NEUBERGER BERMAN

HAKAN KAYA
PhD, Senior Portfolio Manager

NICOLE VETTISE
CAIA, Client Portfolio Manager

The Muddy Logic of Passive Commodity Investing

Passive investing in commodities is a bit of an oxymoron. Unlike popular equity indices, which are weighted by market capitalization, the leading commodity indices are based on more arbitrary construction methodologies that, in our view, don't stand to scrutiny and can lead to suboptimal performance for investors.

This paper continues our series on the nuances and potential limitations of passive investing. Our first installment highlighted how equity index providers often tweak the construction of their benchmarks to help index fund managers accommodate massive asset flows, even to investors' potential detriment; in the second installment, we showed how passive investing to achieve a net-zero outcome invites its own set of challenges and potentially unintended consequences.

In this third chapter, we examine the potential limitations of passive commodity investing and present, in our view, a more thoughtful and active framework.

Executive Summary

Leading commodity indices are weighted by a hodgepodge of factors, the main one being *production*—meaning that commodities produced in larger quantities play a larger role in commodity indices.

We consider these various construction approaches to be both arbitrary and illogical, potentially resulting in unfavorable consequences for commodity investors.

1. Production-based weighting effectively flouts the fundamental law of supply and demand, risking potential value destruction.
2. Production-weighting ignores fluctuating consumption dynamics due to structural and policy-driven shifts, potentially thwarting optimal exposure.
3. The two leading commodity indices display a large tracking error relative to each other, thereby presenting a benchmark-selection dilemma for passive investors.
4. Popular commodity indices are wildly under-diversified—energy markets tend to dominate—resulting in suboptimal risk-management.

We believe investors are better served taking a more thoughtful, diligent approach that:

- Focuses on scarcity to capitalize on short-term supply-demand imbalances using a variety of signals.
- Seeks excess roll returns via active rolling of maturing derivative contracts and managing execution costs.
- Enhances cash collateral returns while preserving capital by investing in high-grade debt rather than in short-term Treasury bills favored by passive indices.

Production Weights: A Long Ill-Fated Approach

Commodity indexing is not a new idea. First came the *Economist*'s Commodity-Price Index—created in 1864 to track spot commodities prices—followed decades later by benchmarks that tracked various commodities futures markets.

The first *investible* benchmark wouldn't arrive until 1991 in the form of the Goldman Sachs Commodity Index (S&P GSCI), a basket of exchange-traded commodities futures. Seven years later came the Dow Jones-AIG Commodity Index, which would eventually be acquired by Bloomberg and rebranded as the Bloomberg Commodity Index (BCOM). Today the GSCI and BCOM are widely considered the industry standards among passive commodity investors.

Upon closer inspection, however, we find both popular benchmarks suffer from fundamentally flawed construction methodologies that, in our view, amount to a series of *active* decisions that commodity investors may neither appreciate nor desire.

To appreciate these distinctions, consider a traditional equity index weighted by the market capitalizations of its constituents. This approach (while far from perfect, in our view) makes some theoretical sense: First, market-cap weightings are inherently self-balancing—investors need only match the index names and reinvest the dividends—thereby minimizing trading costs; second, cap-weighting captures the relative value of different securities within an index.

With commodities, however, market caps do not apply because the "capitalization" of any commodity is unknown. Instead, commodity indices are weighted by a hodgepodge of factors, the main one being production—that is, commodities produced in larger quantities play a larger role in commodity indices.

At first glance, highly produced commodities—given their potentially significant impact on the economy—could appear a source of attractive returns and a dependable inflation hedge. Yet we believe production-based weighting effectively flouts the fundamental law of supply and demand: All things equal, *greater supply tends to push commodity prices down, not up, potentially inviting value destruction for investors.*

The GSCI index is weighted *entirely* by ranking real-world production, while the BCOM is built using a combination of factors, including production and liquidity (based on trading volumes and open interest), as well as additional rules defining minimum and maximum weightings of each commodity. For example, no "related sub-group of commodities" (i.e. energy, precious metals, livestock or grains) may constitute more than 33% of the index, and no single commodity may constitute less than 2% of the index as liquidity allows.

