Commodity Investing 3.0

The Rise of Factor and Curve-Aware Strategies

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Contents

Executive summary

Commodity investing is increasingly viewed as a strategic necessity, not merely a tactical lever.

As established in The Case for Investing in Broad Commodities, diversified commodity futures exposure can offer a persistent risk premium due to its role in hedging and inventory transfer mechanisms. This also improves portfolios through diversification during economic stress, and robust inflation protection, especially against unexpected shocks.

Building on this foundation, we investigate how quantitative signals and curve-aware contract selection can significantly enhance traditional long-only commodity indices.

Drawing on decades of academic research and robust empirical testing, we demonstrate that systematic signals, such as Carry (roll yield),[1] Price Momentum, Slope Momentum, and Value, are persistent sources of return in commodity markets, similar to equity factors. Each factor captures a distinct structural or behavioural dynamic of commodity markets, and several show statistically significant alpha potential in real-world implementations. Our findings reveal the following:

- Carry performs best in cross-sectional applications, particularly when measured using 12-month futures spreads, offering stable returns with lower turnover.
- Momentum signals are most effective in time series frameworks. Binary Momentum and Trend Breadth approaches deliver robust, low volatility returns across multiple commodity sectors.

1 In this paper, the terms 'roll yield', 'carry', and 'basis' are used largely interchangeably, as they describe closely related aspects of the return linked to the futures curve. In theory, basis is defined as the difference between the futures price and the spot price. However, because the spot price is often unobservable or illiquid in many commodity markets, it is commonly approximated by the front month futures contract. Under this practical definition, the basis effectively captures the slope between two futures contracts, making it conceptually very similar to the ex-ante carry or implied roll yield—that is, the expected return implied by the shape of the futures curve assuming no change in the futures curve. By contrast, roll yield usually refers to the realised component of carry—the actual gain or loss that occurs as the futures price converges toward the spot (or front contract) during the life of the position. For simplicity, we treat these measures as functionally equivalent indicators of the return (expected or realised) associated with the term structure of commodity futures prices.

- Slope Momentum, capturing changes in curve steepness, is effective both cross-sectionally and in time series, providing timely insights into market tightening or loosening.
- Value signal, when adjusted for Carry, exhibits strong mean-reversion tendencies and complements Momentum dynamics.

We also address the limitations of classic front-month-focused traditional broad commodity indices by introducing contract selection strategies. For seasonal commodities, anchoring to peak demand contracts captures hedging premia otherwise missed. For non-seasonal commodities, dynamically rolling into the curve point with the most favourable implied roll yield enhances both return and stability. This two-pronged contract optimisation demonstrably reduces volatility and roll drag over time.

Finally, we introduce two advanced strategies aiming to leverage these findings into creating more efficient commodity investments:

- A 'third generation' long-only commodity strategy combining factor tilts and curve optimisation that preserves core characteristics, such as cyclicality, inflation beta, and low equity correlation while materially improving return efficiency.
- An all-weather long-short commodity strategy, blending time series Momentum with contract selection, which can offer steady performance across regimes with notably reduced drawdowns while maintaining the key characteristics of a long-only commodity index.

Together, these innovations mark a significant evolution in strategic commodity investing, offering investors not only a better beta but also a systematic alpha grounded in economic rationale and empirical persistence.

Introduction

Commodities have long proven their value as strategic building blocks in multi-asset portfolios, offering diversification, inflation sensitivity, and a structurally grounded risk premium.

However, traditional long-only indices, such as the Bloomberg Commodity Index (BCOM) or the S&P GSCI index (GSCI), often fail to fully capture these benefits. Their static contract exposures and lack of dynamic allocation can dilute Carry, increase volatility, and leave return premia underexploited.

Our goal in this paper is to bridge academic insight with practitioner application by exploring how factor investing and contract selection optimisation can enhance commodity investing. We rigorously test well documented signals, such as Carry, Momentum, Value, and Slope Momentum and introduce practical implementation tools that systematically improve on traditional benchmarks while preserving the core characteristics that make commodities a strategic asset class.

1. Literature review

In this section

The academic literature has demonstrated over the last 50 years that selecting stocks based on specific fundamental or performance-based characteristics (called factors) can create long-term outperformance above and beyond the equity risk premium itself by leveraging other risk premia or behavioural anomalies.

Those equity factors (Momentum, Quality, High Dividend, Size) are widely recognised by practitioners as well, and form the basis of many equity strategies, whether active or smart beta. These factors, however, do not exist only in equities. They can be found in other asset classes, such as fixed income or commodities, even if they are less widely used and discussed outside of equities.

Academic research has made it increasingly clear that commodity strategies based on factors such as Momentum and the slope of the term structure of commodity futures prices tend to outperform on a risk-adjusted basis (for example, Erb & Harvey, 2006; Gorton & Rouwenhorst, 2006; Miffre & Rallis, 2007; Fuertes et al., 2010; Szakmary et al., 2010). This growing body of evidence suggests that systematic, factor-like signals can be successfully applied to commodities, offering professional investors a compelling route to enhancing performance beyond broad indices such as the BCOM or the GSCI in the same way that Quality or low Volatility strategies have delivered outperformance in the equity world.

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A. Understanding the commodity risk premium

Returns in commodity futures markets stem from three primary sources: spot price movements, roll yield, and collateral yield. Unlike equities or bonds, long-only commodity investments, typically implemented through futures contracts, do not deliver income through dividends or coupons. Instead, their returns are tied to the appreciation of the futures contract (related to the movement of the spot price of the underlying commodity, but not exactly equal) and the gain or loss incurred when rolling from an expiring contract into a new one.

The classic cost-of-Carry framework links these returns to fundamental drivers: storage costs, interest rates, and the convenience yield. Storage and financing costs generally push futures prices above spot (a condition known as contango), while the convenience yield, in other words, the implicit benefit of holding the physical commodity (for example, ensuring supply for a refiner, or the ability to profit from shortages), drives futures prices below spot (backwardation) when inventories are tight.

When a commodity is scarce, the value of immediate access to the physical good increases, resulting in backwardation (futures price < spot price) and a positive expected roll yield for long futures holders. In contrast, an abundant supply with high storage costs and low convenience yield leads to contango, eroding returns for long-only investors.

Another core concept is the ‘insurance premium’, derived from Keynes's theory of normal backwardation. Commodity producers, typically net short hedgers in futures markets, are willing to sell futures below their expected future spot prices to lock in revenues. Risk-averse speculators, on the long side, effectively provide price insurance and, in doing so, earn a risk premium. This phenomenon implies that long-only investors in futures contracts are compensated for bearing the price risk that commercial producers wish to offload.

The hedging pressure hypothesis extends this idea: if producers (supply side) dominate future markets as net short hedgers, the market will exhibit backwardation and a positive risk premium will emerge; if consumers (demand side) are the dominant future market players seeking to secure future supply, the situation can reverse, potentially leading to contango and enabling short positions to collect a premium.

Both the insurance premium theory and the theory of storage help explain the shape of the forward curve and offer justification for long-only investment in commodities. The theoretical basis for long-only commodity strategies often relies on the concept of normal backwardation, which suggests that all long positions in commodity futures should provide a positive excess return due to a risk premium. Empirical evidence indeed shows that long-only commodity futures investments have historically produced returns comparable to those of equities. However, broad commodity indices have also suffered long periods of depressed returns during that time. Recent literature has, indeed, questioned the effectiveness of long-only strategies (Erb & Harvey, 2005). All of this together has shifted the conversation towards more dynamic approaches that better exploit the structural characteristics of commodity markets.

B. Signals based on the Theory of Storage: Carry and inventory levels

Commodities strategies originating from the theory of storage, developed by Kaldor (1939), Working (1949), and Brennan (1958), focus on signals such as roll yields and inventory levels. These strategies exploit the relationship between the basis (difference between spot and futures prices) and storage costs, interest foregone, and convenience yield (Miffre, 2016).

According to the Theory of Storage (Working, 1949), commodities experiencing low inventories (scarcity) tend to have their futures prices trading below their spot prices (backwardation). Producers and holders of physical commodities are willing to pay a premium to avoid inventory holding costs (storage, insurance, spoilage risks). Investors taking long positions in futures markets earn compensation for assuming this inventory risk, resulting in a positive roll yield. Conversely, commodities with ample inventories have futures prices above spot prices (contango), reflecting storage and convenience yield costs and creating negative roll yields.

Systematic strategies can exploit these dynamics. Overweighting commodities in backwardation and underweighting those in contango effectively tilts a portfolio towards markets where investors are rewarded for taking on inventory and pricing risk. These positioning choices can be seen as a form of insurance underwriting, where the investor earns a premium for assuming the risk that producers are keen to shed.

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C. Momentum as a signal

Momentum, one of the most enduring market anomalies, is well documented in commodity futures. In this context, price-based Momentum typically refers to the persistence of trends in commodity prices, where recent winners continue to outperform, and losers continue to underperform. The concept has been empirically validated across decades of data and remains a cornerstone of systematic commodity investment strategies.

The seminal work of Miffre and Rallis (2007) provided robust evidence that cross-sectional Momentum strategies in commodities, that is, investing long into contracts with the strongest past 12-month returns and shorting those with the weakest, deliver statistically significant excess returns. Their study, covering a broad range of futures markets, showed that traditional risk premia do not explain these profits, and they persist after accounting for transaction costs.

Fuertes, Miffre, and Rallis (2010) confirmed that price Momentum alone, even without combining with term structure signals, produces economically meaningful Sharpe ratios and diversification benefits. They found that pure Price Momentum captures persistent return dynamics driven by investor behaviour and slow information diffusion rather than risk-based compensation.

Several studies have reinforced and extended these findings. Szakmary, Shen, and Sharma (2010) examined both price- and term-structure-based signals across 27 commodity futures and found that past price performance strongly predicts future excess returns, with Momentum profits remaining significant after controlling for backwardation and contango effects. Similarly, Boons and Prado (2019) analysed an extensive panel of commodities and concluded that Momentum profits arise from slow-moving fundamental information about supply and demand conditions, suggesting that the anomaly may reflect rational learning dynamics rather than pure behavioural biases.

Further evidence comes from Menkhoff, Sarno, Schmeling, and Schrimpf (2012), who showed that Momentum profits in commodities persist even after accounting for common risk factors. They also demonstrated that cross-commodity Momentum is weakly correlated across asset classes, reinforcing its diversification value. Baltas and Kosowski (2013) also found that simple trend-following rules—essentially time series Momentum strategies—generate consistent risk-adjusted returns in commodity futures, particularly during periods of market stress when traditional assets underperform.

Recent research has examined the persistence and evolution of this effect. Koijen, Moskowitz, Pedersen, and Vrugt (2018) explored Carry and Momentum in commodity markets and found that both capture distinct but complementary sources of return premia. They documented strong and statistically significant alphas relative to benchmark models even when the price-trend component was isolated. Meanwhile, Baz et al. (2015) highlighted that time series Momentum in commodities remains robust across parameter choices (lookback windows, scaling methods, and holding periods), supporting its interpretation as a structural feature of price behaviour rather than a transient anomaly.

Momentum consistently emerges as a cross-asset constant: robust, repeatable, and deeply grounded in empirical research.

Taken together, this body of evidence demonstrates that price-based Momentum is a persistent and economically significant phenomenon in commodities. It reflects a combination of behavioural underreaction, information diffusion, and structural features of futures markets (such as hedging pressure and inventory dynamics). For practitioners, it remains one of the most reliable and empirically supported signals for tactical allocation and systematic trading in commodity space.

Momentum consistently emerges as a cross-asset constant: robust, repeatable, and deeply grounded in empirical research.

D. Value as a signal

The Value factor in commodity markets captures return predictability based on the deviation of futures prices from fundamental estimates of fair value, often linked to cost-of-production metrics, inventory signals, or relative pricing across maturities. The core idea is analogous to Value investing in equities: commodities that appear undervalued relative to fundamentals tend to outperform those that appear expensive.

Researchers at AQR (2014) constructed a very simple commodity Value strategy that takes long positions in commodities when their price is low compared to their historical norm (implying underpricing) and shorts those whose price is high compared to their history (implying overpricing). Across decades of backtests, they demonstrated that Value strategies are not only diversifying, but also positively rewarded, with Sharpe ratios comparable to Momentum strategies.

Importantly, the Value factor in commodities often acts as a countercyclical complement to Momentum, performing well during mean-reverting phases or market corrections. While less headline-grabbing than Momentum or Carry, Value provides critical diversification and persistence when incorporated into multi-signal commodity portfolios.

E. Slope Momentum as a signal

Basis Momentum is a recently identified strategy that marries the concepts of basis (Carry) and Momentum into a single predictor. It was formally introduced by Boons and Prado (2019), who describe basis Momentum as a maturity-specific Momentum signal—the Momentum of the spread between the front and second-nearby futures.

In practical terms:

Basis Momentum = (past return of nearest futures) – (past return of second-nearest futures) over a given lookback (in the paper, 12 months)

The signal measures whether the front contract outperformed the next contract (positive basis Momentum, indicating the curve moved toward backwardation) or underperformed it (negative Basis Momentum, indicating the curve moved towards contango) in the recent past. Boons and Prado (2019) found this to be an extremely powerful predictor of future returns: commodities with strong positive basis Momentum tend to continue outperforming, and those with negative basis Momentum continue underperforming, at least in the near term.

It turns out that basis Momentum can be decomposed into two distinct components, both of which have predictive power: the average curvature and the change in slope of the futures curve. The average curvature captures how pronounced the average 'bend' of the curve has been over the last year—essentially, the difference between the short-term and medium-term slopes—and reflects persistent structural conditions in the market. In contrast, the change in slope measures how the steepness of the curve evolved over time.[2]

Building on the intuition of Boons and Prado (2019), we built a Slope Momentum signal that extends the traditional roll yield measure by introducing a second dimension—the change in the slope of the futures curve. While the classic roll yield captures the level of backwardation or contango (the first derivative of the curve), our signal measures how this slope itself evolves over time—effectively, a second derivative of price structure along the curve. This dynamic view recognises that meaningful information is embedded not only in where the curve currently stands, but also in how it is shifting.

2 The authors compute the change in slope as the basis (roll yield) of the front contract in t minus the basis (or roll yield) of the second front contract in t-12.

2.

Practical application of factor investing in commodities: Testing the theories in real life

In this section

In Chapter One, we highlighted how, as in the equity world, academics have documented the existence of risk factors in the commodity world, which can be used to improve on classic long-only broad commodity indices or to develop innovative long–short commodity strategies. Having said that, as always, there is a gap between the academic and practitioner worlds. The second chapter of this paper aims to bridge that gap by testing different implementation hypotheses across the main factors highlighted in Chapter 1: Carry, Momentum, Value, and Slope Momentum.

A. Factor-based commodity selection

a) Setting up the analysis

When testing factor strategies across a universe of assets, such as commodities, one of the key questions is how to apply the factor to the asset. Two classical ways have emerged over time:

1. Cross-sectional

The idea here is that the factor strength for each commodity is assessed on a relative basis versus the other commodities. In other words, all the commodities in the universe are ranked based on their factor 'score', and therefore it is not the strength of the factor itself that counts, but its relative strength.

A standard way to test the quality of the signal is to divide the commodities into three groups. The first group includes the top third of commodities with the strongest signals. The second group includes the second third of commodities with the strongest signals, and so on. It is then possible to form an equal-weight portfolio that invests on a regular basis in the first group of commodities, one that invests in the second group of commodities, and one that invests in the third group of commodities (we will call them 'first tercile', 'second tercile', and 'third tercile' portfolios).

If the signal is strong, then the first tercile portfolio should outperform the second tercile portfolio, which itself would outperform the third tercile portfolio. In addition, a long–short portfolio that would be long in the first tercile portfolio and short in the third tercile portfolio should deliver consistent positive performance.

2. Time series

The idea here is that the factor strength for each commodity is assessed on its own basis, in other words, without looking at the rest of the commodity universe. A factor score for commodity A will therefore be assessed as 'good' if it is above zero (after normalisation), for example, or if it is above the historical values for that factor for that commodity. It is the strength of the score itself that counts.

The best way to test the quality of the signal is to create a long–short portfolio consisting of an equal-weighted portfolio of all commodities with either a positive or negative signal. The total notional weight of the portfolio is fixed at 100% at each rebalancing. This approach ensures that equal importance is allocated to each signal, rather than constructing separate long and short portfolios where the notional weight per commodity in the long positions could differ from that in the short positions, depending on the number of commodities with long versus short signals. Because this approach gives equal notional weight to each commodity, the resulting portfolio could be a net long or a net short portfolio at any rebalance. If the signal is strong, then this long–short portfolio should deliver consistent positive performance.

Bear in mind that a signal performing well cross-sectionally does not necessarily perform well in a time series, and vice versa. This is because the two approaches capture different dynamics: cross-sectional signals exploit relative differences across commodities at a given time (ranking them by factor strength), while time series signals capture absolute trends within each individual commodity over time. A factor can be very effective at ranking commodities against each other without being consistently strong for any single commodity over time, and the opposite can also be true.

For this analysis, we use the Bloomberg Commodity Index (BCOM) universe,[3] which includes a diversified set of major commodity futures across precious metals, industrial metals, energy, and agriculture. BCOM provides a robust and liquid reference set that ensures comparability and relevance for institutional investors while maintaining representativeness of the global commodity markets. Using BCOM as the base universe also facilitates practical implementation, as it aligns with the construction of many benchmark indices and investable products.
The rebalance is based on signals calculated on a weekly basis at the close of each week and implemented at the close of the first business day of the following week.

3 We consider 24 different commodities: Aluminium, Brent crude, Coffee, Copper (COMEX), Corn, Cotton, Gasoil, Gold, HRW wheat, Lead, Lean hogs, Live cattle, Natural gas, Nickel, RBOB gasoline, Silver, Soybean, Soybean meal, Soybean oil, SRW wheat, Sugar, ULS diesel, WTI crude, Zinc.

b) Testing Carry

As discussed before, the goal of a Carry strategy is to invest, preferably in commodities that are in backwardation (with a positive Carry or roll yield), and to short or not invest in commodities that are in contango (with a negative Carry or roll yield).

In this section, we want to test for two different hypotheses:

+ Carry as a factor works best in a cross-sectional manner compared to time series, as the goal is to allocate capital where it is the most efficient.
+ When calculating the Carry, it is better to use the difference in price between the 12-month forward contract and the front-month contract than to use shorter periods, as using 12 months allows for avoiding seasonality issues.

Below, the Carry is calculated as the percentage difference in the price of two future contracts on the same commodity curves at two different points in time. We use two different formulas:

+ We calculate the percentage price difference between the front-month contract (the closest to expiry) and the 12-month contract (the contract set to expire 12 months after the front-month contract) as a way to proxy the shape of the curve over a full year to avoid seasonality biases.
+ We calculate the difference between the front-month contract (the closest to expiry) and the second contract (the next closest to expiry) as a way to proxy the shape of the curve as close as possible to the spot.

Testing roll yield in cross section

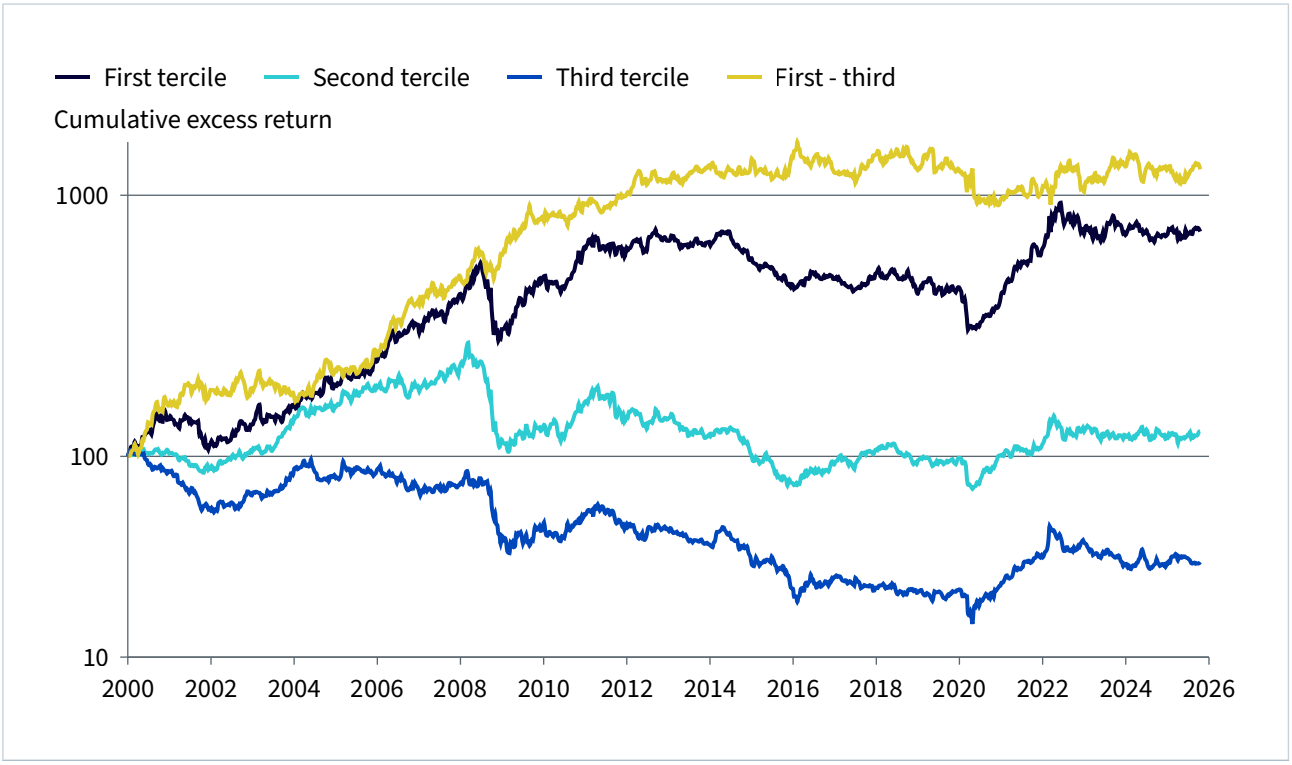
Both versions of the roll yield signal—the 12-month and the front (closest) roll yield—deliver broadly similar long-term results, confirming the robustness of the Carry premium. In both cases, performance (yellow line, representing the spread between the top and bottom terciles) flattened somewhat after 2016, but this is a well-established signal with deep empirical support and remains a cornerstone of commodity factor investing.

The front roll yield signal (RY-closest) shows stronger results from 2020 onward, reflecting its greater responsiveness to short-term curve dynamics. However, this comes at a cost: the front-month signal experiences sharper drawdowns and significantly higher turnover.

Indeed, the turnover for the front-month metric has been 15% weekly over the entire history. The turnover is computed as the average one-way turnover across the three terciles. On the other hand, the 12-month metric has a weekly turnover of 9% in this framework.

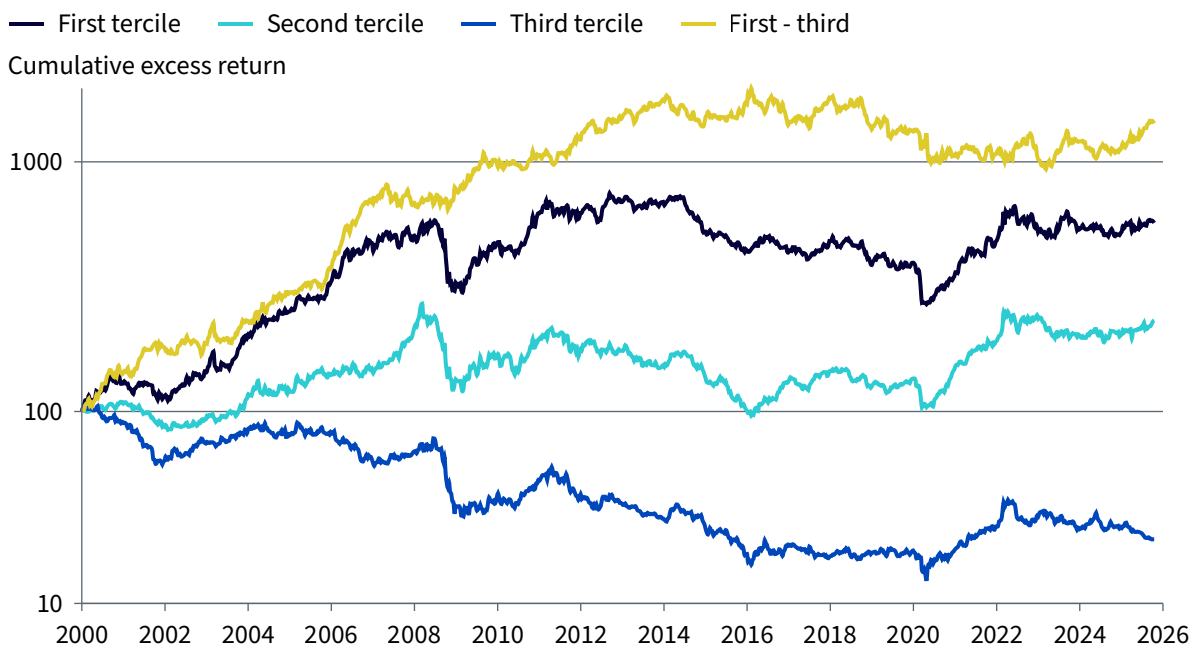
Because it does not adjust for seasonality, the front-month signal becomes more volatile and less stable, making the 12-month version a more balanced and sustainable choice for systematic implementation.

