

BlackRock

Rethinking fixed income asset allocation

A systematic approach



Summary

- Diversification is a cornerstone of asset allocation in investing. However, this assumption is critically dependent upon uncorrelated or negatively correlated asset returns.
- The post-pandemic landscape has ushered in an era of high inflation and interest rate volatility leading to increased stock-bond correlations — a stark departure from the negative correlations of the previous two decades.
- The ongoing struggle to rein in inflation has perpetuated volatility and uncertainty surrounding the diversification value of fixed income.
- With Treasuries no longer serving their role as a reliable form of portfolio ballast, asset allocators need a fresh approach to asset allocation and a departure from frameworks built and relied upon in a low interest rate, low inflation environment.
- Armed with data-driven insights, informed by studying historical periods of high inflation and positive stock bond correlation, we propose a more nimble and agile approach aimed at enhancing portfolio resilience.
- In this paper, we examine a novel method of blending tilting and timing in asset allocation to generate portfolios seeking a more consistent return profile.



Raffaele Savi
Global Head of
BlackRock Systematic



Tom Parker, CFA
Chief Investment Officer of
Systematic Fixed Income



Jeffrey Rosenberg, CFA
Senior Portfolio Manager for
Systematic Fixed Income



Ignacio Blanch
Head of Research and Innovation
for Systematic Fixed Income



Jasmitha Mohan, FRM
Portfolio Manager for
Systematic Fixed Income



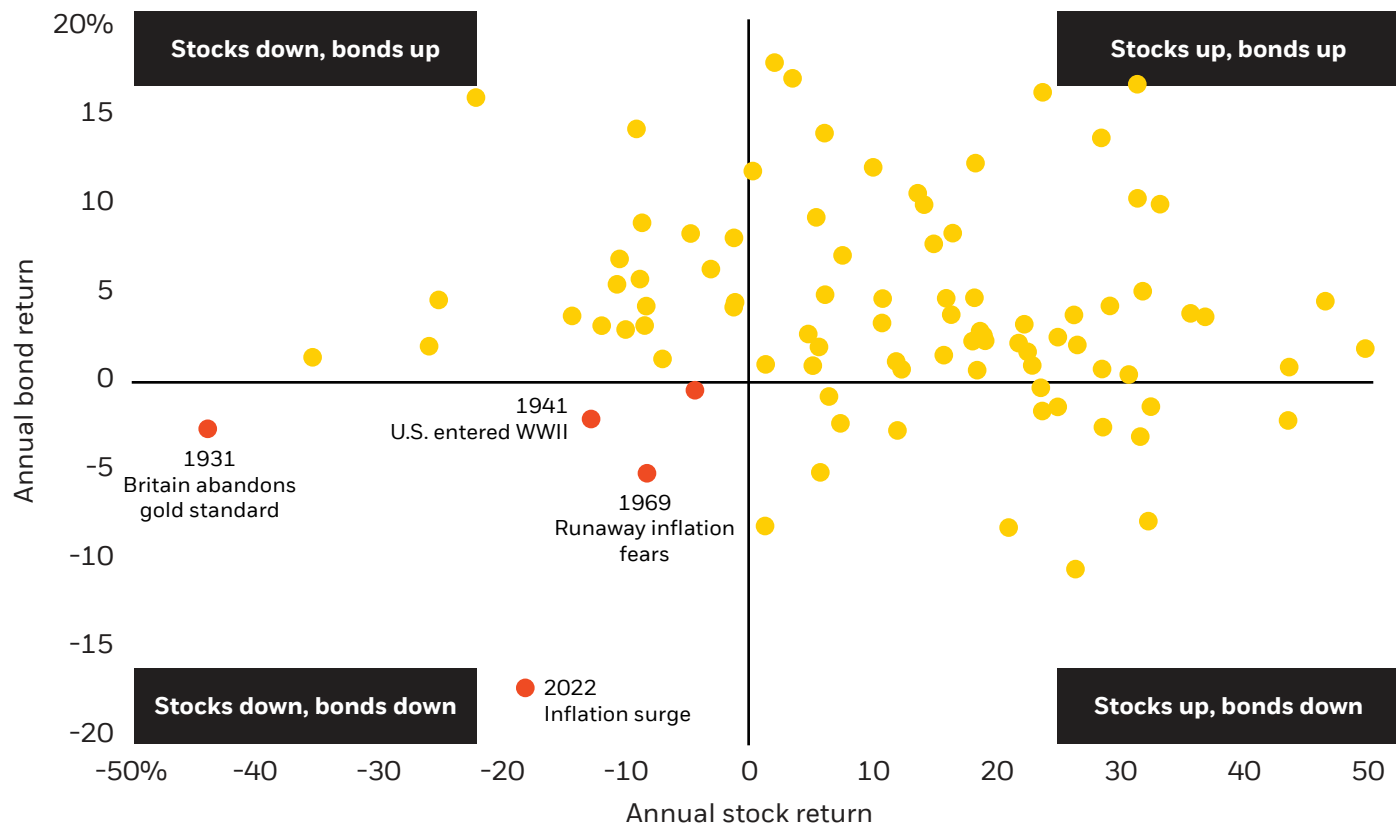
Nikolaos Prezas
Quantitative Researcher for
Systematic Fixed Income

The role of the stock-bond correlation (“SBC”)

Changes in the macroeconomy post-pandemic have ushered in a regime largely unfamiliar to most investors. For over twenty years, price of stocks and bonds typically moved in opposite directions making bonds a reliable diversifier in portfolios. This inverse relationship began to change in 2021 with stock-bond correlation (“SBC”)

turning positive. What followed in 2022 was the fastest and most aggressive monetary tightening since the Volcker shock resulting in rare simultaneous downturn in stocks and bonds leading to historically poor performance (Figure 1).

Figure 1: Annual U.S. equity and bond returns



The return of bonds are based on the annual return of 10-year U.S. Treasury Bond. Stocks are represented by the total return of S&P 500 Index from 1957 onwards. Prior to 1957, the returns are based on price changes in S&P Composite Index. Source: BlackRock, with data from LSEG Datastream as of June 30, 2025. The figures shown relate to past performance. **Past performance is not a reliable indicator of current or future results.** Index performance returns do not reflect any management fees, transaction costs or expenses. Indices are unmanaged and one cannot invest directly in an index.

What drives stock-bond correlation?

There has been much academic literature published decomposing the fundamental and econometric characteristics underlying SBC. One approach with appealing economic sensibility draws the link between SBC and the impact of inflation on consumption, growth and equity valuations.

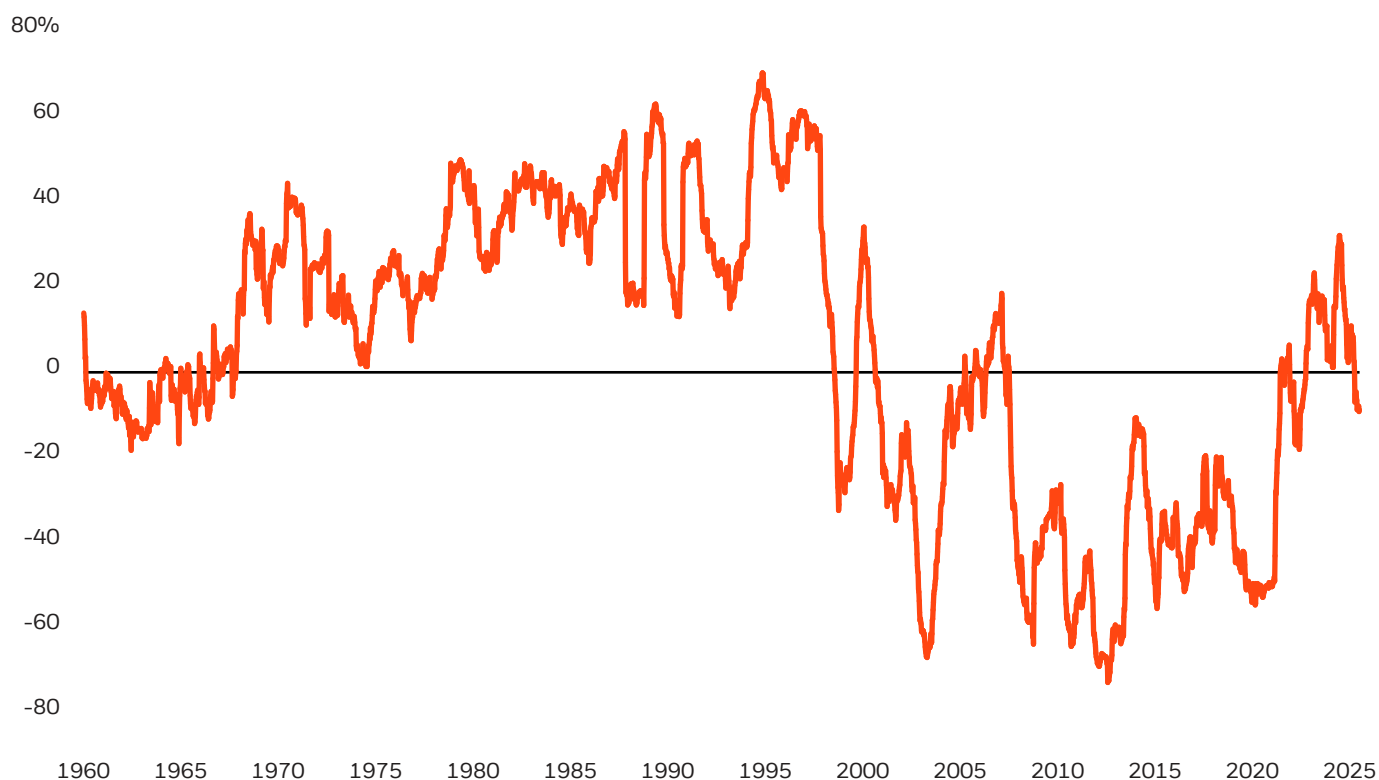
For over the last two decades, stock and bond returns have generally shown negative correlation. Figure 2 shows the rolling 252-day correlation between stock and bond returns since 1960. Between 1970 and 2000, daily stock and bond returns had an average correlation of approximately +30%. However, since 2000, this correlation shifted to an average of -26%.

