

Rethink Commodities

Alternatives · Commodities
April 2017

Inflation protection

p.04

At a glance

- The commodities recovery is well underway, but prices remain generally below their average of the last 10 years.
- Commodities can bring strategic benefits to a portfolio: powerful diversification; and a compelling risk-return profile when inflation is rising.
- A commodity-futures index is the most convenient and effective way to get exposure, in our view, but we believe traditional commodity indices have three severe drawbacks:
 - A tendency to concentrate risk in the energy sector.
 - Slow reactivity to changing market dynamics due to annual rebalancing.
 - High exposure to the costs of rolling futures contracts.
- Index providers have developed products that try to address some of these drawbacks.
- We discuss how the Lombard Odier Commodity Risk Premia Indices aim to address these and other drawbacks:
 - Diversification: our indices deploy a risk-based weighting methodology.
 - Reactivity: our indices rebalance monthly, not yearly.
 - Roll yield: our indices deploy an enhanced roll methodology.
 - Ethical concerns: our indices exclude essential food commodities.

Publication of Lombard Odier Investment Managers

Contact

1798 Investor Relations Team

For further information
Email us at 1798-InvestorRelations@lombardodier.com
Or visit www.loim.com

Specialist Sales

Clément Leturgie
+41 22 709 1101
c.leturgie@lombardodier.com

• Commodities make a comeback	p.02
• The strategic benefits of commodities	p.04
• Getting exposure to commodities	p.07
• The risk associated with futures	p.08
• The limitations of traditional commodity indices	p.10
• The LOIM approach	p.11
• Conclusion	p.15

A strategic case,
a tactical opportunity,
an enhanced solution

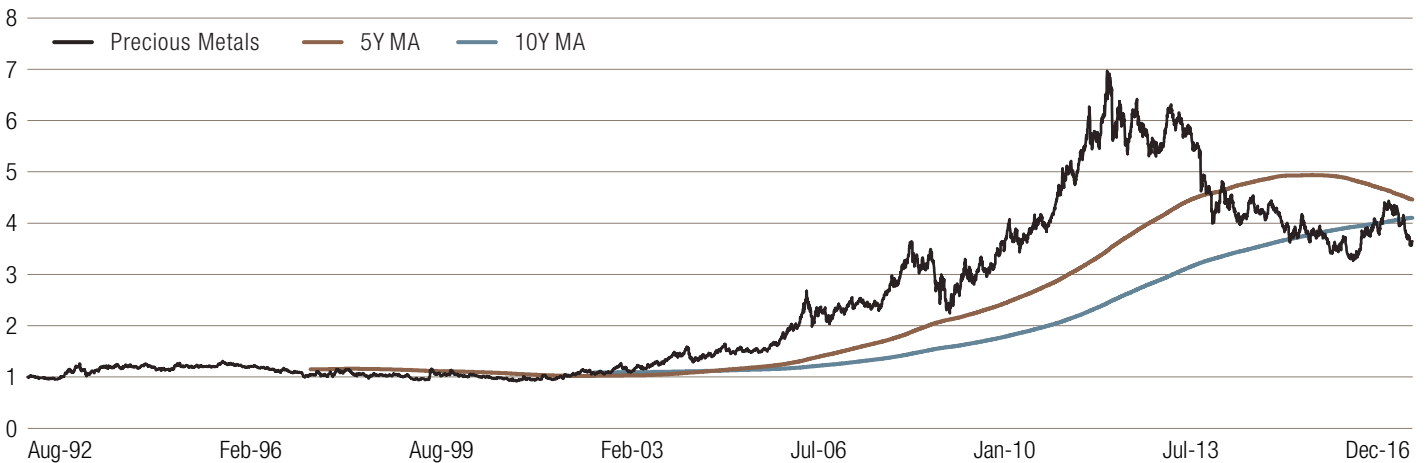
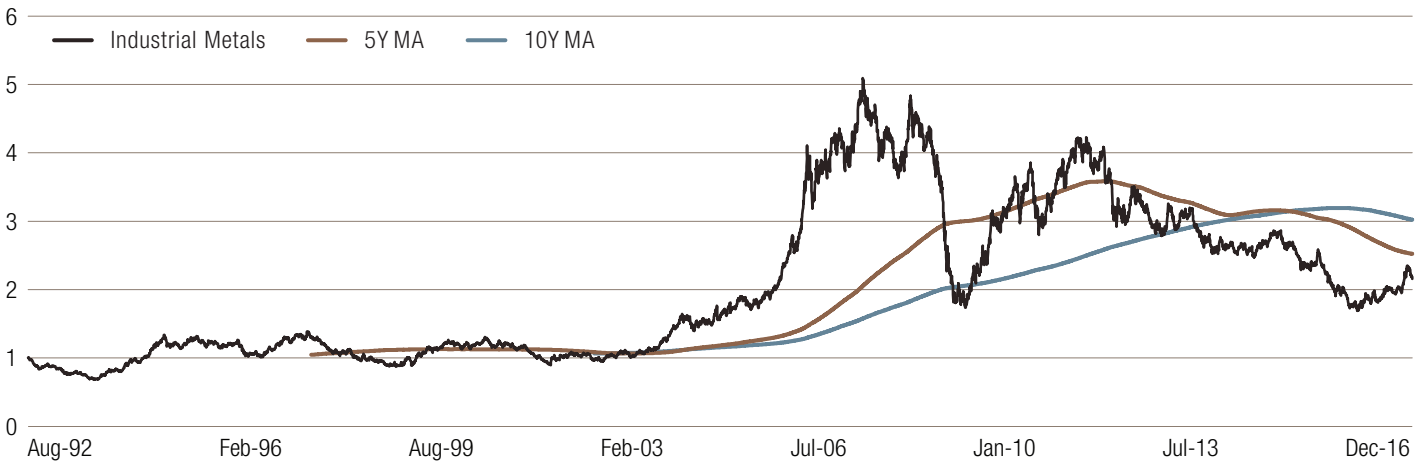
Commodities make a comeback

During the second half of 2016, improving global economic indicators, supportive global monetary policies and the election of a new US administration promising a substantial fiscal stimulus have led many investors and economic commentators to conclude that the fear of deflation has been put to rest, marking the beginning of a “reflation trade.”

The commodity complex has generally benefited from this trend, performing well in 2016. This has attracted renewed interest from investors as commodities recover from a long bear cycle that has left prices generally below their five-year and 10-year moving averages (Figure 1).

FIG. 1 THE FOUR COMMODITY COMPLEXES REMAIN ATTRACTIVELY VALUED





Source: Bloomberg. Agriculture is represented by the BCOMAGTR Index; energy by the BCOMENTR Index; industrial metals by the BCOMINTR Index; and precious metals by the BCOMPRTR Index. Index returns rebased to 1.0 at the start of the period. Past performance is not a guarantee of future results.

Our purpose here is to discuss the strategic benefits of a diversified exposure to commodities and therefore we will not provide a supply-and-demand analysis of individual commodities. However, we do believe that the asset class generally benefits from improving economic growth and rising inflation, which is supported by our macro outlook: inflation could rise further and faster as economic growth recovers, especially in the US, where the new administration has put fiscal stimulus on its agenda; and from China, where we expect continued government support for the economy in this year of the 19th National Congress of the Communist Party.

In this paper, we:

1. Discuss the benefits of investing in commodities
2. Consider the ways investors can access the asset class
3. Look at the inherent limitations of traditional commodity indices
4. Explore Lombard Odier Investment Managers' (LOIM) way of accessing the asset class.

**The strategic benefits of commodities:
inflation protection and portfolio diversification**

In our opinion, commodities have three main features that are attractive to investors: return opportunities, inflation protection and diversification benefits. While there is no guarantee that all three of these benefits will be evident all the time, each of them could be useful in constructing a diversified global portfolio.

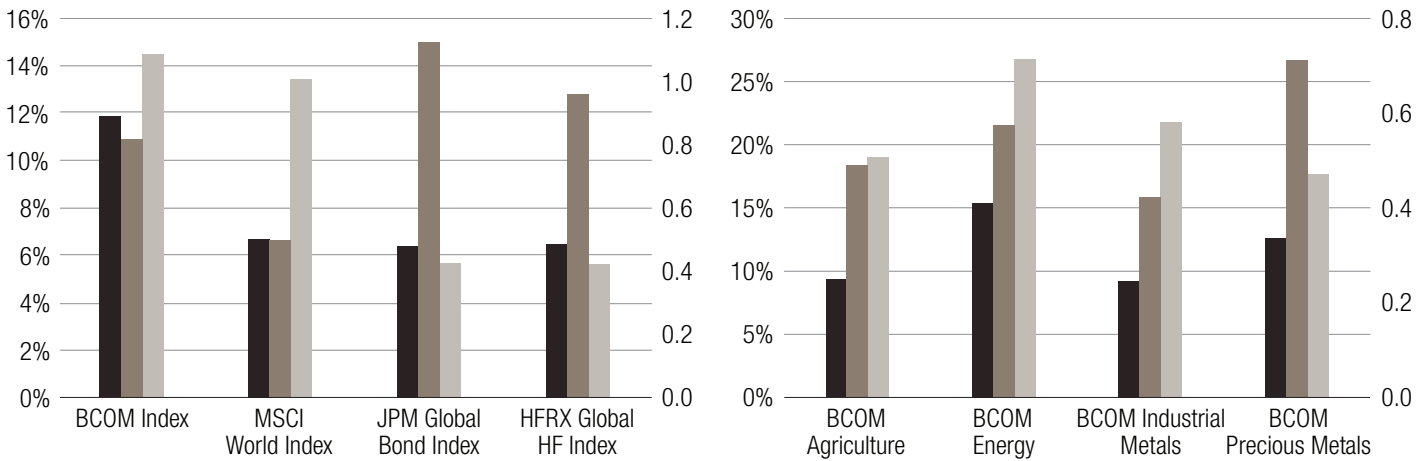
As suggested above, we think the case for a return opportunity is supported by current valuations and the macro outlook – in particular, that deflation fears seem to be abating and inflation pressures could be rising. Our analysis shows that, on average, commodities have delivered attractive risk-adjusted returns

during periods of inflation (Figure 2). The asset class has delivered positive performance when the rate of inflation is accelerating, as well as when it is positive but decelerating.