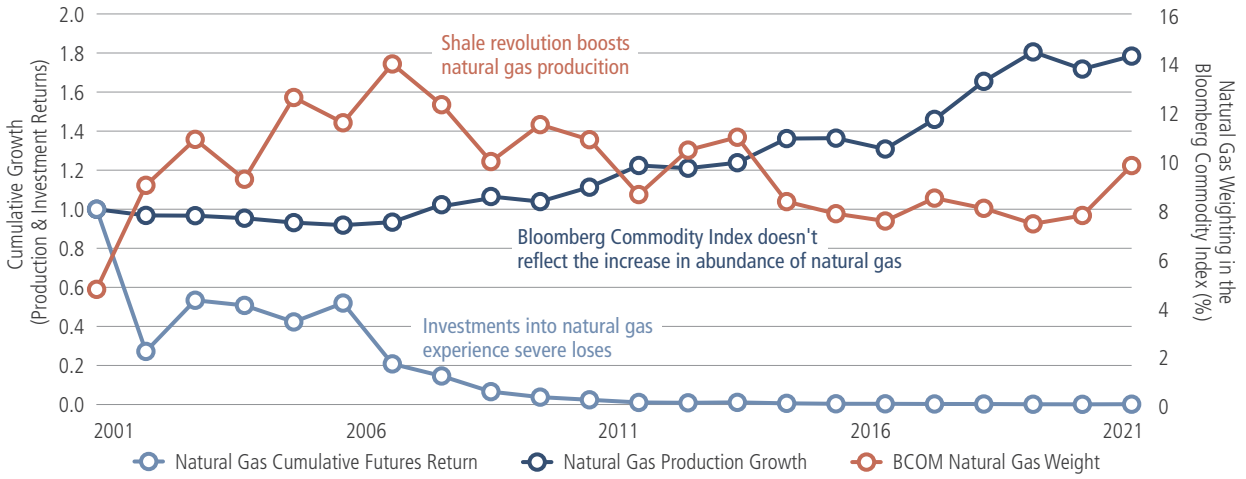
In short, we think these various construction methodologies amount to a collection of arbitrarily *active* decisions that investors may not intend to make, don't stand to scrutiny, and can lead to suboptimal risk-adjusted performance.

The Potential Consequences of Poor Index Construction

Let's start with potential value destruction.

Natural gas offers a glaring example. As shown in figure 1, natural gas production expanded more than 80% since the dawn of the 21st century. As a result, the weight of natural gas in the BCOM doubled, to 10%, reflecting the increase in production; meanwhile, the Bloomberg Natural Gas Subindex, which reflects underlying gas prices, plummeted by 99.9%,[1] erasing significant value for investors exposed to natural gas. In commodities' indices, we fear that *more* can mean a lot less for investors.

FIGURE 1: HIGHER GAS VOLUMES LED TO HIGHER INDEX WEIGHTINGS—EVEN AS PRICES COLLAPSED



Source: Bloomberg, EIA.
Note: Natural gas returns are nearby futures returns (BCOMNG Index). Natural gas production is from the United States Short Term Energy Outlook Dry Natural Gas Production.

