MEKETA

Risk Parity

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Risk parity is a distinct approach to portfolio construction that differs from traditional capital allocation frameworks. By altering (i.e., balancing) how risk is distributed across asset classes, it produces portfolio exposures that can behave differently from conventional allocations across a range of market environments. As a result, outcomes may diverge from peer portfolios, particularly over shorter time horizons. For institutional investors, evaluating risk parity involves considerations related to implementation, portfolio fit, and the broader economic environment in which the strategy is deployed.

This paper examines risk parity in the context of institutional asset allocation. While the concept can be applied more broadly to other areas of portfolio construction, those applications are beyond the scope of this paper.

Key Takeaways

- Risk parity reallocates portfolio risk rather than portfolio capital. By reducing reliance on any single source of risk, the framework seeks to create a more balanced distribution of exposures across asset classes. Relative to traditional allocations, this often results in higher exposure to rate-sensitive assets and lower exposure to equities.
- Leverage is generally required for risk parity portfolios to achieve return objectives comparable to traditional allocations. While leverage can improve expected returns, it also increases implementation complexity and introduces additional considerations related to liquidity, financing costs, and portfolio management.
- The effectiveness of risk parity depends on the persistence of diversification benefits across asset classes. Historically, equities and bonds have often provided diversification benefits, but those relationships have varied meaningfully across market environments, particularly during periods of elevated inflation.
- Interest-rate environments have been an important driver of risk parity outcomes. The strategy benefited from a multi-decade secular decline in interest rates, while more recent periods of rising rates have highlighted the challenges associated with greater exposure to rate-sensitive assets.
- Risk parity portfolios can differ substantially from traditional allocations and peer portfolios. As a result, investors considering risk parity typically need to be comfortable with potentially significant tracking error and have the governance structure, operational infrastructure, and conviction necessary to maintain the allocation through varying market environments.

What is Risk Parity

Risk parity is an asset allocation strategy that, as the name suggests, aims to allocate risk equally among assets in a portfolio. Furthermore, the strategy may target a relatively constant level of overall portfolio volatility. This involves a departure from traditional approaches that allocate capital, rather than risk. The objective is to reduce reliance on any single source of risk within the portfolio.

In terms of implementation, given that asset classes have different levels of risk (e.g., equities have higher risk than high quality bonds), an investor would need to use leverage to construct a risk parity portfolio with an expected level of risk (or return) that mirrors that of a traditional allocation.[1] Leverage can be a flexible tool for investors to magnify the expected returns of a strategy, but it does come with risks; in particular, it amplifies losses and may introduce liquidity and counterparty risk to a portfolio. Most risk parity portfolios use some degree of leverage.

This approach results in higher allocations to bonds and lower allocations to equities relative to traditional capital allocations, which means they should outperform during times of equity turbulence or strong bond market performance, but underperform during periods of rising rates or strong equity market environments. Additionally, since these strategies are not widely implemented, institutional investors that adopt this allocation methodology need to be comfortable being "different" from peers, that is, having high tracking error relative to broad peer portfolios.

The Rationale Behind Risk Parity

The mathematical model that underpins the way much of the investment world has thought about diversification and asset allocation is known as Modern Portfolio Theory, or MPT. Importantly, MPT shows that the risk of a diversified portfolio may be less than the risk of any single investment in that portfolio, particularly when assets do not move in tandem. It also shows that an investment should not be evaluated based solely on its individual risk-return profile, but rather how it interacts with other assets within a portfolio. MPT serves as the basis for mean variance optimization, or MVO, which can be used to mathematically determine a set of "optimal" portfolios with the highest risk-adjusted returns.[2]

A key academic takeaway from this framework is that investors should seek to maximize expected return per unit of risk taken. Risk-adjusted returns are often measured by a statistical metric called the Sharpe ratio. If asset classes are expected to have similar long-term Sharpe ratios and are difficult to estimate with precision, then a portfolio that balances risk more evenly across asset classes may reduce reliance on any single return source. This idea provides part of the rationale for risk parity.

In an unlevered portfolio, however, an evenly balanced risk allocation may produce a lower expected return than many traditional allocations. By applying leverage to that more diversified risk allocation, an investor can increase the portfolio's expected return while maintaining the underlying balance of risk exposures. In this way, leverage can allow investors to access portfolios that may lie above the traditional efficient frontier, offering a higher expected return for a given level of risk relative to that available from many traditional portfolios (see Figure 1).

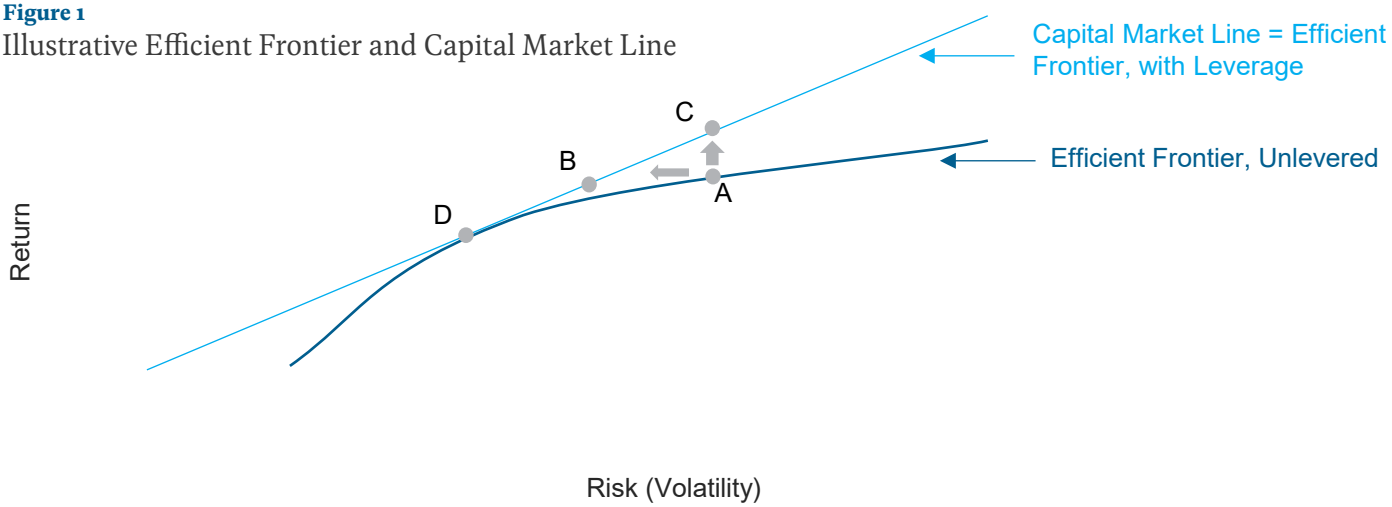
Risk parity offers an alternative approach in this context by focusing on the distribution of risk across asset classes. Its proponents maintain that broad asset classes such as equities, bonds, and inflation-related assets have similar long-term risk-adjusted returns, so using this methodology reduces dependence on input estimation, and focuses on building a portfolio that has a balanced exposure to the major asset classes by allocating risk equally to each.

