Morgan Stanley

WEALTH MANAGEMENT

INVESTMENT STRATEGY

Retirement & Goals Based Solutions | August 04, 2023

On Retirement

The New Retirement Income Playbook

Daniel Hunt, CFA
Senior Investment Strategist

Lisa Shalett
Chief Investment Officer
Head of the Global Investment Office
Morgan Stanley Wealth Management

Zi Ye, CFA
Investment Strategist

Stephanie Wang
Investment Strategist

This report is a republish of the original report published on August 3, 2020. All text references, data and sourcing remains as of the original publish date.

The coronavirus-related market sell-off deeply hurt investor retirement readiness, even as portfolio losses have been relatively muted. Not only is market volatility detrimental to retirement income solutions oriented toward total return, but the recent income and dividend yields also portends lower total returns going forward. To address these challenges, we investigate the potential for a so-called "all weather" strategy, which blends the strongest-performing asset types under different regimes of economic growth and consumer price inflation. Such a strategy may raise risk-adjusted returns, especially against stagflationary forces that may be more common in the future. However, its dependence on long-maturity US Treasury bonds is a problem for yield-reliant retirement investors. We suggest fixed annuities or fixed-index annuities as substitutes for long-term bonds in a retirement income context.

Retirement Income; Preparing for the Possibilities

A Pandemic's Reach

The market sell-off that began in February of this year and subsequent lockdown of the US economy marked the end of more than a decade of uninterrupted economic expansion, the longest on record. Much analysis from the financial industry has focused on the still-unfolding global pandemic and the near-term prospects for the economy and public health in light of the policy measures taken around the world. Less attention has been paid to the picture that's emerging of the adverse longer-term consequences that the pandemic and related economic shock will leave in its wake for various constituencies. This report examines the implications of the changed landscape for one such constituency: retirement investors.

Few retirees these days can live entirely off pension or other forms of guaranteed income payments. The vast majority rely at least partially on their investments to support their lifestyle. Whereas during their working lives these retirees contributed money to investment accounts on a regular basis, during retirement they must withdraw on a regular basis to support their lifestyle. The change is not simply a nuance – it has a profound impact on the forces governing investing and wealth dynamics. That is why we differentiate between strategies designed to facilitate distributions and those used to build wealth in the first place. Wealth-building strategies are judged by the degree to which they deliver return versus the downside risk to which they expose an investor. So-called "retirement income strategies" that facilitate distributions, are judged by how sustainably they furnish needed income and, secondarily, what type of bequest can be left to heirs. Consequently, what may be a good strategy for one objective isn't necessarily a good one for the other.

Not Your Father's Market

In the not-so-distant past, a retirement income strategy generally wasn't something that required much thinking. In the 1980s, for example, rates on high-quality interest-bearing securities were high enough that a retiree could realistically expect to live off a conservatively invested portfolio without ever having to dip into principal. Indeed, given the high rates that prevailed back then, retirees may even have seen a growth in principal, depending on their rate of spend. But interest rates have been falling for the most part in the decades since, with real rates (that is, inflation-adjusted rates) hitting rock-bottom levels in the wake of the pandemic.

The downward move in rates is a direct consequence of the economic shock of COVID-19 and the response of policymakers, which has been to inject massive quantities of liquidity into credit markets to backstop market function.

According to most forecasts (and in accord with Federal Reserve communications of a "lower for longer" policy stance), it will be a long time before policy rates begin to normalize – and the normalization period could drag on much longer in terms of the real interest rate, as it tends to increase more slowly during rate hike cycles. In other words, for the foreseeable future, conservatively invested portfolios will generate a fraction of the income they were once capable of producing, especially after accounting for inflation.

Where that leaves us is the other side of the spectrum from the market conditions of the 1980s. In periods of market duress, yields on high-quality interest-bearing securities can diverge substantially from Fed policy rates. However, the alphabet soup of facilities set up by the Federal Reserve in the wake of the pandemic to lend directly to effectively every sector of the economy has caused yields to remain tethered to policy rates. Meanwhile, earnings' yields on investments with greater risk exposures, such as equities, have also fallen substantially, lowering their prospective returns. And these diminished forward-looking expectations are occurring at a time when market volatility remains elevated, and when inflation expectations are higher (compared to what you might expect, given the surge in unemployment), and unstable, with some strategists pointing to substantial upside risk.

The Perfect Storm

In some ways, it's the perfect storm of adversity for retirement investors. Low yields on bonds and lower-than-expected inflation, together with relatively low prospective returns on riskier investments like equities, mean portfolios need to be aggressively positioned to generate sufficient after-tax return to cover retirees' post-inflation spending needs. At the same time, heightened volatility and inflation risk threaten the sustainability of strategies that are positioned aggressively, even before considering the potential of renewed market stress to drive their returns downward.

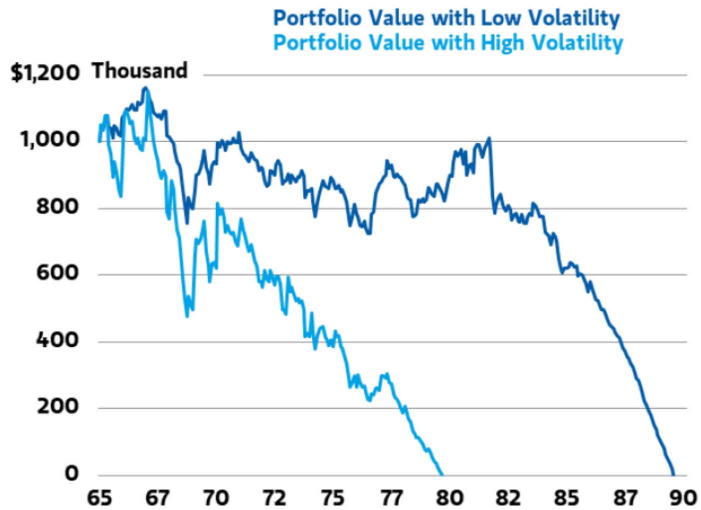
The reason for that goes back to why retirement income strategies and accumulation strategies differ to begin with: portfolios facing withdrawals work differently from those that don't.

