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Investing in Commodities

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Commodities have long been considered an inflation hedge and a potential diversifier for investment portfolios composed primarily of equities and bonds. Yet, the lack of meaningful inflation in developed markets for 40 years, accompanied by low absolute returns for commodities for much of that period, led to commodities falling out of favor as an asset class. However, the period of inflation that started in 2021 has re-ignited interest in commodities, at least among some investors.

This paper provides an overview of commodities as an asset class. It briefly explains the nature of investing in commodities futures. It then discusses the performance of commodities, partly through the lens of scenario analysis, with an emphasis on inflationary scenarios.

We find that commodities may act as valuable portfolio diversifiers but typically only in very specific environments. These environments tend to be when most major asset classes struggle (e.g., during stagflation). Yet, to benefit from this hedge, investors will have to be willing to accept the opportunity cost that commodities' low historical (and expected) returns present, as well as be willing to ride out long periods of underperformance.

Commodities investing

Commodities are generally physical goods or raw materials which derive value from their utility. Commodities are normally grouped into four broad categories: energy, metals (industrial and precious), agriculture, and livestock (see Figure 1). Historically, investing in these assets has shown low correlation with more traditional assets like stocks and bonds, which provides diversification potential at the portfolio level. Another important historical benefit is that commodities have offered an effective hedge against inflation.

Energy	Industrial Metals	Precious Metals	Agriculture	Livestock
Crude Oil	Aluminum	Gold	Wheat	Live Cattle
Gasoline	Copper	Silver	Corn	Feeder Cattle
Heating Oil	Lead	Platinum	Soybeans	Lean Hogs
Natural Gas	Nickel		Cotton	
	Zinc		Sugar	
	Tin		Coffee	

FIGURE 1
Representative List of Commodities
List includes commodities that are commonly included in major commodity indices.

Commodities futures

Most investors have no interest in taking physical delivery of, for example, 40,000 pounds of live cattle. As a result, the bulk of the commodities market operates with the use of futures contracts, which provide investors a convenient vehicle to get exposure to commodities without being required to deal with the complexity of handling the physical commodities exchange, storage, transportation, insurance, etc. While these factors can still affect prices, futures contracts vastly simplify the investment process.

Even though futures contracts eliminate much of the complicated overhead of directly investing in commodities, they do add an element of complexity. For example, the time element of a future "delivery date" can be the source of some confusion. The delivery date is the date specified in the contract when delivery of the physical commodity will take place. As previously stated, because many investors have no interest in taking delivery, they will close out their positions before that date.

If a futures contract (e.g., for delivery of corn in three months) is trading at a price below the current spot price, this commodity is said to be "backwardated." If the opposite is true, and the investor must buy a contract at a price above the current spot price, that commodity is said to be in "contango." These relationships are illustrated in Figure 2 below.

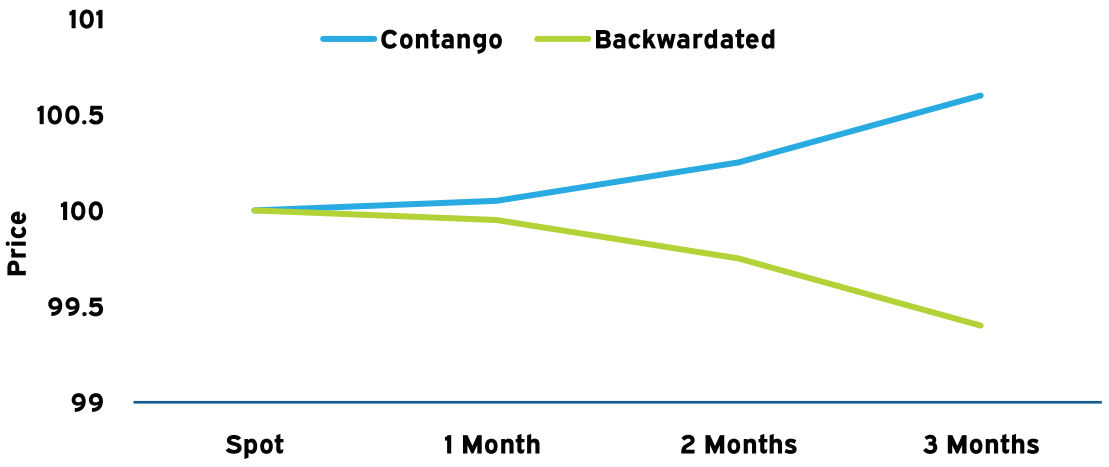

FIGURE 2
Example: Relationship Between Price and Delivery Date
Source: Meketa Investment Group.

An investor must post collateral (usually cash) to "maintain" their position. Futures may be purchased on "margin," allowing the investor to put as little as 10% down to open their position. This is a form of leverage. However, an investor who does not purchase on margin (i.e., puts 100% down as collateral) is considered "fully collateralized."

Components of commodity futures return

When investing in futures, there are three main components of return, the combination of which is unique in comparison to most other asset classes[1] Putting these pieces together, we can express the main components of total return as follows:

Total Return = Spot Return +Collateral Return + Roll Return

[1] Investors may also benefit from a fourth source of returns, called diversification returns, if they own a broad basket of commodities and rebalance regularly. This is addressed in greater detail in the appendix.