However, over shorter horizons, risk-adjusted returns can vary, and the relative attractiveness of asset classes may shift across market environments (see Figure 2). This poses a challenge to the thesis underlying the risk parity framework.

Specifically, the risk parity approach depends on the assumption that these assets are not highly correlated over the long term, as diversification benefits diminish when assets move together. However, in practice this assumption does not always hold. For example, the interaction between equities and bonds has historically depended on the broader economic environment, notably the level and stability of inflation. In periods of higher and more uncertain inflation, both asset classes may respond to the same underlying pressures, resulting in periods where they decline at the same time. When this happens, it reduces the diversification benefit that investors traditionally have expected from combining these assets (see Figure 3). As a result, the effectiveness of diversification should be viewed as dependent on the macroeconomic environment rather than as a fixed characteristic of the asset classes themselves.

Figure 1

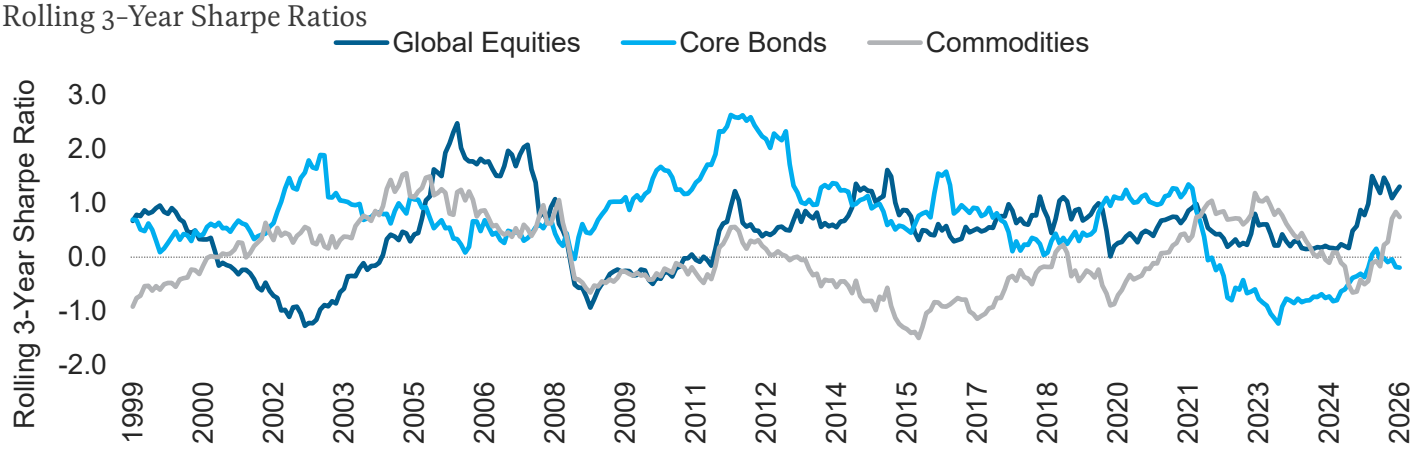
Illustrative Efficient Frontier and Capital Market Line



A, B, C, and D represent illustrative portfolios. Portfolio A reflects a portfolio on the traditional efficient frontier. Portfolio D represents the tangency portfolio with the highest expected risk-adjusted return available without leverage. Portfolio B applies 10.5% leverage pro rata across a diversified portfolio, achieving a comparable expected return to Portfolio A with lower expected volatility. Portfolio C achieves a higher expected return by using even more leverage than Portfolio B. For more details, see Meketa Investment Group's Leverage white paper (June 2021).

