Commodity premia:
It's all about risk control

With numerous strategies that offer attractive rewards for assuming risks that other market participants are unwilling to bear, commodities are well suited to a risk premia approach. However, common commodity premia can feature exposure to unwanted risks. **Luc Dumontier** and **Guillaume Garchery** present the main commodity risk premia, ways to implement them and pitfalls to avoid

The impact of repeated crises – the bursting of the technology bubble in 2001/2002, the global financial crisis of late 2008/early 2009 and the sovereign debt crisis of 2011/2012 – on the performance of traditional asset allocation funds has been amply documented. Professionals have recognised that allocating between traditional (equities and bonds) and alternative (real estate, commodities, infrastructure, private equity, etc) asset classes resulted in an implied exposure to, at best, only a few risk factors in benign conditions and, at worst, to a single equity/liquidity factor in times of strong risk aversion.

Rather than investing in asset classes that tend to re-correlate at the worst time, a new generation of multi-asset products allows for direct investment in the alternative premia that can be extracted from various asset classes. These premia reward investors either for assuming an additional structural risk (economic or financial) that cannot be diversified away, or for their ability to develop strategies that benefit from the behavioural biases and/or regulatory constraints that other market participants face. The best-known premia are those that can be extracted from equities including value and size (Fama French, 1992), momentum (Carhart, 1997), low risk (Haugen and Heins, 1975) and quality (Asness, Frazzini & Pedersen, 2013). These premia can be replicated using long/short portfolios – for example, by purchasing the lowest price-to-book stocks and selling the highest price-to-book stocks to capture the equity value premium.

Premia on other asset classes have recently come into focus, with those on commodities probably among the least documented. Yet the commodity space is particularly well-suited to this thematic, with numerous investable premia that offer attractive rewards for assuming risks that other market participants – including consumers, producers and inflation hedgers – are unwilling to bear on a systematic basis. However, the commodity market is very specific and most common risk premia also feature potential exposure to unwanted risks that may cause strong drawdowns. In this paper, we present the main commodity risk premia, various ways to implement them and the main pitfalls to avoid.

Where do commodity premia come from?

In commodities, the best-known premia are curve, liquidity, trend, carry/value and volatility premia. Commodity curve premia are linked to Keynes's theory of normal backwardation, which states that commodity producers sell long-dated contracts at a discount in order to hedge their output, whereas consumers often buy short-dated contracts at a premium in order to secure near-time consumption. Therefore, investors who buy from producers and sell to consumers can capture an 'insurance risk premium' in the form of the roll yield (see figure 1).
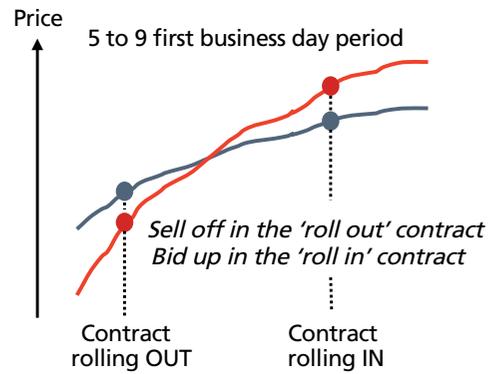
Commodity liquidity premia stem from the congested roll periods of traditional commodity benchmarks. Both the S&P GSCI and Bloomberg Commodity (BCOM) reference indexes track prices of futures contracts
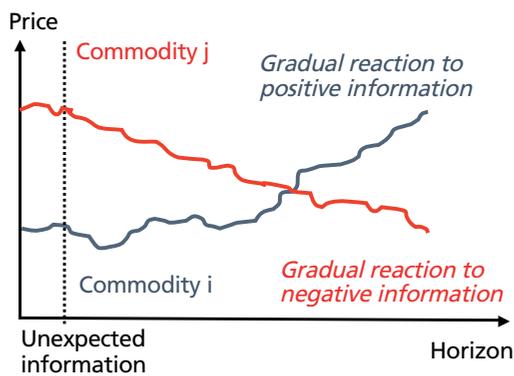
1 Illustration of the curve premia
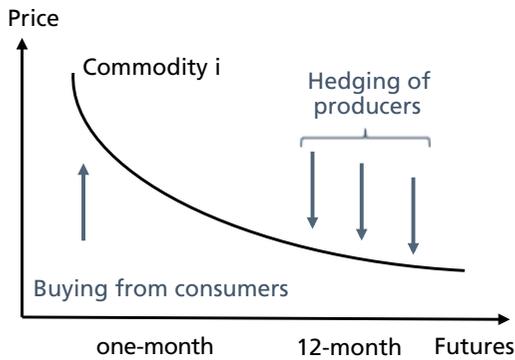
Source: La Française Investment Solutions
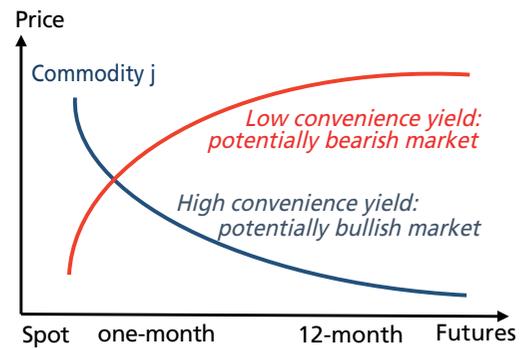
2 Illustration of the liquidity premia