Spot return

The spot return is perhaps the most intuitive component. The spot price is based on the change in the underlying commodity price, which would be reflected by a shift in the curves shown in Figure 2. For example, if the spot price shifted from 100 to 101, the long (short) investor would collect (lose) the return from that price increase (i.e., $1).

Spot price return is highly related to the inflation-hedging characteristic of commodity investing. This relationship occurs because as inflation causes the price of an underlying commodity to rise, it increases the spot price. Moreover, expected inflation becomes "priced in" to the futures contract. This component is responsible for a large piece of the inflation hedging characteristic of commodities.

Going beyond inflation, the spot price return also captures individual commodity price appreciation/depreciation. To the extent that investors or managers have a non-consensus view about the future price of a commodity, this view can be expressed by going long or short a commodity futures contract.

Collateral return

Collateral return is the return that is earned by the posted collateral. While this collateral is held against the contracts, it will earn a yield. The yield will be linked to the prevailing interest rate for short-term cash-like instruments, such as 90-day Treasury bills.

The collateral return can also provide an inflation link to commodities futures. This is because short-term interest rates typically rise when inflation is accelerating or is high. Hence the collateral return will typically increase in an inflationary environment.

Roll return

Roll return is due to "rolling," or the process of substituting a futures position approaching settlement with another position further in the future based. The amount and sign (i.e., whether it is negative or positive) of the roll return is based on the steepness of the futures curve, as illustrated in Figure 2. If the curve is in contango, the roll return will be negative as the price rolls down the curve toward the delivery date, and vice versa for backwardation.

The roll return can be thought of as an insurance cost (benefit) that is paid (received) to "carry" the commodity into the future. These may vary based on the commodity. For example, electricity is difficult to store and transport large distances, so it has a very different cost of carry than oil, which can be stored for long periods and transported worldwide. In essence, an investor in a commodities future either pays a fee to guarantee access to a commodity at some future date or receives a fee to accept the price risk of a commodity over time.

Performance characteristics of commodities

In order to evaluate the performance of commodities, it is useful to define the universe. The two most commonly used benchmarks are the S&P Goldman Sachs Commodities index (GSCI) and the Bloomberg Commodity index (once known as Dow Jones UBS Commodities index). The composition of each is illustrated in Figure 3.

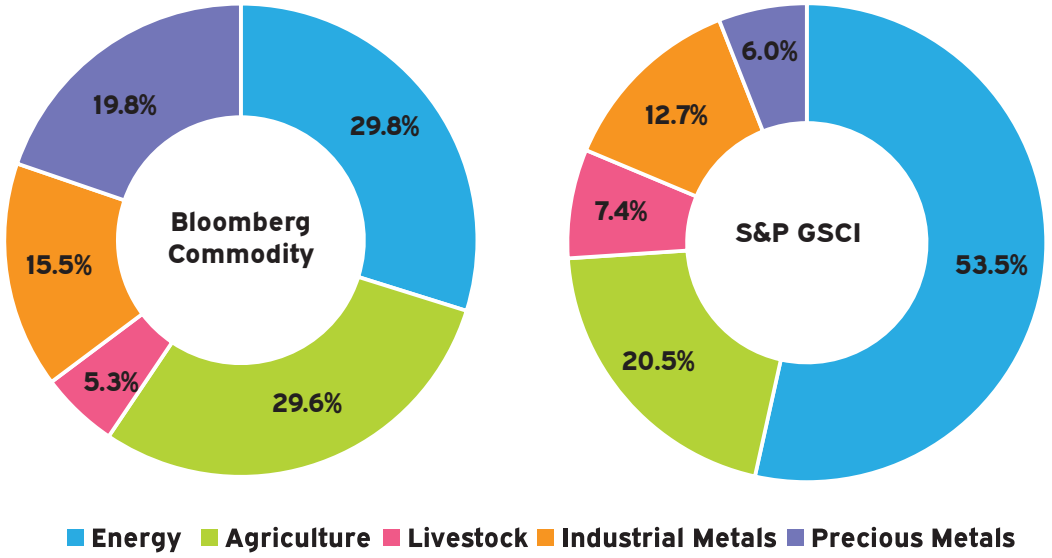

FIGURE 3
Sector Weights of the Major Commodity Indices
Sources: Bloomberg. Target Weight for 2022. Standard and Poor's Global. Target Weight for 2022.

The GSCI is notable in that more than half of the index is composed of energy-related commodities. Specifically, oil accounts for nearly 21% of the basket, whereas in the Bloomberg index oil only accounts for 8%. Oil in particular - and energy in general – is subject to volatile price changes, so the much larger weighting to it in the GSCI will impact the volatility of the index.