Figure 2

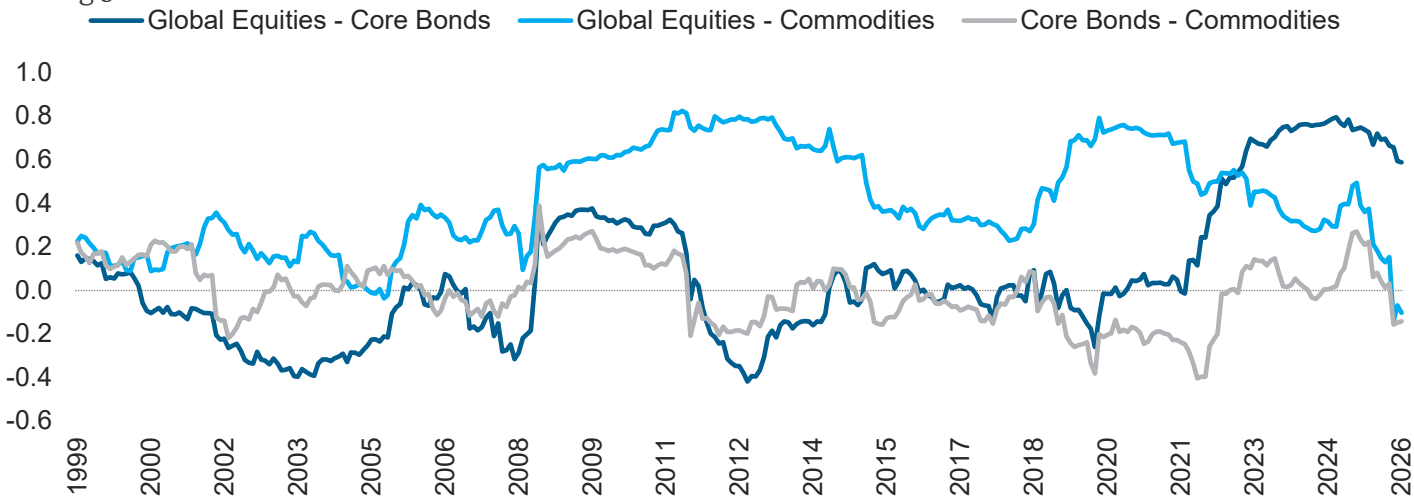
Rolling 3-Year Sharpe Ratios



Global equities, core bonds, and commodities proxied by MSCI ACWI, Bloomberg US Aggregate, and Bloomberg Commodity indices, respectively.

Figure 3

Rolling 3-Year Asset Class Correlations



Global equities, core bonds, and commodities proxied by MSCI ACWI, Bloomberg US Aggregate, and Bloomberg Commodity indices, respectively

Portfolio Construction

Risk parity starts by creating a long-only portfolio that seeks to balance risks. A risk parity portfolio seeks to achieve a more balanced risk allocation than a traditional capital allocation, where most of the risk taken is concentrated in equities (see Figure 4). The resulting portfolio is superior from a risk-adjusted perspective (i.e., higher Sharpe ratio). Unfortunately, not every aspect is favorable, as the risk parity portfolio's expected return is considerably lower than the traditional allocation portfolio.

To bring the portfolio's risk up to a level where its expected return is commensurate with many investors' objectives (or in this case, the 60/40 portfolio), leverage is introduced. This is usually done by levering up the entire risk parity portfolio.[3]

The levered risk parity portfolio in the example above is constructed by applying leverage to the unlevered allocation so that the portfolio's volatility matches that of the traditional allocation. The resulting portfolio exhibits a higher expected risk-adjusted return, but now it also has a higher expected return than the traditional allocation. There is an explicit downside to this approach, as the levered risk parity portfolio requires a leverage ratio of roughly two times.

Figure 4

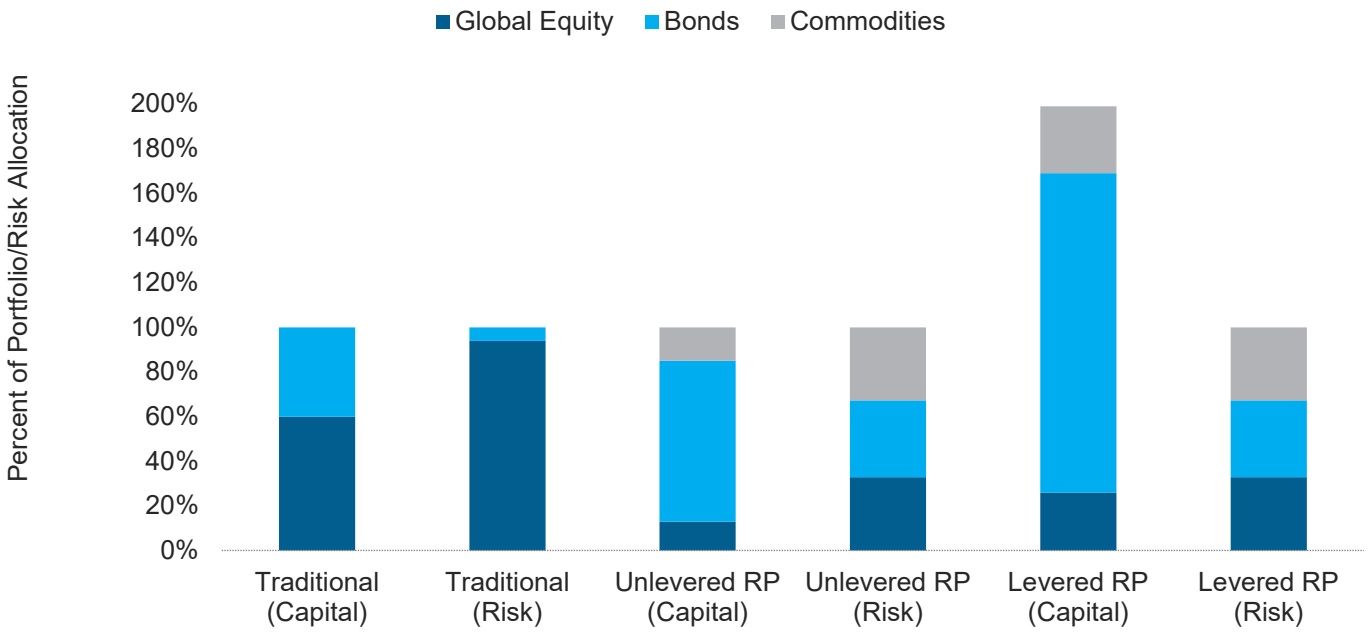
Traditional, Risk Parity, and Levered Risk Parity Allocations

Capital Allocation	Traditional Allocation	Unlevered Risk Parity	Levered Risk Parity
Growth/Equities	60%	13%	26%
Rate Sensitive	40%	72%	143%
Commodities	0%	15%	30%
Risk Free (Leverage)	0%	0%	-99%
Expected Return (20 Years)	7.0%	5.7%	8.0%
Standard Deviation	10.7%	5.4%	10.7%
Sharpe Ratio	0.36	0.47	0.47
Gross Exposure	100%	100%	299%

Expected return, volatility, and correlation figures based on Meketa Investment Group 2026 capital markets expectations. Performance figures in this paper are shown before the deduction of advisory fees or transaction costs. Actual investor returns would likely be lower.