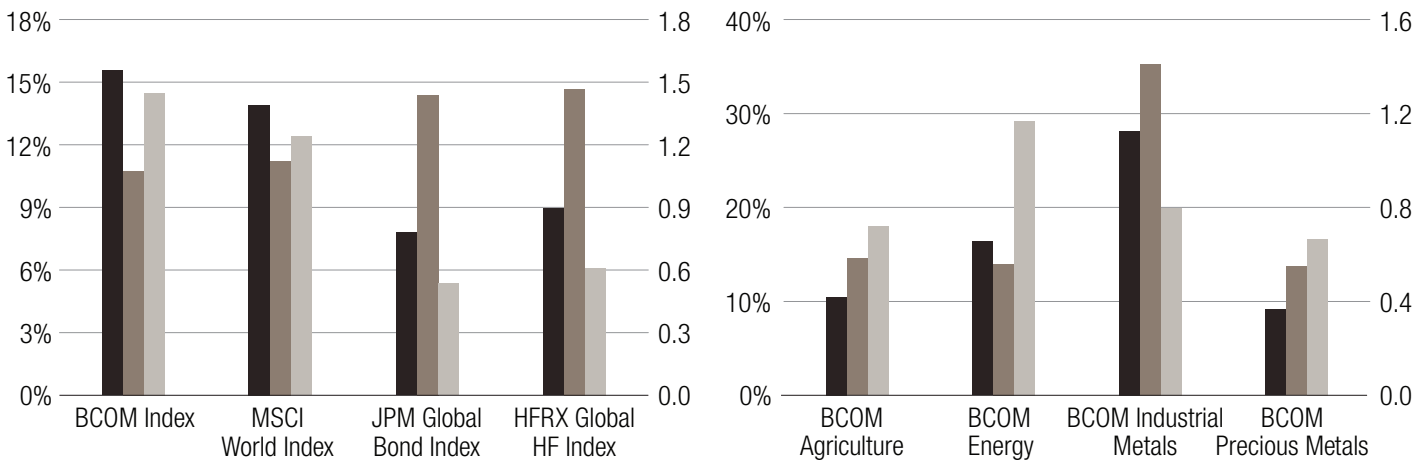
However, the performance has come from different parts of the complex. Notably, industrial metals have delivered the best average returns and Sharpe ratio during periods of accelerating inflation, while precious metals performed best – and thus offered the most protection – in the periods of decelerating inflation. This has also been the case during periods of outright deflation.

FIG. 2 COMMODITIES DURING PERIODS OF INFLATION, 1992 TO 2016

AVERAGE RETURNS, VOLATILITY AND SHARPE RATIO OF GLOBAL ASSET CLASSES AND COMMODITIES DURING PERIODS OF INFLATION

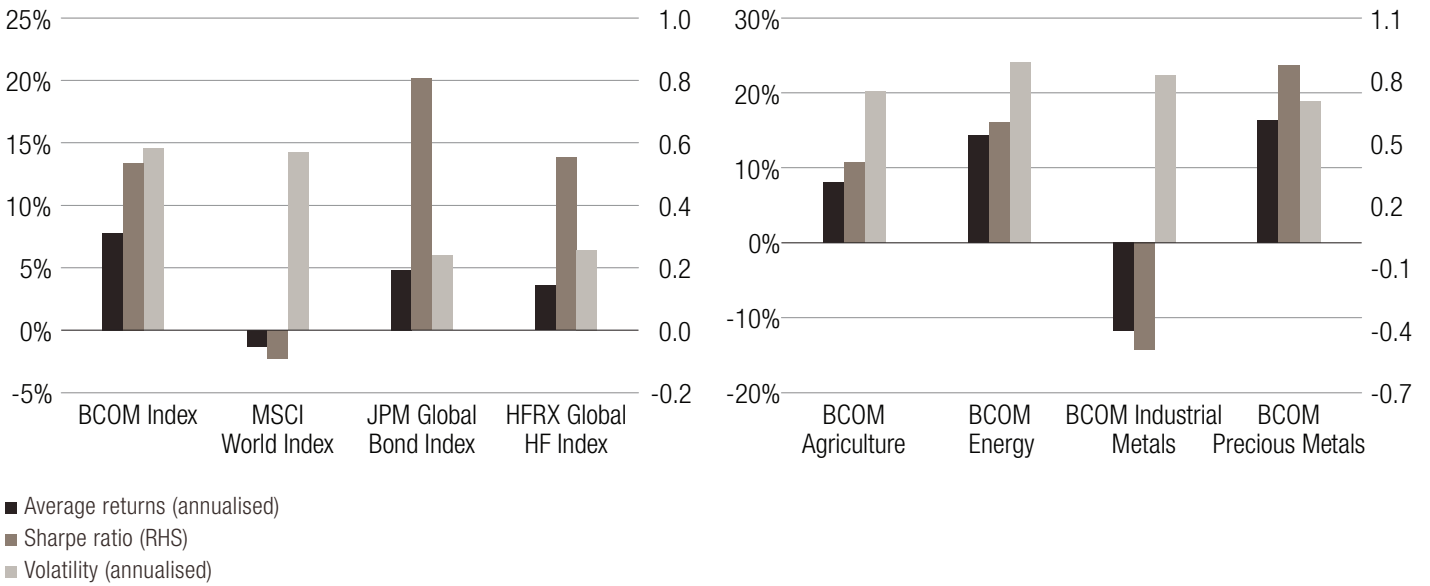


AVERAGE RETURNS, VOLATILITY AND SHARPE RATIO OF VARIOUS ASSET CLASSES AND COMMODITIES DURING PERIODS WHEN INFLATION IS POSITIVE AND ACCELERATING

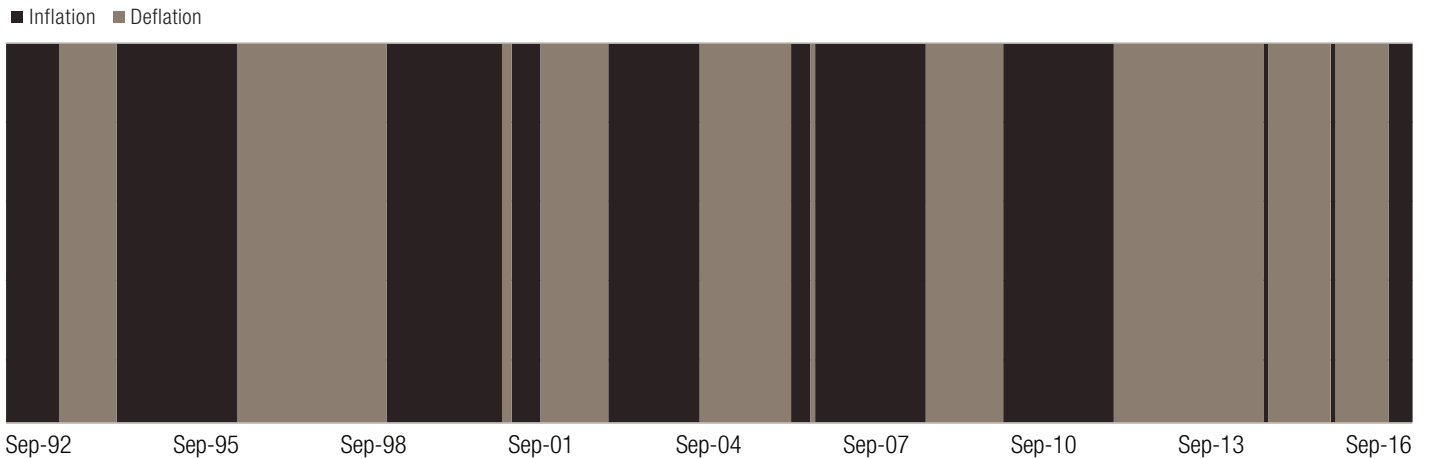


■ Average returns (annualised)
■ Sharpe ratio (RHS)
■ Volatility (annualised)

AVERAGE RETURNS, VOLATILITY AND SHARPE RATIO OF VARIOUS ASSET CLASSES AND COMMODITIES DURING PERIODS WHEN INFLATION IS POSITIVE BUT DECELERATING



PERIODS OF INFLATION AND DEFLATION, 1992 TO 2016



Source: Bloomberg. Data begins in 1992, except HFRX Index data which begins on 31 March 2003. BCOM indices are total return. Periods of inflation are identified using a proprietary indicator based on estimates of imported inflation, cost-driven inflation and monetary inflation across the US, the Eurozone and China. Four regimes are estimated: (1) Accelerating Inflation and (2) Decelerating Inflation, indicated by the light panels in the chart; and (3) Worsening Deflation and (4) Retreating Deflation, indicated by the dark panels. Past performance is not a guarantee of future results. For illustrative purposes only.

