

Comparing First, Second and Third Generation Commodity Indices

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Abstract

The rising interest of institutional investors for commodities since the early 2000s prompted remarkable financial engineering in the commodity index space which is now in its third generation. The purpose of this article is to review this evolution and to give an assessment of index performance. Long-only second generation indices, which attempt to minimize the harmful impact of contango on performance and use active long-only signals based on momentum or roll-yields, are found to outperform their first generation counterparts. Third generation indices fare even better as they accurately buy backwardated assets and short contangoed ones, thereby reducing overall volatility. We see these indices as serious contenders to commodity trading advisors who merely replicate strategies based on momentum or term structure.

Keywords: Commodity indices, Backwardation, Contango, Long, Short.

JEL classifications: G13, G14.

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Commodities are now treated as a mainstream asset class. As of April 2012, Barclays Capital reported that assets under management in commodity-based exchange traded products, structured notes and index swaps totalled a record high \$435 billion versus merely \$100 billion in 2006. This rise can be in part explained by the fact that commodities are now standard components of an investor's strategic asset allocation: this is due to the fact that they generate equity-like returns in the long-run, act as risk diversifiers¹ and serve as an inflation hedge (Bodie and Rosansky [1980], Erb and Harvey [2006], Gorton and Rouwenhorst [2006]). Besides, recent research has made it clear that momentum and term structure strategies work well in commodity futures markets, suggesting that commodities should also be part of the tactical asset allocation of investors (Erb and Harvey [2006], Gorton and Rouwenhorst [2006], Miffre and Rallis [2007], Fuertes, Miffre and Rallis [2010] amongst others).

An easy way to get exposure to commodities consists simply in tracking an index. Then one gets exposure to a broad range of commodities without worrying about rolling contracts, paying margin calls, posting collaterals or setting up complex futures trading processes. As the commodity market developed, new forms of indices were introduced. At present one can split the universe of commodity indices into three categories: i) the first generation indices which are long-only and do not pay much attention to the fundamentals of backwardation and contango; ii) the second generation indices which are also long-only but attempt to lessen the negative blow on performance of contango while exploiting backwardation; and iii) the third generation indices which are long-short and capitalize on both the price appreciation associated with backwardation and the price depreciation related to contango.

The purpose of this paper is to briefly narrate the history of commodity indexing, to introduce new developments and to appraise the performance of the different generations as of April 30, 2012. It has indeed become increasingly bewildering for investors to choose which index to track. In fact, it takes a very informed and active investor to understand which passive index to choose. We see therefore the comparative investigation and performance evaluation we implement in this paper as interesting contributions given the recent proliferation of indices. By doing so, we extend on the earlier works of Akey [2005] and Schneeweis, Spurgin, Das and Donohue [2009] who focus on first and second generations.

We conclude on the superiority of second generation indices which outperform first generation indices by minimizing the harmful impact of contango on performance and using active long-only signals based on momentum or roll-yields. Out of the three generations, the third generation stands out as offering the best performance for the lowest volatility. Their outperformance is particularly obvious in periods of increased uncertainty such as the post-Lehman Brothers debacle.

The rest of the paper is as follows. The next section discusses the fundamentals of commodity futures pricing, paying special attention to the notion of backwardation and contango. We then present the data, explain the logic that underpins portfolio construction and look at the performance of each generation. Finally the last section provides a conclusion.

Fundamentals of Commodity Futures Pricing

The essence of commodity futures pricing comes down to the fundamentals of backwardation and contango. Broadly speaking, backwardation means that the futures price of a commodity is expected to appreciate as maturity approaches, and contango means the opposite: the futures price is expected to drop. One can bring two rationales for these observed price evolutions. The first one relies on the hedging pressure hypothesis of Cootner [1960] as generalized in Hirshleifer [1988] and validated empirically in Bessembinder [1992] and Basu and Miffre [2012]. The second

1 - Recently however the diversification benefits of commodities have been put into question. Not only Daskalaki and Skiadopoulos [2011] question whether commodities should at all be part of optimally diversified portfolios but also the correlations between stock and commodity returns has been shown to have risen dramatically since the debacle of Lehman Brothers (see for example, Büyüksahin and Robe [2010], Miffre [2011], Tang and Xiong [2011]).

rationale relies on the theory of storage of Kaldor [1939] and Working [1948] as empirically supported by Gorton, Hayashi and Rouwenhorst [2012].