Figure 1: Historical performance of roll yield (cross-sectionally using 12-m roll yield)



From 10/01/2000 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 2: Historical performance of roll yield (cross-sectionally using closest roll yield)



From 10/01/2000 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

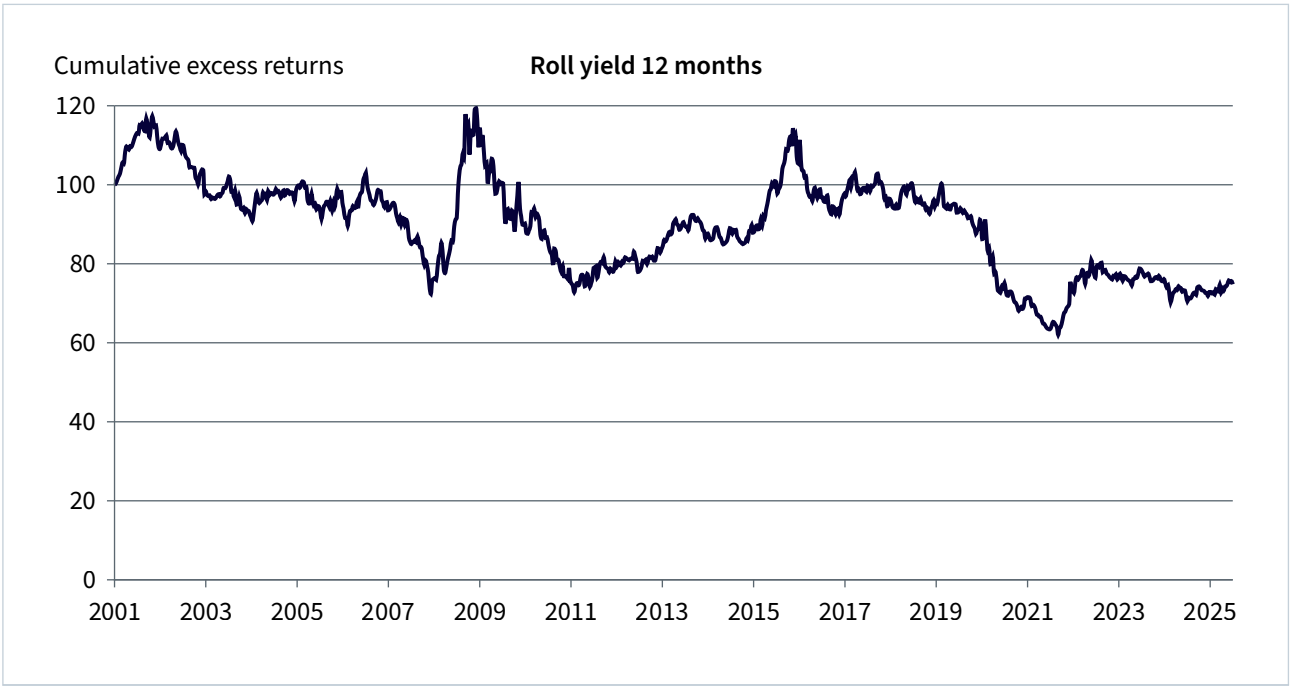
Testing roll yield in time series

The 12-month roll yield signal demonstrated inconsistent performance throughout the backtested period, characterised by heightened volatility and frequent whipsaws. This instability suggests that extended roll horizons may be less effective in capturing the near-term dynamics of the futures curve, particularly during periods of curve inversion or rapid structural change. Quantitatively, the strategy produced an annualised excess return of –1.2%, an annualised volatility of 10.8%, and a maximum drawdown of –49.3%, underscoring the fragility of the signal under shifting market conditions.

In contrast, the front (nearest) roll yield signal exhibited more stable and persistent performance characteristics. By focusing on the closest maturity spreads, it was better able to reflect contemporaneous supply–demand pressures and short-term roll opportunities. Over the same period, this approach achieved an annualised excess return of 2.9%, with a lower annualised volatility of 8.5% and a reduced maximum drawdown of –26.5%.

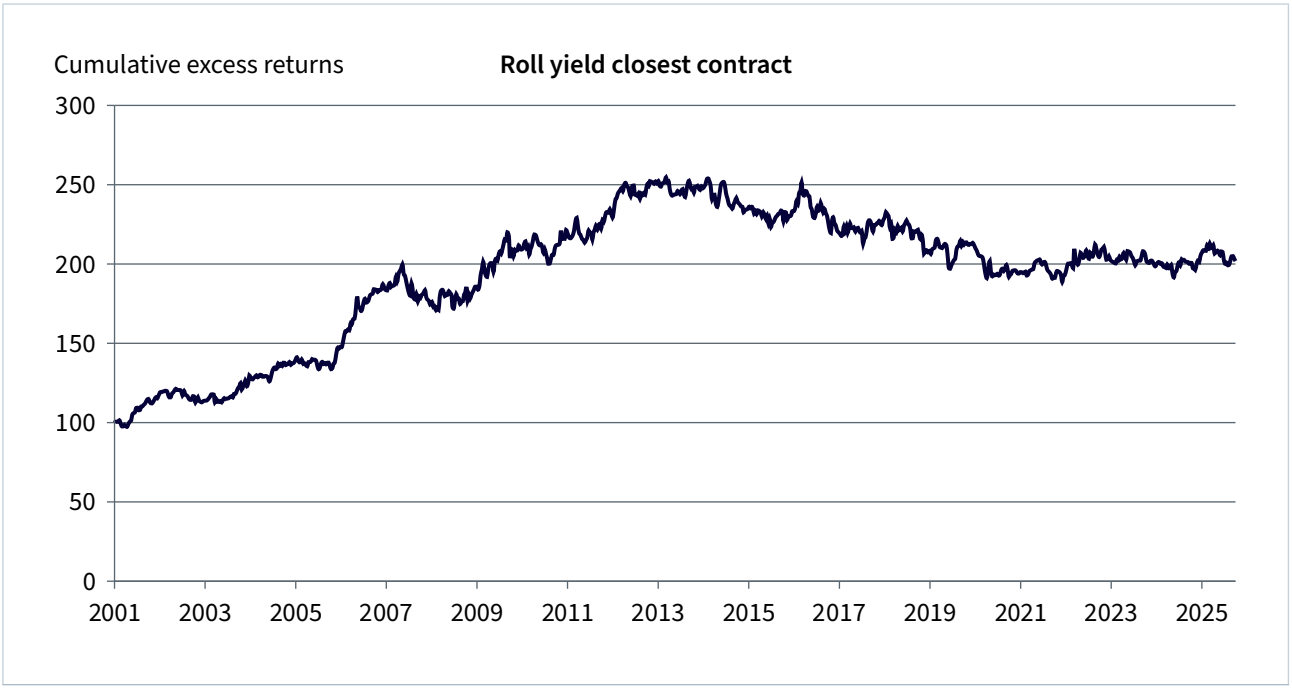
Taken together, these results indicate that shorter horizon roll yield measures tend to provide more reliable and adaptive representations of Carry in commodity markets. Conversely, longer-horizon roll yield formulations may introduce unnecessary lags and increase susceptibility to structural shifts in the term structure of futures prices.

Figure 3: Historical performance of roll yield (times series using 12-m roll yield)



From 02/04/2001 to 30/09/2025. Source: WisdomTree, Bloomberg, FactSet. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investment may go down in value**.

Figure 4: Historical performance of roll yield (times series using closest roll yield)



From 01/01/2001 to 30/09/2025. Source: WisdomTree, Bloomberg, FactSet. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investment may go down in value**.

Conclusion

The analysis confirms that roll yield, or Carry, remains a powerful and persistent source of return in commodity markets, particularly when implemented in a cross-sectional framework. Ranking commodities by their relative degree of backwardation or contango allows the strategy to allocate capital where Carry premia are strongest, which can produce consistent outperformance over time. The 12-month measure of roll yield proves especially effective, as it smooths seasonal effects and reduces turnover while retaining significance.

c) Testing Price Momentum

The goal of a Momentum strategy is to invest in commodities that have been performing well recently, preferably, and to short or not invest in those that have not. Having said that, there are many ways to assess such Momentum.

In this section, we want to assess two different hypotheses:

+ Momentum as a factor works best in a time series manner, as the goal is to allocate capital to commodities that are in favour, and it seems logical that if a commodity has lost money in recent months, it does not really matter whether it has performed better or worse than other commodities.
+ The different metrics used to assess Momentum in time series, such as moving average, Trend Breadth, or Binary Momentum, do not impact results in a very meaningful way.

Below is a quick definition of three momentum metrics that we intend to test in this chapter.

Moving average crossover

We define the trend-following signal based on the relative strength between a short-term linearly weighted moving average (LWMA) and a long-term simple moving average (SMA). The signal turns positive when the short-term LWMA exceeds the long-term SMA, indicating upward Momentum and suggesting long or positive exposure. Conversely, when the short-term LWMA falls below the long-term SMA, the signal turns negative, indicating downward Momentum and implying short or reduced exposure.

This framework captures the dynamic transition between trend initiation and exhaustion by emphasising more recent price movements through the linearly weighted average, while still anchoring the long-term trend direction via the simple average. Importantly, the signal is calculated independently for each commodity, allowing it to adapt to the unique behavioural patterns and volatility structures of individual markets. The lookback parameters for the short- and long-term averages are tailored to each commodity sector, reflecting differences in market structure, supply–demand dynamics, and information flow.

By allowing sector-specific calibration, the signal aims to balance responsiveness with stability, improving both the timing precision and robustness of trend identification across the commodity spectrum.

Trend Breadth

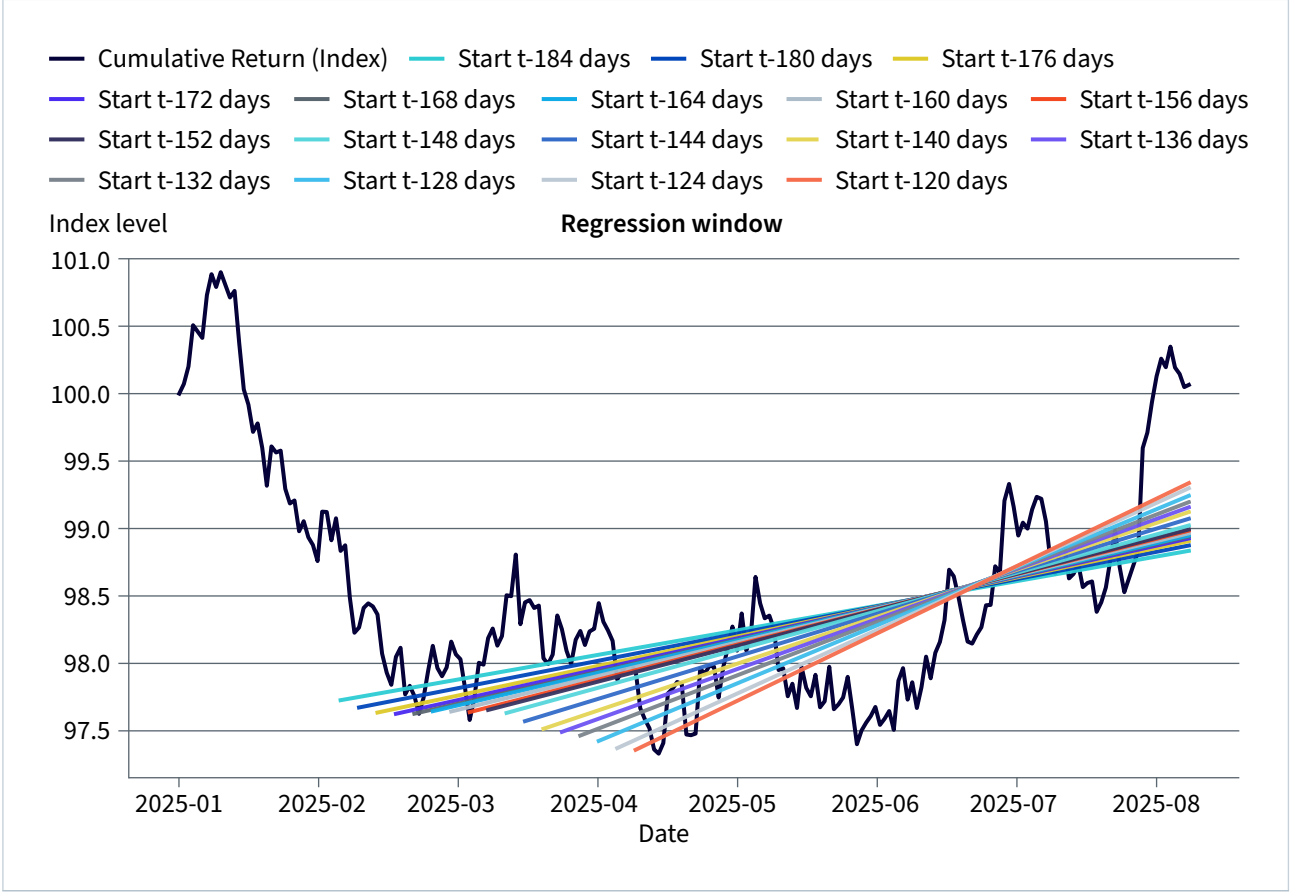
One of the key limitations of traditional Momentum signals lies in their inability to capture the consistency or persistence of trends. Because these signals typically respond to price magnitude rather than stability, they can be overly influenced by short-term price spikes or reversals, which may distort the signal and lead to premature position changes. This sensitivity often reduces robustness, particularly in volatile or mean-reverting commodity markets.

To address this shortcoming, we enhance the Momentum framework by combining it with a Trend Breadth measure. The goal is to ensure that the detected trends are not only strong but also consistent over time. The Trend Breadth signal quantifies this consistency by examining how stable the underlying trend has been across multiple time horizons. Specifically, we compute the slopes of 16 linear regressions, each estimated over progressively longer lookback windows that span the range between sector-specific short-term and long-term Momentum periods. These regression slopes capture how trend strength evolves across time scales, with a greater number of positive slopes indicating broader, more reliable upward Momentum.

This approach produces a composite indicator that reflects both the direction and durability of trends, reducing sensitivity to noise and price spikes. When used in conjunction with conventional Momentum signals, Trend Breadth can therefore provide a more stable and robust measure of directional conviction.

We illustrate this methodology conceptually in Figure 5.

Figure 5: Illustration of Trend Breadth calculation



Source: WisdomTree. For illustration purposes only.

Binary Momentum

The logic behind this Momentum measure is that direction matters more than magnitude in commodity markets. Price movements usually reflect gradual shifts in supply–demand balances or inventory dynamics rather than sudden large swings. By focusing on the consistency of daily moves instead of their size, this measure captures steady market trends rather than short-term noise. Concretely, each daily return is assigned a value of +1 or –1 depending on its sign, and an exponentially weighted moving average of this series is calculated to produce the binary Momentum signal—highlighting persistent directional trends in commodity prices.

A word on Momentum lookback parameters

The lookback period is arguably the most critical parameter in constructing Momentum-based signals. It determines how quickly a model responds to changing market conditions and can significantly influence both return potential and turnover. In the context of commodities, applying a uniform or 'one size fits all' lookback period may not produce optimal results, as different sectors exhibit distinct structural and behavioural characteristics.

For instance, the ideal lookback horizon can vary based on the length and persistence of supply–demand cycles, which may differ between commodities such as energy, precious metals, industrial metals, and agricultural products. Additionally, the frequency and timeliness of fundamental data releases (such as inventory reports, production updates, or weather forecasts) can shape how quickly price trends emerge and decay. Shorter lookbacks may be more effective in markets with faster information turnover, while longer horizons may suit sectors where structural imbalances evolve more gradually.

Recognising and adapting to these differences is key to improving signal robustness. A dynamic or sector-specific approach to lookback calibration can therefore enhance both the stability and predictive power of Momentum factors across the commodity universe.

Figure 6: Lookback table by commodity type (in months)

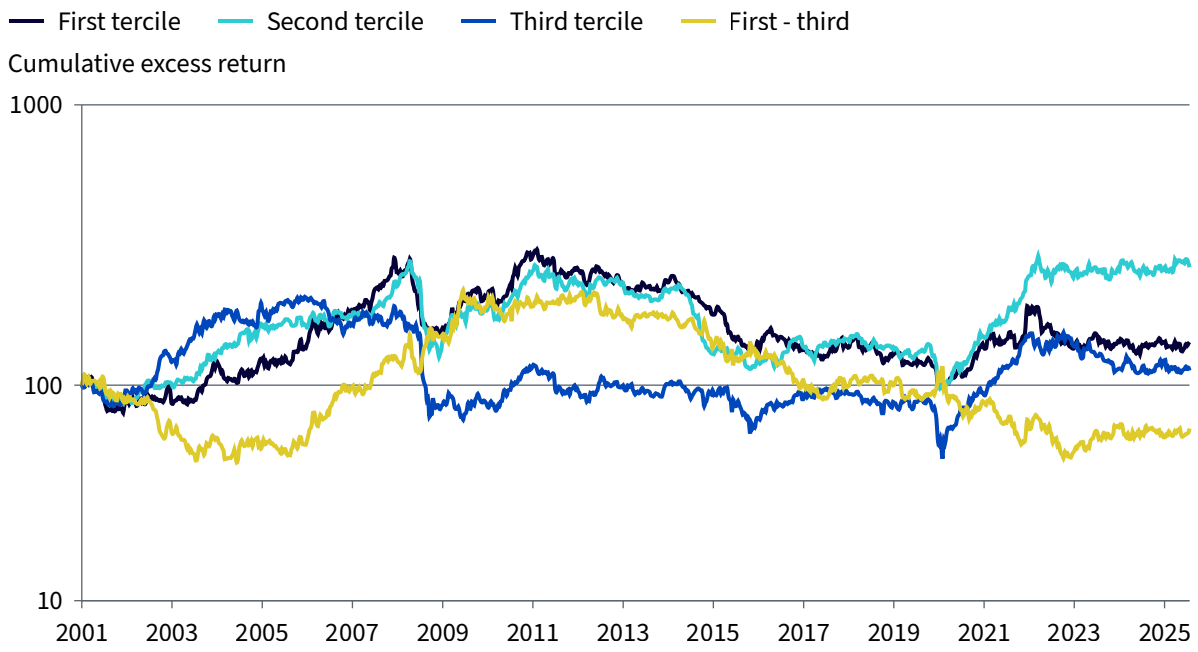
Sector	Short-term lookback	Long-term lookback
Oil	1	3
Livestock	1	3
Softs	1	3
Industrial metals	2	6
Grains	3	9
Precious metals	4	12
Natural gas	4	12

Source: WisdomTree.

Testing Price Momentum in cross section

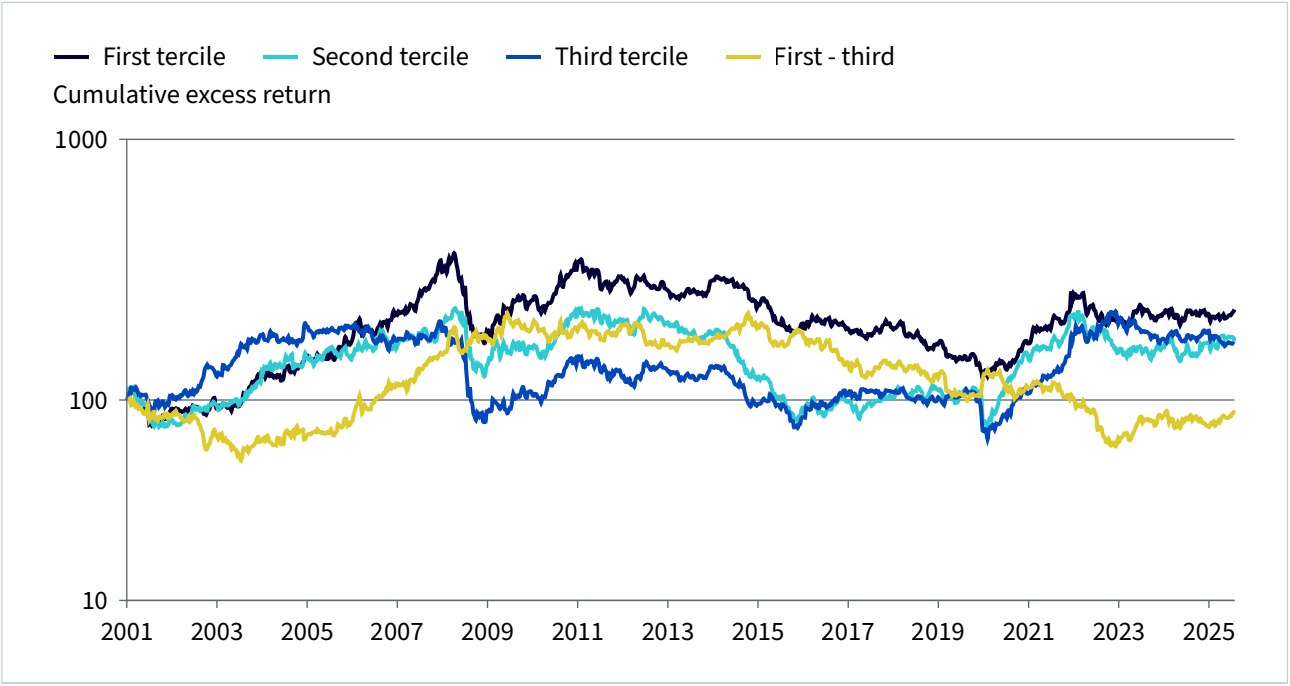
As we can see from the charts, Momentum did not have a great track record in cross section in the past 25 years. The only model that performs marginally well is the Binary Momentum, but the performance difference between the first and last tercile is not statistically significant. The other two models did a poor job of discriminating which commodities were set to outperform.

Figure 7: Historical performance of Price Momentum (cross-sectional using moving average crossover)



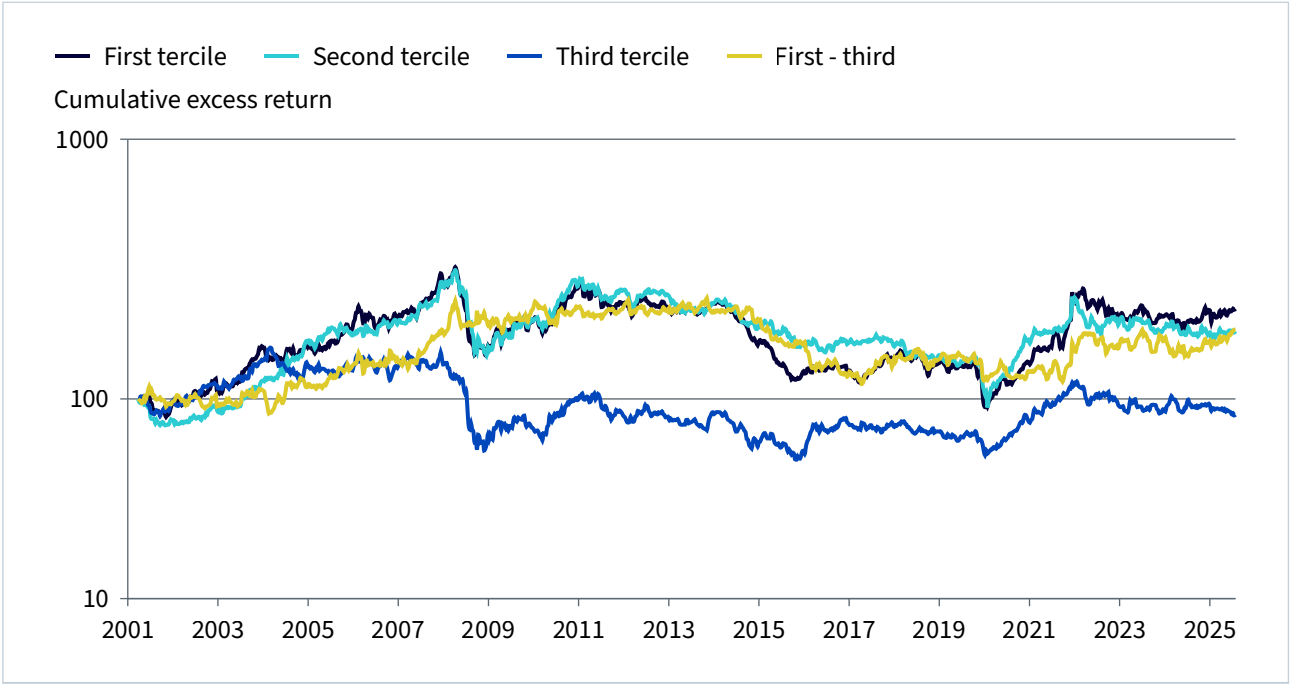
From 02/04/2001 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 8: Historical performance of Price Momentum (cross-sectional using Trend Breadth)



From 02/04/2001 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 9: Historical performance of Price Momentum (cross-sectional using Binary Momentum)

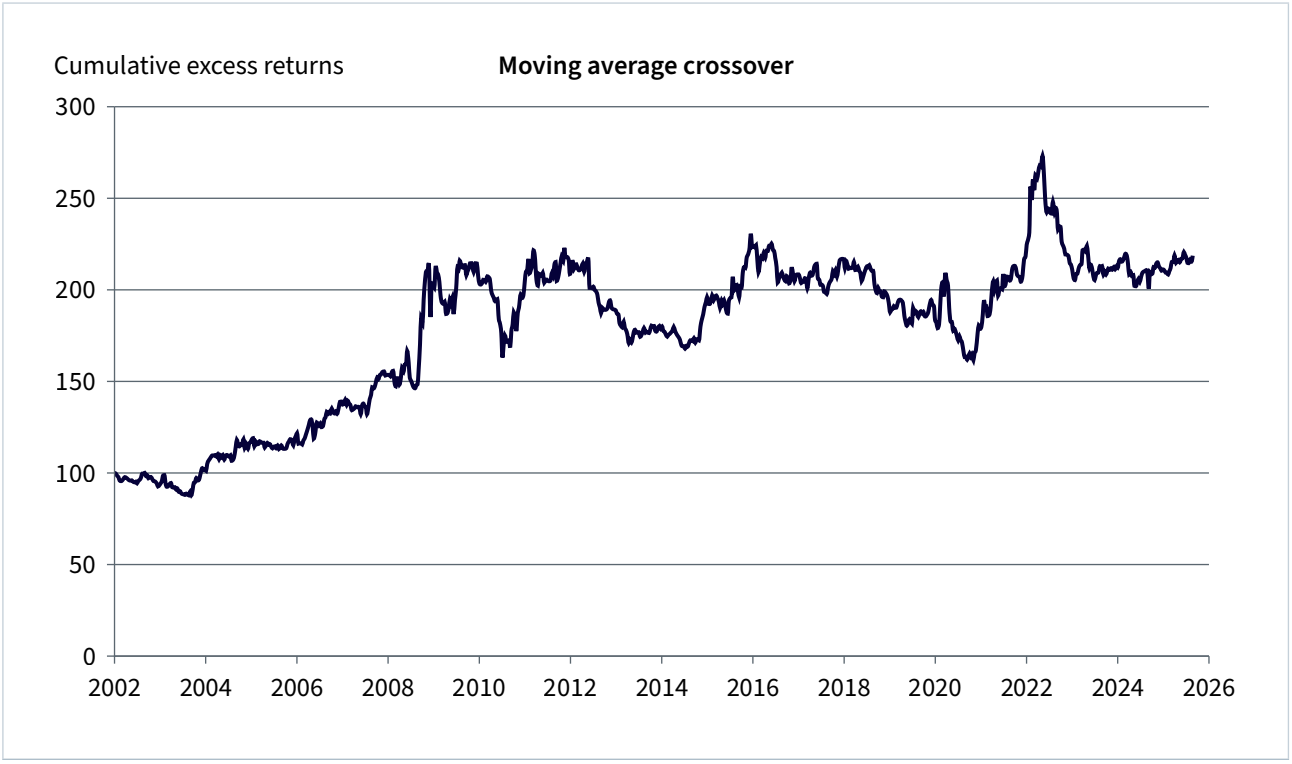


From 25/06/2001 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Price Momentum in time series

The moving average crossover strategy performed particularly well prior to 2010. Although some whipsaws appeared in the post-2009 period, the signal effectively captured beta during rising markets while mitigating downside exposure in drawdowns. Its robustness was evident during major crises, such as the global financial crisis (2008) and the COVID-19 pandemic. Sector-level analysis showed mixed contributions: while livestock added little to overall performance, energy, particularly oil, responded strongly to the signal. Over the full sample period, the strategy generated an annualised excess return of 3.4%, with 12.1% volatility and a maximum drawdown of –31.1%.

