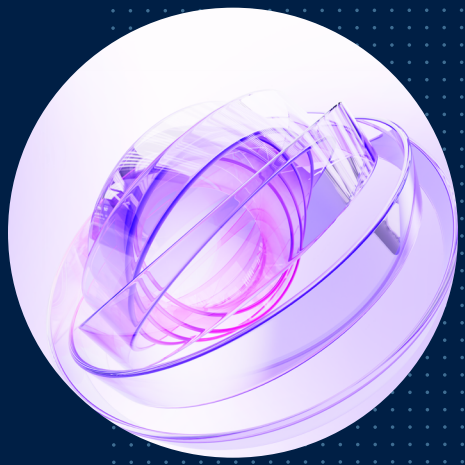
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MAKING THE TOTAL PORTFOLIO APPROACH WORK

The Role of Systematic GTAA in Enhancing Total-Fund Outcomes



November 2026

For asset owners adopting the Total Portfolio Approach (TPA), a key opportunity to improve total-fund outcomes is tactical asset allocation, which seeks to capitalize on short-term market dislocations through dynamic allocation across assets. In this paper, we argue that systematic Global Tactical Asset Allocation (GTAA) overlays provide a transparent, scalable, and capital-efficient way to implement such views. By expressing investment opportunities through a rules-based, cross-asset framework, GTAA enables active-risk capital to be deployed in a measurable, repeatable, and governance-friendly manner.

To support our proposal, we examine a compact set of well-established systematic strategies, including cross-asset Carry and Momentum and U.S. dollar Value, Carry, and Momentum currency-timing signals, implemented as overlays on representative reference portfolios. In our back-test, an equal-risk combination of these strategies delivered information ratios (IRs) of roughly 0.45-0.60 net of assumed transaction costs compared with the 0.30 hurdle rate commonly used by asset owners. The overlay improved the reference portfolio's rolling five-year Sharpe ratio in most windows, suggesting systematic GTAA overlays can provide consistent value across macro regimes when diversified across asset classes and factor styles.

Beyond the return enhancement documented in this paper, systematic GTAA overlays offer several additional benefits:

- Overlays typically exhibit low or negative correlation to reference portfolios, providing diversification alongside alpha generation.
- Their independent risk profile makes active risk easier to measure, budget, and compare with other investment opportunities at the total-fund level.
- The back-test results presented here are based on a simple set of well-established signals. Performance has shown some decay since 2021, potentially reflecting increased signal crowding. In our view, consistently achieving a realized IR of 0.50 over the long term requires a broader opportunity set, including additional cross-asset strategies and proprietary alternative data signals.
- GTAA overlays are generally implemented through highly liquid futures, providing capital efficiency without disrupting strategic allocations. Asset owners can manage these strategies internally if infrastructure permits, while externally managed mandates are often only partially funded, remain highly liquid, fully redeemable on short notice, and can be tailored to specific volatility, leverage, and factor-exposure objectives.
- The systematic rule-based nature provides a long back-test history, satisfying further diagnostic demands under TPA framework. For example, systematic macro risk exposures can be readily identified, enabling more informed macro-regime-aware portfolio construction.

All performance results shown on this page are back-tested (hypothetical) results for January 2001 to June 2026, before management fees. Refer to "Hypothetical, back-tested results" on page 11.

1. INTRODUCTION

The Total Portfolio Approach (TPA) is rapidly evolving from a conceptual framework into an operational reality for institutional investors. Leading organizations, including CPP Investments, NZ Super, GIC, the Future Fund, and most recently CalPERS, have adopted a model that manages the portfolio as a single pool of capital, anchored by a simple reference portfolio and governed by total-fund risk budgets rather than siloed asset-class allocations.[1] CalPERS' adoption, effective July 2026, highlights the growing momentum behind TPA among U.S. asset owners. A common theme across both early pioneers and recent adopters is the importance of cross-asset tactical allocation as a tool for capturing market dislocations. This growing demand for cross-asset tactical allocation is the primary motivation for this paper.

A key question for asset owners is whether tactical allocation strategies can reliably generate positive information ratios (IRs). To address this, we evaluate representative systematic (G)TAA strategies, including cross-asset allocation and USD timing, within a TPA framework. These strategies are grounded in well-established academic research, extensively tested in practice, and selected for their relevance to asset owners pursuing TPA.

- Dynamic cross-asset allocation is particularly important for investors moving beyond traditional Strategic Asset Allocation (SAA) frameworks and adopting larger active risk budgets, often a first step toward TPA. We show that a systematic, rules-based overlay spanning equities, fixed income, commodities, and cash delivered, in our back-test, an IR of approximately 0.5.
- We also examine systematic USD timing, another important opportunity set for asset owners. Because reference portfolios are typically fully exposed to the investor's local currency, selective allocations to alternative currencies can create opportunities for additional return. Our results show that a systematic currency-timing strategy achieved, in our back-test, an IR above 0.4.

