Commodities Research

Global Markets Research

Deutsche Bank

July 2007

Deutsche Bank Guide To Commodity Indices

Table of Contents

London

Michael Lewis
Global Head of Commodities Research

Jude Brhanavan
Analyst

Hong Kong

Amanda Lee, CFA
Strategist

Paris

Mark Lewis
Strategist

New York

Adam Sieminski, CFA
Chief Energy Economist

Joel Crane
Strategist

David Folkerts-Landau
Managing Director
Global Head of Research

Table of Contents

For monthly updates of the commodity index space please subscribe to the DBLCI Monthly report, which is also available in German and Japanese.

Introduction

July 16, 2007

To Deutsche Bank's Clients:

The Deutsche Bank Guide To Commodity Indices is the fourth in our Commodity Guide series following the publication of the Investor Guide To Commodities, the User Guide To Commodities and the User Guide To Commodities AnalyzerLite in April 2005, July 2006 and September 2006 respectively.

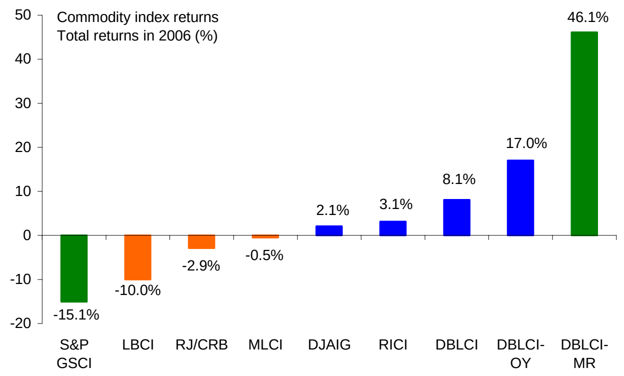
This Guide outlines the development of the commodity index space, which before 2003 was limited to just the Goldman Sachs Commodity Index, the Dow Jones-AIGCI and the Rogers International Commodity Index. Since then the population of investible commodity indices has exploded and index performance has become highly divergent. As a result, investors need to be acutely aware of the characteristics that differentiate the numerous commodity index products in the marketplace.

This report is divided into four broad sections. The first outlines the universe of commodity indices and what features distinguish them apart. The second examines the properties of commodity indices, their sources of returns and the portfolio benefits of adding a commodity index to an overall portfolio. The third section illustrates a few examples of commodity index trading strategies. The final chapter details index calculation, rules and historical returns data.

I hope you, our clients, find this guide informative in what has become a rapidly developing space, a sign, in our view, of the building credibility of commodities as a distinct asset class.

Michael Lewis
Global Head of Commodities Research
michael.lewis@db.com

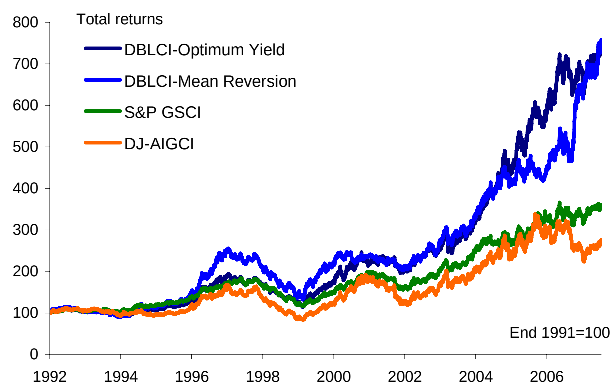
Figure 1: Commodity index returns in 2006



The commodity index winners in 2006 were those with a high allocation to the grains sector such as the DBLCI-MR or indices which used technology to tackle the dynamic nature of commodity forward curves such as the DBLCI-Optimum Yield.

Source: DB Global Markets Research, Bloomberg

Figure 2: Commodity index returns compared



Past performance is not necessarily indicative of future results.

Source: DB Global Markets Research, Bloomberg

Commodity Index Universe

Overview

The construction of a commodity index has employed the minds of many academics and investment bankers over the past few years. However, no commodity index can be truly representative of the entire commodity complex since none of them include the two most important commodities in the world: steel and rice.

World crude steel production reached 1.22 billion tonnes in 2006. This compares with aluminium production, which exceeds the combined production of all the other non-ferrous metals, of just 34 million tonnes over the same period. Despite the importance of steel to the world economy, it is not financially traded due to the numerous grades available and consequently the difficulties in establishing a widely recognised benchmark. Instead steel prices are determined by individual contracts between producers and consumers which prohibits steel, for the time being, from being included in a commodity index.

Rice is the staple diet for half of the world's population and is grown in every continent except Antarctica. China and India account for half of the world's production and all Asia combined constitutes 90% of global rice production. The Chicago Board of Trade, the AFE in Thailand and the NCDEX and MCX in India are the only exchanges in the world listing rice futures. Like steel, rice grades are variable and the liquidity of rice future contracts has so far been negligible. On NYBOT, turnover of the rough rice futures contract in 2006 was just 320K lots, Figure 1.

Despite the potential difficulties in constructing a representative commodity index, this has not deterred the rapid development of the commodity index space during this decade. The major determining features of a commodity index are:

1) How many commodities are included and in what proportion?
2) What is the selection process for the inclusion and what are the criteria for the re-weighting of the commodity basket?
3) Which specific futures contracts are used for each individual commodity?
4) How are these futures contracts rolled?
5) Are the commodities reset to base weights periodically?

Number of components & weights

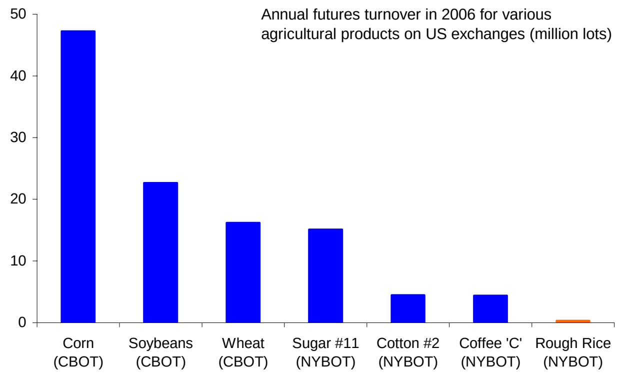
The number of commodities within an index varies from as low as six for the Deutsche Bank commodity indices to as high 45 and 36 for the Diapason Commodity Index and the Rogers International Commodity Index respectively. The factors determining the individual component weights are typically a function of world production and consumption, global inventory levels, open interest and market turnover. In certain commodity indices, weights for individual commodities or sectors are capped. For example, the DBLCI-Optimum Yield Balanced caps the weight of any one commodity or closely correlated commodities to 35% in order to be UCITS III compliant.

The Dow Jones-AIGCI prohibits any single commodity constituting less than 2% or more than 15% of the index and any individual commodity sector weight exceeding 33%. For the majority of commodity indices, rebalancing is undertaken once a year and can occur on a discretionary basis via an investment committee such as the procedures adopted by the Dow Jones-AIGCI, the S&P GSCI and the Rogers International Commodity Index (RICI). For others, re-weighting can occur mechanistically or not at all, for example for the DBLCI-Mean Reversion.

Commodity exchanges

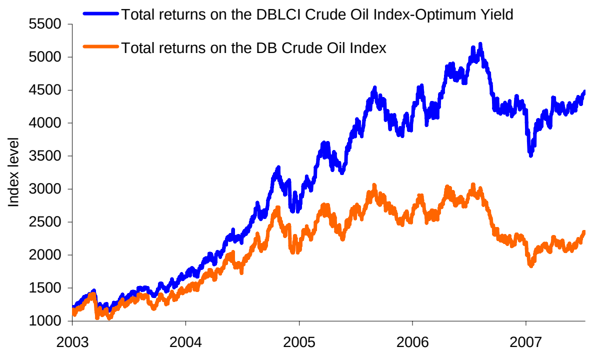
In terms of the family of Deutsche Bank commodity indices, the commodity futures contracts were chosen to represent the most liquid contracts in their respective sectors. Consequently NYMEX tends to dominate energy futures contracts and industrial metals are typically represented by contracts on the London Metal Exchange.

Figure 1: A comparison of futures turnover across the agricultural sector in 2006



Source: CBOT, NYBOT

Figure 2: The benefits of the Optimum Yield technology in a contangoed crude oil market



Source: DB Global Markets Research

The treatment of futures rolling

The traditional approach to commodity futures rolling is to roll to the next nearby futures contract, a method employed by the S&P GSCI. However, the DBLCI and DBLCI-Mean Reversion, energy contracts are rolled monthly while all the non-energy contracts are rolled annually. This rolling procedure was adopted given the historical tendency for energy curves to be in backwardation and metal and agricultural forward curves to be in contango.

However, over recent years there has been a move away from a fixed rolling scheduled to a more dynamic rolling procedure to address the unstable nature of commodity forward curves. Examples of this approach are the family of Deutsche Bank Optimum Yield indices, which roll to that futures contract that maximises the roll return from the list of tradeable futures contracts that expire in the next 13 months.

Figure 2 illustrates the destructive effect on returns from a pre-defined monthly rolling schedule in an environment of an upward sloping WTI forward curve. By adopting a dynamic rolling schedule aimed at maximising the roll return, the Optimum Yield technology has delivered observable benefits.

Rebalancing

The DBLCI-Mean Reversion is the only commodity index that undertakes no rebalancing. Instead weighs are adjusted according to a pre-defined formula which attempts to underweight "expensive" commodities and overweight "cheap" commodities.

Figure 3: The commodity index universe can therefore be classified according to three broad categories:

1) Fixed weight, fixed roll index

2) Fixed weight, dynamic roll index

3) Dynamic weight, fixed roll index

Figure 4 classifies the major commodity indices according to these three categories.

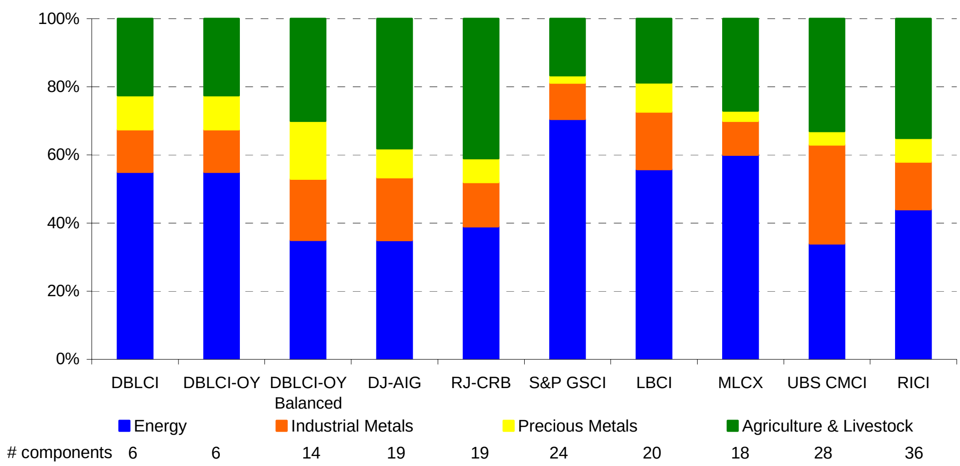
Figure 4: Summary of major commodity indices

Commodity index	Rolling frequency	Rebalancing frequency
Fixed weight, fixed roll index:		
DBLCI	Monthly for energy contracts, annual for non-energy contracts	Yearly
Dow Jones-AIGCI	Six times per annum	Yearly
S&P GSCI	Monthly	Yearly
Reuters-Jefferies/CRB	Monthly	Monthly
RICI	Monthly	Yearly
LBCI	Monthly	Yearly
MLCX	Monthly	Monthly
UBS Bloomberg CMCI	Daily rolling at constant maturity	Monthly
Fixed weight, dynamic roll index:		
DBLCI-Optimum Yield	Dynamic	Yearly
DBLCI-OY Broad	Dynamic	Yearly
DBLCI-OY Balanced	Dynamic	Yearly
Dynamic weight, fixed roll index:		
DBLCI-Mean Reversion	Monthly for energy contracts, annual for non-energy contracts	No rebalancing

Source: DB Global Markets Research

The sector composition of the major commodity indices are illustrated in Figure 5. The allocation to energy varies from 35% for the DBLCI-OY Balanced to 70% for the S&P GSCI. Figure 6 outlines historical performance data of the major commodity indices in the marketplace since the end of 2000.

Figure 5: Sector weights of major commodity indices



Source: DB Global Markets Research, Bloomberg; Base weights apply except for DJAIG and S&P GSCI weights, which are as of July 9, 2007

Figure 6: Historical returns, volatility & Sharpe ratios compared

	DBLCI	DBLCI - MR	DBLCI - OY Balanced	S&P GSCI	DJ_AIGCI	RICI	MLCX	LBCI
Annualised Return								
For the last 1Y	-0.04%	40.21%	4.74%	-17.70%	-0.54%	-3.01%	-5.88%	-9.29%
For the last 3Y	12.29%	20.16%	22.57%	2.54%	5.79%	9.65%	12.93%	3.75%
For the last 5Y	16.64%	21.47%	22.41%	9.95%	11.11%	16.04%	20.05%	10.91%
Since 29/12/2000	10.95%	15.47%	15.82%	2.94%	6.22%	10.77%	13.19%	5.00%
Annualised Vol	20.51%	16.20%	13.77%	22.41%	15.02%	16.48%	20.47%	19.42%
Sharpe Ratio	0.53	0.95	1.15	0.13	0.41	0.65	0.64	0.26

* annualised return based on excess return
** annualised vol of the daily normal returns
# calculated as a quotient of excess return and the volatility
Data from 29/12/2000 to 29/06/2007 as historical data are only available for LBCI since this date.

Past performance is not necessarily indicative of future results; annualised vol and Sharpe ratio data relate to the entire period; Source: DB Global Markets Research, Bloomberg

Conclusion

During the early stages of this commodity price rally, the performance of commodity indices had been relatively uniform. However, since the end of 2005 commodity returns have become highly divergent. The commodity index winners in 2006 were those indices with a high allocation to grains such as the Deutsche Bank Liquid Commodity Index-Mean Reversion or indices which used technology to tackle the dynamic nature of commodity forward curves such as the Deutsche Bank Liquid Commodity Index-Optimum Yield. The commodity losers in 2006 were those with a high allocation to energy, such as the S&P GSCI, which suffered on both a spot and roll return basis.

Investors therefore need to be acutely aware of the characteristics that differentiate the numerous commodity index products in the marketplace so as to be familiar how changing market conditions can affect index performance. The next section outlines the world's major commodity indices and the features that distinguish them apart.