The generally low or even negative correlation between different commodities and commodity complexes is one important reason why the commodity asset class as a whole has tended to exhibit low correlation with traditional assets and regions (Figure 3).

Consequently, commodities can offer attractive diversification benefits to a portfolio.

FIG. 3 THE DIVERSIFICATION BENEFITS OF COMMODITIES

CROSS CORRELATION MATRIX OF VARIOUS ASSET CLASSES AND REGIONS

CORRELATION MATRIX	BCOM INDEX	MSCI WORLD INDEX	JPM GLOBAL BOND INDEX	HFRX GLOBAL HF INDEX	US EQUITY LARGE CAP	US EQUITY MID CAP	US EQUITY SMALL CAP	EUROPE EQUITY LARGE CAP	EUROPE EQUITY SMID	MSCI EM LARGE CAP	MSCI EM SMALL CAP	US RATES	EUROPE RATES	EM RATES	US INVESTMENT GRADE	USD HY CORP BOND	EUR IG CORP BOND	EUR HY CORP BOND	USD IG EM CORP BOND	USD HY EM CORP BOND	DOLLAR INDEX
BCOM INDEX	1.00	0.34	0.15	0.29	0.27	0.31	0.29	0.25	0.34	0.42	0.49	-0.12	-0.11	0.55	-0.08	0.37	0.00	0.34	0.27	0.37	-0.33
MSCI WORLD INDEX	0.34	1.00	0.02	0.52	0.83	0.79	0.76	0.74	0.86	0.70	0.72	-0.23	-0.10	0.70	-0.20	0.54	0.05	0.61	0.34	0.55	-0.21
JPM GLOBAL BOND INDEX	0.15	0.02	1.00	0.02	-0.07	-0.08	-0.09	-0.17	-0.11	0.05	0.13	0.61	0.50	0.44	0.66	0.10	0.37	0.07	0.48	0.12	-0.77
HFRX GLOBAL HF INDEX	0.29	0.52	0.02	1.00	0.42	0.45	0.43	0.39	0.53	0.43	0.69	-0.10	-0.04	0.48	-0.09	0.64	0.16	0.62	0.38	0.60	-0.14
US EQUITY LARGE CAP	0.27	0.83	-0.07	0.42	1.00	0.90	0.86	0.77	0.77	0.66	0.62	-0.20	-0.14	0.59	-0.26	0.47	0.01	0.53	0.26	0.48	-0.07
US EQUITY MID CAP	0.31	0.79	-0.08	0.45	0.90	1.00	0.99	0.73	0.79	0.69	0.61	-0.25	-0.14	0.58	-0.26	0.48	0.01	0.52	0.24	0.47	-0.09
US EQUITY SMALL CAP	0.29	0.76	-0.09	0.43	0.86	0.99	1.00	0.70	0.76	0.66	0.58	-0.26	-0.15	0.55	-0.26	0.46	0.00	0.50	0.21	0.44	-0.09
EUROPE EQUITY LARGE CAP	0.25	0.74	-0.17	0.39	0.77	0.73	0.70	1.00	0.88	0.68	0.60	-0.28	-0.10	0.58	-0.28	0.44	0.00	0.57	0.25	0.44	0.04
EUROPE EQUITY SMID	0.34	0.86	-0.11	0.53	0.77	0.79	0.76	0.88	1.00	0.75	0.67	-0.37	-0.07	0.58	-0.25	0.49	0.04	0.63	0.28	0.50	-0.11
MSCI EM LARGE CAP	0.42	0.70	0.05	0.43	0.66	0.69	0.66	0.68	0.75	1.00	0.91	-0.24	-0.10	0.81	-0.02	0.60	0.20	0.65	0.54	0.67	-0.24
MSCI EM SMALL CAP	0.49	0.72	0.13	0.69	0.62	0.61	0.58	0.60	0.67	0.91	1.00	-0.20	0.14	0.69	0.06	0.62	0.26	0.70	0.53	0.69	-0.26
US RATES	-0.12	-0.23	0.61	-0.10	-0.20	-0.25	-0.26	-0.28	-0.37	-0.24	-0.20	1.00	0.57	-0.04	0.86	-0.14	0.46	-0.27	0.34	-0.17	-0.13
EUROPE RATES	-0.11	-0.10	0.50	-0.04	-0.14	-0.14	-0.15	-0.10	-0.07	-0.10	0.14	0.57	1.00	0.11	0.41	0.07	0.62	0.18	0.37	0.12	-0.07
EM RATES	0.55	0.70	0.44	0.48	0.59	0.58	0.55	0.58	0.58	0.81	0.69	-0.04	0.11	1.00	0.23	0.53	0.26	0.53	0.70	0.63	-0.60
US INVESTMENT GRADE	-0.08	-0.20	0.66	-0.09	-0.26	-0.26	-0.26	-0.28	-0.25	-0.02	0.06	0.86	0.41	0.23	1.00	0.24	0.63	0.10	0.61	0.17	-0.16
USD HY CORP BOND	0.37	0.54	0.10	0.64	0.47	0.48	0.46	0.44	0.49	0.60	0.62	-0.14	0.07	0.53	0.24	1.00	0.36	0.77	0.66	0.82	-0.14
EUR IG CORP BOND	0.00	0.05	0.37	0.16	0.01	0.01	0.00	0.00	0.04	0.20	0.26	0.46	0.62	0.26	0.63	0.36	1.00	0.43	0.57	0.36	0.05
EUR HY CORP BOND	0.34	0.61	0.07	0.62	0.53	0.52	0.50	0.57	0.63	0.65	0.70	-0.27	0.18	0.53	0.10	0.77	0.43	1.00	0.55	0.73	-0.18
USD IG EM CORP BOND	0.27	0.34	0.48	0.38	0.26	0.24	0.21	0.25	0.28	0.54	0.53	0.34	0.37	0.70	0.61	0.66	0.57	0.55	1.00	0.75	-0.24
USD HY EM CORP BOND	0.37	0.55	0.12	0.60	0.48	0.47	0.44	0.44	0.50	0.67	0.69	-0.17	0.12	0.63	0.17	0.82	0.36	0.73	0.75	1.00	-0.18
DOLLAR INDEX	-0.33	-0.21	-0.77	-0.14	-0.07	-0.09	-0.09	0.04	-0.11	-0.24	-0.26	-0.13	-0.07	-0.60	-0.16	-0.14	0.05	-0.18	-0.24	-0.18	1.00

HISTORICAL TWO-YEAR ROLLING CORRELATION BETWEEN TRADITIONAL ASSET CLASSES AND THE BCOM INDEX



Source: Bloomberg. US Equity Large Cap represented by S&P 500 Index (SPX), US Equity Mid Cap by Russell 2500 Index (RU25INTR), US Equity Small Cap by Russell 2000 Index (RU20INTR), Europe Equity Large Cap by Euro Stoxx 50 Index (SX5E), Europe Equity SMID by Euro Stoxx Small Index (SCXT), US Rates by S&P U.S. Treasury Bond Index (SPBDUSBT), Europe Rates by S&P Eurozone Sovereign Bond Index (SPBDEGIT), EM Rates by J.P. Morgan Government Bond Index Emerging Markets Global Core Index (GBIEMCOR), US Investment Grade by Bloomberg US Corporate Bond Index (BUSC), USD HY Corp Bond by Bloomberg USD High Yield Corporate Bond Index (BUHY), EUR IG Corp Bond by Bloomberg EUR Investment Grade European Corporate Bond Index (BERC), EUR HY Corp Bond by Bloomberg EUR High Yield Corporate Bond Index (BEUH), USD IG EM Corp Bond by Bloomberg USD Investment Grade Emerging Market Corporate Bond Index (BIEM), USD HY EM Corp Bond by Bloomberg USD High Yield Emerging Market Corporate Bond Index (BEAC).

Getting exposure to commodities: physical, equities or futures?

Once an investor acknowledges the potential benefits of commodities within a portfolio, the next question is how to access the asset class.

Commodities are physical assets. One way to get exposure is to buy, store and resell the physical products themselves. This generally necessitates large operational abilities and incurs substantial associated costs, and therefore tends to be reserved for specialists such as commodity brokers. As a result, the most common ways to invest are through commodity-related equities and commodity futures contracts.

Getting access via equities begs an obvious question: is there any fundamental relationship between the returns to an oil major's stock and the crude oil price; or the returns to agribusiness shares and grain prices; or the returns to copper, gold and silver miners and the prices of these metals? Over the long term the relationship is fairly close – as one would expect, given that the price of a product is an important contributor to the earnings of the company that produces it.