Consider the example illustrated in Exhibit 1, where we present two scenarios of a $1 million retirement portfolio that has just begun making distributions. In each scenario, retirement starts at age 65, with an initial withdrawal rate of 5% of the portfolio value per year, adjusted for inflation (for the sake of simplicity, we only consider the portion of spending needed to be sourced from the portfolio).

Exhibit 1: Volatility Damages Retirement Income Sustainability

IN BRIEF: In wealth accumulation strategies, results are measured by total return. That is not the case with retirement income strategies, where income distributions are locked in regardless of volatility-driven downturns, with significant consequences for portfolio sustainability.

WHAT'S HAPPENING? We used historical returns from 1970 in the low-volatility scenario and boosted its volatility with no effect on return in the high-volatility scenario to illustrate how damaging turbulence is to a retirement-income strategy. In this example, the impact on portfolio durability was dramatic, turning a portfolio that would have lasted until about age 90 into one that vanished before 80.



WHAT'S NEXT? We highlight other pitfalls of volatility in order to further highlight the importance of choosing a retirement-income strategy with potentially the most favorable risk- adjusted returns.

Source: Morningstar, Morgan Stanley Wealth Management Global Investment Committee as of June 30, 2020
See Endnotes for details of the assumptions used in this analysis.

The first "low-volatility" scenario shows the actual, historical returns of a 60/40 equity/bond portfolio (hereafter, 60/40 portfolio) starting in December 1970, and continuing for as long as the portfolio can sustain withdrawals. The second scenario depicts the same strategy, with the same cumulative return, but where the volatility of portfolio returns has been doubled.

While each set of returns produces the same cumulative growth, and thus would yield identical outcomes without withdrawals, the differences in volatility are far from neutral in their effect. In the high-volatility scenario, a portfolio that would have provided income for the full length of most retirements and still have room to spare, was depleted shy of age 80, well before a female or male retiree reached their median post-65 life expectancy. The reason? Redemptions magnify downward legs in a volatile market by reducing the dollars available to participate in a potential rally. This is especially true early in retirement, when a portfolio is most vulnerable to poor performance.

Unforced Errors Are a Fact of Life

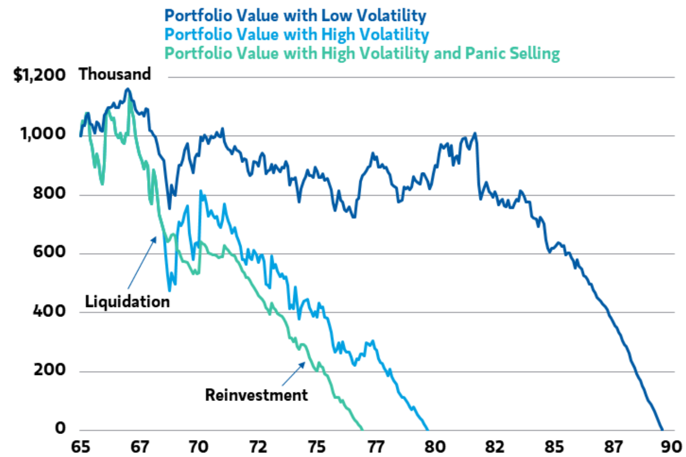
Indeed, Exhibit 1 might be understating the danger posed by volatility to retirement income strategies. After all, volatility is not something that happens to portfolios managed by robots that set their investment policy and let it run its course, come what may. Volatility is something that happens to portfolios managed by human beings who have been known to make decisions based on emotions, not least the fear of losses, often to their detriment. While that observation is pertinent to any investment strategy, it is all the more relevant when the portfolio taking losses is the one the investor is counting on to furnish their standard of living. That can magnify fear and, consequently, the impulse to engage in destructive panicky behavior. We were able to observe just that effect in the 2008-2009 global financial crisis by comparing redemption behavior for target date funds, where investors are segregated across funds by their age. Retirement and near-to-retirement age fund vintages saw substantial redemption activity, while fund vintages still decades out, for younger investors, did not.

Exhibit 2: Investor Panic Can Amplify Damage

IN BRIEF: Fortunately or not, investors are not robots. As people, investors sometimes make emotional decisions, including panicked selling during downturns, often with damaging consequences.

WHAT'S HAPPENING? We used the case study in Exhibit 1 to highlight the additional pitfall of poorly timed selling due to panic, something that's hard to avoid when the portfolio is needed for paying bills. In this instance, selling at an inopportune time and waiting too long to reinvest, cost this retirement-income portfolio an additional three years of sustainability.

WHAT'S NEXT? WHAT'S NEXT? We investigate strategies that may deliver returns in the current environment without exposing investors to as much volatility.



Source: Morningstar, Morgan Stanley Wealth Management Global Investment Committee as of June 30, 2020
See Endnotes for details of the assumptions used in this analysis.

Exhibit 2 revisits the scenarios in Exhibit 1 with an important exception: It institutes a policy where a deep loss results in the panicked liquidation of the portfolio to cash, with reinvesting only taking place once the market has recovered to its previous high. In this situation, selling has turned temporary, volatility-based losses that would otherwise wash out over a longer timeframe, into permanent ones that damage the ability of the portfolio to furnish income deep into retirement. Here, the departure from plan causes the portfolio to be exhausted three years earlier than in Exhibit 1, exacerbating the funding gap the retiree in question would have to resolve to cover average life expectancy.

Better Strategy Can Help

Understanding why retirement-income strategies are more vulnerable than wealth accumulation strategies to the challenge posed by volatility is a jumping off point to appreciating why the two approaches should be different. In previous issues, we've discussed techniques that can help insulate common investment strategies (such as 60/40 portfolios) from the damaging consequences of forced withdrawals in down markets.

These tactics have included using home equity withdrawals to cover spending needs in times of market duress, but also things like cutting back on spending or simply continuing to work in early retirement. Other themes have included ways to structure pools of cash in buckets, or to increase tax efficiency so as to enhance a strategy's efficacy. But there are also ways that the core portfolio construction approach can be better aligned with the task of furnishing retirement income, especially in the context of post-pandemic market conditions.

One such approach starts from the basic observation that two key variables have a large impact on the performance of different asset types: economic growth and the rate of change in the prices of consumer goods and services, otherwise known as inflation. More specifically, it is not the variables' levels that appear to matter so much to the market as the degree to which they are accelerating or decelerating, often in contrast with investor expectations.