Figure 7: The commodity index universe

Commodity index	Launch date	Historic data from
S&P GSCI	January 1991	January 1970
Dow Jones-AIG	July 1998	January 1991
RICI	July 1998	July 1998
DBLCI	February 2003	December 1988
DBLCI-MR	February 2003	December 1988
RJ/CRB*	June 2005	January 1994
DBLCI-OY	May 2006	December 1988
MLCI	June 2006	June 1990
LBCI	July 2006	December 2000
Diapason CI	July 2006	December 1997
CXCI	November 2006	December 1996
CYD CI	November 2006	December 1979
DBLCI-OY Broad	January 2007	September 1997
DBLCI-OY Balanced	January 2007	September 1997
UBS Bloomberg CMCI	January 2007	October 1997

** The original CRB index was launched in 1957, which solely tracked commodity spot prices*

Source: DB Global Markets Research, S&P GSCI, DJ-AIG, UBS, Bloomberg, Deutsche Börse, Diapason

Deutsche Bank Liquid Commodity Index (DBLCI)

The Deutsche Bank Liquid Commodity Index (DBLCI) was launched in February 2003. It tracks the performance of six commodities in the energy, precious metals, industrial metals and grain sectors. The commodity futures contracts chosen represent the most liquid contracts in their respective sectors. The DBLCI has constant weightings for each of the six commodities and the index is rebalanced annually in the first week of November. Consequently the weights fluctuate during the year according to the price movement of the underlying commodity futures.

Energy contracts are rolled monthly, all other commodity futures contracts are rolled annually. This rolling procedure was adopted given the historical tendency for energy curves to be in backwardation and metal and agricultural forward curves to be in contango. Futures contracts rolling takes place between the second and sixth business day of the month. The DBLCI is quoted in both total returns and excess returns terms in US dollars as well as a variety of major currencies.

Figure 1: Characteristics of the DBLCI:

- **Six commodities: WTI crude oil, heating oil, aluminium, gold, corn and wheat.**
- **Constant weighting which reflect world production and inventory, providing a diverse and balanced commodity exposure.**
- **A rule-based and transparent calculation methodology. Energy contracts are rolled monthly, metal and grain contracts annually.**
- **Total and excess returns data are available from December 1, 1988.**

Bloomberg Page: DBCM

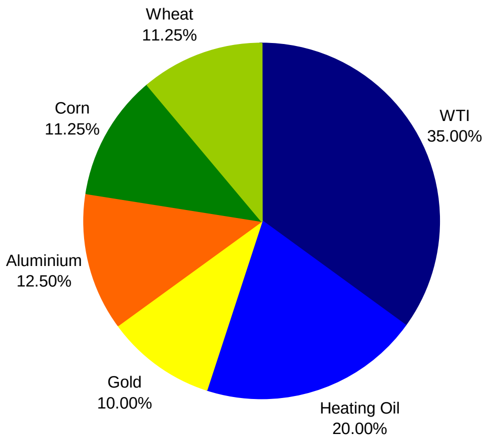
Bloomberg Ticker: DBLCMAVL<Index>

Reuters Page/RIC: <DBLCI>; .DBLCITR

Two of the main distinguishing features between the DBLCI and other commodity indices relate to the number of components and the overall allocation to the energy complex. While the number of commodities in the S&P Goldman Sachs Commodity Index, Dow Jones-AIG and the Reuters-Jeffries/CRB index are broadly similar ranging from 19 to 24 commodities, the DBLCI has just six commodities. The allocation to energy also differs substantially ranging from 70% in the S&P GSCI, 55% in the DBLCI, 39% in the RJ/CRB and 33% in the Dow Jones-AIG.

A lower number of commodities in an index can offer certain advantages. For example, it involves an investor in only the most liquid commodity contracts in their respective sectors. Last year, aluminium accounted for 46% of combined turnover on the LME. Consequently a commodity index which has part of its basket in lead or nickel would entail greater liquidity risk since these two metals constitute only 11% of total turnover on the LME. Energy markets exhibit a similar degree of market concentration with the benchmark West Texas Intermediate (WTI) crude oil contract representing 37% of total energy futures turnover on NYMEX in 2006.

Figure 2: Commodity weights of the DBLCI



Source: DB Global Markets Research; Base weights July 9, 2007

Figure 3: DBLCI contract specifications

	Index weight	Contract months	Exchange
Energy			
WTI crude oil	35.00%	Jan-Dec	NYMEX
Heating oil	20.00%	Jan-Dec	NYMEX
Precious Metals			
Gold	10.00%	Dec	COMEX
Industrial Metals			
Aluminium	12.50%	Dec	LME
Grains			
Corn	11.25%	Dec	CBOT
Wheat	11.25%	Dec	CBOT

Source: DB Global Markets Research

Representation & liquidity

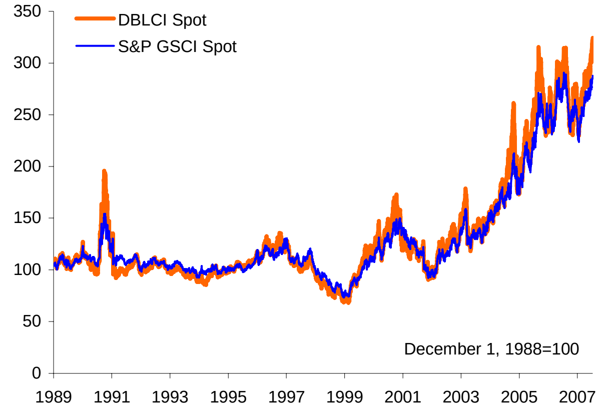
One concern of a small number of commodities within an index is the potential that an investor does not enjoy full representation of the entire commodity complex. For example, the DBLCI includes just WTI sweet crude oil and heating oil to represent the energy complex. This compares with WTI crude oil, Brent crude oil, RBOB gasoline, heating oil, gasoil and natural gas in the energy basket of the S&P Goldman Sachs Commodity Index.

However, one of the major properties of commodities is their strong and positive cross-correlation within each sector. The reason for this is straightforward: in both energy and industrial metals, the underlying fundamentals affecting the supply of and demand for benchmark commodities, such as crude oil and aluminium, are the same forces affecting the other less liquid commodities within the energy and industrial metals sector.

To test for the robustness of this cross-correlation relationship we examined the overall spot returns of the DBLCI and the S&P GSCI since 1988, Figure 4. Despite the S&P GSCI comprising between 24 and 26 commodities over this period, we find that spot returns are almost identical between the two commodity indices. Consequently adding additional individual commodity components to a commodity index does not necessarily improve representation, which can be achieved by a small number of liquid commodities.

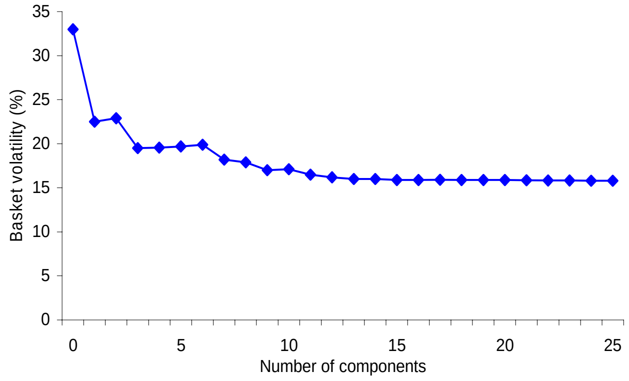
However, the drawback from a regulatory perspective of the DBLCI is that it is not UCITS III compliant. This requires that the weight of no one commodity or highly correlated commodities can exceed 35%. Since the weights of WTI crude oil and heating oil amount to 55% this disqualifies the DBLCI as a UCITS III investment vehicle. To ensure UCITS III compliance we launched the DBLCI-Optimum Yield Balanced index in January 2007. For more details of the DBLCI-OY Balanced index see page 17.

Figure 4: Spot returns of the DBLCI & S&P GSCI compared



Source: DB Global Markets Research, Bloomberg

Figure 5: Volatility of a commodity basket with a differing number of components



This analysis was conducted in 2004 when the S&P GSCI had 26 components

Source: DB Global Markets Research, Bloomberg

It has been cited that another potential hazard of a narrower commodity index could be the elevated level of volatility risk. In theory, the larger the number of commodities within an index should provide greater diversification and hence dampen volatility of the overall commodity basket. However, at some point adding one more commodity to the basket will eventually deliver no reduction in volatility, but, merely entail significant liquidity risk given that market turnover tends to be concentrated in a low number of individual commodity contracts.

To test this, we estimated the optimal number of commodities in an index from a volatility perspective by removing the lowest weighted commodity in the S&P Goldman Sachs Commodity Index and redistributing its weight among the remaining components to see its effect on the overall volatility of the index. We found that decreasing the number of basket components had only a gradual effect on the volatility of the basket. It was only when the number of components fell below four that there was a significant increase in volatility risk, Figure 5.

Conclusion

The DBLCI has the lowest number of components of any commodity index currently in the marketplace. However, this does not come at the cost of diminishing its representation of the commodities complex in our view, since spot returns on the DBLCI are strongly positively correlated with spot returns on the S&P GSCI.

Deutsche Bank Liquid Commodity Index-Mean Reversion (DBLCI-MR)

Launched at the same time as the DBLCI in February 2003, the DBLCI-Mean Reversion has the same underlying assets as the DBLCI. The listed instruments are also rolled using the same mechanism as the DBLCI, namely energy contracts are rolled monthly and the metal and grain contracts are rolled annually. This occurs between the second and sixth business day of the month. The DBLCI-MR is also quoted in both total returns and excess returns terms in US dollars as well as EUR, JPY and GBP.

In contrast to the DBLCI, the DBLCI-MR undertakes no annual re-balancing. Instead, the individual commodity weights are reset every time any one of the commodities undergoes a 'trigger event'. This happens when the one-year moving average of the commodity price is a whole multiple of 5% away from the five-year moving average. When this happens, the weights of all the commodities are re-balanced such that 'expensive' commodities have their weights reduced while 'cheap' commodities have their weights increased according to a simple, pre-defined formula. The entire process is rule-based and mandatory. The fact that there exist clear pre-set 'hurdle rates' to trigger a re-weighting, minimises the number of re-weightings and thus reduces the transactions costs for replication.

Figure 1: Characteristics of the DBLCI-Mean Reversion

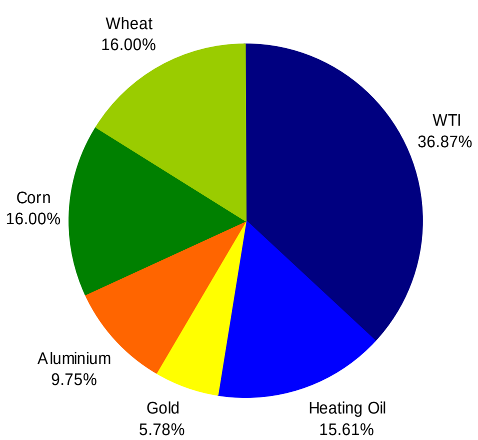
- **Six commodities: WTI crude oil, heating oil, aluminium, gold, corn and wheat. The same rolling schedule as the DBLCI.**
- **No annual rebalancing. Instead commodity weights are adjusted according to a pre-defined formula.**
- **It is the only commodity index in the marketplace which possesses a dynamic rule-based asset allocation mechanism which attempts to underweight "expensive" commodities and overweight "cheap" commodities.**
- **Total and excess returns data are available from December 1, 1988.**

Bloomberg Page: DBCM

Bloomberg Ticker: DBLCMMVL <Index>

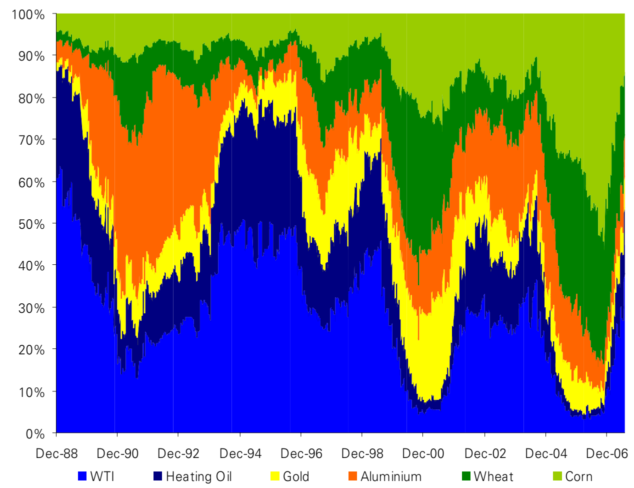
Reuters Page/RIC: <DBLCI> .DBLCIMRTR

Figure 2: Commodity weights of the DBLCI-MR



Source: DB Global Markets Research, Weights as of July 9, 2007

Figure 3: DBLCI-MR sector weights over time



Source: DB Global Markets Research

The DBLCI-Mean Reversion is the only index which dynamically changes its weights according to whether a commodity is considered cheap or expensive. When all the commodities are within 5% of their five-year averages, the weights will automatically revert to the weights of the base index, the DBLCI. The rationale behind the construction of the DBCLI-MR is to exploit the tendency of commodity prices to trade within wide, but, defined ranges because:

1) As prices of commodities rise, new production capacity is brought on line to benefit from higher prices.

2) More supply becomes available from alternative sources previously considered uneconomic.

3) In oil markets, quota systems that attempt to control supply come under strain as the rewards for cheating rise.

4) As prices rise, the demand for the commodity will begin to fall as it faces competition from cheaper sources.

The net effect is to keep commodity prices bound around their long run average price.

DBLCI-MR index calculation

The reweighting rule for the DBLCI-MR is outlined below. For each commodity, each day, the number of divergence ticks is calculated.

$$d_{i,t} = trunc\left\{\frac{1}{f}\left(\frac{a_{i,t}}{A_{i,t}} - 1\right)\right\}$$

$a_{i,t}$ = the 1-year moving average of commodity i at time t

$A_{i,t}$ = the 5-year moving average of commodity i at time t

A reweighting is only triggered when the divergence goes through a multiple of the divergence hurdle rate, f, which we set at 5% to limit the number of trigger events. Then, for each time that the number of divergence ticks changes for any of the commodities, the weights are recalculated:

$$W_{i,t} = \frac{W_{i,0}\exp(-d_{i,t}k)}{\sum_{i=1}^{n} W_{i,0}\exp(-d_{i,t}k)}$$

where,

$W_{i,0}$ = weight of commodity i at time 0

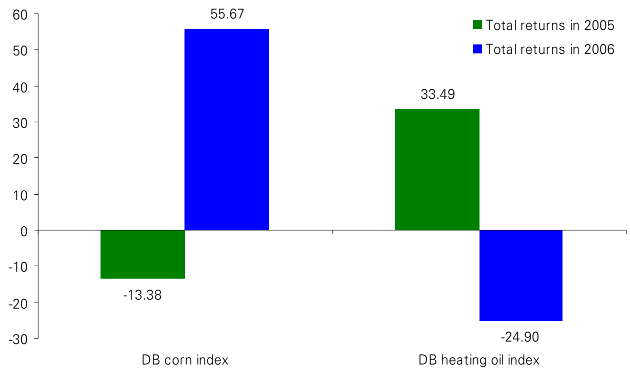
As the divergence increases, the weight of the commodity is reduced and vice versa. If the divergences are all zero, the weights are simply those of the base DBLCI. The constant k=30% is the 'weighting factor' and determines the degree of reweighting. The benefit of this approach is that the rule is entirely mechanistic and consequently no judgement is made in terms of the determinants of the weights.