Taken together, the findings suggest that systematic cross-asset allocation and currency timing can provide meaningful value-added relative to the reference portfolio, making them compelling building blocks within a TPA framework.

Crucially, our empirical design is grounded in a survey of more than 20 global pension funds and sovereign wealth funds operating under TPA frameworks, representing more than $10 trillion in assets.[2] Several consistent patterns emerged:

- Most funds anchor decisions to a reference portfolio, typically a passive global equity-bond mix ranging from 60/40 to 80/20. Because reference portfolio design materially influences outcomes, we evaluate reference portfolios spanning 60/40 to 100% equity.
- Active strategies are generally expected to achieve an IR of about 0.30 to justify capital allocation. In our back-test, the overlays' IRs exceeded this hurdle net of assumed transaction costs.
- Active risk budgets are typically 200-400 bps. Consistent with industry practice, we assume an active risk budget of 300 bps.
- Performance evaluation focuses on beta exposure, active risk, and total-fund value added. Our analysis follows this framework. We find that factor overlays exhibit low and, on average, slightly negative correlations with the reference portfolios. As a result, active risk can be reasonably approximated by stand-alone volatility under the assumption of zero beta exposure to the reference portfolio.

[1] For foundational surveys and case studies of TPA adoption, see Filbeck and Bok (2024, 2025); Thinking Ahead Institute and NSW Treasury Corporation (2020); Elkamhi and Lee (2025); Hyde (2025); and Fernandez, Lester, Bookstaber, and Giguere-Morello (2024).

[2] PGIM Quantitative Solutions survey of asset owners, conducted March 2026.

In this paper, we focus on classic factor strategies that are well supported by both academic research and investment practice. To keep the analysis transparent, we exclude specialized and proprietary signals. In practice, investors can enhance returns through non-traditional signals from alternative data or advanced statistical methods, and within-asset-class decisions such as country, sector, and style allocation of equities. For this paper, we use a realized IR of 0.5 as an illustrative assumption for a long-term investor, particularly for an overlay built on a broad opportunity set and diversified signal sources.

The appeal of systematic GTAA overlays extends beyond their strong back-tested results. Their transparent, rules-based implementation, combined with high liquidity and capital efficiency, makes them particularly well suited to a TPA framework. Evaluating the diversification benefits of active mandates at the total-fund level is analytically demanding and sometimes requires years to develop robust frameworks, particularly for complex and opaque strategies such as private assets. In contrast, systematic GTAA overlays offer a practical and transparent alternative, as their long back-test histories make TPA-relevant metrics relatively straightforward to assess. Thus, they represent an attractive opportunity for asset owners at any stage of TPA adoption, especially those in the early transition stage from a traditional SAA framework. Furthermore, compared with fully funded mandates, systematic GTAA overlays can be implemented with minimal capital, low trading costs, and ample liquidity, without reducing exposure to reference portfolios (Aiolfi et al., 2020).[3]

In conclusion, we argue that systematic GTAA offers an effective mechanism for implementing cross-asset investment views within a TPA framework. The remainder of the paper evaluates the extent to which a compact GTAA program can enhance total-fund outcomes through the lens of TPA metrics.

2. RESEARCH DESIGN

2.1 Performance Measurement Under the TPA Framework

The choice of a reference portfolio is a central decision within the TPA framework. In general, the reference portfolio consists of a combination of broad equity and fixed-income indices designed to represent a hypothetical low-cost passive portfolio. The asset mix is typically determined by the asset owner's return objectives, risk tolerance, and projected future liabilities. In this paper, we consider five reference portfolios: four allocations combining global equities and short-duration U.S. Treasuries (60/40, 70/30, 80/20, and 90/10), as well as a 100% equity portfolio. Global equity exposure is represented by the MSCI ACWI Index (USD returns), while fixed-income exposure is represented by the Bloomberg U.S. Treasury 1-3 Year Index. We deliberately evaluate the overlay against several blends rather than one. Because asset owners anchor to different reference portfolios, reporting the value added across a range of common blends lets each reader identify the result most relevant to their own portfolio, without having to re-run the analysis for their specific allocation.

Because future liabilities are generally denominated in an investor's local currency, it is common practice to construct a reference portfolio with full exposure to that currency. In this study, we assume a U.S.-based investor and therefore use USD-denominated benchmark returns. Investors with different base currencies can adopt the same research framework by adjusting the construction of both the reference portfolio and the factor overlays to reflect their local currency exposures. We expect the incremental value added by the factor overlays to remain broadly similar across different currency settings.

Each factor is treated as an active tilt added to the reference portfolio, with the reference portfolio as the funding source and the reference portfolio plus the factor exposure as the

[3] As shown in Aiolfi et al. (2020), approximately 13% cash is required to support 200 bps of active risk under conservative assumptions for initial margin and cash buffers. Funding requirements generally vary with the target active risk and the maximum leverage employed.

replacement. For both TAA and USD timing factors, we assume zero correlation with the reference portfolio, so their active risk equals their stand-alone volatility.