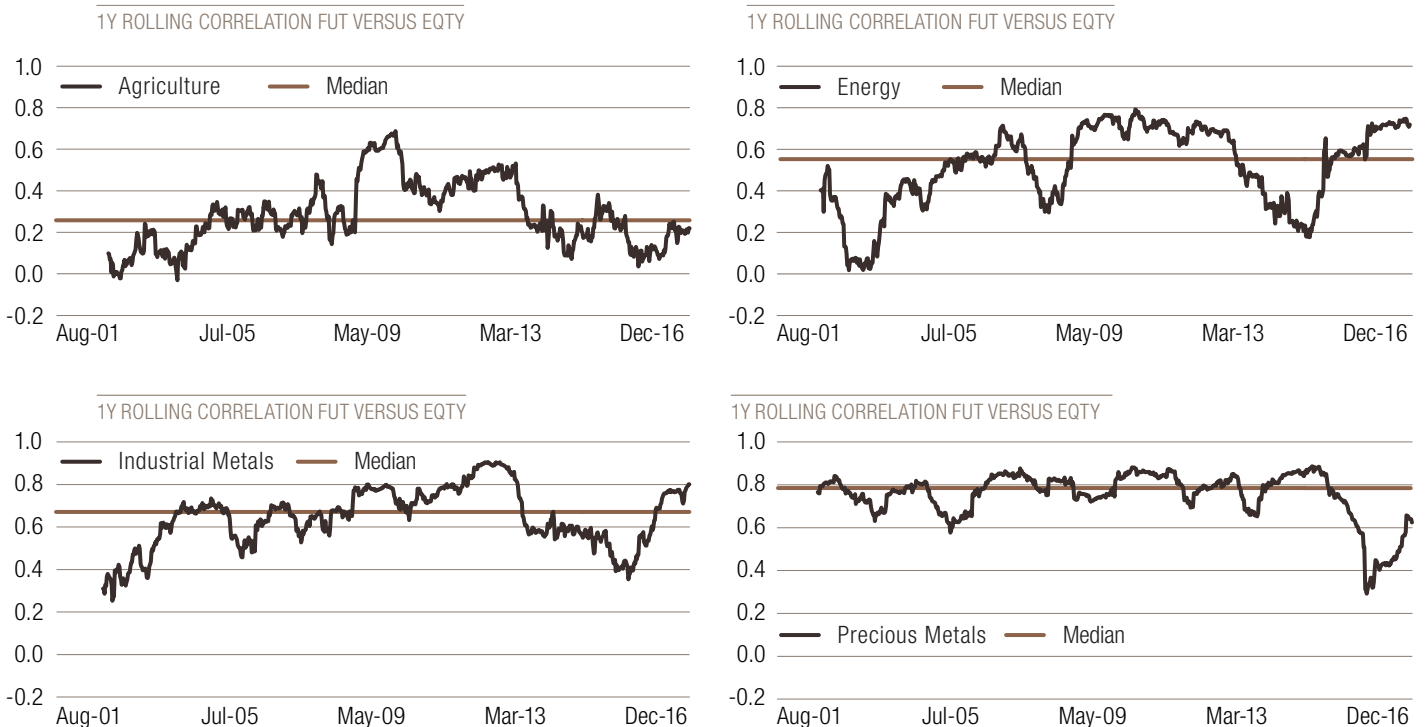
But even over the long term, the price of a commodity is only one factor influencing a producer's earnings, and not always the main one. Indeed, most producers have hedging programmes precisely

to smooth out some of the commodity-price volatility. Then there are all the other fundamental factors to consider, such as how well the business is managed, the quality of its assets, its regulatory and competitive environment, and so on.

Add the time lags between changes in commodity prices and financial results, and it's easy to see why short-term correlations between equity sectors and their underlying commodities are unstable and even, on rare occasions, negative.

Figure 4 shows the one-year rolling correlation between four commodity-complex futures indices and their equity counterparts. We can see the relatively low correlations observed for commodities such as agriculture and energy – we have occurrences with negative correlation to equity. While over the long term the correlation of metals futures with related equities seems relatively high, periods of low correlation occurs. The variability in the observed rolling correlations clearly indicates the absence of any structure between the future index and its corresponding equity index counterpart. As expected, equity-related risks often drown out the commodity risks, which clearly suggests that equity indices are not the optimal way to access commodities.

FIG. 4 CORRELATION BETWEEN EQUITY SECTORS AND RESPECTIVE COMMODITIES HAS BEEN UNSTABLE AND EVEN NEGATIVE

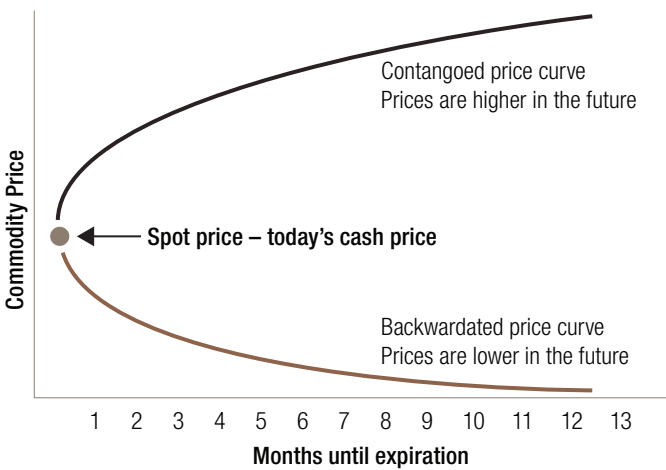


Sources: LOIM, Bloomberg. Annual rolling correlations of weekly returns. Commodities represented by the S&P GSCI Agriculture Index (SPGCAGTR), and the Energy (SPGCENTR), Industrial Metals (SPGCINTR) and Precious Metals (SPGCPMTR) Total Return Indices. Equity sectors represented by MSCI World Agriculture & Food Chain Index (M1W00AGF), MSCI World Energy Sector Index (MXW00EN), MSCI ACWI Select Metal & Mining Producers Ex Gold & Silver Index (MXWDS1PI), and Thomson Reuters CRB Precious Metals Producers Index (CRBGX). For illustrative purposes only.

We regard commodity futures contracts as the purest and most practical way to access commodity returns, which have the advantages of being liquid, exchange traded, standardised and free of the delivery and operational burdens of physical commodities.

A futures contract offers the opportunity to buy or sell a predetermined amount of a commodity on a specific date and at a specific price. Plotting the price of a commodity for delivery at various points in the future, using a number of contracts with different maturities, forms a futures-price curve. As shown in Figure 5, when future prices are expected to be higher than current (or “spot”) prices, the futures-price curve is said to be in **contango**. When future prices are expected to be lower than spot prices, the futures-price curve is said to be in **backwardation**.

FIG. 5 COMMODITY FUTURES-PRICE CURVES: CONTANGO AND BACKWARDATION



Source: LOIM. For illustrative purposes only.

While backwardation is not wholly unusual, and is associated with imbalances in supply and demand due to seasonality, drought, war or other supply disruptions, the prevalent case is a curve in contango: the further into the future a commodity has been contracted for delivery, generally the higher its price due to the costs of storing and insuring it in the meantime.

The risk associated with futures: roll yield

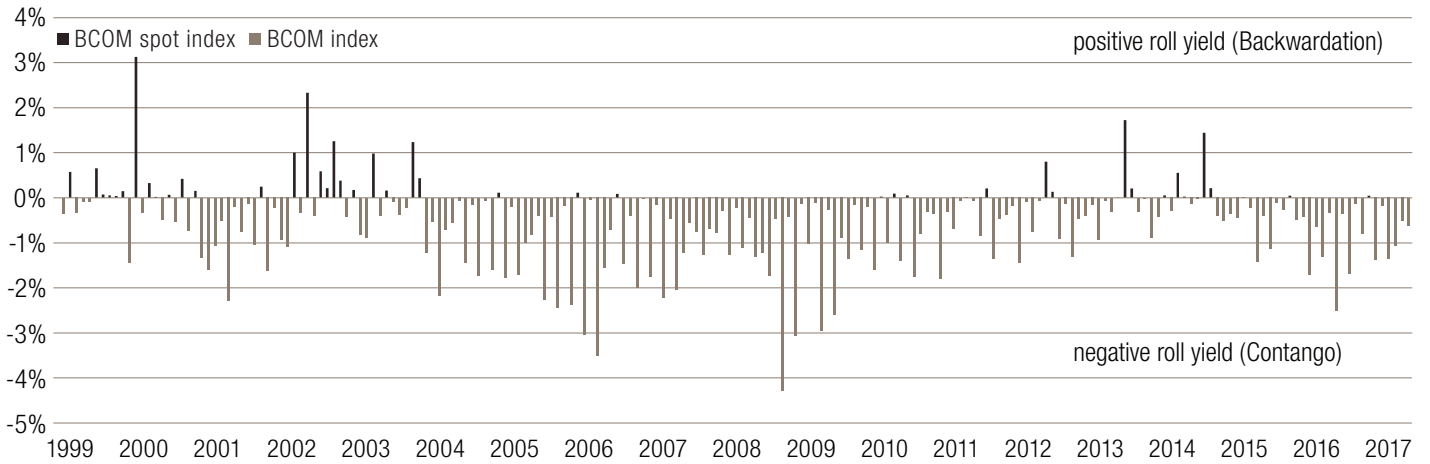
When a breakfast-cereal producer or an oil refinery buys a futures contract, it often intends to accept delivery of the promised corn or crude oil when the contract matures. Not many pension funds, wealth managers, retail investors or commodity-index providers want physical commodities turning up at their front door. Financial investors wanting to maintain exposure to commodity prices will be reminded by their brokers to “roll” out of maturing contracts – by selling them through intermediaries – and enter into later-dated contracts.