In essence the DBLCI-MR is a strategy to buy low and sell high. It therefore tends to take profits gradually in a bull run and re-invest those proceeds into cheaper commodities. One benefit of this approach is that the DBLCI-MR tends to extract volatility from the index since as commodity prices rally so to does volatility.

The dynamic allocation process of the DBLCI-MR index is illustrated in Figure 3. Since last year, the allocation to corn and wheat has been cut from 80% to just 30%. The energy sector has been the main beneficiary of the DBLCI-Mean Reversion's shift out of grains. The DBLCI-MR is therefore recognising what has been known in for some time, namely that excessive optimism and pessimism towards an individual security often leads to poor portfolio performance.

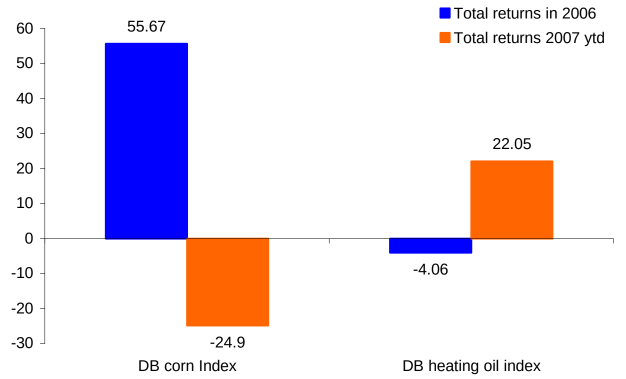
In fact evidence suggests that portfolios comprising past losers tend to outperform past winners and vice versa over time, see Hersh Shefrin, *Beyond Greed and Fear*, Harvard Business School, 2000. In fact this has been a recurring theme of commodity markets over the past few years. Figures 4 & 5 examine the annual returns of corn and heating oil in 2005, 2006 and so far in 2007. We find that it has been common for a commodity to be at the bottom of the league table in terms of total returns in one year, to be close to the top in the following year only to reverse these gains in the next 12 month period.

Figure 4: The lesson of fear & greed…



Source: DB Global Markets Research

Figure 5: …past losers are often tomorrow's winners and vice versa



Source: DB Global Markets Research; ytd figures relate to end June 2007

Deutsche Bank Liquid Commodity Index-Optimum Yield (DBLCI-OY)

In May 2006, Deutsche Bank launched a new set of commodity index products called the Deutsche Bank Liquid Commodities Indices Optimum Yield, or DBLCI-OY. The DBLCI-OY indices are available for 24 commodities drawn from the energy, precious metals, industrial metals, agricultural and livestock sectors. A DBLCI-OY index based on the DBLCI benchmark weights is also available and the optimum yield technology has also been applied to the energy, precious metals, industrial metals and agricultural sector indices. Like the DBLCI, the DBLCI-OY is available in USD, EUR, GBP and JPY on a hedged and un-hedge basis. The DBLCI-OY is rebalanced on the fifth index business day of November when each commodity is adjusted to its base weight. The DBLCI-OY is also listed as an Exchange Traded Fund (ETF) on the American Stock Exchange.

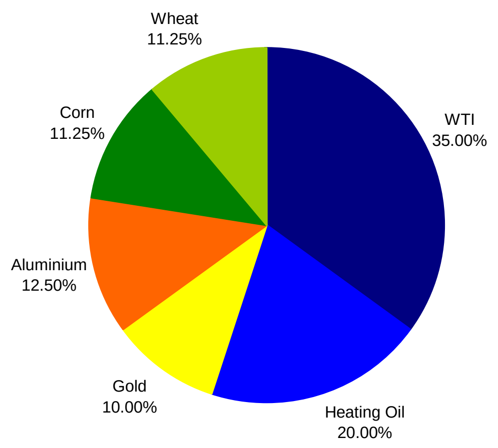
The rationale of the Optimum Yield technology was to address the dynamic nature of commodity forward curves. Unstable forward curves has meant the traditional approach employed by commodity indices, namely rolling futures contracts on a pre-defined scheduled (e.g. monthly) has, in our view, become an inferior strategy for passive commodity index investing. The DBLCI-OY indices are designed to select the futures contacts that either maximises the positive roll yield in backwardated term structures or minimises the negative roll yield in contangoed markets from the list of tradeable futures that expire in the next 13 months.

Figure 1: Characteristics of the DBLCI-Optimum Yield

- **Six commodities: components and weights are identical to the DBLCI.**
- **Index rolls to the futures contract that generates the maximum implied roll return from the list of tradable futures that expire in the next 13 months.**
- **Like the DBLCI, commodity weights are re-balanced annually.**
- **The DBLCI-OY is listed as an Exchange Trade Fund on the American Stock Exchange**
- **Total and excess returns data are available from December 2, 1988.**

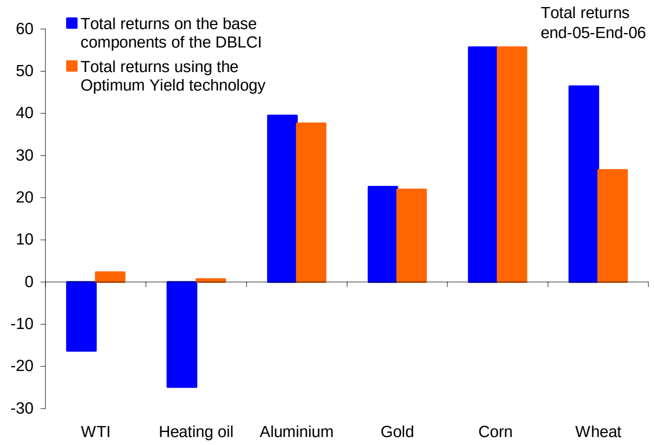
Bloomberg Ticker: DBC / DBLCOYTR <Index>
Reuters RICS: <DBLCI>

Figure 2: Commodity weights of the DBLCI-OY



Source: DB Global Markets Research; Base weights July 9, 2007

Figure 3: Sector returns of the DBLCI & DBLCI-OY



Source: DB Global Markets Research

The changing pattern in commodity term structures has important implications for commodity index investing. Historically the engine room of performance within a commodity index has derived from the positive roll return generated in the energy sector due to the tendency for forward curves in this part of the commodity complex to be downward sloping or backwardated. However, the appearance of contango in the crude oil term structure over the past three years has meant the benefits of a positive roll return have disappeared and have been replaced by a negative roll return.

This change has been dramatic in terms of returns performance. We find that between 1988 and 2004 the roll return in the DB crude oil index has amounted to 9.0% per annum, Figure 4. However, in 2005 following the appearance of contango in the WTI forward curve the roll return on the DB crude oil index collapsed to -22%. Consequently those commodity indices such as the S&P GSCI, the Dow Jones-AIG or the DBLCI which roll energy contracts monthly have incurred significant carrying costs over the past few years.

We believe this mechanistic approach to futures rolling every month was in need of reform. The launch of Deutsche Bank Liquid Commodities Indices-Optimum Yield (DBLCI-OY) was therefore specifically designed to combat the unstable nature of commodity forward curves. Last year for example, total returns on the DB crude oil index fell by approximately 15%. However, using the OY technology total returns on the DBLCI Crude Oil-Optimum Yield index actually rose slightly, Figure 3.

In terms of performance, from December 1988 to December 2006 the DBLCI-OY index has tended to outperform the DBLCI index: the annualised return over this period rises from 8.24% to 9.08% and the Sharpe ratio increases from 0.44 to 0.59. We find that the energy indices benefit most from the optimum yield technology. The DBLCI-OY WTI crude oil (CL) index has an overall annual out-performance over DBLCI CL of 4.16%. Furthermore the DBLCI-OY CL index has exhibited a lower volatility when compared to the DBLCI CL index giving it a significantly higher Sharpe ratio.

Figure 4: The composition of returns of the DBLCI from 1989 to 2004

1989-2004 p.a.	**Total returns**	**Spot return**	**Roll return**
DBLCI	12.67%	3.56%	4.21%
Returns of the individual components of the DBLCI			
Crude oil	20.17%	5.95%	8.99%
Heating oil	13.86%	5.34%	3.59%
Aluminium	-0.96%	-1.44%	-1.96%
Gold	0.99%	0.42%	-5.69%
Wheat	1.17%	-2.21%	-1.03%
Corn	-3.68%	-2.03%	-5.84%

Source: DB Global Markets Research

Figure 5: The composition of returns of the DBLCI in 2005

2005	**Total returns**	**Spot return**	**Roll return**
DBLCI	17.54%	28.10%	-14.21%
Returns of the individual components of the DBLCI			
Crude oil	22.26%	40.48%	-22.01%
Heating oil	33.49%	40.52%	-11.18%
Aluminium	24.79%	16.29%	4.63%
Gold	17.97%	17.92%	-3.60%
Wheat	-1.38%	10.33%	-14.76%
Corn	-13.38%	5.37%	-21.44%

Source: DB Global Markets Research

Deutsche Bank Liquid Commodity Index-Optimum Yield Broad (DBLCI-OY Broad)

In January 2007, Deutsche Bank launched two new commodity indices, the Deutsche Bank Liquid Commodity Index Optimum Yield-Broad ("DBLCI-OY Broad") and the Deutsche Bank Liquid Commodity Index Optimum Yield-Balanced ("DBLCI-OY Balanced") based on DB's Optimum Yield technology.

However, instead of six components, the DBLCI-OY Broad consists of 14 commodities drawn from the energy, precious metals, industrial metals and agricultural sectors. The *sector* weights for the DBLCI-OY Broad are identical with the base weights of the DBLCI.

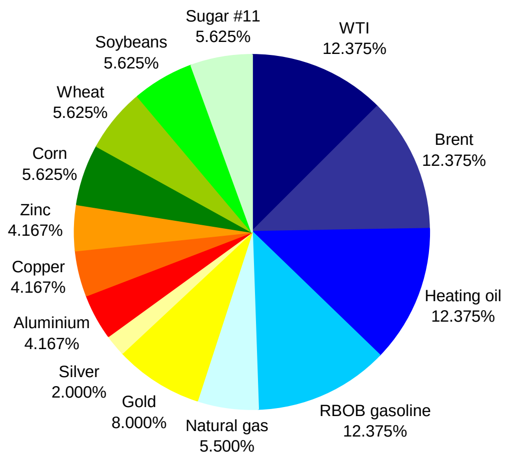
Figure 1: Characteristics of the DBLCI-OY Broad

- **The index consists of 14 commodities drawn from the energy, precious metals, industrial metals and agricultural sectors.**
- **Index rolling mechanism is based on DB's Optimum Yield technology.**
- **Total and excess returns data are available from September 3, 1997.**

Bloomberg Ticker: DBLCBRTR<Index>

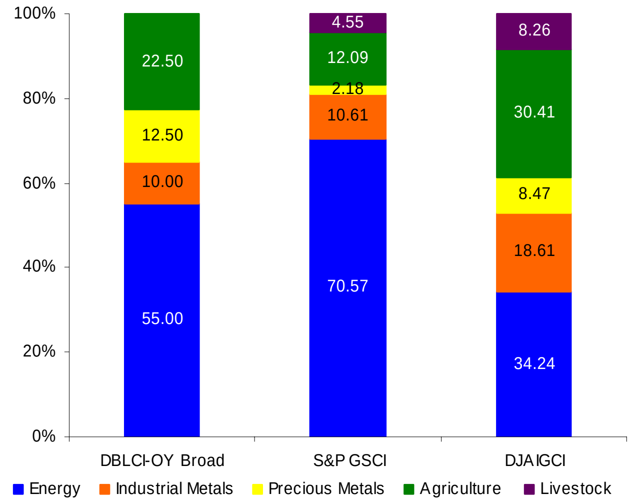
The main differences between the DBLCI-OY Broad, the S&P GSCI and Dow Jones-AIG are first, the DBLCI-OY Broad index has no exposure to livestock, second, the Broad index uses the Optimal Yield technology and finally the allocation to energy at 55% is mid-way between the S&P GSCI's 70% allocation and the Dow Jones AIGCI's 33% exposure, Figure 3.

Figure 2: Commodity weights of the DBLCI-OY Broad



Source: DB Global Markets Research; Base weights July 9, 2007

Figure 3: DBLCI-OY Broad, S&P GSCI & DJAIGCI sector weights compared



Source: DB Global Markets Research, Bloomberg; Weights as of July 9, 2007

Deutsche Bank Liquid Commodity Index-Optimum Yield Balanced (DBLCI-OY Balanced)

The DBLCI-OY Balanced has the same underlying 14 commodities as the DBLCI-OY Broad, but, the energy sector weight is reduced from 55% of the broad index to 35%. The DBLCI-OY Balanced is designed to be UCITS III compliant, that is the weight of no single commodity or strongly correlated securities exceed 35%. The DBLCI-OY Balanced is listed as an ETF on the Deutsche Börse.

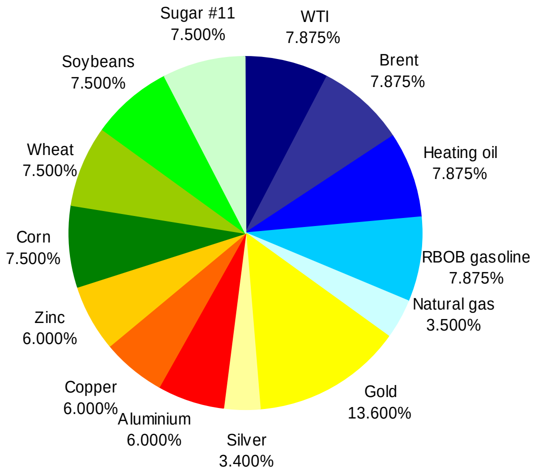
Figure 1: Characteristics of the DBLCI-OY Balanced

- **Consists of 14 commodities drawn from the energy, precious metals, industrial metals and agriculture sectors.**
- **Index rolling mechanism is based on DB's Optimum Yield technology.**
- **UCITS III compliant.**
- **Maximum sector allocation is limited to 35%.**

In terms of sector weights, the DBLCI-OY Balanced is broadly similar to the S&P GSCI Light Energy Index and the Dow Jones-AIG commodity index although the DBLCI-OY Broad has no exposure to the livestock sector, but, instead has a higher allocation to precious metals.