Source: La Française Investment Solutions

3 Illustration of the trend premia

Source: La Française Investment Solutions

4 Illustration of the carry/value premia

Source: La Française Investment Solutions

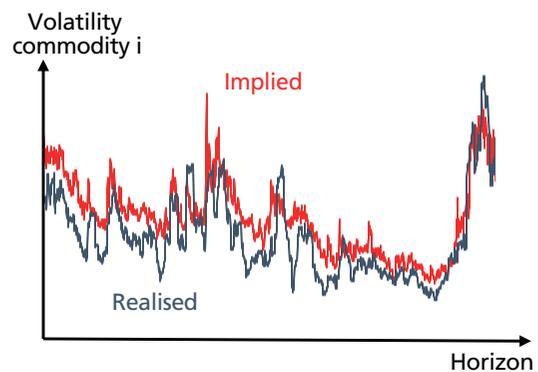**5 Illustration of the volatility premia**

Source: La Française Investment Solutions

on single commodities with predefined monthly contract roll schedules (typically between the fifth and the ninth business day of the calendar month). We estimate, on the basis of data provided by the Commodity Futures Trading Commission (CFTC), that approximately one third of the volume traded during the roll period is attributable to the products that track these benchmarks, which tend to weigh on the spread between the old contract and the new one. Investors in liquidity premia take advantage of these structural flows to carry the spread 'new future versus old future' before the congested roll period and the opposite spread after (see figure 2).

As with other asset classes, commodity trend premia seek to benefit from the stylised fact that past winners continue to outperform past losers for some time in the future for reasons that are often behavioural (gradual diffusion of new information, extrapolation and so on). Investors in commodity trend premia allocate between commodities, applying positive weights to those that have recently outperformed and negative weights to those that have underperformed over the same lookback period (see figure 3).

The choice of name for the following premia – carry or value – is difficult, as is the case in the equity space. Indeed, the strategy goes long the most backwardated commodities and short the most contangoed commodities to take advantage of both positive carry and timely relative spot appreciation of the long portfolio versus the short portfolio. Backwardated curves may indicate scarcity of supply in the spot market whereas contangoed curves typically indicate an abundance of supply (see figure 4).

Investors in commodity volatility premia aim to capture the structural spread that exists between the implied volatility and the realised volatility of single commodities. In commodity markets, the main driver of the volatility risk premium is consumers and producers using options to hedge their commodity price exposure while there are few natural sellers of optionality who have to be compensated for taking the risk of losses during stressed periods (for example, since the start of 2015, see figure 5).