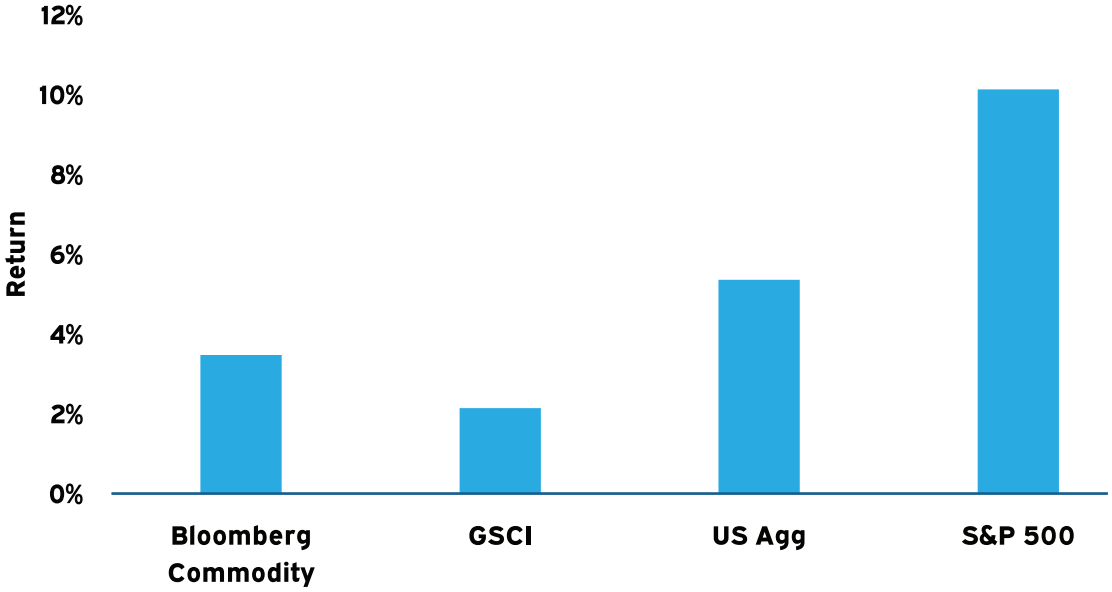

FIGURE 4
Average Annualized Returns for Major Asset Classes (January 1990 – June 2022)
Source: Bloomberg, January 1990 - June 2022.

While commodities have produced positive returns historically, these returns have lagged those of other major asset classes, such as stocks and bonds. Going forward, this should continue to be the case, as productivity growth will allow corporations to grow at a rate exceeding that of the price growth in commodities. Hence, holding commodities represents an "opportunity cost" for many investors who are seeking higher returns. In addition, commodities have been very volatile, making them appear to be a very inefficient asset class when measured from the standpoint of a traditional two-dimensional risk-return measure (e.g., Sharpe ratio).

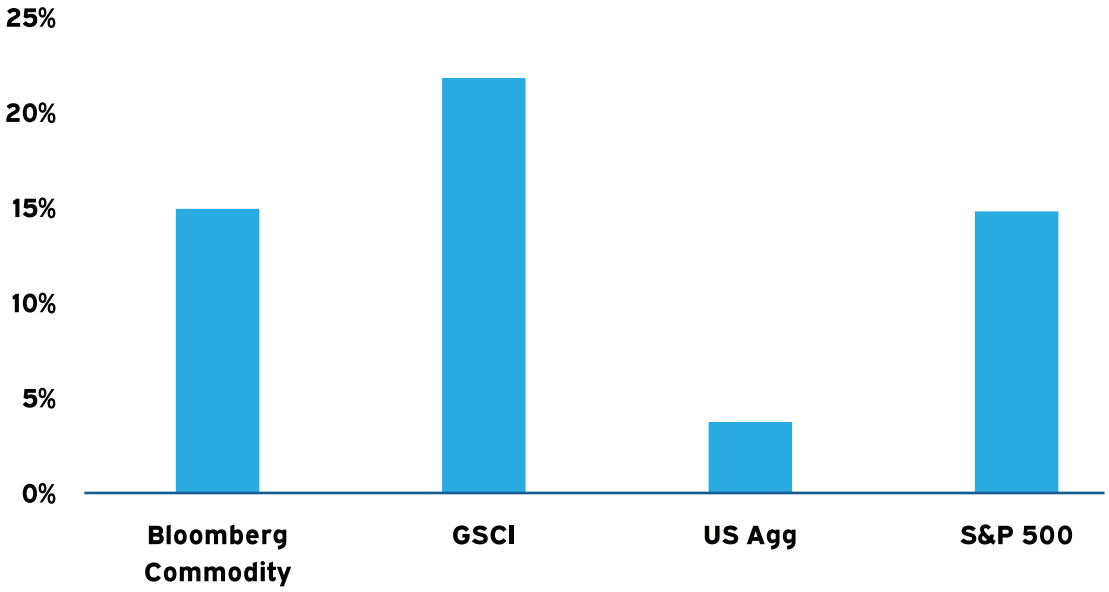

FIGURE 5
Volatility of Major Asset Classes (January 1990 - June 2022)
Source: Bloomberg.

Beyond their normally positive returns, commodity futures investments have two important beneficial characteristics for multi-asset class portfolios. First, because commodities futures tend to have a low correlation to stocks and bonds, a diversification benefit can be gained by incorporating them in a portfolio. The second benefit is their inflation-hedging capacity.

Diversification potential

Because commodities tend to have very low correlations with traditional asset classes like stocks and bonds, commodities contribute to diversification at a portfolio level. The table below shows that the passive commodities indices have exhibited relatively low correlations with stocks and negative correlation with bonds.