Exhibit 3 plots just shy of a century's worth of this specific data for the United States. The dark blue bars correspond to the quarterly acceleration in the year-over-year inflation rate while the light blue bars illustrate the same for the economic growth rate. In addition to the degree to which acceleration varies and oscillates between acceleration and deceleration, one important factor to note is that in some cases these two variables move in the same direction. In others, they move in opposite directions.

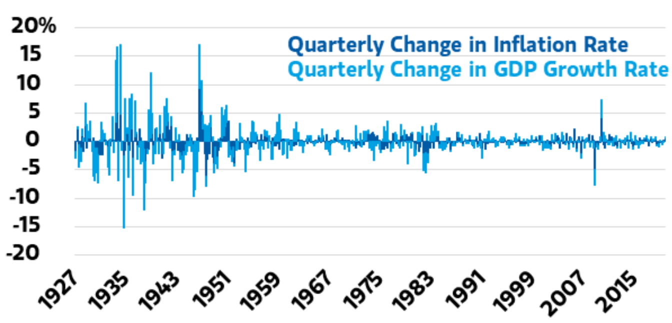
The pattern they trace out creates four regimes: 1) rising inflation, rising growth; 2) rising inflation, falling growth; 3) falling inflation, rising growth; 4) falling inflation, falling growth. While this simplification of the data in Exhibit 3 collapses important information about the magnitude of acceleration and its absolute level, its simplified dimensions reveal the power that these two variables' cardinal direction and coincident pattern have over capital market performance, as can be seen in the dramatic variation in equity market real returns in the four different regimes in Exhibit 4.

Exhibit 3: Four Regimes in Two Key Variables

IN BRIEF: Market returns are a product of a large and complex set of factors. Arguably, none are more important than economic growth and inflation – specifically, the rate of change in those variables.

WHAT'S HAPPENING? We plot the long-term historical data to identify quarterly acceleration in year-over-year rates of growth for each variable by magnitude and direction. The results make clear that at times these variables accelerate in tandem, and at other times move in opposite directions, on both sides of the axes.

WHAT'S NEXT? Investigate whether the simplest expression of this data – in other words, the directional pattern of the acceleration or deceleration – meaningfully explains market outcomes.



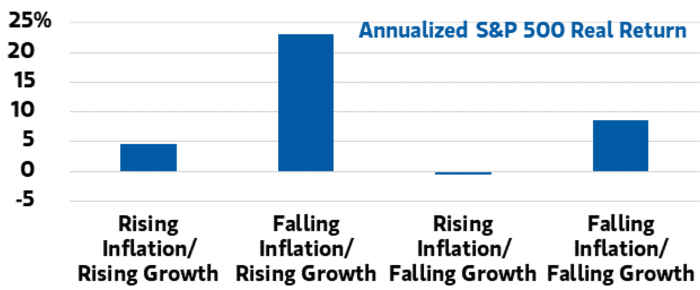
Source: Morningstar, Morgan Stanley Wealth Management Global Investment Committee as of June 30, 2020

Exhibit 4: Equity Performance in Four Key Regimes

IN BRIEF: The real equity returns in rising and falling inflation and growth regimes are plotted, revealing wide differences that confirm their importance to portfolio construction.

WHAT'S HAPPENING? The difference in real equity returns is plotted based on the regimes identified in Exhibit 3, revealing an eye-popping contrast that includes negative real returns in rising inflation/falling growth regimes and robust returns in falling inflation/rising growth regimes.

WHAT'S NEXT? We look to extend the investigation of the importance of the regimes identified in Exhibit 3 to other asset classes, with an eye toward retirement-income portfolio construction.



Source: Morningstar, Morgan Stanley Wealth Management Global Investment Committee as of June 30, 2020

A "Best" of Blend

Hard to read in the miasma of data in Exhibit 3 is the relative frequency of the regimes. Obviously, if one were highly improbable while another almost always observed, that would reduce the materiality of their impact on performance. But that's not the case. Instead, we find the four regimes observed in nearly equal proportion in our long-term data sample, with the two falling growth regimes slightly edging out the rising growth regimes (53% and 47%, respectively). This means that identifying the regime in a given quarter is both highly consequential and extremely difficult to do. And that is the case for asset classes beyond equities.

Exhibit 5: Relative Favorability in Four Key Regimes

IN BRIEF: Relative asset class performance depends heavily on the particular macroeconomic regime, with bonds and commodities, in particular, varying widely.

WHAT'S HAPPENING? We measured the cumulative performance of each asset class in each regime and ranked them to see how much variation we could expect in the "best portfolios," given the particular macroeconomic regime. The asset class rankings varied widely, with asset classes that provided support in more bearish environments being challenged in more bullish ones.

WHAT'S NEXT? We investigate the use of portfolio construction techniques that leverage insights into the patterns of performance across regimes to improve risk-adjusted return of a retirement income strategy.

	Rising Inflation/ Rising Growth	Falling Inflation/ Rising Growth	Rising Inflation/ Falling Growth	Falling Inflation/ Falling Growth
Better Performance ↑	International Equity	US Small-Cap	Global Commodities	US Investment Grade
	US Large-Cap	US Large-Cap	US Large-Cap	US Large-Cap
	Global Commodities	International Equity	US Small-Cap	International Equity
	US Small-Cap	US High Yield Corp	International Equity	US High Yield Corp
	US High Yield Corp	US Investment Grade	US Investment Grade	US Small-Cap
	US T-Bill	Global Commodities	US T-Bill	Global Commodities
	US Investment Grade	US T-Bill	US High Yield Corp	US T-Bill

Source: Morningstar, Morgan Stanley Wealth Management Global Investment Committee as of June 30, 2020
See Endnotes for details of the assumptions used in this analysis.

Indeed, as outlined in Exhibit 5, one of the more important elements of the insight about the importance of these four regimes is the degree to which it configures the asset mixes that may potentially deliver the most advantageous performance and risk metrics. For example, in a rising inflation/falling growth regime, which is the least favorable environment for equities (with a negative average historical return in those periods), commodities have the potential to be a key diversifier where investment-grade fixed income does not. Alternatively, in the falling inflation/falling growth regime, traditional fixed income (especially quality, long-dated bonds) looks more attractive. Rising growth, in general, is more favorable for equities and other risk assets, but a so-called "goldilocks" condition of rising growth and falling inflation is generally more favorable for these assets and hardest on equity hedges of all types on a relative basis.