In sum, there are three broad ways to seize commodity premia: (i) intra-curve positioning such as curve and liquidity premia, (ii) inter-commodity premia such as trend and carry/value premia and (iii) classical volatility premia. Each of these three implementation approaches is exposed to several unwanted risks that savvy investors can overcome.

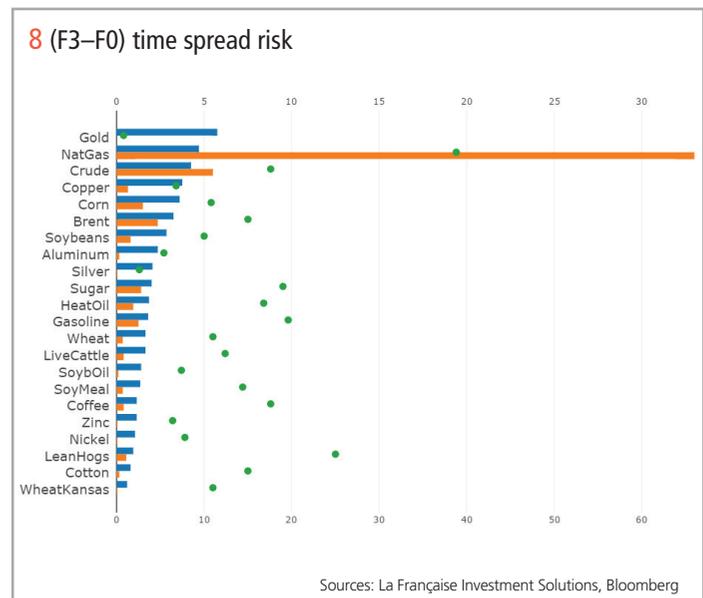### What are the main risks of intra-curve positioning and how can they be mitigated?

As detailed in the previous section, seizing commodity curve premia may result in carrying the spread between the third nearby contract and the first – namely the (F3–F0) time spread. Analysis of the track record of curve