In 2022, the average daily correlation between stocks and bonds shifted to strongly positive with both asset classes

posting sharp declines. This shift coincided with a profound change in how economic, consumption and confidence levels interact with inflation.¹

COVID-19 pandemic's inflationary period diminished consumers' real purchasing power and eroded confidence; effects that persist and continue to impact consumption forecasts negatively.² The outlook for consumption, and by extension the outlook for the broader economy, is now negatively related to increases in inflation, and this leads to a change in the relationship between stocks and bonds. Periods of rising inflation are not only bad for bonds (as they typically are) but are also bad for stocks (as inflation undermines confidence, spending and growth). The converse also applies, as falling inflation boosts both stocks and bonds. In both directions of inflation, we see a fundamental case for positive SBC.

Figure 2: Stock-bond correlation



Notes: Correlations computed using 252-day lookback, equally weighted daily returns. Return of bonds are based on 10-year U.S. Treasury note and equity returns are represented by S&P 500 Index from 1965. Prior to 1965, equity returns are based on DJ Industrial index. Source: BlackRock, with data from LSEG Datastream as of June 30, 2025.

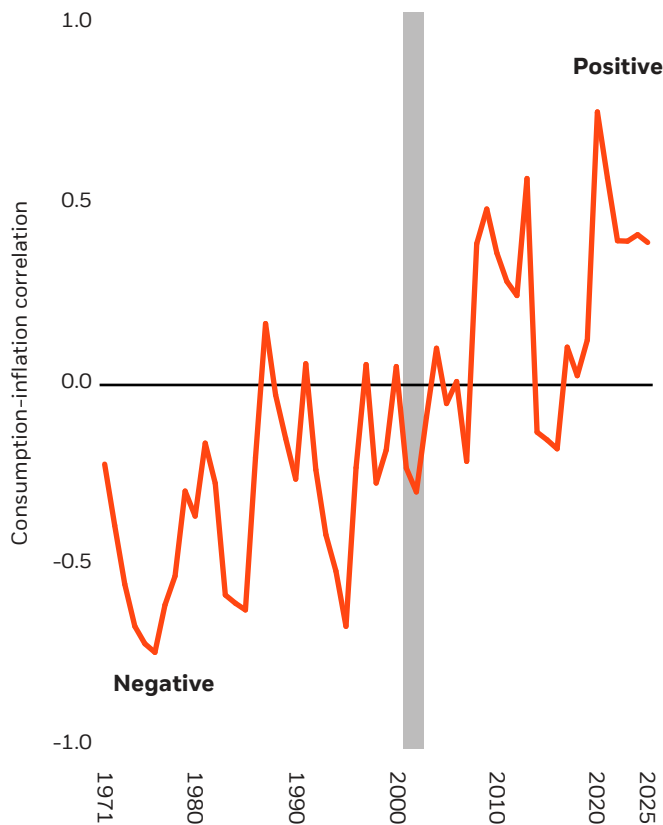
¹ BlackRock Investment Institute. "Investment Perspectives Mega Forces Future of Finance." October 2023. <https://www.blackrock.com/corporate/literature/whitepaper/bii-investment-perspectives-october-2023.pdf>. ² Binici, M., Centorrino, S., Cevik, S., & Gwon, G. (2022). Here Comes the Change: The Role of Global and Domestic Factors in Post-Pandemic Inflation in Europe. IMF Working Papers, 2022(241), A001. Retrieved August 12, 2025, from <https://doi.org/10.5089/9798400225789.001>.

Figure 3 presents the long-term historical trend of how consumption relates to inflation. It highlights a significant change around 2000, similar to the pattern observed in Figure 2 for SBC. Before 2000, inflation and consumption were negatively correlated by an average of 30%, a trend that is comparable to the current situation where an increase in inflation corresponds with a decrease in consumption.

After 2000, the period of sustained low inflation accompanied at times by concerns over the possibility of deflation meant the greater problem facing policy makers was one of too little inflation. As a result, increases in inflation were an objective, associated with improved consumption and economic growth leading to enhanced stock market performance. During this period, the correlation between consumption and inflation was positive, averaging around 15%. This indicates that inflationary periods were generally beneficial for stocks but typically detrimental for bonds, resulting in a negative SBC. And though not yet reflected in long-term correlations in Figure 3, the post-COVID era highlights a return to a negative consumption/inflation relationship, where rising (falling) inflation is both bad (good) for bonds and stocks and hence contributing to positive stock-bond correlation.

Moving forward, the crucial insight for portfolio management is that a dependable negative SBC, which historically allowed bonds to diversify portfolios effectively, is unlikely to reemerge. This will only happen if there is a resurgence of a positive link between consumption and inflation.

Figure 3: Inflation may now harm growth



Notes: Long-term correlation between consumption and inflation based on 5-year window of quarterly PCE and GDP price deflator.
 Source: Federal Reserve Bank of St Louis, as of March 31, 2025. Calculations based on those presented in NBER working paper No. 27861 “Stock-bond return correlation, bond risk premium fundamental, and fiscal-monetary policy regime” September 2020.

Stock-bond correlation and market regimes

In the late '90s, central banks in developed markets gained credibility for their ability to control inflation, supported by global trends that kept inflation below target levels. This harmonious monetary policy supported growth and also stabilized inflation — a phenomenon Olivier Blanchard and Jordi Gali called the “divine coincidence” of monetary policy.³

During this period, markets were characterized by alternating between “risk on” and “risk off” regimes. In each of these phases, risky assets such as equities and credit would move inversely to safe assets such as government bonds. The SBC was consistently negative over this timeframe. Post Global Financial Crisis, the

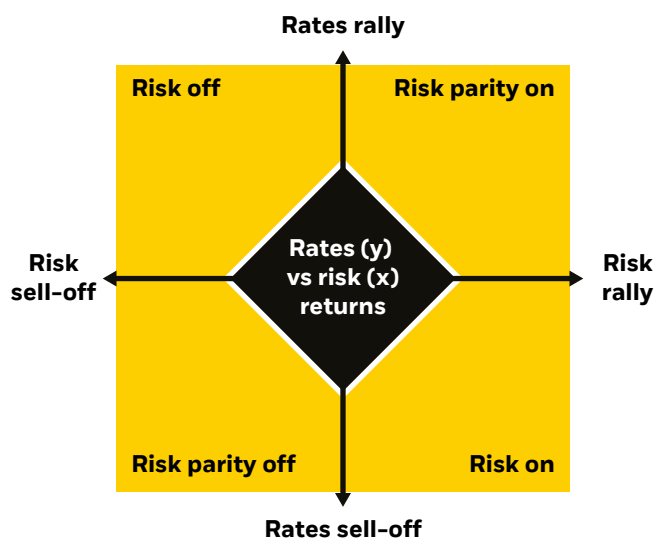
combination of positive risk premia for both asset types, combined with negative SBC, led to a rise in the popularity of risk parity allocations (allocating exposures based on risk contribution). Risk parity asset allocations capitalize on the diversification benefits of government bonds to optimize portfolios during periods of negative SBC.

But this was not always the case. From the mid-'60s to the late '90s, a period characterized by high inflation uncertainty, SBC was mostly positive. During this time, markets were characterized by risky and safe assets moving in tandem, which we refer to as ‘risk parity’ regimes.

³ Blanchard, O. and Gali, J. (2007), “Real Wage Rigidities and the New Keynesian Model,” Journal of Money, Credit and Banking, Vol. 39, No 1, pp.36-65.

The illustration in Figure 4 depicts how the SBC interacts with different market conditions, specifically “risk” and “risk parity” scenarios. Negative SBC regimes, where risky and safe asset returns move in opposite directions, align with risk on/risk off market environments (the southeast to northwest diagonal). Conversely, positive SBC regimes, where both risky and safe assets move together, align with risk parity on/risk parity off movements (the southwest to northeast diagonal).

Figure 4: “Risk parity on/off” vs. “risk on/off” quadrants



Notes: For illustrative purposes only. Source: BlackRock.

Traditional asset allocation approaches

Asset allocators traditionally differentiate between “strategic” and “tactical” decision making. The former involves harvesting long-term risk premia (i.e., the compensation for bearing any multitude of types of risk) across asset classes, while the latter focuses on identifying short-term dislocations, either directionally or cross-sectionally. The distinction reflects two ways investors typically seek to generate returns in financial markets.

In our systematic framework, “tilt” and “timing” correspond to strategic and tactical asset allocation. “Tilt” is slow-moving and seeks to capture long-term risk premia. It generally contributes positively to portfolios during low volatility periods and expansion phases of the economic cycle. “Timing” is fast and complements tilt by seeking to generate positive returns in periods of higher volatility or economic transitions.

Combining tilt with timing in asset allocation can result in portfolios with a more consistent return profile. Both strategies are crucial for navigating the full spectrum of economic cycles and market volatility, corresponding to both transitions into and out of economic recessions and/or financial crises. Timing can offset periods of underperformance when tilts are struggling. Conversely, in periods where volatility is muted, and risk premia are stable, tilts can add value.

A closer look at tilts

Asset allocation tilts are adjusted to capture gradually evolving long-term trends in expected returns, accommodating both directional long exposures and cross-sectional short positions. These include well-known risk premia, such as carry, which are dynamic and reflect changes in the potential for expected returns and relative value across asset classes within a strategic asset allocation framework. Generally, tilts are based on three broad concepts which encapsulate the economic sensibility of risk parity, momentum and carry.

Inverse volatility weighted (1/vol)

This approach establishes the archetypical “risk parity” portfolio where each asset is given the same level of risk. The total risk for the portfolio is balanced out according to predictions of long-term risk and return. While risk parity typically thrives in stable conditions with low inflation, they have recently faced challenges due to inflation and increasing interest rates, which have simultaneous losses in both stocks and bonds.