Figure 5

Capital and Risk Decomposition by Allocation



Capital and risk decomposition figure based on Meketa Investment Group 2026 capital markets expectations.

Implementation Issues

Investable Universe

Institutional portfolios generally invest in a wide array of additional asset classes. Examples include credit-related securities (e.g., high yield and bank loans), private equity (e.g., buyouts and venture capital), real assets (e.g., real estate and infrastructure), and hedge funds.

Risk parity strategies need to invest in asset classes that are flexible enough to be easily levered. While using borrowing facilities could, in theory, address this issue, in most cases, risk parity allocates capital through liquid derivatives such as futures, which offer cheap (almost free at times) and less risky leverage.[4] Unfortunately, this means the strategy's universe is usually constrained to asset classes with liquid futures markets, such as bonds, equities, and inflation-linked assets like commodities.[5]

Although the simplified examples in this paper focus primarily on equities, bonds, and commodities, other assets commonly considered in risk parity portfolios include inflation-linked bonds, credit, and gold. These assets broaden the range of risks captured within a risk parity portfolio, though it also lends itself to overlapping risk exposures. For example, TIPS can help offset the impact of unexpected changes in inflation, but they tend to be very sensitive to changes in interest rates, while gold has historically exhibited sensitivity to movements in real interest rates and periods of market stress. Arguably, incorporating TIPS or gold allows the portfolio to better capture inflation as a distinct source of risk, though the evidence of how well these assets behave as an inflation hedge is mixed.[6]

Leverage

The benefits of leverage depend in part on financing costs and the broader market environment, and the use of leverage introduces several important risks. The most direct risk is that leverage amplifies losses as well as gains. This becomes particularly important when several exposures decline at the same time, such as during an inflation shock in which bond prices fall as interest rates rise and equities come under pressure from higher discount rates.

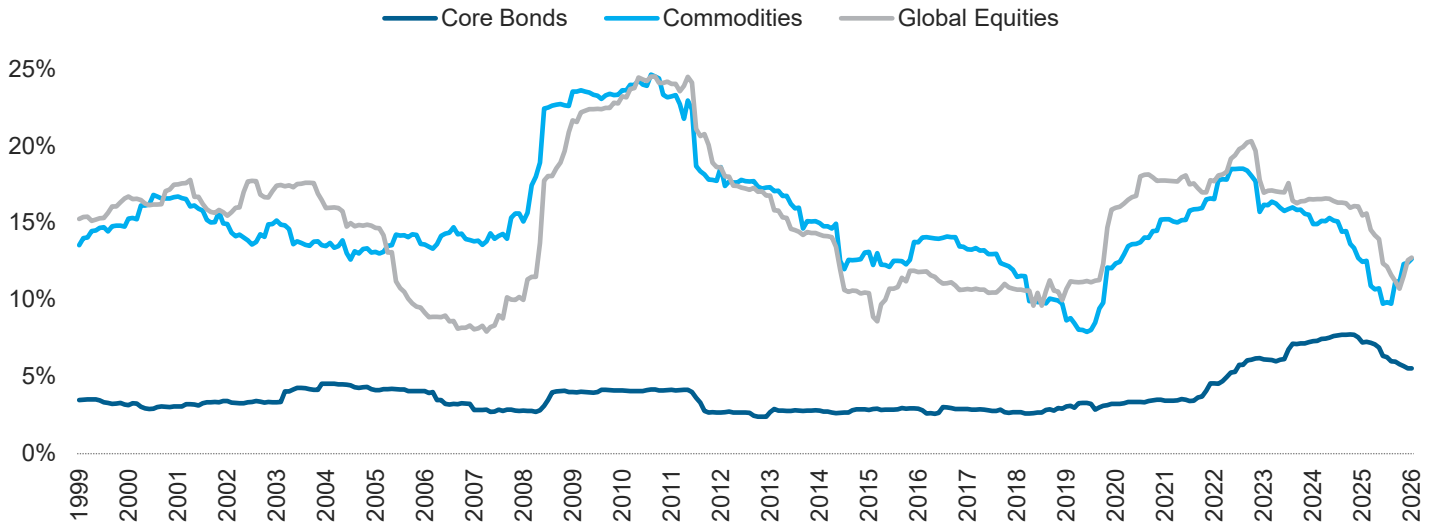
Leverage also creates liquidity risk because futures positions are marked to market daily and may require additional collateral after adverse price moves. If the portfolio does not maintain enough liquid assets to meet margin calls, it may be forced to reduce exposures at unfavorable prices, turning a temporary market decline into a more permanent impairment of capital.

Financing costs are another risk. When short-term interest rates rise, the cost of maintaining levered exposures increases, reducing the expected return advantage that leverage was intended to provide. Finally, leverage increases operational complexity, requiring careful collateral management, counterparty oversight where applicable, and disciplined controls around portfolio rebalancing.

Risk parity strategies usually access leverage through derivatives. Institutional investors typically obtain this exposure by trading standardized futures contracts on exchanges or entering into agreements with counterparties through a custodian or derivatives manager. The dynamics of a futures contract are such that by posting an initial margin of, for example, $1, an investor can achieve an economic exposure to the asset class of $10 or more.[7] Positions are then marked to market (valued) daily, so that any gains or losses increase or reduce this initial margin. To maintain the position, an investor needs to maintain what is called a "maintenance margin" in the account at all times, or else be forced to exit the position.[8]

Accessing leverage through futures is the preferred approach for creating risk parity portfolios, as futures markets for traditional asset classes are very liquid, offer virtually no counterparty risk, and have mechanisms in place that can limit the losses to an investor. This is a significant departure from models that access leverage through credit lines or borrowing facilities with banks or other lenders, as these are less liquid, are exposed to counterparty risk, and tend to substantially increase in cost during turbulent times.