The existence and importance of these regimes led to a portfolio construction innovation that came out of the hedge fund industry, known as an "all weather" portfolio[1]. Since the all-weather strategy first made its appearance, various spins have been applied to constructing such portfolios, including different ways to identify and define the key regimes that lie at its core. What all of them tend to have in common is that the regimes address states of growth and inflation and involve a blend of the most favorable asset in each identified regime in the portfolio. Our primary interest in highlighting all-weather strategies here is the degree to which, with some customization, its features can make it a highly attractive part of a holistic retirement-income solution, especially in the current market environment.

Goodness of Fit

As with everything else under the sun, an all-weather strategy comes with benefits and drawbacks. What matters for decision-makers is whether the package of trade-offs is appropriate for the objectives that have been set. As to its benefits, a diversified blend of investment types explicitly chosen to hold up against a range of key macroeconomic risks would seem likely to be able to achieve better risk control. That would be a particularly attractive benefit in a retirement-income setting, given the degree to which volatility and drawdowns can jeopardize a retirement portfolio. But is that supposition true?

To evaluate the potential enhancement in risk profile against its potential cost in terms of risk-adjusted return, we used the long data set compiled in creating the regime analysis to compare a historical all-weather portfolio analysis against a more traditional 60/40 portfolio. The results, listed in Exhibit 6, lend credence to the proposition that this type of portfolio construction may yield important risk-control benefits, from both a volatility and downside (drawdown) perspective.

Exhibit 6: Historically, All-Weather Has Had Better Risk-Adjusted Returns

IN BRIEF: We review the historical performance of an "all weather" portfolio across a long history to investigate its potential usefulness for retirement income portfolios.

WHAT'S HAPPENING? To test whether utilizing an asset mix that borrows from the strongest-performing asset classes in each of the four regimes improves risk-adjusted performance overall, we analyzed 80-plus years of data. We found that despite a lower total return, an all-weather strategy can deliver dramatically stronger historical risk-adjusted returns, with notable improvements in terms of the return-to-volatility ratio and, especially, maximum drawdown.

WHAT'S NEXT? We pivot toward a prospective analysis that takes into account the extraordinary circumstances investors are now confronting.

	Return (Ann.)	Volatility (Ann.)	Sharpe Ratio	Maximum Drawdown
All-Weather Portfolio	7.6%	4.4%	0.99	-38.7%
60/40 Portfolio	6.6%	6.5%	0.50	-63.2%

Source: Bloomberg, Morningstar, Morgan Stanley Wealth Management Global Investment Committee as of June 30, 2020
See Endnotes for details of the assumptions used in this analysis.

Importantly, the material reduction in risk is not simply "inexpensive" in return terms, with return per unit of volatility (that is, the portfolio's Sharpe ratio) substantially improved over the 60/40 baseline portfolio. It actually outperforms the 60/40 overall, at least historically. This suggests that, at least in a long-term context, all-weather portfolios may be able to deliver more of what a retiree needs – return – and less of what they can't afford.

That said, there are drawbacks to the all-weather portfolio. Most notably, it relies heavily on asset types that are uncorrelated with equities in certain regimes, especially long-term fixed income and commodities, as a way to hedge risk in challenging market conditions such as slowing growth with accelerating or slowing inflation. These asset classes, in general, have lower returns than equities on average, which would naturally pull down the overall return of the all-weather portfolio, were it not for the dramatic run in the long-term Treasuries that the all-weather portfolio has a large amount of (hedge funds can leverage these strategies to enhance return, and often do, but that isn't a reasonable or advisable approach for retail retirement investors). Indeed, both our seven-year return forecasts and the long-term 20-plus-year planning return forecasts suggest materially lower returns for an all-weather strategy going forward than for a 60/40 portfolio.

For less well-funded retirees with high-return needs, that may be a substantial impediment to adopting the all-weather strategy, short of an ability to increase funding levels in other ways (such as explicitly factoring home equity into the retirement income plan). However, the decision to go aggressive in the portfolio strategy should be weighed carefully, as taking too much risk can be worse than targeting insufficient return, especially in volatile times.

Navigating the Storm

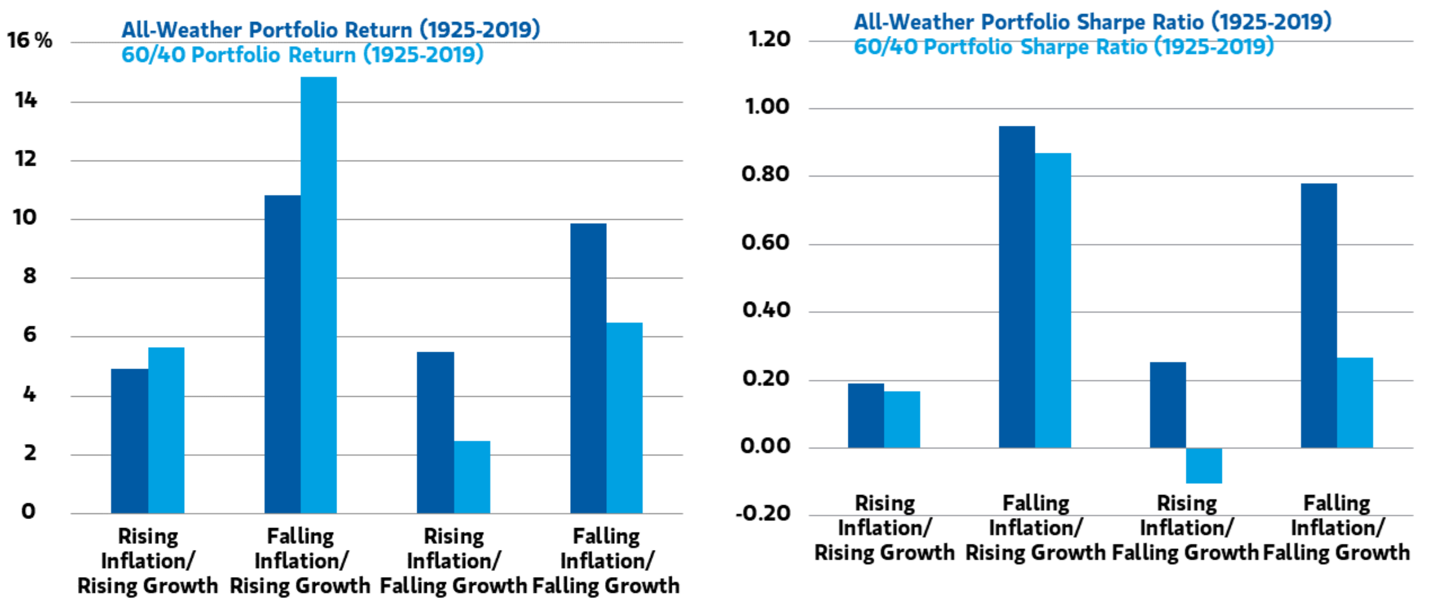
All of which brings us back to where we started: the challenging market conditions that look set to confront retirees in the post-pandemic world. While a hypothetical analysis is useful in understanding how an all-weather strategy may perform across a range of market conditions, what ultimately matters are the specific conditions we can expect in the following several years and decades, which could prove to be very different from the long-term average. And as discussed, the currently observable conditions and surrounding circumstances do not look, by any measure, average. Shifting our lens toward that future, in so far as we can, the prospects for the all-weather strategy appear mixed. On the one hand, you have the data in Exhibit 7, which highlights that the all-weather approach outperforms a 60/40 strategy on a total and risk-adjusted (Sharpe ratio) basis in the types of adverse regimes and markets we anticipate may become more common in the near future. Specifically, the data there indicates that the largest advantages of an all-weather strategy come from better risk-adjusted performance in two regimes – falling growth/rising inflation and falling growth/falling inflation – most significantly outperforming the higher-risk 60/40 portfolio in stagflationary (rising inflation/falling growth) environments.[2]