Trend following (mean/vol)

This approach uses asset price trends, return persistence and serial correlation observed in asset returns captured by a mean (smoothed) of recent realized returns. It plays a key role in Commodity Trading Advisor (CTA) funds’ time-series momentum strategies. Mean/vol is defensive during protracted downturns such as the Global Financial Crisis, but vulnerable to sharp market reversals. Abrupt selloffs, followed by steep market rallies are its Achilles’ heel, as seen with the quick sell-off and rally in March 2020, an environment where recent returns are poor predictors of future performance.

Volatility adjusted expected return (carry/vol)

The carry factor approach for fixed income allocation relies on forward-looking return expectations. Since carry in fixed income is inversely related to recent price returns, this factor has a strong value trait, favoring underperforming assets. This pro-cyclical tilt is challenged during extended market downturns or recessions.

Table 1 summarizes key performance statistics from a stylized back-test of two-asset tilt portfolios constructed using the above-mentioned approaches. In line with expectations, tilt portfolios generally exhibit a strong risk-on profile (i.e., they outperform in up markets and underperform in down markets) with carry/vol being the most risk seeking. Tilt is also implicitly short volatility (i.e., it underperforms when market volatility is high or

increasing). Historically, these strategies have tended to perform well in low-volatility, growth-positive environments (i.e., "Goldilocks"), and have struggled during periods of stagnant or negative growth combined with rising inflation (i.e., "stagflation"). The trend-following approach offers the most defensive return profile, but at the cost of limited upside. Figure 5 shows cumulative return for each type of tilt portfolio.

Table 1: Performance statistics for tilt portfolios

	1/vol	mean/vol	carry/vol
Return	0.72%	0.73%	0.73%
Risk	1.08%	0.97%	1.10%
Information ratio	0.66	0.75	0.67
S&P 500			
Up months	1.95%	1.21%	2.39%
Down months	-1.75%	-0.24%	-2.55%
Risk parity			
Up months	2.55%	1.31%	2.09%
Down months	-2.63%	-0.35%	-1.78%
Growth/inflation regime			
Goldilocks	1.47%	0.83%	2.14%
Overheating	0.74%	0.88%	0.72%
Slowdown	1.15%	0.75%	1.16%
Stagflation	-0.28%	0.47%	-0.62%
Interest rate volatility regime (MOVE)			
Quartile 1	1.44%	1.36%	1.61%
Quartile 2	1.40%	0.85%	1.27%
Quartile 3	0.50%	0.53%	0.57%
Quartile 4	-0.02%	0.36%	-0.04%
Risk volatility regimes (VIX)			
Quartile 1	2.03%	1.97%	2.21%
Quartile 2	1.15%	1.09%	1.56%
Quartile 3	0.64%	0.22%	0.77%
Quartile 4	-0.54%	0.10%	-1.14%

Notes: Summary of performance statistics from a stylized back-test for a hypothetical two-asset tilt portfolio containing U.S. 10-year Treasury Note Future and 5-year U.S. High Yield CDX rebalanced daily. Performance measured over period July 31, 2006–June 30, 2025. Risk and return statistics are reported annualized using monthly data. Asset returns based on TY1 Comdty and Markit CDX.NA.HY 5-year Excess Return Index. Growth and inflation regimes defined using difference between 3-month and 6-month average for U.S. Manufacturing PMI and headline CPI YOY respectively. Interest rate volatility regimes defined using ICE BofA MOVE Index. Risk regimes defined using Chicago Board Options Exchange Volatility (VIX) Index. Risk parity regime returns calculated for a hypothetical inverse volatility weighted portfolio of S&P 500 Index and Bloomberg Barclays U.S. Treasury Index. Performance measured over period July 31, 2006–June 30, 2025. Source: BlackRock, with data from Bloomberg. For illustrative purposes only. The figures shown relate to past performance. **Past performance is not a reliable indicator of current or future results.**

This presentation contains back-tested data for indices listed above. Unless otherwise noted, returns do not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Hypothetical data results are based on criteria applied retroactively with the benefit of hindsight and knowledge of factors that may have positively affected its performance, and cannot account for risk factors that may affect actual performance. The back-tested past performance returns are shown for illustrative purposes only and are not meant to be representative of actual performance returns of any account, portfolio or strategy. The back-tested performance period is from July 31, 2006–June 30, 2025.

The securities or asset classes in the back-tested portfolios were selected with the full benefit of hindsight, after their performance returns over the period shown was known. It is not likely that similar results could be achieved in the future. Back-tested performance returns have certain limitations. Unlike actual performance returns, they do not reflect actual trading, liquidity constraints, fees and other costs. Back-tested performance returns are indicative of a hypothetical portfolio rebalanced daily. No representation is being made that any account, portfolio or strategy will or is likely to achieve results similar to those shown.

Figure 5: Cumulative performance of different types of tilt portfolio



Notes: Stylized back-test showing cumulative performance of each type of tilt calculated for a two-asset portfolio of U.S. 10-year Treasury Note Future and 5-year High Yield CDX rebalanced daily. Asset returns based on TY1 Comdty and Markit CDX.NA.HY 5-year Excess Return Index. 1/vol portfolio uses inverse volatility weighting for each asset. Mean/volatility approach uses the ratio of exponentially weighted moving average return with 252-day half-life over volatility to weight each asset. Carry/vol method uses 5-year High Yield CDX Option Adjusted Spread and 10-year repo rates as measure of carry of each asset respectively. Volatility is computed as the exponentially weighted standard deviation of daily returns with 63-day half-life. Performance measured over period July 31, 2006–June 30, 2025. Source: BlackRock, with data from Bloomberg. For illustrative purposes only. The figures shown relate to past performance. **Past performance is not a reliable indicator of current or future results.**

This presentation contains back-tested data for indices listed above. Unless otherwise noted, returns do not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Hypothetical data results are based on criteria applied retroactively with the benefit of hindsight and knowledge of factors that may have positively affected its performance, and cannot account for risk factors that may affect actual performance. The back-tested past performance returns are shown for illustrative purposes only and are not meant to be representative of actual performance returns of any account, portfolio or strategy. The back-tested performance period is from July 31, 2006–June 30, 2025.

The securities or asset classes in the back-tested portfolios were selected with the full benefit of hindsight, after their performance returns over the period shown was known. It is not likely that similar results could be achieved in the future. Back-tested performance returns have certain limitations. Unlike actual performance returns, they do not reflect actual trading, liquidity constraints, fees and other costs. Back-tested performance returns are indicative of a hypothetical portfolio rebalanced daily. No representation is being made that any account, portfolio or strategy will or is likely to achieve results similar to those shown.

A closer look at timing

Asset allocation timing is about generating alpha by tactically capitalizing on significant market movements. Therefore, timing indicators are quicker than tilts and designed to be directionally neutral over time (i.e., equally long and short). Timing signals typically fall within two main categories:

Market-based technicals

These are fast indicators which consume market data such as price return, level etc. and capture short-term momentum bursts, or the cross-asset lead/lag interactions that take place when markets react to exogenous surprises.

Macro-based fundamentals

Large and persistent market moves can also be driven by broader changes in macroeconomic fundamentals, which

are gradually reflected in asset pricing. Therefore, it is sensible to complement the faster technical signals with slower ones that rely on leading properties of key macroeconomic data. This data can be either structured (e.g., metrics in corporate financial statements), or unstructured such as central bank statements. With advancements in AI-based machine learning techniques, we can now analyze unstructured data sets to forecast investment outcomes. For example, we can extract market sentiment from central bank reports using sophisticated algorithms. With central banks actively combating inflation, these tools allow us to develop nuanced signals based on the language used in central bank communications.

Revisiting asset allocation framework in positive SBC regimes

Asset allocation frameworks, that have been developed and tested over the last two decades (a period defined by negative SBC), must adapt to the current positive but unstable SBC regime. A positive SBC regime makes it difficult to diversify risk, exposing portfolios to extreme tail events and deeper maximum drawdowns. This significant change underscores the need for a more dynamic approach to asset allocation. This approach should include robust timing that is defensive and aims to perform well in both positive and negative SBC regimes.

This also means tackling the challenge of developing insights for a relatively unfamiliar positive SBC regime. To address the lack of recent experience with positive SBC, we examine periods of high inflation and positive SBC from the early 1960s in our research. This allows us to test and validate new insights that are robust and can navigate both risk-on/off and risk-parity-on/off regimes.

Within our framework, we define a “risk on/risk off” (R2) factor and a “risk parity on/risk parity off” (P2) factor.

In negative SBC regimes, we aim to maximize the return of the R2 factor by taking a long position in risky assets and a corresponding short position in safe assets. Asset weights are adjusted so that each asset contributes equally to the overall risk. The direction of these exposures means the factor exhibits the maximum gain (loss) during risk on (off) periods.

In positive SBC regimes, we aim to maximize the return of the P2 factor by taking long positions in both risky and safe assets. Asset weights are adjusted so that each asset contributes equally to the overall risk. The direction of these exposures means the factor exhibits the maximum gain (loss) during risk parity on (off) periods.