The zero-correlation assumption is intentionally conservative. As shown in Section 3, realized correlations between our factor overlays and the reference portfolios are small and, on average, negative. In our back-test, total risk was lower with the overlay than without it. As a result, the total portfolio improved through both higher return and lower risk. In practice, one can assume a more realistic correlation value given their own understanding of the factor overlays.

2.2 Data and Factors

Our sample starts from January 2001 through June 2026. We evaluate two families of systematic factors. The first is a set of Tactical Asset Allocation (TAA) factors, Carry, and Momentum, expressed through cross-asset positions across U.S. 1M-3M T-bills, the Bloomberg Global Agg Government Bond Index, the Bloomberg Commodity Index, and the MSCI World Index (USD return). The second is a set of USD timing factors, Value, Carry, and Momentum, expressed through developed-market currency exposure against the U.S. dollar.[4] Factor returns are reported net of transaction costs.[5] Factor constructions are summarized in Exhibit 1.

Exhibit 1: Factor Definitions

Factor	Definition of Factor Values
TAA Carry	T-bill carry is 0. Global bond carry is the difference between bond yield and the 1-3M T-bill rate. Commodity carry is index futures carry. Equity carry is the difference between the 12-month average dividend yield and the 1-3M T-bill rate.
TAA Momentum	12-month asset return momentum
USD Timing Value	Spot FX deviation from OECD PPP
USD Timing Carry	1-month interest rate differential with the USD
USD Timing Momentum	12-month asset return momentum
Factor Type	**Trading Assets and Weight Schemes**
TAA	• Trading assets include 1-3M T-bill, Bloomberg Global Agg Government Bond Index, Bloomberg Commodity Index, MSCI World Index (USD return).[6] • Asset weights are linearly assigned based on the ranking of factor values, with weights summing to zero. The minimum and maximum weight limits are chosen so that full sample volatility is 300 bps.
USD Timing	• Trading assets include 1M currency forward of AUD, CAD, CHF, EUR, GBP, JPY, NOK, NZD, and SEK. • Asset weights are equal to the signs of the factor values scaled by the asset volatility, with volatility estimated from the preceding 126 daily returns. As a result, the sum of asset weights is not constrained to zero and may be positive when the strategy is short USD or negative when it is long USD. The time varying total weights are chosen so that full sample volatility is 300 bps.

[4] The TAA and USD factors can be implemented through cash securities and/or derivatives, depending on the asset owner's investment objectives and operational requirements. For demonstration purposes, we simulate factor performance using traditional asset class benchmarks under reasonable transaction cost assumptions. We further analyze factor implementation using futures and currency forwards across equities, government bonds, commodities, and currencies, and obtain similar results.

[5] The assumption of transaction costs is based on our trading experience on average. For assets in TAA factors, the round-trip transaction costs are assumed to be 20 bps for cash equities and bonds, 6 bps for the futures of government bond, commodities, and equity indices, and 1 bp for T-bills. For assets in USD timing factors, we assume 3 bps for all currency forwards. All factors are rebalanced at calendar month end with a two-day implementation lag.

[6] Trading assets for each factor are selected based on accessibility and ease of trading, including the ability to establish both long and short positions at low cost. We therefore restrict the cross-asset universe to broad, liquid, and readily shortable asset classes, and exclude asset classes that are difficult or costly to short.

To align with the 200-400 bps active risk budget observed across the asset owners in our review, each factor is scaled to a full-sample annualized volatility of 3%, equivalent to a 300 bps active risk budget under the assumption of zero correlation with reference portfolios. Consistent with our empirical findings, this assumption allows active risk to be approximated by the overlay's total volatility. While alternative active-risk definitions may be appropriate for mandates with non-zero beta exposure, such considerations are beyond the scope of this paper.

Factor composites are then constructed as equally weighted combinations of the scaled factors: TAA_Eq combines TAA Carry and Momentum; USD_Eq combines USD Value, Carry, and Momentum; and All_Eq combines all five factors. We additionally construct All_8020, which places 80% weight on the TAA composite and 20% on the USD-timing composite; this corresponds to an equal-weight scheme across the underlying asset-class exposures (four cross-asset legs and one currency sleeve) and keeps the overlay's composition stable as individual factors are added or removed. Composites are re-scaled to a 3% full-sample annualized volatility so that all reported combinations sit at the same 300 bps active-risk budget.