The hedging pressure hypothesis relates backwardation and contango to the propensity of hedgers to be net short or net long. More specifically, backwardation occurs when hedgers are net short (namely, commodity producers are more prone to hedge than commodity consumers and processors), leading to the necessary intervention of net long speculators to restore equilibrium. Contango arises in the opposite case, when hedgers are net long (namely, consumers and processors of a commodity outnumber producers), leading this time around to the necessary intervention of net short speculators.

The theory of storage explains backwardation and contango by means of the incentive that inventory holders have in owning the spot commodity. When inventories are high, commodity futures markets are contangoed – and the term structure of commodity futures prices is upward-sloping – to give incentive to inventory holders to buy the commodity spot (at a cheap price) and sell it forward at a profit that exceeds the cost of storage and the cost of financing the purchase of the spot commodity. When inventories are low, commodity futures markets are backwardated – and the term structure of commodity futures prices is downward-sloping – as the benefits of owning the commodity spot (called convenience yield) then exceed the costs, giving incentive to inventory holders to own the spot asset even though its price exceeds that of the futures contract.

To summarize, a backwardated market (with a downward-sloping term structure or positive roll-yield) is characterized by net short hedging and scarce inventories, while a contangoed market (with an upward-sloping term structure or negative roll-yield) is characterized by net long hedging and abundant inventories. These fundamentals are essential understanding the evolution of commodity futures indexing as explained in Section 4.

Data

Excluding sector specific indices, there were 71 commodity indices listed in Bloomberg as of April 30, 2012. Our dataset focuses on the 38 that have return history over the period May 31, 2008 – April 30, 2012. We limit our sample to indices with 4 years of data to ensure robust inference on performance and to enable comparison of performance across generations. We download excess return data at a monthly frequency. To avoid backfilling bias, only live data are used in the analysis. The cross-section is split into generations, with the first generation comprising of 6 indices, the second generation of 23 and the third generation of 9. Details on these generations are explained next.

Empirical Results

First Generation Commodity Indices

Members of this category include Deutsche Bank Liquid Commodity Index (DBLCI),² Diapason Commodity Index (DCI), Dow Jones-UBS Commodity Index (DJ-UBSCI), Rogers International Commodity Index, S&P Goldman Sachs Commodity Index (S&P-GSCI) and Thompson Reuters-Jefferies/CRB Index. In spite of the recent proliferation of indices, the S&P-GSCI and the DJ-UBSCI are still considered as benchmarks for commodities investing and attract most of the assets under management.

Akey [2005] and Schneeweis, Spurgin, Das and Donohue [2009] provide interesting and detailed account of first generation indices. Here, it suffices to mention the following. These indices aim

2 - Because of its early inception date (February 2003), DBLCI is often considered as a first generation index (Akey [2005]). As it holds distant metals and agricultural contracts and thus performs well in contangoed markets, it could equally well be treated as second generation.

at being representative of a broad commodity market. They rebalance infrequently (sometimes as rarely as once a year). They are fully-collateralized, meaning that their total return depends on both futures returns and collateral yields (e.g., the 3-month T-bill rate). They are long-only and as such, they assume that commodity markets are solely backwardated. With the noticeable exception of DBLCI, they hold liquid contracts located at the front end of the term structure, rolling positions from the front to the second nearest contract. They tend to be heavily weighted towards energy; as a result, their performance is mostly driven by that sector. The number of constituents vary widely from one index to the next and with it so do the diversification benefits, liquidity and tracking errors.

Exhibit 1 reports summary statistics of the performance of first generation indices over a period common to all 38 indices here considered (May 31, 2008 – April 30, 2012). The first generation indices earn negative (albeit insignificant) annualized excess return, ranging from -9.54% (S&P-GSCI) to -2.64% (DCI). This is due to the impact of the financial and sovereign debt crises on the real economy. The measure of risks vary widely too, with standard deviations ranging from 22.35% to 33.48%, skewness ranging from -0.7928 to 0.7988 and excess kurtosis ranging from 1.1820 to 5.0120. It is interesting to note that all indices except DCI are negatively skewed and leptokurtic at the 5% level, indicating a high probability for large negative excess returns. At first sight, this might look puzzling given Gorton and Rouwenhorst [2006] who note that the skewness of commodity futures positions is positive. As reported in Rallis, Miffre and Fuertes [2012], the negative skewness observed here comes from very poor index performance over the period of July 2008 – February 2009, where this dramatic fall in prices was the result of a slowdown in worldwide economic activity triggered by the 2008 financial crisis.