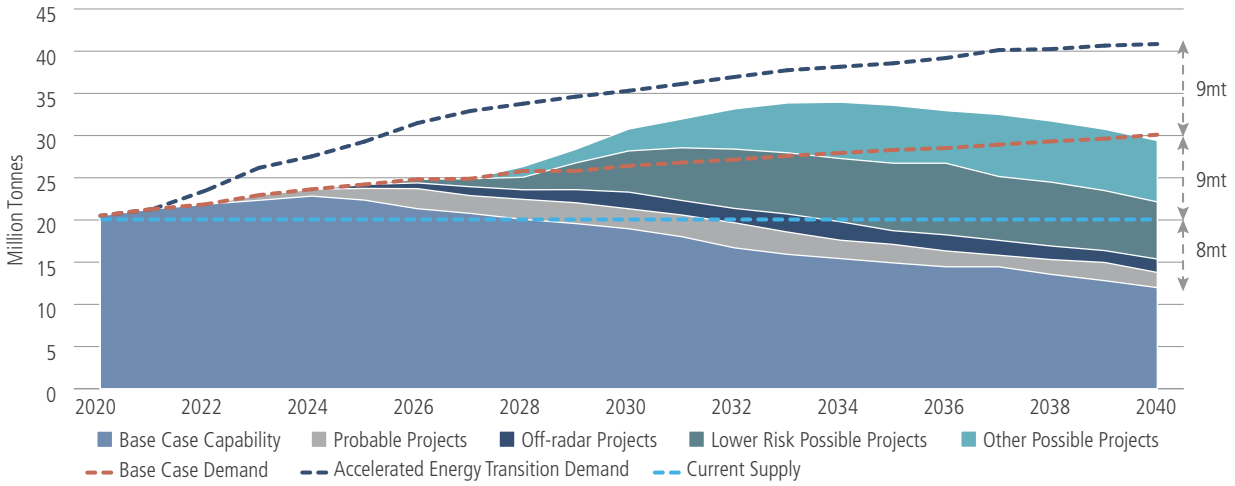
Second, we fear production-weighting in indices ignores consumption dynamics which can fluctuate due to structural and policy-driven shifts. We believe the underlying demand for a given commodity should inform investors' optimal exposure to it.

For example, consider the potential demand for copper, a lynchpin of the clean-energy transition. While government initiatives around the globe are turbocharging the need for copper, a crucial component in everything from electric vehicles to solar photovoltaic plants, yields from gradually exhausted copper mines have been declining for decades, and new-mine construction confronts both long-cycle risks and general underinvestment due to historically poor returns. Copper supplies are also geologically concentrated across a few countries, potentially restricting overall supply.

As shown in figure 2, the world produced 20 million metric tons of copper in 2020. At that "base case capability" (meaning no new mines are built), production is expected to fall roughly 8 million metric tons by 2040 as existing mines exhaust; at the same time, "base case demand" is expected to *climb* by 9 million tons. We believe that supply-demand mismatch could widen further, boosting annual copper demand by an *additional* 9 million tons from recent levels (see the dotted "accelerated energy transition demand" line).

[1] Bloomberg, data as of December 31, 2023.

FIGURE 2: DEMAND FOR COPPER MAY SOON OUTSTRIP SUPPLY AND PUSH UP PRICES



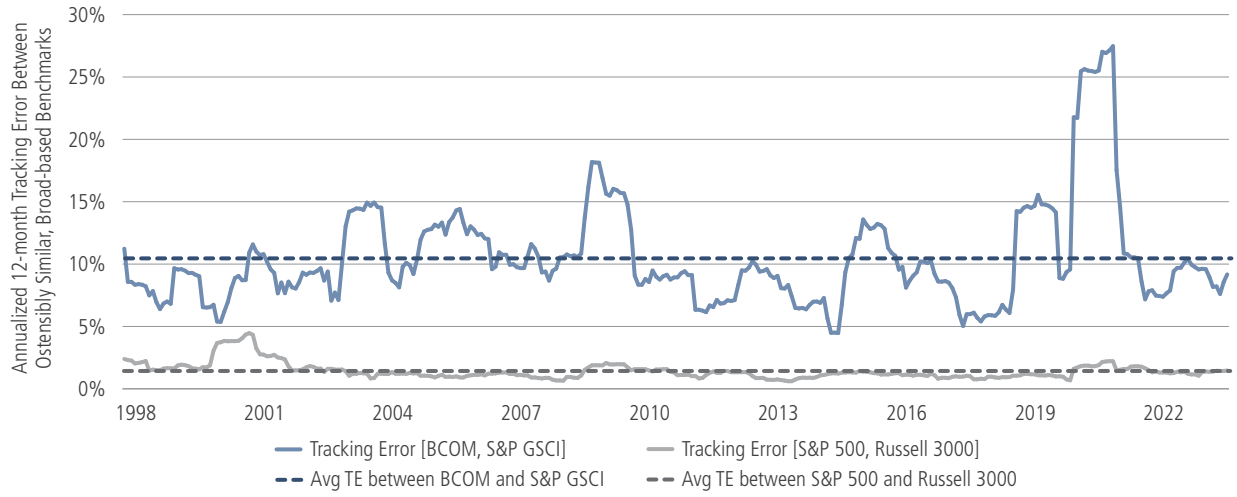
Source: Wood Mackenzie, March 23, 2021.