7 (F3–F0) time spread beta

Sources: La Française Investment Solutions, Bloomberg
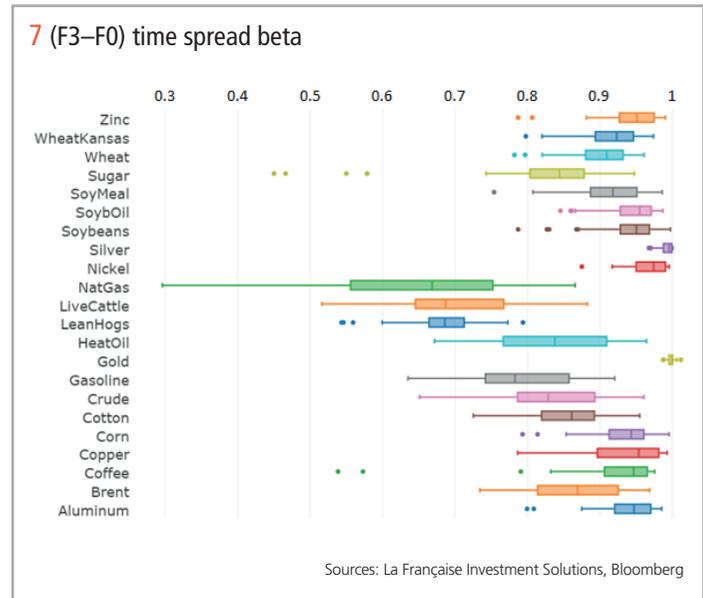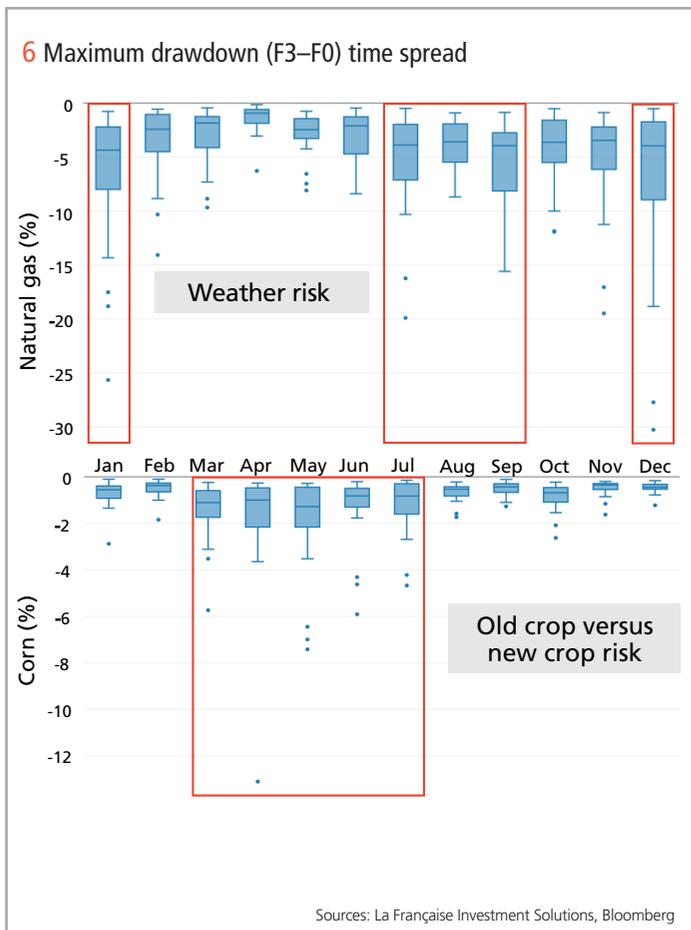
strategies shows that most historical drawdowns were caused by weather-related and seasonal risk factors. Figure 6 shows the drawdowns of (F3–F0) time spreads for two seasonal commodities – natural gas and corn – per calendar month since 1991. Natural gas risks are mostly weather related – linked to demand (hot summers or cold winters) and supply (hurricanes). Corn risks generally materialise during the US planting season (between spring and the beginning of summer), when inventories are low and the crop is very sensitive to weather events.

Due to the seasonal nature of some commodities, these risks can be predicted and mitigated. In practice, investors simply have to carry the spread of contracts that are sensitive to the same seasonal effects. For example for corn, rather that carrying the 'September versus May' spread (as most customised indices do), investors should instead carry the 'July versus May' spread.

The second main pitfall when implementing commodity premia related to curve positioning comes from the fact that the risk of different contracts on the same commodity may be very different. As an

6 Maximum drawdown (F3–F0) time spread

Sources: La Française Investment Solutions, Bloomberg

8 (F3–F0) time spread risk

Sources: La Française Investment Solutions, Bloomberg

illustration, figure 7 displays the beta of the third nearby contract versus the first for various commodities. Front-month contracts are generally more risky as they are more exposed to short-term supply and demand effects. The lowest beta is approximately 0.7, observed for lean hogs, live cattle and natural gas.

In practice, this means that if an investor purchases a nominal of $100 on F3 and sells a nominal of $100 on F0, the spread has a residual beta of –0.3 or a short position of $30 to the underlying commodity. To build a commodity-neutral spread, the nominal of the short and the long legs should be adjusted depending on their relative beta.

The third possible pitfall comes from the fact that the (F3–F0) time spread of certain commodities is much more volatile (for example, 20% for natural gas) than that of other commodities (less than 5% for metals). However, most investors implement the strategy using the nominal weights of the BCOM index, resulting in an overweight to natural gas (10% in terms of nominals) – the commodity with the most volatile spread. Consequently, 65% of the risk (in variance terms) of their strategy is linked to this spread (see figure 8).

To build a more robust strategy, one approach is to implement nominal weights that depend on the relative risk of spreads (for example, allocation using an equal risk contribution methodology).

What are the main risks of inter-commodity allocation and how can they be mitigated?