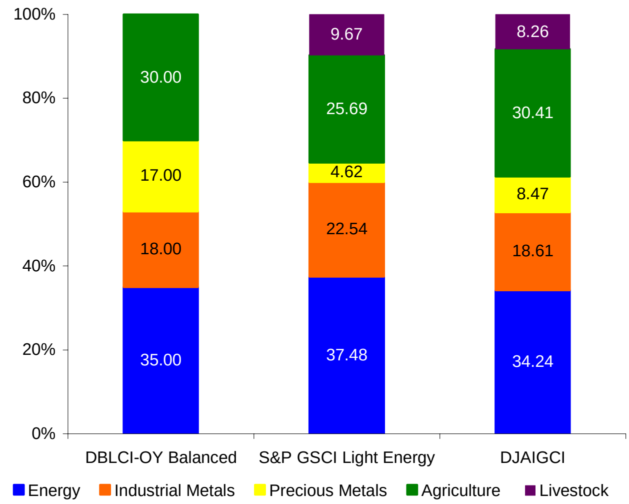
Bloomberg Ticker: DBLCBBTR<Index>

Figure 2: Commodity weights of the DBLCI-OY Balanced



Source: DB Global Markets Research; Base weights July 9, 2007

Figure 3: DBLCI-OY Balanced, S&P GSCI Light Energy & DJAIGCI sector weights compared



Source: DB Global Markets Research, Bloomberg; Weights as of July 9, 2007

The DBLCI-OY Family Of Commodity Sectors & Atoms

The Deutsche Bank Liquid Commodities Indices Optimum Yield (DBLCI-OY) are designed to maximise the potential roll returns by selecting, for each commodity, the futures contract with the highest implied roll return.

Aside from the basket indices introduced earlier, the DBLCI-OY technology is also available for 24 individual commodities, drawn from the energy, precious metals, industrial metals and agricultural sectors as well as for the broad commodity sector. For all indices both excess return (unfunded) and total return (funded) index levels based in USD are available. Further to this, hedged and unhedged levels are available in EUR, JPY and GBP.

The sector components for energy comprise of WTI, heating oil, RBOB gasoline, US natural gas and Brent. All components have a weight of 22.5% with the exception of US natural gas, whose weight is 10%. For precious metals exposure is limited to just gold and silver with weights of 80% and 20% respectively. The industrial metals index has three components, aluminium, copper and zinc which are equally weighted. Corn, wheat, soybeans and sugar #11 constitute the agricultural index.

The index values are calculated on each index business day using the exchange closing prices. Index business days are weekdays when bank in NYC are open. If it is an exchange holiday but an index business day, the exchange close price from the previous index business day is use. In addition to the commodity sector and individual atom indices, customised indices based on client defined weights can also be constructed as well as using the OY atoms to replicate other commodity indices.

Table 1: DBLCI-OY commodity membership list

Index	Commodity	Symbol	Exchange	DBLCI-OY Weight	Broad Weight	Balanced Weight	Sector Weight	Inception Date	BBG Excess Return Ticker	BBG Total Return Ticker
DBLCI-OY	Overall							2-Dec-88	DBLCOYER	DBLCOYTR
DBLCI-OY Broad	Overall							3-Sep-97	DBLCBRER	DBLCBRTR
DBLCI-OY Balanced	Overall							3-Sep-97	DBLCBBER	DBLCBBTR
Energy										
DBLCI-OY Energy	Sector							4-Jun-90	DBLCYEEN	DBLCYTEN
DBLCI-OY CL	Light Crude	CL	NYMEX	35.00%	12.375%	7.875%	22.50%	2-Dec-88	DBLCOCLE	DBLCOCLT
DBLCI-OY HO	Heating Oil	HO	NYMEX	20.00%	12.375%	7.875%	22.50%	2-Dec-88	DBLCOHOE	DBLCOHOT
DBLCI-OY RB	RBOB Gasoline	RB	NYMEX	0.00%	12.375%	7.875%	22.50%	2-Dec-88	DBLCYERB	DBLCYTRB
DBLCI-OY NG	Natural Gas	NG	NYMEX	0.00%	5.500%	3.500%	10.00%	4-Jun-90	DBLCYENG	DBLCYTNG
DBLCI-OY LCO	Brent Crude	LCO	IPE	0.00%	12.375%	7.875%	22.50%	3-Jan-90	DBLCYECO	DBLCYTCO
DBLCI-OY LGO	Gasoil	LGO	IPE	0.00%	0.00%	0.000%	0.00%	5-Jul-89	DBLCYEGO	DBLCYTGO
Precious Metals										
DBLCI-OY Precious Metals	Sector							2-Dec-88	DBLCYEPM	DBLCYTPM
DBLCI-OY GC	Gold	GC	COMEX	10.00%	8.000%	13.600%	80.00%	2-Dec-88	DBLCOGCE	DBLCOGCT
DBLCI-OY SI	Silver	SI	COMEX	0.00%	2.000%	3.400%	20.00%	2-Dec-88	DBLCYESI	DBLCYTSI
Industrial Metals										
DBLCI-OY Industrial Metals	Sector							3-Sep-97	DBLCYEIM	DBLCYTIM
DBLCI-OY MAL	Aluminium	MAL	LME	12.50%	4.167%	6.000%	33.33%	3-Sep-97	DBLCOALE	DBLCOALT
DBLCI-OY MZN	Zinc	MZN	LME	0.00%	4.167%	6.000%	33.33%	4-Aug-97	DBLCYEZN	DBLCYTZN
DBLCI-OY MCU	Copper - Grade A	MCU	LME	0.00%	4.167%	6.000%	33.33%	4-Aug-97	DBLCYECU	DBLCYTCU
DBLCI-OY MNI	Primary Nickel	MNI	LME	0.00%	0.000%	0.00%	0.00%	4-Aug-97	DBLCYENI	DBLCYTNI
DBLCI-OY MPB	Standard Lead	MPB	LME	0.00%	0.000%	0.00%	0.00%	4-Aug-97	DBLCYEPB	DBLCYTPB
Agriculture										
DBLCI-OY Agriculture	Sector							2-Dec-88	DBLCYEAG	DBLCYTAG
DBLCI-OY C	Corn	C	CBOT	11.25%	5.625%	7.500%	25.00%	2-Dec-88	DBLCOCNE	DBLCOCNT
DBLCI-OY W	Wheat	W	CBOT	11.25%	5.625%	7.500%	25.00%	2-Dec-88	DBLCOWTE	DBLCOWTT
DBLCI-OY S	Soybeans	S	CBOT	0.00%	5.625%	7.500%	25.00%	2-Dec-88	DBLCYESS	DBLCYTSS
DBLCI-OY SB	Sugar # 11	SB	NYBOT	0.00%	5.625%	7.500%	25.00%	2-Dec-88	DBLCYESB	DBLCYTSB
DBLCI-OY KC	Coffee "C"	KC	NYBOT	0.00%	0.00%	0.00%	0.00%	2-Dec-88	DBLCYEKC	DBLCYTKC
DBLCI-OY CT	Cotton #2	CT	NYBOT	0.00%	0.00%	0.00%	0.00%	2-Dec-88	DBLCYECE	DBLCYTCT
DBLCI-OY CC	Cocoa	CC	NYBOT	0.00%	0.00%	0.00%	0.00%	2-Dec-88	DBLCYECC	DBLCYTCC
DBLCI-OY KW	Kansas Wheat	KW	KBOT	0.00%	0.00%	0.00%	0.00%	4-Jan-89	DBLCYEKW	DBLCYTKW
Livestock										
DBLCI-OY LC	Live Cattle	LC	CME	0.00%	0.00%	0.00%	0.00%	2-Dec-88	DBLCYELC	DBLCYTLC
DBLCI-OY LH	Lean Hogs	LH	CME	0.00%	0.00%	0.00%	0.00%	2-Dec-88	DBLCYELH	DBLCYTLH
DBLCI-OY FC	Feeder Cattle	FC	CME	0.00%	0.00%	0.00%	0.00%	2-Dec-88	DBLCYEFC	DBLCYTFC

Source: DB Global Markets Research

Dow Jones-AIG Commodity Index (DJ-AIGCI)

The Dow Jones-AIG Commodity Index was launched in July 1998 with historical returns data beginning from January 1991. The index is comprised of 19 commodities from the energy, precious metals, industrial metals, agricultural and livestock sectors. The weight of each component is determined by liquidity and world production values, with liquidity being the dominant factor.

The Dow Jones-AIGCI relies on two important rules to ensure diversification: no single commodity may constitute less than 2% or more than 15% of the index and a maximum of 33% allocation for any sector at the time of the annual re-balancing. The DJ-AIGCI is re-weighted and re-balanced every January with the annual weightings determined six months earlier in June by AIGI under the supervision of an Oversight Committee. This committee consists of AIGI employees, financial market participants and leading academics.

Energy futures contacts are rolled every other (uneven) month between the fifth and ninth business days. Silver contacts are rolled every uneven month while gold futures contracts are rolled every even month. The industrial metals contracts are rolled 5-6 times per annum and the agricultural contracts are rolled 4-5 times p.a.

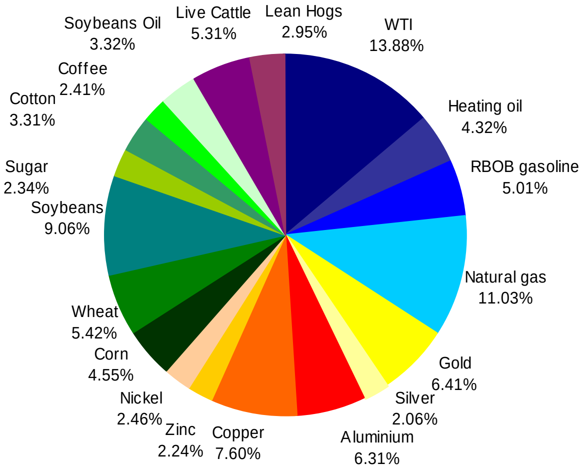
Figure 1: Characteristics of the Dow Jones-AIGCI

- **Widely acknowledged as one of the two industry benchmarks.**
- **The index consists of 19 commodities drawn from the energy, precious metals, industrial metals, agricultural and livestock sectors.**
- **No single commodity may constitute less than 2% or more than 15% of the index.**
- **A maximum allocation of 33% is permitted for any individual commodity sector.**

Bloomberg Page: DJAIG

Reuters RICS: < AIGCI1>

Figure 2: Commodity weights of the DJ-AIGCI



Source: DJ-AIG weights as of July 9, 2007

Figure 3: Tickers for DJ-AIGCI & its sub-indices

Bloomberg	
DJ-AIG Total Return	DJAIGTR <Index>
DJ-AIG Energy Index Total Return	DJAIGENTR <Index>
DJ-AIG Petroleum Index Total Return	DJAIGPETR <Index>
DJ-AIG ExEnergy Index Total Return	DJAIGEXTR <Index>
DJ-AIG Precious Metals Index Total Return	DJAIGPRTR <Index>
DJ-AIG Industrial Metals Index Total Return	DJAIGINTR <Index>
DJ-AIG Agricultural Index Total Return	DJAIGAGTR <Index>
DJ-AIG Grains Index Total Return	DJAIGGRTR <Index>
DJ-AIG Livestock Index Total Return	DJAIGLITR <Index>
Reuters	
DJ-AIG Total Return	.DJAIGTR
DJ-AIG Energy Index Total Return	.DJAIGENTR
DJ-AIG Petroleum Index Total Return	.DJAIGPETR
DJ-AIG ExEnergy Index Total Return	.DJAIGXETR
DJ-AIG Precious Metals Index Total Return	.DJAIGPRTR
DJ-AIG Industrial Metals Index Total Return	.DJAIGINTR
DJ-AIG Agricultural Index Total Return	.DJAIGAGTR
DJ-AIG Grains Index Total Return	.DJAIGGRTR
DJ-AIG Livestock Index Total Return	.DJAIGLITR

Source: DJ-AIG

Standard & Poor Goldman Sachs Commodity Index (S&P GSCI)

The S&P Goldman Sachs Commodity Index has been publicly traded since January 1991, although historical data are available from January 1970. The index, formally known as Goldman Sachs Commodity Index (GSCI) was renamed to S&P GSCI when Standard and Poor's acquired it from Goldman Sachs in February 2007. The index is composed of 24 commodities representing the energy, precious metals, industrial metals, agricultural and livestock sectors.

The S&P GSCI is production weighted meaning the weightings of the individual S&P GSCI commodities are determined by their relative levels of world production over the past five years. Thus the index has a heavy allocation to the energy sector. In fact the combined allocation of agriculture, livestock, industrial metals and precious metals constitutes approximately 30% of the index. S&P GSCI employs a traditional pre-defined monthly rolling strategy for all commodity futures contracts. For the energy and industrial metals contracts, rolling occurs between the fifth and ninth business days of the month.

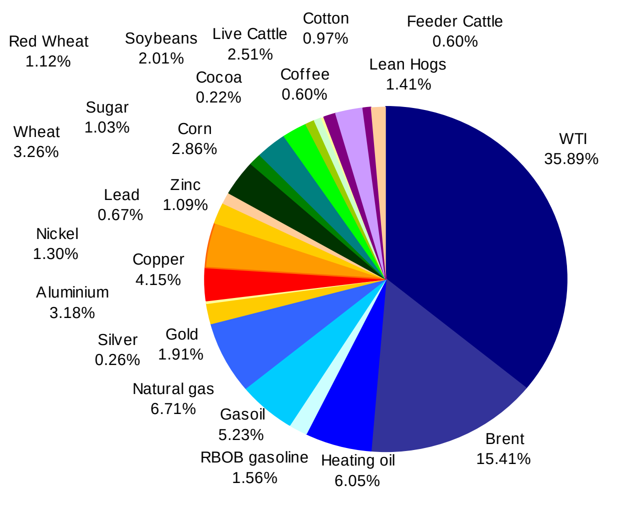
Figure 1: Characteristics of the S&P GSCI

- **Widely acknowledged as one of the two industry benchmarks for measuring the performance of commodities indices.**
- **The index consists of 24 commodities drawn from the energy, precious metals, industrial metals, agricultural and livestock sectors.**
- **By sector, energy has the largest weight at approximately 70%.**

Aside from the S&P GSCI, there are also the S&P GSCI Reduced Energy, S&P GSCI Light Energy and S&P GSCI Ultra Light Energy commodity indices. These are composed of the same underlying commodities as the S&P GSCI, but the contract production weights (CPW) of the energy components have been divided by two, four and eight respectively. The CPW are then used to determine the actual commodity weights.