And yet, because of the metal's modest production volumes versus other commodities, such as oil and diesel fuel, *copper may play a relatively minor role in popular commodity indices, potentially crimping investors' returns.*

Third, we believe arbitrary construction criteria create a benchmark-selection dilemma for investors. In equities, the tracking error between broad-based, market cap-weighted indices tends to be small, rendering the choice of an index somewhat trivial. In commodities, however, the two leading indices display a much larger tracking error relative to each other.

As shown in figure 3, the average annualized 12-month tracking error between the S&P 500 and the Russell 3000 amounts to around 1%; by contrast, the tracking error between the GSCI and the BCOM is *north* of 10%. Hence the dilemma: If the GSCI is deemed the "true" passive benchmark, then it follows that choosing a commodity index fund that tracks the BCOM represents a decidedly active strategy; likewise, if the BCOM is considered the true passive benchmark, tracking the GSCI would, in our view, also amount to seeking active exposure.

FIGURE 3: PASSIVE COMMODITY INVESTING CREATES A BENCHMARK-SELECTION DILEMMA



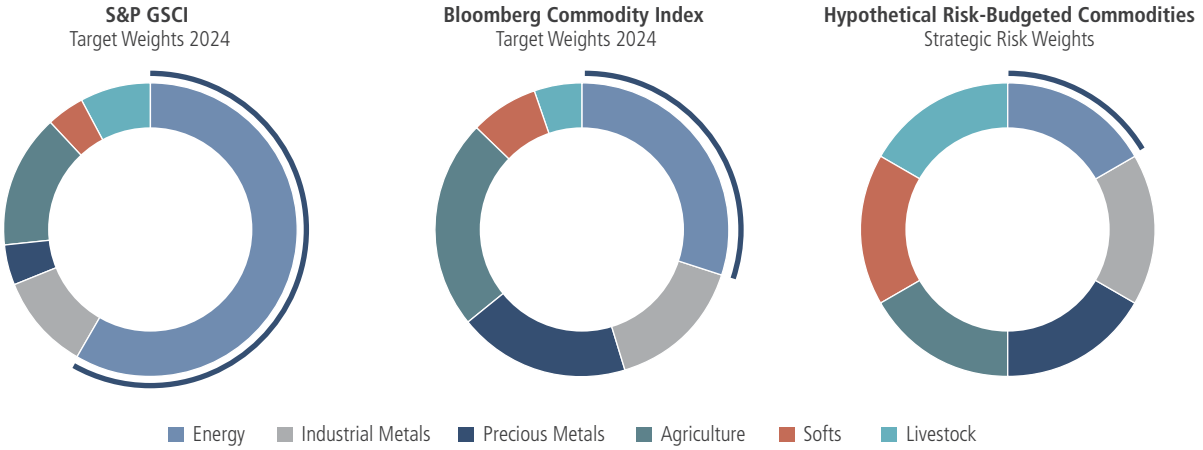
Source: Bloomberg, Neuberger Berman.

In short: When it comes to commodities, *passive investing appears a more active enterprise than its moniker would suggest.*

Our fourth concern is overconcentration in specific commodity sectors, which we fear results in poor overall risk management.

Commodity indices tend to be heavily concentrated, predominantly in the energy sub-sector. In the GSCI, for example, energy accounts for a vast majority of the volatility, while the BCOM—with its ad hoc sector weight constraints—is slightly more diversified (see the left and middle pie charts in figure 4).