Exhibit 1: Performance of first generation indices over the period May 31, 2008 – April 30, 2012

	Annualized Mean		Annualized Standard		Sharpe		Skewness		Excess Kurtosis	
	Excess Returns		Deviation		Ratio					
Deutsche Bank Liquid Commodity Index	-0.0735	(-0.56)	0.2646	-0.2779	-0.7286	(-2.06)	1.1820	(1.67)		
Diapason Commodity Index	-0.0264	(-0.16)	0.3348	-0.0789	0.7988	(2.26)	5.0120	(7.09)		
Dow Jones-UBS Commodity Index	-0.0713	(-0.64)	0.2235	-0.3192	-0.7739	(-2.19)	1.5059	(2.13)		
Rogers International Commodity Index	-0.0421	(-0.33)	0.2530	-0.1664	-0.7928	(-2.24)	1.8861	(2.67)		
S&P Goldman Sachs Commodity Index	-0.0954	(-0.67)	0.2863	-0.3333	-0.7234	(-2.05)	1.7479	(2.47)		
Thompson Reuters-Jeffries/CRB Index	-0.0465	(-0.41)	0.2256	-0.2059	-0.7745	(-2.19)	1.8282	(2.59)		
Average	-0.0592		0.2646	-0.2303	-0.4991		2.1937			

(*t*-statistic in parentheses)

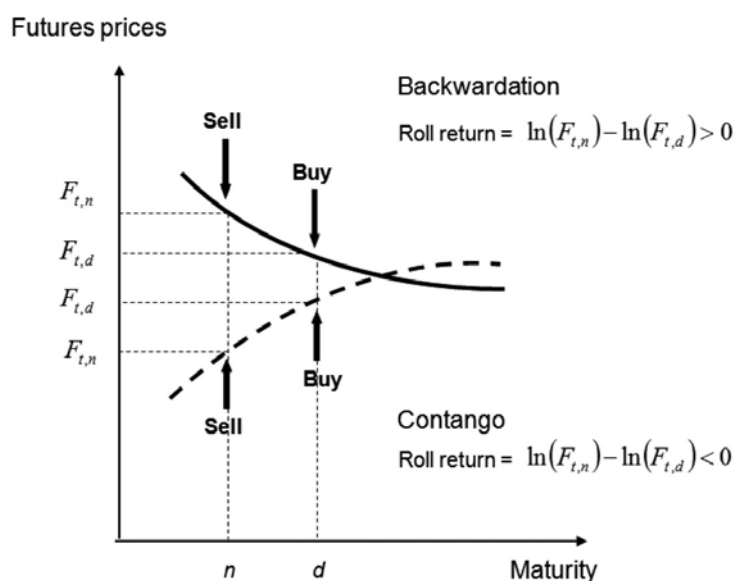
First generation indices suffer from the pitfall of assuming that commodity futures markets are solely in backwardation. In other words, they do not take the shape of the term structure into account. Since markets tend to switch between backwardation and contango (based, for example, on hedging demand or inventory levels), the first generation indices perform poorly in contangoed markets. They perform all the worse that contracts closer to maturity tend to be more contangoed than more distant contracts. Contracts closer to expiration are also known to be the most volatile (Samuelson [1965], Daal, Farhat and Wei [2006]) as they are more sensitive to supply/demand shocks. Second generation indices challenge these issues by investing into contracts further out on the term structure of commodity futures prices.

Second Generation Commodity Indices

Figure 1 considers what happens when a position is rolled from a near (*n*) to a more distant (*d*) contract. If the market is in backwardation (continuous curve), the term structure is downward-sloping and the roll yield (defined as a function of the price differential between the nearby contract *n* that is closed out and the distant contract *d* that is rolled into) will then be positive. In other words, investors rolling positions in backwardated contracts earn positive roll-yields. However, should the market be in contango (dashed curve), the term structure is then upward-

sloping, resulting in a negative roll yield. To put this differently, rolling positions in contangoed markets can have a very damaging impact on the total returns of commodity indices.

Figure 1: Term structure of commodity futures prices



The second generation indices were introduced to mitigate the impact on performance of these potentially disastrous negative roll-yields. These indices, instead of rolling from the front to the second nearest contracts (as would their first generation counterparts), attempt to reduce the losses incurred when roll yields are negative by considering the whole price curve, while simultaneously bearing in mind liquidity requirements. Within our cross section, we could identify the following rolling techniques (see also Tsui and Dash [2011])

(i) *Enhanced roll*: These indices choose, per commodity, a relatively liquid contract located in the mid to far end of the futures curve and hold it until it nearly matures. It follows that the cost of rolling in contangoed markets is incurred less often than with first generation indices where front contracts are continuously held. Since contracts are traded less often, the cost of replication is also reduced. Longview Extended Commodity Index and S&P GSCI Enhanced Index are structured using this strategy.