It follows that, all other things being equal, when the futures-price curve is in contango (future prices are higher than the spot price), rolling involves buying a contract that is more expensive than the one being sold. The investor experiences this as a loss known as a “negative roll yield”. When the curve is in backwardation, the investor buys a cheaper contract than the one they sell, earning a positive roll yield.

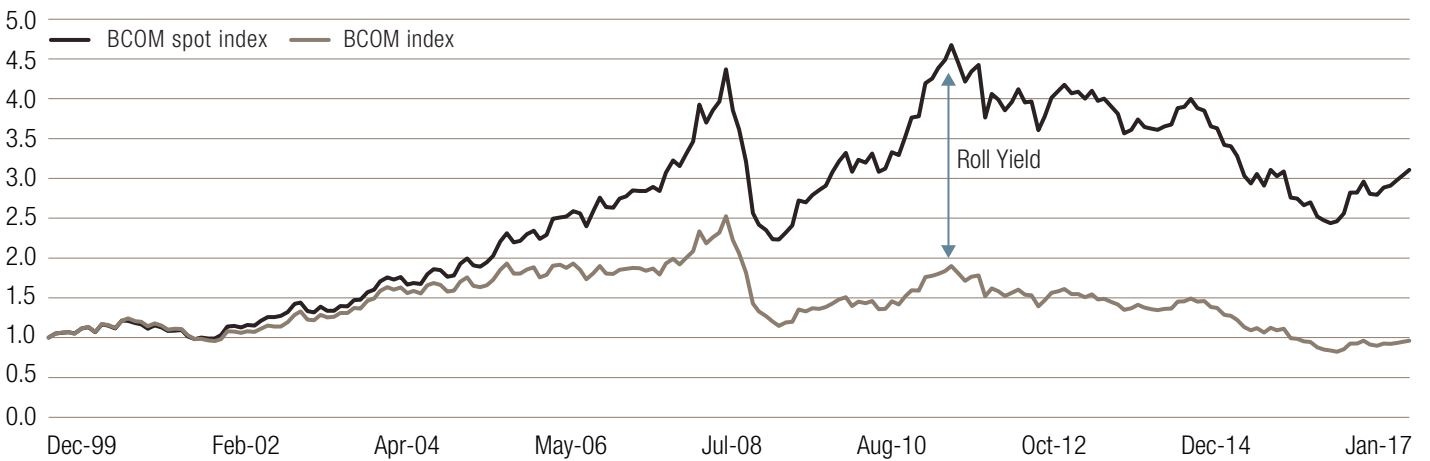
The result is illustrated in the first chart in Figure 6. The second chart compares the spot price of a commodity, with an index that rolls its contract exposure to maintain a front-month futures exposure. It shows that, historically, the prevalence of contango has imposed costs that have substantially eroded returns. The same effect is shown by the fact that commodities whose futures-price curves have spent a higher proportion of time in backwardation have tended to deliver the highest average returns, as exhibited in the third chart.

FIG. 6 NEGATIVE ROLL YIELD CAN SUBSTANTIALLY ERODE RETURNS

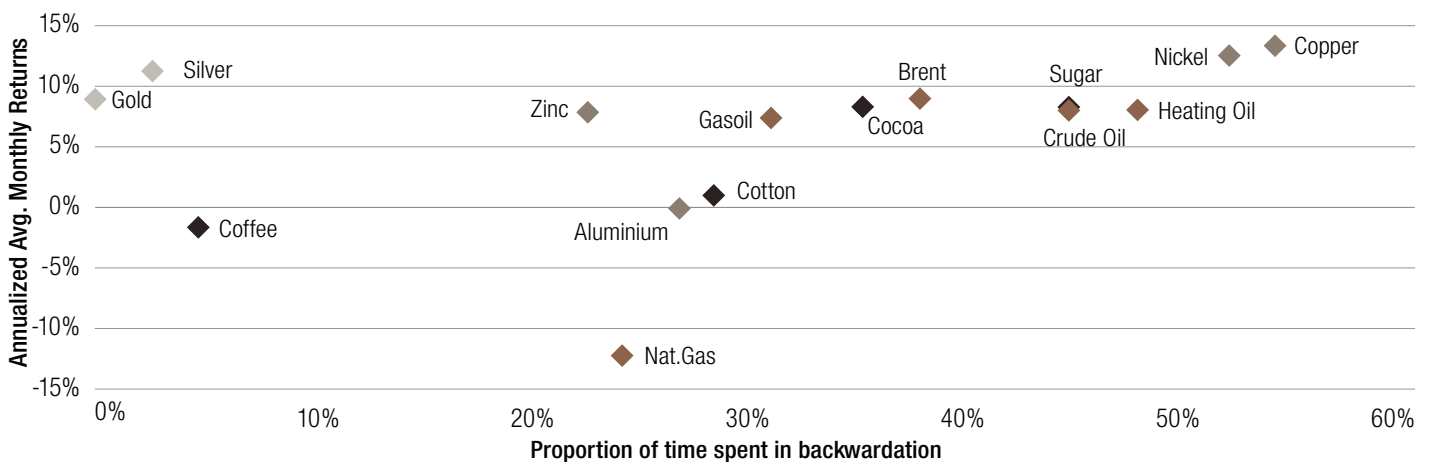
ROLL YIELDS FOR DISCRETE MONTHS, BCOM INDEX, 1999 TO 2016



CUMULATIVE IMPACT OF MONTHLY ROLL YIELDS, 1999 TO 2016



RELATIONSHIP BETWEEN FUTURES CURVE SHAPE AND RETURNS, JANUARY 2001 TO OCTOBER 2016



Sources: LOIM, Bloomberg. Past performance is not a guarantee of future results.

The limitations of traditional commodity indices

Rather than buying individual commodity futures contracts, most investors will choose the more convenient approach of gaining exposure via a commodity-futures index. There are two major, widely-used commodity indices: the Bloomberg Commodity Index (BCOM) and the S&P Goldman Sachs Commodity Index (SPGSCI). In our opinion, these indices suffer from three major drawbacks, as follows.

1. Allocation based on production

Weighting the indices by the amount of each commodity produced results in a large concentration in the energy complex. This concentration effect is compounded by the fact that the prices of the individual commodities in the energy complex are quite closely correlated with one another (Figure 7).

FIG. 7 CORRELATIONS HAVE BEEN HIGH WITHIN THE ENERGY COMPLEX

	SOYBEANS	CORN	SUGAR	WHEAT	COFFEE	COTTON	COCOA	LIVE CATTLE	LEAN HOGS	COPPER	ALUMINUM	ZINC	NICKEL	GOLD	SILVER	CRUDE OIL	NATURAL GAS	BRENT	HEATING OIL	GASOIL	GASOLINE
SOYBEANS	100%	66%	20%	44%	14%	30%	19%	9%	2%	26%	27%	20%	21%	16%	21%	20%	16%	22%	20%	19%	20%
CORN	66%	100%	20%	64%	14%	23%	17%	5%	2%	19%	19%	13%	18%	18%	21%	18%	13%	18%	16%	14%	17%
SUGAR	20%	20%	100%	18%	18%	13%	16%	8%	4%	17%	17%	13%	14%	9%	15%	17%	9%	18%	17%	15%	18%
WHEAT	44%	64%	18%	100%	14%	24%	12%	3%	5%	20%	16%	14%	14%	15%	16%	14%	8%	15%	14%	12%	14%
COFFEE	14%	14%	18%	14%	100%	12%	15%	3%	2%	14%	16%	15%	14%	10%	18%	11%	5%	12%	10%	6%	9%
COTTON	30%	23%	13%	24%	12%	100%	18%	5%	3%	21%	16%	17%	19%	11%	14%	17%	4%	18%	14%	14%	16%
COCOA	19%	17%	16%	12%	15%	18%	100%	7%	2%	17%	19%	15%	12%	22%	24%	17%	7%	18%	15%	14%	18%
LIVE CATTLE	9%	5%	8%	3%	3%	5%	7%	100%	29%	9%	8%	6%	8%	-1%	-1%	10%	8%	10%	8%	7%	10%
LEAN HOGS	2%	2%	4%	5%	2%	3%	2%	29%	100%	2%	2%	5%	4%	3%	2%	3%	4%	4%	2%	1%	1%
COPPER	26%	19%	17%	20%	14%	21%	17%	9%	2%	100%	64%	64%	56%	26%	36%	28%	10%	30%	27%	25%	28%
ALUMINUM	27%	19%	17%	16%	16%	16%	19%	8%	2%	64%	100%	60%	50%	22%	32%	26%	14%	27%	24%	25%	25%
ZINC	20%	13%	13%	14%	15%	17%	15%	6%	5%	64%	60%	100%	52%	24%	34%	21%	7%	23%	20%	20%	21%
NICKEL	21%	18%	14%	14%	14%	19%	12%	8%	4%	56%	50%	52%	100%	18%	29%	29%	8%	29%	25%	21%	26%
GOLD	16%	18%	9%	15%	10%	11%	22%	-1%	3%	26%	22%	24%	18%	100%	73%	17%	8%	18%	17%	17%	16%
SILVER	21%	21%	15%	16%	18%	14%	24%	-1%	2%	36%	32%	34%	29%	73%	100%	25%	8%	26%	23%	23%	23%
CRUDE OIL	20%	18%	17%	14%	11%	17%	17%	10%	3%	28%	26%	21%	29%	17%	25%	100%	28%	95%	90%	83%	88%
NATURAL GAS	16%	13%	9%	8%	5%	4%	7%	8%	4%	10%	14%	7%	8%	8%	8%	28%	100%	28%	36%	31%	29%
BRENT	22%	18%	18%	15%	12%	18%	18%	10%	4%	30%	27%	23%	29%	18%	26%	95%	28%	100%	91%	86%	88%
HEATING OIL	20%	16%	17%	14%	10%	14%	15%	8%	2%	27%	24%	20%	25%	17%	23%	90%	36%	91%	100%	91%	87%
GASOIL	19%	14%	15%	12%	6%	14%	14%	7%	1%	25%	25%	20%	21%	17%	23%	83%	31%	86%	91%	100%	80%
GASOLINE	20%	17%	18%	14%	9%	16%	18%	10%	1%	28%	25%	21%	26%	16%	23%	88%	29%	88%	87%	80%	100%

Sources: LOIM, Bloomberg. Commodities are represented by their respective BCOM Sub Indices. Weekly data, 31 August 1992 to 31 December 2016.