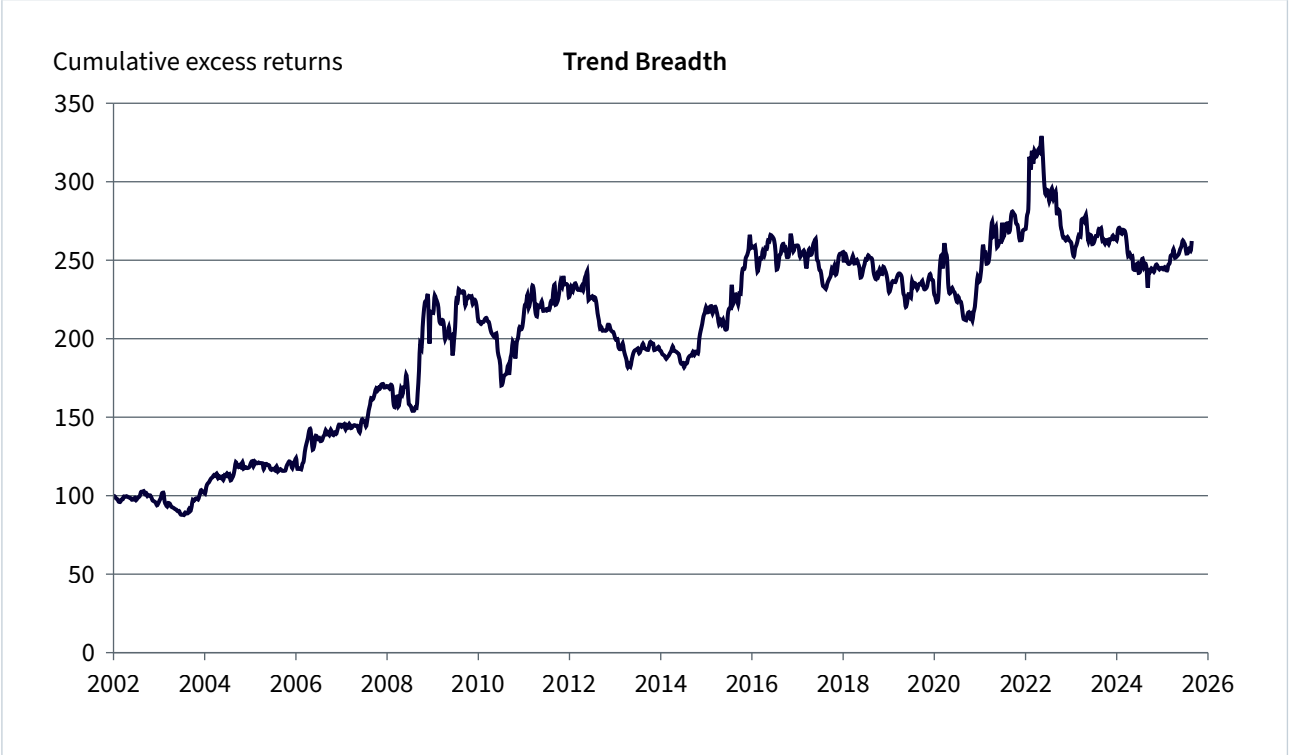
Figure 10: Historical performance of Price Momentum (time series using moving average crossover)



From 01/02/2002 to 30/09/2025. Source: WisdomTree, Bloomberg, FactSet. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investment may go down in value**.

The Trend Breadth signal exhibited a return profile similar to the moving average crossover strategy but delivered a stronger performance overall. It achieved an annualised excess return of 4.2%, accompanied by a volatility of 13.3% and a maximum drawdown of –30.9%. While its risk characteristics were broadly comparable, the higher excess return suggests that aggregating multiple trend signals across markets enhanced the robustness and persistence of performance.

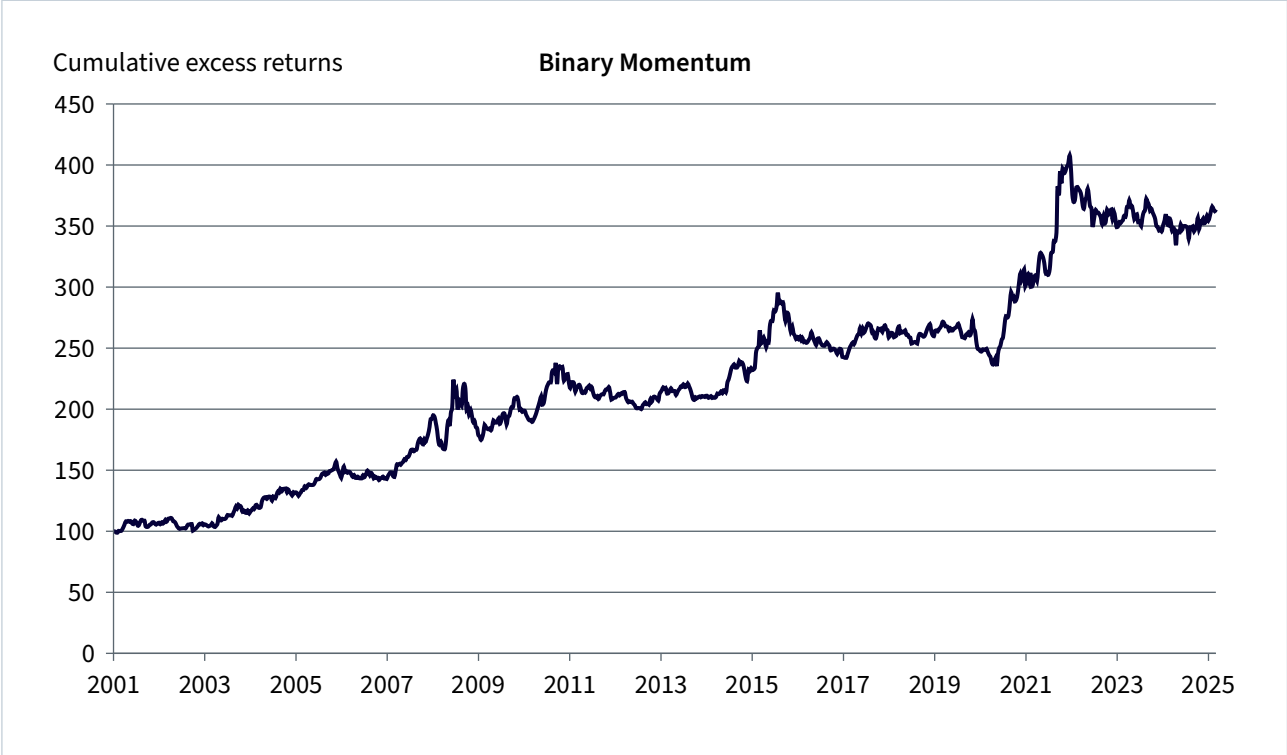
Figure 11: Historical performance of Price Momentum (time series using Trend Breadth)



From 01/02/2002 to 30/09/2025. Source: WisdomTree, Bloomberg, FactSet. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investment may go down in value**

The Binary Momentum signal exhibited steady and resilient performance throughout the backtested period, producing an annualised excess return of 5.5%. This return profile reflects the signal's ability to systematically capture persistent price trends while avoiding excessive drawdowns and volatility. The annualised volatility of 10.5% remained comfortably within reasonable bounds, indicating that the strategy maintained disciplined exposure without amplifying risk. The maximum drawdown of –22.5% further underscores its defensive characteristics.

Figure 12: Historical performance of Price Momentum (time series using Binary Momentum)



From 25/06/2001 to 30/09/2025. Source: WisdomTree, Bloomberg, FactSet. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investment may go down in value**.

Momentum stands out as the most enduring and reliable signal, capturing persistent price trends across diverse market conditions.

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Conclusion

In the cross-sectional framework, the Binary Momentum signal was the only one to deliver modest excess returns. However, when evaluated in a time series context, all three Momentum-based signals—the moving average crossover, Trend Breadth, and Binary Momentum—demonstrated meaningful potential to generate performance over the long term.

A deeper sector-level analysis revealed that the effectiveness of these signals varied meaningfully across market segments. Sectors such as Livestock exhibited weaker and less persistent trends, limiting their contribution to overall performance. In contrast, Energy and Industrial Metals showed more robust and sustained directional behaviour, allowing trend-following signals to capture Momentum more effectively in these areas.

Taken together, these findings suggest that while Momentum dynamics are not uniform across sectors, they can form a valuable component of a systematic allocation framework. With their strong academic foundations and positive empirical results, these signals demonstrate clear potential for real-world implementation, particularly with thoughtful parameter calibration and risk management. The following chapters delve deeper into this fine-tuning process and the construction of diversified, trend-based strategies.

d) Testing Slope Momentum

The goal of the Slope Momentum strategy is to invest, preferably in commodities whose curve has been moving towards backwardation recently, and to short or not invest in commodities whose curve has moved towards contango.

In this section, we test the following hypothesis:

+ Slope Momentum as a factor works best in a time series manner.

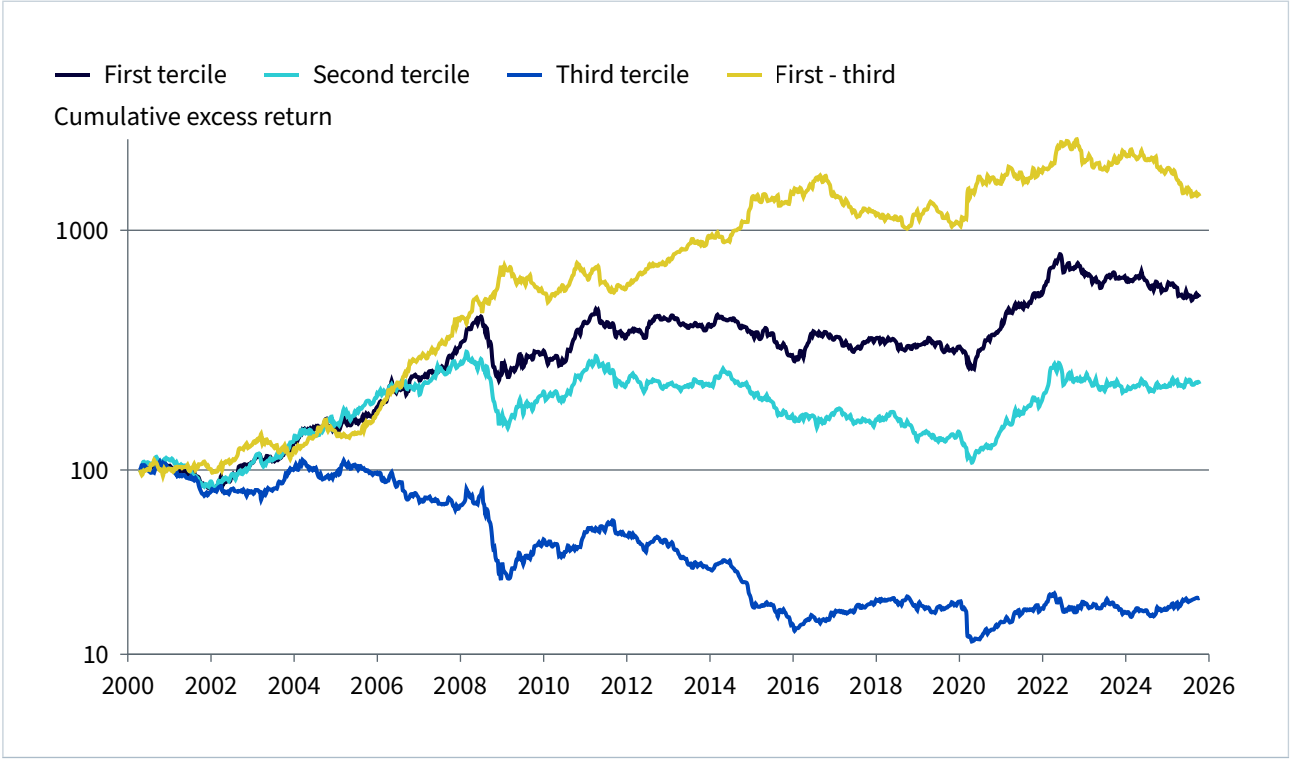
Below, the Slope Momentum signal is calculated as follows: each week, we calculate how roll yield has changed daily; these daily differences are smoothed using an exponentially weighted moving average (EWMA) and scaled by their EWMA volatility, producing a volatility-adjusted score. As usual, the test below divides the commodities into terciles and then goes long in the first tercile and short in the third tercile.

Testing Slope Momentum in cross section

The performance of the cross-sectional Slope Momentum signal has been remarkable over the past 25 years, showing positive excess returns across most market regimes. The long–short (yellow line) that goes long in the first tercile and short in the third generated an annualised performance of almost 9% on an annualised basis.

While there were temporary setbacks between 2016 and 2019 and again in the most recent years, the overall signal remains robust and economically meaningful. Its ability to identify commodities whose futures curves are steepening towards backwardation has historically provided a reliable source of excess return.

Figure 13: Historical performance of Slope Momentum (cross-sectional)



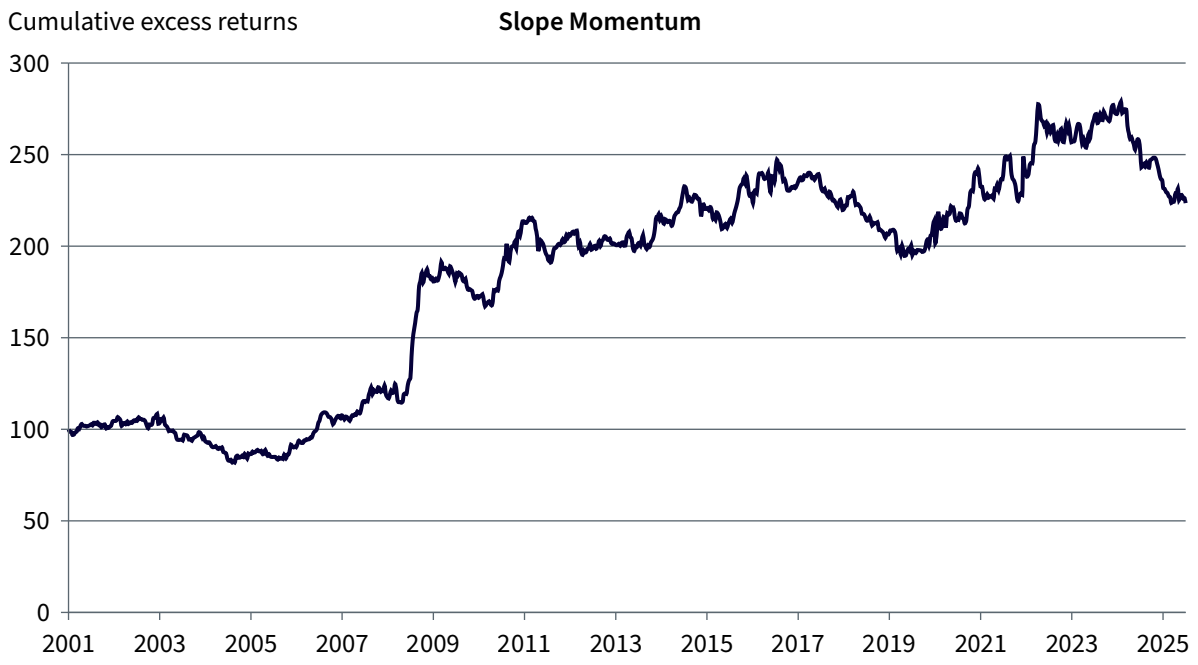
From 24/04/2001 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Testing Slope Momentum in time series

The Slope Momentum signal, when evaluated in a time series context, exhibited strong performance during specific market regimes, most notably during the global financial crisis period. This phase highlighted the signal's ability to capture sharp directional movements when market dislocations intensified, and trends became more pronounced. However, its performance over the full backtested horizon was not uniformly consistent, with returns being realised in distinct, staggered phases rather than displaying steady compounding over time.

For the entire sample, the strategy achieved an annualised excess return of 3.3%, with an annualised volatility of 9.1%, resulting in a moderate risk-adjusted profile. The maximum drawdown, at –25.2%, was comparatively well controlled, suggesting that the signal managed downside risk effectively, even during periods of weaker trend persistence.

Figure 14: Historical performance of Slope Momentum (time series)



From 02/04/2001 to 30/09/2025. Source: WisdomTree, Bloomberg, FactSet. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investment may go down in value**.

Conclusion

When the curve talks, Slope Momentum listens. Tracking second-order shifts in the term structure historically delivers durable outperformance across cycles and commodities.

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Interestingly, the results for Slope Momentum in the time series and cross-sectional setting are broadly similar. Both implementations capture comparable trends and deliver consistent excess returns, suggesting that this factor reflects a pervasive and stable dynamic of curve behaviour rather than a purely relative phenomenon. This alignment between the cross-sectional and time series versions reinforces the validity of the signal and highlights its versatility as a driver of performance in systematic commodity strategies.

e) Testing Value

The goal of this last group of analyses is to test Value as a factor. The strategy aims to invest, preferably in commodities that are currently cheaper, and to not invest or short in commodities that are more expensive.

In this section, we want to test the hypothesis that Value works well in a cross section. The rationale behind this lies in the substitution effects and relative pricing dependencies that naturally exist across commodities. When commodities become expensive relative to their historical or fundamental value—such as when prices rise well above production costs or when inventories rebuild—consumers, producers, and investors tend to shift demand or capital towards substitutes. This behaviour induces a mean-reverting dynamic across the commodity spectrum, where undervalued commodities tend to outperform over time, while overvalued ones lag. In other words, the Value premium in commodities is largely a relative-value phenomenon; it emerges because commodities compete for similar end uses[4], and their prices are interconnected through cross-commodity demand elasticities. These economic linkages mean that Value opportunities appear more clearly when commodities are compared against each other than when each is analysed in isolation. Consequently, a cross-sectional approach—ranking commodities by how cheap or expensive they are relative to their peers or historical norms—can more effectively capture this substitution-driven rebalancing process and deliver a more stable and economically grounded source of alpha.

Below, the Value factor is calculated in a manner similar to AQR's definition[5]. Specifically, Value for commodities is defined as the logarithm of the ratio between the current spot price and its historical average over the past five years[6]. This metric aims to identify commodities that are undervalued or overvalued relative to their historical norms.

4 For example, energy sources including oil, gas, and coal, or grains such as wheat, corn, and soybeans.

5 Asness, C., Moskowitz, T., and Pedersen, L. (2013). "Value and momentum everywhere", Journal of Finance, 68, 929-985.

6 In the AQR paper, the signal is constructed as the logarithm of the ratio between the current spot price and the price average between 4.5 and 5.5 years before.

The five-year window reflects a standard and reasonable estimate of the frequency at which mean reversion operates in commodity markets[7].

Constructing a strategy based solely on this Value definition tends to introduce a negative Carry by design. This occurs because the Value signal may be inversely related to the roll yield, leading to positions in commodities with unfavourable Carry drag. To address this issue, we perform a daily regression of the initially constructed Value signal against the roll yield of the commodities. By using the residuals from this regression as our adjusted Value signal, we effectively remove the influence of the roll yield (that is, we 'clean' the Value signal from the Carry effect). We implement this adjustment by using the front-month futures prices as a proxy for the spot prices and regressing them against the Carry calculated from the front-month contracts. This approach reflects the most immediate market expectations and pricing.

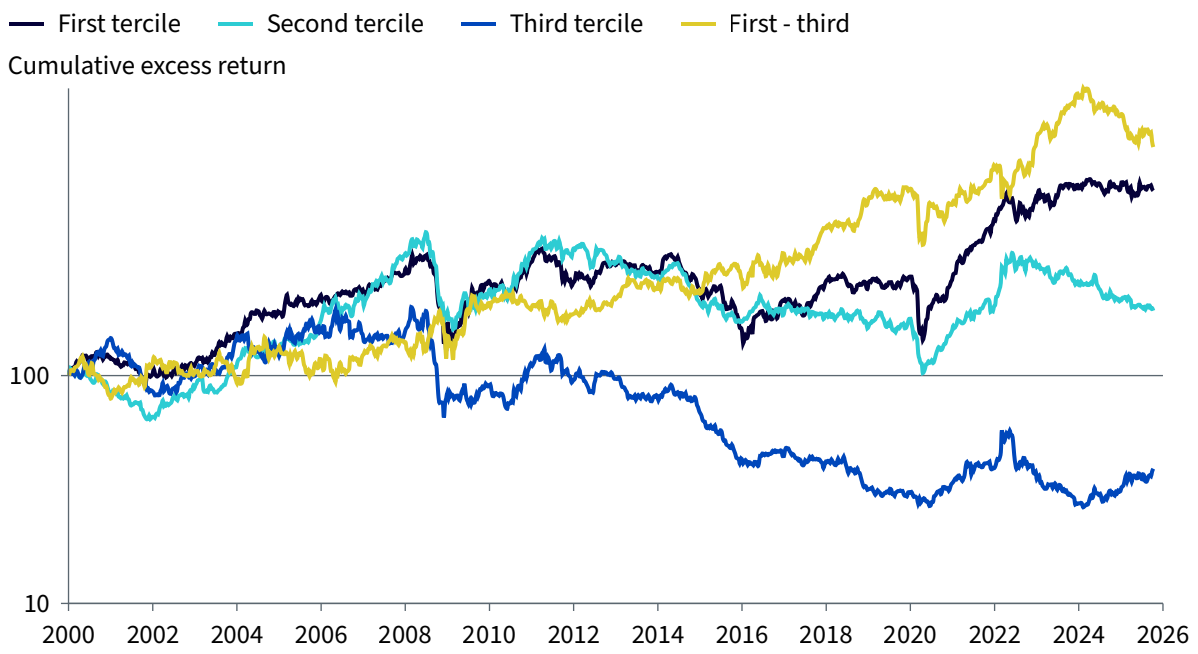
By employing these adjusted Value signals, we aim to capture the true Value effect in commodities investing without the detrimental influence of negative Carry. The residuals from the regressions represent the portion of the Value signal that is uncorrelated with the roll yield, potentially leading to a more robust and profitable strategy.

Testing Value in cross section

The chart below shows that the Value signal performed strongly overall, with the first tercile (most undervalued commodities) clearly outperforming the third tercile (most overvalued) over the full period. While the distinction between the first and second terciles was less pronounced up to around 2020, the overall trend remained consistently positive. The long–short portfolio, going long in the first tercile and short in the third, delivered an annualised excess return of approximately 8.8% over the period.

7 The chosen five-year window for computing the value signal is also economically meaningful. It aligns with the typical time horizon required for physical substitution or capacity adjustments in commodity markets, such as switching energy sources, changing feedstocks in industrial production, or investing in new mining or agricultural infrastructure. These transitions require years rather than months to materialise, making a multi-year average a realistic reflection of the underlying fundamental equilibrium toward which prices tend to revert.

Figure 15: Historical performance of Value (cross-sectional)



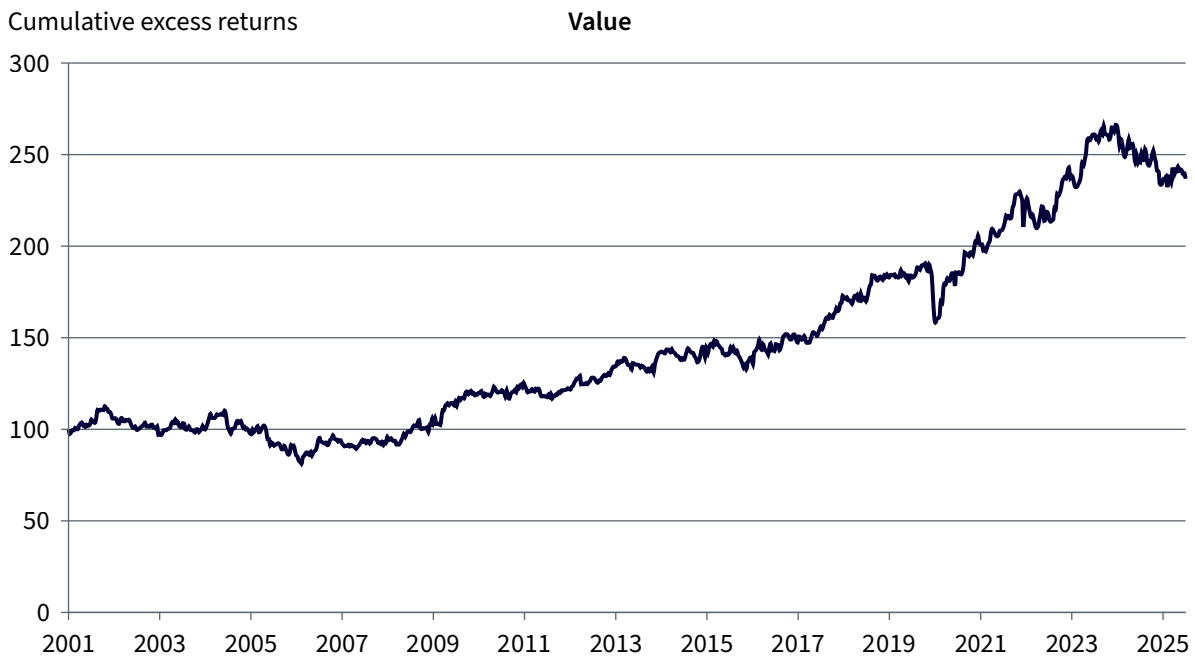
From 10/01/2000 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Testing Value in time series

The Value signal demonstrated steady and resilient performance throughout the backtested period, characterised by relatively low volatility and an absence of large abrupt drawdowns. Unlike several other Momentum-based approaches discussed earlier, the Value signal exhibited fewer whipsaws, suggesting a greater degree of stability and persistence in signal generation.

Over the full sample period, the strategy produced an annualised excess return of 3.6%, with a volatility of 8.4%, reflecting an attractive balance between return and risk. While large drawdowns were infrequent, the maximum drawdown over the period was –28%, remaining within a controlled range compared to other systematic signals.