(ii) *Constant maturity*: Instead of choosing a single futures contract, these indices invest in a number of contract months across the futures curve, in order to achieve a targeted maturity. They can also hold all contracts on the futures curve up to a certain target maturity. JPMorgan Commodity Curve Index and UBS Bloomberg Constant Maturity Commodity Index use this strategy.

(iii) *Implied roll yield*: A dynamic approach is used first to determine implied roll yields for all contracts up to a given maturity and then to choose the contract with the maximum implied roll yield. Examples in this category include DBLCI Optimum Yield and DCI BNP Paribas Enhanced Index.

(iv) *Other roll methodologies*: This section covers methodologies such as forward roll, which shifts the asset allocation to contracts with a given maturity;³ e.g., 3-month (Barclays Commodity Curve Allocation Index) and methodologies that choose one representative contract each month along the curve (Merrill Lynch Commodity Index).

Mouakhar and Roberge [2010] present evidence that the implied roll yield methodology does improve performance relative to being long front contracts; Rallis, Miffre and Fuertes [2012]

3 - As the term structure of commodity futures prices tends to be less steep in the mid to far end, the cost of rolling in contangoed markets is then reduced.

draw the same conclusion but with respect to the forward roll strategy. It should be noted however that while decreasing the risk of potential losses in contangoed markets, many of the strategies mentioned above (e.g., enhanced roll, constant maturity, forward roll) mitigate the potential gains that come from rolling in backwardated markets equally well. This comes from the fact that, as mentioned in Figure 1, the curve is less steep in the mid to far end in both states of nature: backwardation and contango. Besides, the benefits of using commodity contracts with longer maturities must be carefully weighted against the lack of liquidity of distant contracts.

Indeed, Rallis, Miffre and Fuertes [2012] show that liquidity is concentrated in the front-end of the futures curve and thus that part of the performance of the forward roll strategy is in fact a compensation for the lack of liquidity of distant contracts.

While many second generation indices use advanced rolling techniques to mitigate the cost of negative roll yields, other differentiate themselves from their first category counterparts by using momentum and term structure signals in a long-only framework, where these signals have been shown to add value (2.10% alpha) beyond mere replication of the S&P-GSCI or DJ-UBSCI (Rallis, Miffre and Fuertes [2012]). Examples in the category include: Bache Commodity Index and Morningstar Long-Only Commodity Index amongst others. Another signal that is often used is based on mean reversion. The widespread use of this signal follows from the seminal papers of Gorton and Rouwenhorst [2006] and Erb and Harvey [2006], which show that investors can earn equity-like returns by rebalancing monthly to equal-weights the constituents of a long-only portfolio of fully-collateralized commodity contracts. Within our cross section, this strategy is followed by DBLCI-Mean Reversion. Liquidity is yet another signal used to ease replication and thus enhance net performance (CX Commodity Index).

Exhibit 2 presents summary statistics on the performance of second generation indices, with Panels A to D focusing on the four roll methodologies mentioned above and Panel E on enhancements based on e.g., momentum, term structure or mean reversion signals. Exhibit 2, Panel F compares the performance of first and second generation indices over a period that is common to both: May 31, 2008 - April 30, 2012.

Exhibit 2: Performance of second generation indices over the period May 31, 2008 - April 30, 2012