The strength of the risk premia approach lies primarily in the capacity to combine numerous and uncorrelated premia rather than optimising the implementation of each premia. This is why most risk premia managers seek to avoid errors relative to valuation and risk models as much as possible. Thus, the criteria for assessing the attractiveness of the assets are very intuitive (for example, price-to-book ratio for equity value premia). Similarly, portfolio construction rules are usually simple (for example, equal long positions on the 10% of stocks that display the lowest price-to-book value (PBV) and equal short positions on the 10% of stocks that display the highest PBV, the nominal of overall long and short portfolios being equal).
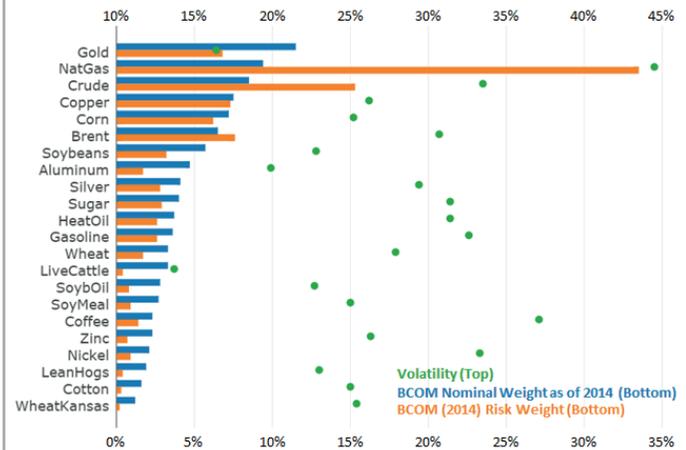

9 PCA within the major asset classes
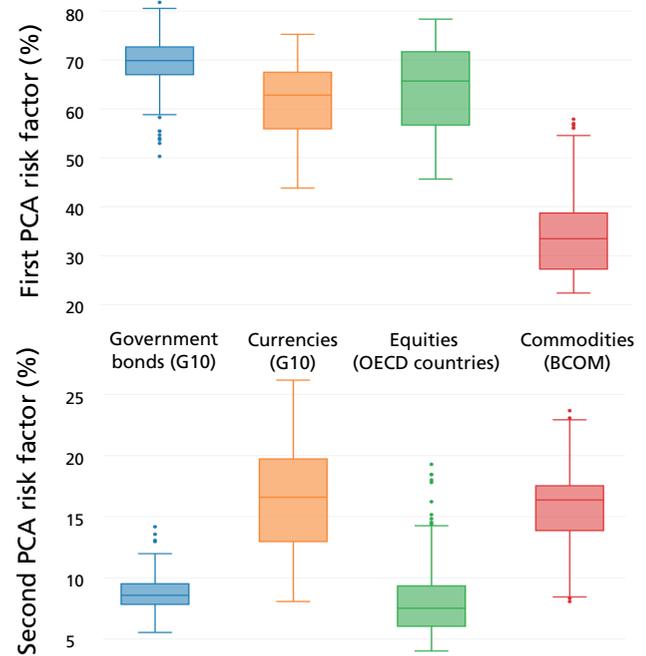
Sources: La Française Investment Solutions, Bloomberg

10 BCOM index weights in nominal and risk terms

Volatility (Top)
BCOM Nominal Weight as of 2014 (Bottom)
BCOM (2014) Risk Weight (Bottom)

Sources: La Française Investment Solutions, Bloomberg

One may feel that these portfolio construction principles are too simplistic for the commodity space. Indeed, comparing gold, lean hogs and natural gas is not straightforward, as the determinants of their returns are certainly very different. This suspicion is confirmed by the data. Figure 9 illustrates the results of four principal Component analyses (PCA) carried out within the four major asset classes, using one-year rolling weekly data since 2001. For nominal government bonds (NGB), the analysis is done using the 10-year yields of the G10 countries. The same G10 universe is used for currencies (FX). For equities (EQY), we run the

PCA between the MSCI indices of the 23 countries of the OECD developed universe. Finally for commodities (CMDY), we use the front-month futures of the 22 constituents of the BCOM index.