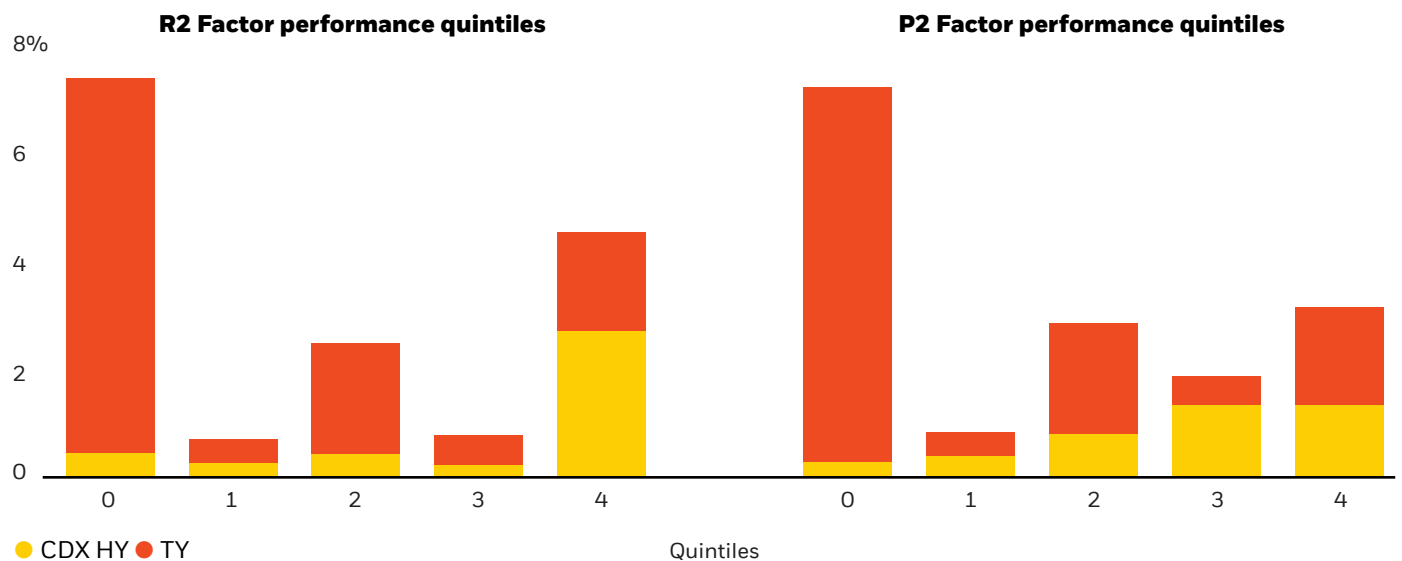
Putting it all together

As systematic investors, we embrace innovation and new methods to maintain an information edge in financial markets. By expanding our research to cover data from the 1960s and tapping into sophisticated machine learning techniques to analyze complex data, we've identified valuable insights. These insights allow us to dynamically navigate positive and negative SBC regimes. **Our framework captures SBC regime shifts without directly estimating the SBC parameter, aligning with the risk on/off and risk parity on/off factors.**

To verify the efficacy of these insights, we examine the average performance of timing R2 and P2 factor across various regimes. We construct R2 and P2 factor as a two-asset portfolio made up of 5-year High Yield CDX as

the risky asset and 10-year U.S. Treasury Note Future as the safe asset. (R2 factor is long risky asset and short safe asset; equal risk weighted, P2 factor is long both risky and safe asset; equal risk weighted). We then modulate the exposure of these factors using our timing indicators and measure performance through time. The bar chart in Figure 6 shows the performance of each timed factor across return quintiles for a buy and hold R2 and P2 portfolios. On average, the returns are positive across all quintiles and most notably concentrated at the tails of return distribution for R2 and P2 factors. This concentration gives the bar chart its convex shape. This clustering of performance in the tails indicates a defensive return profile and outperformance during periods of extreme market conditions.

Figure 6: Portfolio timing returns in R2 and P2 factor return quintiles



Notes: Bar plot showing average monthly performance of timing R2 and P2 portfolio of a risky (5-year High Yield CDX) and safe (10-year U.S. Treasury Note Future) asset in quintiles of returns for risk parity "R2" and risk on-risk off "P2" factor. Timing portfolio uses a blend of proprietary technical and fundamental insights. Asset returns based on TY1 Comdty and Markit CDX.NA.HY 5-year Excess Return Index. Portfolio rebalanced daily over period July 31, 2006–June 30, 2025. Source: BlackRock, with data from Bloomberg. For illustrative purposes only. The figures shown relate to past performance. **Past performance is not a reliable indicator of current or future results.**

This presentation contains back-tested data for the indices listed above. Unless otherwise noted, returns do not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Hypothetical data results are based on criteria applied retroactively with the benefit of hindsight and knowledge of factors that may have positively affected its performance, and cannot account for risk factors that may affect actual performance. The back-tested past performance returns are shown for illustrative purposes only and are not meant to be representative of actual performance returns of any account, portfolio or strategy. The back-tested performance period is from July 31, 2006–June 30, 2025.

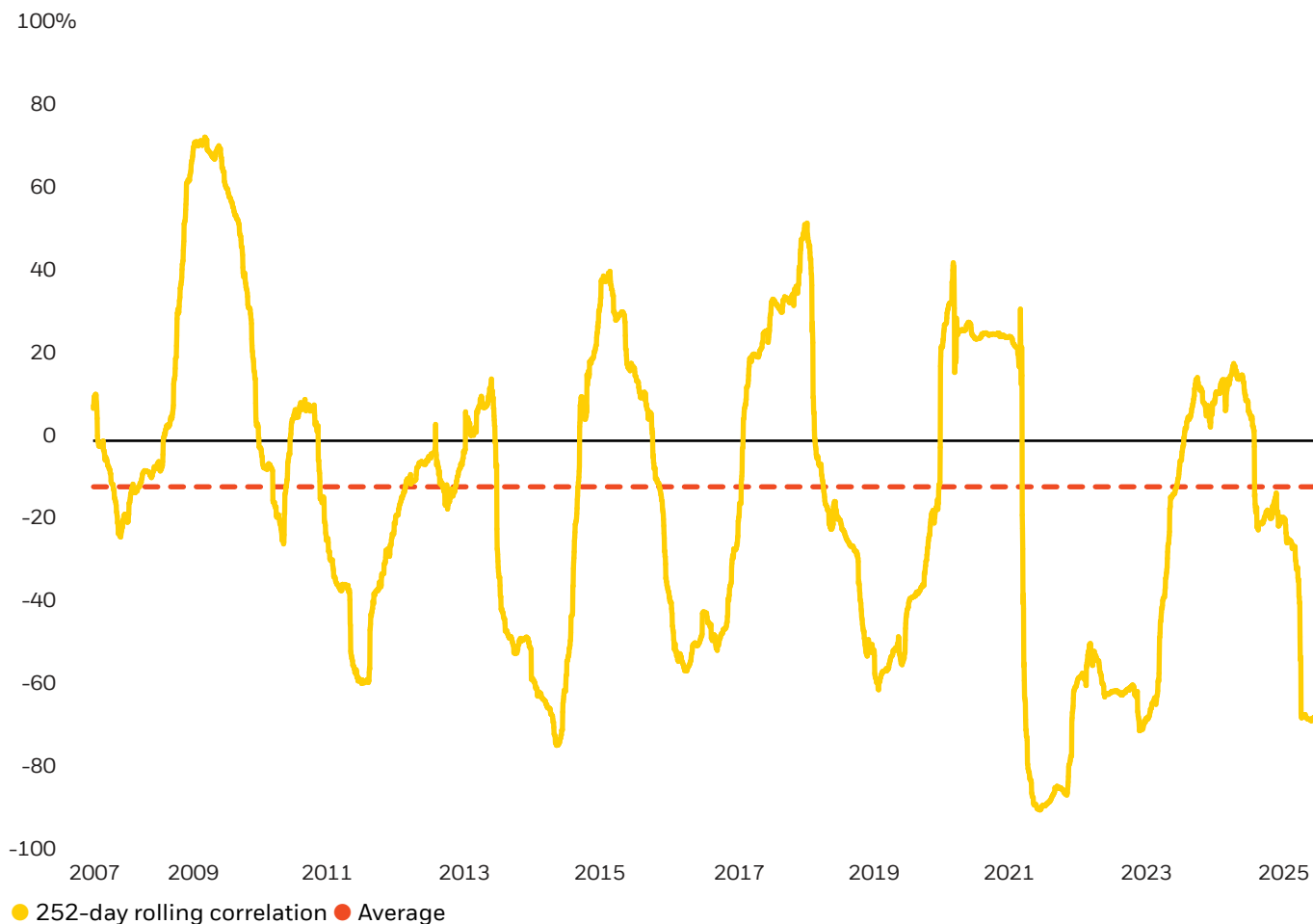
The securities or asset classes in the back-tested portfolios were selected with the full benefit of hindsight, after their performance returns over the period shown was known. It is not likely that similar results could be achieved in the future. Back-tested performance returns have certain limitations. Unlike actual performance returns, they do not reflect actual trading, liquidity constraints, fees and other costs. Back-tested performance returns are indicative of a hypothetical portfolio rebalanced daily. No representation is being made that any account, portfolio or strategy will or is likely to achieve results similar to those shown.

For tilt, we use a blend of trend following and carry/vol based approach, balancing the defensiveness of trend following with risk seeking, and aim for a higher return profile of carry/vol.

We examine the correlation between tilt and timing to ensure additivity. Figure 7 displays the rolling 252-day

correlation. The average correlation over the performance window is -14%. The low or slightly negative correlation between tilt and timing suggests that together, they have the potential to enhance risk-adjusted returns and generate a more consistent return profile across SBC regimes.