	S&P GSCI	Bloomberg Commodity	S&P 500	Bloomberg US Agg
S&P GSCI	1.00			
Bloomberg Commodity	0.84	1.00		
S&P 500	0.23	0.23	1.00	
Bloomberg US Agg	-0.06	-0.09	0.21	1.00

FIGURE 6
Correlations of Commodities Indices with Stocks and Bonds (January 1976 – July 2022)
Source: Bloomberg. Data for the period January 1976 – July 2022.

Inflation hedging

Many investors care not only about their nominal return on investment, but also about how much that investment can buy in the future. This is called the real return.[2]

[2] Where real return = (1+ nominal return) / (1 + inflation) - 1.

Inflation is normally measured by changes in the Consumer Price Index (CPI), which is a basket of goods. Nearly 40% of the CPI basket consists of commodities, so holding the other factors constant, commodities investments should be strongly related to changes in the price of such a basket.

This relationship can be illustrated by looking at longer-term correlations between commodities and the CPI. Figure 7 shows correlations between the S&P GSCI, the Bloomberg Commodity index, and inflation. Annual correlations are substantially higher than monthly correlations, perhaps because the effects of other factors wash out over this time horizon, leaving the longer-term relationship with inflation more evident.

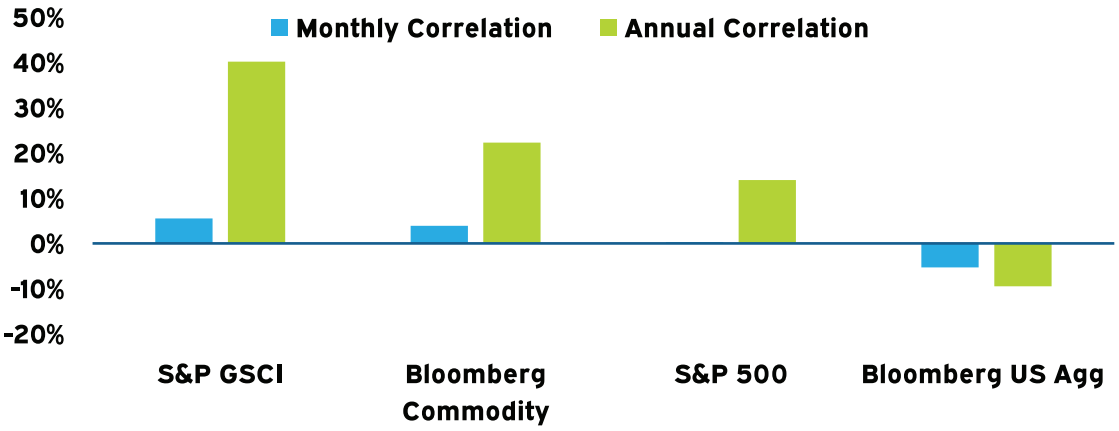

FIGURE 7

Asset Class Correlations to CPI Inflation (January 1976 – July 2022)

Source: Bloomberg. Data for the period January 1976 – July 2022.

However, "average" correlation does not always tell the full story. Importantly, for commodities, this correlation has translated into positive returns during high inflation periods. Figure 8 shows returns during periods of high, average, and low inflation. During the highest inflationary periods, commodities have significantly outperformed stocks and bonds. Perhaps unsurprisingly, they have lagged just as dramatically during the periods of lowest inflation and deflation.

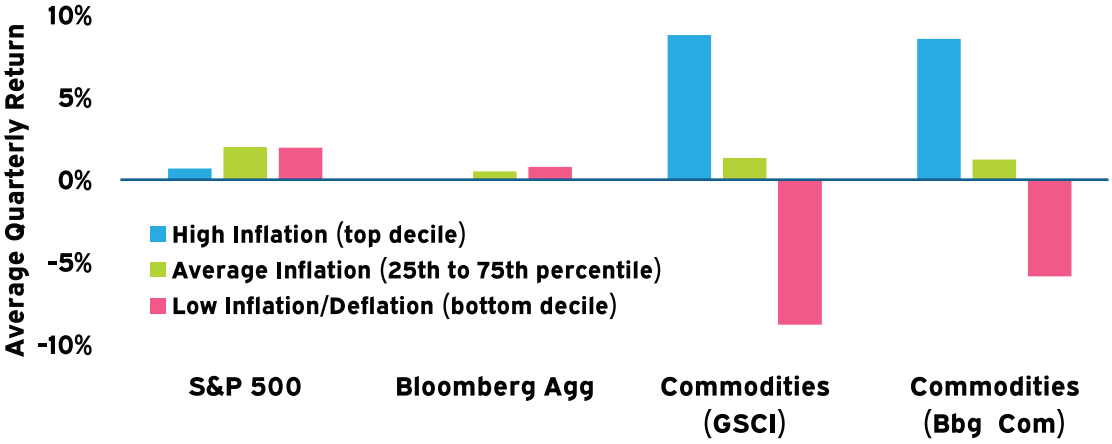

FIGURE 8

Returns During Quarters of Low, High, and Average Inflation (December 1969 – July 2022)

Source: Meketa Scenario Analysis for the period December 1969 - July 2022, based on data from Bloomberg, FRED. It takes the CPI year-over-year index and then calculates a rolling quarterly change of how much CPI has changed in order to isolate the quarters with the highest amount of change in inflation. The amount the index has returned in that quarterly period is shown in terms of top and bottom decile inflation (the quarters with the top 10% of inflation and bottom 10% of inflation) as well as an "average" inflation (as represented by the middle 50% of inflation).