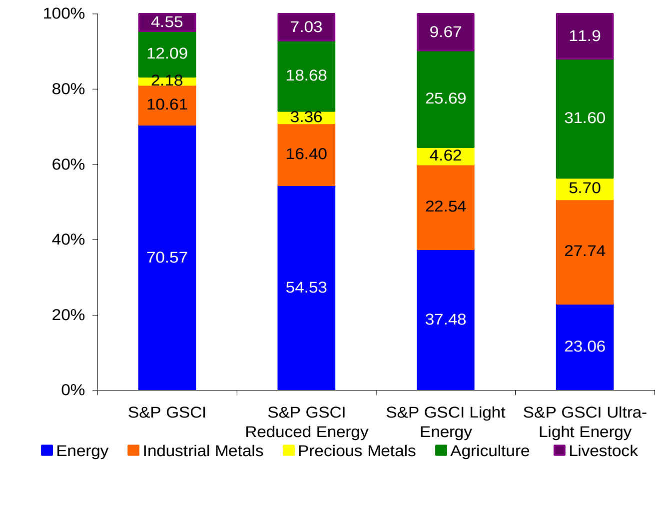
Bloomberg Page: SPGC / SPGW / ALLX SPGC
Bloomberg Ticker: SPGSCITR <Index>
Reuters RIC: < SPGC01>

Figure 2: Commodity weights of the S&P GSCI



Source: S&P; weights as of July 9, 2007

Figure 3: Sector weights of the various S&P commodity indices



Source: S&P, Weights as of July 9, 2007.

Reuters-Jefferies/CRB Index (RJ/CRB)

The CRB index is one of the oldest commodity indices in the marketplace, having been launched in 1957. At that time the index tracked commodity spot prices. The New York Board of Trade began trading the CRB in 1986. In 2001, the index changed its name to the Reuters CRB Index and four years later it became the Reuters-Jefferies/CRB index. The index was originally comprised of 28 commodities, across the energy, metals, agricultural and livestock sectors. However, over the years less liquid components have been dropped from the index and replaced by more liquid commodities. Currently the index is composed of 19 commodity futures and until 2005 all components of the index were equally weighted.

Since its inception there have been 10 revisions to the original CRB index. During its tenth and latest incarnation in 2005, the index was renamed to Reuters-Jefferies CRB index (RJ/CRB). Other key changes in 2005 included arithmetic averaging, monthly rebalancing and adopting a nearby rollover futures schedule. The RJ/CRB employs a four day rollover schedule for each commodity beginning on the first business day of the month and ending on the fourth business day. Monthly rebalancing aims to maintain the stability and consistency of index weighting.

Figure 1: Characteristics of the Reuter-Jefferies/CRB Index

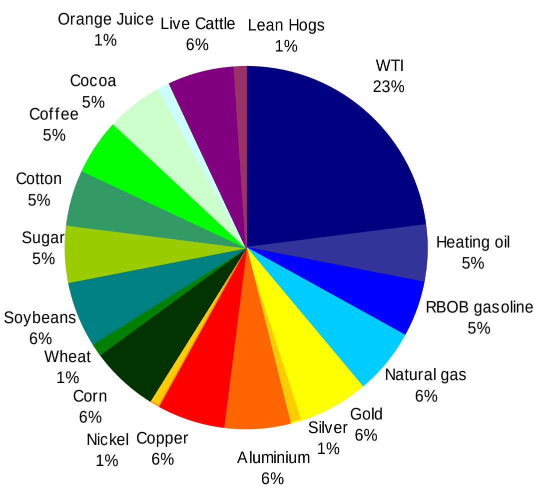
- **One of the oldest commodity indices in the marketplace.**
- **The index is composed of 19 commodity futures.**
- **The index is rebalanced monthly and rolling occurs on the first nearby contract.**
- **Total returns data are available from January 1994.**

Bloomberg Page: CRB

Bloomberg Ticker: CRYTR<Index>

Reuters RICS: < .RJCRBNETR >

Figure 2: Commodity weights of the RJ/CRB



Source: Reuters, Jefferies, base weights as of July 2007

Figure 3: RJ/CRB commodity index weights

	Commodity	Index Weight	Contract months	Exchange
Group I	WTI crude oil	23%	Jan-Dec	NYMEX
	Heating oil	5%	Jan-Dec	NYMEX
	Unleaded gasoline	5%	Jan-Dec	NYMEX
	Total	**33%**		
Group II	Aluminium	6%	Mar, Jun, Sep, Dec	LME
	Copper	6%	Mar, May, Jul, Sep, Dec	COMEX
	Corn	6%	Mar, May, Jul, Sep, Dec	CBOT
	Gold	6%	Feb, Apr, Jun, Aug, Dec	COMEX
	Live cattle	6%	Feb, Apr, Jun, Aug, Oct, Dec	CME
	Natural gas	6%	Jan-Dec	NYMEX
	Soybeans	6%	Jan, Mar, May, Jul, Nov	CBOT
	Total	**42%**		
Group III	Cocoa	5%	Mar, May, Jul, Sep, Dec	NYBOT
	Coffee	5%	Mar, May, Jul, Sep, Dec	NYBOT
	Cotton	5%	Mar, May, Jul, Dec	NYBOT
	Sugar	5%	Mar, May, Jul, Oct	NYBOT
	Total	**20%**		
Group IV	Lean hogs	1%	Feb, Apr, Jun, Jul, Aug, Oct, Dec	CME
	Orange juice	1%	Jan, Mar, May, Jul, Sep, Nov	NYBOT
	Nickel	1%	Mar, Jun, Sep, Dec	LME
	Silver	1%	Mar, May, Jul, Sep, Dec	COMEX
	Wheat	1%	Mar, May, Jul, Sep, Dec	CBOT
	Total	**5%**		

Source: Reuters, Jefferies

Lehman Brothers Commodity Index (LBCI)

The Lehman Brothers Commodity Index (LBCI) was launched in July 2006. It is a rule based index composed of 20 commodities representing the energy, metals, agricultural and livestock sectors. The selection and weightings of the individual components are purely based on their historical trading volumes. As a result, the index has a high allocation to the energy sector. Liquidity of each contract is calculated from the exchange reported trading volume of non-financial commodities futures. The LBCI imposes no upper or lower limit to the weight of a particular commodity or sector. Re-weighting and rebalancing of the index takes place annually. The rolling period for the futures contracts takes place from the fifth to ninth NYMEX business day of the month.

Figure 1: Characteristics of the LBCI

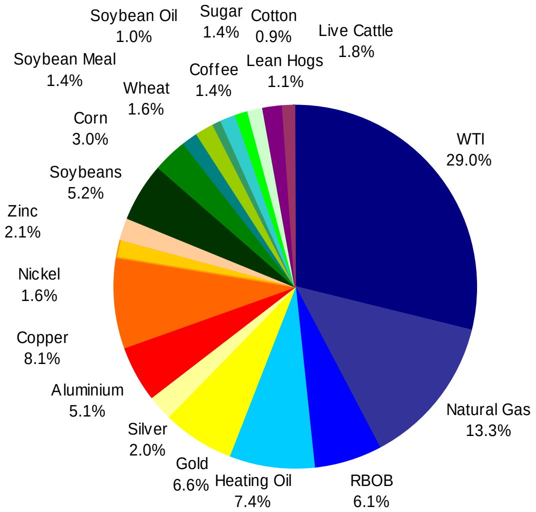
- **Consists of 20 commodities representing the energy, metals, agricultural and livestock sectors.**
- **Selection and weighting of each component is entirely based on their respective trading volumes.**
- **No upper or lower weight restrictions on a particular commodity or sector are imposed.**
- **Weights re-assigned to each commodity in January using its average daily volume during the past three years as of previous November.**

Bloomberg Page: LBCI

Bloomberg Ticker: LBCITR <Index>

Reuters RIC: < LEH/COMMA>

Figure 2: Commodity weights of the LBCI



Source: Lehman Brothers; Base weights as of January 29, 2007

Figure 3: Tickers for LBCI and LBCI sub indices

Bloomberg	
LBCI Total Return	LBCITR <Index>
LBCI Energy Total Return	LBENTR <Index>
LBCI Metals Total Return	LMMTTR <Index>
LBCI Industrial Metals Total Return	LBBMTR <Index>
LBCI Precious Metals Total Return	LBPMTR <Index>
LBCI Agriculture Total Return	LBAGTR <Index>
LBCI Grains Total Return	LBGRTR <Index>
LBCI LiveStock Total Return	LBLSTR <Index>
LBCI Soft Commodities Total Return	LMFRTR <Index>

Source: Lehman Brothers

Merrill Lynch Commodity Index eXtra (MLCX)

The Merrill Lynch Commodity Index eXtra (MLCX) was launched in June 2006. It is a rule based commodity index composed of 18 commodities futures drawn from the energy, precious metals, industrial metals, agricultural and livestock sectors.

The index is designed with particular emphasis on downstream commodities, thus it has a higher allocation to gasoline and heating oil compared to other commodity indices. The weighting of each component reflects the liquidity of the underlying commodity as well as its importance to the global economy.

To address the negative roll return in contangoed markets, the individual commodity futures contracts in the MLCX are rolled second to third nearby contract over a 15 day as opposed to the traditional front to second month contract rolling over a five day window.

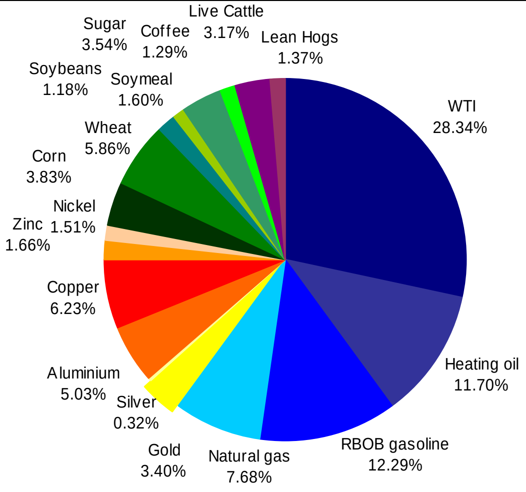
The maximum and minimum allocation to any sector is limited to 60% and 3% respectively. Historical total returns and excess returns data are available from June 1991.

Figure 1: Characteristics of the MLCX

- **The index consists of 18 commodities with particular emphasis on downstream commodities.**
- **The index is rolled second to third month contract over a 15 day period.**
- **Maximum and minimum allocation to any sector is limited to 60% and 3% respectively.**

Bloomberg Page: MLCX

Figure 2: Commodity weights of the MLCX



Source: Merrill Lynch; base weights as of January 2007

Figure 3: Tickers for MLCX & its sub-indices

Bloomberg	
MLCX Total Return	MLCXTR <Index>
MLCX Energy Total Return	MLCXENTR <Index>
MLCX Industrial Metals Total Return	MLCXIMTR <Index>
MLCX Precious Metals Total Return	MLCXPMTR <Index>
MLCX Soft Commodities Total Return	MLCXSCTR <Index>
MLCX Grains Total Return	MLCXGRTR <Index>
MLCX LiveStock Total Return	MLCXLSTR <Index>
MLCX Agriculture Total Return	MLCXAGTR <Index>

Reuters	
MLCX Total Return	MLCXTR=MERL
MLCX Energy Total Return	MLCXENTR=MERL
MLCX Industrial Metals Total Return	MLCXIMTR=MERL
MLCX Precious Metals Total Return	MLCXPMTR=MERL
MLCX Soft Commodities Total Return	MLCXSCTR=MERL
MLCX Grains Total Return	MLCXGRTR=MERL
MLCX LiveStock Total Return	MLCXLSTR=MERL
MLCX Agriculture Total Return	MLCXAGTR=MERL

Source: Merrill Lynch

Rogers International Commodity Index (RICI)

The Rogers International Commodity Index (RICI) was launched in July 1998. It is a composite, US dollar based, total returns index. The RICI consists of 36 commodities, listed on eleven exchanges and quoted in four different currencies, which makes it one of the broadest commodity indices in the marketplace. Along with the DCI, it is the only commodity index that includes a rice futures contract.

The index is designed to provide a representation of raw materials prices globally. Weights of each commodity reflect its relative importance to international commerce. Weights are not related to commodities production data. The selection and weightings in the index are reviewed annually and the weights for the next year are assigned every December. Aside from the RICI Total Returns index, there are also total return indices for the agricultural, metals and energy sectors.

Even though the RICI committee reviews the composition and weightings of the index annually, there has been only one change since inception, involving 0.15% of the index. The RICI Committee is composed of Mr Rogers, Diapason Commodities Management S.A., Daiwa Asset Management America, Beeland Management Company, UBS AG, ABN Amro and Merrill Lynch.

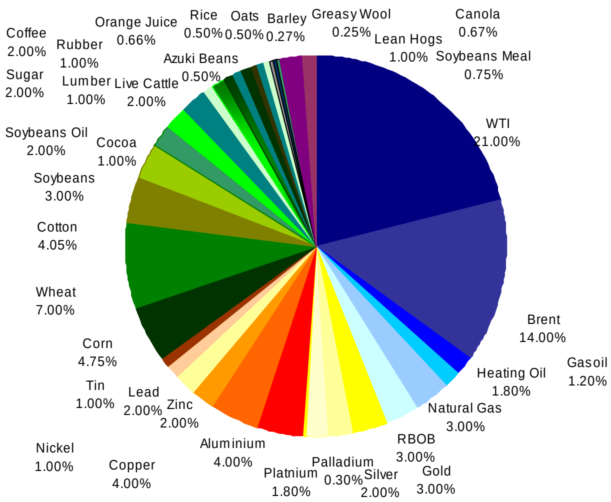
The RICI index is rebalanced and rolled monthly. The rolling dates take place over three days: from the day prior to the last RICI business day of the month to the first RICI business day of the following month. In the event of at least one of the last three weekdays of the month is simultaneously a holiday in the US and a business day in Japan, the roll period will be shifted forward by the number of days meeting the preceding criteria.

