


# The curve

Commodity Indices and the curve







To better understand the impact of changing curve shapes on commodity index investments, we have closely examined the performance of commodity indices under different curve conditions.

This report was produced by UBS Investment Bank and UBS Asset Management

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## Introduction

Against the backdrop of rising inflation risks and widespread supply threats, we think the case for investing in commodities has rarely been stronger. Investors seem to agree and have increased their broad commodity exposure so far in 2018.

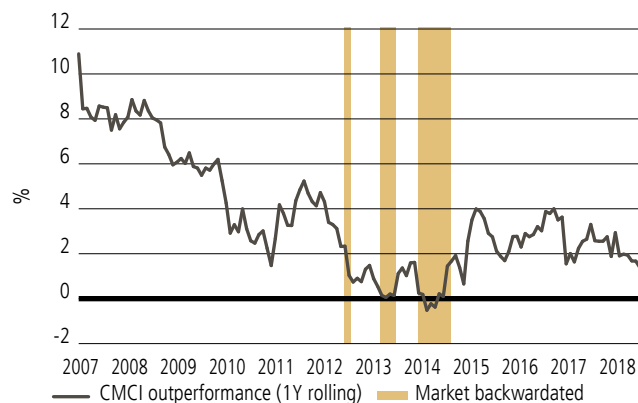
Global inflows into broad commodity ETFs exceeded 4.8bn US dollars by the end of May 2018. This is more than double the full-year 2017 inflows of 1.8bn USD<sup>1</sup>.

Strong economic growth and above-trend inflation have historically been good indicators of strong commodities performance. In this paper, we take a closer look at another important commodity performance driver – curve shapes and the impact of roll yield.

Oil's recent transition into a period of sustained backwardation, where longer dated oil futures are cheaper than near-dated futures, is the first such period since 2014. Clients have asked us what sort of implications this situation might have on their commodity index performance.

To help address this, we have examined our flagship UBS Bloomberg Constant Maturity Commodity Index (CMCI) to analyse its performance under different curve shapes over its 11-year history.

**Exhibit 1 CMCI outperformance under different market conditions, 31 January 2007 – 30 June 2018**



Source: UBS, Bloomberg, as of 30 June 2018. CMCI outperformance is the outperformance of the UBS Bloomberg BCOM Constant Maturity Index ER against the Bloomberg Commodity Index ER. Past performance is not a reliable indicator of future returns

### Roll yield

Commodity indices typically represent a diversified, long-only basket of exchange-traded commodity futures. To provide continuous exposure, index investments have to sell out of their expiring futures and roll into futures with a longer-dated maturity. The difference in price between the near-dated future and the far-dated future is called the "roll yield". It plays a large part in driving the overall performance of a commodity index investment alongside commodity spot performance.

<sup>1</sup> Source: UBS, Morningstar, as of 31 May 2018

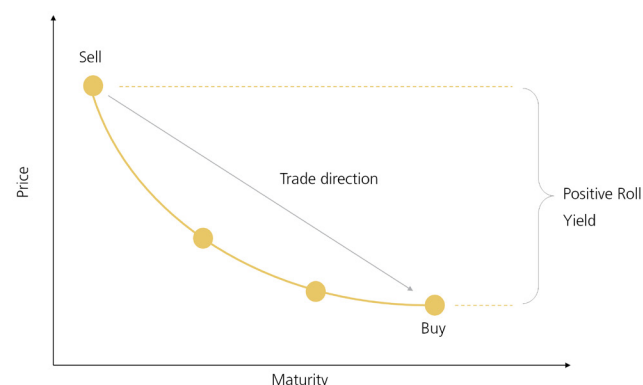
### Backwardation

Roll yield is positive when the price of the expiring future is higher than the price of the far-dated futures. This can occur when participants prefer to hold a physical commodity rather than a future, perhaps due to short-term supply disruptions. The premium for short-term delivery is often referred to as the "convenience yield".

For example, Aluminium markets temporarily entered a period of backwardation in April 2018, when the USA imposed sanctions on Rusal, one of the largest aluminium producers in the world.