Figure 16: Historical performance of Value (time series)



From 02/04/2001 to 30/09/2025. Source: WisdomTree, Bloomberg, FactSet. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investment may go down in value**.

Applying systematic factors, such as Carry, Momentum, Value, and Slope, demonstrates how academic insight can translate into practical portfolio results.

Conclusion

Surprisingly, the Value signal performs well in both time series and cross-sectional setups, indicating that the factor captures a broad and persistent mean-reversion dynamic across commodity markets. However, the results are slightly stronger in the cross-sectional implementation, where relative pricing effects and substitution mechanisms between commodities are better exploited.

f) Summary of results

Our analyses show that, overall, all four factors tested do deliver significant outperformance in a realistic investment setting and can therefore be used to construct real-life long-only or long–short strategies. Using all or some of these factors, it is possible on a regular basis to decide which commodity to overweight/underweight or which commodity to invest in/short to deliver above market performance.[8]

Applying systematic factors, such as Carry, Momentum, Value, and Slope, demonstrates how academic insight can translate into practical portfolio results.

8 Annualised returns for the cross-sectional setup are halved for comparability, since the time-series test maintains a gross exposure of 100%, whereas the cross-sectional test—being long in the first tercile and short in the third—implies a gross exposure of 200%.

Figure 17: Factor performance summary

Model type	Model	Submodel	Periods	Annualised return	t-stat	p-value
Cross-sectional	Price Momentum	Binary	6347	2.18%	1.26	20.70%
Cross-sectional	Price Momentum	Combined	6407	0.86%	0.50	61.87%
Cross-sectional	Price Momentum	Moving avergae	6407	-0.37%	-0.18	85.71%
Cross-sectional	Price Momentum	Trend Breadth	6407	0.60%	0.34	73.24%
Cross-sectional	Roll Yield	12M	6727	5.21%	2.75	0.60%
Cross-sectional	Roll Yield	Front	6727	5.46%	3.13	0.18%
Cross-sectional	Slope Momentum	-	6652	4.28%	2.51	1.19%
Cross-sectional	Value	-	6727	4.15%	2.34	1.95%
Time-series	Price Momentum	Binary	5961	6.00%	2.79	0.53%
Time-series	Price Momentum	Combined	5835	4.82%	1.73	8.34%
Time-series	Price Momentum	Moving avergae	5835	4.11%	1.64	10.07%
Time-series	Price Momentum	Trend Breadth	5835	5.05%	1.83	6.80%
Time-series	Roll Yield	12M	6035	-0.62%	-0.28	78.03%
Time-series	Roll Yield	Front	6098	3.26%	1.88	5.99%
Time-series	Slope Momentum	-	6035	3.78%	2.03	4.24%
Time-series	Value	-	6035	3.94%	2.31	2.12%

Source: WisdomTree, Bloomberg, Factset. The table reports annualised returns, t-statistics, and p-values for each model and sub-model tested across both cross-sectional and time-series frameworks. The t-statistic measures how statistically different the observed returns are from zero—higher values indicate greater confidence that the factor's performance is not due to random chance. The p-value represents the probability that the observed result occurred by chance; lower values imply stronger statistical significance. For comparability, the annualised returns for cross-sectional models are divided by two. **Historical performance is not an indication of future performance, and any investments may go down in value.**

B. Quant-based contract selection

First-generation commodity indices have usually been modelled on equity indices. The weight of the different commodities is fixed at regular intervals (very often once a year) and then left to drift. However, what sets them apart is the way the rolling is performed. These indices have been built to stay as close as possible to the uninvestable spot, so they invest very close to the front month of the curve, usually in the first one or two futures contracts. Consequently, they roll every month or two. The average maturity of the futures in these indices is usually less than two months. The S&P GSCI and the BCOM indices are two of the oldest examples in that generation.

Second-generation indices (or enhanced indices) have been created more recently, starting in the early 2000s. First-generation indices are known to be sub-optimal because they fail to consider the term structure of each future curve. These new indices are designed to address this by investing in futures contracts with longer maturities, allowing for adaptation to the term structure of the curve and creating outperformance versus first-generation indices.

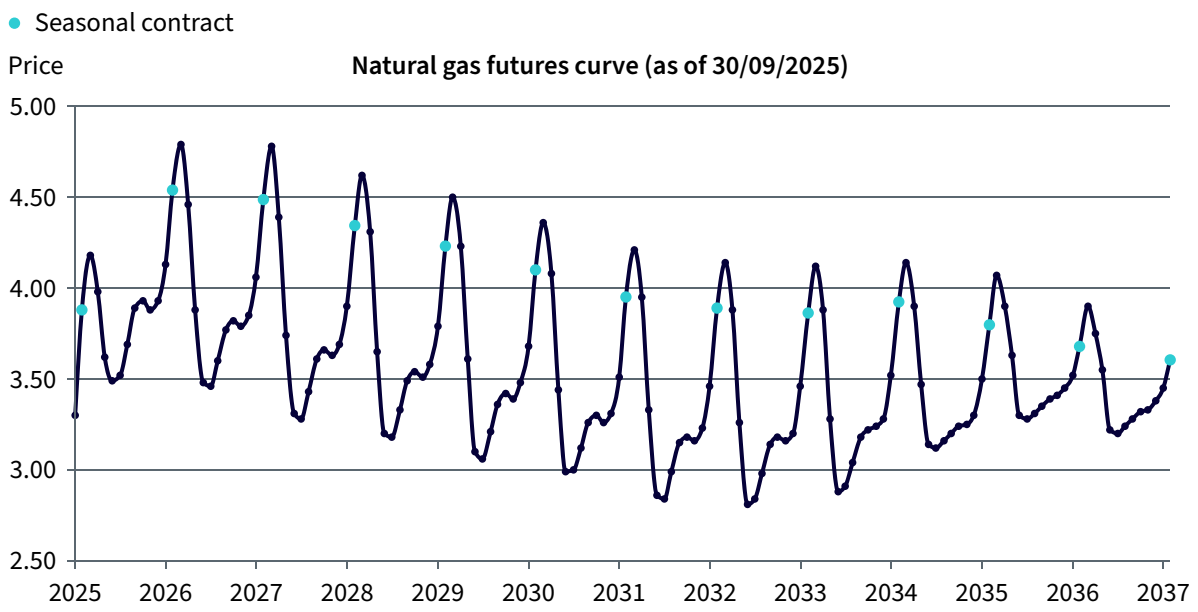
Academics have shown that by rolling front- or second-month futures contracts, first-generation indices tend to exhibit higher volatility due to their higher exposure to the spot price according to (Daal et al., 2006 and Samuelson, 1965). They can also suffer from high negative roll yields when the curve is in contango. By investing further up the curve, enhanced commodity indices aim and often succeed in reducing this volatility and the average roll yield.

Having said that, each commodity curve behaves differently, and there is not always a single approach that can improve on the Carry. Below, we explore two different techniques to improve first-generation indices, one for seasonal commodities and one for non-seasonal commodities.

a) Seasonal commodities

A high roll yield does not always indicate tightness in the market. For a particular group of commodities, namely, seasonal commodities, the forward curve can display systematic oscillations reflecting seasonal patterns inherent to the underlying market. These seasonal patterns arise due to variations in demand (or supply), combined with relatively inelastic supply (or demand), and general limitations or costs associated with storage. Consequently, the characteristic sinusoidal shape of seasonal forward curves implies that high roll yields at certain points along the curve may result from seasonal effects rather than genuine market tightness. To address this issue, we examine whether selecting seasonal contracts for commodities with pronounced seasonality is preferable to optimising solely for roll yield.

Figure 18: A seasonal contract future curve: natural gas

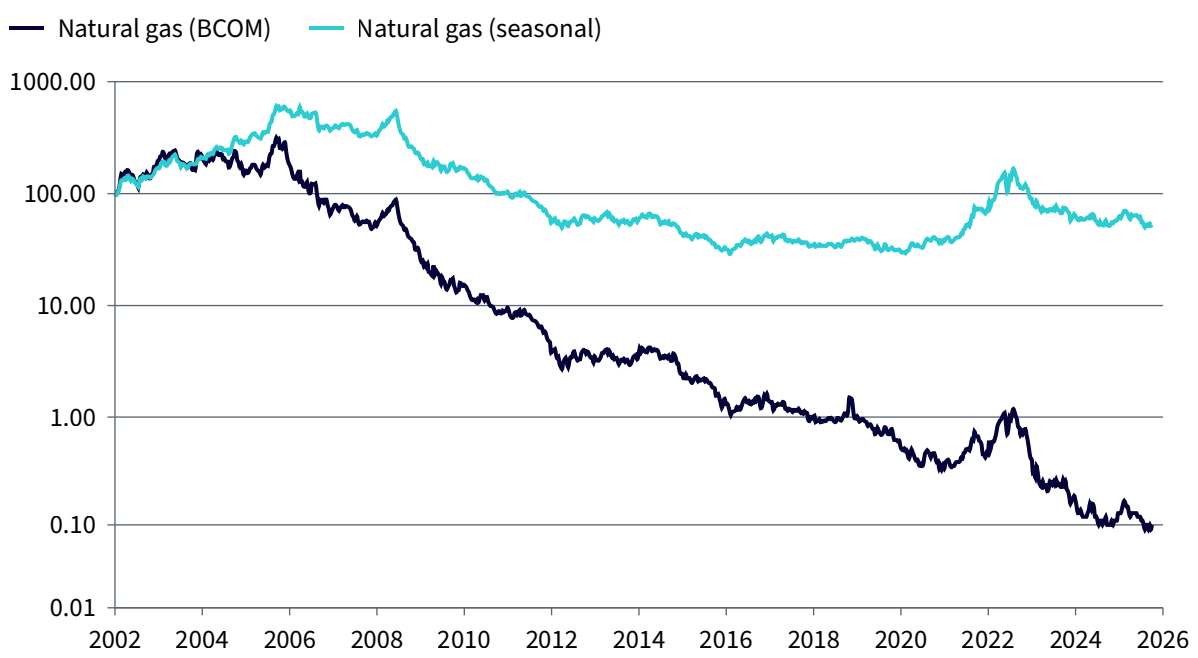


As of 30/09/2025. Source: WisdomTree, Bloomberg, Factset. Prices in USD. **Historical performance is not an indication of future performance, and any investments may go down in value.**

A seasonal contract refers to a futures contract whose delivery period coincides with a specific, recurrent seasonal pattern that influences supply, demand, and, consequently, price dynamics. Seasonal contracts frequently introduce distinct peaks and valleys into the futures curve. The seasonal nature emerges because many commodities have production cycles, harvest periods, or demand fluctuations tied directly to calendar events or weather patterns. For non-storable commodities, seasonality cannot be arbitraged away. For example, for natural gas, the seasonal contract is the December contract, which is the winter's highest volume contract.

By choosing the seasonal contract, the strategy avoids being on the front of the curve and gets the seasonal premium associated with the contract (strong hedging pressure). Typically, the seasonality premium erodes as we get closer to maturity. That's why the seasonal contract selection methodology rolls into the next seasonal contract two months before expiry.

Figure 19: Improving performance by investing in the seasonal contract instead of the front-month contract: natural gas



From 25/01/2002 to 20/10/2025. Source: WisdomTree, Bloomberg, Factset. Excess returns in USD. **Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 19 is striking—it shows how natural gas, the seasonal commodity par excellence, benefits substantially from using the seasonal contract selection methodology. Under the traditional BCOM methodology, which consistently rolls the front contract, the index is heavily exposed to the negative Carry associated with contango during non-winter months. By contrast, seasonal contract selection systematically invests in the December contract, aligning with the winter demand peak when hedging pressure is most favourable. This adjustment captures the recurring seasonal premium and reduces the structural drag that has historically penalised front-month exposure.

However, the improvement is not limited to natural gas. Figure 20 compares the performance of the BCOM front-contract approach with seasonal contract selection across a broad set of seasonal commodities. The results are consistent: in all cases, seasonal contract selection outperforms the front-contract approach. The gains are most pronounced in highly seasonal markets such as natural gas (+22.7%) and livestock (+8.2%), but the effect extends to grains and soft commodities as well, where the seasonal approach improves returns by 2–4% per annum.

Figure 20: Improving performance by investing in the seasonal contract instead of the front-month contract

Name	BCOM contract selection	Seasonal contract selection	Relative return	*Relative Volatility*
RBOB Gasoline	5.9%	7.7%	**1.8%**	**-4.3%**
ULS Diesel	4.7%	5.4%	**0.7%**	**-3.0%**
HRW Wheat	-7.1%	-4.1%	**3.0%**	**-1.2%**
SRW Wheat	-10.0%	-5.9%	**4.1%**	**-2.0%**
Soybean	4.8%	6.5%	**1.7%**	**-1.0%**
Corn	-6.5%	-4.8%	**1.7%**	**-1.6%**
Cotton	-5.2%	-3.0%	**2.2%**	**-1.8%**
Sugar	-0.3%	2.2%	**2.5%**	**-3.4%**
Lean Hogs	-9.3%	-1.2%	**8.1%**	**-3.6%**
Live Cattle	-0.2%	1.9%	**2.1%**	**-1.5%**
Natural Gas	-24.5%	-13.9%	**10.6%**	**-8.2%**
Soybean Oil	0.9%	2.3%	**1.4%**	**-0.8%**
Soybean Meal	8.1%	9.9%	**1.8%**	**-1.2%**

From 25/01/2002 to 20/10/2025. Source: WisdomTree, Bloomberg. Excess returns in USD. **Historical performance is not an indication of future performance, and any investments may go down in value.**

b) Non-seasonal commodities

Non-seasonal contracts' future curve shape is mostly dictated by inventory level, storage cost, and convenience yield. Therefore, it is possible to use the shape of the curve to find the optimal point of investment—ideally, at a point of the curve where the commodity is scarce, and therefore the roll yield is positive. If not, at least, at a point of the curve where the inventory is less plentiful, and therefore the roll yield is less negative.

As discussed in more detail in the introduction to this paper, the excess return performance of commodity futures contracts can be explained by two components: spot return and roll return. The roll return is the yield generated due to the rolling of one futures contract to the next contract, thereby ensuring continual exposure to futures prices and avoiding physical delivery and contract expiry.

The roll return is mainly impacted by the shape of the futures curve and how it changes over time. To improve first-generation commodity indices, it is possible to adopt a dynamic approach, looking at each commodity's futures curve every month to select the most optimal contract on the futures curve, minimise this drag when the curve is upward sloping (contango), and maximise the benefit when downward sloping (backwardation).

By doing this monthly, the approach can respond quickly to changes in the shapes of futures curves. To ensure liquidity and reduced transaction costs, it is preferable not to go too far on the curve where liquidity dries out, so up to nine months' maturity is usually a good compromise.

Overall, this approach aims:

+ to minimise negative roll yield in contango and pick further-out futures contracts
+ to maximise positive roll yield in backwardation by selecting close-to-front futures contracts.

Over long periods, this 'optimised roll yield' approach can improve the index return. It also tends to reduce volatility because choosing futures contracts further along the curve means that the strategy is less exposed to spot price movements, enhancing the risk–return profile over the long term. This is in line with (Rallis et al., 2010). As shown in the table below, every non-seasonal commodity using the maximum roll yield contract selection outperformed the front-month benchmark, with annualised excess returns ranging from 0.6% to 7.2%. In addition, all commodities experienced lower volatility, confirming that optimising contract selection not only enhances returns, but also improves the overall risk profile.

Figure 21: Roll yield optimisation for non-seasonal commodity investments

Name	BCOM contract selection	Max roll yield contract selection	Relative return	*Relative Volatility*
WTI Crude	-1.9%	5.3%	**7.2%**	**-5.5%**
Brent Crude	4.8%	6.4%	**1.6%**	**-3.0%**
Gasoil	5.1%	5.7%	**0.6%**	**-2.5%**
Aluminium	-2.0%	-0.7%	**1.3%**	**-1.0%**
Zinc	0.9%	2.7%	**1.9%**	**-0.9%**
Lead	5.3%	6.0%	**0.7%**	**-0.9%**
Nickel	2.4%	4.2%	**1.8%**	**-0.8%**
Coffee	-5.7%	-4.4%	**1.3%**	**-1.6%**
Copper	5.5%	7.0%	**1.5%**	**-0.7%**

From 03/01/2000 to 20/10/2025. Source: WisdomTree, Bloomberg. Excess returns in USD. **Historical performance is not an indication of future performance, and any investments may go down in value.**

C. What about precious metals?

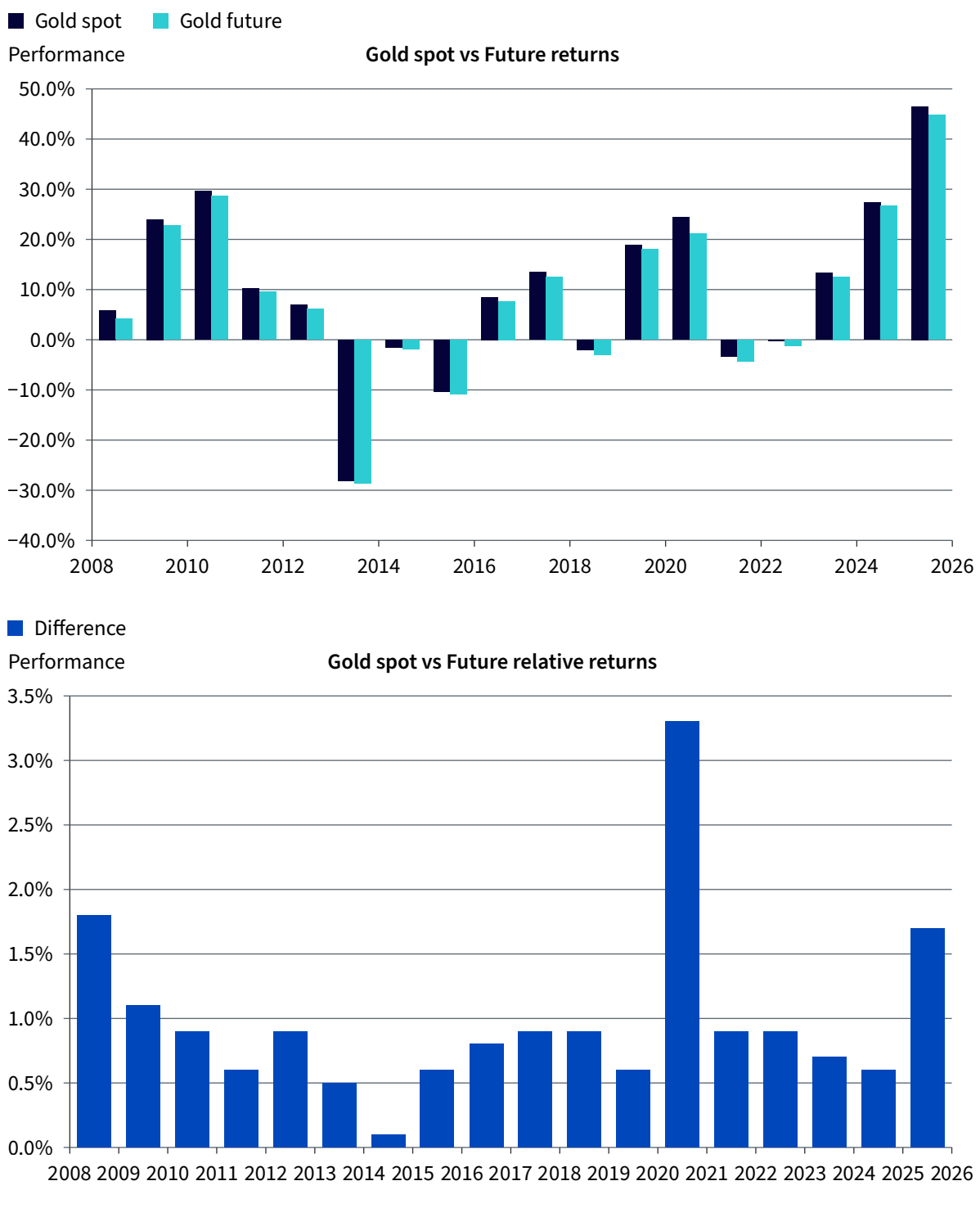
Precious metals, and in particular gold and silver, tend to behave a bit differently from the rest of the commodities. Because of their high price per weight and their relatively large above-ground stocks, their future curve tends to be fairly flat and very stable over time. What that means is that there is significantly less value in running contract selection optimisation for those commodities, as the roll yield is almost the same across the curve, and it also makes it difficult to apply 'curve-based' factors such as Carry or Slope Momentum.

Having said that, it is also worth noting that because of their very high price-to-weight ratio, precious metals are among the few commodities that can be invested in physically (via the spot) instead of via a futures contract. Gold and silver do not deteriorate over time, and they are not very expensive to store, as volumes are smaller, making physical investment possible.

Comparing a physical investment to a futures-based investment in gold or silver, we note that physical gold and silver investments have outperformed futures-based ones almost every year since 2007. In fact, in 2020, disruptions in the futures markets led to very high outperformance of the physical commodity.

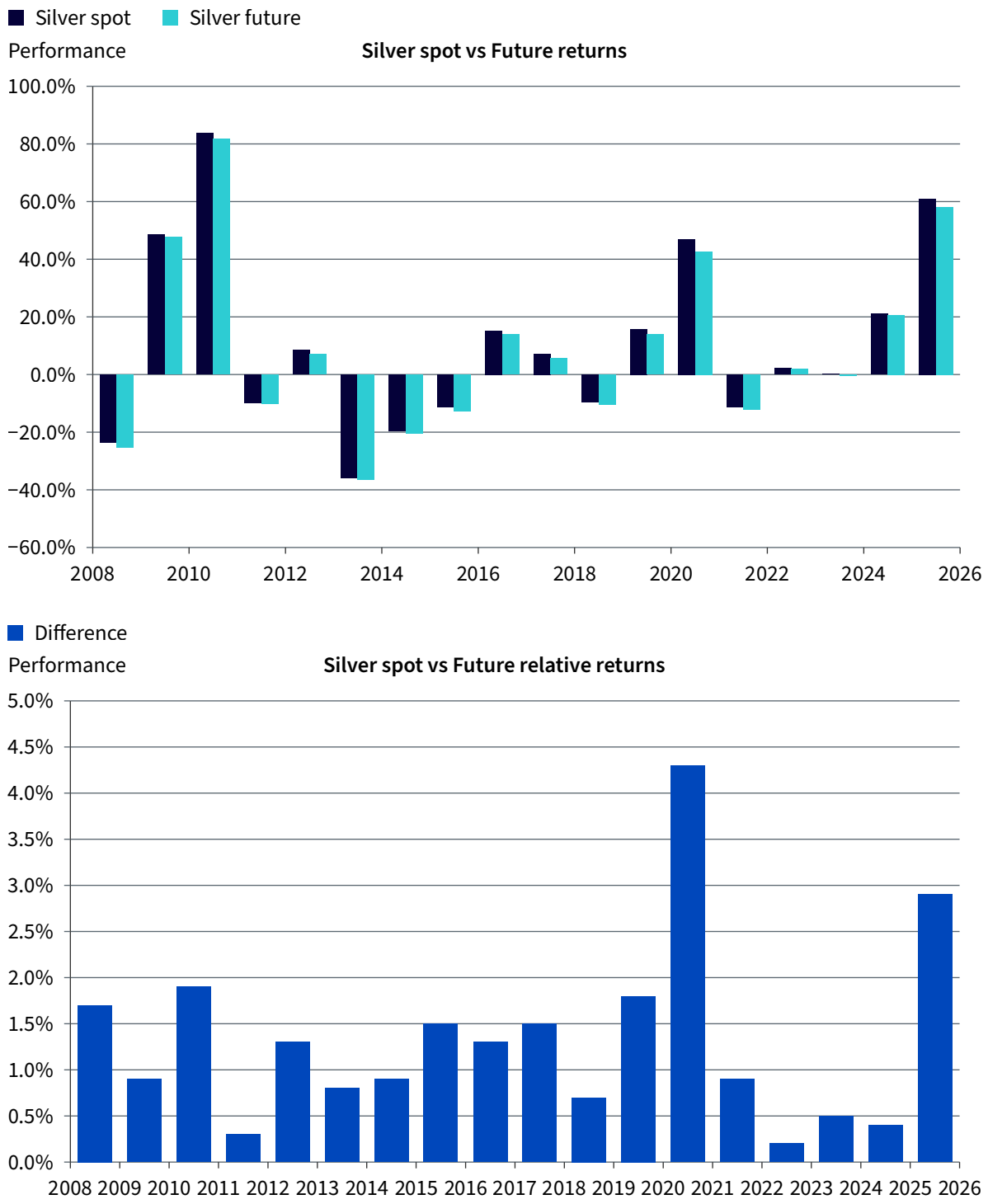
Overall, physical gold overperformed futures-based gold by 0.9% per annum, with a 0.7% tracking error. Since 2008, physical gold has never underperformed synthetic gold. Physical silver overperformed futures-based Silver by 1.2% per annum, with a 1.0% tracking error. Also, in the case of silver, the physical metal outperformed a synthetic exposure every year since 2008.

Figure 22: Historical outperformance of physical gold versus an investment in gold futures contracts



From 31/12/2007 to 30/09/2025. Source: WisdomTree, Bloomberg. Excess returns in USD. In the chart above, the dark blue bars represent physical gold performance, while the teal bars represent a fully funded synthetic exposure to gold. in the bottom chart, the blue bars represent the delta between the two. **Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 23: Historical outperformance of physical silver versus an investment in silver futures contracts



From 31/12/2007 to 30/09/2025. Source: WisdomTree, Bloomberg. Excess returns in USD. In the chart above, the dark blue bars represent physical silver performance, while the teal bars represent a fully funded synthetic exposure to silver. In the bottom chart, the blue bars represent the delta between the two. **Historical performance is not an indication of future performance, and any investments may go down in value.**

This leads us to conclude that the best investment choice regarding precious metals, even in second- or third-generation indices, may be to leave them be and continue to roll front-month contracts or, even better, invest in the physical metal itself.

D. Conclusions

These findings spanning Carry, Momentum, Slope Momentum, and Value support the notion that commodity returns are not solely driven by market beta, but also by systematic cross-sectional and time series patterns. Factor-like signals enable investors to dynamically allocate across commodities according to prevailing market conditions, paving the way for second- and third-generation commodity indices that integrate these signals to enhance long-only strategies, or even for long–short 'all-weather' frameworks designed to capture commodity premia more efficiently.

3.
Improving a long-only strategy

In this section

Having discussed commodity selection and contract selection in the previous chapters, the goal of this section is to introduce what could be a strong third-generation broad commodity index, that is, an index that overweights and underweights commodities based on factor signals and that also optimises contract selection based on seasonality and curve shapes.