3. EMPIRICAL ANALYSIS

We evaluate the overlay against five reference portfolios spanning the range of practice observed in our review (60/40, 70/30, 80/20, and 90/10 blends of global equities and short-duration U.S. Treasuries, together with a 100% equity-only benchmark) and against four composites of the five underlying factors: TAA_Eq (TAA Carry and Momentum), USD_Eq (USD Value, Carry, and Momentum), All_Eq (equal weight across all five), and All_8020 (80% TAA composite and 20% USD-timing composite). Each factor and composite is scaled to a full-sample annualized volatility of 3%, corresponding to a 300 bps active risk budget assuming zero correlation with reference portfolios.

Results in this section are back-tested (hypothetical) and before management fees. See page 11.

Exhibit 2: Summary Statistics : Reference Portfolios, Overlay Factors, and Factor Composites

Jan 2001 to Jun 2026, Back-Tested

Summary Stats for Reference Portfolios					
Portfolio	Ann_AvgRet	Ann_Vol	Sharpe	MaxDD	MaxDD_Vol
RP6040	6.31%	9.28%	0.49	34.69%	3.74
RP7030	6.96%	10.86%	0.48	40.24%	3.71
RP8020	7.61%	12.44%	0.47	45.38%	3.65
RP9010	8.26%	14.02%	0.46	50.15%	3.58
ACWI	8.91%	15.60%	0.46	54.57%	3.50
Summary Stats for Factors					
Portfolio	Ann_AvgRet	Ann_Vol	IR	MaxDD	MaxDD_Vol
TAA_Carry	0.94%	3.00%	0.31	16.88%	5.63
TAA_Momentum	1.32%	3.00%	0.44	10.09%	3.36
USD_Value	0.71%	3.00%	0.24	10.23%	3.41
USD_Carry	0.59%	3.00%	0.20	16.10%	5.37
USD_Momentum	0.49%	3.00%	0.16	10.47%	3.49
Summary Stats for Factor Combinations					
Portfolio	Ann_AvgRet	Ann_Vol	IR	MaxDD	MaxDD_Vol
TAA_Eq	1.44%	3.00%	0.48	7.34%	2.45
USD_Eq	1.36%	3.00%	0.45	11.86%	3.95
All_Eq	1.80%	3.00%	0.60	8.27%	2.76
All_8020	1.57%	3.00%	0.52	7.42%	2.47
Correlation					
Portfolio	RP6040	RP7030	RP8020	RP9010	ACWI
TAA_Carry	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
TAA_Momentum	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
USD_Value	(0.28)	(0.28)	(0.28)	(0.28)	(0.27)
USD_Carry	0.11	0.12	0.12	0.12	0.12
USD_Momentum	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
TAA_Eq	(0.18)	(0.18)	(0.18)	(0.18)	(0.18)
USD_Eq	(0.24)	(0.24)	(0.23)	(0.23)	(0.23)
All_Eq	(0.27)	(0.26)	(0.26)	(0.26)	(0.26)
All_8020	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)

Source: PGIM Quantitative Solutions, MSCI, Bloomberg. Back-tested (hypothetical) results, January 2001-June 2026, net of assumed transaction costs and before management fees, which would reduce returns. Not actual performance. Past performance is not a reliable indicator of future results. See "Hypothetical, back-tested results" on page 11.

Two observations stand out at the factor level in Exhibit 2. First, the individual factors deliver IRs between 0.16 and 0.44 over the sample, with the TAA factors, which take positions across asset classes rather than within currency markets, earning larger IRs than the USD timing factors. Second, the correlations of the individual factors with reference portfolios are uniformly small in magnitude: USD Carry is weakly positively correlated with the reference portfolios, while USD Value, USD Momentum, and both TAA factors are weakly negatively correlated. The realized correlations are therefore materially lower than the zero-correlation assumption we impose for active-risk budgeting; as a result, the effective contribution of each factor to total active risk is much smaller than 300 bps.

In our back-test, the composites' IRs ranged from 0.45 to 0.60, compared with the 0.30 hurdle rate documented in Section 1. Every composite exhibits a negative correlation with each of the reference portfolios. The All_Eq composite, which weighs all five factors equally, produces the highest IR (0.60) and the most negative correlation with the reference portfolios. This illustrates the value of pairing cross-asset TAA signals with FX timing signals in a single overlay, and the role of factor-style diversity in driving the composite-level improvement. For the remainder of the paper, we focus on All_8020, which places 80% of its active risk on the cross-asset signals and 20% on currency timing. It retains most of this diversification benefit, with an IR of 0.52 and correlations near -0.21, while keeping FX from dominating the overlay and holding the factor weights stable as the underlying factor set evolves.