Figure 7: Correlation between tilt and timing



Notes: 252-day correlation between tilt and timing returns measured over period July 31, 2006–June 30, 2025. Correlation statistics from a stylized back-test for a hypothetical two-asset tilt portfolio containing U.S. 10-year Treasury Note Future and 5-year U.S. High Yield CDX rebalanced daily. Asset returns based on TY1 Comdty and Markit CDX.NA.HY 5-year Excess Return Index. Performance measured over period July 31, 2006–June 30, 2025. Correlation statistics from a stylized back-test for a hypothetical two-asset tilt portfolio containing U.S. 10-year Treasury Note Future and 5-year U.S. High Yield CDX rebalanced daily. Asset returns based on TY1 Comdty and Markit CDX.NA.HY 5-year Excess Return Index. Performance measured over period July 31, 2006–June 30, 2025. Risk and return statistics are reported annualized using monthly data. Growth and inflation regimes defined using difference between 3-month and 6-month average for U.S. Manufacturing PMI and headline CPI YOY respectively. Interest rate volatility regimes defined using ICE BofA MOVE Index. Risk regimes defined using Chicago Board Options Exchange Volatility (VIX) Index. Risk parity regime returns calculated for a hypothetical inverse volatility weighted portfolio of S&P 500 Index and Bloomberg Barclays U.S. Treasury Index. Performance measured over period July 31, 2006–June 30, 2025. Source: BlackRock, with data from Bloomberg. For illustrative purposes only. The figures shown relate to past performance. **Past performance is not a reliable indicator of current or future results.**

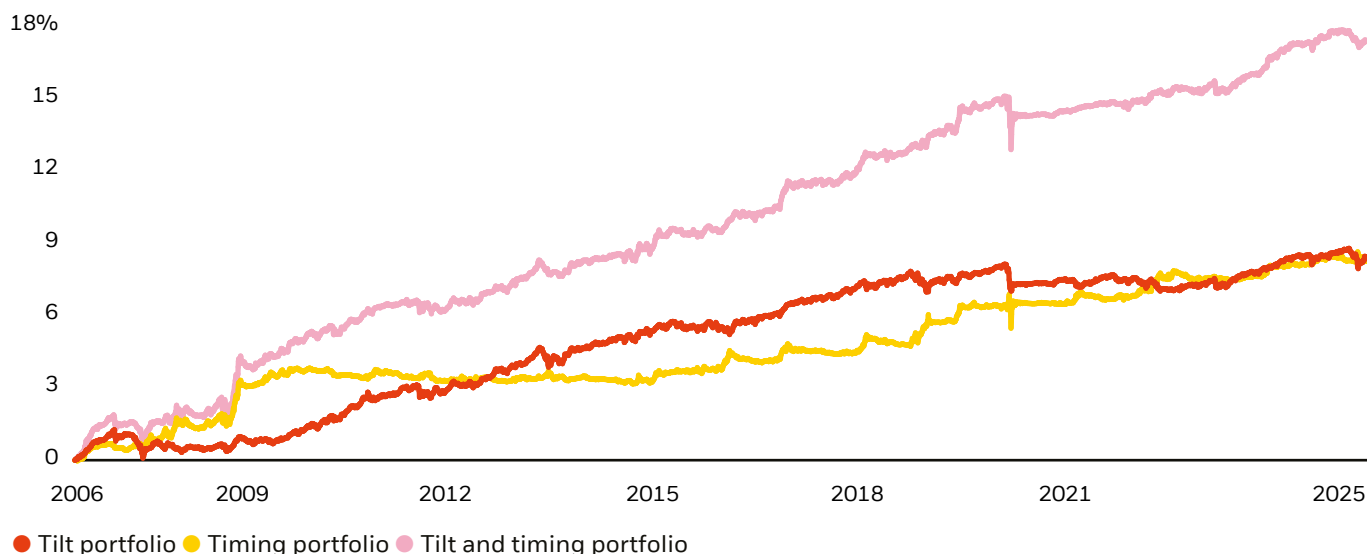
This presentation contains back-tested data for the indices listed above. Unless otherwise noted, returns do not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Hypothetical data results are based on criteria applied retroactively with the benefit of hindsight and knowledge of factors that may have positively affected its performance, and cannot account for risk factors that may affect actual performance. The back-tested past performance returns are shown for illustrative purposes only and are not meant to be representative of actual performance returns of any account, portfolio or strategy. The back-tested performance period is from July 31, 2006–June 30, 2025.

The securities or asset classes in the back-tested portfolios were selected with the full benefit of hindsight, after their performance returns over the period shown was known. It is not likely that similar results could be achieved in the future. Back-tested performance returns have certain limitations. Unlike actual performance returns, they do not reflect actual trading, liquidity constraints, fees and other costs. Back-tested performance returns are indicative of a hypothetical portfolio rebalanced daily. No representation is being made that any account, portfolio or strategy will or is likely to achieve results similar to those shown.

Ultimately, we combine tilt and timing using the scientific and disciplined techniques pioneered by Richard Grinold and Ronald Kahn.⁴ Optimization methods balance the return forecasts from these characteristics against the risk of deviating from a given benchmark. Our systematic asset allocation framework is versatile, and can be appropriate for both top-level multi-asset allocation seeking to harvest broad risk premia and for systematic global macro strategies to exploit short-term opportunities. In our Systematic Fixed Income team, we use this framework to tilt and time core allocations within multi-sector strategies. Our framework adapts to market conditions by emphasizing tilts in stable markets. It focuses on timing to enhance alpha potential and defensiveness in periods when outcomes are driven by tails of asset return distribution.

Figure 8 and Table 2 show cumulative returns and performance statistics from a stylized back-test of a tilt, timing and tilt + timing portfolio. As conjectured, a combination of tilt and timing yields better risk-adjusted performance with an information ratio of 1.26 vs. 0.85 for tilt and 0.82 for timing. The correlation statistics also highlight the additivity from combining a defensive timing overlay to a traditional risk on tilt as measured by lower correlation to broad market betas. In conclusion, our framework seeks to deliver a portfolio with a more upside participation and helps mitigate losses in down markets across SBC regimes.

Figure 8: Cumulative returns of tilting + timing



Notes: Summary of stylized back-test showing cumulative performance of hypothetical performance statistics for tilt, timing and tilt + timing portfolio in Figure 8 and in Table 2. Correlation statistics calculated using data for Bloomberg U.S. Treasury Total Return Index, Bloomberg U.S. Corporate High Yield Total Return Index and S&P 500 Total Return Index. Stylized back-test for a hypothetical two-asset tilt portfolio containing U.S. 10-year Treasury Note Future and 5-year U.S. High Yield CDX rebalanced daily. Performance measured over period July 31, 2006–June 30, 2025. Risk and return statistics are reported annualized using monthly data. Growth and inflation regimes defined using difference between 3-month and 6-month average for U.S. Manufacturing PMI and headline CPI YOY respectively. Interest rate volatility regimes defined using ICE BofA MOVE Index. Risk regimes defined using Chicago Board Options Exchange Volatility (VIX) Index. Risk Parity regime returns calculated for a hypothetical inverse volatility weighted portfolio of S&P 500 Index and Bloomberg Barclays U.S. Treasury Index. Performance measured over period July 31, 2006–June 30, 2025. Source: BlackRock, with data from Bloomberg. For illustrative purposes only. The figures shown relate to past performance. **Past performance is not a reliable indicator of current or future results.**

This presentation contains back-tested data for the indices listed above. Unless otherwise noted, returns do not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Hypothetical data results are based on criteria applied retroactively with the benefit of hindsight and knowledge of factors that may have positively affected its performance, and cannot account for risk factors that may affect actual performance. The back-tested past performance returns are shown for illustrative purposes only and are not meant to be representative of actual performance returns of any account, portfolio or strategy. The back-tested performance period is from July 31, 2006–June 30, 2025.

The securities or asset classes in the back-tested portfolios were selected with the full benefit of hindsight, after their performance returns over the period shown was known. It is not likely that similar results could be achieved in the future. Back-tested performance returns have certain limitations. Unlike actual performance returns, they do not reflect actual trading, liquidity constraints, fees and other costs. Back-tested performance returns are indicative of a hypothetical portfolio rebalanced daily. No representation is being made that any account, portfolio or strategy will or is likely to achieve results similar to those shown.

⁴ Richard Grinold and Ronald Kahn. "Active Portfolio Management: A Quantitative Approach for Producing Superior Returns and Controlling Risk." McGraw Hill, 2nd edition. 1999.

Table 2: Performance statistics for blended tilt + timing portfolio

	Tilt	Timing	Tilt + timing
Return	0.44%	0.42%	0.86%
Risk	0.51%	0.50%	0.69%
Information ratio	0.87	0.85	1.25
S&P 500			
Up months	1.08%	0.27%	1.35%
Down months	-0.84%	0.74%	-0.11%
Risk parity			
Up months	1.02%	0.35%	1.37%
Down months	-0.64%	0.56%	-0.08%
Growth/inflation regime			
Goldilocks	0.89%	0.42%	1.31%
Overheating	0.48%	0.06%	0.54%
Slowdown	0.57%	0.58%	1.16%
Stagflation	-0.04%	0.66%	0.61%
Interest rate volatility regime (MOVE)			
Quartile 1	0.89%	0.12%	1.01%
Quartile 2	0.64%	0.33%	0.97%
Quartile 3	0.33%	0.49%	0.83%
Quartile 4	0.10%	0.64%	0.74%
Risk volatility regimes (VIX)			
Quartile 1	1.25%	0.36%	1.61%
Quartile 2	0.79%	0.09%	0.88%
Quartile 3	0.30%	0.39%	0.69%
Quartile 4	-0.31%	0.83%	0.51%
Correlation			
Treasury	2.72%	22.46%	18.10%
HY	46.83%	-8.98%	27.72%
SPX	54.21%	-15.77%	28.24%

Notes: Summary of stylized back-test showing cumulative performance of hypothetical performance statistics for tilt, timing and tilt + timing portfolio in Figure 8 and in Table 2. Correlation statistics calculated using data for Bloomberg U.S. Treasury Total Return Index, Bloomberg U.S. Corporate High Yield Total Return Index and S&P 500 Total Return Index.

Stylized back-test for a hypothetical two-asset tilt portfolio containing U.S. 10-year Treasury Note Future and 5-year U.S. High Yield CDX rebalanced daily. Performance measured over period July 31, 2006–June 30, 2025. Risk and return statistics are reported annualized using monthly data. Growth and inflation regimes defined using difference between 3-month and 6-month average for U.S. Manufacturing PMI and headline CPI YOY respectively. Interest rate volatility regimes defined using ICE BofA MOVE Index. Risk regimes defined using Chicago Board Options Exchange Volatility (VIX) Index. Risk Parity regime returns calculated for a hypothetical inverse volatility weighted portfolio of S&P 500 Index and Bloomberg Barclays U.S. Treasury Index. Performance measured over period July 31, 2006–June 30, 2025. Source: BlackRock, with data from Bloomberg. For illustrative purposes only. The figures shown relate to past performance. **Past performance is not a reliable indicator of current or future results.**

This presentation contains back-tested data for the indices listed above. Unless otherwise noted, returns do not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Hypothetical data results are based on criteria applied retroactively with the benefit of hindsight and knowledge of factors that may have positively affected its performance, and cannot account for risk factors that may affect actual performance. The back-tested past performance returns are shown for illustrative purposes only and are not meant to be representative of actual performance returns of any account, portfolio or strategy. The back-tested performance period is from July 31, 2006–June 30, 2025.