Figure 6
Rolling 3-Year Asset Class Volatility



Global equities, core bonds, and commodities proxied by MSCI ACWI, Bloomberg US Aggregate, and Bloomberg US Commodity indices respectively.

Volatility Targeting

As illustrated in the levered risk parity portfolio example, for a risk parity strategy to offer expected returns comparable to traditional capital allocations, the portfolio's expected risk (i.e., volatility) also needs to be increased via leverage. Generally, risk parity investors will select a target risk level (e.g., of around 10%) and construct a portfolio designed to match it.[9]

Similar to how traditional capital allocation portfolios rebalance their weights periodically to avoid unwanted drift, risk parity portfolios also need to adjust both their asset class allocations and overall portfolio leverage to maintain a desired volatility level.

This is because asset class volatility is not constant; like performance, it moves up and down over time in cycles (see Figure 6). What this means for a risk parity allocation is that when the volatility of an asset is decreasing (increasing), it will appear less risky (riskier), so in order to maintain the target level of risk at the portfolio level, the strategy will increase (decrease) leverage and/or its risk exposure to the asset.[10] More simply, a volatility targeting strategy adjusts leverage in response to changes in volatility. This dynamic is most evident in higher-volatility asset classes such as equities and commodities, where volatility can rise sharply during periods of market stress or inflationary shocks. Bond volatility is generally lower but can still increase meaningfully during periods of inflation or interest rate uncertainty, as seen in the interest rate hikes from 2022 through 2023.

Volatility targeting also creates a risk management challenge to implementation, given that increasing volatility tends to correlate with decreasing returns and vice versa. While returns can be augmented by increasing leverage during benign periods, the opposite is also true. Losses may be amplified during periods of rising volatility, as it most likely involves increased selling at a loss. If not managed carefully, this de-levering could result in permanent impairment of capital, as assets may be sold rather than reinvested in (when they have declined in value) during periods of volatility spikes.

Interest Rate and Equity Risk

The traditional risk parity portfolio generally has higher (and/or levered) allocations to low-volatility assets like bonds, and lower allocations to higher volatility assets such as equities. This creates a portfolio profile with higher interest rate risk and lower equity risk relative to traditional allocations (e.g., a 60/40 portfolio, a typical public pension plan or endowment). These characteristics are reflected in how the portfolio performs across different market environments.

Figure 7
Stress Scenarios

Scenario	Traditional Allocation	Unlevered Risk Parity	Levered Risk Parity
10-year Treasury Bond rates rise 100 bps	2.8%	-0.6%	-0.9%
10-year Treasury Bond rates rise 300 bps	-4.5%	-8.6%	-16.6%
Baa Spreads widen by 50 bps, High Yield by 200 bps	1.2%	2.1%	1.4%
Baa Spreads widen by 300 bps, High Yield by 1000 bps	-20.0%	-8.3%	-17.7%
Trade Weighted Dollar gains 10%	-5.0%	-1.1%	-5.7%
Trade Weighted Dollar gains 20%	-1.5%	-1.3%	-3.8%
US Equities decline 10%	-5.0%	0.5%	-1.7%
US Equities decline 40%	-23.8%	-11.5%	-23.2%

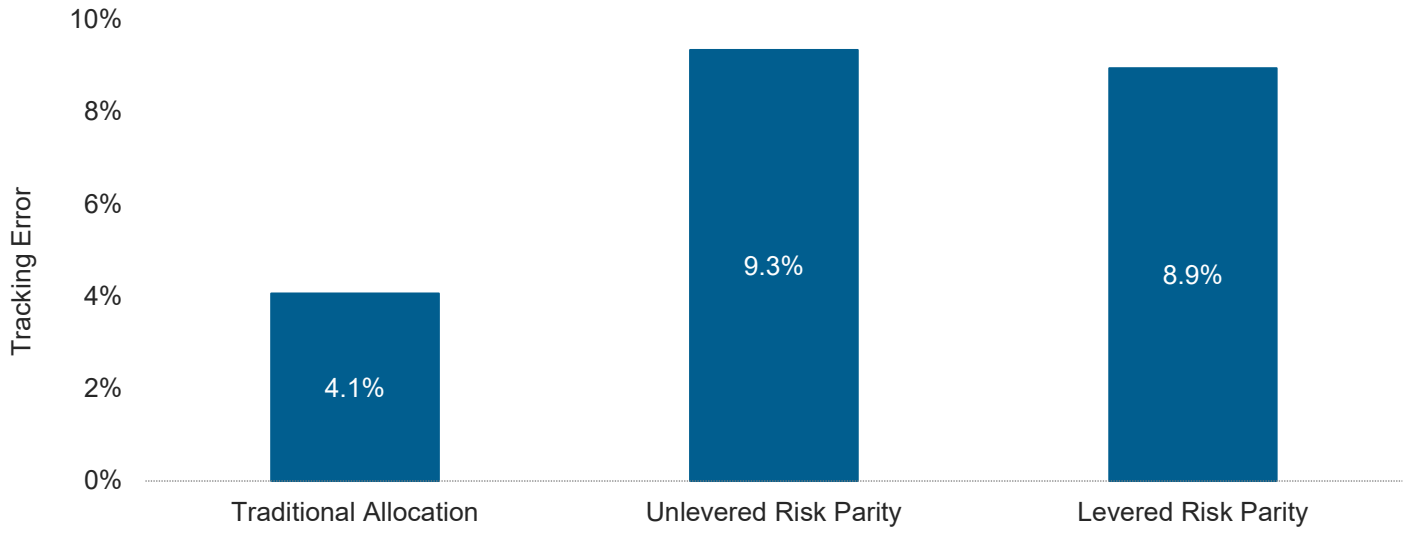
Based on Meketa Investment Group 2026 capital markets expectations. Stress scenarios are estimated using historical asset class behavior during similar market environments and conditional beta assumptions. Results do not represent isolated shocks to individual asset classes. The traditional allocation assumes 60% equities and 40% rate-sensitive assets. The unlevered risk parity portfolio assumes 13% equities, 72% rate-sensitive assets, and 15% commodities. The levered risk parity portfolio reflects the same allocation scaled to 26% equities, 143% rate-sensitive assets, and 30% commodities, with -99% in risk-free assets representing the use of leverage. Performance figures are shown before the deduction of advisory fees and transaction costs. Actual investor returns would likely be lower.