Exhibit 3: Return by Reference Portfolio, With and Without Composite Overlays

Back-Tested

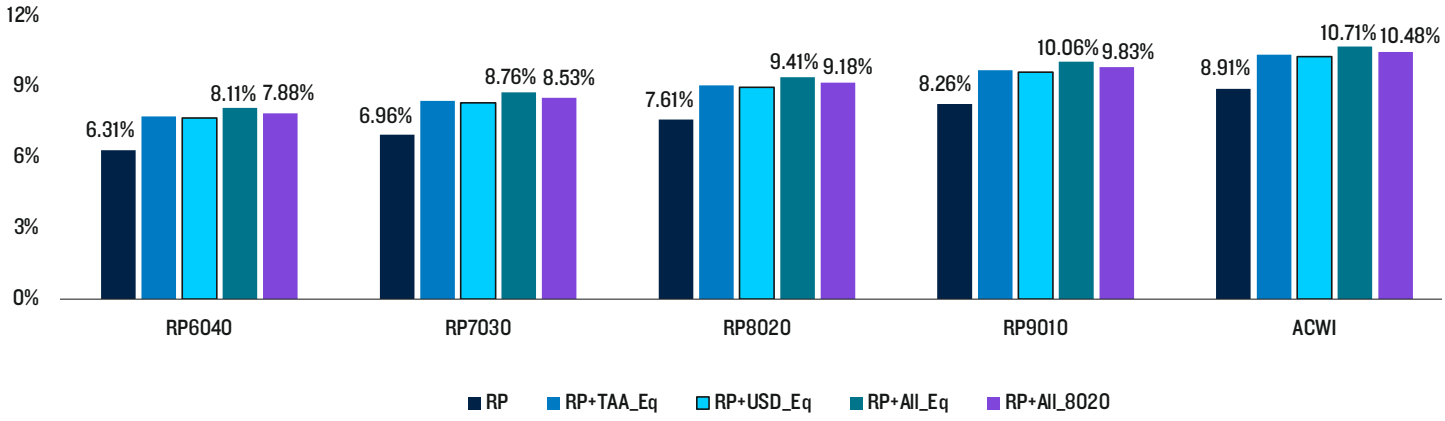
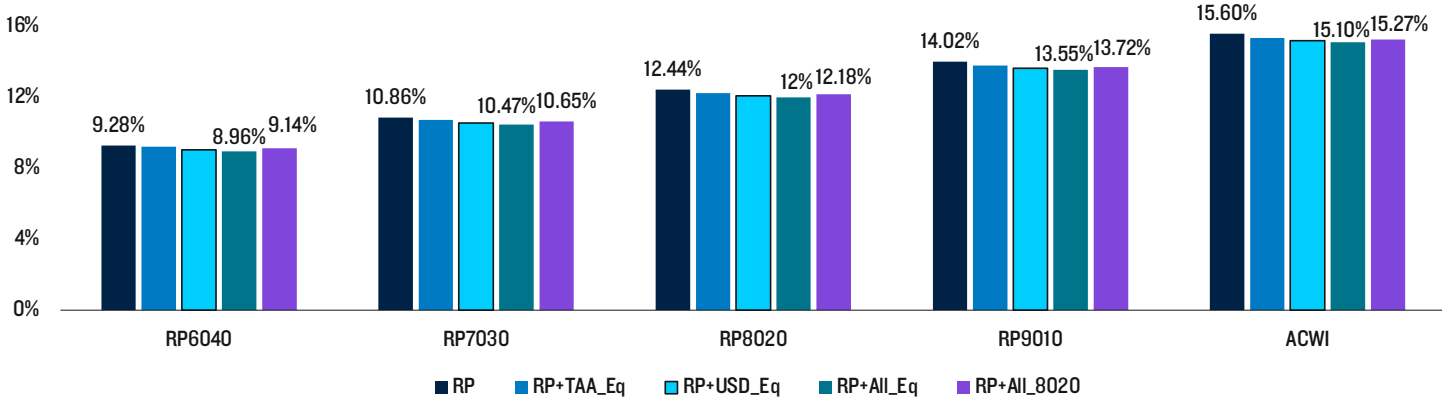


Exhibit 4. Volatility by Reference Portfolio, With and Without Composite Overlays