			Annualized					
	Annualized Mean		Standard	Sharpe				
	Excess Returns		Deviation	Ratio	Skewness	Excess Kurtosis		
Panel A: Enhanced Roll								
Longview Commodity Index	0.0255	(0.22)	0.2327	0.1097	-0.7377	(-2.09)	1.0945	(1.55)
Longview Extended Commodity Index	0.0208	(0.19)	0.2218	0.0939	-0.7820	(-2.21)	1.2486	(1.77)
S&P GSCI Enhanced Index	-0.0491	(-0.37)	0.2670	-0.1838	-0.8992	(-2.54)	2.0446	(2.89)
Average	-0.0009		0.2405	0.0066	-0.8063		1.4626	
Panel B: Constant Maturity								
JPMorgan Commodity Curve Index	-0.0445	(-0.37)	0.2390	-0.1864	-0.9180	(-2.60)	1.7457	(2.47)
UBS Bloomberg Constant Maturity Commodity Index	-0.0104	(-0.09)	0.2230	-0.0466	-0.9674	(-2.74)	1.9671	(2.78)
UBS Bloomberg SPGSCI Constant Maturity Composite	-0.0395	(-0.30)	0.2607	-0.1515	-0.8147	(-2.30)	1.7428	(2.46)
Average	-0.0315		0.2409	-0.1282	-0.9000		1.8185	
Panel C: Implied Roll Yield								
Barclays Index Pure Beta	0.0085	(0.07)	0.2359	0.0360	-1.0433	(-2.95)	2.3593	(3.34)
DB Commodity Booster	-0.0346	(-0.25)	0.2741	-0.1263	-0.6269	(-1.77)	1.6949	(2.40)
DBLCI-Optimum Yield	-0.0314	(-0.24)	0.2568	-0.1222	-0.6347	(-1.80)	1.1640	(1.65)
DBLCI-Optimum Yield Balanced	0.0080	(0.07)	0.2287	0.0350	-0.9601	(-2.72)	2.2855	(3.23)
DBLCI-Optimum Yield Broad	-0.0099	(-0.08)	0.2461	-0.0402	-0.8564	(-2.42)	2.1758	(3.08)
DCI BNP Paribas Enhanced Index	-0.0189	(-0.17)	0.2283	-0.0826	-0.9981	(-2.82)	2.1332	(3.02)
Average	-0.0130		0.2450	-0.0500	-0.8533		1.9688	
Panel D: Other Roll Methodologies								
Barclays Commodity Curve Allocation Index	0.0378	(0.32)	0.2378	0.1590	-0.9459	(-2.68)	1.9436	(2.75)
Merrill Lynch Commodity Index eXtra	-0.0497	(-0.37)	0.2677	-0.1857	-0.7627	(-2.16)	2.0415	(2.89)
RICI Enhanced Index	-0.0152	(-0.14)	0.2246	-0.0679	-0.9163	(-2.59)	1.8064	(2.55)
Average	-0.0091		0.2434	-0.0315	-0.8750		1.9305	

Panel E: Signal-based Enhancements								
Bache Commodity Index	-0.0079	(-0.10)	0.1580	-0.0498	-0.1833	(-0.52)	0.4344	(0.61)
BNP Paribas COMAC Long Only	0.0107	(0.11)	0.2019	0.0530	-1.3428	(-3.80)	3.0155	(4.26)
BNP Paribas Oscillator Commodities	0.0074	(0.12)	0.1237	0.0599	-0.6146	(-1.74)	0.1983	(0.28)
CYD Long-Only	-0.0118	(-0.12)	0.1943	-0.0608	-0.5248	(-1.48)	1.2765	(1.81)
CX Commodity Index	0.0096	(0.08)	0.2272	0.0421	-0.5828	(-1.65)	1.6926	(2.39)
DBLCI-Mean Reversion	-0.0368	(-0.29)	0.2533	-0.1451	-0.6169	(-1.74)	-0.1564	(-0.22)
Morningstar Long/Flat Commodity Index	0.0368	(0.51)	0.1439	0.2554	-0.6355	(-1.80)	1.2678	(1.79)
Morningstar Long-Only Commodity Index	-0.0186	(-0.16)	0.2319	-0.0803	-0.7790	(-2.20)	1.7465	(2.47)
Average	-0.0013		0.1918	0.0093	-0.6600		1.1844	
Panel F: Averages								
First generation	-0.0592		0.2646	-0.2303	-0.4991		2.1937	
Second generation	-0.0093		0.2252	-0.0298	-0.7888		1.6053	

(t-statistic in parentheses)

The performance of second generation indices over the 2008-2012 period is better than that reported in Exhibit 1, Panel B for first generation indices. Even though none of the second generation indices earn positive mean excess return at the 5% level in Panels A to E, their average excess returns in Panel F, which stands at -0.93% a year, exceeds that of first generation indices by 5% a year. With the exception of constant maturity strategies that tend to underperform (-3.15% a year in panel B), the performance of the other strategies is found to be close to that of the average second generation index in Panel F. As distant contracts tend to be less volatile than nearby contracts, the annualized standard deviation of second generation indices is on average smaller than that of their first generation counterparts (22.52% a year versus 26.46% for first generation). As a result, the performance of second generation indices stands out on a risk-adjusted basis: their Sharpe ratios average -0.0298 versus -0.2303 for first generation indices. As in Exhibit 1, the distribution of second generation indices is negatively skewed and leptokurtic. Second generation indices fare worse than first generation in terms of skewness (-0.7888 versus -0.4991) but this result is mainly driven by DCI which has positive and significant skewness in Exhibit 1. Excluding DCI, the average skewness in Exhibit 1 falls to -0.7586 and is thus similar to that reported for second generation indices. This suggests that both generations suffer severely during deep downturns. We will come back to this point shortly.