Exhibit 7: Better Performance in Adverse Regimes

IN BRIEF: We review the relative performance of the two strategies by historical regime to test their potential in a future environment of heightened risks to inflation and growth.

WHAT'S HAPPENING? A finer review of the hypothetical analysis reveals that the all-weather strategy is most effective in improving risk-adjusted returns by hedging the downside associated with falling growth and falling inflation, and, especially falling growth and rising inflation, that is, a stagflationary environment, which historically is the most challenging one for risk assets. These attributes are attractive because the cyclical and secular risks of an acceleration in inflation have risen during this crisis.

WHAT'S NEXT? The all-weather strategy has much to commend to it within a retirement-income strategy, but we strongly favor substitution of fixed annuities or fixed-index annuities for its heavy long-term US Treasury allocations for such investors.



Source: Bloomberg, Morningstar, Morgan Stanley Wealth Management Global Investment Committee as of June 30, 2020
See Endnotes for details of the assumptions used in this analysis.

That is good news for its forward-looking prospects for two reasons. First, inflation has historically trended secularly in decades-long streaks, including its secular decline over the past nearly 40 years. Between changes in demographic and geopolitical forces (such as the disinflationary shock of billions of Asian citizens joining the global supply chain and an increasingly globalized economy, respectively), the causal factors behind that long-term trend have begun to look spent. More tangibly, the expansionary fiscal and monetary policy that the coronavirus-inspired economic crisis has ushered in around the world is both a clear break with the recent past (which featured the substantial and controversial imposition of austerity by national governments) and increasingly appears in vogue among governments and political parties across the globe. That has clear potential to accelerate underlying inflation in a post-pandemic recovery scenario and shift longer-term inflation expectations – and thus inflationary regimes – structurally. In that type of environment, the additional inflation hedging that an all-weather portfolio provides could render its performance even more favorable relative to the traditional 60/40 strategy than it has been heretofore.

The flip side of the coin is that the hedging assets the all-weather strategy relies on for risk control in falling inflation environments may not work so well for retirement investors who tend to have greater return needs – specifically, the high allocations to long-term US Treasury bonds. While these allocations have been very useful in the four-decade bull market in bonds, and are one of few investment types that perform well in deflationary market downturns, they are less appealing for retirement savers who often need greater returns to meet spending plans. Furthermore, heavy inclusion of this type of exposure sets the stage for them to absorb losses to the extent that the recent acceleration in inflation continues to be a feature of future market trends. More concretely, investment at these levels locks in low returns that retirees often cannot afford unless they are very well-funded, while theoretical constraints on yields (which can only go so negative as the costs associated with hoarding physical cash or gold) put a theoretical constraint on the degree of diversification that they could provide in any deflationary bust scenario.

Adding Value With Annuities

Of course, it's possible to boost the expected returns to the fixed income sleeve on the all-weather portfolio by increasing exposure to shorter-term debt with greater credit risk in lieu of the prescribed long-term US Treasury bond allocation exposures. This might be an appropriate approach for less well-funded investors who are comfortable with the additional risk. The problem is that fixed income with elevated credit risk does not protect against the types of regimes that longer-term high-quality fixed income has historically served as a defense against. Indeed, higher returning credit investments have an unfortunate tendency to correlate with risk assets in those types of periods, as they did during the financial crisis and earlier this year in the throes of the March market panic. Consequently, tailoring the strategy to current market conditions this way would be less of a substitution of like investment types than a departure from its precepts.

There are, however, other approaches to modifying the strategy to increase its payout potential in a retirement context, including one that we've written about in the past. Specifically, substituting fixed annuities, which make contractually specified payments, or fixed-index annuities with lifetime-income guarantees, whose payments vary (typically subject to maximum and minimum amounts) based on the performance of a specified index, for long-term fixed income serves to maintain the nature of those allocations and potentially increase their equivalent returns in the mortality scenarios in which retirees will have the largest income shortfall. In other words, these types of annuities effectively pay people for living, something known in the industry as mortality credits. In the event a retiree lives a long life, well past their life expectancy, the internal rate of return on their investment will substantially exceed what it would have been had they allocated instead to long-term US Treasuries.