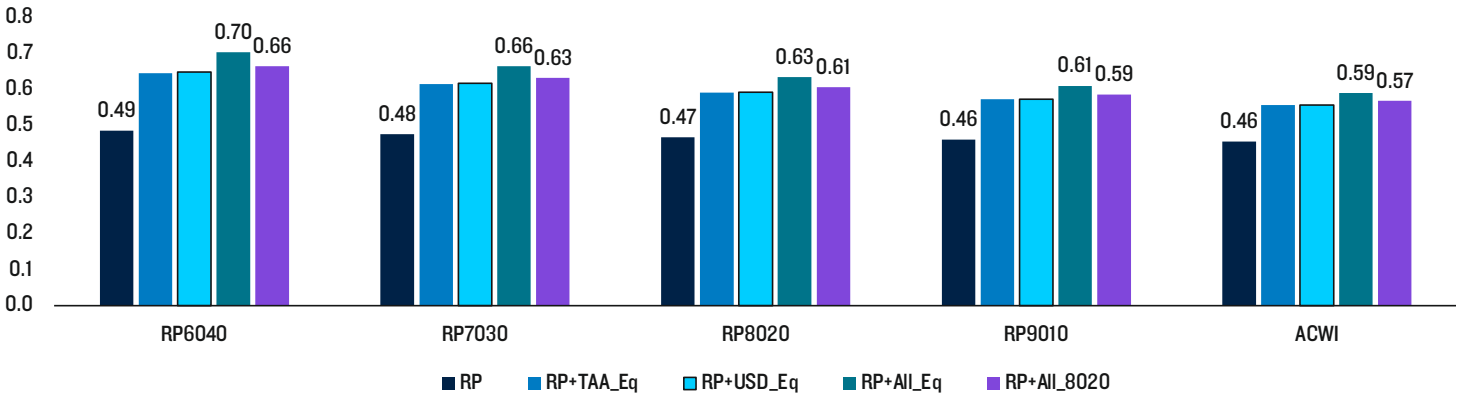
Back-Tested



Source: PGIM Quantitative Solutions, MSCI, Bloomberg. Back-tested (hypothetical) results, January 2001-June 2026, net of assumed transaction costs and before management fees, which would reduce returns. Not actual performance. Past performance is not a reliable indicator of future results. See "Hypothetical, back-tested results" on page 11.

Exhibit 5. Sharpe Ratio by Reference Portfolio, With and Without Composite Overlays

Back-Tested



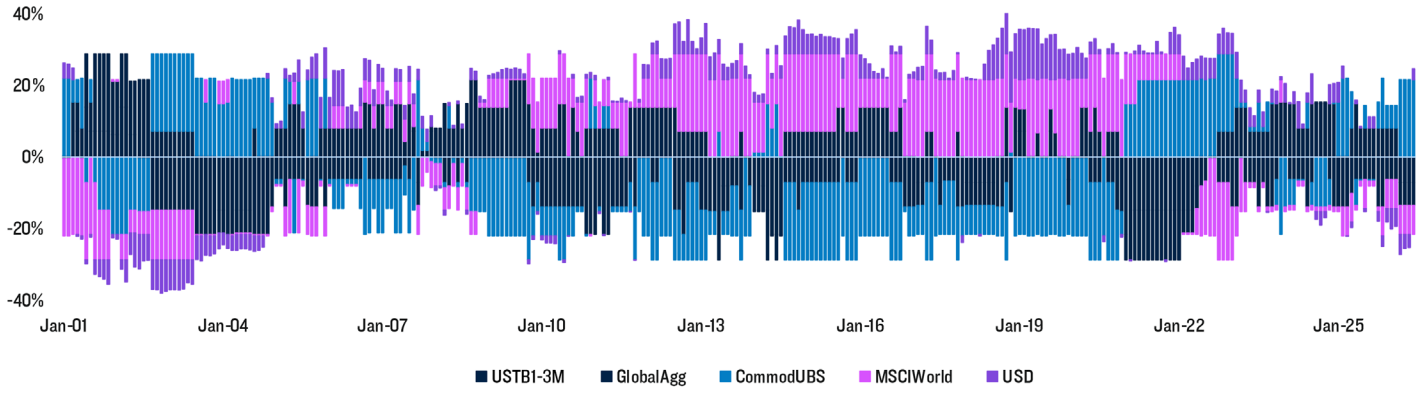
Source: PGIM Quantitative Solutions, MSCI, Bloomberg. Back-tested (hypothetical) results, January 2001-June 2026, net of assumed transaction costs and before management fees, which would reduce returns. Not actual performance. Past performance is not a reliable indicator of future results. See "Hypothetical, back-tested results" on page 11.

In our back-test at the total portfolio level, adding the All_8020 composite to each reference portfolio raises the Sharpe ratio meaningfully, from 0.46-0.49 to 0.57-0.66 with the overlay (Exhibit 5). Meanwhile, the total volatility of the combined portfolio is essentially unchanged, and in several cases slightly lower (Exhibit 4). This is the mechanism emphasized throughout the paper; because the overlay is uncorrelated (indeed mildly negatively correlated) with the reference portfolio, its 300-bps stand-alone active risk translates into a much smaller contribution to total-fund active risk. In TPA language, the overlay competes efficiently for risk capital and improves total-fund efficiency both through return enhancement and through modest risk reduction.

Exhibit 6 illustrates the active asset allocations for All_8020 over time. The chart plots the overlay's active weights across the four cross-asset positions (cash, bonds, commodities, and equities) together with its aggregate USD exposure. Commodities and equities, the two risky asset classes, generally exhibit offsetting positions over time; for instance, the strategy adopted a long commodity and short equity stance as inflation rose during the COVID period. USD exposure remained predominantly positive or neutral throughout the sample, except for the period before 2005 and since late 2025.