As well as undermining the diversification benefits that come from other parts of the complex (for example, precious metals have tended to deliver attractive downside protection during recessions), weighting allocation by production is somewhat counterintuitive as, typically, a decrease in production will tend to result in an increase in price. The BCOM Index adds concentration limits and therefore remains relatively well diversified, but the SPGSCI Index gets more than 55% of its exposure from the energy complex.

2. Yearly rebalancing

The two major commodity-futures indices rebalance to their standard weightings once a year. This makes them slow to react to changing commodity prices: should one commodity or complex perform in a markedly different way from the rest in between rebalancings, the index can develop a significant concentration of risk and become subject to boom-and-bust cycles.

3. Rolling contracts with short-dated maturities

Traditional indices typically buy front-month or other nearby contracts, depending on the availability for each commodity. This has major drawbacks: by limiting themselves to the front end of the curve, these indices typically suffer from a higher and more frequent negative roll yield due to contango.

FIG. 8 CONSTRUCTION METHODOLOGIES OF THE TWO MAJOR COMMODITY FUTURES INDICES

INDEX	SECTOR WEIGHTS	COMPONENTS AND WEIGHTS	CONTRACTS AND ROLL FREQUENCY
Bloomberg Commodity Index	Energy: 30.57% Agriculture: 36.75% Industrial Metals: 17.39% Precious Metals: 15.29%	22 commodities Rebalanced in January on price % basis Annual committee takes place in June to define weights	Contracts dated 1-3 months out Monthly roll
S&P Goldman Sachs Commodity Index	Energy: 56.24% Agriculture: 19.88% Industrial Metals: 9.71% Precious Metals: 4.93%	24 commodities Rebalanced annually Weights based on five-year world production	Contracts dated 1-3 months out Monthly roll

Sources: Bloomberg, Standard & Poor's.

Addressing traditional index limitations: the LOIM approach

Given these problems of negative roll yield, lack of diversification and lack of reactivity, is there a better way to construct a commodity-futures index?

We believe there is. A number of index manufacturers have been exploring a wide variety of ways to mitigate the energy bias associated with world production-based weighting, and the negative roll yield that comes with curves in contango. At LOIM, we regarded the limitations of the traditional commodity futures indices to be so severe that we too developed our own investable indices back in 2011: the LOIM Commodity Index and the LOIM Commodity Ex-Agri Index.

We designed these indices with the specific aim of addressing the three limitations we saw in traditional indices, as well as a fourth concern for ethical investors regarding agricultural commodities:

- 1. Diversification:** our indices deploy a risk-based weighting methodology
- 2. Reactivity:** our indices rebalance monthly, not yearly
- 3. Roll yield:** our indices deploy an enhanced roll methodology
- 4. Ethical issues:** our indices exclude essential food commodities.

To create a broad index for the asset class, we include three broad sectors: agriculture, metals (containing both industrial and precious metals) and energy. We select assets based on their liquidity, stability, tradability and similarity with commodities

commonly traded in traditional commodity indices. And, in accordance with LOIM's Responsible Investing Policy, we exclude the essential food commodities corn, wheat, soybeans and rice. The full LOIM commodities universe is shown in Figure 9.

FIG. 9 THE LOIM COMMODITIES UNIVERSE

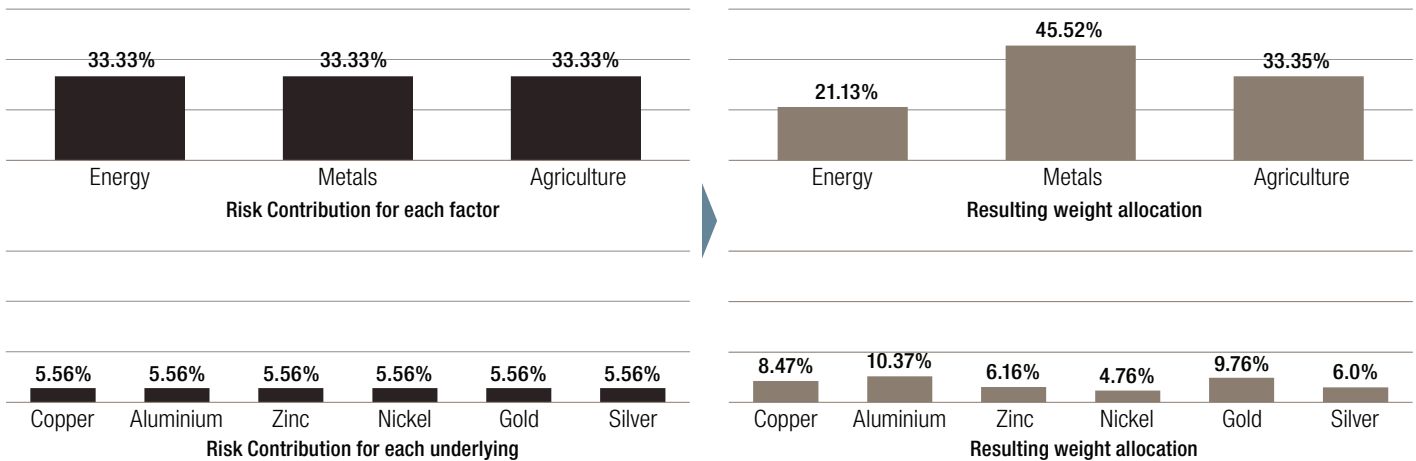
SECTORS	COMMODITY	EXCHANGE	BLOOMBERG TICKER
AGRICULTURE	Coffee	ICE/NYBOT	LOIMDRKC Index
	Cotton	ICE/NYBOT	LOIMDRCT Index
	Sugar	ICE/NYBOT	LOIMDRSB Index
	Cocoa	ICE/NYBOT	LOIMDRCC Index
	Live Cattle	ICE/NYBOT	LOIMDRLC Index
	Lean Hogs	ICE/NYBOT	LOIMDR LH Index
METALS	Copper	LME	LOIMDRLP Index
	Aluminum	LME	LOIMDR LA Index
	Zinc	LME	LOIMDR LX Index
	Nickel	LME	LOIMDR LN Index
	Gold	COMEX	LOIMDR GC Index
	Silver	COMEX	LOIMDR SI Index
ENERGY	WTI Crude	NYMEX	LOIMDR CL Index
	Brent Crude	ICE	LOIMDR CO Index
	Heating Oil	NYMEX	LOIMDR HO Index
	Natural Gas	NYMEX	LOIMDR NG Index
	Unleaded Gasoline	NYMEX	LOIMDR XB Index
	Gasoil	ICE	LOIMDR QS Index

Sources: LOIM, Bloomberg. For illustrative purposes only.

We believe in the merits of diversification. That is why we regard the energy concentration of the traditional production-weighted indices as so undesirable. Some index providers have created products that mechanically cap weights, while others have experimented with alternative weighting systems, such as by

consumption rather than production. At LOIM, we decided to apply an intuitive approach focused on diversification: we weight the risk contribution of each commodity to its sector equally, and the risk contribution of each sector to the portfolio equally (Figure 10).

FIG. 10 EQUALISING THE RISK CONTRIBUTION FROM EACH COMMODITY AND EACH SECTOR



Source: LOIM. The resulting capital weights will fluctuate as the risk profiles of each commodity change over time. The capital weights shown are illustrative only and do not represent the actual weights at any particular point in time. The charts only show the underlying commodity risk and capital weights for the metals sector.

Each commodity is characterised by a specific risk, which we assess by the commodity's:

- Expected shortfall
- Curve structure

Expected shortfall is a risk measure that is more sensitive to potential losses and therefore seems particularly suitable for the commodity asset class, where extreme price movements can be quite common. In our process, the risk measure for each underlying commodity is the one-year shortfall expected with a 90% confidence level – in other words, the expected return in the worst 10% of cases of one-year returns.