There are also potential drawbacks to substituting annuities for bonds, of course. These include potential differences in expenses and in their liquidity profile, the latter of which can be consequential for financial flexibility. For example, some annuities specify surrender charges that impose costs on the contract holder for liquidating its cash value prior to the contractually specified deferral term. Furthermore, to the extent annuitants do not ultimately outlive their life expectancies, they will almost certainly reduce the bequest that will be available to heirs by some amount, depending on the terms of the annuities and the mortality scenario. That said, for many retirees facing deeply significant challenges to their finances in the post- pandemic world, that may be a trade-off worth making. ■

Endnotes

[1]The strategy was innovated by Bridgewater Associates and its founder Ray Dalio in 1996 as an evenly risk-weighted portfolio from four regimes of changing expectations of inflation and growth. https://www.bridgewater.com/research-and-insights/the-all-weather-story

[2]We note that, while this regime often does not take place amidst technical stagflation (that is, a period of negative growth with high inflation), with respect to the rate of change, this regime is directionally stagflationary.

For more information about the assumptions, methodology, and limitations of funding ratio, the three families of retirement models that are the subject of this report, and Monte Carlo simulation, as well as the risks to hypothetical performance, please see the white paper, Introducing the *Morgan Stanley Wealth Management Retirement Framework.*

Model Calculation Assumptions: The analyses in this publication are based, in part, on a Monte Carlo simulation, which involves repeated sampling of asset class returns from a known distribution.

IMPORTANT: The projections or other information generated by this Monte Carlo simulation analysis regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. Results may vary with each use and over time.

The assumptions used in the analyses outlined in the Exhibits in this report are listed below.

Exhibit 1: The portfolio with low volatility is the 60/40 portfolio while the portfolio with high volatility is constructed by scaling up the volatility on top of the 60/40 portfolio and keeping the same geometric average return of the 60/40 portfolio. The hypothetical retirees are assumed to be a 65 year old who just starts retirement with $1,000,000 initial savings. All retirees have individual initial withdrawal rate 5%, adjusted by inflation rate.

Exhibit 2: The portfolio with low volatility and the portfolio without panic selling (high volatility) are the same ones introduced in Exhibit 1. The portfolio with panic selling (high volatility) is the built on top of the portfolio without panic selling (high volatility) but gives the investor the option to liquidate the equity portion of the portfolio and save it into cash account when market goes down and reinvest when the market recovers. The trigger to liquidate the portfolio is when the market drawdown reaches 35% or more and the threshold to reinvest is when the market recovers at the peak prior to liquidation.

Exhibit 5: All seven asset classes are ranked according to their quarterly returns in each regime, and final rank is based on asset class average ranks over time.

Exhibit 6: The all-weather portfolio has the allocations such as 30% equity, 40% long term treasuries, 15% intermediate treasuries, 7.5% diversified commodities and 7.5% gold. It is compared with the 60/40 portfolio in terms of annual return, volatility, Sharpe Ratio and maximum drawdown. Some blended bond return data is used in the 60/40 portfolio. Prior to 1976, it is a weighted average of four components from Morningstar (Ibbotson Associates), IA SBBI US 30 Day TBill (10%), IA SBBI US IT Govt (40%), IA SBBI US LT Govt (20%), IA SBBI US LT Corp (30%). After 1976, it is the Barclays Aggregate Index.

Exhibit 7: The two portfolios set up in Exhibit 6 are compared to each other in 4 different regimes as described in Exhibit 5.

For all Exhibits:

Any portfolios in the Exhibits are not provided as part of an investment advisory service offered by Morgan Stanley Wealth Management, are not available to be directly implemented as part of an investment advisory service and should not be regarded as a recommendation of any Morgan Stanley Wealth Management investment advisory service. The performance above does not reflect the investment or performance of actual portfolios. These results do not reflect fees or commissions. Had the results reflected these costs, the performance would have been lower. For more information about the fees or commissions which may be charged, please contact your Financial Advisor.

The charts and graphs in the Exhibits are provided for illustrative purposes. The charts and graphs may contain hypothetical performance displays. As such, Morgan Stanley is providing information in the Risk Considerations section at the end of this material regarding the risks and limitations related to such hypothetical performance displays. The inclusion of these displays in this material is in no way a solicitation of advisory services.

Past performance of any index or hypothetical portfolio does not guarantee future results. Do not use these Exhibits as the sole basis for your investment decisions.

Disclosure Section

For index, indicator and survey definitions referenced in this report please visit the following: https://www.morganstanley.com/wealth-investmentsolutions/wmir-definitions

Glossary

Drawdown refers to the largest cumulative percentage decline in net asset value or the percentage decline from the highest value or net asset value (peak) to the lowest value net asset value (trough) after the peak.

Fixed-index annuity A fixed-index annuity is a type of annuity that typically provides the contract owner an investment return based on a formula linked to the change in the level of one or more published equity-based indexes, such as the S&P 500, which tracks the performance of the 500 largest US publicly traded securities. A fixed index annuity provides a guaranteed minimum accumulation value, and may also offer death benefit protection as well as a variety of payout options. Although it is possible to lose money when investing in a fixed index annuity, these products are designed for investors who want a protected investment floor with the ability to partake in the potential benefits of a market-linked vehicle. The index used, the formula that determines the index rate and the guaranteed minimum value can vary by annuity company and product selected.

Sharpe Ratio This statistic measures a portfolio's rate of return based on the risk it assumed and is often referred to as its risk-adjusted performance. Using standard deviation and returns in excess of the returns of T-bills, it determines reward per unit of risk. This measurement can help determine if the portfolio is reaching its goal of increasing returns while managing risk.

Volatility This is a statistical measure of the dispersion of returns for a given security or market index. Volatility can either be measured by using the standard deviation or variance between returns from that same security or market index. Commonly, the higher the volatility, the riskier the security.

Risk Considerations

Hypothetical Performance

General: Hypothetical performance should not be considered a guarantee of future performance or a guarantee of achieving overall financial objectives. Asset allocation and diversification do not assure a profit or protect against loss in declining financial markets. Hypothetical performance results have inherent limitations. The performance shown here is simulated performance, not investment results from an actual portfolio or actual trading. There can be large differences between hypothetical and actual performance results achieved by a particular asset allocation.