Exhibit 6. Active Weights of All_8020

Back-Tested

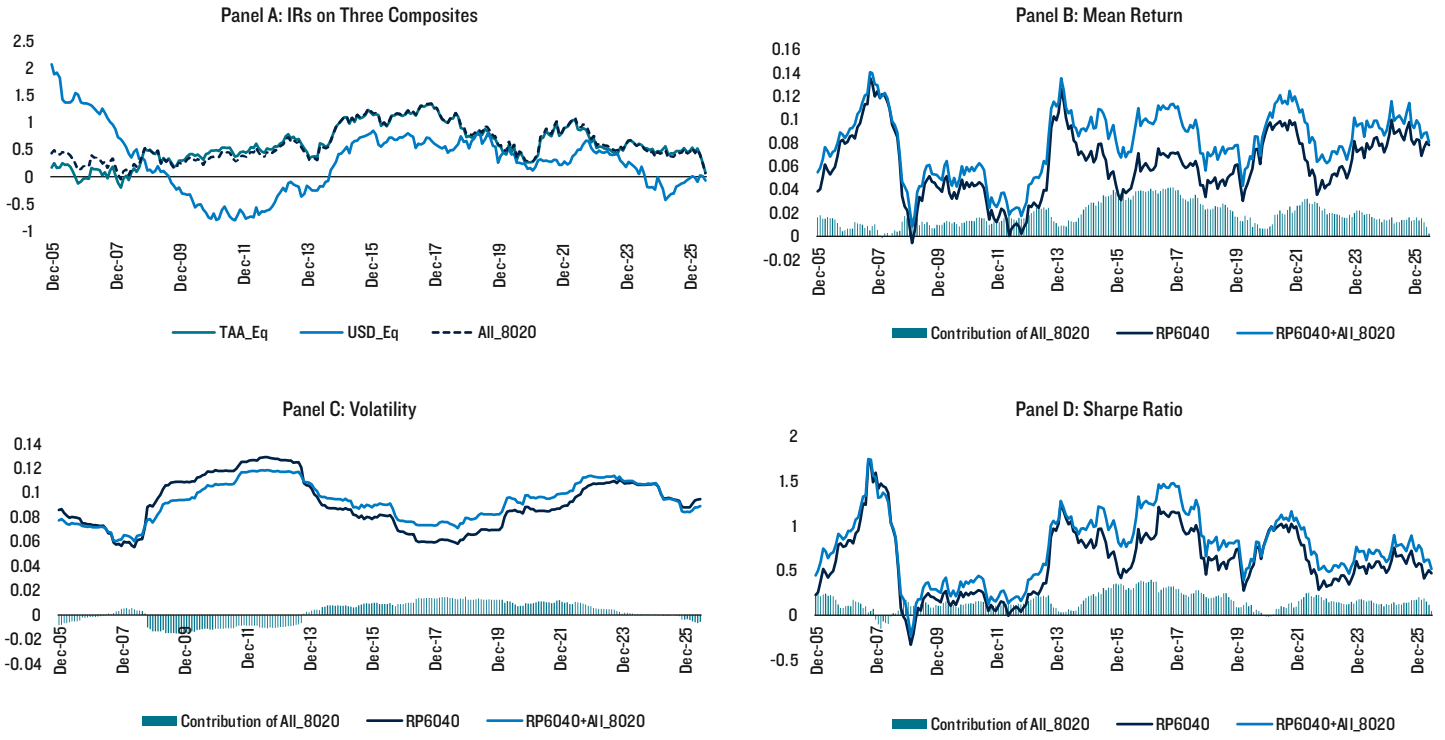


Source: PGIM Quantitative Solutions, MSCI, Bloomberg. Back-tested (hypothetical) allocations, January 2001-June 2026, shown for illustrative purposes only; not actual positions. See "Hypothetical, back-tested results" on page 11.

Finally, we examine the consistency of the result across sub-periods using rolling five-year windows (Exhibit 7). The rolling-IR panel (Exhibit 7, Panel A) illustrates the value of factor-style diversification most clearly during USD_Eq's 2010-2012 drawdown: as USD_Eq fell to roughly -0.75, All_8020 was cushioned by TAA factors and still delivered a 5-year IR from 0 to 0.5. Across the full sample, All_8020's rolling IR is far steadier than USD_Eq's, which alone turns deeply negative in 2010-2012 and again late in the sample, while it tracks TAA_Eq since 2013 closely without relying on it exclusively. Adding All_8020 to the 60/40 reference portfolio almost always improves the rolling five-year mean return relative to the reference portfolio alone, with the largest incremental gains around dislocations such as the COVID-19 shock (Panel B). Rolling five-year volatility of the combined portfolio remains close to that of the reference portfolio and, in several windows, is lower, keeping the active-risk contribution to total risk toward the low end of the 200-400 bps budget range implied by the zero-correlation assumption (Panel C). The rolling five-year Sharpe ratio of the combined portfolio dominates that of the reference portfolio in almost every window, driven by both return enhancement and risk reduction (Panel D). Taken together, these results suggest the improvement in our back-test was not driven by one or two favorable episodes.