The table above illustrates how this dynamic translates to performance during stress events based on four market factors: rising rates, widening spreads, a strengthening dollar, and equity bear markets (see Figure 7). It shows that risk parity portfolios are expected to suffer far worse returns relative to traditional allocations during interest rate spike scenarios. This is unsurprising given the higher exposure to rate-sensitive fixed income. What is more surprising, however, is that a leveraged risk parity portfolio is expected to suffer declines on par with a traditional equity-oriented portfolio during severe equity-driven downturns. This result highlights that the benefit of lower equity exposure depends on whether other exposures, particularly bonds, provide offsetting performance during the downturn. As a result, risk parity may perform significantly better during some equity downturns and only modestly better during others. The magnitude of this benefit can vary across market environments.

Active Risk (Maverick Risk)

Implementing risk parity typically requires institutional investors to be comfortable with meaningful tracking error (i.e., active risk or "maverick" risk) relative to peers. In practice, tracking error typically ranges from approximately 5% to 10% when measured against traditional capital-based allocations (e.g., a 60/40 portfolio), reflecting the strategy's different asset exposures.[11] Understanding and quantifying this risk is key to determining if they will be comfortable being significantly "different" from peers at any point in time. Implementing risk parity across a large portion of or the whole portfolio will likely lead to substantial tracking error relative to peers (see Figure 8).

Figure 8
Expected Tracking Error relative to Peers



Expected tracking error measured relative to peer groups created by Meketa based on large public pension plans and large endowments universe. Expected tracking error is estimated using Meketa capital market expectations and the stated peer universe. These figures are illustrative estimates only, do not reflect the actual tracking error of any portfolio, and actual results would differ, potentially significantly.

Risk Parity as a Partial Portfolio Allocation

Risk parity may be (and often is) implemented as a part of a broader portfolio rather than as a standalone allocation for the entire portfolio. In this context, the strategy can introduce different risk exposures relative to the rest of the portfolio, particularly through its higher allocation to rate-sensitive assets and use of leverage. The impact on the overall portfolio will depend on factors such as the size of the allocation, the implementation, and prevailing market conditions.

As with full risk parity allocations, incorporating the strategy introduces tradeoffs, including differences in expected tracking error relative to peers and sensitivity to interest rate environments. As a result, it is prudent to evaluate its role within a portfolio in the context of the broader asset allocation framework.

Derivatives Infrastructure and Cost

The implementation of levered risk parity allocations requires that investors have sufficient infrastructure to trade and manage derivative contracts, including the ability to meet margin requirements and manage collateral on an ongoing basis. These activities introduce operational complexity, as positions are marked to market daily and require active oversight to ensure sufficient liquidity is available to support the portfolio. As a result, implementing these strategies internally typically requires established systems and experienced staff to manage these processes.

Investors without sufficient staff or internal infrastructure may instead access risk parity strategies through investment managers who provide integrated implementation. In these cases, the manager assumes responsibility for portfolio construction, trading, and operational management, which can simplify executions but add cost. Management fees typically begin at around 0.5% and increase with the complexity of the strategy.

Manager Implementation Differences

Risk parity is a broad portfolio construction framework rather than a single investment strategy, and its implementation can differ across managers. One important driver of differences is the choice of asset classes used to express the underlying risk exposures. For example, one manager may build a relatively simple portfolio around global equities, developed market government bonds, and commodities, while another may include inflation-linked bonds, credit, currencies, or gold. These choices can materially change the portfolio's behavior. A strategy that relies heavily on nominal government bonds will likely be more sensitive to interest rate shocks, while one that includes commodities or short-term TIPS may have more direct exposure to inflation. Similarly, a manager that includes credit may introduce spread risk that behaves more like equities during periods of market stress, even if

the asset is categorized as fixed income. As a result, two portfolios that both use the risk parity label may respond quite differently to the same economic environment.

A second source of variation is how managers size, rebalance, and manage those exposures over time. For example, a portfolio targeting 10% volatility will typically use less leverage than one targeting 15%, which can lead to meaningfully different returns during both strong and weak markets. The approach to volatility targeting also matters. A manager that reduces exposures quickly when volatility spikes may limit drawdowns, while a manager that adjusts more gradually may tolerate larger interim losses in an effort to avoid forced de-risking. Managers may also differ in approach to rebalancing: some managers may maintain relatively static risk weights, while others may tilt toward assets they view as more attractive based on valuation, momentum, carry, or macroeconomic conditions. In practice, these choices mean manager selection is not simply a question of choosing a risk parity allocation; it requires understanding how the manager defines the opportunity set, controls leverage, responds to changing volatility, and decides when to deviate from a balanced risk allocation.