Despite the limitations of hypothetical performance, these hypothetical performance results may allow clients and Financial Advisors to obtain a sense of the risk /return trade-off of different asset allocation constructs. Investing in the market entails the risk of market volatility. The value of all types of securities may increase or decrease over varying time periods. This analysis does not purport to recommend or implement an investment strategy. Financial forecasts, rates of return, risk, inflation, and other assumptions may be used as the basis for illustrations in this analysis. They should not be considered a guarantee of future performance or a guarantee of achieving overall financial objectives. No analysis has the ability to accurately predict the future, eliminate risk or guarantee investment results. As investment returns, inflation, taxes, and other economic conditions vary from the assumptions used in this analysis, your actual results will vary (perhaps significantly) from those presented in this analysis.

The assumed return rates in this analysis are not reflective of any specific investment and do not include any fees or expenses that may be incurred by investing in specific products. The actual returns of a specific investment may be more or less than the returns used in this analysis. The return assumptions are based on hypothetical rates of return of securities indices, which serve as proxies for the asset classes. Moreover, different forecasts may choose different indices as a proxy for the same asset class, thus influencing the return of the asset class.

Annuities

Annuities are long term tax-deferred retirement savings vehicles. Annuities are generally subject to surrender charges. A surrender charge is a penalty you have to pay if you sell or withdraw money from an annuity before it matures. The time before an annuity's maturity is called the surrender period and usually lasts for several years after purchase. Surrender charges reduce the value of your annuity and its returns. Early withdrawals will reduce the death benefit and cash surrender value.

Under current law, a nonqualified annuity that is owned by an individual is generally entitled to tax deferral. IRAs and qualified plans—such as 401(k)s and 403(b)s—are already tax-deferred. Therefore, a deferred annuity should be used only to fund an IRA or qualified plan to benefit from the annuity's features other than tax deferral. These include lifetime income and death benefit options.

Fixed annuities are insurance contracts that provide a guarantee of principal and interest over a stated term or for life. Although there are varying types and options to fixed annuities, they generally include the following:

• Investment is backed by the general account of the insurance company;
• Earnings will grow at the stated interest rate on a tax deferred basis. Withdrawals are taxed at ordinary income tax rates and may be subject to a 10% penalty for individuals below the age of 59 ½; and
• The option to transition control of your investment to an insurance company in return for a guaranteed income stream for your life and possibly that of your spouse (annuitization).

Fixed annuities pay a fixed rate of return for a specified time period known as a "guarantee period". Upon the expiration of that guarantee period, the annuity will generally automatically renew subject to a contractual renewal rate. During permitted window(s), which generally fall in the days post term expiration, you may decide to reallocate your investment to an alternative guaranteed term (subject to product availability) or withdraw some of, or all of your funds.

Fixed-indexed annuities are not securities and do not participate directly in the stock market or any index, so they are not investments. It is not possible to directly invest in an index within a Fixed-index annuity. Annuities may be subject to fees that differ from the purchase of a fixed income security such as a bond. These fees may include, but are not limited to, contract inception fees and annual fees that differ among annuities and insurance companies.

Unlike bonds, fixed and fixed-index annuities are not protected by SIPC.

Withdrawals and distributions of taxable amounts are subject to ordinary income tax and, if made prior to age 59 ½, may be subject to an additional 10% federal income tax penalty.

Early withdrawals will reduce the death benefit and cash surrender value.

Living benefits are optional and available at additional cost. When evaluating a living benefit there are several key factors that must be considered such as: cost investment limitations, holding periods, liquidity, withdrawals and your age and risk tolerance.

All guarantees are based on the claims paying ability of the issuing insurance company.

General information on annuities can be obtained from The American Council of Life Insurers website.

Investors should carefully consider the investment objectives and risks as well as charges and expenses of a fixed annuity before investing. To obtain a disclosure document, contact your Financial Advisor. The disclosure document contains this and other information about the annuity. Read the disclosure document carefully before investing.

Morgan Stanley Smith Barney LLC offers insurance products in conjunction with its licensed insurance agency affiliates.

International investing entails greater risk, as well as greater potential rewards compared to U.S. investing. These risks include political and economic uncertainties of foreign countries as well as the risk of currency fluctuations. These risks are magnified in countries with **emerging markets and frontier markets**, since these countries may have relatively unstable governments and less established markets and economies.

Bonds are subject to interest rate risk. When interest rates rise, bond prices fall; generally the longer a bond's maturity, the more sensitive it is to this risk. Bonds may also be subject to call risk, which is the risk that the issuer will redeem the debt at its option, fully or partially, before the scheduled maturity date. The market value of debt instruments may fluctuate, and proceeds from sales prior to maturity may be more or less than the amount originally invested or the maturity value due to changes in market conditions or changes in the credit quality of the issuer. Bonds are subject to the credit risk of the issuer. This is the risk that the issuer might be unable to make interest and/or principal payments on a timely basis. Bonds are also subject to reinvestment risk, which is the risk that principal and/or interest payments from a given investment may be reinvested at a lower interest rate.

Bonds rated below investment grade may have speculative characteristics and present significant risks beyond those of other securities, including greater credit risk and price volatility in the secondary market. Investors should be careful to consider these risks alongside their individual circumstances, objectives and risk tolerance before investing in high-yield bonds. High yield bonds should comprise only a limited portion of a balanced portfolio.

Treasury Inflation Protection Securities' (TIPS) coupon payments and underlying principal are automatically increased to compensate for inflation by tracking the consumer price index (CPI). While the real rate of return is guaranteed, TIPS tend to offer a low return. Because the return of TIPS is linked to inflation, TIPS may significantly underperform versus conventional U.S. Treasuries in times of low inflation.

Yields are subject to change with economic conditions. Yield is only one factor that should be considered when making an investment decision.

Equity securities may fluctuate in response to news on companies, industries, market conditions and general economic environment.

Companies paying **dividends** can reduce or cut payouts at any time.

Investing in smaller companies involves greater risks not associated with investing in more established companies, such as business risk, significant stock price fluctuations and illiquidity.

Stocks of medium-sized companies entail special risks, such as limited product lines, markets, and financial resources, and greater market volatility than securities of larger, more-established companies.

Value investing does not guarantee a profit or eliminate risk. Not all companies whose stocks are considered to be value stocks are able to turn their business around or successfully employ corrective strategies which would result in stock prices that do not rise as initially expected.

Growth investing does not guarantee a profit or eliminate risk. The stocks of these companies can have relatively high valuations. Because of these high valuations, an investment in a growth stock can be more risky than an investment in a company with more modest growth expectations.