Third Generation Commodity Indices

The high volatility observed in long-only commodity indices and the recognition of the importance of contango following the 2008 downturn in commodity futures prices were major factors initiating the creation of third generation indices. These long-short indices take long positions in backwardated commodities (with low inventory and net short hedgers) whose prices are expected to appreciate and short positions in contangoed commodities (with high inventory and net long hedgers) whose prices are expected to depreciate. As compared to the previous long-only generations, the dynamic long-short indices are designed to perform well both in up and down markets and also to capture the risk premium of commodities futures contracts, by applying more active investment approach.

Backwardation / contango in turn can be modelled via different signals that have been shown by academics to work well in commodity futures markets. These include: momentum (Erb and Harvey [2006], Miffre and Rallis [2007], Shen, Szakmary and Sharma [2007], Szakmary, Shen and Sharma [2010]) and the slope of the term structure (Erb and Harvey [2006], Gorton and Rouwenhorst [2006], Fuertes, Miffre and Rallis [2010]). Macroeconomic and financial factors, geopolitical situation, supply/demand and technical analysis are also used as signal to add value for commodity selection. In our sample, we have 9 third generation indices categorized into the following strategies

(i) *Momentum*: These indices use price continuation to determine long or short positions. Indices in this category include Mount Lucas Management Commodity Index and Morningstar Long/Short Commodity Index.

(ii) *Term structure*: These indices define positions based on the shape of the futures curve, taking long positions in the most backwardated commodities with the highest roll yields and short positions in the most contangoed ones with the lowest roll yields. CYD Long Short is a good example in this category.

(iii) *Market neutral*: These indices enter simultaneous long and short positions so as to be market neutral. CYD Market Neutral Plus is included in our cross section as an example.

(iv) *Fundamental/Rule-based*: These indices are based on a quantitative approach that combines fundamental forecasts and technical signals to design optimum commodity weights. For example, Barclays Capital CORALS defines asset allocation by combining technical signals (momentum) and fundamental analysis (inventory data, roll yield, unemployment data...). Other methodologies in this group base index weights on recommendations from an outside specialist. An example here is BNP Paribas COMAC Long Short which works jointly with Tiberius Group.⁴

Exhibit 3 presents summary statistics for third generation indices in Panel A, alongside with the average performance of first, second and third generation indices in Panel B. Over the period of May 31, 2008 – April 30, 2012 that is common to all three generations, the third generation indices stand out as offering the highest mean excess returns (at 3.02% on average versus -5.92% and -0.93% for their first and second generations, respectively). There is no clear tendency for one strategy to outperform the other ones. This suggests that the signal used is no guarantee of outperformance and that other parameters such as index constituents, rebalancing frequency, diversification constraints or weighting scheme are likely to impact performance too.

Exhibit 3: Performance of third generation indices over the period May 31, 2008 – April 30, 2012