Figure 1: Characteristics of the RICI

- **The RICI consists of 36 commodities futures traded globally.**
- **It is designed to provide a representation of raw materials prices worldwide.**
- **Futures contracts are rebalanced and rolled monthly.**

Bloomberg Page: RICI

Figure 2: Commodity weights of the RICI



Source: RICI Handbook April 2007

Figure 3: Tickers for RICI® & RICI® sub-indices

Bloomberg	
RICI Total Return	RICIGLTR <Index>
RIC Agricultural Index Total Return	RICIAGTR <Index>
RIC Metals Index Total Return	RICIMETR <Index>
RIC Energy Index Total Return	RICIENTR <Index>
Reuters	
RICI Total Return	RICIGLTR=DIAP
RIC Agricultural Index Total Return	RICIAGTR=DIAP
RIC Metals Index Total Return	RICIMETR=DIAP
RIC Energy Index Total Return	RICIENTR=DIAP

Source: RICI Handbook April 2007; http://www.diapason-cm.com

UBS Bloomberg Constant Maturity Commodity Index (UBS CMCI)

The UBS Bloomberg CMCI Index was launched in January 2007 and is composed of 28 commodity futures across the energy, precious metals, industrial metals, agricultural and livestock sectors. Aside from the CMCI index, there is a sub-index for each commodity sector and 24 individual commodity indices.

The UBS CMCI provides access to an array of different maturities ranging from three months to up to five years for each underlying commodity. The weighting of each component is a blend of fundamental and liquidity factors. Fundamental factors are determined by economic data such as GDP and commodity-level consumption data. Liquidity is a function of open interest and exchange turnover data of the underlying futures contracts. This dual approach is employed to ensure a good representation of the commodity universe and hence diversification.

The additional flexibility in maturity dates as opposed to the traditional fixed rolling strategy enables investors to gain exposure to their preferred part of the forward curve to optimise returns.

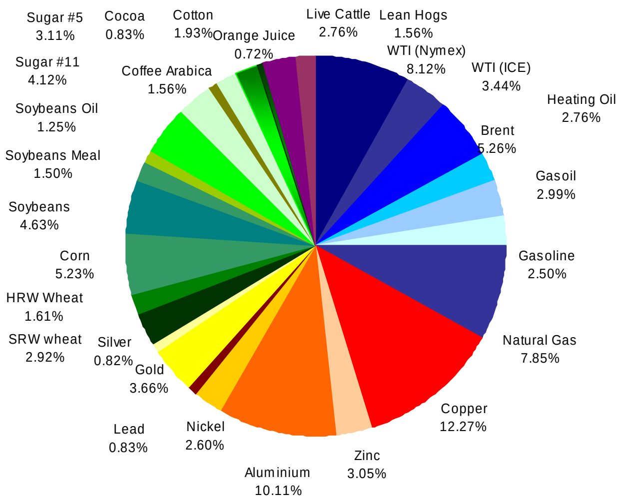
Figure 1: Characteristics of the UBS Bloomberg CMCI

- **The index is composed of 28 commodity futures and provides access to a range of different maturities for each underlying commodity. The index is UCITS III compliant.**
- **Index weightings are reviewed twice a year in May and November and are effected during the following July and January maintenance period.**
- **The index rebalances monthly over the last three business days of the month.**
- **Futures contracts are rolled continuously to maintain a constant maturity. This helps to address the negative roll return.**

Bloomberg Page: CMCN / CMCX

Reuters RIC: <UBSCMCI>

Figure 2: Commodity weights of the UBS CMCI



Source: UBS, Bloomberg as of 29 Jan 2007

Figure 3: Tickers for UBS-Bloomberg CMCI

UBS Bloomberg CMCI Ticker	
CMCI Total Return	CMCITR3M, CMCITR6M, CMCITR1Y, CMCITR2Y, CMCITR3Y
CMCI Energy Total Return	CMENTR3M, CMENTR6M, CMENTR1Y, CMENTR2Y, CMENTR3Y
CMCI Precious Metals Total Return	CMPMTR3M, CMPMTR6M, CMPMTR1Y, CMPMTR2Y, CMPMTR3Y
CMCI Industrial Metals Total Return	CMIMTR3M, CMIMTR6M, CMIMTR1Y, CMIMTR2Y, CMIMTR3Y
CMCI Agricultural Total Return	CMAGTR3M, CMAGTR6M, CMAGTR1Y
CMCI Livestock Total Return	CMLVTR3M, CMLVTR6M

Source: DB Global Markets Research

Diapason Commodities Index

The Diapason Commodities Index was created by Diapason Commodities Management in July 2006. The index is designed to provide a broad representation of commodity futures traded inside the OECD. The DCI is composed of 45 commodities futures, which makes it the broadest commodities index in the market place. In addition DCI is the only commodity index that includes electricity, coal and ethanol futures as its constituents.

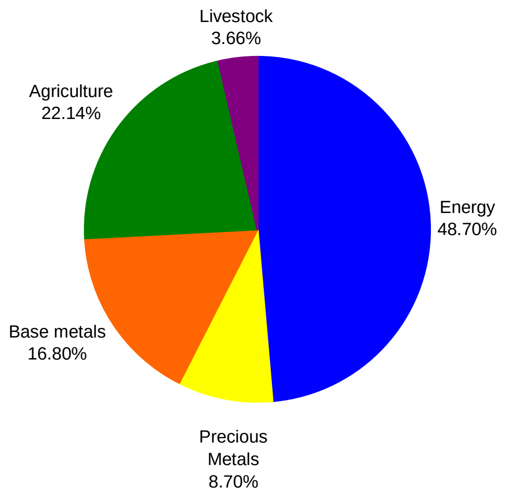
The weighting of each component is based on liquidity and its significance to world trade. The World Contract Liquidity (WCL) is determined by considering the dollar value of open interest, while World Trade Significance (WTS) is based on the world export share of the commodity. 66.67% of WCL and 33.33% of WTS make up the final weightings of the index. Weights are re-assigned to each commodity in December and the rebalancing of the index takes place annually.

Bloomberg Page : DIAP <GO>
Bloomberg Ticker: DCI TRUS Index

Reuters Page : DIAPASON
Reuters RICS: DCIUSDTR=DIAP

In addition to the DCI, an improved version of the index, the DCI BNP Paribas Enhanced was launched on 12 April 2007. The composition of the enhanced index is identical to the DCI, namely it has 45 components. However, the 17 most liquid components of the index, which constitute approximately 70% of total basket, are rolled dynamically using a rule based enhancement methodology. The enhancement process attempts to maximise roll returns by reducing the adverse effects of contangoed markets.

Figure 2: Diapason Commodities Index sector weights



Source: Diapason Commodities Management; Base weights July 9, 2007

Figure 3: Tickers for Diapason commodity indices

DCI and sub-indices	
Diapason Commodities Index Total Return	DCI TRUS <Index>
Diapason Energy Index Total Return	DCI ENTR <Index>
Diapason ExEnergy Index Total Return	DCI EXTR <Index>
Diapason Metals Index Total Return	DCI METR <Index>
Diapason Agriculture Index Total Return	DCI AGTR <Index>
DCI BNP Enhanced and sub-indices	
Diapason BNP Enhanced Total Return	DCIBGLTR <Index>
DCI-B Energy Index Total Return	DCIBENTR <Index>
DCI-B Metals Index Total Return	DCIBMETR <Index>
DCI-B Precious Metals Index Total Return	DCIBPMTR <Index>
DCI-B Industrial Metals Index Total Return	DCIBIMTR <Index>
DCI-B Agriculture Index Total Return	DCIBAGTR <Index>

Source: Bloomberg, Reuters

CX Commodity Index (CX)

The CX commodity index is a rule based index launched by Deutsche Börse in November 2006. Exchange traded commodities are selected to be included in the index based on their open interest and liquidity. However, liquidity is the only factor that influences individual commodity weightings. In fact the weighting of each commodity is directly proportional to the US dollar weighted open interest of the underlying commodity future.

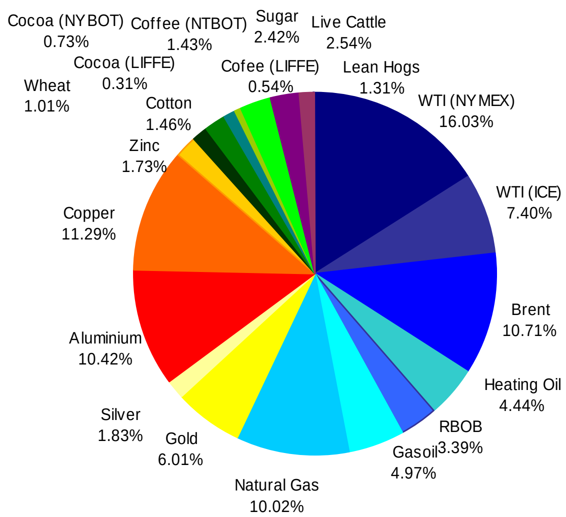
Rolling is trigged when open interest of the second nearby expiry contract exceeds the open interest of the old contract. The index sponsors argue this technique makes the rolling in line with market movements and improves roll yield. The index is re-weighted and rebalanced annually in September. In addition, quarterly re-weightings are carried out to ensure weights remain relatively stable over time.

Figure 1: Characteristics of the CX

- **It consists of 20 commodities.**
- **The selection of each commodity in based on open interest and liquidity.**
- **The weighting of each component is proportional to its dollar weighted open interest.**
- **Rolling is triggered when open interests cross over.**

Reuters RIC: .CX

Figure 2: Commodity weights of the CX



Source: Deutsche Börse AG; weights as of June 27, 2007

Figure 3: Reuters tickers for CX & CX sub-indices

	Reuters
CX Commodity Index	.CX
CX Precious Metals Index	.CXP
CX Industrial Metals Index	.CXI
CX Agriculturals Index	.CXA
CX Livestock Index	.CXL

Source: Deutsche Börse AG

CYD Commodity Indices

Launched in November 2006, the CYD commodity indices were developed by CYD Research GmbH a research firm specialises in the analysis of economic drivers on commodity futures markets. Unlike traditional commodity indices which hold long only positions in commodity futures, CYD index universe offers three choices, LongOnly, LongShort and MarketNeutral indices.

Only exchanged traded physical commodities that satisfy certain trading volume and minimum liquidity criteria are included in the index. However, precious metals such as gold and silver are excluded since the forward term structure of these commodities are almost always in contango.

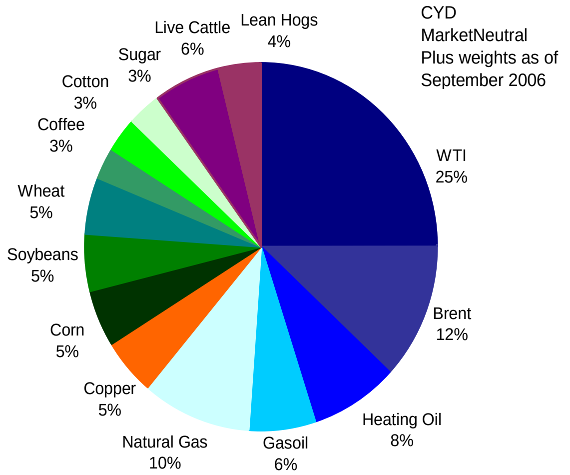
The CYD LongOnly Commodity Index holds long positions solely in backwardated markets, which offer positive roll returns. Likewise, the CYD LongShort Commodity Index has long positions in backwardated markets and short positions in contangoed markets. The CYD MarketNeutral Plus Commodity index enters into simultaneous long and short positions with different maturity dates for each commodity. In addition, the index has a leverage factor of one meaning for every dollar invested into the index an equal amount is put in both long and short contracts.

Figure 1: Characteristics of the CYD Indices

- **Exchange traded physical commodities that satisfy certain trading volume and minimum liquidity conditions are included.**
- **No financial futures are included.**
- **CYD LongShort and MarketNeutral Plus indices have both long and short positions.**

Bloomberg Ticker: CYDILOTR<Index>, CYDILSTR<Index>, CYDIMNTR<Index>

Figure 2: Commodity weights of the CYD MarketNeutral Plus



Source: CYD Research, base weights as of September 2006

Figure 3: Universe of the CYD LongOnly & LongShort Commodity Indices

Sector	Commodity	Exchange	Liquidity
Energy	Brent crude oil	ICE	High
	Gasoil	ICE	High
	Heating oil	NYMEX	High
	Natural gas	NYMEX	High
	Unleaded gasoline	NYMEX	High
	WTI crude oil	NYMEX	High
Industrial Metals	Copper	NYMEX	High
Precious Metals	Palladium	NYMEX	Low
	Platnium	NYMEX	Low
Agriculture	Cocoa	NYBOT	High
	Coffee Arabica	NYBOT	High
	Corn	CBOT	High
	Cotton #2	NYBOT	Medium
	Lumber	CME	Low
	Orange Juice	NYBOT	Low
	Soybean Meal	CBOT	Medium
	Soybean Oil	CBOT	Medium
	Soybeans	CBOT	High
	Sugar #11	NYBOT	High
	Wheat	CBOT	High
Livestock	Feeder Cattle	CME	Medium
	Live Cattle	CME	Medium
	Live Hogs	CME	Medium

Source: CYD Research, September 2006

Index Properties

The Sources of Returns Within A Commodity Index

Introduction

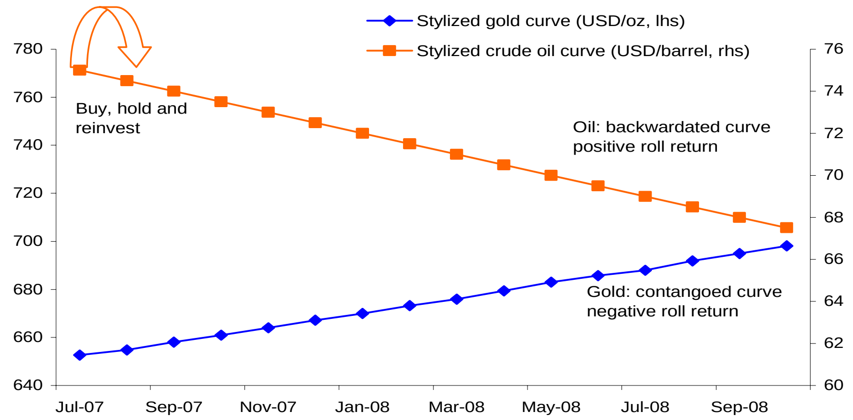
Investors are familiar with the returns generated by equity and bonds, which come in the form of dividends and coupons. However, for commodities, returns come from three main sources:

Formula 1:

Total Returns = Spot Return + Roll Return + Collateral Yield

The spot return is simply a result of commodities becoming more, or less, expensive over time. In terms of the roll yield, where the price of a commodity is higher for shorter delivery dates an investor earns a positive roll yield by buying, waiting for the price to appreciate as the delivery date approaches, then selling and using the proceeds to reinvest at a cheaper price at a future date. Such a strategy is highlighted in Figure 1. The final source of return is the collateral yield which is the return accruing to any margin held against a futures position and which we proxy with the US T-bill rate. Excess returns are simply the sum of spot and roll returns.