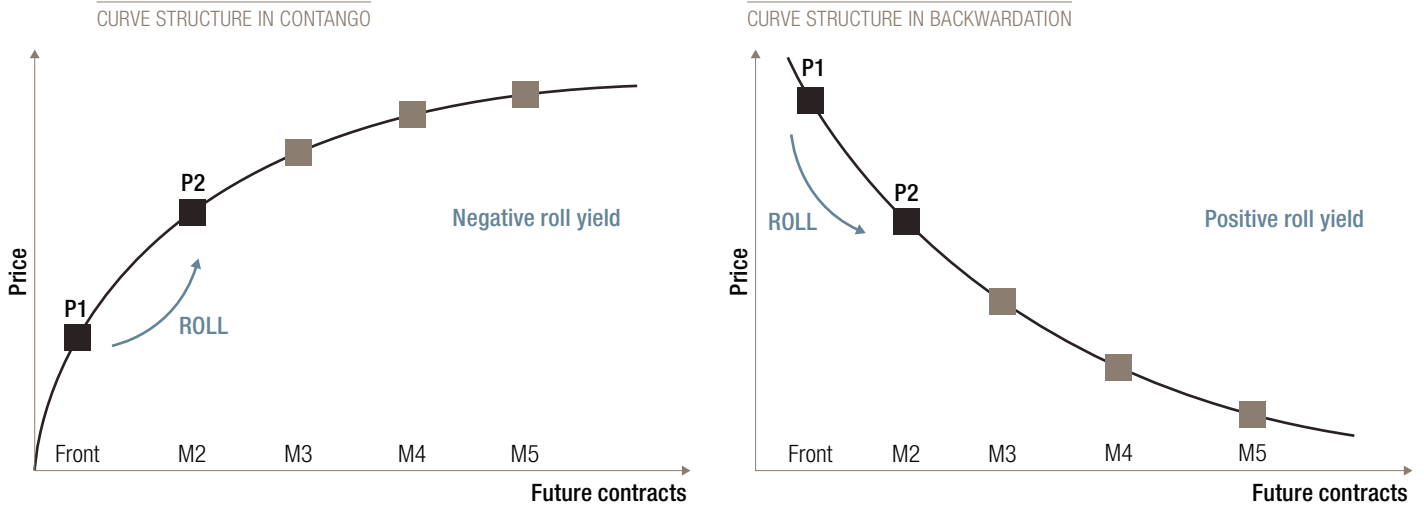
We adjust this to take account of the average cost of rolling from one futures contract to the next, so that contango is considered as a risk in order to mitigate the negative roll yield. In practice, this means that we increase the expected shortfall measure for commodities with futures curves in steep contango, resulting in a smaller weighting in the index – note that we do not decrease expected shortfall when a curve is backwardated.

The result is that overall portfolio diversification is improved and the typical traditional indices' unbalanced exposure to energy is neutralised. Our approach also maintains a more significant exposure to precious metals, which have tended to perform well during recessions, offering downside protection.

Starting out with a properly diversified weighting to different commodities is all well and good, but a lot of that diversification can be lost if prices diverge substantially in between rebalancings. By rebalancing once a month rather than once a year, the LOIM indices: react and adapt to specific market events and new market conditions; take profits every month, effectively trading price mean-reversion; and preserve the diversification benefits of their equal-risk weighting.

Finally, we have tried to find a solution to the problem of incurring a negative roll yield when futures-price curves are in contango. As we have seen, frequently rolling futures contracts into a curve that is upward-sloping is a bit like trying to run up a down escalator. Furthermore, the near-dated part of the curve where traditional indices roll tends to be the steepest and most costly.

FIG. 11 ROLLING ON A CURVE IN CONTANGO IS LIKE RUNNING UP THE DOWN ESCALATOR

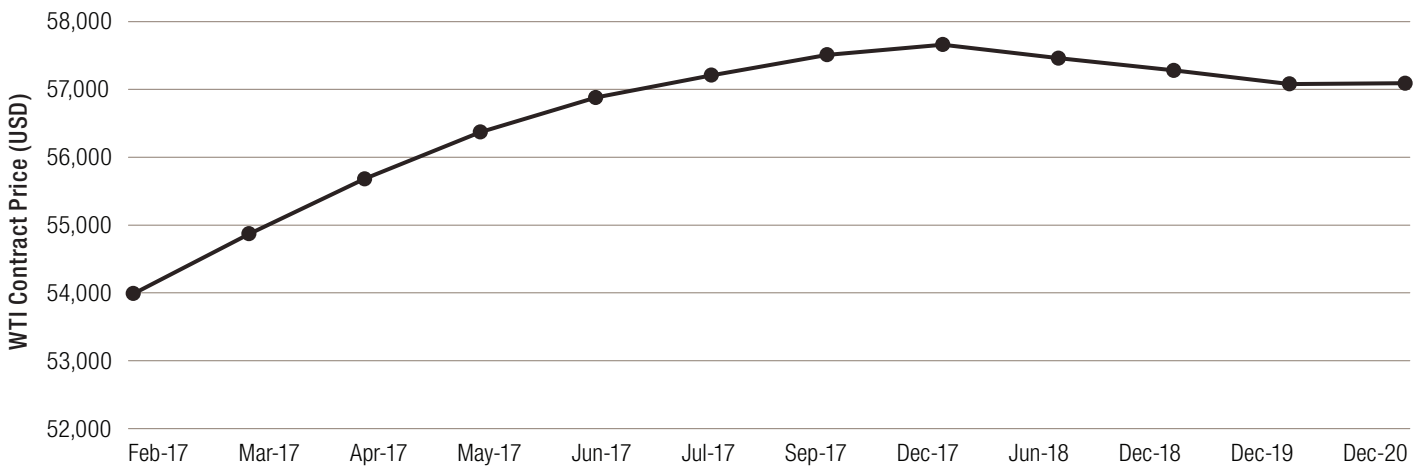


Source: LOIM. For illustrative purposes only.

The perfectly convex and concave theoretical curves shown in Figure 11 would suggest that the best an investor could hope to do when faced with contango is to minimise the negative roll yield by rolling between contracts further out on the curve, where the contango is shallower. In reality, curves tend to be irregular, with kinks at certain dates, meaning that a curve that is generally in contango can have some sections that are backwardated. These

sections suggest the possibility of positioning in contracts that will incur a lower or even a positive yield when the time comes to roll them. The futures-price curve for WTI crude oil in mid-January 2017, shown in Figure 12, is an example of such a kinked curve: the curve is clearly in contango, but after the December 2017 contract it slopes downwards for two years.

FIG. 12 THE WTI CRUDE OIL FUTURES CURVE ON 9 JANUARY 2017



Source: Bloomberg.

This is why we have developed an optimised roll methodology that looks at the curve structure of the commodities in our indices. For each underlying asset, we determine a rolling matrix containing all the eligible maturities at a given time. Roll yield is calculated for each eligible maturity and the contract with the cheapest roll yield is retained for the index.

To illustrate the methodology, let's walk through the example of all the eligible maturities for WTI Crude Oil, assuming that our rebalancing occurred on 9 January 2017 – thus presenting us with the curve illustrated in Figure 12. In order to select the optimal contract, we compute the implied roll yield for each candidate contract as follows:

$$IRY_i = \frac{(P_{i-1} - P_i)}{P_i * (D_i - D_{i-1})}$$

with P the price and D the number of months between the front-month contract and the eligible contract's maturity.

The results for our 12 eligible contracts can be seen in Figure 13: the optimal contract to move to on this rebalancing date – i.e., the one with the highest one-month implied roll yield – was the June 2018 contract. The base hypothesis is that the price implied by the futures contract maturing one month later than the contract the index buys will be the realised price in one month's time, when the index needs to rebalance again.

Of course, future price expectations do move and it is likely that the realised price in one month will not be the same as the implied price today. But by optimising in this way, the index greatly improves the probability of a positive – or less negative – roll yield when a curve is in contango, compared with an index that invariably rolls from a front-month or other near-dated contract.

FIG. 13 IMPLIED ROLL YIELD OF EACH WTI CRUDE OIL CONTRACT ON 9 JANUARY 2017

FUTURES	FEB-17	MAR-17	APR-17	MAY-17	JUN-17	JUL-17	SEP-17	DEC-17	JUN-18	DEC-18	DEC-19	DEC-20
Contract Price (USD)	53,990	54,870	55,680	56,370	56,880	57,210	57,510	57,660	57,460	57,280	57,080	57,090
D		1	2	3	4	5	7	10	16	22	34	46
Implied Roll Yield		-0.016	-0.0145	-0.0122	-0.009	-0.0058	-0.0026	-0.0009	0.0006	0.0005	0.0003	0

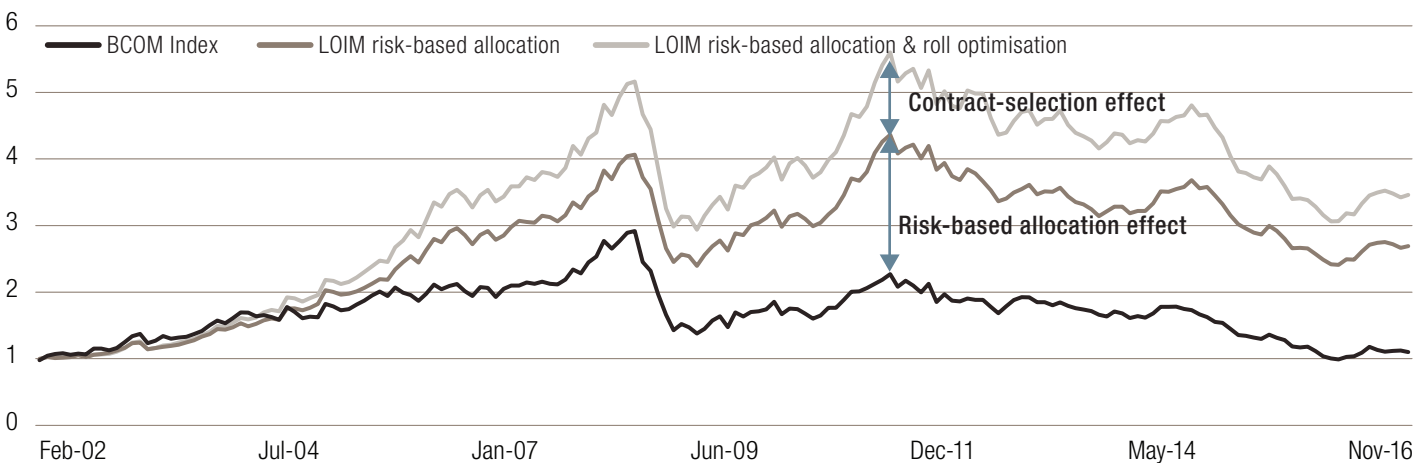
Sources: LOIM, Bloomberg. For illustrative purposes only.