Historical Performance

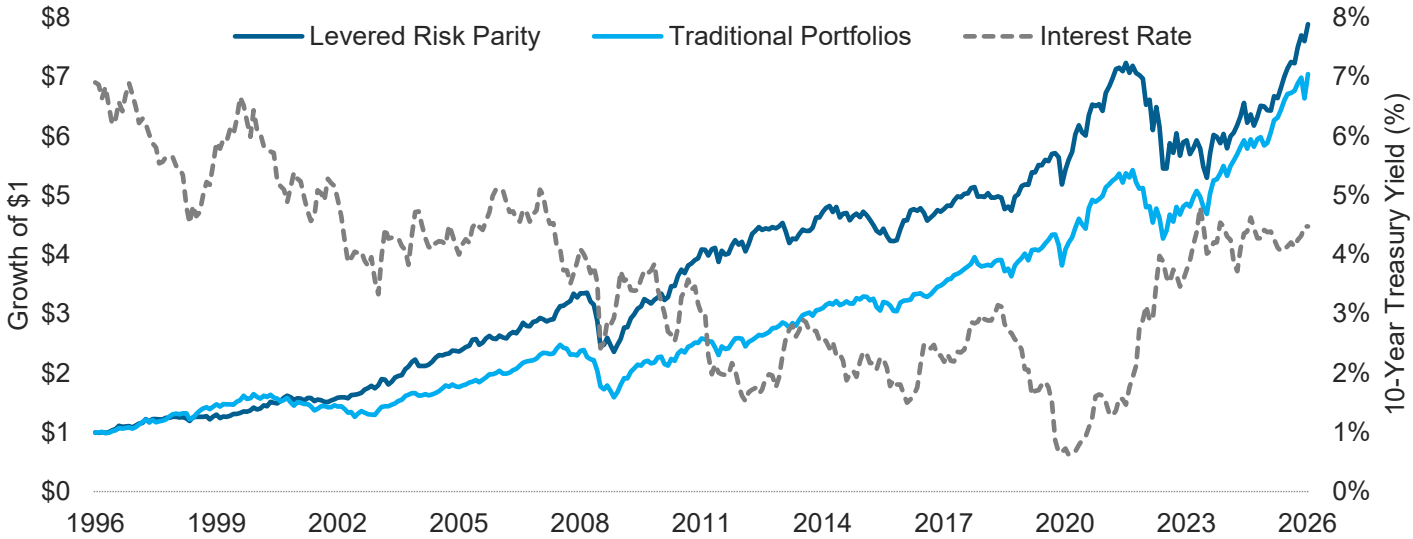
Risk parity portfolios have benefited from a multi-decade secular decline in interest rates. As shown in Figure 9, both risk parity and traditional 60/40 allocations generated substantial growth over this period. The stronger performance of the risk parity allocation highlights the extent to which portfolios with greater exposure to rate-sensitive assets benefited from this favorable rate environment.

While forecasting the future path of interest rates can be a challenging exercise, more recent experience has highlighted the potential for higher and more volatile rate environments. As a result, the current starting point for interest rates suggests that the favorable tailwinds experienced over much of the past several decades may not be present going forward.

The table below shows how risk parity portfolios would likely have fared during several notable historical scenarios, both positive and negative (see Figure 10). Notably, the relative performance observed during several historical equity market downturns was stronger than that suggested by the stress scenarios, highlighting that the relative performance of risk parity during equity market downturns depends not only on equity returns, but also on the behavior of its larger allocation to rate-sensitive assets.

Figure 9

Growth of $1 and US 10-Year Treasury Yield



Global equities, core bonds, and commodities proxied by the MSCI ACWI Index, Bloomberg US Aggregate Bond Index, and Bloomberg US Commodity Index, respectively; interest rate data from the Federal Reserve Bank of St. Louis (FRED). Performance figures in this paper are shown before the deduction of advisory fees and transaction costs. Actual investor returns would likely be lower.