Exhibit 7: Rolling 5-Year Performance, 60/40 RP with and without All_8020 Overlay

Back-Tested



Source: PGIM Quantitative Solutions, MSCI, Bloomberg. Back-tested (hypothetical) results, January 2001-June 2026, net of assumed transaction costs and before management fees, which would reduce returns. Not actual performance. Past performance is not a reliable indicator of future results. See "Hypothetical, back-tested results" on page 11.

4. SUMMARY AND IMPLICATIONS

The evidence assembled in this paper speaks directly to the question posed in the introduction. Evaluated within a TPA framework, one that is anchored to a passively investable reference portfolio, measured against an active risk budget, and judged on the contribution to total-fund outcomes, systematic GTAA strategies in our back-test delivered a positive improvement over the reference portfolio. Individual factor IRs ranged from 0.16 to 0.44 and composite IRs from 0.45 to 0.60, compared with the 0.30 hurdle rate. The improvement appeared in the full sample and in most rolling five-year windows.

Four implications follow. First, TPA is the right lens for evaluating tactical strategies. Under this framework, capital allocation is driven by risk contribution rather than asset-class boundaries. Consequently, the value of tactical overlays becomes more apparent through their ability to enhance total-fund efficiency within an active risk budget that is not tied to specific asset classes. In contrast, traditional asset-class benchmark frameworks often penalize tactical overlays for generating benchmark-relative tracking error, thereby constraining their allocation and thus contribution through tightly defined cross-asset risk budgets.

Second, style diversification is the mechanism that turns individually modest factor IRs into an overlay that clears asset-owner hurdle rates. Combining cross-asset TAA signals with FX timing signals is what drives the composite IRs into the 0.5-0.6 range. Additional diversification across asset classes, such as fixed income and commodities, together with alternative data sources and more sophisticated signal construction techniques, may further improve performance. Nevertheless, for this paper we use a realized IR of 0.5 as an illustrative assumption for a long-term investor.

Third, the overlay is capital-efficient and its active-risk contribution to the total fund is small once realized correlations are accounted for. Asset owners that prefer not to build systematic GTAA in-house may be able to seek improvements through an external overlay, without disturbing their strategic asset allocation or their existing active managers. Prior research has found that similar overlay approaches may retain benefits after management fees (Cavaglia, S., Fan, J. H., & Wang Z (2022)), and the positions stay liquid throughout, so the overlay can be scaled up or down as its risk budget changes rather than committing capital for a fixed term.

Fourth, the systematic overlays can be beneficial to every stage of TPA adoption, and particularly easy to introduce for funds transitioning from a legacy SAA framework. The transparent and rule-based strategies can absorb the additional active risk budget released by a more flexible SAA model and can be introduced incrementally as a low-friction first step that can deliver benefits well before a full TPA operating model is in place. Their capital-efficient design enables investors to add active exposures without disrupting the strategic core portfolio. Moreover, their long back-test histories make their contribution to total-fund objectives relatively straightforward to evaluate.

Taken together, these findings make a simple case: systematic, rules-based GTAA earns a place in the competition for risk capital. The evidence here should not be read as a claim that overlays alone constitute a Total Portfolio Approach. Rather, it shows that systematic tactical strategies offer a transparent, empirically measurable, and capital-efficient use of active risk within the TPA framework. Its appeal rests not only on the improvement in portfolio efficiency, which other well-constructed low-correlation alpha strategies may also deliver, but also on the transparency and tractability that make that improvement straightforward to evaluate and achieve within an active-risk budget. Judged against the fund's overall objective rather than an asset-class benchmark, the strategies studied here add value in our back-test with a modest cost to the total risk budget. Seen this way, systematic GTAA is a practical tool for putting TPA into practice.

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Hypothetical, back-tested results. The results in Exhibits 2 through 7 are hypothetical. They were produced by retroactively applying a model with the benefit of hindsight to data from January 2001 through June 2026, with factor and composite weights scaled to 3% annualized volatility over the full sample. They do not represent actual trading, the performance of any PGIM portfolio, fund or account, or results any investor achieved, and no representation is made that any investor will achieve similar results. Hypothetical results have inherent limitations: they do not reflect actual market conditions, liquidity or investment decisions. Results reflect assumed transaction costs (see note 5) but do not reflect management fees or other fees and expenses, which would reduce returns. Overlay strategies use derivatives, leverage and short positions, which can magnify losses, and results have weakened in recent years. Actual results may differ materially. The 0.30 hurdle rate and 0.5 information ratio are illustrative assumptions, not targets or forecasts of PGIM results. Indices are unmanaged, do not reflect fees and cannot be invested in directly.

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