A. Strategy description

This illustrative strategy combines three academically supported factors—cross-sectional 12-month Carry, Price Momentum, and Slope Momentum—to allocate across commodities dynamically.

- The **cross-sectional Carry** factor was chosen as backwardation is one of the most established and effective sources of returns in commodities, consistently supported by academic and empirical evidence. The cross-sectional version offers stronger and more persistent results across commodities, while the 12-month specification reduces turnover and smooths seasonality without weakening the signal.
- The **time series Momentum** factor, on the other hand, performs much better when applied to individual commodities rather than across cross-sections, capturing medium-term price persistence driven by behavioural and structural dynamics.
- Finally, the **Slope Momentum** (in time series) factor adds a faster, more tactical dimension by tracking changes in the slope of the futures curve—essentially a second derivative of roll yield—allowing the strategy to respond to shorter-term curve movements that precede shifts in market tightness.
- We decided to exclude the Value factor from the final strategy, despite its strong and statistically significant performance, because the academic foundation supporting this specific implementation remains limited. In particular, our formulation—where the Value signal is adjusted through a regression against roll yield to isolate the pure valuation component—represents an approach that has not yet been extensively validated in the literature.

Figure 24: The impact of daily versus weekly rebalancing on the three factors

Model type	Model	Submodel	Periods	Annualised return (daily rebalancing)	t-stat	p-value	Annualised return (weekly rebalancing)
Time-series	Price Momentum	Binary	5963	5.98%	2.79	0.53%	6.00%
Time-series	Slope Momentum	-	6090	5.98%	3.39	0.07%	3.78%
Cross-sectional	Roll Yield	12M	6729	5.72%	3.02	0.25%	5.21%

Source: WisdomTree, Bloomberg, Factset. The table reports annualised returns, t-statistics, and p-values for each model and sub-model tested across both cross-sectional and time series frameworks. The t-statistic measures how statistically different the observed returns are from zero—higher values indicate greater confidence that the factor's performance is not due to random chance. The p-value represents the probability that the observed result occurred by chance; lower values imply stronger statistical significance. For comparability, annualised returns for cross-sectional models are divided by two. **Historical performance is not an indication of future performance, and any investments may go down in value.**

In this implementation, we increase the rebalancing frequency from weekly to daily to better capture fast-changing market dynamics. The comparison of weekly versus daily results (see Figure 24) shows that two of the three signals—namely cross-sectional Carry and Slope Momentum—improve in both annualised return and statistical significance when moving to daily rebalanced. This behaviour is characteristic of well-functioning, economically grounded signals, as genuine information should strengthen with a higher sampling frequency rather than degrade. The effect is particularly evident for Slope Momentum, whose shorter horizon and sensitivity to curve dynamics benefit most from more frequent updates, confirming its role as the 'fast' component in the WCOA factor framework. Price Momentum, on the other hand, is effectively unaffected by changes in rebalancing frequency.

Each factor is built and standardised so that signals range between –1 and +1, ensuring consistency and comparability across commodities and time. To test their impact, each signal is applied to the Bloomberg Commodity Index (BCOM) weights by multiplying them by (1 + signal)—so that a commodity with a +1 signal has its BCOM weight doubled, while one with a –1 signal is reduced to zero. The resulting weights are then rescaled to sum to 100. To test the factors, we use the BCOM single-commodity indices as constituents, thereby removing any impact from contract selection and isolating the pure contribution of each signal to relative performance.[9] The contract selection process, which optimises Carry and roll yield through seasonal and non-seasonal methodologies, is evaluated separately to distinguish its contribution from that of factor-based commodity selection.

9 The robustness of these results is further confirmed by testing the same signals against an equally weighted commodity basket, where outcomes remain consistent in direction and magnitude.

Parameters for each signal are deliberately chosen to discriminate between slow, medium, and fast frequencies, aligning with the economic rationale behind each factor: cross-sectional Carry (slow), Price Momentum (medium), and Slope Momentum (fast).[10]

a) Cross-sectional Carry

To reiterate, this factor captures the idea that commodities in backwardation—where near-term futures trade above longer-dated ones—tend to outperform those in contango. The strategy systematically overweights commodities exhibiting stronger backwardation, as measured by their 12-month roll yield.

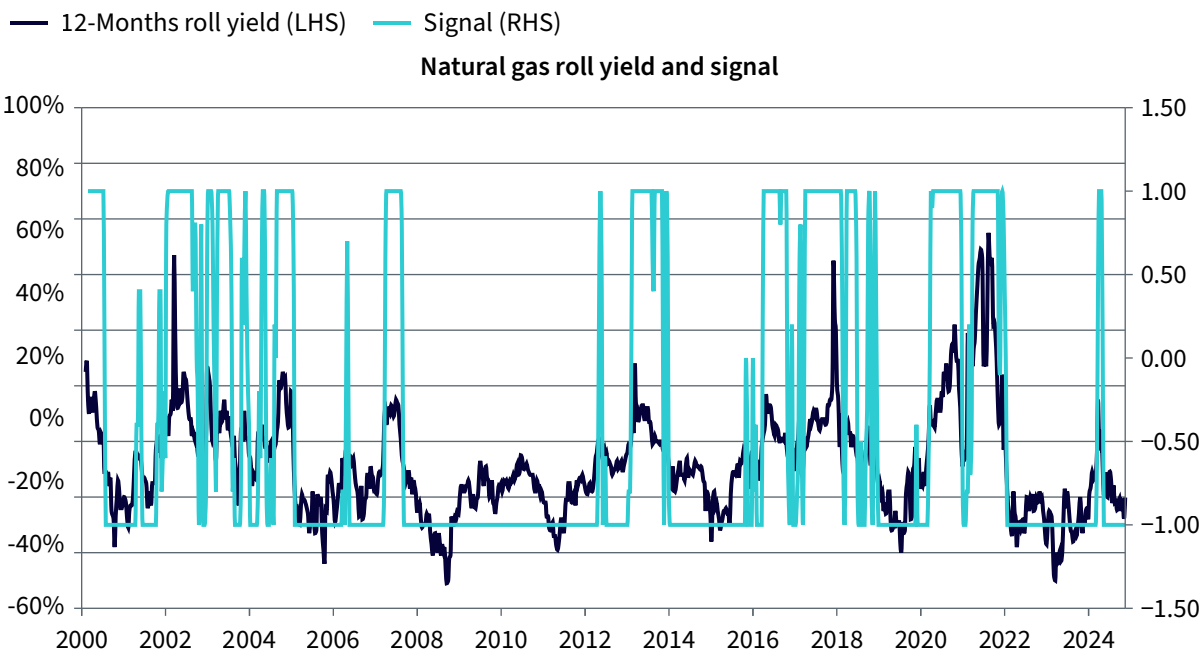
In practice, for each commodity (excluding gold and silver), we calculate the daily roll yield as the basis between the front-month contract and the contract 12 months ahead (that is, the 13th contract). Commodities are then ranked according to this measure:

+ Commodities in the top half of the ranking are assigned a value of +1, while those in the bottom half receive –1.
+ To smooth short-term noise, we take a 10-day moving average of these ranks, ensuring stability and avoiding one-day anomalies.

The resulting signal reflects the relative tightness across commodity markets, allowing the strategy to dynamically tilt towards commodities where supply constraints—and, therefore, potential roll yield gains—are strongest.

10 Robustness analysis shows that these parameters are not over-optimised—their performance remains stable across a range of plausible values—confirming that the model is grounded in economically meaningful and empirically resilient design choices.

Figure 25: Cross-sectional Carry signal for natural gas over time

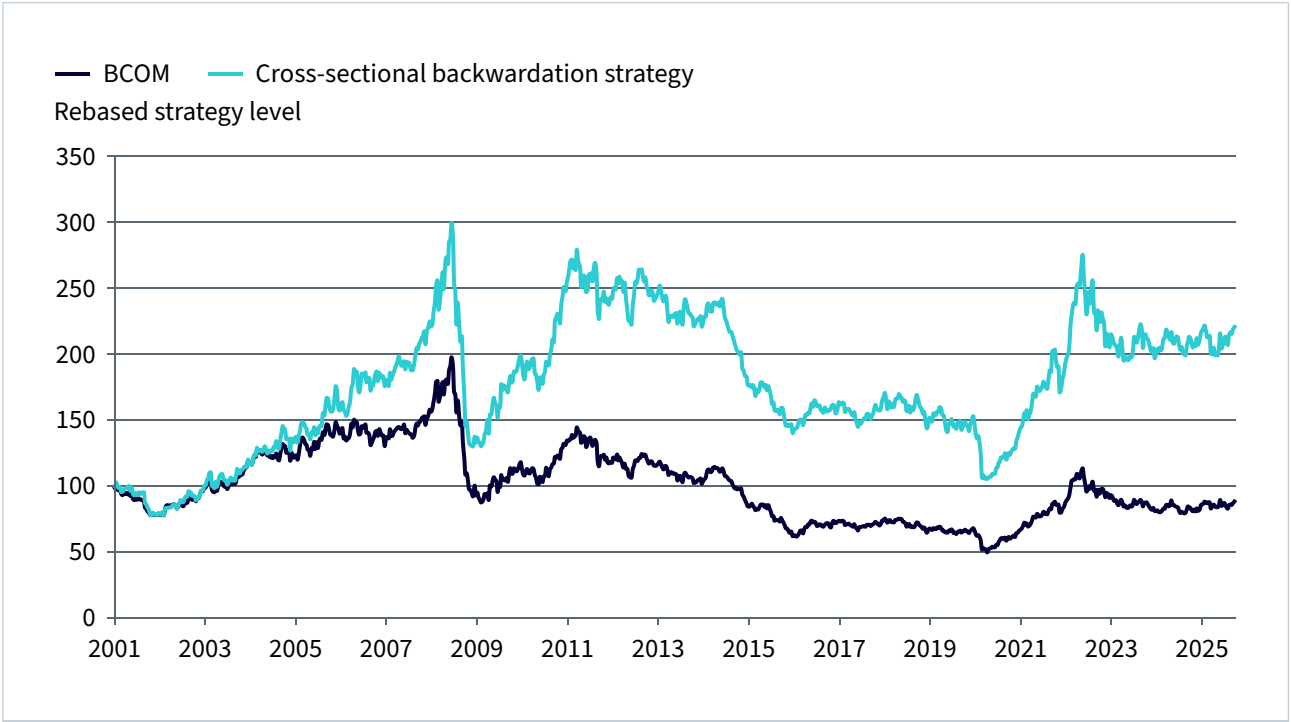


From 18/01/2001 to 21/10/2025. Source: WisdomTree, Bloomberg. The dark blue line represents the 12-month roll yield for natural gas, while the teal line represents the corresponding cross-sectional backwardation signal for natural gas. **Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 25 shows how the signal changes as the roll yield fluctuates. Clearly, being a cross-sectional factor, natural gas roll yield alone is not enough to determine the final signal, but this gives an idea of how a sudden tightness in the market (for example, Russia's invasion of Ukraine) could trigger a spike in the roll yield and hence correspond to a positive cross-sectional backwardation signal, *ceteris paribus*.

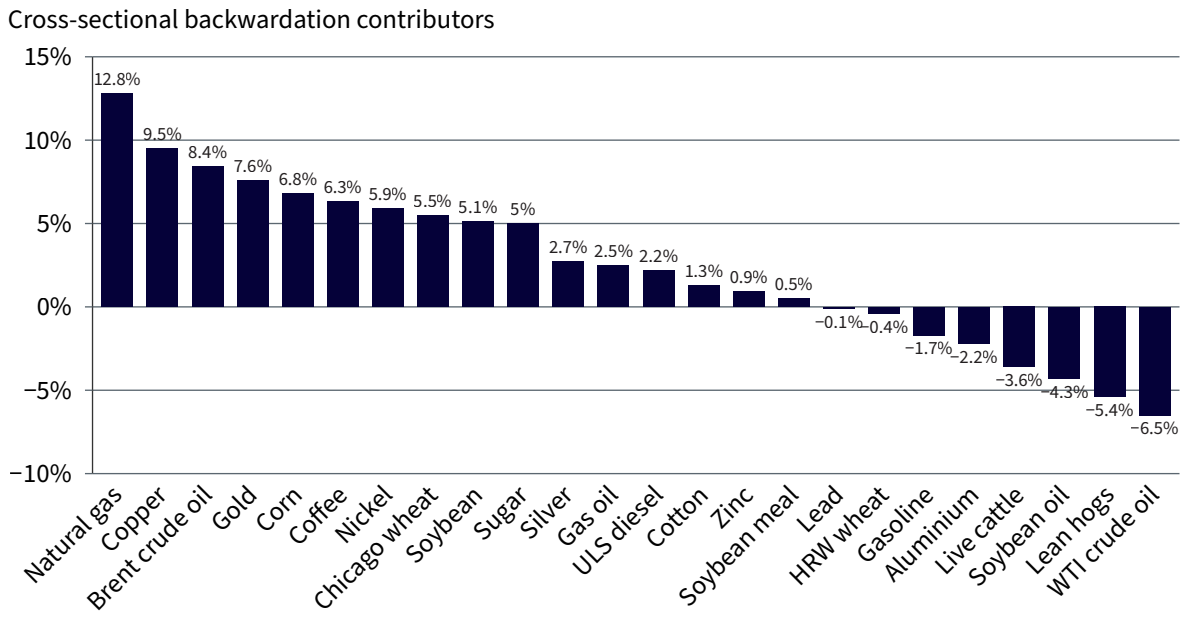
As shown in Figure 26, the cross-sectional backwardation factor performs in line with the expectations from Chapter 2. The strategy systematically tilts towards commodities in backwardation, capturing positive Carry and avoiding the structural drag of the contango. Over time, this results in a strong and persistent outperformance versus the benchmark.

Figure 26: Historical performance of the cross-sectional Carry-driven overweights and underweights applied to the BCOM



From 18/01/2001 to 21/10/2025. Source: WisdomTree, Bloomberg. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 27: Contribution by commodity to the outperformance



From 18/01/2001 to 30/09/2025. Source: WisdomTree, Bloomberg. The bars show the relative contribution of each commodity to the factor performance vs BCOM. **Historical performance is not an indication of future performance, and any investments may go down in value.**

As discussed earlier, the performance impact is not homogeneous across all commodities. The factor has extracted considerable value from natural gas, copper and Brent crude oil. On the contrary, over the period considered, the signal has not been overly efficient with WTI crude oil, lean hogs, or soybean oil. However, overall, the signal has added a great deal of value, with two thirds of commodities creating a positive impact.

b) Slope Momentum

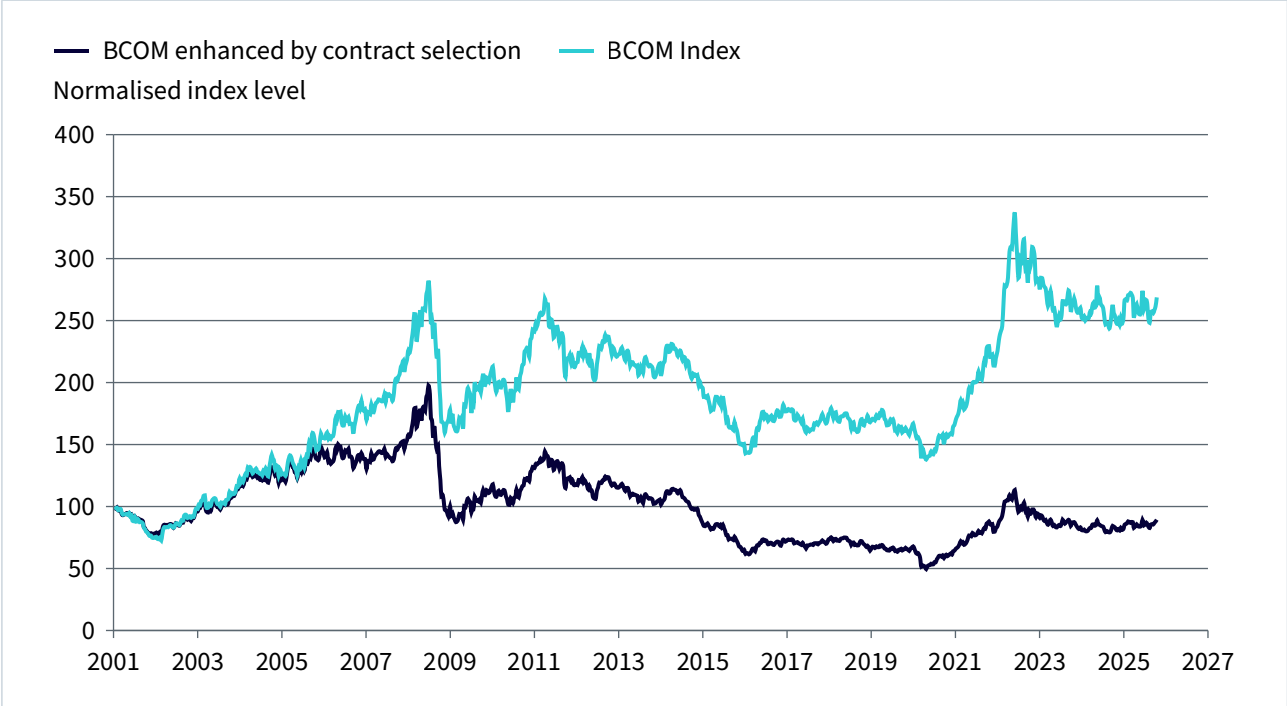
As introduced earlier, the Slope Momentum factor builds on the concept of tracking changes in the shape of the futures curve—specifically, whether a commodity's curve is moving towards backwardation or contango. Commodities whose curves are steepening into backwardation typically indicate tightening market conditions, while those shifting further into contango often signal oversupply.

In practice, for each commodity, we start again from the daily 12-month roll yield.

- These daily differences are smoothed using an exponentially weighted moving average (EWMA) with a 40-day span to reduce noise and emphasise persistent trends.
- The smoothed values are divided by their EWMA volatility, producing a volatility-adjusted score that normalises the signal across commodities.
- Finally, the signal is scaled and bounded between –1 and +1, where positive values indicate a move towards backwardation (overweight) and negative values indicate a move towards contango (underweight).[11]

This approach allows the strategy to detect and act on emerging supply–demand imbalances while maintaining stability through volatility-adjusted smoothing. Confirming the findings from Chapter 2, Slope Momentum delivers a strong outperformance vs the BCOM Index, as illustrated in Figure 28.

Figure 28: Historical performance of the Slope Momentum-driven overweights and underweights applied to the BCOM

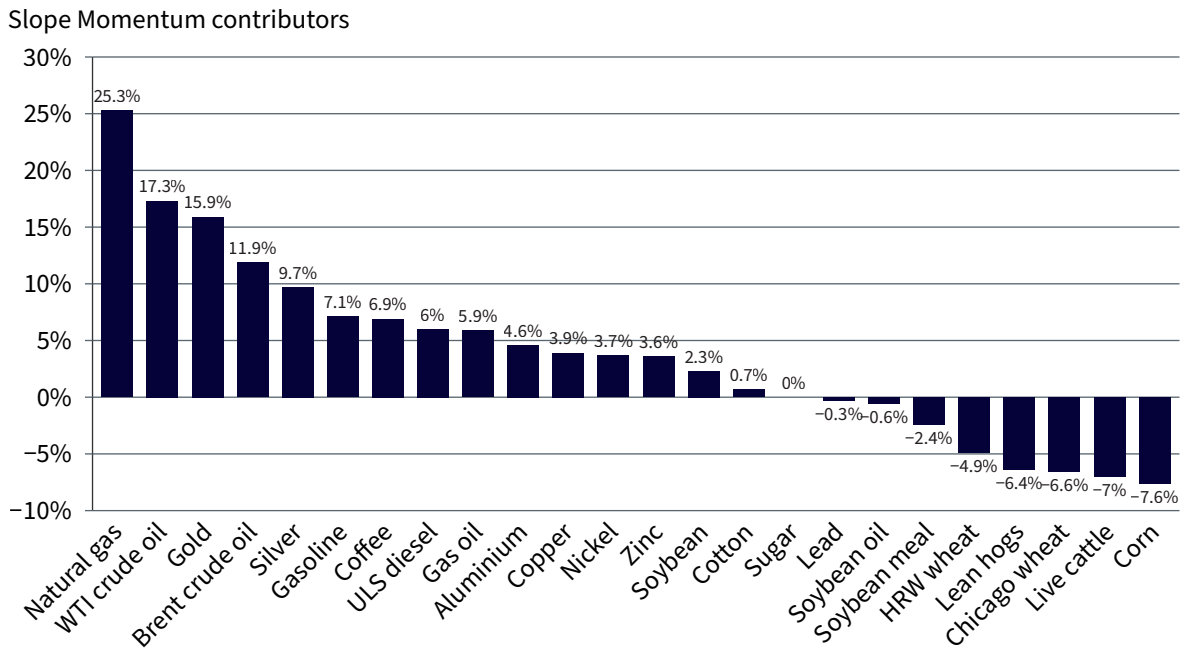


From 18/01/2001 to 21/10/2025. Source: WisdomTree, Bloomberg. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

11 This scaling guarantees that roughly half of the signal values lie between -1 and 1 while the other half are clipped.

Here again, the performance impact is not homogeneous across all commodities. Natural gas, WTI crude oil, and gold show the strongest performance impact, while corn, live cattle, and wheat did not benefit. However, once again, the overall impact on the historical performance of those overweights and underweights is very positive, and two thirds of the commodities contributed positively to that overall outperformance.

Figure 29: Contribution by commodity to outperformance



From 18/01/2001 to 30/09/2025. Source: WisdomTree, Bloomberg. The bars show the relative contribution of each commodity to the factor performance vs BCOM. **Historical performance is not an indication of future performance, and any investments may go down in value.**

c) Price Momentum

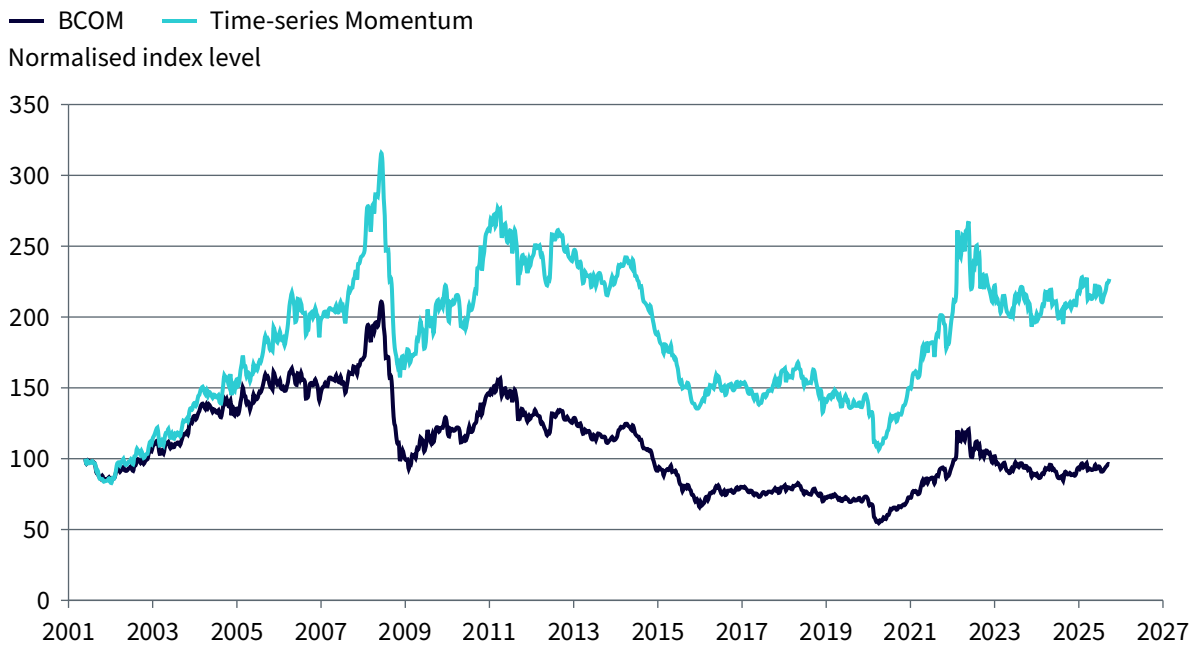
As discussed earlier, the Price Momentum factor exploits the well documented tendency of commodities with strong recent performance to continue outperforming in the short to medium term. This behavioural pattern—long recognised by commodity trading advisors (CTAs)—reflects investor underreaction and the slow adjustment of supply in commodity markets.

In practice, for each commodity, we:

+ Compute the sign of daily returns and smooth them using an exponentially weighted moving average (EWMA) with a six-month span. This process filters out short-term noise while ensuring that the signal reacts quickly to sustained price trends.
+ The smoothed series is then scaled and bounded between –1 and +1, where positive values indicate upward Momentum (overweight) and negative values indicate downward Momentum (underweight).

By capturing persistent price trends across commodities, the Price Momentum factor allows the strategy to systematically tilt towards markets that show continued strength while reducing exposure to those in prolonged declines. In Figure 30, the price Momentum factor also behaves as anticipated, delivering steady excess returns by overweighting commodities with sustained positive trend signals and underweighting those with negative trend signals.

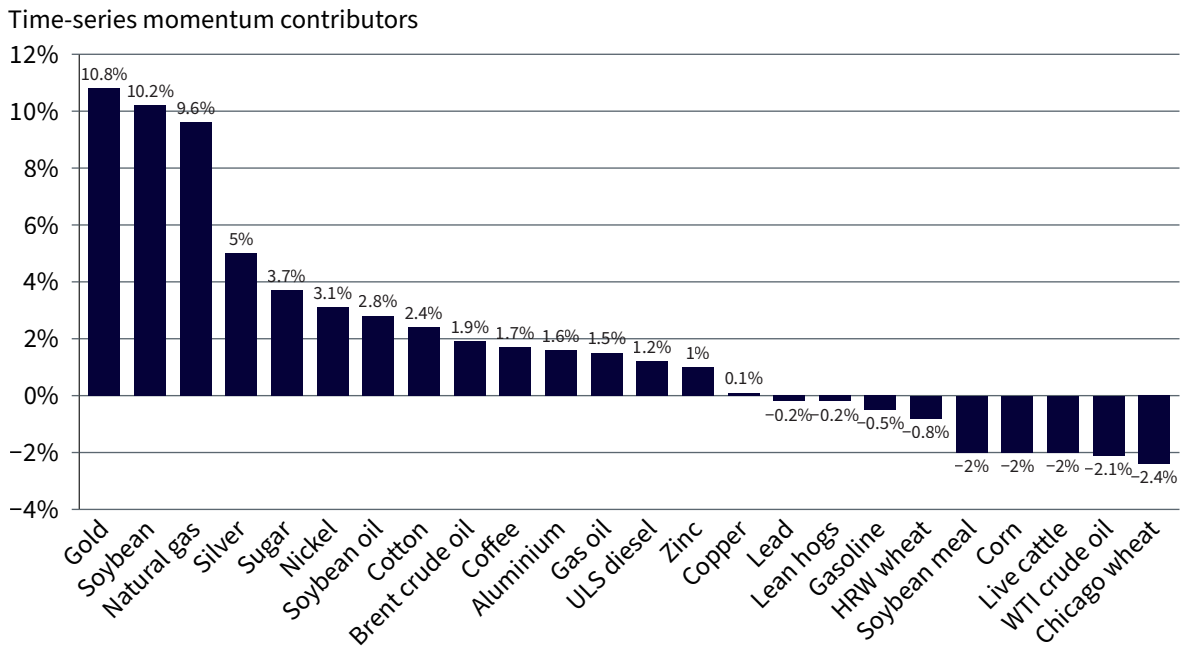
Figure 30: Historical performance of the Momentum-driven overweights and underweights applied to the BCOM



From 19/06/2001 to 20/10/2025. Source: WisdomTree, Bloomberg. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Consistent with the previous two other factors, around two thirds of commodities in the BCOM benefited from the Price Momentum signal and created a positive impact on the performance of the new broad commodity basket.