By looking at specific scenarios, this relationship with inflation can be broken down further (see Figures 9 and 10). In particular, commodities do well in times of unexpected, or "surprise," inflation and when high inflation is accompanied by low growth (i.e., "stagflation"). These two scenarios are clear examples of when traditional portfolios need a hedge. Institutions may not be well prepared for either scenario as stocks and bonds have both performed poorly in these environments historically.

Yet, it is exactly these kinds of environments where commodities have performed well. This is likely because of the linkage between commodities and unexpected/high inflation (e.g., via a "supply shock"). The higher and more unexpected the inflation, the better commodities tended to perform. Hence, an allocation to commodities can provide stability and make the downturn less painful.

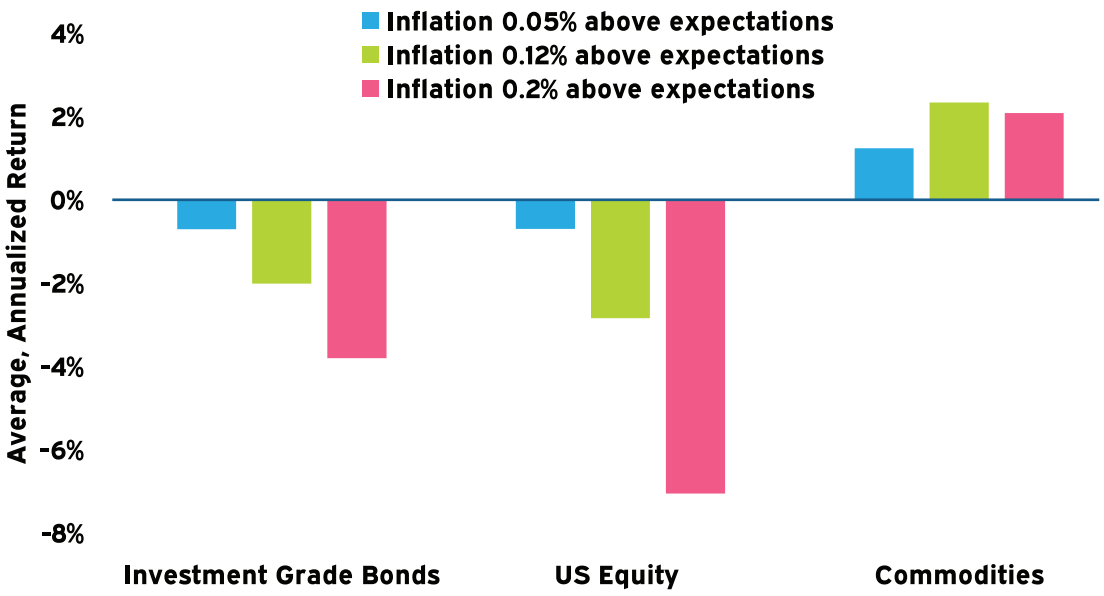

FIGURE 9

Performance During Surprise Inflation (1973-2022)

Source: Meketa Scenario Analysis for the period February 1973 – June 2022, based on data from Bloomberg and FRED. The model estimates the impact of unexpected inflation on asset returns, controlling for the economic environment and realized inflation. See the appendix for a more detailed description.

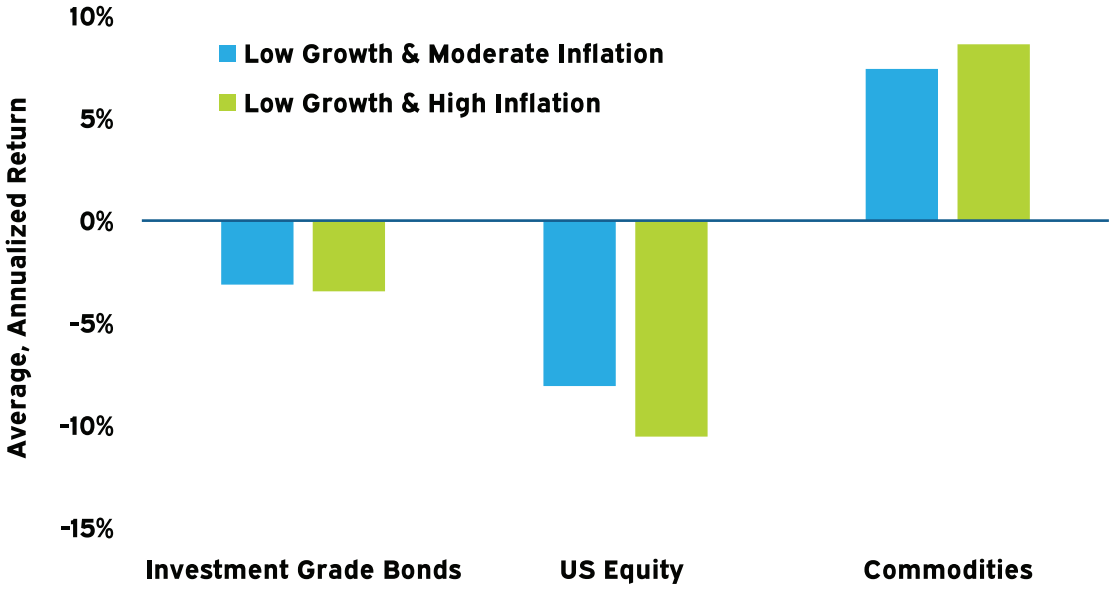

FIGURE 10

Performance During Low Growth and Inflation (1973-2022)