Investing in commodities entails significant risks. Commodity prices may be affected by a variety of factors at any time, including but not limited to, (i) changes in supply and demand relationships, (ii) governmental programs and policies, (iii) national and international political and economic events, war and terrorist events, (iv) changes in interest and exchange rates, (v) trading activities in commodities and related contracts, (vi) pestilence, technological change and weather, and (vii) the price volatility of a commodity. In addition, the commodities markets are subject to temporary distortions or other disruptions due to various factors, including lack of liquidity, participation of speculators and government intervention.

Asset allocation and diversification do not assure a profit or protect against loss in declining financial markets.

Because of their narrow focus, **sector investments** tend to be more volatile than investments that diversify across many sectors and companies.

Rebalancing does not protect against a loss in declining financial markets. There may be a potential tax implication with a rebalancing strategy. Investors should consult with their tax advisor before implementing such a strategy.

The **indices** are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment.

The **indices selected by Morgan Stanley Wealth Management** to measure performance are representative of broad asset classes. Morgan Stanley Smith Barney LLC retains the right to change representative indices at any time.

Disclosures

The author(s) (if any authors are noted) principally responsible for the preparation of this material receive compensation based upon various factors, including quality and accuracy of their work, firm revenues (including trading and capital markets revenues), client feedback and competitive factors. Morgan Stanley Wealth Management is involved in many businesses that may relate to companies, securities or instruments mentioned in this material.

This material has been prepared for informational purposes only and is not an offer to buy or sell or a solicitation of any offer to buy or sell any security/instrument, or to participate in any trading strategy. Any such offer would be made only after a prospective investor had completed its own independent investigation of the securities, instruments or transactions, and received all information it required to make its own investment decision, including, where applicable, a review of any offering circular or memorandum describing such security or instrument. That information would contain material information not contained herein and to which prospective participants are referred. This material is based on public information as of the specified date, and may be stale thereafter. We have no obligation to tell you when information herein may change. We make no representation or warranty with respect to the accuracy or completeness of this material. Morgan Stanley Wealth Management has no obligation to provide updated information on the securities/instruments mentioned herein.

The securities/instruments discussed in this material may not be appropriate for all investors. The appropriateness of a particular investment or strategy will depend on an investor's individual circumstances and objectives. Morgan Stanley Wealth Management recommends that investors independently evaluate specific investments and strategies, and encourages investors to seek the advice of a financial advisor. The value of and income from investments may vary because of changes in interest rates, foreign exchange rates, default rates, prepayment rates, securities/instruments prices, market indexes, operational or financial conditions of companies and other issuers or other factors. Estimates of future performance are based on assumptions that may not be realized. Actual events may differ from those assumed and changes to any assumptions may have a material impact on any projections or estimates. Other events not taken into account may occur and may significantly affect the projections or estimates. Certain assumptions may have been made for modeling purposes only to simplify the presentation and/or calculation of any projections or estimates, and Morgan Stanley Wealth Management does not represent that any such assumptions will reflect actual future events. Accordingly, there can be no assurance that estimated returns or projections will be realized or that actual returns or performance results will not materially differ from those estimated herein.

This material should not be viewed as advice or recommendations with respect to asset allocation or any particular investment. This information is not intended to, and should not, form a primary basis for any investment decisions that you may make. Morgan Stanley Wealth Management is not acting as a fiduciary under either the Employee Retirement Income Security Act of 1974, as amended or under section 4975 of the Internal Revenue Code of 1986 as amended in providing this material.

Morgan Stanley Smith Barney LLC, its affiliates and Morgan Stanley Financial Advisors do not provide legal or tax advice. Each client should always consult his/her personal tax and/or legal advisor for information concerning his/her individual situation and to learn about any potential tax or other implications that may result from acting on a particular recommendation.

This material is disseminated in Australia to "retail clients" within the meaning of the Australian Corporations Act by Morgan Stanley Wealth Management Australia Pty Ltd (A.B.N. 19 009 145 555, holder of Australian financial services license No. 240813).

Morgan Stanley Wealth Management is not incorporated under the People's Republic of China ("PRC") law and the research in relation to this report is conducted outside the PRC. This report will be distributed only upon request of a specific recipient. This report does not constitute an offer to sell or the solicitation of an offer to buy any securities in the PRC. PRC investors must have the relevant qualifications to invest in such securities and must be responsible for obtaining all relevant approvals, licenses, verifications and or registrations from PRC's relevant governmental authorities.

If your financial adviser is based in Australia, Dubai, Germany, Italy, Switzerland or the United Kingdom, then please be aware that this report is being distributed by the Morgan Stanley entity where your financial adviser is located, as follows: Australia: Morgan Stanley Wealth Management Australia Pty Ltd (ABN 19 009 145 555, AFSL No. 240813); Dubai: Morgan Stanley Private Wealth Management Limited (DIFC Branch), regulated by the Dubai Financial Services Authority (the DFSA), and is directed at Professional Clients only, as defined by the DFSA; Germany: Morgan Stanley Private Wealth Management Limited, Munich branch authorized by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the BundesanstaltfuerFinanzdienstleistungsaufsicht; Italy: Morgan Stanley Bank International Limited, Milan Branch, authorized by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority, the Banca d'Italia and the CommissioneNazionale per Le Societa' E La Borsa; Switzerland: Bank Morgan Stanley AG regulated by the Swiss Financial Market Supervisory Authority; or United Kingdom: Morgan Stanley Private Wealth Management Ltd, authorized and regulated by the Financial Conduct Authority, approves for the purposes of section 21 of the Financial Services and Markets Act 2000 this material for distribution in the United Kingdom.

Morgan Stanley Wealth Management is not acting as a municipal advisor to any municipal entity or obligated person within the meaning of Section 15B of the Securities Exchange Act (the "Municipal Advisor Rule") and the opinions or views contained herein are not intended to be, and do not constitute, advice within the meaning of the Municipal Advisor Rule.

This material is disseminated in the United States of America by Morgan Stanley Wealth Management.

Third-party data providers make no warranties or representations of any kind relating to the accuracy, completeness, or timeliness of the data they provide and shall not have liability for any damages of any kind relating to such data.

RSI1691175060209 08/2023