The securities or asset classes in the back-tested portfolios were selected with the full benefit of hindsight, after their performance returns over the period shown was known. It is not likely that similar results could be achieved in the future. Back-tested performance returns have certain limitations. Unlike actual performance returns, they do not reflect actual trading, liquidity constraints, fees and other costs. Back-tested performance returns are indicative of a hypothetical portfolio rebalanced daily. No representation is being made that any account, portfolio or strategy will or is likely to achieve results similar to those shown.

Conclusion

The post-pandemic shifts in interest rates and inflation have significantly changed market dynamics. This new reality means both discretionary and systematic investors should reconsider asset allocation approaches that have been developed and tested over the last two decades. Given the current positive but unstable SBC, it's crucial for those that manage assets to be more deliberate about navigating “risk” and “risk parity” regimes. By examining historical periods of high inflation and positive SBC, we can unlock valuable insights that allow for more dynamic allocation suitable for both negative and positive SBC regimes. A systematic allocation approach, guided by economic sensibility and powered by these data-driven insights is well positioned in seeking to deliver more consistent portfolio outcomes in a world of unpredictability.

For investors in Italy: This document is marketing material. Before investing please read the Prospectus and the PRIIPs KID available on www.blackrock.com/it, which contain a summary of investors' rights.

Risk warnings

Capital at risk. The value of investments and the income from them can fall as well as rise and are not guaranteed. Investors may not get back the amount originally invested.

Past performance is not a reliable indicator of current or future results and should not be the sole factor of consideration when selecting a product or strategy.

Changes in the rates of exchange between currencies may cause the value of investments to diminish or increase. Fluctuation may be particularly marked in the case of a higher volatility fund and the value of an investment may fall suddenly and substantially. Levels and basis of taxation may change from time to time and depend on personal individual circumstances.

Important information

This material is provided to the recipient on a strictly confidential basis and is intended for informational or educational purposes only. Nothing in this document, directly or indirectly, represents to you that BlackRock will provide, or is providing BlackRock products or services to the recipient, or is making available, inviting, or offering for subscription or purchase, or invitation to subscribe for or purchase, or sale, of any BlackRock fund, or interests therein. This material neither constitutes an offer to enter into an investment agreement with the recipient of this document, nor is it an invitation to respond to it by making an offer to enter into an investment agreement.

The distribution of the information contained herein may be restricted by law and any person who accesses it is required to comply with any such restrictions. By reading this information you confirm that you are aware of the laws in your own jurisdiction regarding the provision and sale of funds and related financial services or products, and you warrant and represent that you will not pass on or utilize the information contained herein in a manner that could constitute a breach of such laws by BlackRock, its affiliates or any other person.

In the U.S.: this material is intended for Institutional Investors only.

In Canada, this material is intended for permitted clients as defined under Canadian securities law, is for educational purposes only, does not constitute investment advice and should not be construed as a solicitation or offering of units of any fund or other security in any jurisdiction.

In Latin America, for Institutional Investors and Financial Intermediaries Only (Not for public distribution). This material is for educational purposes only and does not constitute an offer or solicitation to sell or a solicitation of an offer to buy any shares of any fund (nor shall any such shares be offered or sold to any person) in any jurisdiction in which an offer, solicitation, purchase or sale would be unlawful under the securities law of that jurisdiction. It is possible that some or all of the funds mentioned in this document have not been registered with the securities regulator of Argentina, Brazil, Chile, Colombia, Mexico, Panama, Peru, Uruguay or any other securities regulator in any Latin American country and thus might not be publicly offered within any such country. The securities regulators of such countries have not confirmed the accuracy of any information contained herein. No information discussed herein can be provided to the general public in Latin America.

In Argentina, only for use with Qualified Investors under the definition as set by the Comisión Nacional de Valores (CNV).

In Brazil, this private offer does not constitute a public offer, and is not registered with the Brazilian Securities and Exchange Commission, for use only with professional investors as such term is defined by the *Comissão de Valores Mobiliários*.

In Chile, the securities if any described in this document are foreign securities, therefore: i) their rights and obligations will be subject to the legal framework of the issuer's country of origin, and therefore, investors must inform themselves regarding the form and means through which they may exercise their rights; and that ii) the supervision of the Commission for the Financial Market (Comisión para el Mercado Financiero or "CMF") will be concentrated exclusively on compliance with the information obligations established in General Standard No. 352 of the CMF and that, therefore, the supervision of the security and its issuer will be mainly made by the foreign regulator;

In the case of a fund not registered with the CMF is subject to General Rule No. 336 issued by the SVS (now the CMF). The subject matter of this sale may include securities not registered with the CMF; therefore, such securities are not subject to the supervision of the CMF. Since the securities are not registered in Chile, there is no obligation of the issuer to make publicly available information about the securities in Chile. The securities shall not be subject to public offering in Chile unless registered with the relevant registry of the CMF.

In Colombia, the promotion of each product discussed herein is carried out through the Representative Office of BlackRock Fund Advisors, authorized by the Colombian Financial Superintendence.

The transmission of this information does not constitute a securities public offering in Colombia. The products discussed herein may not be promoted or marketed in Colombia or to Colombian residents unless such promotion and marketing is made in compliance with Decree 2555 of 2010 and other applicable rules and regulations related to the promotion of foreign financial and/or securities related products or services in Colombia.

With the receipt of these materials, and unless the Client contacts BlackRock with additional requests for information, the Client agrees to have been provided the information for due advisory required by the marketing and promotion regulatory regime applicable in Colombia.

IN MEXICO, FOR INSTITUTIONAL AND QUALIFIED INVESTORS USE ONLY. INVESTING INVOLVES RISK, INCLUDING POSSIBLE LOSS OF PRINCIPAL. THIS MATERIAL IS PROVIDED FOR EDUCATIONAL AND INFORMATIONAL PURPOSES ONLY AND DOES NOT CONSTITUTE AN OFFER OR SOLICITATION TO SELL OR A SOLICITATION OF AN OFFER TO BUY ANY SHARES OF ANY FUND OR SECURITY.

This information does not consider the investment objectives, risk tolerance or the financial circumstances of any specific investor. This information does not replace the obligation of financial advisor to apply his/her best judgment in making investment decisions or investment recommendations. It is your responsibility to inform yourself of, and to observe, all applicable laws and regulations of Mexico. If any funds, securities or investment strategies are mentioned or inferred in this material, such funds, securities or strategies have not been registered with the Mexican National Banking and Securities Commission (Comisión Nacional Bancaria y de Valores, the "CNBV") and thus, may not be publicly offered in Mexico. The CNBV has not confirmed the accuracy of any information contained herein. The provision of investment management and investment advisory services ("Investment Services") is a regulated activity in Mexico, subject to strict rules, and performed under the supervision of the CNBV. These materials are shared for information purposes only, do not constitute investment advice, and are being shared in the understanding that the addressee is an Institutional or Qualified investor as defined under Mexican Securities (*Ley del Mercado de Valores*). Each potential investor shall make its own investment decision based on their own analysis of the available information. Please note that by receiving these materials, it shall be construed as a representation by the receiver that it is an Institutional or Qualified investor as defined under Mexican law. BlackRock México Operadora, S.A. de C.V., Sociedad Operadora de Fondos de Inversión ("BlackRock México Operadora") is a Mexican subsidiary of BlackRock, Inc., authorized by the CNBV as a Mutual Fund Manager (Operadora de Fondos), and as such, authorized to manage Mexican mutual funds, ETFs and provide Investment Advisory Services. For more information on the Investment Services offered by BlackRock Mexico, please review our Investment Services Guide available in www.blackrock.com/mx. This material represents an assessment at a specific time and its information should not be relied upon by the you as research or investment advice regarding the funds, any security or investment strategy in particular. Reliance upon information in this material is at your sole discretion. BlackRock México is not authorized to receive deposits, carry out intermediation activities, or act as a broker dealer, or bank in Mexico. For more information on BlackRock México, please visit: www.blackrock.com/mx. BlackRock receives revenue in the form of advisory fees for our advisory services and management fees for our mutual funds, exchange traded funds and collective investment trusts. Any modification, change, distribution or inadequate use of information of this document is not responsibility of BlackRock or any of its affiliates. Pursuant to the Mexican Data Privacy Law (*Ley Federal de Protección de Datos Personales en Posesión de Particulares*), to register your personal data you must confirm that you have read and understood the Privacy Notice of BlackRock México Operadora. For the full disclosure, please visit www.blackrock.com/mx and accept that your personal information will be managed according with the terms and conditions set forth therein. BlackRock® is a registered trademark of BlackRock, Inc. All other trademarks are the property of their respective owners.

In Peru, this private offer does not constitute a public offer, and is not registered with the Securities Market Public Registry of the Peruvian Securities Market Commission, for use only with institutional investors as such term is defined by the Superintendencia de Banca, Seguros y AFP.

In Uruguay, the securities are not and will not be registered with the Central Bank of Uruguay. The Securities are not and will not be offered publicly in or from Uruguay and are not and will not be traded on any Uruguayan stock exchange. This offer has not been and will not be announced to the public and offering materials will not be made available to the general public except in circumstances which do not constitute a public offering of securities in Uruguay, in compliance with the requirements of the Uruguayan Securities Market Law (Law Nº 18.627 and Decree 322/011).