Figure 10

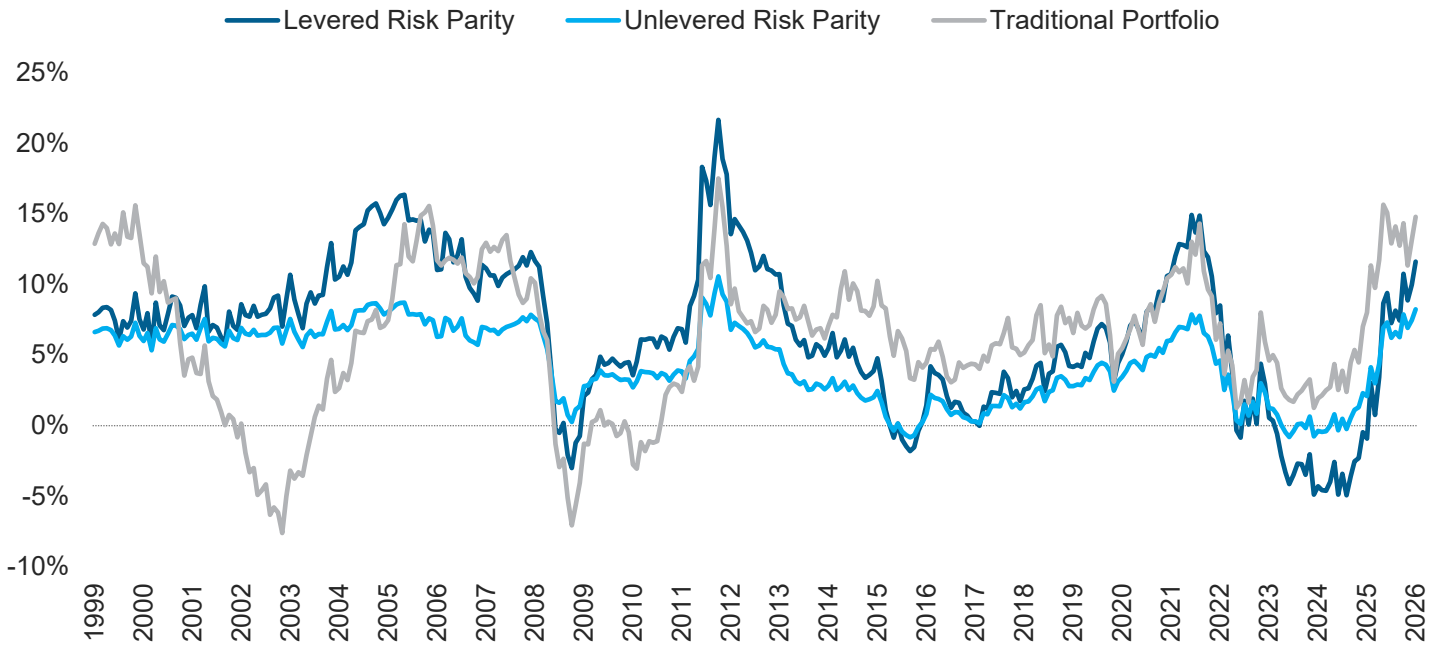
Historical Scenarios

Scenario	Traditional Allocation	Unlevered Risk Parity	Levered Risk Parity
Post-COVID Rate Hikes (Jan 2022 - Oct 2023)	-13.9%	-10.9%	-27.1%
COVID-19 Market Shock (Feb 2020 – Mar 2020)	-20.6%	-7.9%	-16.1%
Global Financial Crisis (Oct 2007 – Mar 2009)	-26.2%	-5.8%	-15.1%
Popping of the TMT Bubble (Apr 2000 – Sep 2002)	-16.6%	17.3%	23.5%
Crash of 1987 (Sep - Nov 1987)	-12.0%	-0.5%	-2.3%
Volcker Recession (Jan - Mar 1980)	-7.0%	-7.5%	-17.8%
COVID Recovery (Apr 2020 – Dec 2021)	46.2%	20.8%	41.1%
Global Financial Crisis Recovery (Mar 2009 - Nov 2009)	39.5%	18.6%	36.7%
Peak of the TMT Bubble (Oct 1998 - Mar 2000)	33.6%	10.9%	14.5%
Plummeting Dollar (Jan 1986 - Aug 1987)	70.8%	25.9%	41.6%
Volcker Recovery (Aug 1982 - Apr 1983)	36.3%	27.3%	48.4%
Bretton Woods Recovery (Oct 1974 - Jun 1975)	30.5%	9.6%	14.5%

Based on methodology published in Meketa's Asset Allocation Tool. Simplified example for illustration purposes only. Does not include potential allocation changes (e.g., changes in leverage or target volatility) to portfolios during the periods studied. Performance figures are shown before the deduction of advisory fees and transaction costs. Actual investor returns would likely be lower.

Figure 11

Rolling 3-Year Annualized Returns



Based on methodology published in Meketa's Asset Allocation Tool. Simplified example for illustration purposes only. Does not include potential allocation changes (e.g., changes in leverage or target volatility) to portfolios during the periods studied. Performance figures in this paper are shown before the deduction of advisory fees and transaction costs. Actual investor returns would likely be lower.

A rolling return analysis shows similar patterns (see Figure 11). Periods such as the early 2000s and Global Financial Crisis (GFC) highlight how outcomes vary across market environments. While declining interest rates supported performance through the early stages of the GFC, the low-rate environment that followed reduced the forward-looking return potential of the portfolio's rate-sensitive exposures. With yields already near historical lows, performance became more sensitive to the possibility of rising interest rates. This affected both the asset exposures and the financing component of the portfolio, as rising rates increased the cost of maintaining leverage. Hence, the rising rate environment that began in 2022 contributed to weaker performance.

Conclusion

Risk parity is an asset allocation framework that allocates risk, rather than capital, across asset classes. This approach seeks to reduce reliance on any single driver of performance by creating a balanced distribution of portfolio risk. Such a structure typically results in lower expected returns and volatility than traditional portfolios. For this reason, risk parity often utilizes leverage to increase the expected return, and consequently the expected volatility, of the portfolio to levels that are more consistent with investor objectives.

Risk parity portfolios will usually have higher (and often levered) exposure to bonds and lower exposure to equities than traditional allocations. This means the strategy tends to do better during times of equity declines but underperform during periods of rising rates. However, outcomes remain dependent on broader market conditions and the extent to which diversification benefits persist across asset classes and environments.

It also depends on an investor's ability to implement leverage efficiently and maintain the operational infrastructure necessary to support the strategy. These considerations, alongside the potential for meaningful tracking error relative to traditional allocations, should be evaluated carefully when assessing the strategy. Ultimately, the suitability of risk parity will depend on how those tradeoffs align with an investor's objectives and constraints.

End Notes

1 Leverage is the use of borrowed funds to purchase an asset or make an investment. Doing so creates economic exposures that exceed the value of capital put up for the investment.

2 Optimal in this context refers to portfolios that maximize expected return for a given level of risk (or minimize risk for a given level of return) based on model assumptions. In practice, results are sensitive to inputs such as expected returns, volatility, and correlations, which are uncertain and may change over time.

3 This process is consistent with finance theory that argues that in order to increase the expected return of an efficient portfolio, leverage should be used, as opposed to overweighting higher return asset classes. However, this also assumes that leverage is always available at the risk-free rate (with no volatility or correlations to the rest of the assets in the portfolio).

4 A borrowing facility refers to any type of short-term credit provided by a bank or non-traditional lender.

5 There are risk parity products/strategies that implement portions of their allocations through physical assets if no futures market exists for the asset class (e.g., TIPS).

6 See Meketa Investment Group, The Inflation Variable: Evaluating Potential Outcomes, 2021.

7 Hypothetical example only, does not reflect current leverage ratios available for derivatives contracts.

8 Maintenance margins are typically lower than initial margins and vary by asset class, depending on factors such as the asset's volatility.

9 Target risk levels vary, usually between 5% and 20%. Levels are chosen with objectives such as matching equity market volatility, or bond market volatility, among others.

10 This explanation assumes risk is defined by the standard deviation of returns only. Some implementations of risk parity could include other measures of risk as well as the correlations between assets. Still, the same logic applies: the less risky (riskier) an asset becomes and the less (more) correlated it becomes relative to the other assets in the portfolio, the higher (lower) its risk parity allocation should be, translating directly to higher (lower) leverage.

11 Source: S&P Dow Jones Indices; Meketa Investment Group analysis. Expected tracking error is estimated using Meketa capital market expectations and the stated peer universe. These figures are illustrative estimates only, do not reflect the actual tracking error of any portfolio, and actual results would differ, potentially significantly.

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