Figure 14 shows the potential added value of both using a risk-based allocation to weight commodities in the index and deploying an optimised, dynamic roll methodology, relative to the traditional approach of the BCOM Index. The bottom line shows the performance of the BCOM Index since 2002; the second line shows what the performance of the LOIM risk-based allocation

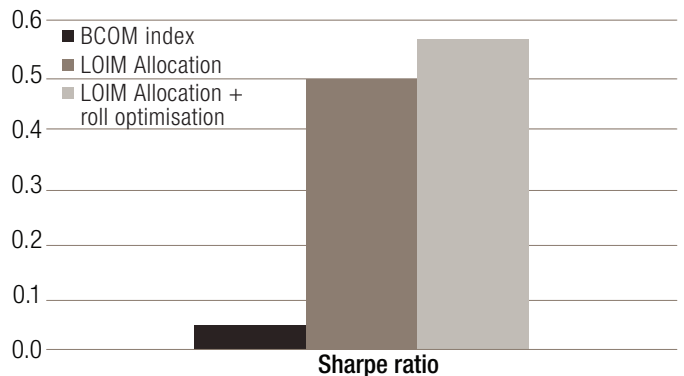
methodology would have been, implemented with front-month futures; and the top line shows the performance of the LOIM Commodity Index itself. The chart indicates that returns have been enhanced by both innovations. Volatility has also been lower, leading to an Sharpe ratio of 0.57 for the LOIM Index, compared with 0.04 for the BCOM Index.

FIG. 14 RISK-BASED WEIGHTING AND OPTIMISED ROLLING HAVE BOTH ENHANCED PERFORMANCE

RETURN DECOMPOSITION, FEBRUARY 2002 TO OCTOBER 2016



SHARPE RATIOS, FEBRUARY 2002 TO OCTOBER 2016



Sources: Bloomberg, LOIM. These performance results are backtested based on an analysis of past market data with the benefit of hindsight, do not reflect the performance of any LOIM product and are being shown for informational purposes only. While the results presented are based on certain assumptions that are believed to reflect actual trading conditions, these assumptions may not include all the variables that can affect, or have affected in the past, the execution of trades. The hypothetical portfolio results are based on the following assumptions: (1) The hypothetical portfolio record does not include deductions for brokerage commissions, exchange fees or slippage; (2) It assumes purchase and sale prices believed to be attainable. In actual trading, the prices attained may or may not be the same as the assumed order prices; (3) The portfolio results do not take into account any tax implications arising from the sale or purchase of securities, which in actual trading do have an impact on gains and losses. Index returns rebased to 1.0 at the start of the period.

Conclusion:

A strategic case, a tactical opportunity, an enhanced solution

Strategically, commodities have offered both portfolio diversification and a compelling risk-return profile throughout past growth and inflation cycles. Tactically, we believe that we are entering a period of deflation that could benefit commodities, which have tended to perform well as inflation rises.

The most reliable option for gaining access to commodities is a commodity futures index, as investing through equities is an uncertain strategy, in our view. However, traditional indices tend to be suboptimal because their construction often results in a high degree of concentration in a single sector or commodity (usually energy and especially crude oil), as well as high costs from rolling futures contracts when futures-price curves are in contango.

At LOIM we argue for an enhanced approach to commodity futures indexing that addresses these issues. Since 2011, we have offered investable indices that achieve this by using an equal risk-weighting methodology and by optimising futures contract selection to minimise negative roll yield. The combination of these innovations can be shown to have delivered improved risk-adjusted returns for commodity index investors.

Important information

For professional investors only

This document has been prepared by Lombard Odier Funds (Europe) S.A. and is issued by Lombard Odier Asset Management (Europe) Limited, a private limited company incorporated in England and Wales with registered number 07099556, having its registered office at Queensberry House, 3 Old Burlington Street, London, United Kingdom, W1S 3AB, authorised and regulated by the Financial Conduct Authority (the "FCA") and entered on the FCA register with registration number 515393. Lombard Odier Investment Managers ("LOIM") is a trade name.

Views and opinions expressed are for informational purposes only and do not constitute a recommendation by LOIM to buy, sell or hold any security. Views and opinions are current as of the date of this presentation and may be subject to change. They should not be construed as investment advice.

This document is provided for informational purposes only and does not constitute an offer or a recommendation to purchase or sell any security or service. It is not intended for distribution, publication, or use in any jurisdiction where such distribution, publication, or use would be unlawful. This document does not contain personalized recommendations or advice and is not intended to substitute any professional advice on investment in financial products. Before entering into any transaction, an investor should consider carefully the suitability of a transaction to his/her particular circumstances and, where necessary, obtain independent professional advice in respect of risks, as well as any legal, regulatory, credit, tax, and accounting consequences. This document is the property of LOIM and is addressed to its recipients exclusively for their personal use. It may not be reproduced (in whole or in part), transmitted, modified, or used for any other purpose without the prior written permission of LOIM. The contents of this document are intended for persons who are sophisticated investment professionals and who are either authorised or regulated to operate in the financial markets or persons who have been vetted by LOIM as having the expertise, experience and knowledge of the investment matters set out in this document and in respect of whom LOIM has received an assurance that they are capable of making their own investment decisions and understanding the risks involved in making investments of the type included in this document or other persons that LOIM has expressly confirmed as being appropriate recipients of this document. If you are not a person falling within the above categories you are kindly asked to either return this document to LOIM or to destroy it and are expressly warned that you must not rely upon its contents or have regard to any of the matters set out in this document in relation to investment matters and must not transmit this document to any other person. This document contains the opinions of LOIM, as at the date of issue. The information and analysis contained herein are based on sources believed to be reliable. However, LOIM does not guarantee the timeliness, accuracy, or completeness of the information contained in this document, nor does it accept any liability for any loss or damage resulting from its use. All information and opinions as well as the prices indicated may change without notice. Neither this document nor any copy thereof may be sent, taken into, or distributed in the United States of

America, any of its territories or possessions or areas subject to its jurisdiction, or to or for the benefit of a United States Person. For this purpose, the term "United States Person" shall mean any citizen, national or resident of the United States of America, partnership organized or existing in any state, territory or possession of the United States of America, a corporation organized under the laws of the United States or of any state, territory or possession thereof, or any estate or trust that is subject to United States Federal income tax regardless of the source of its income.

Source of the figures: Unless otherwise stated, figures are prepared by LOIM.

Important information on benchmarks

Any benchmarks/indices cited herein are provided for information purposes only. No benchmark/index is directly comparable to the investment objectives, strategy or universe of a fund. The performance of a benchmark shall not be indicative of past or future performance of any fund. It should not be assumed that the relevant fund will invest in any specific securities that comprise any index, nor should it be understood to mean that there is a correlation between such fund's returns and any index returns.

Important information on portfolio composition

The portfolio information provided in this document is for illustrative purposes only and does not purport to be a recommendation of an investment in, or a comprehensive statement of all of the factors or considerations which may be relevant to an investment in, the referenced securities. They illustrate the investment process undertaken by the manager in respect of a certain type of investment, but may not be representative of the Fund's past or future portfolio of investments as a whole and it should be understood that they will not of themselves be sufficient to give a clear and balanced view of the investment process undertaken by the manager or of the composition of the investment portfolio of the Fund. As the case may be, further information regarding the calculation methodology and the contribution of each holding in the representative account to the overall account's performance can be obtained by the Fund or the Management Company.

The strategy may include the use of derivatives. Derivatives often involve a high degree of financial risk because a relatively small movement in the price of the underlying security or benchmark may result in a disproportionately large movement in the price of the derivative and are not suitable for all investors. No representation regarding the suitability of these instruments and strategies for a particular investor is made.

Alternative investments often engage in leverage and other investment practices that are extremely speculative and involve a high degree of risk. Such practices may increase the volatility of performance and the risk of investment loss, including the loss of the entire amount invested. Alternative investments may themselves invest in instruments that may be highly illiquid and difficult to value. This may also limit your ability to redeem or transfer your investment or delay receipt of redemption proceeds. We refer you to the offering materials for a more complete discussion of the risks relating to an investment in any particular alternative investment.

©2017 Lombard Odier IM. All rights reserved.



LOMBARD ODIER
INVESTMENT MANAGERS

www.lombardodier.com