In these conditions, the market is "backwardated" and the positive roll yield makes a positive contribution to commodity index investment returns

**Exhibit 2 Backwardation curve – illustrative example**



Note: For illustrative purposes only

### Contango

Roll yield is negative when the prices of far-dated futures are higher than the price of the expiring future. Markets are said to be in "contango". The price difference is largely driven by a commodity's "cost of carry" – i.e. storage, transportation and any other costs associated with physically holding the commodity. Note how costs of carry are still there in a backwardated market, but the convenience yield for holding the physical asset outweighs its cost of carry at the time. Negative roll yields are a drag on commodity index investment returns and a number of different strategies exist to try and mitigate these adverse costs.

**Exhibit 3 Contango curve – illustrative example**



Note: For illustrative purposes only

## Rolling methodologies

First generation indices, such as the Bloomberg Commodity Index (BCOM), are a common investment choice. They typically implement a simple "front-month" rolling methodology – this means they hold a single future until it approaches expiry, then roll into a new future slightly further along the curve, and repeat. By contrast, the UBS Bloomberg Constant Maturity Commodity Index (CMCI) aims to mitigate the cost of carry by simultaneously investing at multiple points along the curve and rolling a small portion of its investment every day, thus maintaining a constant maturity. This is an example of a second generation commodity index.

We are going to see whether the CMCI rolling methodology historically outperforms a first generation rolling methodology under different market conditions.

For more information on the CMCI rolling methodology, please [click here](#).

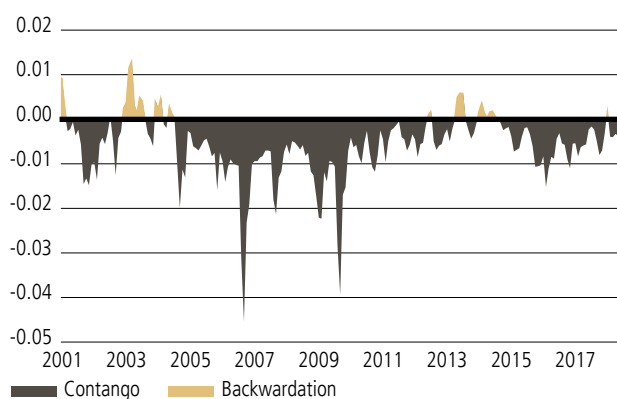
## Curve shape analysis

To begin our comparison, we construct a curve shape time series for each commodity in our reference index by measuring the slope of the curve around the expiring futures. An upward slope implies negative roll yield, while a downward slope implies positive roll yield. The curve shape time series is presented as a commodity's roll yield on a given day and provides an indication of whether a commodity is in "backwardation" or "contango".

Curve shapes are not consistent across all commodities or through time. Indeed, commodity returns are known to exhibit low intra-asset-class correlations and we see a similar picture for intra-asset-class curve shapes. To combine individual commodity curve shapes, we use the prevailing target weights for the Bloomberg Commodity Index (BCOM) to construct a composite curve shape based on the weighted average of each commodity.

Exhibit 4 shows our BCOM curve shape time series: this is what we use to indicate whether markets are generally in backwardation or contango.

**Exhibit 4 BCOM curve shape, monthly average per calendar month (January 2001 – June 2018)**



Source: UBS, Bloomberg, as of 30 June 2018

**Exhibit 5 Curve shape summary statistics (January 2001 – June 2018)**

	Backwardation	Contango
Number of observations	957	5,423
% of observations	15%	85%
Average curve shape (implied 1-month roll yield)	+0.4%	-0.8%
Average period length (days)	23	132
Maximal period length (days)	137	1,372

Source: UBS, Bloomberg, as of 30 June 2018

It is immediately apparent that the natural state of broad commodity markets is in contango. In fact, since 2001, markets have been in contango 85% of the time and the average length of a period of contango is 132 days. This compares to states of backwardation which are far less persistent at an average of 23 days.

