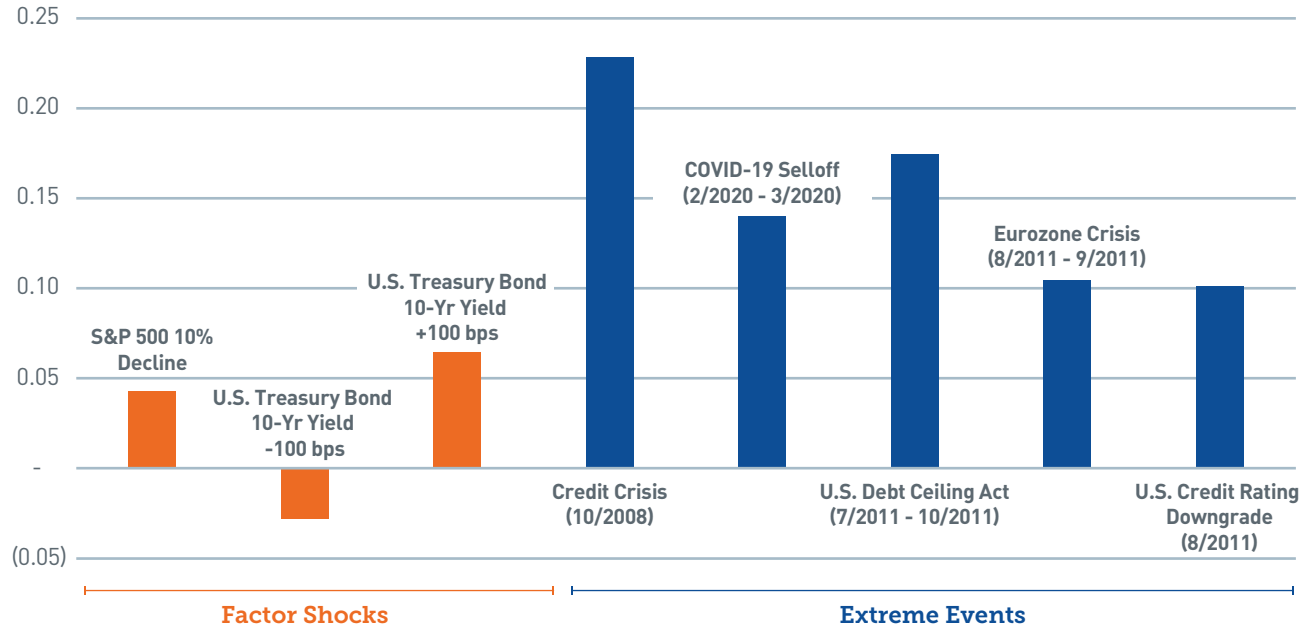
Tactical Trade Monitoring

Performance evaluation is an important step of the investment process to determine the effectiveness of positioning and trade decisions. We believe performance evaluation in the context of tactical trade monitoring can be framed in three stages: (1) Benchmarking, (2) Attribution and (3) Appraisal.

Performance benchmarking provides a reference point for evaluation. Attribution helps identify sources of excess return and requires proper benchmarking tied to respective investment decisions. The appraisal stage assesses the effectiveness of the investment decision and is meant to determine if the tactical trade is performing as expected, or if a change should be considered.

For example, if an investor were to implement a market cap tilt toward an overweight to small-cap equity and sourced the trade from U.S. large cap, an appropriate benchmark would be a large-cap index such as the S&P 500. The excess return of a small-cap index, such as the Russell 2000, versus the S&P 500 index would quantify the relative value added of the "allocation effect," in isolation. If a particular active manager were included in the trade, using the excess return of the manager versus the small-cap index could also be included in the attribution analysis and measured as the "manager effect."

Figure 10 — Scenario Analysis, Example



Source: FactSet®, PNC

In **Figure 11**, we illustrate this example with three reference benchmarks. The allocation effect is positive because the tactical decision to overweight small cap outperformed the market benchmark. However, the implementation using an active manager underperformed the small-cap benchmark.

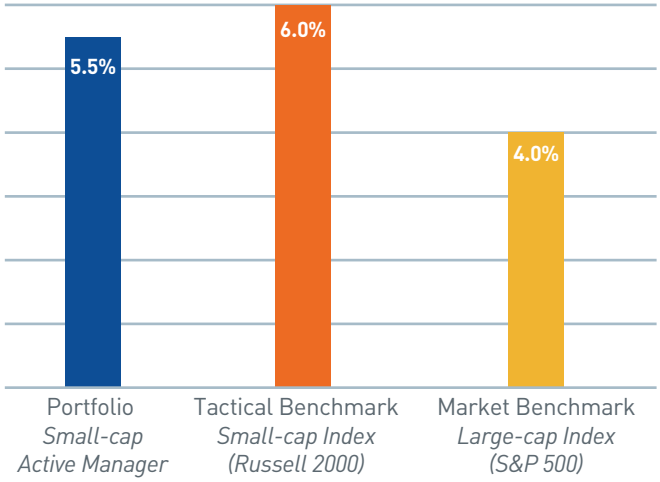
When multiple tactical trades are simultaneously implemented, a separate tactical benchmark might be constructed that includes all the allocation changes to measure the cumulative impact. Tactical benchmark performance can then be compared to a strategic or market allocation-based benchmark. The individual tactical decisions can still be measured, and if constructed properly, they can be sized relative to the portfolio to fully understand the magnitude and impact. This quantitative measurement of the success is a useful tool in evaluating and monitoring an ongoing trade.

When the Plan Comes Together

Markets are dynamic, and as we have outlined, so is our process. The PNC Investment Office investment philosophy and process, combined with a strong risk-based focus, allows us to tailor portfolios to help our clients achieve their goals. As we have demonstrated in this paper, we carefully and thoughtfully use our process to not only develop a long-term allocation for each client and their goals, but also to adjust those allocations tactically to take advantage of market inefficiencies as they arise.

Figure 11 — Attribution Analysis, Example

Absolute Performance



Performance Attribution

Excess Return	Portfolio 5.5%	—	Market Benchmark 4.0%	= 1.5%
Allocation Effect	Tactical Benchmark 6.0%	—	Market Benchmark 4.0%	= 2.0%
Manager Effect	Portfolio 5.5%	—	Tactical Benchmark 6.0%	= -0.5%

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Scan the QR code with your smart phone's camera app to learn more about the PNC Investment Office and our approach to investing.

1- R. J. Shiller, Irrational Exuberance (Princeton, NJ: Princeton University Press, 2000). J. Schwager, Market Sense and Nonsense: How the Markets Really Work (and How They Don't) (New York: Wiley, 2012).