Source: Meketa Scenario Analysis for the period February 1973 – June 2022 based on data from Bloomberg and FRED. Low Growth is defined as when the real GDP growth rate is in the bottom 25th percentile of historical GDP growth. Moderate inflation is the median of historical inflation, and high inflation is the top 75th percentile of historical inflation. See the appendix for a more detailed description.

When inflation is accompanied by a period of growth, the outlook changes. In this scenario, commodities continue to do well (see Figure 11). Yet so do equities, which do even better in all but the highest inflationary environments. Hence there is little need for a hedge from commodities in such an environment.

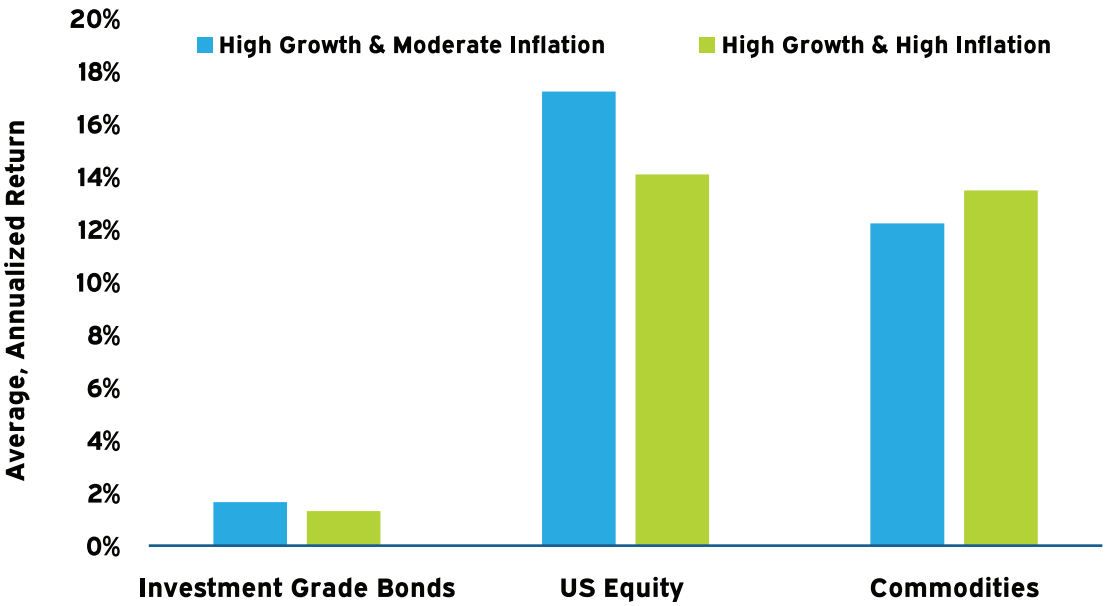

FIGURE 11
Performance During High Growth and Inflation (1973-2022)

Source: Meketa Scenario Analysis for the period February 1973 – June 2022, based on data from Bloomberg and FRED. High Growth is defined as when the real GDP growth rate is in the top 75th percentile of historical GDP growth. Moderate inflation is the median of historical inflation, and high inflation is the top 75th percentile of historical inflation. See the appendix for a more detailed description.

Evaluated more broadly, the diversification benefits of commodities will vary, depending on the environment. Having an allocation to commodities harmed the overall return of a multi-asset class portfolio more often than it helped during the major downturns of the past 50 years (see Figure 12). That said, in the periods when it helped, it often made a dramatic positive difference. Investors should be aware of the conditions in which commodities are likely to help a portfolio and those in which they will likely not.

Scenario	60/40 w/ Commodities (%)	60/40 (%)
COVID-19 Market Shock (Feb 2020 - Mar 2020)	-20.7	-20.6
Taper Tantrum (May - Aug 2013)	-1.9	-1.9
Global Financial Crisis (Oct 2007 - Mar 2009)	-27.8	-26.2
Popping of the TMT Bubble (Apr 2000 - Sep 2002)	-13.9	-16.6
LTCM (Jul - Aug 1998)	-8.2	-7.7
Asian Financial Crisis (Aug 97 - Jan 98)	-0.6	0.1
Rate spike (1994 Calendar Year)	3.4	1.8
Early 1990s Recession (Jun - Oct 1990)	-0.4	-5.2
Crash of 1987 (Sep - Nov 1987)	-10.9	-12.0
Strong dollar (Jan 1981 - Sep 1982)	2.7	5.3
Volcker Recession (Jan - Mar 1980)	-7.2	-7.0
Stagflation (Jan 1973 - Sep 1974)	-4.9	-20.4

FIGURE 12
Historical Scenario Analysis (1973 – 2020)

Source: Meketa Historical Scenario Analysis. 60/40 = 60% Global Equity, 40% Investment Grade Bonds. 60/40 w/ Commodities = 55% Global Equity, 35% Investment Grade Bonds, 10% Commodities.