For bonds, currencies and equities, between 65% and 70% of the variance of the assets is, on average, explained by the first factor – in other words, the market factor. For commodities, this is much less the case: on average, only 30% of the variance of single commodities is explained by the whole commodity factor. On the contrary, the second factor tends to be more significant for commodities than for the other asset classes with the exception of currencies. This shows that the commodity universe has globally low levels of correlation – significantly below that of other asset classes – but with subgroups of commodities that are highly correlated. Furthermore, figure 10 shows that the volatilities of various commodities are strongly heterogeneous, from 17% for aluminum to 45% for natural gas.

The main consequence of these findings is that most investors compare apples and oranges in the commodity space without necessarily realising it. For example, most popular carry strategies simply sell the five most contangoed commodities and buy the five most backwardated commodities. Considering the slope of the front-month contract versus the one-year forward contract, a current portfolio based on this approach (as of end of September 2015) would carry short positions on natural gas, Brent, WTI, gas oil and heating oil, and long positions on lean hogs, soybean meal, cocoa, gold and copper. This might have been a good idea over the past few months, but investors should note that this portfolio is highly concentrated in a strong bet on energy commodities (short) versus others (long). More generally, there is a significant chance that the portfolio is not immune to developments in the commodity market as a whole and potentially bears unwanted risks that may result in strong drawdowns. If simplicity is often preferred for portfolio construction, inter-commodity premia require the intervention of a covariance matrix, or at least the implementation of sector-neutral positions.
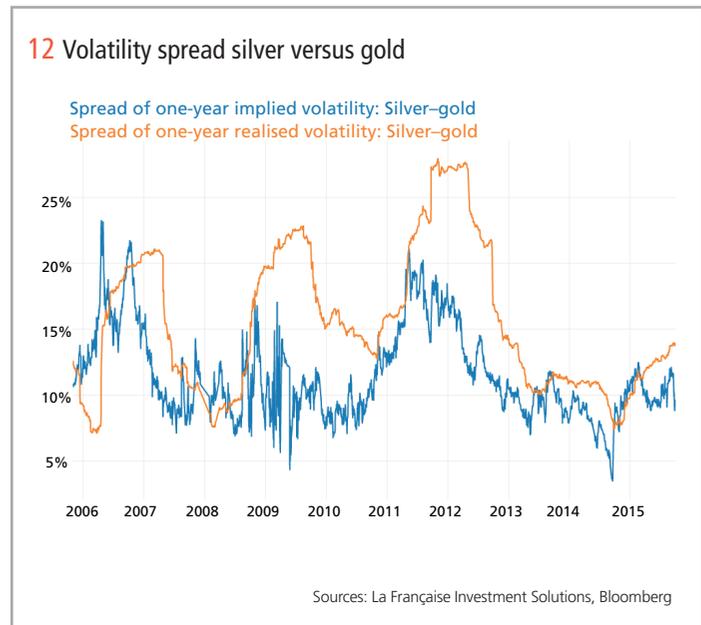
What are the main risks of commodity volatility strategies and how can they be mitigated?

According to Pimco, commodity markets historically exhibit one of the highest volatility risk premia of all asset classes. Systematic short volatility strategies were initially implemented in oil-related commodities for

liquidity reasons. Unfortunately, as indicated in figure 11 (analysis performed by JP Morgan between September 2010 and September 2015), this kind of strategy has displayed a correlation of close to 30% over the past five years to both the same strategy in the equity space and the equity market itself.

This issue may be mitigated by diversifying across other commodities. Indeed, short volatility strategies implemented for sugar, cocoa and coffee show very low correlation to other commodities, even during stressed periods (see figure 11).