Figure 1: WTI and gold term structures & the roll return



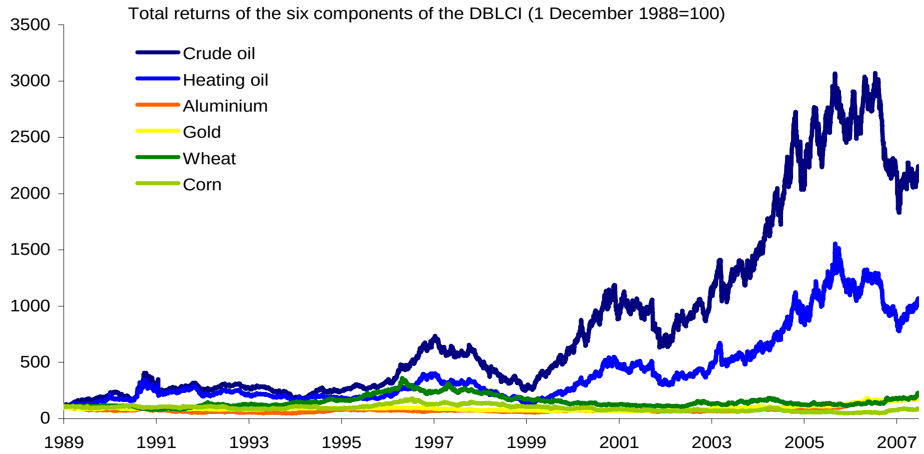
Source: DB Global Markets Research

The Composition of Returns

Since 1972, the forward curves for corn and wheat have been in contango around 75% of the time. Meanwhile, from the inception of the energy futures markets in the 1980s to the end of 2004, the WTI forward curve had been in backwardation just over 60% of the time. The tendency for energy curves to be in backwardation and non-energy curves to be in contango helps to explain why historically the main source of returns within the DBLCI and most other commodity indices has largely been concentrated in the energy sector.

Figure 2 illustrates how energy returns have significantly outperformed all the other components of the DBLCI over the last 18 years. Indeed between 1989 and 2004 crude oil returns have averaged 20.2% per annum, of which +9.0% p.a. was attributable to the roll return. This compares to a +6.0% p.a. return generated by the spot price.

Figure 2 Total returns for single commodity indices (1989-2007)



Source: DB Global Markets Research

What drives commodity term structures?

The different types of commodity term structure can be explained by the theory of storage and the existence of convenience yield. The relationship between the forward and spot price is defined as:

Formula 2:

Forward price = Spot price + Interest Rate - (Convenience yield – Storage)

Formula 2 relies on the fact that by storing rather than selling the commodity, one surrenders the spot price, but, incurs interest rate and warehousing costs. However, offsetting these costs, are the benefits accruing from holding inventory, or what is called the convenience yield.

The convenience yield

A holder of inventories in a particular commodity generates a convenience yield. This is the flow of services and benefits that accrues to an owner of a physical commodity, but, not to an owner of a contract for future delivery of the commodity. This can come in the form of having a secure supply of raw materials and hence eliminating the costs associated with stock-outs. Rearranging Formula 2 above implies that:

Forward – Spot = -Roll Yield = (Interest Rate – [Convenience Yield – Storage Cost]) or,

Formula 3:

Convenience Yield = Roll Return + Storage Costs + Interest Costs

To solve for the convenience yield one only has left to estimate the fixed costs of storage for each commodity. For this we use industry estimates, Figure 3. Since storage costs are fixed, the share of costs accounted for by storage will be a function of the spot price. For example, in 1989 the average WTI spot price was USD19.60/barrel. Fixed costs for storing a barrel of oil amount to USD0.40/barrel per month and consequently for that year fixed costs were USD4.80 (0.40x12) or 24.49%. Over the 1989-2004 period, storage costs have amounted to an average of 22% per annum. We have repeated this exercise for the other five components of the DBLCI and the results are presented in Figure 4.

Figure 3: Estimated fixed storage cost for various commodities

1989-2004	Storage cost (USD/month)	Average cost per annum (%)
Crude Oil (WTI)	0.40/barrel	22.05
Heating Oil	3.00/metric ton	22.05
Aluminium	7.80/metric ton	6.31
Gold	0.004/oz	0.01
Wheat	3.33/bushel	11.91
Corn	2.00/bushel	9.97

Source: Industry estimates, DB Global Markets Research

With this ammunition we are able to calculate the average convenience yield for each commodity since it will be the sum of the roll return, storage and interest rate costs, Figure 4. We then compare the convenience yield to the days of above ground stocks, that is the amount of time it would take to run out of available commercial supplies if production ceased and consumption growth remained unchanged.

These results show that convenience yields trend higher the lower the level of inventories. Put another way, the convenience yield rises as the market's precariousness increases. This makes intuitive sense since in tightening market conditions consumers attach a greater benefit to the physical ownership of a commodity. Oil is the most obvious example since if production ceased today the consequences would be felt within a matter of days, if not hours.

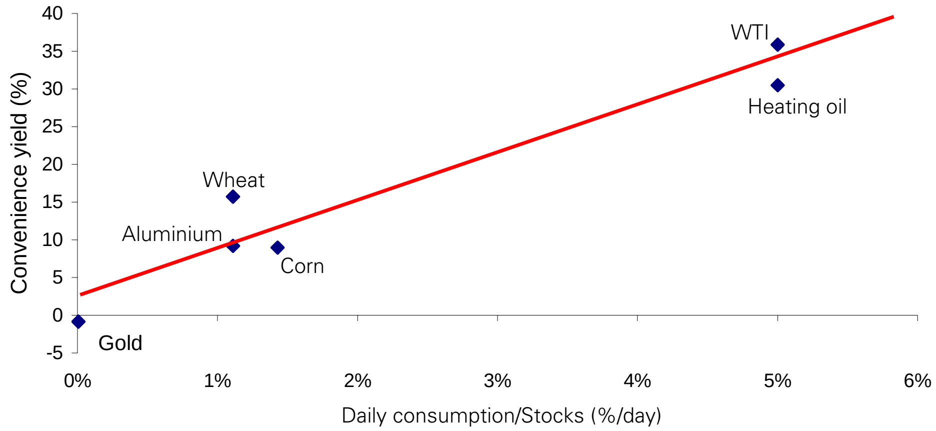
The gold market is at the other extreme. It would take several years for the world to exhaust available gold reserves on current demand trends. This reflects the fact that annual gold consumption amounts to approximately 3,300 tonnes per annum while total above ground stocks (private plus public sector holdings) amounts to more than 145,000 tonnes. In the absence of additional new mine supply the world would consequently only run out of gold after 16,000 days or sometime after 2048. As a result, any disruptions to gold mine production would have only a marginal effect on the convenience yield. This positive relationship between convenience yield and consumption of stock per day is highlighted in Figure 5.

Figure 4: Commodity returns of the six DBLCI components & an estimation of the convenience yield*

1989-2004	Total Returns	Spot Returns	Roll Returns	Collateral Returns	Storage Costs	Convenience Yield	Days of Stock	Effect of Shortage
Crude Oil	20.17%	5.95%	8.99%	4.84%	22.05%	35.88%	20	Severe
Heating Oil	13.89%	5.34%	3.59%	4.84%	22.05%	30.48%	20	Severe
Aluminium	-0.96%	-1.44%	-1.96%	4.84%	6.31%	9.19%	90	Medium
Gold	0.99%	0.42%	-5.69%	4.84%	0.01%	-0.84%	16500	Mild
Wheat	1.17%	-2.21%	-1.03%	4.84%	11.91%	15.72%	90	Severe
Corn	-3.68%	-2.03%	-5.84%	4.84%	9.97%	8.97%	70	Severe

** Convenience yield = Roll returns + storage costs + collateral returns*
Source: DB Global Markets Research; Past performance is not necessarily indicative of future results

Figure 5: Commodity convenience yields vs. %age usage of stocks per day (1988-2004)



Source: DB Global Markets Research

It is worth remembering that the convenience yield will vary over time as and when there is an increase in stocks above or below 'requirements'. Indeed the convenience yield is likely to rise very sharply when there is a reduction of stocks below requirements as occurred across the industrial metals complex between 2003 and 2004 when all LME metal curves flipped from contango to backwardation.

One can therefore consider the slope of the forward price term structure as an indication of the current supply of storage such that a continuing decline in inventory levels implies an even steeper backwardation and vice versa.

Explaining backwardation & contango via the convenience yield

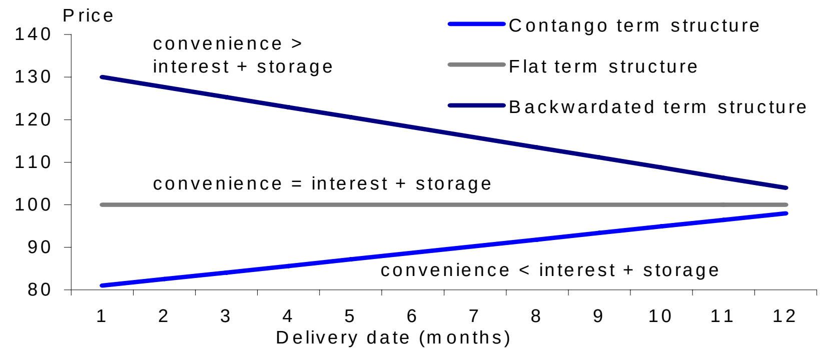
Rearranging one of the formulas derived earlier to solve for the roll yield, that is the difference between the spot and forward price, we find that:

Formula 4

Roll Yield = Convenience Yield - Interest Rate - Storage Cost

Consequently where the convenience yield exceeds the interest rate and storage costs, it implies a positive roll yield or a backwardated market. This is the main feature of the crude oil market and underpins why commodity investment and in particular investment in the energy sector is a highly profitable strategy to undertake. Conversely, where the convenience yield is low and overwhelmed by interest rate and storage costs, the roll yield will be negative. A negative roll yield indicates that the spot prices is lower than the futures price which historically has tended to a typical market structure of the agriculture, precious and industrial metals markets, Figure 6

Figure 6: Commodity curves & convenience yields

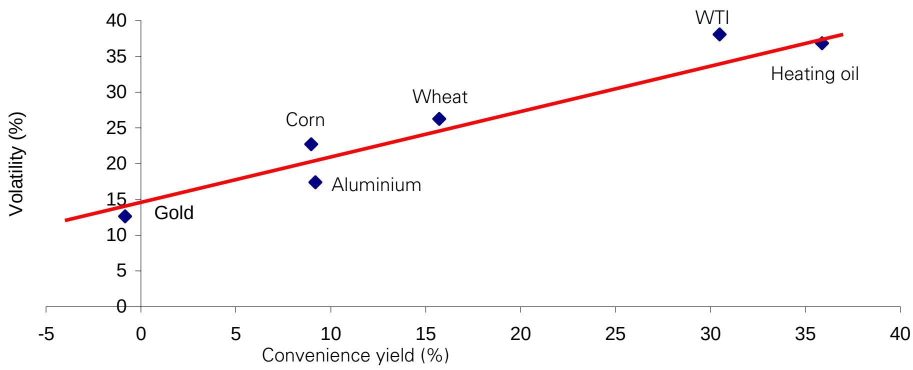


Source: DB Global Markets Research

Commodity volatility & the convenience yield

Since convenience yield is an indication of market precariousness, it is also positively correlated with the level of volatility across various commodity markets, Figure 7. Not surprisingly those markets which have the lowest level of available inventory compared to consumption and hence the highest convenience yields typically have the highest levels of volatility, for example crude oil and heating oil. Where inventories are plentiful and the convenience yield is low so too is the volatility, for example gold.

Figure 7: Commodity volatility & convenience yields (1988-2004)



Source: DB Global Markets Research

Conclusion

Commodity index returns are a function of spot, roll and collateral returns. Since spot returns across the various individual commodity indices are typically strongly positive correlated, see Figure 4 on page 10, the varying performance of total returns across the commodity index universe is highly dependent on the rules governing the rolling procedures for the individual commodity futures contracts.

Investors should therefore pay close to attention to the rolling technology of an individual commodity index as this will, in our view, have a critical effect on overall index performance. In addition, investors should also be aware that those commodities which have low inventories or are vulnerable to sudden supply or demand shocks, such as US natural gas, can exhibit significantly higher levels of volatility which can also have a detrimental effect on performance and the Sharpe ratio.

Benefits of Commodity Index Investment

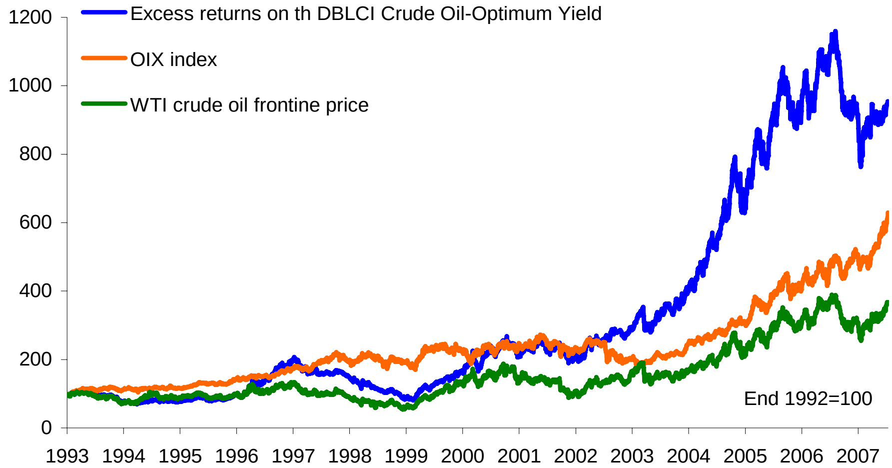
There have been many routes investors have used to gain commodity exposure. The most common approach historically has been via equity investment in major exchange-listed commodity producing companies. Other vehicles have included owning physical assets such as forests, pipelines or royalty trusts or investing in resource-economy currencies such as the Australian and Canadian dollars. However, the emergence of commodity index products as well as Exchange Traded Funds over the past years has increased the popularity of commodity exposure via these routes.

One of the benefits of investing in commodities via an index is that an investor can gain exposure to a broad range of commodities, which tends to enhance diversification, reduce volatility and maximise the Sharpe ratio. In addition, index investment can exploit the benefits of downward sloping forward curves, which deliver a positive return. Equity investment, meanwhile, has tended to be unable to give broad exposure to the entire commodity complex. Rather, it provides an investor exposure to just one sector or simply one commodity.