Figure 31: Contribution by commodity to outperformance



From 19/06/2001 to 20/10/2025. Source: WisdomTree, Bloomberg. The bars show the relative contribution of each commodity to the factor performance vs BCOM. **Historical performance is not an indication of future performance, and any investments may go down in value.**

d) Contract selection

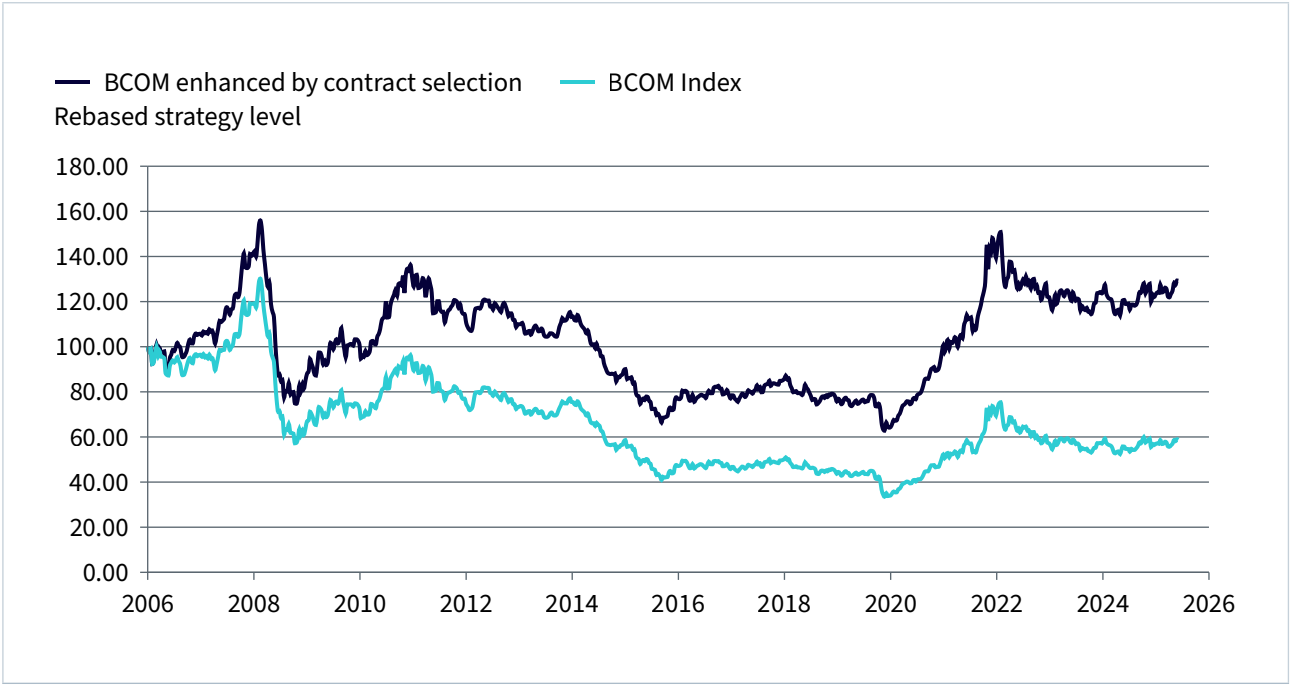
Beyond factor-based commodity weighting, the illustrative strategy also aims to enhance performance through a systematic contract selection process designed to optimise Carry and minimise roll drag. Futures curves embed valuable information about both market expectations and inventory dynamics, and the strategy uses this information differently for seasonal and non-seasonal commodities.

For non-seasonal commodities, the strategy employs Bloomberg's Roll Select methodology, which each month identifies the futures contract with the highest implied roll yield—that is, the contract expected to generate the most favourable Carry. To maintain liquidity and control transaction costs, the eligible universe is limited to contracts with maturities of up to nine months. This cap also guarantees that the portfolio's beta to commodities remains high, avoiding excessive positioning too far along the curve where price sensitivity to the underlying market declines.

For seasonal commodities, such as natural gas or agricultural products, the strategy instead targets the seasonal contract, in other words, the futures contract whose delivery month coincides with predictable supply–demand cycles. By selecting these contracts, the strategy avoids false signals of market tightness caused by recurring seasonal effects and captures the seasonal premium often linked to strong hedging pressure. Because this premium typically erodes as expiry approaches, the methodology rolls into the next seasonal contract two months before maturity, ensuring that the premium is harvested efficiently without exposure to the convergence of fundamentals.

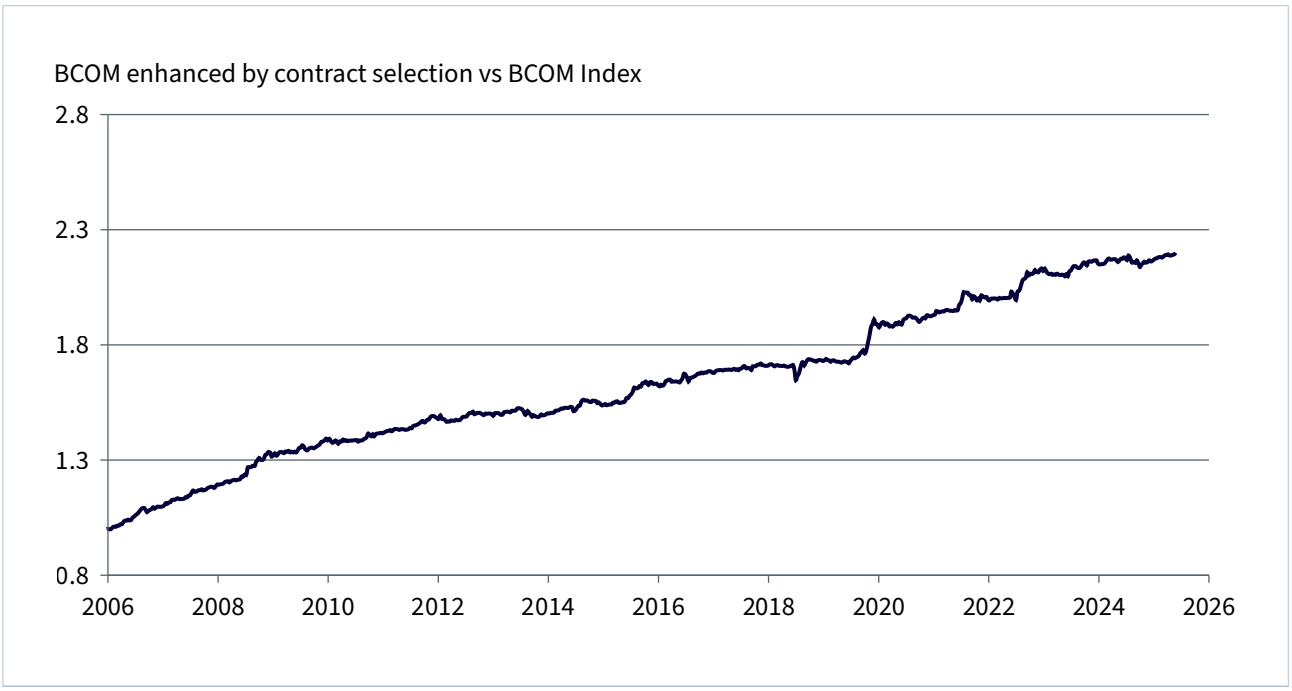
Together, these two approaches form a dual-engine roll framework. As illustrated in Figures 32 and 33 over time, the outperformance created versus a first-generation index, such as the BCOM, by avoiding systematic investment in the front-month contract is both impressive over the long term and regular. The outperformance line in Figure 33 is very steady and clearly highlights how first-generation commodity indices have been built sub-optimally.

Figure 32: Historical performance of the contract selection strategy applied to the BCOM



From 15/05/2006 to 20/10/2025. Source: WisdomTree, Bloomberg, Factset. Excess returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 33: Historical outperformance of the contract selection strategy applied to the BCOM



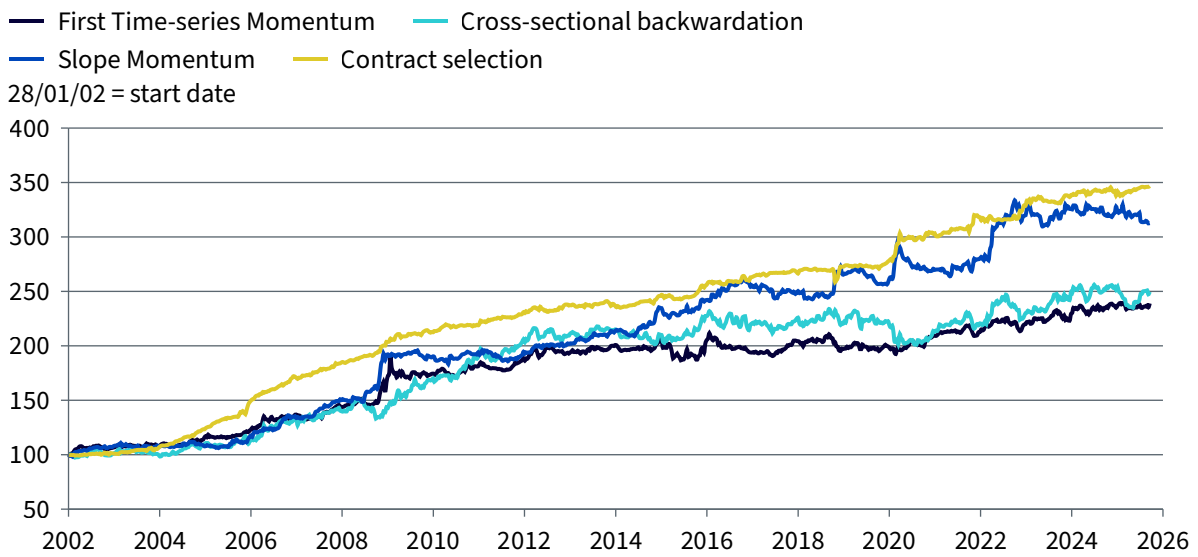
From 15/05/2006 to 20/10/2025. Source: WisdomTree, Bloomberg, Factset. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

e) Portfolio construction

The final illustrative strategy aims to combine the multiple sources of alpha into a single portfolio. Each factor—cross-sectional backwardation, Slope Momentum, and Price Momentum—is designed to capture a different dimension of return opportunity operating at distinct time horizons. As shown in Figure 34, all three signals delivered consistent long-term excess returns versus the benchmark. Cross-sectional backwardation tends to perform well in structurally tight commodity markets. Price Momentum captures medium-term price trends, while Slope Momentum reacts faster to shifts in the shape of futures curves.

By blending multiple systematic factors with optimised contract selection, the strategy improves on traditional commodity indices by combining several independent drivers of return within a single, coherent framework.

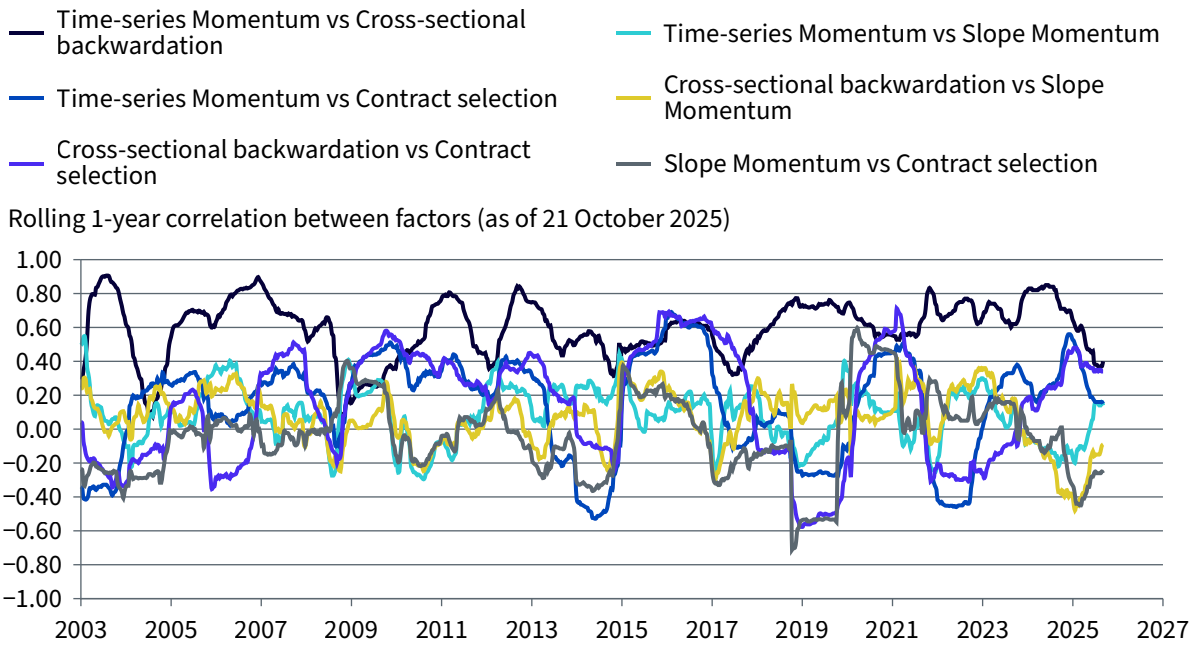
Figure 34: Four different sources of potential alpha



From 28/01/2002 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 35 clearly highlights the diversification potential of those different sources of potential alpha and shows the rolling one-year correlations between factors. Correlations have been hovering around zero in the last 25 years. By delivering four different sources of alpha that remain pretty much uncorrelated, systematic factors and contract selection alpha offer a strong potential to create outperforming third-generation broad commodities strategies.

Figure 35: Four different sources of potential alpha with low overall correlation over time



From 28/01/2002 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

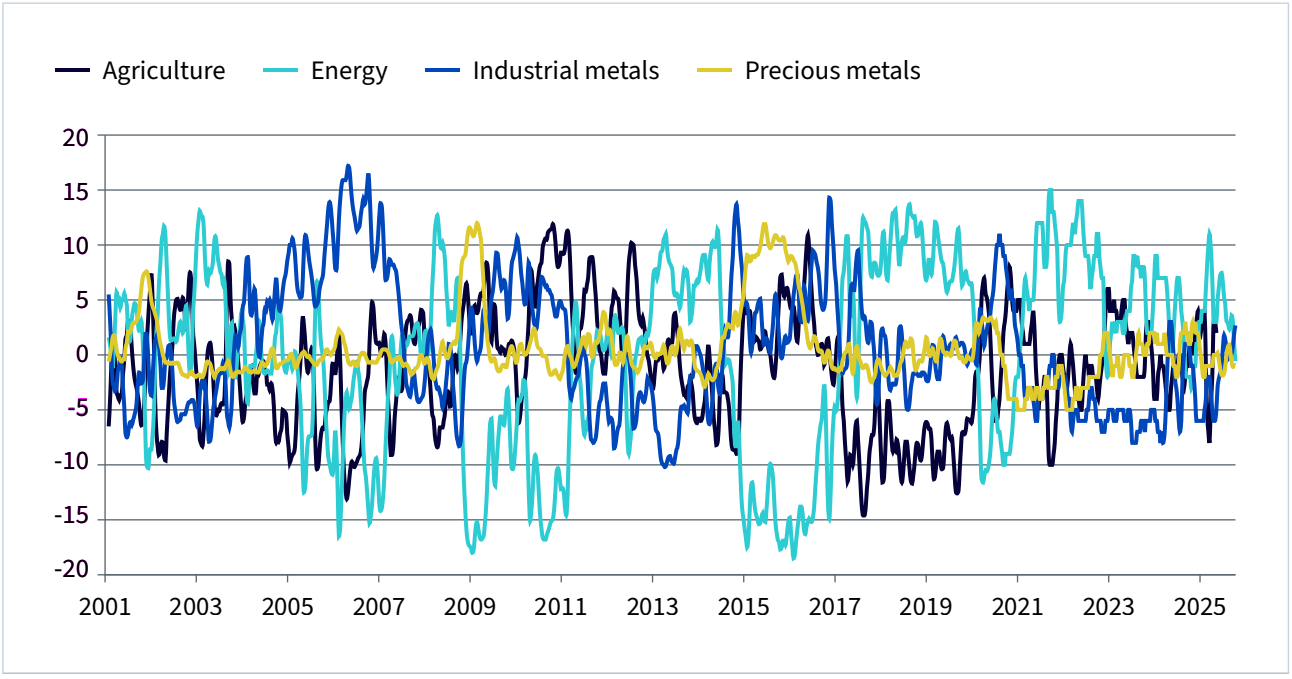
By blending multiple systematic factors with optimised contract selection, the strategy improves on traditional commodity indices by combining several independent drivers of return within a single, coherent framework.

The portfolio is constructed by averaging the three factor signals, assigning equal importance to each. This avoids over-optimisation and ensures that no single signal dominates the allocation. The resulting composite signal determines the relative weights applied to each commodity. Importantly, no factor signals are applied to Gold and Silver, which are maintained at their benchmark BCOM weights. These metals behave differently from cyclical commodities; their futures curves are generally very efficient, offering little value from curve-based factors. As such, they act as implicit risk-off hedges, naturally increasing in relative weight when other commodities have negative signals on average (and decreasing in relative weight when commodities have positive signals on average).

Risk control is achieved through caps and floors relative to the Bloomberg Commodity Index. Each commodity's weight can deviate by a maximum of ±7.5% in absolute terms and by up to three times, or one third of its benchmark weight, in relative terms. These constraints prevent concentration, maintain diversification, and ensure that every commodity remains represented in the index, even when factor signals are weak or negative. This disciplined structure preserves the beta characteristics of a broad commodity index while allowing systematic factor tilts to drive alpha.

Together, this construction method produces a balanced, diversified, and resilient portfolio that captures structural, cyclical, and tactical sources of return across the commodity spectrum without compromising stability or liquidity.

Figure 36: Historical overweights and underweights by commodity sectors as driven by the three factors

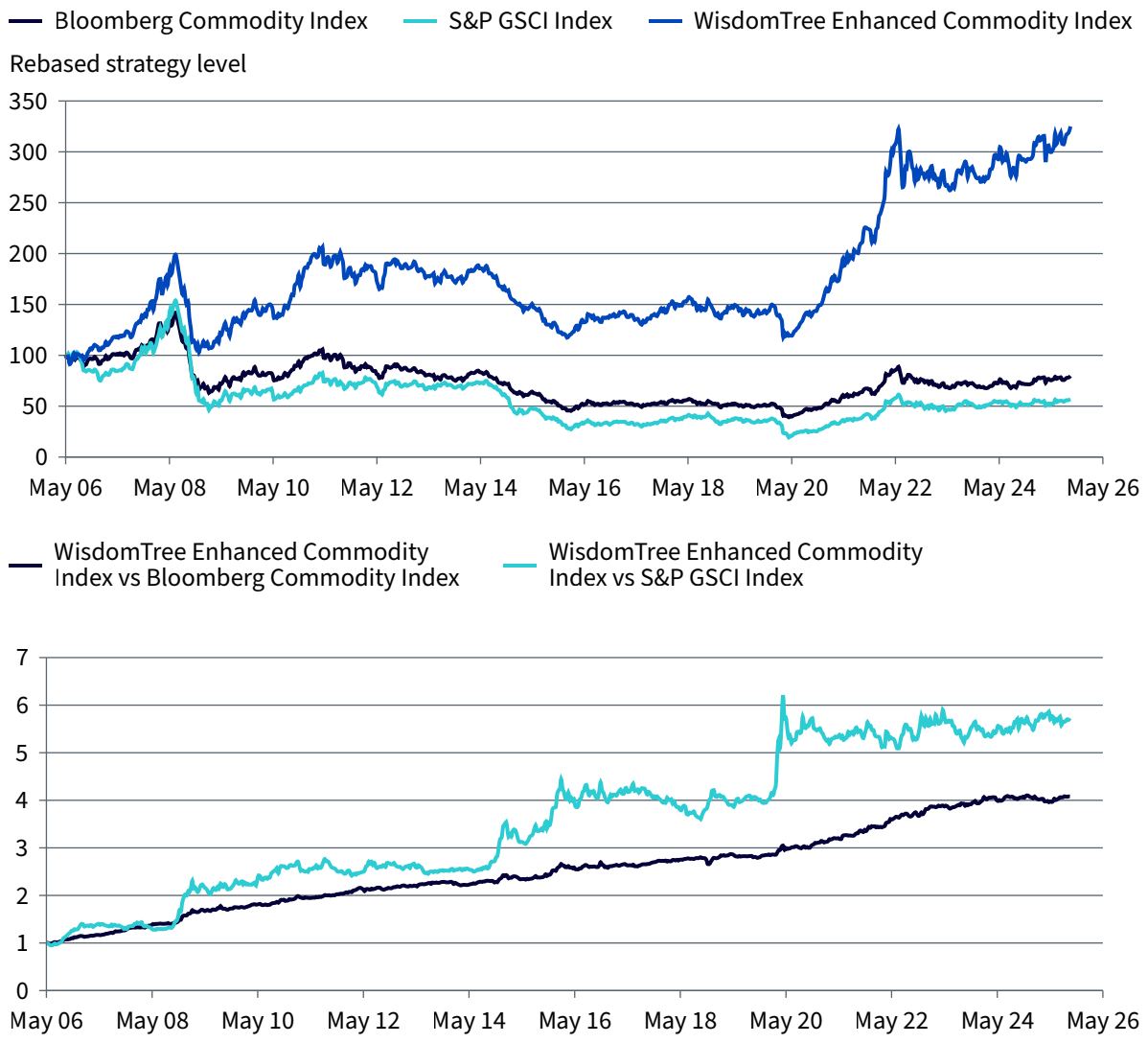


From 15/05/2006 to 21/10/2025. Source: WisdomTree, Bloomberg, Factset. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

B. Performance overview

Figure 37 compares the total return performance of the strategy (The WisdomTree Enhanced Commodity Total Return Index) described above with that of the Bloomberg Commodity Index (BCOM), its natural benchmark and starting point, and the S&P GSCI, a broader production-weighted commodity index. The enhanced strategy clearly outperformed both benchmarks over the full period. The WisdomTree Enhanced Commodity Index has delivered a 223.5% cumulative return (6.2% annualised), compared to –20.6% for BCOM and –43.7% for the S&P GSCI.

Figure 37: Historical performance of the strategy



From 15/05/2006 to 30/09/2025. Source: WisdomTree, Bloomberg, Factset. Total returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value. WT Index went live on 15/08/2025.**

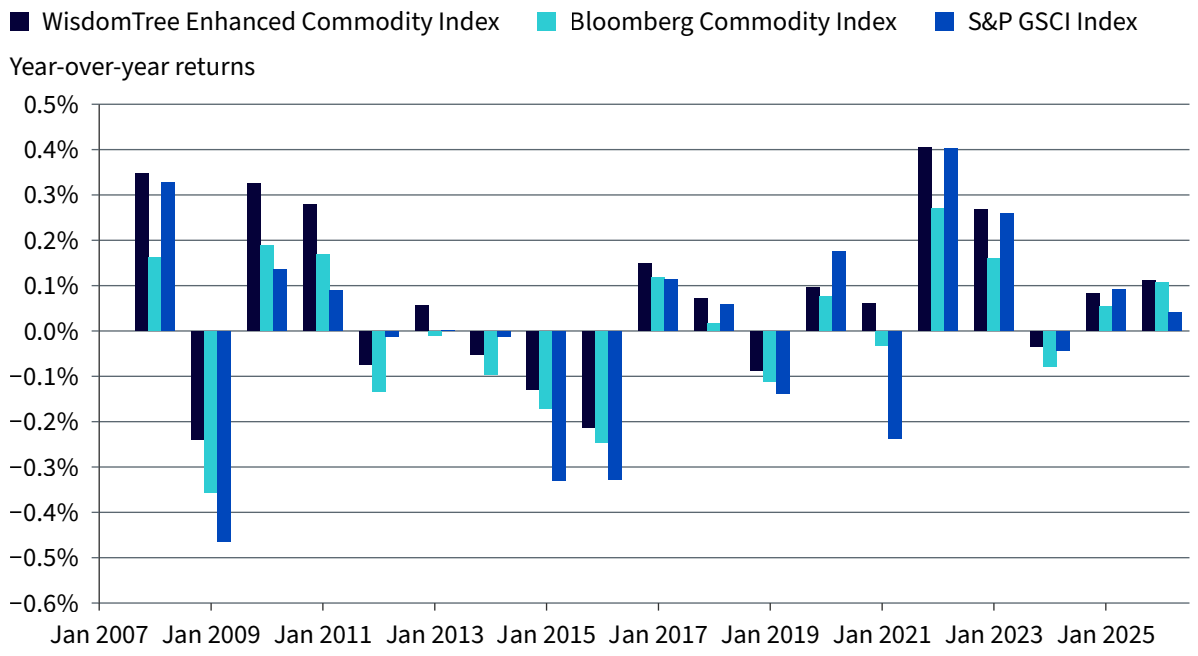
Figure 37: Historical performance of the strategy

15/05/2006 - 30/09/2025	WisdomTree Enhanced Commodity Total Return Index	BCOM Total Return Index	S&P GSCI Total Return Index
Cumulative return	223.5%	-20.6%	-43.7%
Annualised return	6.2%	-1.2%	-2.9%
Volatility	15.3%	16.0%	22.6%
Sharpe	0.30	negative	negative
Max drawdown	-50.9%	-73.2%	-88.5%
Correlation	94.7%	100.0%	89.1%
Information ratio	1.45	0.00	negative

From 15/05/2006 to 30/09/2025. Source: WisdomTree, Bloomberg, Factset. Total returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value. WT Index went live on 15/08/2025.**

This strong relative performance is accompanied by lower volatility (15.3% vs 16.0% for BCOM and 22.6% for GSCI) and a smaller maximum drawdown (–50.9% vs –73.2% and –88.5%), highlighting the strategy's improved risk–return efficiency. The enhanced approach not only captures the structural commodity beta embedded in BCOM but also benefits from factor-based tilts and optimised contract selection, which together enhance Carry and trend exposure while mitigating downside risk. The result is a more consistent return profile, with an information ratio of 1.45.