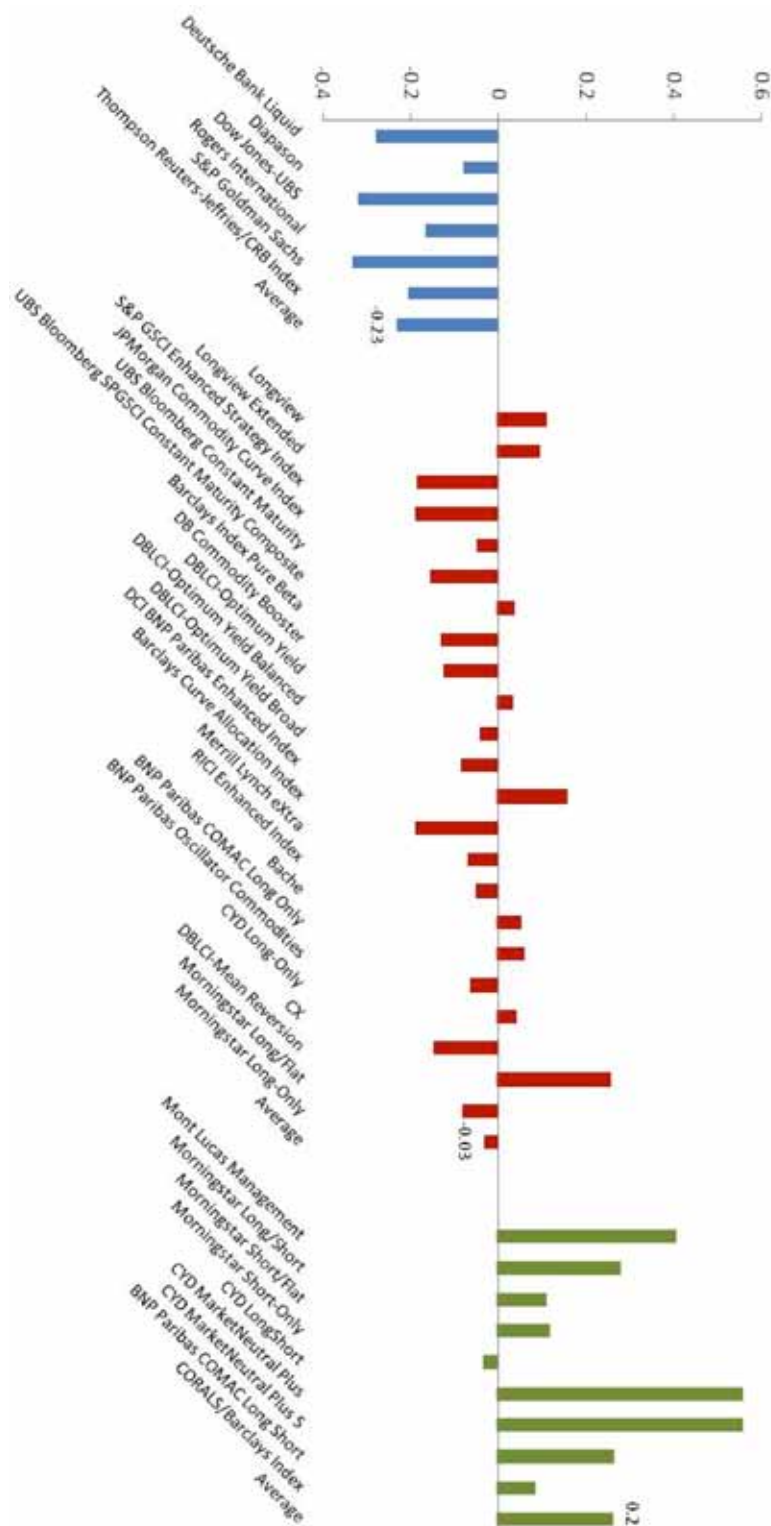
Main Strategy		Annualized Mean Excess Returns	Annualized Standard Deviation	Sharpe Ratio	Skewness	Excess Kurtosis
Panel A: Third-generation: Individual performance						
Mont Lucas Management Commodity Index	Momentum	0.0731 (0.81)	0.1797	0.4067	0.9186 (2.60)	5.3399 (7.55)
Morningstar Long/Short Commodity Index	Momentum	0.0397 (0.56)	0.1423	0.2791	-0.4445 (-1.26)	0.9958 (1.41)
Morningstar Short/Flat Commodity Index	Momentum	0.0090 (0.22)	0.0819	0.1095	1.4523 (4.11)	4.6297 (6.55)
Morningstar Short-Only Commodity Index	Momentum	0.0261 (0.24)	0.2206	0.1185	0.9387 (2.65)	1.8896 (2.67)
CYD Long Short	Term structure	-0.0026 (-0.06)	0.0817	-0.0318	0.2115 (0.60)	-0.2041 (-0.29)
CYD Market Neutral Plus	Market neutral	0.0137 (1.12)	0.0245	0.5583	0.1413 (0.40)	0.4795 (0.68)
CYD Market Neutral Plus 5	Market neutral	0.0343 (1.12)	0.0615	0.5576	0.1614 (0.46)	0.4732 (0.67)
BNP Paribas COMAC Long Short	Fundamental/Rule-based	0.0644 (0.53)	0.2436	0.2644	-0.1148 (-0.32)	-0.4176 (-0.59)
CORALS/Barclays Index	Fundamental/Rule-based	0.0141 (0.17)	0.1658	0.0853	-0.8577 (-2.43)	0.6344 (0.90)
Panel B: Averages						
First generation		-0.0592	0.2646	-0.2303	-0.4991	2.1937
Second generation		-0.0093	0.2252	-0.0298	-0.7888	1.6053
Third generation		0.0302	0.1335	0.2609	0.2674	1.5356

(t-statistic in parentheses)

Irrespective of the risk measures considered, the third generation indices stand out as being less risky since they have noticeably smaller volatility, higher skewness and lower excess kurtosis (all three characteristics are welcome features to risk-averse investors). Most noticeably, the long-short indices present volatilities that are on average 50% (59%) less than those of second (first) generations. This is to be expected as the indices are often fully-collateralized (i.e., unlevered) with the shorts (longs) providing a partial hedge against the risk that the longs (shorts) may depreciate (appreciate) in value, thereby reducing overall volatility. As a result and as pictured in Figure 2, the Sharpe ratios of third generation indices (in green) at an average of 0.26 clearly stand out as being much higher than those of first generations (at -0.23 on average in blue) and second generations (at -0.03 on average in red).