FIGURE 4: LEADING COMMODITY INDICES ARE HIGHLY CONCENTRATED IN THE ENERGY SECTOR



Source: S&P GSCI, Bloomberg, Neuberger Berman.

We believe overconcentration is a significant concern for two reasons.

First, commodities are considered a decent hedge against inflation—but inflation is about more than energy. For example, when housing prices spike, it helps to own lumber and copper; likewise, when grocery bills grow, it can be good to be long soybeans and cattle. When inflation debases the dollar, gold tends to rise. And when geopolitical tensions threaten to snarl global supply chains, prices for crucial commodities such as wheat and rare metals can push higher.

Second, inflation baskets change over time, and we believe future baskets will likely be more metals-heavy than fossil fuel-focused. Although we find that materials like copper are having an increasingly greater impact on the level of inflation,[2] they still are only modestly featured in commodity indices thanks to their relatively low levels of production.

We think commodity investors should prepare for a wider spectrum of inflation outcomes by diversifying their exposure in proportion to potential portfolio risk (see the right pie chart in figure 4). For a simple, two-commodity example, the price of natural gas might be three times as volatile as the price of gold—implying that a 75%-to-25% weighting between gas and gold would theoretically result in equal contributions to risk, thereby giving both commodities their proper due in the portfolio.

Time for a *Truly* Active Approach

Commodity prices are driven by myriad factors that, in our view, leading production-weighted indices are not built to capture. We believe commodity investors are better served taking a more thoughtful and diligent approach that actively seeks to emphasize scarcity, improve roll yields and enhance cash management.

Emphasizing Scarcity

In our view, a truly strategic, scarcity-driven approach involves closely minding the following elements:

- **Shape of the futures curve:** If nearby contracts (those with the nearest settlement date) are trading at a premium to longer-dated ones, that could be a sign that inventory levels are running tight.

[2] Societe Generale, "Greenflation: The Costs of The Energy Transition Start to Hit Home," April 20, 2022.

- **Storage costs:** Larger inventories (i.e. reduced scarcity) increase commodity carrying costs, including warehousing, insurance and financing.
- **Who's hedging:** Scarcity of risk transference—i.e. a glut of commodity producers looking to lock in lower prices to hedge their risk—could be a good sign for long-term commodity investors hoping to capture an attractive insurance premium.
- **Momentum:** Inventories do not become scarce overnight; short-term price trends can be indicative of the direction of inventory levels.
- **Seasonality and macroeconomics:** Commodity inventories can shift with the seasons and/or the business cycle, potentially allowing diligent investors to capitalize on those variations.
- **Relative valuations:** Some commodities tend to move in pairs. Examples: Soybeans and corn compete for the same acreage, and crude oil and heating oil are linked to refinery-profit margins. When the relative scarcity of two paired commodities gets out temporarily out of sync, we believe selective mean-reversion bets can pay off.

Improving Roll Yields

While an equity index is somewhat akin to a buy-and-hold portfolio, passive commodity investing requires frequent trading in commodity futures markets. To avoid taking physical delivery of a commodity, managers must exit each position prior to expiration and "roll" it into a new one with a later maturity date.

The challenge: Commodity indices tend to follow a predictable roll schedule, which makes them potentially susceptible to pesky arbitrageurs aiming to purchase the longer contracts in advance and sell them to index investors at a higher price.

To overcome this challenge, we believe commodity investors are wise to employ a dynamic rolling schedule across the entire futures curve in order to strike an optimal balance between seasonally adjusted roll yields and trading costs. We think this diligent approach has the potential to help long-term commodity investors improve roll returns and optimize overall performance.

Enhancing Cash Management

Commodity futures do not require large cash investments—just initial and maintenance margins. That leaves ample cash to be managed.

Index funds tend to park that cash in short-term Treasury bills, which can create cash drag for investors, especially in negative real-rate environments during inflationary periods. Furthermore, commodities futures are often priced based on the Secured Overnight Financing Rate, and those implied financing costs may be significantly higher than yields on T-bills.