Commodity performance has tended to be cyclical historically (see Figure 13) so much so that it has earned the name of the "commodity super-cycle." These cycles can be quite long, with extended periods of both outperformance and underperformance. Investors should be cognizant of the potential for a very extended period of underperformance before investing in the asset class.

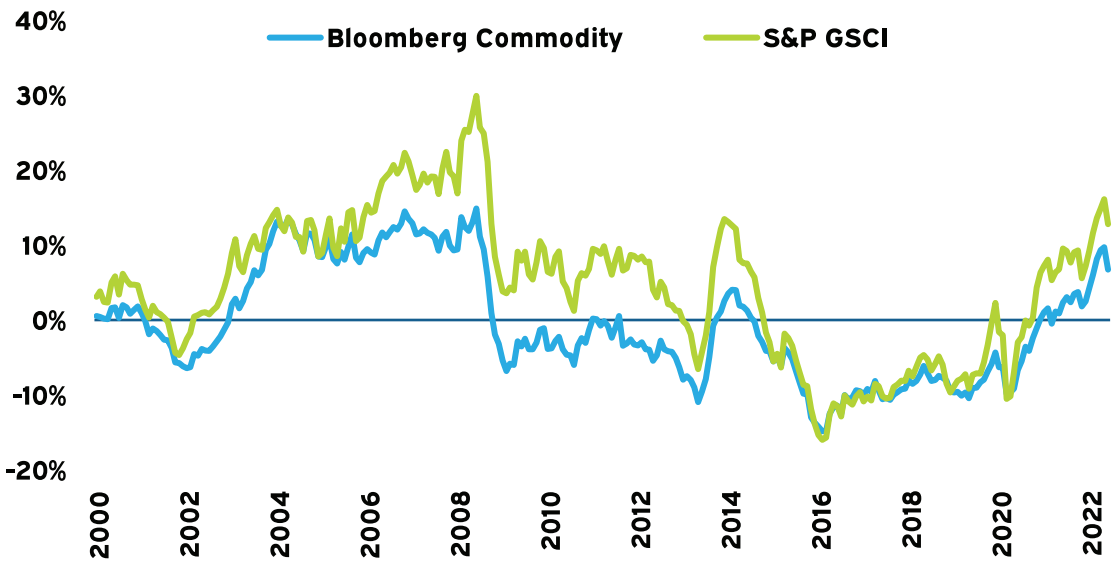

FIGURE 13
Rolling 5-year Annualized Returns for Commodities (2000 – July 2022)
Source: Bloomberg

How to invest in commodities

Investors who allocate to commodities have a wide range of implementation options. The main decisions are determining preference between passive versus active[3] investment managers and the structure used to access commodity futures markets. Investors must also understand the liquidity requirements of the desired investment structure.

[3] Investors either need in-house expertise and scale or they should employ a manager. For more of an overview on futures strategies, reference Appendix A.

Investors should understand the risks being accepted when choosing between passive and active mandates. As described above, the structure of commodity markets presents a different dynamic than equity or fixed income investing. Passive strategies present exposure to commodities at a low cost; however, the index construction methodologies are subjective and could present profiles that emphasize a specific segment of the commodity complex (e.g., energy).

Investment strategies also vary for commodities and the best strategy for each investor will depend on the desired role of commodities in their portfolio. For those purely seeking an inflation hedge, long-only approaches tend to work best. Long-short and momentum strategies can produce better risk-adjusted returns, but they will not offer the same inflation hedge. A fully collateralized approach is preferable unless an investor is intentionally seeking leverage. Lastly, for those wanting the greatest amount of diversification, a basket with many types of commodities would provide that and help reduce commodity-specific risk.

Liquidity for commodity managers ranges widely from daily-liquid Exchange Traded Funds to quarterly-open limited partnerships. As a general rule, the more active a manager is, the higher likelihood of reduced liquidity. Investors should pay close attention to the risks associated with the illiquidity sought by managers in an otherwise liquid segment of the capital markets.

Summary

Commodities have produced modestly positive returns over the long run, and they will likely struggle to keep pace with equities in most (especially benign) environments. In addition, commodities have exhibited substantial volatility and extended periods of underperformance. Yet they have also exhibited low correlations to stocks and bonds. Hence, they can theoretically be used to build a more efficient portfolio.

However, the true diversification benefits of commodities can only be observed in very specific environments. These environments tend to be when most major asset classes struggle (e.g., during stagflation). Hence, the main appeal of commodities is their ability to hedge during times of hyperinflation and geopolitical risks.

Futures are the most appropriate vehicle for commodity investing. For investors seeking a pure inflation hedge, we recommend a diversified, long-only, fully collateralized strategy.

Commodities are not the only inflationary hedge available to investors. Moreover, their low expected return in most environments imputes an opportunity cost to holding them for many investors. Hence, we recommend that investors consider owning commodities within a basket of other possible inflation hedges (e.g., public natural resource equities, TIPS).