For investors in Central America, these securities have not been registered before the Securities Superintendence of the Republic of Panama, nor did the offer, sale or their trading procedures. The registration exemption has made according to numeral 3 of Article 1.29 of the Consolidated Text containing of the Decree-Law No. 1 of July 8, 1999 (institutional investors). Consequently, the tax treatment set forth in Articles 334 to 336 of the Unified Text containing Decree-Law No. 1 of July 8, 1999, does not apply to them. These securities are not under the supervision of the

FOR PROFESSIONAL, INSTITUTIONAL, QUALIFIED, WHOLESALE INVESTORS AND PERMITTED, PROFESSIONAL AND QUALIFIED CLIENT USE ONLY – NOT FOR PUBLIC DISTRIBUTION (PLEASE READ IMPORTANT DISCLOSURES)

Securities Superintendence of the Republic of Panama. The information contained herein does not describe any product that is supervised or regulated by the National Banking and Insurance Commission (CNBS) in Honduras. Therefore any investment described herein is done at the investor's own risk. In Costa Rica, any securities or services mentioned herein constitute an individual and private offer made through reverse solicitation upon reliance on an exemption from registration before the General Superintendence of Securities ("SUGEVAL"), pursuant to articles 7 and 8 of the Regulations on the Public Offering of Securities ("Reglamento sobre Oferta Pública de Valores"). This information is confidential, and is not to be reproduced or distributed to third parties as this is NOT a public offering of securities in Costa Rica. The product being offered is not intended for the Costa Rican public or market and neither is registered or will be registered before the SUGEVAL, nor can be traded in the secondary market. If any recipient of this documentation receives this document in El Salvador, such recipient acknowledges that the same has been delivered upon their request and instructions, and on a private placement basis. In Guatemala, this communication and any accompanying information (the "Materials") are intended solely for informational purposes and do not constitute (and should not be interpreted to constitute) the offering, selling, or conducting of business with respect to such securities, products or services in the jurisdiction of the addressee (this "Jurisdiction"), or the conducting of any brokerage, banking or other similarly regulated activities ("Financial Activities") in the Jurisdiction. Neither BlackRock, nor the securities, products and services described herein, are registered (or intended to be registered) in the Jurisdiction. Furthermore, neither BlackRock, nor the securities, products, services or activities described herein, are regulated or supervised by any governmental or similar authority in the Jurisdiction. The Materials are private, confidential and are sent by BlackRock only for the exclusive use of the addressee. The Materials must not be publicly distributed and any use of the Materials by anyone other than the addressee is not authorized. The addressee is required to comply with all applicable laws in the Jurisdiction, including, without limitation, tax laws and exchange control regulations, if any.

This material is for distribution to Professional Clients (as defined by the Financial Conduct Authority or MiFID Rules) only and should not be relied upon by any other persons. This document is marketing material.

In the UK and Non-European Economic Area (EEA) countries: This is issued by BlackRock Investment Management (UK) Limited, authorised and regulated by the Financial Conduct Authority. Registered office: 12 Throgmorton Avenue, London, EC2N 2DL. Tel: + 44 (0)20 7743 3000. Registered in England and Wales No. 02020394. For your protection telephone calls are usually recorded. Please refer to the Financial Conduct Authority website for a list of authorised activities conducted by BlackRock.

In the European Economic Area (EEA): This is issued by BlackRock (Netherlands) B.V., authorised and regulated by the Netherlands Authority for the Financial Markets. Registered office Amstelvein 1, 1096 HA, Amsterdam, Tel: 020-549 5200, Tel: 31-20-549-5200. Trade Register No. 17068311. For your protection telephone calls are usually recorded.

In Italy: For information on investor rights and how to raise complaints please go to <https://www.blackrock.com/corporate/compliance/investor-right> available in Italian.

BlackRock Advisors (UK) Limited-Dubai Branch is a DIFC Foreign Recognised Company registered with the DIFC Registrar of Companies (DIFC Registered Number 546), with its office at Unit L15-01A, ICD Brookfield Place, Dubai International Financial Centre, PO Box 506661, Dubai, UAE, and is regulated by the DFSA to engage in the regulated activities of 'Advising on Financial Products' and 'Arranging Deals in Investments' in or from the DIFC, both of which are limited to units in a collective investment fund (DFSA Reference Number F000738).

For investors in Abu Dhabi Global Market (ADGM)

The information contained in this document is intended strictly for Authorised Persons.

The information contained in this document, does not constitute and should not be construed as an offer of, invitation or proposal to make an offer for, recommendation to apply for or an opinion or guidance on a financial product, service and/or strategy. Whilst great care has been taken to ensure that the information contained in this document is accurate, no responsibility can be accepted for any errors, mistakes or omissions or for any action taken in reliance thereon. You may only reproduce, circulate and use this document (or any part of it) with the consent of BlackRock.

The information contained in this document is for information purposes only. It is not intended for and should not be distributed to, or relied upon by, members of the public.

The information contained in this document, may contain statements that are not purely historical in nature but are "forward-looking statements." These include, amongst other things, projections, forecasts or estimates of income. These forward-looking statements are based upon certain assumptions, some of which are described in other relevant documents or materials. If you do not understand the contents of this document, you should consult an authorised financial adviser.

For investors in Bahrain

The information contained in this document is intended strictly for sophisticated institutions.

The information contained in this document, does not constitute and should not be construed as an offer of, invitation or proposal to make an offer for, recommendation to apply for or an opinion or guidance on a financial product, service and/or strategy. Whilst great care has been taken to ensure that the information contained in this document is accurate, no responsibility can be accepted for any errors, mistakes or omissions or for any action taken in reliance thereon. You may only reproduce, circulate and use this document (or any part of it) with the consent of BlackRock.

The information contained in this document is for information purposes only. It is not intended for and should not be distributed to, or relied upon by, members of the public.

The information contained in this document, may contain statements that are not purely historical in nature but are "forward looking statements." These include, amongst other things, projections, forecasts or estimates of income. These forward looking statements are based upon certain assumptions, some of which are described in other relevant documents or materials. If you do not understand the contents of this document, you should consult an authorised financial adviser.

For investors in Dubai (DIFC)

The information contained in this document is intended strictly for Professional Clients as defined under the Dubai Financial Services Authority ("DFSA") Conduct of Business (COB) Rules.

The information contained in this document, does not constitute and should not be construed as an offer of, invitation or proposal to make an offer for, recommendation to apply for or an opinion or guidance on a financial product, service and/or strategy. Whilst great care has been taken to ensure that the information contained in this document is accurate, no responsibility can be accepted for any errors, mistakes or omissions or for any action taken in reliance thereon. You may only reproduce, circulate and use this document (or any part of it) with the consent of BlackRock.

The information contained in this document is for information purposes only. It is not intended for and should not be distributed to, or relied upon by, members of the public.

The information contained in this document, may contain statements that are not purely historical in nature but are "forward-looking statements." These include, amongst other things, projections, forecasts or estimates of income. These forward-looking statements are based upon certain assumptions, some of which are described in other relevant documents or materials. If you do not understand the contents of this document, you should consult an authorised financial adviser.

For investors in Israel

BlackRock Investment Management (UK) Limited is not licensed under Israel's Regulation of Investment Advice, Investment Marketing and Portfolio Management Law, 5755-1995 (the "Advice Law"), nor does it carry insurance thereunder.

For investors in Kuwait

The information contained in this document is intended strictly for sophisticated institutions that are 'Professional Clients' as defined under the Kuwait Capital Markets Law and its Executive Bylaws.

The information contained in this document, does not constitute and should not be construed as an offer of, invitation or proposal to make an offer for, recommendation to apply for or an opinion or guidance on a financial product, service and/or strategy. Whilst great care has been taken to ensure that the information contained in this document is accurate, no responsibility can be accepted for any errors, mistakes or omissions or for any action taken in reliance thereon. You may only reproduce, circulate and use this document (or any part of it) with the consent of BlackRock.

The information contained in this document is for information purposes only. It is not intended for and should not be distributed to, or relied upon by, members of the public.

The information contained in this document, may contain statements that are not purely historical in nature but are "forward-looking statements." These include, amongst other things, projections, forecasts or estimates of income. These forward-looking statements are based upon certain assumptions, some of which are described in other relevant documents or materials. If you do not understand the contents of this document, you should consult an authorised financial adviser.

For investors in Oman

The information contained in this document is intended strictly for sophisticated institutions.

The information contained in this document, does not constitute and should not be construed as an offer of, invitation or proposal to make an offer for, recommendation to apply for or an opinion or guidance on a financial product, service and/or strategy. Whilst great care has been taken to ensure that the information contained in this document is accurate, no responsibility can be accepted for any errors, mistakes or omissions or for any action taken in reliance thereon. You may only reproduce, circulate and use this document (or any part of it) with the consent of BlackRock.

The information contained in this document is for information purposes only. It is not intended for and should not be distributed to, or relied upon by, members of the public.

The information contained in this document, may contain statements that are not purely historical in nature but are "forward-looking statements." These include, amongst other things, projections, forecasts or estimates of income. These forward-looking statements are based upon certain assumptions, some of which are described in other relevant documents or materials. If you do not understand the contents of this document, you should consult an authorised financial adviser.

FOR PROFESSIONAL, INSTITUTIONAL, QUALIFIED, WHOLESALE INVESTORS AND PERMITTED, PROFESSIONAL AND QUALIFIED CLIENT USE ONLY – NOT FOR PUBLIC DISTRIBUTION (PLEASE READ IMPORTANT DISCLOSURES)

For investors in Qatar

The information contained in this document is intended strictly for sophisticated institutions.

The information contained in this document, does not constitute and should not be construed as an offer of, invitation or proposal to make an offer for, recommendation to apply for or an opinion or guidance on a financial product, service and/or strategy. Whilst great care has been taken to ensure that the information contained in this document is accurate, no responsibility can be accepted for any errors, mistakes or omissions or for any action taken in reliance thereon. You may only reproduce, circulate and use this document (or any part of it) with the consent of BlackRock.

The information contained in this document is for information purposes only. It is not intended for and should not be distributed to, or relied upon by, members of the public.

The information contained in this document, may contain statements that are not purely historical in nature but are "forward-looking statements." These include, amongst other things, projections, forecasts or estimates of income. These forward-looking statements are based upon certain assumptions, some of which are described in other relevant documents or materials. If you do not understand the contents of this document, you should consult an authorised financial adviser.

For investors in Saudi Arabia

This material is for distribution to Institutional and Qualified Clients (as defined by the Implementing Regulations issued by Capital Market Authority) only and should not be relied upon by any other persons.