**Exhibit 6 CMCI outperformance in sustained backwardation or sustained contango (January 2001 – June 2018)**

	Markets in sustained backwardation	Markets in sustained contango
Annualised outperformance of CMCI rolling methodology	0.2%	3.0%
Number of days	452 (11%)	3706 (89%)

Source: UBS, Bloomberg, as of 30 June 2018. CMCI outperformance is the outperformance of the UBS Bloomberg BCOM Constant Maturity Index ER against the Bloomberg Commodity Index ER. Past performance is not a reliable indicator of future returns

To see whether curve shape can affect the rolling performance of our broad commodity indices, we measure the relative performance of the CMCI rolling methodology versus the BCOM rolling methodology in each period of contango and backwardation. In sustained contango markets the average annualised outperformance of CMCI is 3.0%, and the average annualised outperformance in sustained backwardation is 0.2%. It is important to note that the backwardation data set is much smaller than the contango data set, so the average outperformance is calculated based on a smaller number of observations.

Our curve shape analysis shows markets have generally exhibited long periods of contango punctuated by short periods of backwardation. Further, our performance analysis supports the merits of the second-generation CMCI rolling methodology in all market curve shapes and especially when markets are in contango.

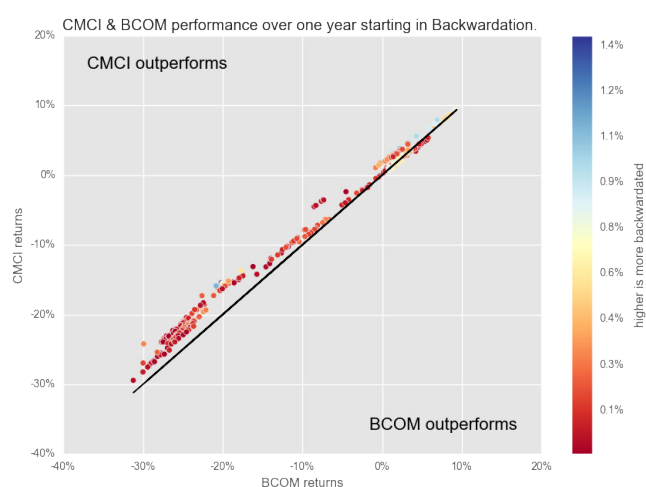
As contango is the long-term natural state of commodity markets, we can speculate that any outperformance foregone during short periods of backwardation are recovered during the subsequent periods of contango. To investigate this further, we extend our analysis to look at each day in our time series and calculate the relative performance of the CMCI rolling methodology over the subsequent twelve months (imagine looking at the curve shape today, and asking whether the rolling methodology should outperform over the next twelve months, or not).

The results reveal the CMCI rolling methodology consistently outperforms the BCOM rolling methodology (in over 89% of our observations), regardless of curve shape. This seems to support our claim.

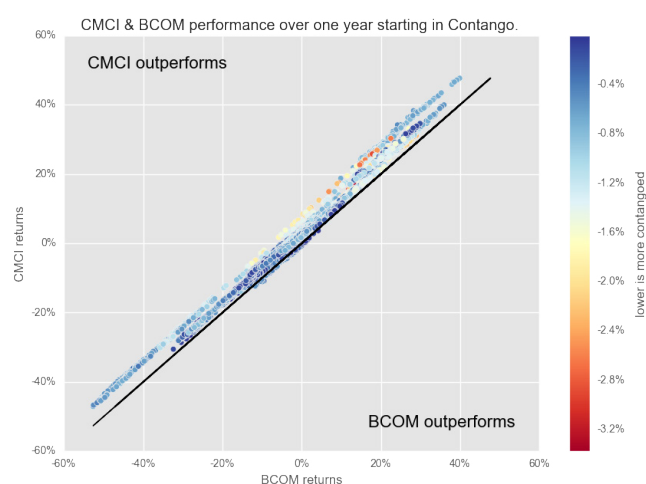
Exhibit 7 plots CMCI returns against BCOM returns – points above the straight line indicate CMCI outperformance and the intensity of the colour indicates the strength of backwardation / contango at the start of the twelve month period.