Nevertheless, the best way to hedge the strategy against strong changes in overall implied volatility is to consider the volatility space as an asset class in its own right and build long/short portfolios. As an example, figure 12 compares the one-year implied volatility of the spread of silver versus gold and the one-year realised volatility of the same spread. This relative value position is very attractive for at least two reasons. First, there seems to be a premium to the extent that the realised spread is almost always above the implied spread. This finding is all the more appealing as we can clearly explain its rationale: hedging activity is much stronger in

12 Volatility spread silver versus gold

Spread of one-year implied volatility: Silver–gold
Spread of one-year realised volatility: Silver–gold

Sources: La Française Investment Solutions, Bloomberg

11 Correlation of short volatility strategies

Source: JP Morgan

	WTI	Brent	Heating oil	Gold	Corn	Soybeans	Wheat	Sugar	Cocoa	Coffee	Live cattle	Equity volatility	MSCI World
WTI	100												
Brent	89	100											
Heating oil	83	88	100										
Gold	26	21	21	100									
Corn	22	19	20	17	100								
Soybeans	17	17	19	14	50	100							
Wheat	21	20	22	17	65	41	100						
Sugar	17	14	13	13	15	15	14	100					
Cocoa	6	2	5	2	2	3	-1	2	100				
Coffee	8	5	3	6	9	15	9	16	8	100			
Live cattle	7	3	2	11	14	11	7	9	3	4	100		
Equity volatility	26	26	26	34	4	6	11	-1	3	9	10	100	
MSCI World	31	29	25	34	19	18	22	9	6	8	16	42	100

Conclusion

This paper provides some recipes to limit, to the extent possible, unwanted risks to which the most common risk premia are exposed. Readers might wonder about the impact of these improvements on the risk-return profile of commodities. The short and direct answer is that the analysis of simulated and actual (since end of 2013) track records shows that the improvements can help to almost double the Sharpe ratio of the various commodity premia strategies. The observations in this paper are based on long-term historical simulations, which necessarily have their limitations. Nevertheless, the results provide valuable insight into the functioning of commodities markets and point to areas to focus on when implementing commodity premia. ■

Luc Dumontier and Guillaume Garchery are both senior portfolio managers at La Française Investment Solutions. This article reflects the authors' opinions and not necessarily those of their employer. Emails: ldumontier@lafrancaise-group.com, ggarchery@lafrancaise-group.com

the gold space than for silver. Secondly, the implied spread doesn't display trends in stressed periods (for example, 2008), meaning that this position provides returns that are not linked to the overall market context. The commodity space is full of such relative value premia, which offer the potential to be profitable, understandable and lowly correlated.

REFERENCES

Asness C, A Frazzini and L Pedersen, 2013
Quality minus junk
Working paper

Carhart M, 1997
On the persistence in mutual fund performance
The Journal of Finance

Erb C and C Harvey, 2006
The tactical and strategic value of commodity futures
Yale ICF working paper

Fama E and K French, 1992
The cross-section of expected stock returns
The Journal of Finance

Gorton G and K Rouwenhorst, 2006
Facts and fantasies about commodity futures
Yale ICF working paper

Gorton G, F Hayashi and K Rowenhourst, 2012
The fundamentals of commodity futures returns
NBER Working Paper Series

Haugen R and AJ Heins, 1975
Risk and the rate of return on financial assets: Some old wine in new bottles
Journal of Financial and Quantitative Analysis

Ilmanen A, 2011
Expected returns: An investor's guide to harvesting market rewards
Wiley Finance

Keynes M, 1930
A treatise on money
Macmillan

Miffre J, 2012
Comparing first, second and third generation commodity indices
EDHEC

Miffre J and G Rallis, 2006
Momentum strategies in commodity futures markets
EDHEC

Rennison G and N Pedersen, 2012
The volatility risk premium
Pimco Viewpoint

Prokopczuk M and C Simen, 2012
Variance risk premia in commodity markets
University of Reading

Rouwenhorst K and K Tang, 2012
Commodity investing
Yale ICF working paper

Ung D and X Kang, 2013
Alternative beta strategies in commodities
Journal of Indexes Europe