To close that return gap, we believe commodity investors should embrace an enhanced cash-management strategy anchored by a portfolio of short-duration, higher-yielding corporate bonds. In our view, this approach should encompass a variety of factors, including liquidity, duration, sector diversification and stringent rating requirements. Additionally, we think it's important to maintain a substantial cash reserve to help ensure seamless management and capital preservation even in the midst of highly volatile market conditions.

Conclusion

We find that popular commodity indices are built on dubious construction methodologies, the main one being that commodities produced in larger quantities carry more weight. In this paper, we showed that this ostensibly passive investing approach amounts to an ineffective strategy that, in our view, doesn't stand to scrutiny and can lead to suboptimal risk-adjusted performance.

Indeed, we observe that commodity prices are driven by myriad factors that leading commodity indices are not designed to capture. That's why we believe investors are better served taking a more thoughtful, diligent and *truly* active approach when allocating to commodities rather than seeking passive exposure via an index.

This is the third paper in our series on the potential limitations and hidden costs of passive investing. For additional perspective, please see our first two installments: The Fine Print of Indexation *and* The Limitations of Passive Investing to Achieve a Net-Zero Outcome.

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The **S&P GSCI Index** is the first major investable commodity index. It is one of the most widely recognized benchmarks that is broad-based and production weighted to represent the global commodity market beta. The index is designed to be investable by including the most liquid commodity futures, and provides diversification with low correlations to other asset classes.

The **Bloomberg Commodity Index** is a leading commodities benchmark. It is constructed using 24 of the most traded commodities futures contracts across six sectors. One third of the target weights of the 24 commodities in BCOM is derived according to world production of each commodity and two thirds is derived from the underlying liquidity of each commodities futures market. Weights are then adjusted further to cap commodity and sector exposures enhancing diversification and reducing the impact of idiosyncratic risk. Each of the six sectors that make up BCOM: Energy, Grains, Softs, Industrial Metals, Precious Metals, and Livestock, is restricted to a maximum weight of 33% and each individual commodity is restricted to a maximum weight of 15%. BCOM indices use a consistent, systematic process to best represent the commodities markets today.

The **Bloomberg Natural Gas Subindex** is a single commodity subindex of the Bloomberg CI composed of futures contracts on Natural Gas. It reflects the return of underlying commodity futures price movements only and is quoted in USD.

The S**&P 500 Index** is a capitalization weighted index comprised of 500 stocks chosen for market size, liquidity, and industry group representation. The S&P 500 Index is constructed to represent a broad range of industry segments in the U.S. economy. The S&P 500 focuses on the large-cap segment of the market with over 80% coverage of US equities. Criteria for inclusion include financial stability (minimize turnover in the index), screening of common shares to eliminate closely held companies, and trading activity indicative of ample liquidity and efficient share pricing. Companies in merger, acquisition, leveraged-buy-outs, bankruptcy (Chapter 11 filing or any shareholder approval of recapitalization which changes a company's debt-to-equity ratio), restructuring, or lack of representation in their representative industry groups are eliminated from the index.

The **Russel 3000 Index** is composed of 3000 large U.S. companies, as determined by market capitalization. This portfolio of Securities represents approximately 98% of the investable U.S. equity market. The Russell 3000 Index is comprised of stocks within the Russell 1000 and the Russell 2000 Indices. The index was developed with a base value of 140.00 as of December 31, 1986.

Tracking risk is simply the standard deviation of a portfolio's relative returns (relative to some benchmark). Whereas the standard risk measure of standard deviation measures the absolute return volatility, tracking error measures the volatility of the return differences between the portfolio and the benchmark over time. A portfolio that is actively managed in an aggressive manner would have a large amount of tracking error versus its index, whereas a portfolio that is more constrained to look like its index (an index fund being the extreme) would have smaller amounts of tracking error.

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Neuberger Berman
1290 Avenue of the Americas
New York, NY 10104-0001

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