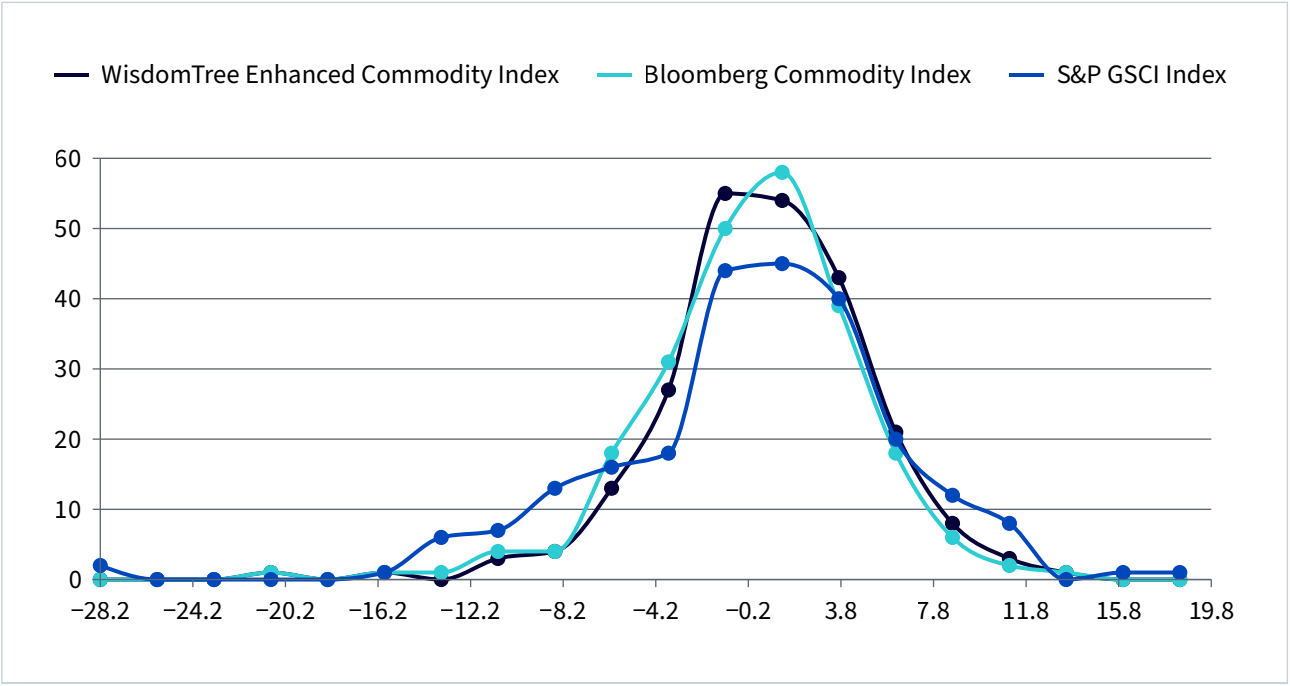
Figure 38: Year-on-year historical performance of the strategy



From 15/05/2006 to 30/09/2025. Source: WisdomTree, Bloomberg, Factset. Total returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

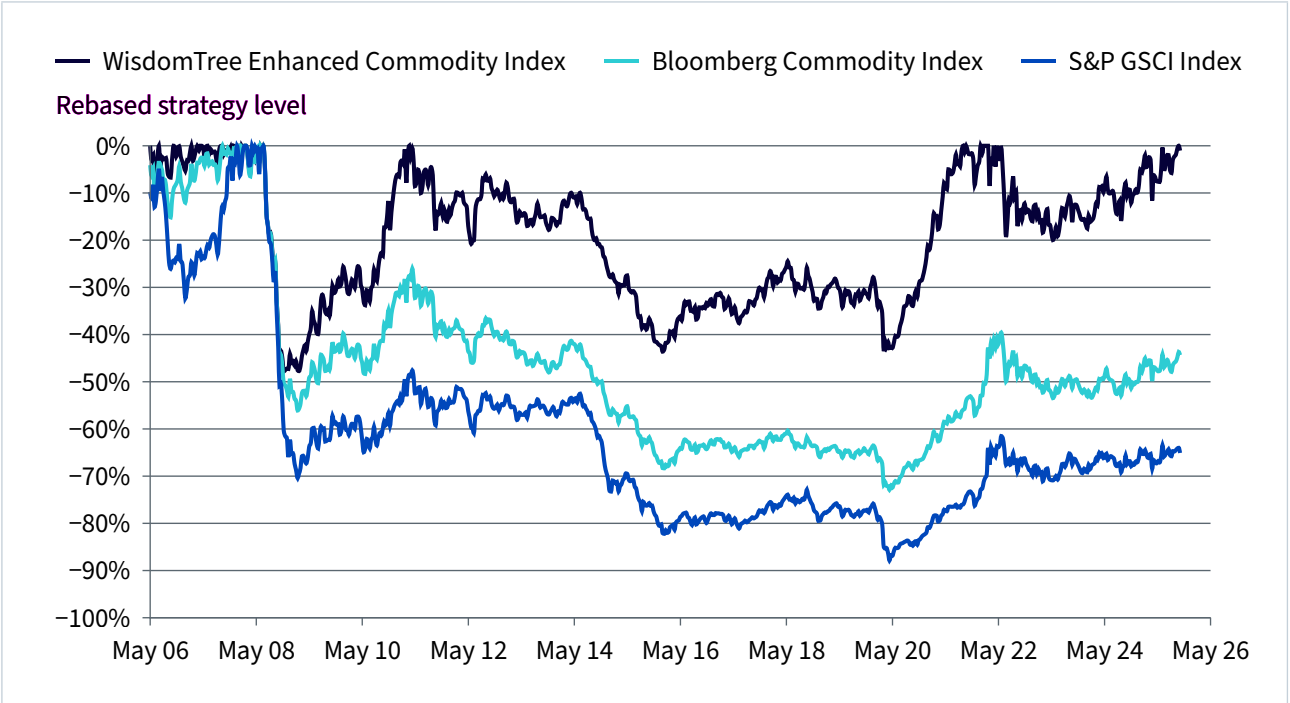
The monthly return distribution and drawdown analyses (Figures 39 and 40) further confirm the improved risk-adjusted profile of the enhanced commodity strategy. The distribution of monthly returns shows a thinner negative 'tail' compared to both BCOM and GSCI. This illustrates a smoother performance, with fewer extreme losses. The underwater plot reinforces this observation, revealing that drawdowns for the enhanced strategy were consistently shallower and recovered faster than those of the traditional indices.

Figure 39: Distribution of historical monthly returns of the strategy



From 15/05/2006 to 30/09/2025. Source: WisdomTree, Bloomberg, Factset. The chart shows the frequency of the monthly total returns in USD for each strategy. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

Figure 40: Historical underwater plot of the strategy



From 15/05/2006 to 30/09/2025. Source: WisdomTree, Bloomberg, Factset. Based on total returns in USD. **Includes backtested data for illustration purposes. Historical performance is not an indication of future performance, and any investments may go down in value.**

C. Characteristics that remain part of a long commodity strategy

When investors allocate to commodities, their objective is not limited to absolute or relative performance. Commodities also provide a set of unique structural characteristics that distinguish them from equities, bonds, or other asset classes. Chief among these are:

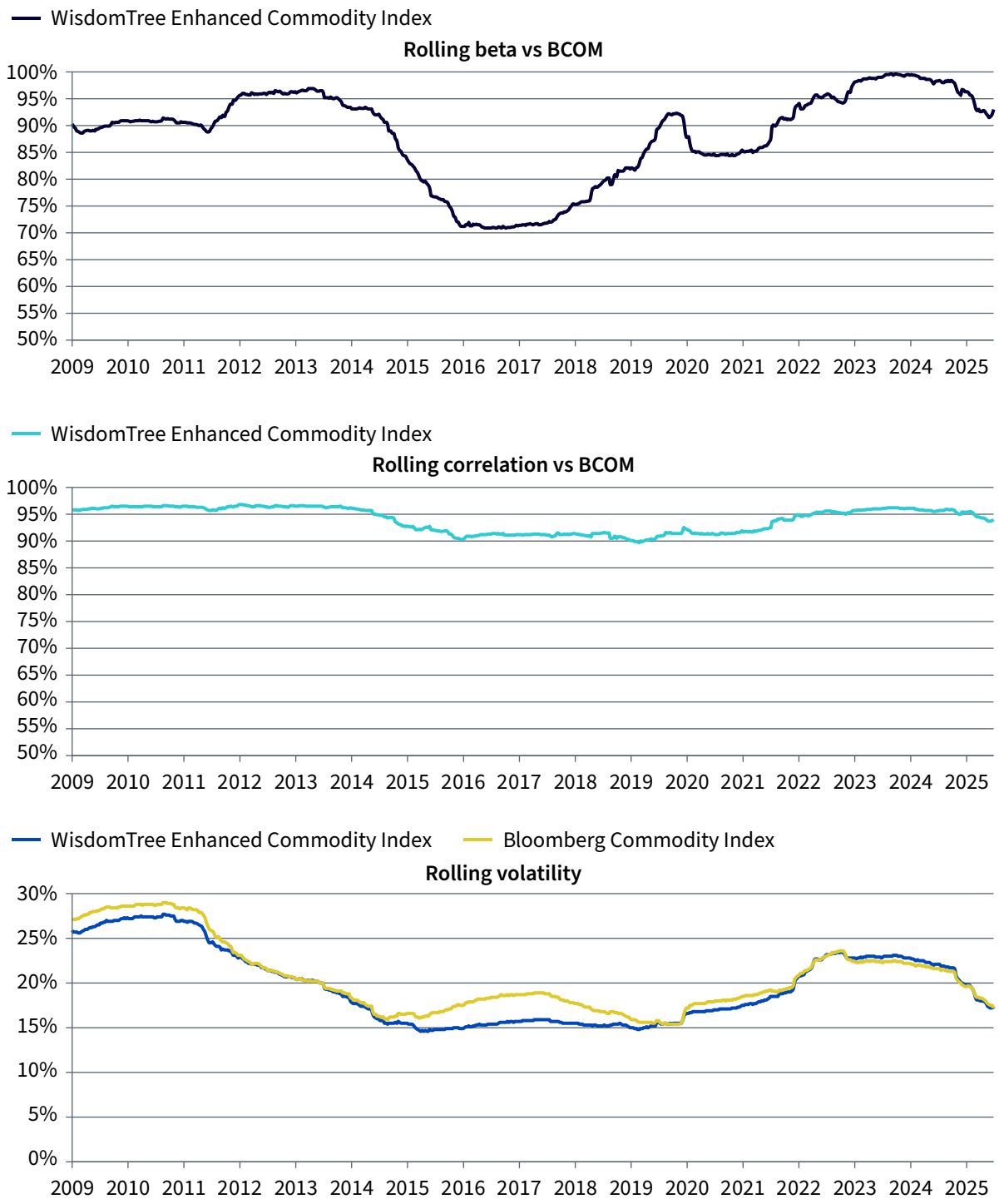
+ Their positive beta to unexpected inflation
+ Their ability to perform in periods of persistently high inflation
+ Their low correlation with traditional assets.

In this section, we aim to show that second- and third-generation broad commodity indices, and in particular our illustrative, enhanced, factor-based strategy, retain these essential features while improving the overall efficiency of exposure.

Figure 41 clearly illustrates that the correlation of enhanced commodity strategies remains very high versus traditional broad commodity indices, such as the BCOM (above 90%). The beta also remains very elevated, above 90%, most of the time.

Factor-driven weighting refines traditional benchmarks, enhancing returns while preserving commodities' essential inflation-hedging and diversification traits.

Figure 41: Enhanced commodity strategies exhibit high beta and correlation to traditional broad commodity indices



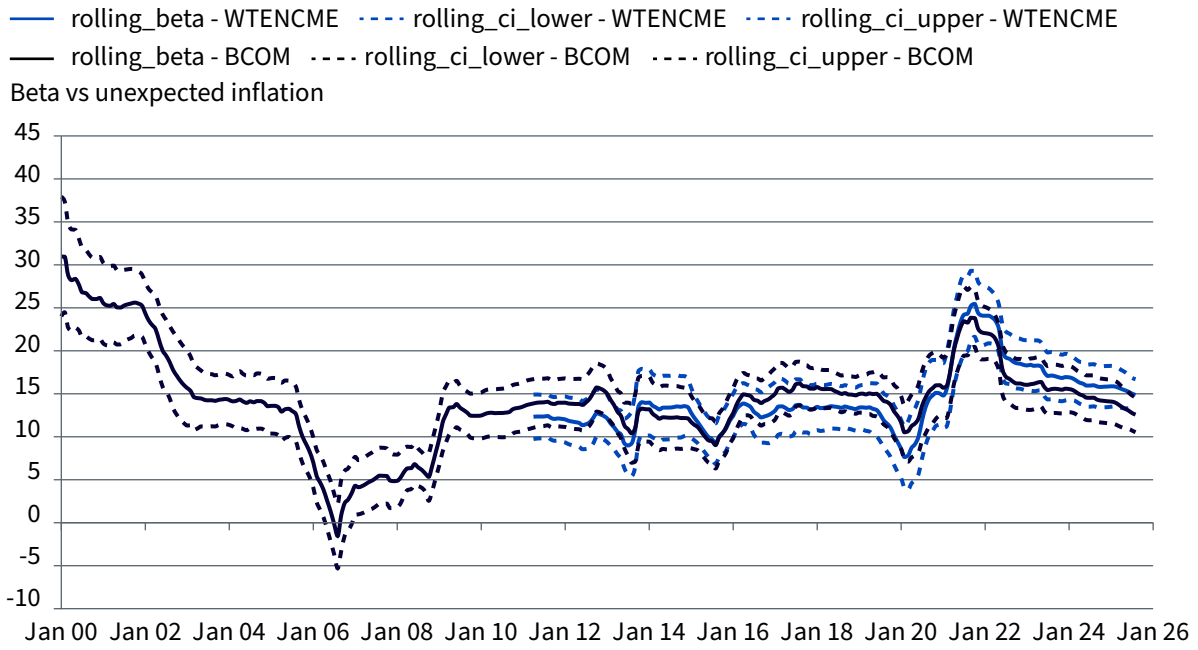
From 15/05/2006 to 30/09/2025. Source: WisdomTree, Bloomberg, Factset. Based on excess returns in USD. The rolling window is of three years in all three sub-charts. **Historical performance is not an indication of future performance, and any investments may go down in value.**

One of the defining characteristics of commodities as an asset class is their strong beta to unexpected inflation—that is, their tendency to perform well when inflation surprises to the upside. This property makes them crucial hedges within diversified portfolios, especially when other asset classes, such as equities or bonds, typically suffer from rising price pressures.

Figure 42 shows the rolling beta to unexpected inflation[12] for both the enhanced commodity strategy (blue line) and the Bloomberg Commodity Index (BCOM) (black line). The two series are virtually indistinguishable over time, demonstrating that the enhanced factor-based approach preserves one of the most valuable structural features of commodities: their ability to protect against unexpected inflation shocks.

In other words, while enhanced commodity strategies introduce systematic factor tilts and contract optimisation to improve efficiency and risk-adjusted returns, they do so without compromising the inflation-hedging role that is at the core of commodity investing.

Figure 42: Rolling beta versus unexpected inflation



From 01/01/2000 to 30/09/2025. Source: WisdomTree, Bloomberg. Based on excess returns in USD. The beta is rolling over a 4-year window. **Historical performance is not an indication of future performance, and any investments may go down in value.**

12 We define the unexpected inflation as the difference between the Consumer Price Index (CPI) and the core CPI, that is, a measure of inflation that excludes the more volatile prices of food and energy.

Extending the analysis beyond inflation surprises, we test performance across regimes of realised inflation in Figure 43. The enhanced commodity strategy shows positive and consistent returns across all inflation environments, maintaining the hallmark feature of long-only commodities. During periods of high or rising inflation (for example, year-on-year CPI above 3%), returns are comparable to or slightly higher than those of traditional indices, while drawdowns remain smaller. Importantly, even in moderate or low-inflation periods, when traditional commodity benchmarks often post negative returns, the enhanced approach remains resilient. This reflects the combined influence of contract selection, which limits roll drag in contango, and factor weighting, which allows the portfolio to remain exposed to commodities with favourable Carry or trend characteristics rather than to all commodities indiscriminately.

Figure 43: Historical performance in different inflation scenarios

	YoY Inflation > 2.0	YoY Inflation > 3.0	YoY Inflation <= 2.0
WisdomTree Enhanced Commodity Strategy	19.10%	28.40%	-3.60%
BCOM Index	10.40%	16.00%	-10.20%
S&P GSCI TR Index	17.60%	27.60%	-16.70%
Rogers Int. Comm. Index	16.40%	24.90%	-10.50%

From 01/06/2006 to 30/08/2025. Source: WisdomTree, Bloomberg. Gross total returns in USD. Mean 252 day returns leading to inflation release date. You cannot invest in an index. **Historical performance is not an indication of future performance, and any investment may go down in value.**

Factor-driven weighting refines traditional benchmarks, enhancing returns while preserving commodities' essential inflation-hedging and diversification traits.

Another key attribute of commodities is their low correlation with other major asset classes. Over the full sample, the WisdomTree Enhanced Commodity Index exhibits correlations between 0.3 and 0.4 with equities, and close to 0 with global bonds, consistent with the historical diversification benefits of broad commodities. These levels are similar to those observed for BCOM, confirming that the introduction of active signals does not make the exposure more equity- or bond-sensitive.

Figure 44: Historical correlation matrix

Ticker	WisdomTree Enhanced Commodity Index	Bloomberg Commodity Index	S&P 500 Index	MSCI ACWI	Bloomberg Global Aggregate Index
WisdomTree Enhanced Commodity Index	1.00				
Bloomberg Commodity Index	0.95	1.00			
S&P 500 Index	0.30	0.26	1.00		
MSCI All Country World Index	0.44	0.38	0.89	1.00	
Bloomberg Global Aggregate Index	0.16	0.13	-0.07	0.08	1.00

From 31/12/2006 to 30/09/2025. Source: WisdomTree, Bloomberg, Factset. Based on excess returns in USD. **Historical performance is not an indication of future performance, and any investments may go down in value.**

Finally, the scenario analyses in Figure 45 reinforce these findings. Across major market dislocations—such as the subprime crisis, the 2008 banking collapse, and the COVID-19 shock—the strategy moved in tandem with broad commodities but consistently outperformed the Bloomberg Commodity Index. Notably, it also outperformed the BCOM during positive commodity shocks, such as the onset of the Ukraine war. This resilience confirms that third-generation commodities strategies with factor integration do not compromise their pro-cyclical nature but instead enhance their adaptability to shifting macroeconomic regimes.

Figure 45: Scenario analyses

Event	Start date	End date	WisdomTree Enhanced Commodity Strategy	Bloomberg Commodity Index	S&P 500 Index	MSCI ACWI
Subprime debacle 2007	01/12/2007	30/06/2009	-9.21%	-29.29%	-35.08%	-37.36%
Bank meltdown 2008	12/09/2008	15/10/2008	-19.79%	-21.05%	-27.34%	-25.91%
Divergence of monetary policy	01/05/2013	11/03/2015	-18.55%	-24.27%	34.10%	17.72%
Spring interest rates jump	07/05/2013	24/05/2013	-0.26%	-0.04%	1.65%	-0.03%
Vixmageddon	26/01/2018	08/02/2018	-4.05%	-4.13%	-10.10%	-8.98%
Natural gas volatility	31/10/2018	31/12/2018	-7.29%	-7.41%	-7.18%	-5.68%
COVID-19 crash	19/02/2020	23/03/2020	-15.96%	-18.95%	-33.79%	-33.64%
COVID-19 (V market)	19/02/2020	18/08/2020	-0.29%	-5.21%	1.07%	-0.11%
Start of the Ukraine War	24/02/2022	31/03/2022	8.82%	7.98%	5.80%	4.59%

From 31/12/2006 to 30/09/2025. Source: WisdomTree, Bloomberg, Factset. Based on excess returns in USD.
Historical performance is not an indication of future performance, and any investments may go down in value.

Overall, these analyses show that through the use of systematic factor signals and improved contract selection, it is possible to create a long-only commodity strategy that delivers both improved long-term returns while maintaining the key characteristics of a broad commodity strategy.

4.

All Weather strategy

In this section

As commodities are directly tied to inflation, they tend to mean-revert to long-term returns after shorter periods of exceptional returns. A long–short strategy designed to use these cycles of positive and negative performance could yield a returns profile that is much more consistent than long-only exposures.

Well designed, such a strategy could also offer a high degree of upside capture while converting downside into further upside, thereby leading to an all-weather returns profile. Such a strategy could therefore retain the inflation-hedging and diversification benefits of commodities while mitigating the lower average returns over a very long period.

One can also think of long–short strategies as a further evolution in commodities investing that goes one step further than even enhanced commodity strategies by allowing positions to go short.

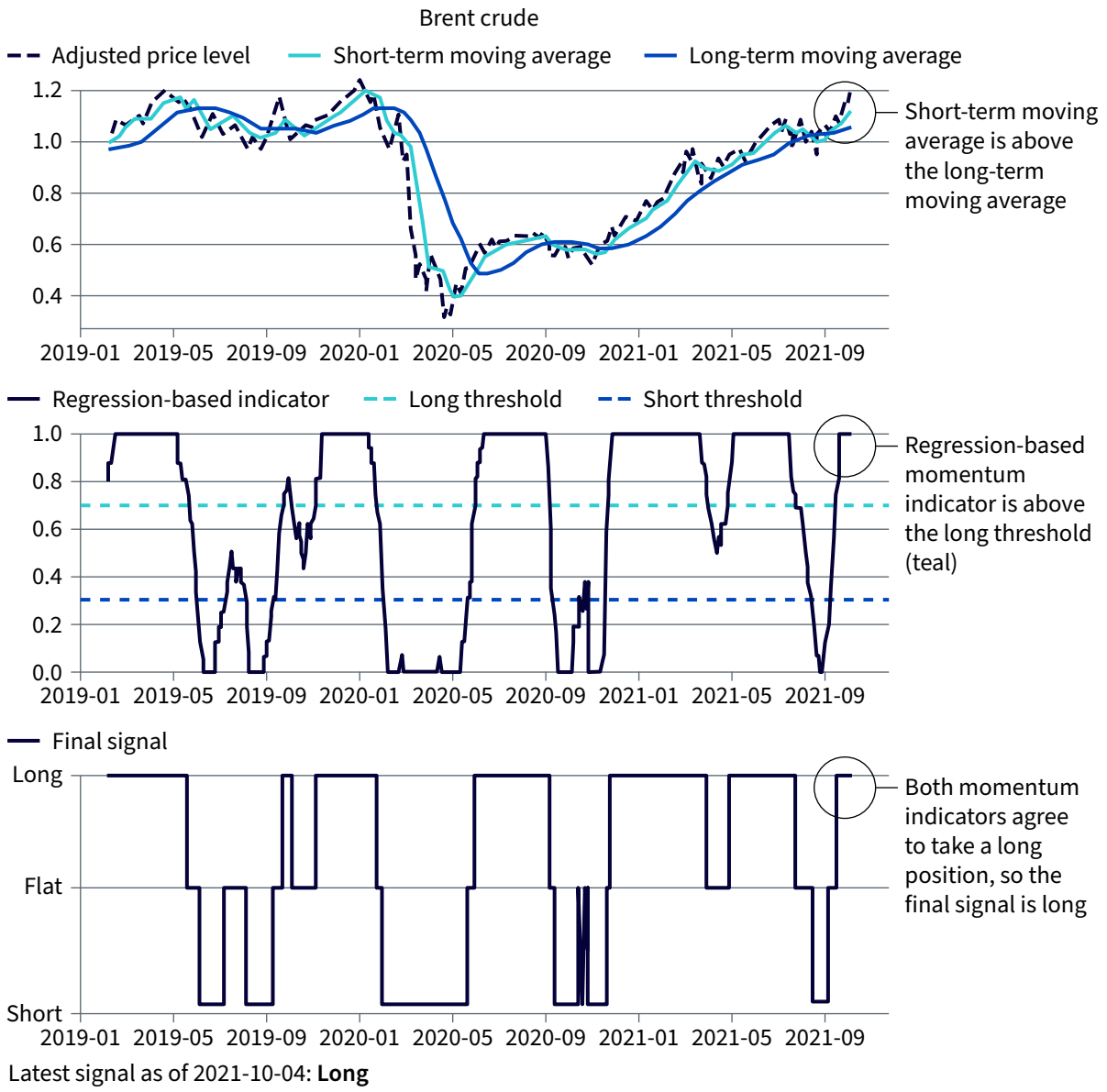
A. Strategy description

Based on the promising results shown in the previous chapter, it is possible to develop a strategy that utilises Momentum signals and better contract selection as a starting point for an all-weather, long–short commodity strategy.

In such a strategy, Momentum signals can be applied independently to each commodity with lookback parameters that work best for the sector. The moving average crossover and the Trend Breadth signals, as defined above in Chapter 2, are combined using a confirmation approach (only taking a position when both signals indicate the same direction) to create a robust and stable signal. To ensure capital efficiency, we select a subset of commodities that have been shown to have strong and consistent trends maximising the impact of Momentum signals to generate portfolio returns (see Figure 47 for a list of eligible commodities in the strategy).

To better understand how positions are formed, Figure 46 shows the calculation over a period of time for Brent crude. The final signal assumes three values: long, flat, or short. The long and short positions are taken when both the moving average crossover and the regression-based Trend Breadth signal point are in the same direction. When the two signals have opposite values, a flat position (no position) is assumed.

Figure 46: Applying two different Momentum signals to create a long or short position in Brent crude oil



Source: WisdomTree. For illustration purposes only.

The strategy is rebalanced every month at the close of the first business day using signals calculated at the close of the previous month's end. The weights are distributed among commodities that have either a long or a short signal, such that the notional weight adds up to a total of 85%.