#### Exhibit 7 Relative performance in backwardation / contango

##### Periods starting in backwardation



##### Periods starting in contango



Source: UBS, Bloomberg, as of 30 June 2018. CMCI returns are the returns of the UBS Bloomberg BCOM Constant Maturity Index ER. BCOM returns are the returns of the Bloomberg Commodity Index ER. Past performance is not a reliable indicator of future returns

#### Exhibit 8 12-month relative performance for periods starting in backwardation or contango (January 2007 – June 2018)

	Starting point in backwardation	Starting point in contango
Number of observations	422 (11%)	3,641 (89%)
Average CMCI roll performance (12 months)	+0.1%	-5.0%
Average BCOM roll performance (12 months)	-1.8%	-8.3%
Average outperformance of CMCI rolling methodology (12 months)	1.9%	3.3%
Number of observations where CMCI roll performance is higher than BCOM roll performance	375 (89%)	3,266 (97%)

Source: UBS, Bloomberg, as of 30 June 2018. CMCI roll performance is the relative performance of the UBS Bloomberg BCOM Constant Maturity Index ER and the Bloomberg Commodity Spot Return Index. BCOM roll performance is the relative performance of the Bloomberg Commodity Index ER and the Bloomberg Commodity Spot Return Index. CMCI outperformance is the outperformance of the UBS Bloomberg BCOM Constant Maturity Index ER against the Bloomberg Commodity Index ER.

**Past performance is not a reliable indicator of future returns**

The final part of our analysis looks at the historic persistency of outperformance and underperformance of the CMCI rolling methodology.

Exhibit 9 plots the eventual twelve month CMCI outperformance against the CMCI outperformance observed mid-way through the twelve month period (imagine looking at the six-month performance of the CMCI and asking whether it should outperform over a full twelve-month period, or not). In backwardation and contango, there are very few points in the lower left quadrant. This indicates that twelve month performance is usually strong even if the index has underperformed in the first six months of the year.

**Exhibit 9 12-month / 6-month CMCI outperformance**



Source: UBS, Bloomberg, as of 30 June 2018. CMCI outperformance is the outperformance of the UBS Bloomberg BCOM Constant Maturity Index ER against the Bloomberg Commodity Index ER. Past performance is not a reliable indicator of future returns

# Conclusion

As we have seen, commodity markets are most-often in a state of contango, causing a drag on commodity index returns due to negative roll yields. We have shown that adopting our CMCI rolling methodology has mitigated these effects in periods of contango, thereby improving returns. Furthermore, the CMCI rolling methodology also outperformed during periods that start in backwardation. Periods of overall backwardation at the index level have not lasted more than 23 days on average, as backwardation in some commodities tends to be balanced by contango in others.

The analysis indicates that for twelve-month periods that start in contango (89% of observations since 31 January 2007), the CMCI rolling methodology outperforms the BCOM rolling methodology by an average of 3.3% and in 97% of cases. In periods that begin in backwardation, where positive roll yields have no such drag on commodity index returns, the CMCI roll performance is superior to the BCOM roll performance. This is by an average of 1.9% over twelve-month observation periods, and in 89% of observations.

Click [here](#) to read more about the UBS Bloomberg CMCI Index.

For more information, please do not hesitate to contact:

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# Appendix

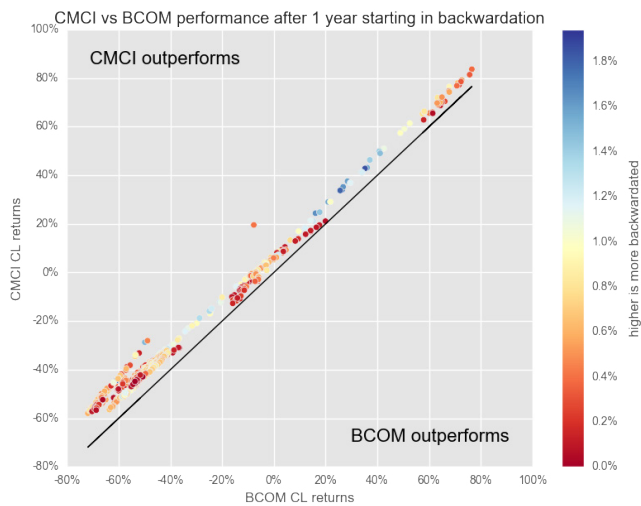
The Figures below plot CMCI returns against BCOM returns for specific commodities from the Energy, Agriculture, Industrial Metal and Precious Metal sectors. Points above the straight line indicate CMCI outperformance and the intensity of the colour indicates the strength of backwardation / contango at the start of the twelve month period.

Source: UBS, Bloomberg, as of 30 June 2018. CMCI returns are the returns of the relevant UBS Bloomberg Commodity CMCI ER sub-index. BCOM returns are the returns of the relevant Bloomberg Commodity ER sub-index. **Past performance is not a reliable indicator of future returns.**

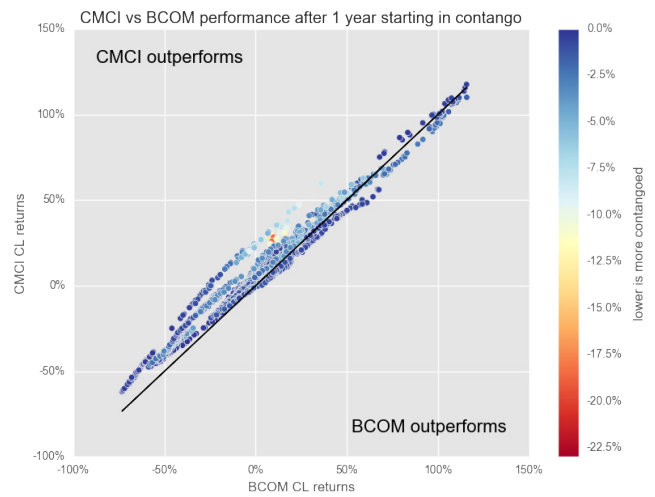
## CL—Crude Oil (WTI)