4 – Other examples include Credit Suisse (Goldman Sachs) which designs an index based on the views of Glencore (Clive Capital). These indices are not included as their return history is too short.

Figure 2: Sharpe ratios of first (in blue), second (in red) and third (in green) generation indices (May 31, 2008 – April 30, 2012)



The benefits of third generation indices are particularly clear in Figure 3 where we plot the excess returns of the different indices sorted per generation in October 2008 or right after the Lehman Brothers debacle (dated September 15, 2008). Both first and second generation indices (as modelled in blue and red, respectively) performed poorly in this severely volatile market condition. However, the third generation long-short commodity indices performed exceptionally well benefiting fully from contango and market downturn through the shorts, thereby increasing performance and maintaining low overall volatility. This result confirms those presented in Miffre [2011] which highlight the outperformance of long-short (over long-only) commodity strategies such as those implemented by CTAs in periods of high volatility in equity markets. Altogether, Exhibit 3, Figures 2 and 3 suggest that third generation commodity indices could become serious contenders to CTAs that merely replicate strategies based on momentum and term structure.

Excess returns in October 2008

Fund/Index	Excess Return
Deutsche bank Liquid	-0.24
Dapason	-0.24
Dow Jones-UBS	-0.24
Regis International	-0.24
S&P Goldman Sachs	-0.24
Thompson Reuters-Jeffrey CDB Index	-0.24
Average	-0.24
Longview	-0.21
Longview Extended	-0.21
Enlanced Strategy Index	-0.21
Commodity Curve Index	-0.21
UBS Bloomberg Constant Maturity	-0.21
JP Morgan Constant Maturity Composite	-0.21
Barclays Index Pure Beta	-0.21
DB Commodity Booster	-0.21
DB Commodity Index	-0.21
DB Commodity Yield	-0.21
DB Commodity Yield Balanced	-0.21
DB Commodity Yield Broad	-0.21
DB Commodity Yield Enhanced	-0.21
DB Commodity Yield Allocation Index	-0.21
Merrill Lynch Extra	-0.21
RICI Enhanced Index	-0.21
BNP Paribas COMMAC Long Only	-0.21
BNP Paribas Commodities	-0.21
BNP Paribas Oscillator	-0.21
CTD Long-Only	-0.21
DB Commodity Mean Reversion	-0.21
CTD Long-Only	-0.21
Morningstar Long/Flat	-0.21
Morningstar Long-Only	-0.21
Average	-0.21
Monte Carlo Management	0.10
Morningstar Long/Short	0.10
Morningstar Short/Flat	0.10
Morningstar Short-Only	0.10
CTD Long-Only	0.10
CTD Market Neutral Plus	0.10
CTD Market Neutral	0.10
BNP Paribas COMMAC Long-Short	0.10
CORAL/Barclays Index	0.10
Average	0.10

The rising interest of institutional investors for commodities since the early 2000s prompted remarkable financial engineering in the commodity index space which is now in its third generation. The purpose of this article was to review this evolution and to give an assessment of index performance. Given recent proliferation of indices, this review seems important as it has become increasingly puzzling for investors to choose a specific index.

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based on momentum or roll-yields. Yet, second generation indices suffer from two major drawbacks. First, many of them hold distant contracts, that are less liquid and thus are costly to trade; second, and most importantly, as they are long-only, they cannot fully benefit from the price depreciation associated with contango. We propose, as an interesting alternative, the third generation indices that accurately take into account the fundamentals of commodity futures markets by going long backwardated assets and short contangoed ones, simultaneously reducing overall volatility. In their design, they are closer to actively managed commodity trading strategies than they are to first or second generation indices. Besides, they offer good performance in periods of market downturn, good diversification to equity investors, high liquidity and full transparency at a low cost. As such, they might become serious contenders to commodity trading advisors that merely replicate strategies based on momentum or term structure.

Second and third generation indices regrettably only started trading recently, thus the live dataset that we have at our disposal to appraise their performance might be too small to draw clear inferences. It will be interesting to revisit the evidence once more data is made available.

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