The information contained in this document, does not constitute and should not be construed as an offer of, invitation or proposal to make an offer for, recommendation to apply for or an opinion or guidance on a financial product, service and/or strategy. Whilst great care has been taken to ensure that the information contained in this document is accurate, no responsibility can be accepted for any errors, mistakes or omissions or for any action taken in reliance thereon. You may only reproduce, circulate and use this document (or any part of it) with the consent of BlackRock.

The information contained in this document is for information purposes only. It is not intended for and should not be distributed to, or relied upon by, members of the public.

The information contained in this document, may contain statements that are not purely historical in nature but are "forward looking statements." These include, amongst other things, projections, forecasts or estimates of income. These forward-looking statements are based upon certain assumptions, some of which are described in other relevant documents or materials. If you do not understand the contents of this document, you should consult an authorised financial adviser.

For investors in South Africa

Please be advised that BlackRock Investment Management (UK) Limited is an authorised Financial Services provider with the South African Financial Services Conduct Authority, FSP No. 43288.

For Qualified Investors in Switzerland

This document shall be exclusively made available to, and directed at, qualified investors as defined in Article 10 (3) of the CISA of June 23, 2006, as amended, at the exclusion of qualified investors with an opting-out pursuant to Art. 5 (1) of the Swiss Federal Act on Financial Services ("FinSA").

For information on Art. 8/9 Financial Services Act (FinSA) and on your client segmentation under Article 4 FinSA, please see the following website: www.blackrock.com/finsa.

For investors in United Arab Emirates

The information contained in this document is intended strictly for Professional Investors.

The information contained in this document, does not constitute and should not be construed as an offer of, invitation or proposal to make an offer for, recommendation to apply for or an opinion or guidance on a financial product, service and/or strategy. Whilst great care has been taken to ensure that the information contained in this document is accurate, no responsibility can be accepted for any errors, mistakes or omissions or for any action taken in reliance thereon. You may only reproduce, circulate and use this document (or any part of it) with the consent of BlackRock.

The information contained in this document is for information purposes only. It is not intended for and should not be distributed to, or relied upon by, members of the public.

The information contained in this document, may contain statements that are not purely historical in nature but are "forward-looking statements." These include, amongst other things, projections, forecasts or estimates of income. These forward-looking statements are based upon certain assumptions, some of which are described in other relevant documents or materials. If you do not understand the contents of this document, you should consult an authorised financial adviser.

For investors in China, this material may not be distributed to individuals resident in the People's Republic of China ("PRC", for such purposes, not applicable to Hong Kong, Macau and Taiwan) or entities registered in the PRC unless such parties have received all the required PRC government approvals to participate in any investment or receive any investment advisory or investment management services.

For investors in Hong Kong, this material is issued by BlackRock Asset Management North Asia Limited and has not been reviewed by the Securities and Futures Commission of Hong Kong. This material is for distribution to "Professional Investors" (as defined in the Securities and Futures Ordinance (Cap.571 of the laws of Hong Kong) and any rules made under that ordinance.) and should not be relied upon by any other persons or redistributed to retail clients in Hong Kong.

For investors in Singapore, this is issued by BlackRock (Singapore) Limited (Co. registration no. 200010143N) for use only with institutional investors as defined in Section 4A of the Securities and Futures Act, Chapter 289 of Singapore. This advertisement or publication has not been reviewed by the Monetary Authority of Singapore.

For investors in South Korea, this information is issued by BlackRock Investment (Korea) Limited. This material is for distribution to the Qualified Professional Investors (as defined in the Financial Investment Services and Capital Market Act and its sub-regulations) and for information or educational purposes only, and does not constitute investment advice or an offer or solicitation to purchase or sells in any securities or any investment strategies.

For investors in Taiwan, independently operated by BlackRock Investment Management (Taiwan) Limited. Address: 28F., No. 100, Songren Rd., Xinyi Dist., Taipei City 110, Taiwan. Tel: (02)23261600.

For investors in Australia & New Zealand, issued by BlackRock Investment Management (Australia) Limited ABN 13 006 165 975, AFSL 230 523 (BIMAL) for the exclusive use of the recipient, who warrants by receipt of this material that they are a wholesale client as defined under the Australian Corporations Act 2001 (Cth) and the New Zealand Financial Advisers Act 2008 respectively.

BlackRock Investment Management (Australia) Limited ("BIMAL") is not licensed by a New Zealand regulator to provide 'Financial Advice Service' or 'Keeping, investing, administering, or managing money, securities, or investment portfolios on behalf of other persons'. BIMAL's registration on the New Zealand register of financial service providers does not mean that BIMAL is subject to active regulation or oversight by a New Zealand regulator.

This material provides general advice only and does not take into account your individual objectives, financial situation, needs or circumstances. Before making any investment decision, you should therefore assess whether the material is appropriate for you and obtain financial advice tailored to you having regard to your individual objectives, financial situation, needs and circumstances. Refer to BIMAL's Financial Services Guide on its website for more information. This material is not a financial product recommendation or an offer or solicitation with respect to the purchase or sale of any financial product in any jurisdiction.

Information provided is for illustrative and informational purposes and is subject to change. It has not been approved by any regulator.

This material is not intended for distribution to, or use by, any person or entity in any jurisdiction or country where such distribution or use would be contrary to local law or regulation. BIMAL is a part of the global BlackRock Group which comprises of financial product issuers and investment managers around the world. BIMAL is the issuer of financial products and acts as an investment manager in Australia. BIMAL does not offer financial products to persons in New Zealand who are retail investors (as that term is defined in the Financial Markets Conduct Act 2013 (FMCA)). This material does not constitute or relate to such an offer. To the extent that this material does constitute or relate to such an offer of financial products, the offer is only made to, and capable of acceptance by, persons in New Zealand who are wholesale investors (as that term is defined in the FMCA).

BIMAL, its officers, employees and agents believe that the information in this material and the sources on which it is based (which may be sourced from third parties) are correct as at the date of publication. While every care has been taken in the preparation of this material, no warranty of accuracy or reliability is given and no responsibility for the information is accepted by BIMAL, its officers, employees or agents. Except where contrary to law, BIMAL excludes all liability for this information.

Any investment is subject to investment risk, including delays on the payment of withdrawal proceeds and the loss of income or the principal invested. While any forecasts, estimates and opinions in this material are made on a reasonable basis, actual future results and operations may differ materially from the forecasts, estimates and opinions set out in this material. No guarantee as to the repayment of capital or the performance of any product or rate of return referred to in this material is made by BIMAL or any entity in the BlackRock group of companies.

No part of this material may be reproduced or distributed in any manner without the prior written permission of BIMAL.

For Southeast Asia: This document is issued by BlackRock and is intended for the exclusive use of any recipient who warrants, by receipt of this material, that such recipient is an institutional investors or professional/sophisticated/qualified/accredited/expert investor as such term may apply under the relevant legislations in Southeast Asia (for such purposes, includes only the Philippines, Thailand, and Indonesia). BlackRock does not hold any regulatory licenses or registrations in Southeast Asia countries listed above, and is therefore not licensed to conduct any regulated business activity under the relevant laws and regulations as they apply to any entity intending to carry on business in Southeast Asia, nor does BlackRock purport to carry on, any

regulated activity in any country in Southeast Asia. BlackRock funds, and/or services shall not be offered or sold to any person in any jurisdiction in which such an offer, solicitation, purchase, or sale would be deemed unlawful under the securities laws or any other relevant laws of such jurisdiction(s). This material is provided to the recipient on a strictly confidential basis and is intended for informational or educational purposes only. Nothing in this document, directly or indirectly, represents to you that BlackRock will provide, or is providing BlackRock products or services to the recipient, or is making available, inviting, or offering for subscription or purchase, or invitation to subscribe for or purchase, or sale, of any BlackRock fund, or interests therein. This material neither constitutes an offer to enter into an investment agreement with the recipient of this document, nor is it an invitation to respond to it by making an offer to enter into an investment agreement. The distribution of the information contained herein may be restricted by law and any person who accesses it is required to comply with any such restrictions. By reading this information you confirm that you are aware of the laws in your own jurisdiction regarding the provision and sale of funds and related financial services or products, and you warrant and represent that you will not pass on or utilize the information contained herein in a manner that could constitute a breach of such laws by BlackRock, its affiliates or any other person.

Individual portfolio managers for BlackRock may have opinions and/or made investment decisions that may, in certain respects, not be consistent with the information contained in this presentation. This is not intended to be relied upon as a forecast, research or investment advice, and is not a recommendation, offer or solicitation to buy or sell any securities or to adopt any investment strategy. The information and opinions contained in this presentation are derived from proprietary and non-proprietary sources deemed by BlackRock to be reliable, are not necessarily all inclusive and are not guaranteed as to accuracy. **Past performance does not guarantee future results.** There is no guarantee that any forecasts made will come to pass. Reliance upon information in this material is at the sole discretion of the viewer.

BlackRock, Inc., 50 Hudson Yards, New York, NY 10001.

THIS MATERIAL IS HIGHLY CONFIDENTIAL AND IS NOT TO BE REPRODUCED OR DISTRIBUTED TO PERSONS OTHER THAN THE RECIPIENT.

The information contained in this document is for information purposes only. It is not intended for and should not be distributed to, or relied upon by, members of the public. The information contained in this document, may contain statements that are not purely historical in nature but are "forward-looking statements." These include, amongst other things, projections, forecasts or estimates of income. These forward-looking statements are based upon certain assumptions, some of which are described in other relevant documents or materials. If you do not understand the contents of this document, you should consult an authorized financial adviser.

Any research in this document has been procured and may have been acted on by BlackRock for its own purpose. The results of such research are being made available only incidentally. The views expressed do not constitute investment or any other advice and are subject to change. They do not necessarily reflect the views of any company in the BlackRock Group or any part thereof and no assurances are made as to their accuracy.

This document is for information purposes only and does not constitute an offer or invitation to anyone to invest in any BlackRock funds and has not been prepared in connection with any such offer.

© 2025 BlackRock, Inc. All Rights Reserved. **BLACKROCK**, **BLACKROCK SOLUTIONS**, and **iSHARES** are trademarks of BlackRock, Inc. or its affiliates. All other trademarks are those of their respective owners.

251509T-0825

BlackRock