Sector: Energy

### Periods starting in backwardation



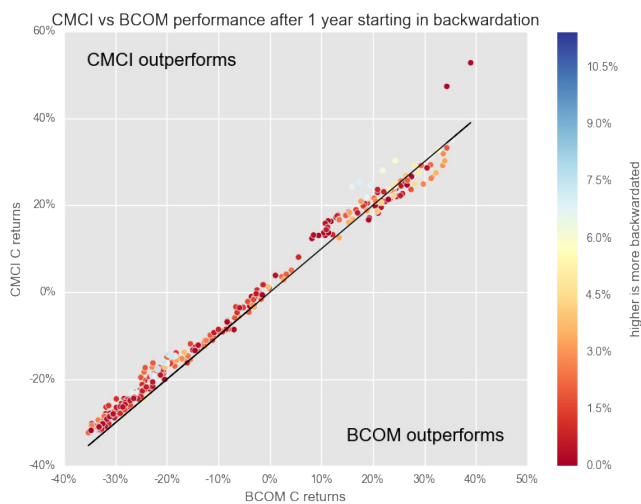
### Periods starting in contango



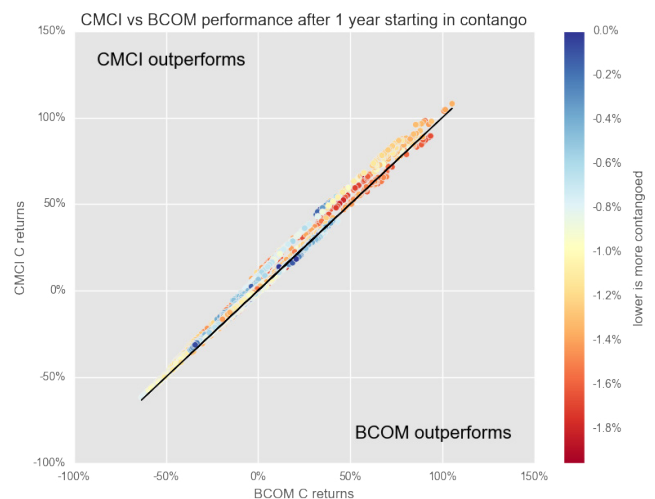
## C—Corn

Sector: Agriculture

### Periods starting in backwardation



### Periods starting in contango



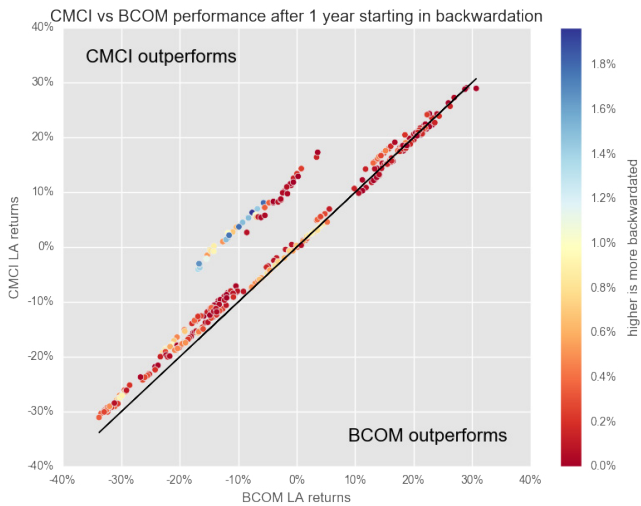


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LA—Aluminium  
Sector: Industrial Metals

Periods starting in backwardation

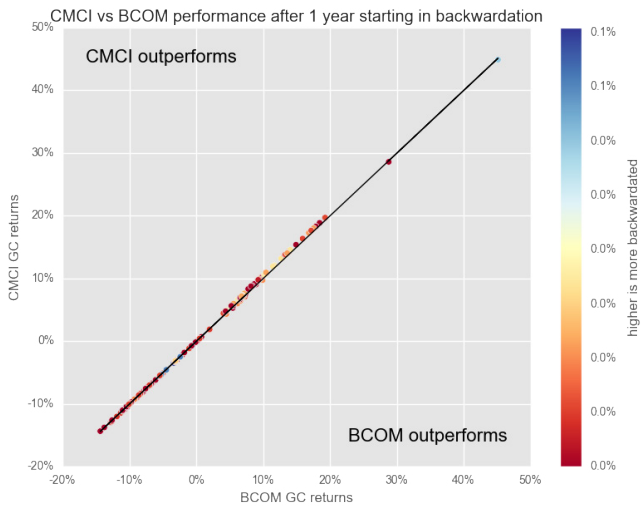


Periods starting in contango

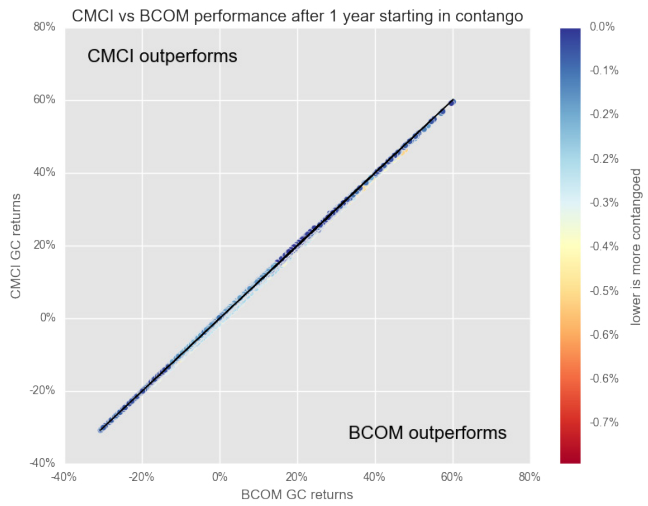


GC—Gold  
Sector: Precious Metals

Periods starting in backwardation



Periods starting in contango



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