Appendix A

Overview of commodity futures strategies

Building off the elements of a commodities return, different strategies have emerged in order for investors to make a return on commodities. There are three sources of returns that investors can target and that we believe will persist in the future.

The first is the **Roll return**; according to the theory of storage framework, we can expect to capture a positive roll return by targeting commodities for which future inventory imbalances are expected and where a long (short) position is justified in commodities with low (high) future inventories.

A second consistent source of return is **Momentum**, which results from the fact that physical goods take time to be produced, so demand and supply imbalances may persist for long periods of time. This generates price trends, or momentum.

A third source of return is the **Diversification return**. This source of return comes from the periodic rebalancing of a portfolio to its original target weights, which achieves variance reduction and generates additional returns compared to a traditional buy and hold portfolio. This attribute can have an important effect within a portfolio of commodities futures. In that rebalancing process, a manager will effectively buy low and sell high its portfolio components. This generates a positive return from any asset class, although it is especially prevalent with commodities since they have low correlations with one another.

Commodity strategies are typically constructed around these three returns and optimizing them. Typically, strategies have a fair amount of their return from momentum, but some managers will prioritize seeking returns from roll capture as well. Different strategies offer different advantages, such as long momentum and roll strategies typically offering the best hedge against inflation. Investors looking to include futures in their portfolio should speak to a consultant about the best strategy for them.

Appendix B

Commodities fees

The average management fee for passive commingled strategies ranges from 0.30% to 0.50% (composed of a 0.20% management fee and 0.10% to 0.30% in operating costs). The average management fee for actively managed funds is roughly 0.70%,[4] though the range of fees is broad.

[4] Source: FactSet as of July 2022.

Commodity managers offer both separate accounts and commingled fund options. Investors who prefer a separate account should understand the additional operational costs of custody and engaging a Futures Commission Merchant, or FCM.[5] An FCM will range in cost from 0.25% to 0.50%. In addition to costs of an FCM, custodians charge fees on futures positions or other derivative contracts. These additional costs vary based on active and passive mandates and the amount of trading volume.

[5] An FCM is an individual or organization which solicits orders to buy or sell futures contracts, options, OTC and swaps and dealing with the CFTC and the NFA. Most large banks have FCMs available, and we recommend that investors work with the investment manager on whom to engage as an FCM.

Appendix C

Surprise inflation model

The model examines the effect of surprise inflation on asset returns, controlling for the economic environment and realized inflation:

$$\text{Asset Returns} = \beta 0 + \beta 1\ \text{Unemployment} + \beta 2\ \text{Unemployment}^2 + \beta 3\ \text{Inflation} + \beta 4\ \text{Inflation}^2 + \beta 5\ \text{Surprise Inflation} + \beta 6\ \text{Surprise Inflation}^2$$

where Asset Returns is the monthly asset class return from 1973 to 2022, unemployment is the 3-month rolling average unemployment rate, inflation is the monthly change in CPI from the 3-month rolling average CPI, and surprise inflation is the difference between this month and last month's inflation rate. Unemployment and inflation data are taken from the St. Louis Federal Reserve Bank's FRED database. The independent variables Unemployment^2, Inflation^2, and Surprise Inflation^2 capture the non-linear effects of realized inflation, surprise inflation, and the economic environment on asset returns. For example, the relationship between Long-term Government Bonds and realized inflation may be an upside-down U shape in periods of high economic growth – Long-term Government Bond returns are positive when monthly inflation is low at 0.2%, but returns turn negative when monthly inflation reaches higher levels, such as 0.5%.

The estimate is the annualized return of:

$$\beta 5 * E[\text{Surprise Inflation} \mid \text{Scenario}] + \beta 6 * E[\text{Surprise Inflation}^2 \mid \text{Scenario}]$$

where the scenarios are low (.05%, 25th percentile), medium (.15%, median), and high (.3%, 75th percentile) surprise inflation.

Growth and inflation model

The model examines the combined effect of inflation and GDP Growth on asset returns:

$$\text{Asset Returns} = \beta 0 + \beta 1\ \text{GDP Growth} + \beta 2\ \text{GDP Growth}^2 + \beta 3\ \text{Inflation} + \beta 4\ \text{Inflation}^2$$

where Asset Returns is the monthly asset return from 1973 to 2022, GDP Growth is the percent change in GDP from the previous quarter, and inflation is the monthly change in CPI from the 3-month rolling average CPI. Since GDP data is only quarterly, the regression was run on quarterly asset return, GDP and inflation observations.

The estimate is the annualized return of:

$$\beta 1 * E[\text{GDP Growth} \mid \text{Scenario}] + \beta 2 * E[\text{GDP Growth}^2 \mid \text{Scenario}] + \beta 3 * E[\text{Inflation} \mid \text{Scenario}] + \beta 4 * E[\text{Inflation}^2 \mid \text{Scenario}] +$$

where the GDP Growth scenarios are high growth rate (1%, 75th percentile) and low growth rate (0.3%, 25th percentile). The inflation scenarios are low (.07%, 25th percentile), medium (0.25%, median), and high (0.5%, 75th percentile) realized inflation.

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