Precious metals (such as gold and silver) which are regarded as a store of value, are held in a fixed proportion with long positions only; as such, gold and silver are allocated a fixed weight of 7.5% each. In order to comply with UCITS rules, the total notional weight of energy ex natural gas is capped at 25%, and individual commodities are capped at 10%. An illustrative sample portfolio with corresponding positions is shown in Figure 47.

Figure 47: Sample portfolio

Commodity	Momentum signal	Weight
Gold	-	7.50%
Silver	-	7.50%
Brent crude oil	1	7.73%
West Texas Intermediate (WTI) crude oil	0	0.00%
Heating oil /ULS diesel	-1	-7.73%
RBOB gasoline	1	7.73%
(Low Sulphur) gas oil	0	0.00%
Natural gas	0	0.00%
Copper (COMEX)	-1	-7.73%
Aluminium	1	7.73%
Lead	1	7.73%
Nickel	1	7.73%
Tin	1	7.73%
Zinc	0	0.00%
SRW wheat	-1	-7.73%
HRW wheat	1	7.73%
Corn	0	0.00%
Sugar	1	7.73%

Source: WisdomTree. For illustration purposes only.

While the notional exposure of the commodities always sums up to 100% in the portfolio (subject to individual and sector caps), the net exposure could be net long or net short. In the above example, the portfolio is 53.6% long.

Once the commodity weights have been determined, it is also possible to apply optimised contract selection. The strategy uses a similar logic as the long-only strategy defined above. Non-seasonal long contracts are selected based on implied Carry, while seasonal long contracts are pre-determined based on the specific cyclicality of the commodity. Short exposures are implemented through the respective BCOM contracts.

Removing the long-only constraint marks the next evolution in commodity investing: unlocking balanced, long–short exposures that perform across regimes.

Removing the long-only constraint marks the next evolution in commodity investing: unlocking balanced, long–short exposures that perform across regimes.

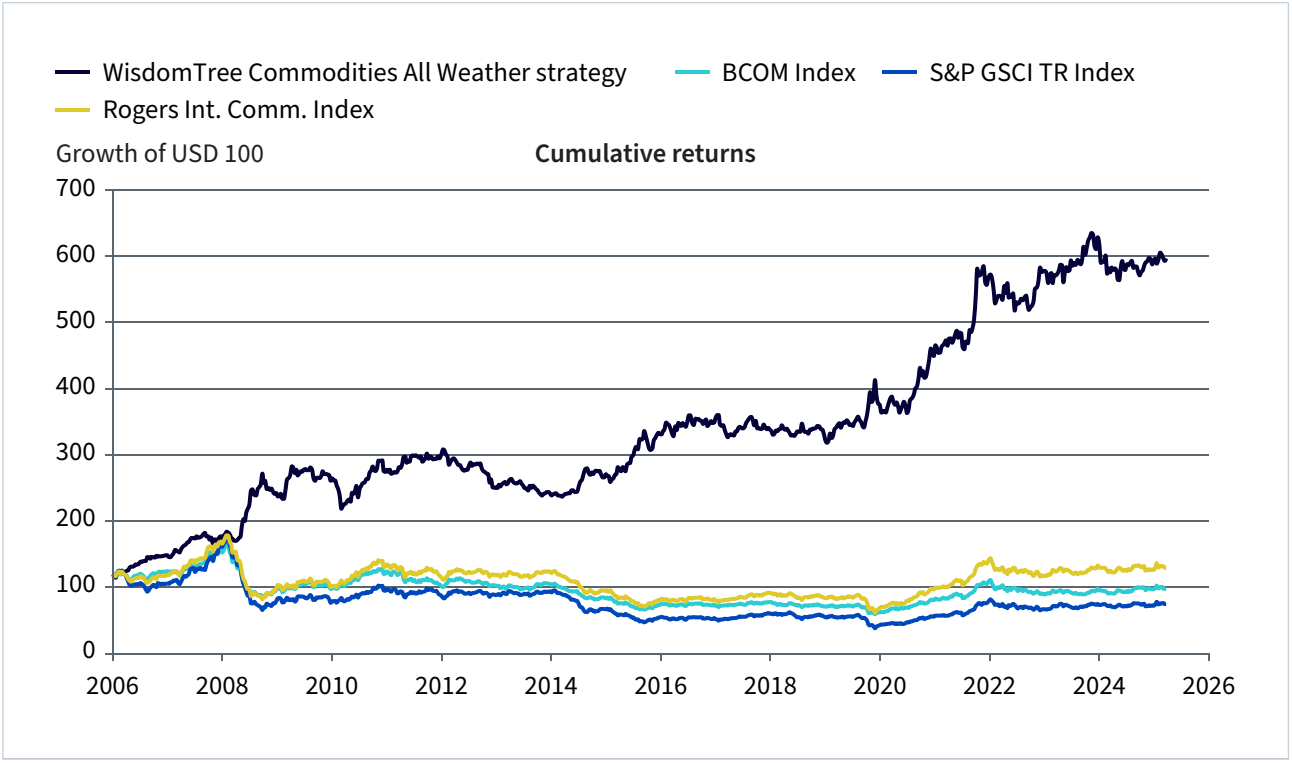
B. Performance overview

The backtested results of the all-weather commodity strategy show steady outperformance versus long-only benchmarks. Returns are less volatile, and drawdowns are much more controlled, reflecting the combined effect of two well-diversified factors: Momentum-based signals and enhanced roll selection (as defined above). The confirmation approach, which combines Trend Breadth and moving average signals to form the final positions, reduces whipsaws that often plague pure Momentum strategies.

The allocation to precious metals (fixed 15% split between gold and silver) further enhances portfolio stability, ensuring a core defensive allocation regardless of signal noise from other commodities. This long-only tilt in gold and silver has been accretive throughout the backtest period, providing a diversifying source of returns while strengthening the strategy's ability to protect against downturns and inflation.

The strategy also exhibited significantly reduced volatility compared to the benchmark indices, a characteristic unusual for Momentum strategies. The defensive characteristics extend further, as the maximum drawdown was also considerably lower at -26% compared to below -70% for the benchmark indexes.

Figure 48: Historical performance of the strategy



From 01/06/2006 to 30/08/2025. Source: WisdomTree, Bloomberg. Gross total returns in USD. **Includes backtested data for illustration purposes.** You cannot invest in an index. **Historical performance is not an indication of future performance, and any investment may go down in value.**

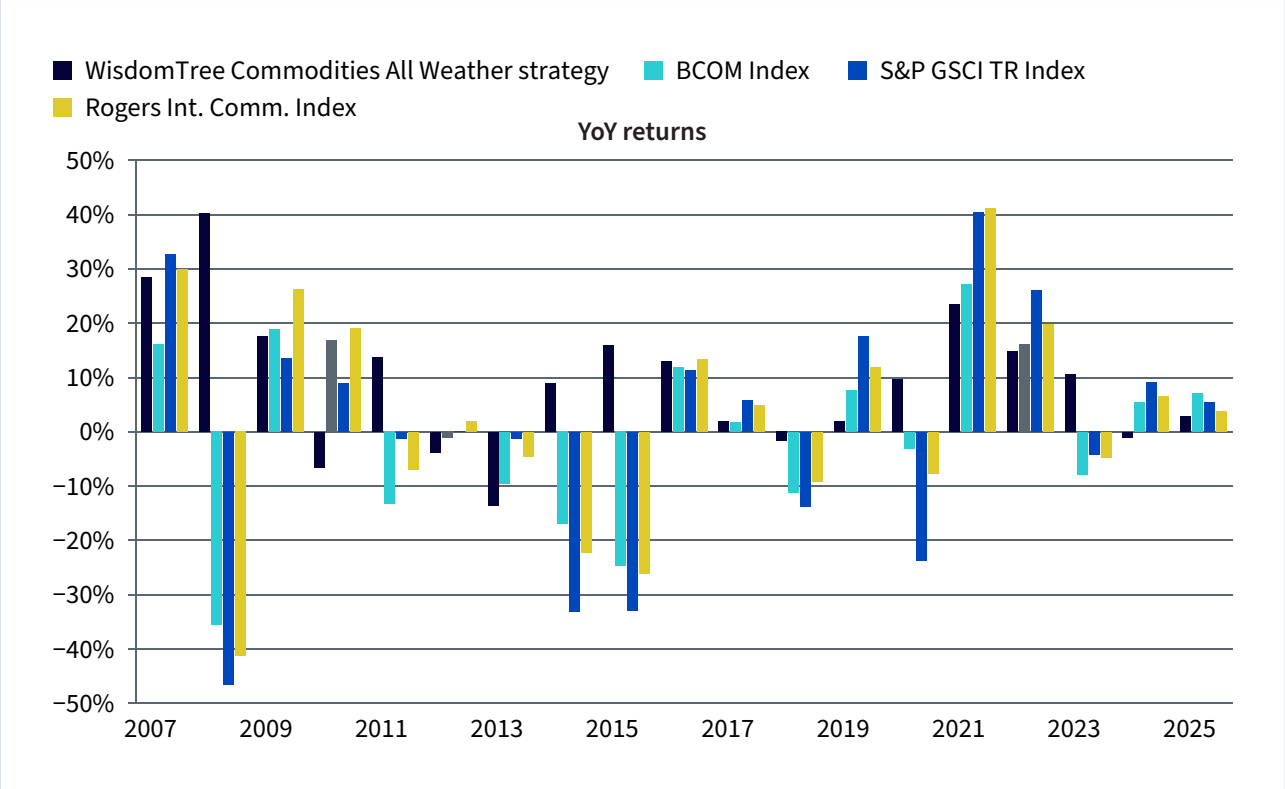
Figure 48: Historical performance of the strategy

	WisdomTree Commodities All Weather strategy	BCOM Index	S&P GSCI TR Index	Rogers Int. Comm. Index
Annualised return	9.6%	-1.2%	-2.9%	0.6%
Volatility	12.8%	16.4%	23.3%	18.8%
Sharpe	0.75	-0.07	-0.13	0.03
Max drawdown	-25.7%	-73.2%	-88.5%	-74.8%

From 01/06/2006 to 30/08/2025. Source: WisdomTree, Bloomberg. Gross total returns in USD. **Includes backtested data for illustration purposes.** You cannot invest in an index. **Historical performance is not an indication of future performance, and any investment may go down in value.**

The year-on-year performance demonstrated consistency across different commodity cycles. This illustrative long–short commodities all-weather strategy effectively captured a substantial portion of the upside during years of strong commodity gains while successfully mitigating losses during years of significant declines.

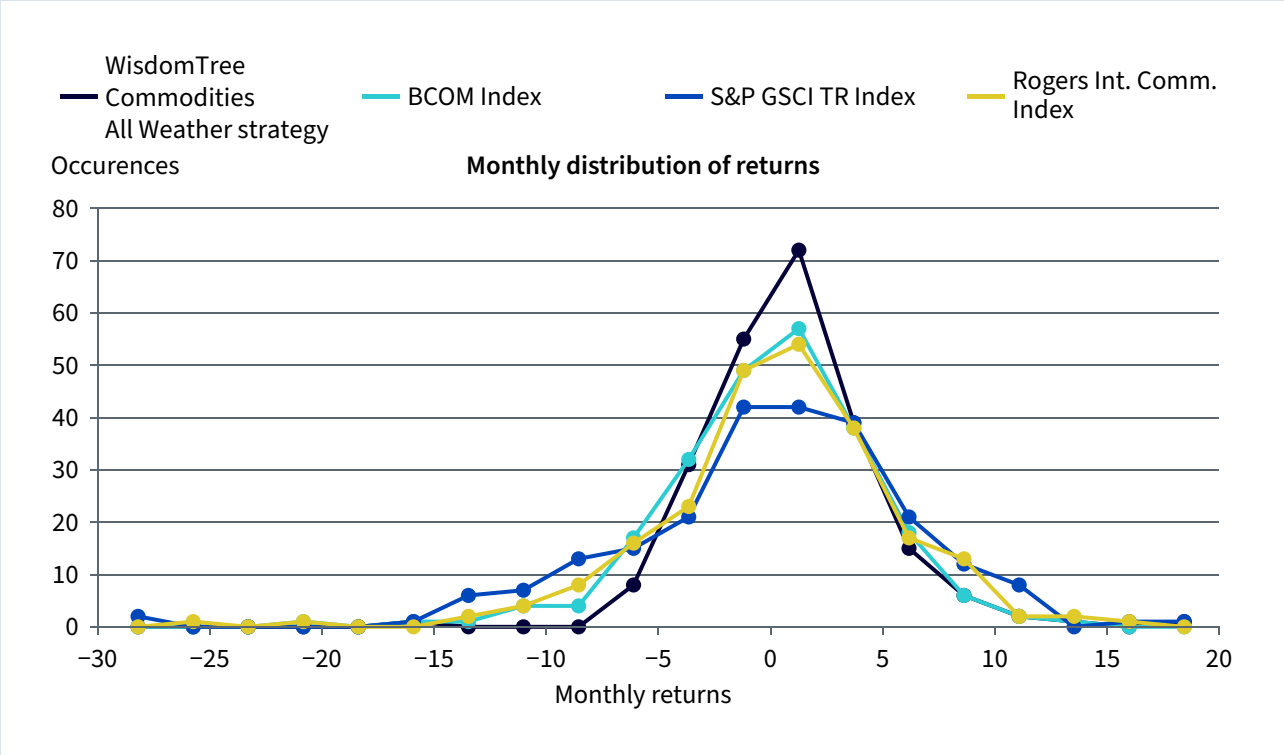
Figure 49: Year-on-year historical performance of the strategy



From 01/01/2007 to 30/08/2025. Source: WisdomTree, Bloomberg. Gross total returns in USD. **Includes backtested data for illustration purposes.** You cannot invest in an index. **Historical performance is not an indication of future performance, and any investment may go down in value.**

A deeper look at the monthly return distribution highlights the stability of returns. The strategy experienced far fewer instances of large negative monthly returns, reflecting its effectiveness in mitigating tail risk and protecting capital during market stress. Simultaneously, it exhibited a higher frequency of modest, steady gains, creating a more balanced performance profile that supports steady compounding over time. This combination demonstrates the strategy's strength in limiting downside risks while participating meaningfully in positive commodity environments.

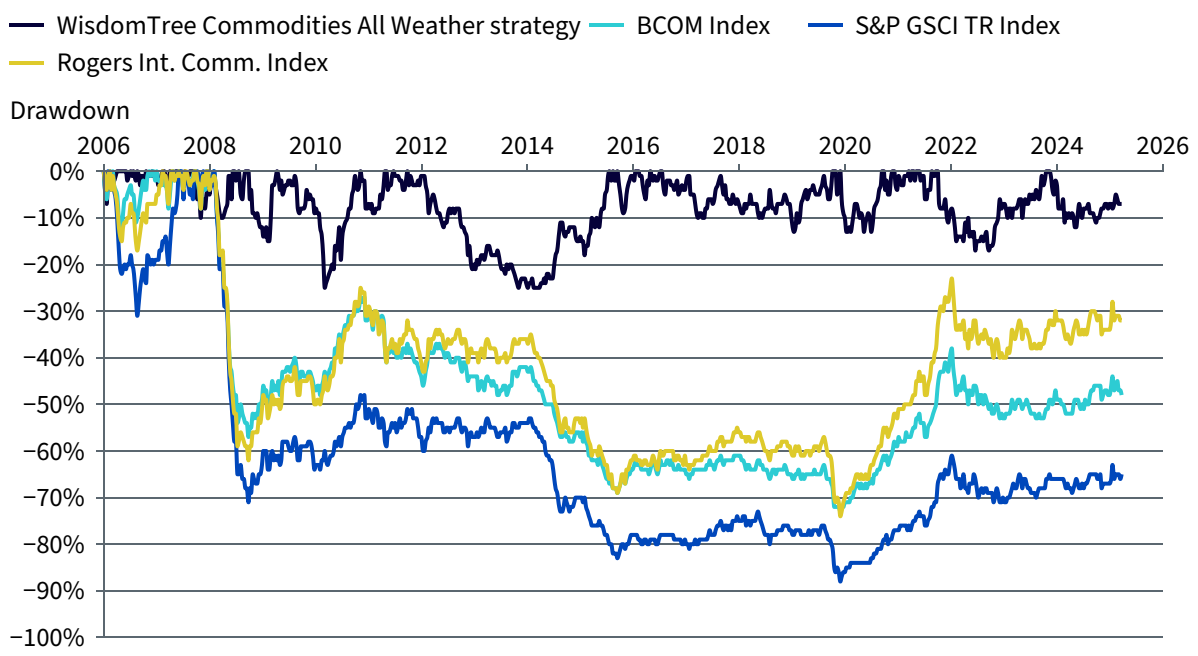
Figure 50: Distribution of historical monthly returns of the strategy



From 01/06/2006 to 30/08/2025. Source: WisdomTree, Bloomberg. Gross total returns in USD. **Includes backtested data for illustration purposes.** You cannot invest in an index. **Historical performance is not an indication of future performance, and any investment may go down in value.**

The underwater analysis further illustrates this resilience. The strategy consistently displayed shallower and shorter drawdowns, resulting in a substantially lower maximum drawdown compared with long-only benchmarks. These characteristics highlight its ability to remain resilient through periods of commodity weakness and recover more swiftly once markets stabilise.

Figure 51: Historical underwater plot of the strategy



From 01/06/2006 to 30/08/2025. Source: WisdomTree, Bloomberg. Gross total returns in USD. **Includes backtested data for illustration purposes.** You cannot invest in an index. **Historical performance is not an indication of future performance, and any investment may go down in value.**

Taken together, the evidence shows that a long–short commodity strategy using factor-based signals and contract optimisation techniques has the potential to offer a more stable and consistent return path, capturing the broad upside of commodity markets while reducing exposure to sharp declines. This balance between participation and protection makes it a compelling option for investors seeking diversified, inflation-sensitive exposure without the high volatility typical of traditional commodity allocations.

C. Characteristics that remain part of a long commodity strategy

In this section, we aim to show that such a long–short commodity strategy retains the essential features of a broad commodity strategy described earlier while improving the overall efficiency of exposure:

+ their positive beta to unexpected inflation
+ their ability to perform in periods of persistently high inflation
+ their low correlation with traditional assets

The strategy performance in different inflation regimes, as illustrated in Figure 52, shows that a long–short commodity strategy can continue to deliver a strong hedge against inflation. During periods when year-over-year inflation exceeded 2%, the strategy delivered +9.1%, outperforming the BCOM Index (+10.8%), S&P GSCI (+15.3%), and Rogers International Commodities Index (+13.9%).

As inflation rose above 3%, returns increased further to +14.4%, again ahead of comparable commodity indices. Importantly, even when inflation was at or below 2%, the strategy continued to deliver positive performance (+9%), whereas traditional commodity indices posted negative returns ranging from -8% to -15%.

This suggests that the all-weather approach can capture inflation-linked return potential while maintaining consistency in lower-inflation periods, offering a more balanced exposure across varying macro environments.

Figure 52: Historical performance in different inflation scenarios

	YoY Inflation > 2.0	YoY Inflation > 3.0	YoY Inflation <= 2.0
WisdomTree Commodities All-Weather Strategy	11.30%	18.10%	9.40%
BCOM Index	10.40%	16.00%	-10.20%
S&P GSCI TR Index	17.60%	27.60%	-16.70%
Rogers Int. Comm. Index	16.40%	24.90%	-10.50%

From 01/06/2006 to 30/08/2025. Source: WisdomTree, Bloomberg. Gross total returns in USD. Mean 252 day returns leading to inflation release date. **Includes backtested data for illustration purposes.** You cannot invest in an index. **Historical performance is not an indication of future performance, and any investment may go down in value.**

The correlation analysis underscores the diversification benefits of the strategy within a multi-asset portfolio context. Its correlation with equities (-0.11) and fixed income (0.15) has been notably low, suggesting that it behaves independently of traditional asset classes. Even its correlation with broad commodities (0.06) remains modest, indicating a differentiated approach that can contribute to a more balanced portfolio construction.

By comparison, correlations between commodities and equities (0.44) were higher, underscoring the strategy's potential role as a true diversifier capable of providing exposure to commodity themes without being heavily linked to risk assets or traditional market cycles.

Figure 53: Historical correlation matrix

	WisdomTree Commodities All Weather strategy	Equities	Fixed income	Commodities
WisdomTree Commodities All Weather strategy	1.00			
Equities	-0.11	1.00		
Fixed income	0.09	0.12	1.00	
Commodities	0.01	0.44	0.14	1.00

From 01/06/2006 to 30/08/2025. Source: WisdomTree, Bloomberg. Gross total returns in USD. **Includes backtested data for illustration purposes.** You cannot invest in an index. **Historical performance is not an indication of future performance, and any investment may go down in value.**

Across major market dislocations and macro shocks, the strategy demonstrated consistency and resilience, delivering strong absolute performance and maintaining stability relative to traditional benchmarks.

During the subprime crisis (2007–2009), the strategy returned +42.1%, standing out in a period when most asset classes, including equities and commodities, experienced severe declines. Similarly, in the 2008 bank meltdown, it delivered a +20% return while equities and broad commodities fell sharply, highlighting its ability to participate in favourable commodity dynamics even during widespread market stress.

In subsequent periods, the strategy continued to show steady performance patterns across varying environments. During the spring 2013 interest rate jump episodes, returns remained contained and comparable to broader commodities. During the COVID-19 crash (Feb–Mar 2020), the strategy returned 16.1%, compared to -18.5% to -33.5% losses seen across equity and commodity markets. It then participated effectively in the subsequent V-shaped recovery, gaining +14.1%, and later posted +9.4% at the onset of the Ukraine conflict, again demonstrating its capacity to capture upside in volatile conditions.

Figure 54: Scenario analyses

Event*	WisdomTree Commodities All Weather strategy	BCOM	S&P 500	MSCI World	Bloomberg Global Agg.
Subprime debacle 2007	42.12%	-29.56%	-35.46%	-37.03%	6.06%
Bank meltdown 2008	20.02%	-19.80%	-27.18%	-24.58%	-2.92%
Divergence of monetary policy	5.26%	-25.58%	32.86%	21.51%	-4.49%
Spring interest rates jump	0.34%	-0.86%	2.38%	1.02%	-2.11%
Vixmageddon	-3.64%	-3.76%	-9.03%	-8.42%	-1.67%
Natural gas volatility	4.92%	-7.84%	-6.16%	-5.29%	2.12%
COVID-19 crash	16.11%	-18.45%	-33.47%	-33.66%	-3.36%
COVID-19 (V market)	14.09%	-4.63%	1.57%	0.37%	5.72%
Start of the Ukraine War	9.46%	8.86%	7.39%	5.30%	-2.88%

From 01/06/2006 to 30/08/2025. Source: WisdomTree, Bloomberg. Gross total returns in USD. **Includes backtested data for illustration purposes.** You cannot invest in an index. **Historical performance is not an indication of future performance, and any investment may go down in value. *Event period start and end dates in the appendix.**

Overall, these analyses show that through the use of systematic factor signals and improved contract selection, it is possible to create a long–short commodity strategy that delivers strong long-term returns, lower risk, and drawdowns while maintaining the key characteristics of a broad commodity strategy.

A disciplined, Momentum-led long–short design converts cyclical commodity swings into a steadier, all-weather return profile.

A disciplined, Momentum-led long–short design converts cyclical commodity swings into a steadier, all-weather return profile.

Conclusion

Commodity futures deserve a more prominent role in strategic portfolios. Their structural return drivers, rooted in risk premia from hedging pressure, inventory dynamics, and curve shape, are persistent and well documented. However, traditional index exposures leave value on the table by ignoring the dispersion across commodities and the information embedded in the term structure.

This paper demonstrates that the following systematic and economically intuitive signals, Carry, Momentum, Slope Momentum, and Value can be effectively applied to enhance commodity portfolios. Factor-driven allocation, when combined with contract selection that adjusts for curve shape and seasonality, consistently improves risk-adjusted returns, reduces drawdowns, and mitigates roll drag.

Importantly, these enhancements do not compromise the core strengths of the asset class. Enhanced strategies retain a high inflation beta, low correlation to equities and bonds, and strong performance in cyclical turning points. They offer better beta, and more than that, they unlock systematic alpha.

Whether deployed in long-only frameworks or in more adaptive long/short portfolios, this paper offers a blueprint for constructing third-generation commodity strategies that go beyond passive exposure and towards robust, repeatable performance. For investors seeking inflation protection, diversification, and excess return, commodities, done right, are no longer optional. They are essential.

Glossary of Indices and Strategies

Bloomberg Commodity Index (BCOM)

A first-generation, broad-based commodity benchmark composed of 24 major commodities across energy, metals and agriculture. BCOM invests primarily in front-month futures contracts and is rebalanced annually. It serves as the primary reference benchmark throughout this paper.

S&P GSCI Index (GSCI)

A production-weighted, first-generation commodity benchmark with a high exposure to energy. The index invests near the front of the futures curve and rebalances annually. It is used as a secondary comparator to assess performance and volatility differences against enhanced strategies.

Rogers International Commodity Index (RICI)

A globally diversified commodity benchmark designed by Jim Rogers to reflect worldwide consumption patterns across energy, metals and agriculture. The index includes a broad basket of futures contracts with annually reviewed weights and monthly rolls, aiming to provide balanced exposure to the global commodity market.

WisdomTree Enhanced Commodity Index (WCOA)

A third-generation, long-only commodity index that combines three systematic factors—Cross-Sectional Carry, Price Momentum, and Slope Momentum—with optimised contract selection for both seasonal and non-seasonal commodities.

+ Live date: 15 August 2025
+ Backtest period: 15 May 2016 to 15 August 2025
+ Bloomberg tickers: WTENCMT (Total Return) and WTENCME (Excess Return)

WisdomTree Commodities All Weather Strategy (WT All-Weather)

A long–short commodity strategy designed to capture both up and down market cycles. It combines Momentum signals (Moving Average and Trend Breadth using a confirmation approach) with the contract selection framework based on Bloomberg Roll Select methodology for long positions. Short positions are assumed through BCOM contracts.

+ Status: Research backtest only (not live)
+ Backtest period: 1 June 2006–August 2025

Bloomberg Roll Select Methodology

A contract-selection mechanism that identifies, for each non-seasonal commodity, the futures contract with the maximum implied roll yield within a nine month horizon. This methodology is used in both the WisdomTree Enhanced Commodity Index and the All-Weather Strategy to minimise carry drag.

Seasonal Contract Selection Rule

Applied to commodities with strong seasonal demand or supply patterns (for example, natural gas, grains). It selects the contract aligned with peak seasonal activity—for instance, the December contract for natural gas—and rolls two months before expiry. This rule is implemented in both the WisdomTree Enhanced Commodity Index and the All-Weather Strategy to optimise carry and reduce seasonal roll costs.

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