Superior returns than investing through equities

To assess the relative benefits of commodity-index investing versus an equity-investment strategy, Figure 1 examines the performance of the Deutsche Bank Crude Oil Index versus the Chicago Board Options Exchange (CBOE) OIX oil equity index. The CBOE oil index is a price-weighted index of the 15 companies involved in the exploration, production and development of petroleum. The DB Crude Oil index is one of the Deutsche Bank Liquid Commodity (DBLCI) sub-indices, which is available on a total-returns or excess-returns basis. We find that investing in the DBLCI Crude Oil Index has significantly outperformed the OIX index, Figure 1.

Figure 1: The performance of crude oil returns, the OIX oil equity index and WTI frontline



Source: DB Global Markets Research, Bloomberg; Past performance is not necessarily indicative of future results

The divergence in their relative performance results from

1. the roll returns accruing to a commodity index, and

2. the inability of a broad equity index to track the underlying commodity price one-for-one related to hedging, management or accounting risk.

Note, however, that returns on the OIX oil index exclude dividend yield. We attempt to take account of this by tracking the performance of the DB Excess Returns WTI Crude Oil index. However, this would require the dividend yield to be approximately equivalent to the cash rate, which may be valid only in the very short term.

Weak or negative correlation to traditional asset classes

Long-term institutional investors have become attracted to commodities because of their weak or negative correlation of commodity returns with more traditional assets such as bonds and equities. The low and negative correlation of commodities across different sectors provides even greater diversification benefits. We find that commodity sub-indices exhibit on average a low correlation to broad market indices.

Figure 2 examines the correlation since 1982 of the sub-indices of the S&P GSCI, which has the deepest historical data of all the major commodity indices, to other major indices such as the S&P500 and the 5Y T-note. As expected these exhibit low or negative correlations although these correlations have increased in absolute value terms over the past five years. We also observe that the highest correlations are observed for energy with consumer price inflation and industrial metals with the S&P 500.

Figure 2: Correlation of commodity sub-indices with major indices

Long-run correlation of S&P GSCI sub-indices with major indices					
	3M T-bill	**5Y T-note**	**CPI**	**S&P500**	**S&P GSCI**
Agricultural	0.02	-0.03	-0.07	0.11	0.15
Energy	0.04	-0.03	0.23	-0.08	0.92
Industrial Metals	0.00	-0.17	0.06	0.11	0.14
Livestock	0.05	-0.08	0.08	0.07	0.17
Precious Metals	-0.14	-0.05	0.18	-0.10	0.21
Correlation of S&P GSCI sub-indices with major indices over the last five years					
	3M T-bill	**5Y T-note**	**CPI**	**S&P500**	**GSCI**
Agricultural	0.07	-0.04	-0.05	0.14	-0.07
Energy	-0.22	0.08	0.36	-0.25	0.99
Industrial Metals	0.22	-0.28	-0.01	0.45	0.18
Livestock	-0.06	-0.08	0.12	-0.07	-0.04
Precious Metals	0.04	0.14	0.11	0.04	0.26

All data based on monthly annualized data from Dec-82 to Feb-07

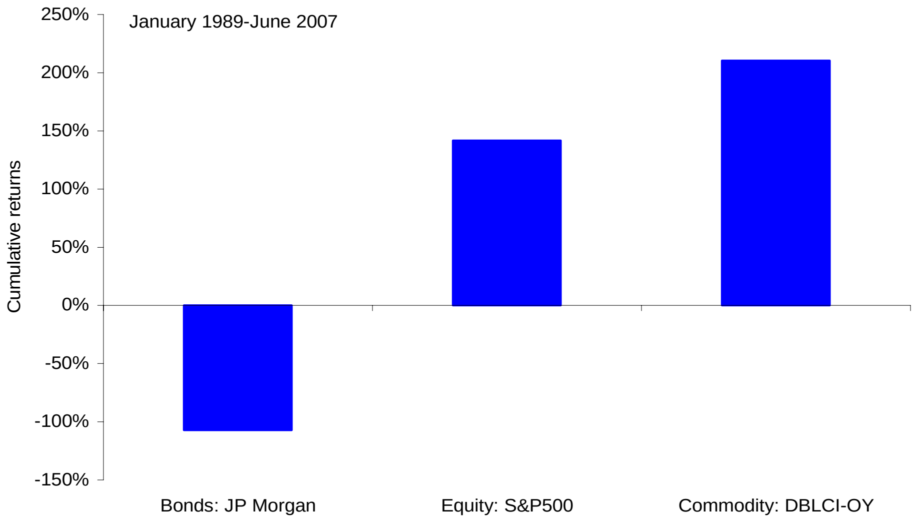
Source: DB Global Markets Research, Bloomberg

A hedge against event risk

Another way of examining the properties of commodities low or negative returns with other asset classes is by examining the cumulative returns for bonds, equities and commodities during periods of either fixed income or equity market distress, which we define as a month where returns are negative.

Figure 3 considers the performance of equity and commodity returns in months when fixed income returns are negative between January 1989 and June 2007. We tracked returns of the DBLCI-OY, versus returns in more traditional asset classes. We find that like equities, commodities offer strong diversification benefits in periods where fixed income returns are negative. Indeed in the 85 months between 1989 and 2007 when fixed income returns were negative, the DBLCI-OY posted positive returns 59% of the time.

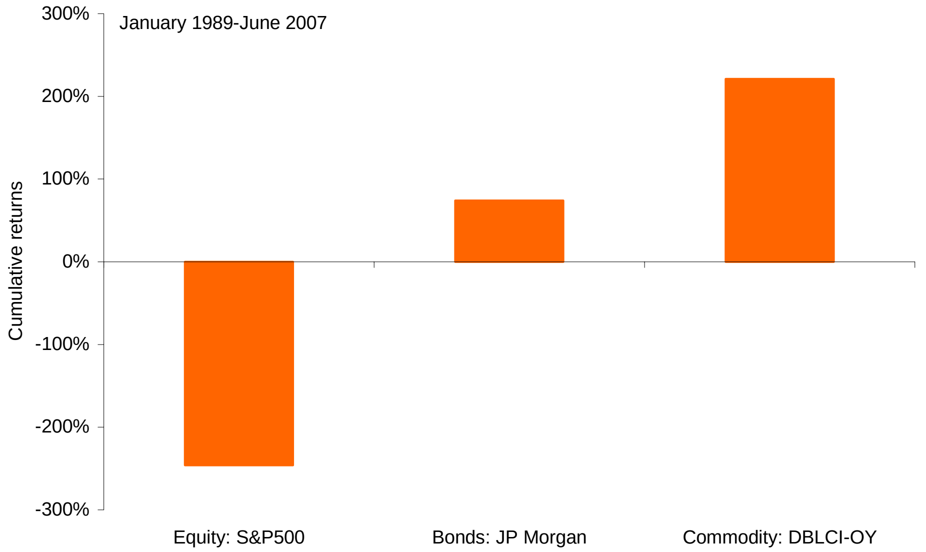
Figure 3: Cumulative performance in negative bond months



Source: DB Global Markets Research, Bloomberg

Figure 4 considers the performance of fixed income and commodity returns in months when equity returns are negative between January 1989 and June 2007. We find that like bonds, commodities offer strong diversification benefits in periods where equity returns are negative. Indeed in the 81 months between 1989 and 2007 when equity returns were negative, the DBLCI-OY posted positive returns 62% of the time.

Figure 4: Cumulative performance in negative equity months

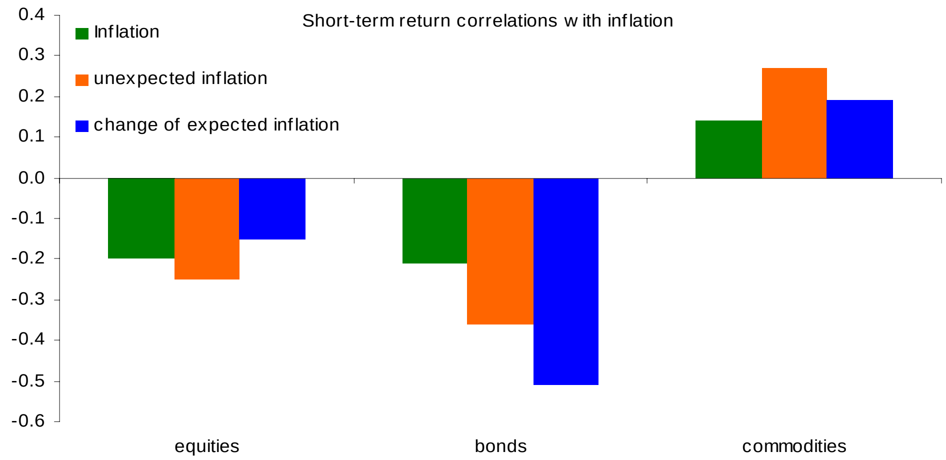


Source: DB Global Markets Research, Bloomberg

A hedge against inflation

Commodities tend to react to economic changes in ways that are different to traditional asset classes. Historically commodity returns have tended to perform well during the periods of high and rising inflation. This positive correlation with inflation, a larger positive correlation to changes in the rate of inflation as well as inflation shocks provide portfolios with a commodity exposure a hedge against inflation. These results are illustrated in Figure 5, from work conducted by Yale International Centre for Finance.

Figure 5: The correlation of equity, bonds and commodities to inflation

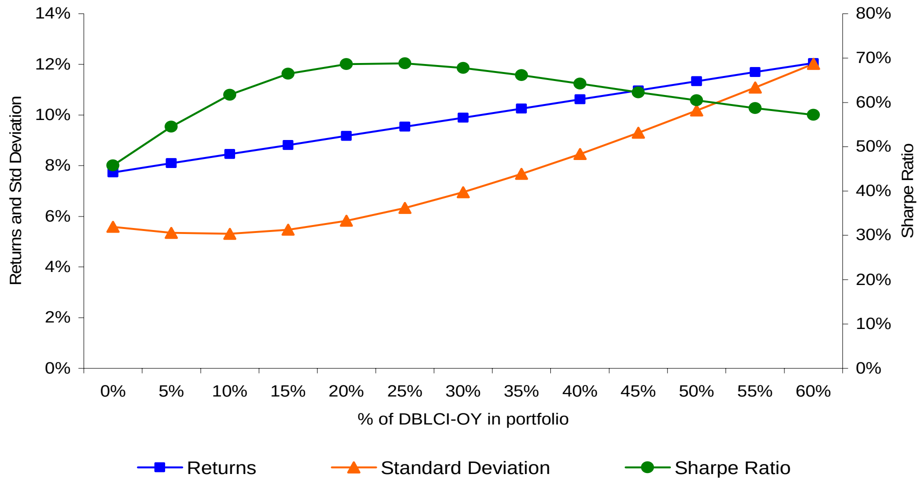


Source: Facts & Fantasies About Commodity Futures, Yale International Centre For Finance

The benefits of commodities in a portfolio

Given the apparent diversification benefits of commodities, we examined their effect on a representative portfolio. Figure 6 details the effect on returns, volatility and the Sharpe ratio by adding an increasing allocation of the DBLCI-OY to a representative portfolio of equities, bonds and cash. In the case of the portfolio under examination the optimal amount of the DBLCI-OY was 25%, which raised the Sharpe ratio from 0.46 to 0.69. However, in our experience an initial strategic allocation to commodities has tended to be between 5% and 10% depending on the type of fund.

Figure 6: Adding DBLCI-OY to a representative portfolio



Past performance is not necessarily indicative of future results.

Source: DB Global Markets Research, Bloomberg

Commodity Index Trading Strategies

The commodity market landscape is shifting and the index space is evolving to take account of these changes. Since 2003 Deutsche Bank has launched five major commodity indices and an array of commodity sub-indices to cater for the growing investor appetite for commodities. However, as mentioned in the previous chapter, commodity indices can differ widely between various providers in terms of components, weightings and rolling mechanism.

These variations in the features of commodity indices in the marketplace present some interesting trading opportunities in the index space. Different long/short combinations of various commodity indices can be used to express inter-sector relative performance or even pure alpha plays without taking any directional view on the commodities market.

In this section, we detail a few trading strategies to complement the traditional long only approach.

Commodity index trading strategies:

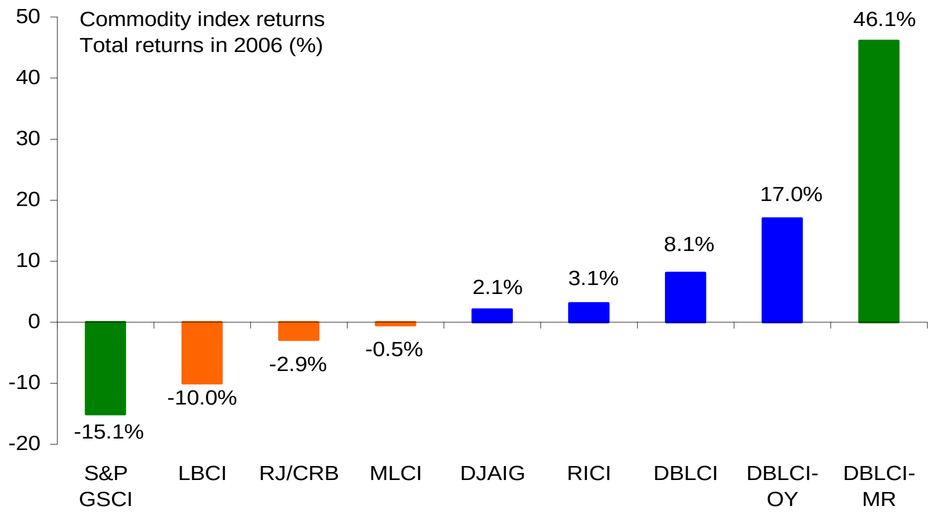
- **DBLCI-MR 'Plus':** This strategy combines the DBLCI-Mean Reversion's successful approach to inter-sector commodity allocation, with a quantitative, rule-based momentum strategy that aims at immunizing returns from downturns in commodity markets.
- **Long DBLCI-OY vs. short DBLCI:** This strategy arbitrages the different rolling mechanism of the two indices without taking any directional view towards the entire commodity complex since both indices are identical in terms of components and market weights.
- **Long DBLCI-CL OY vs. short DBLCI-CL and the other sub-indices:** This strategy is a more risky and direct play on the term structure of the individual commodity atoms.

DBLCI-MR 'Plus'

Introduction

The DBLCI-Mean Reversion index posted total returns of 46.1% in 2006, Figure 1. This has helped the DBLCI-MR to outperform both bonds and equities over the past ten years as well as leading benchmark commodity indices, Figure 2.

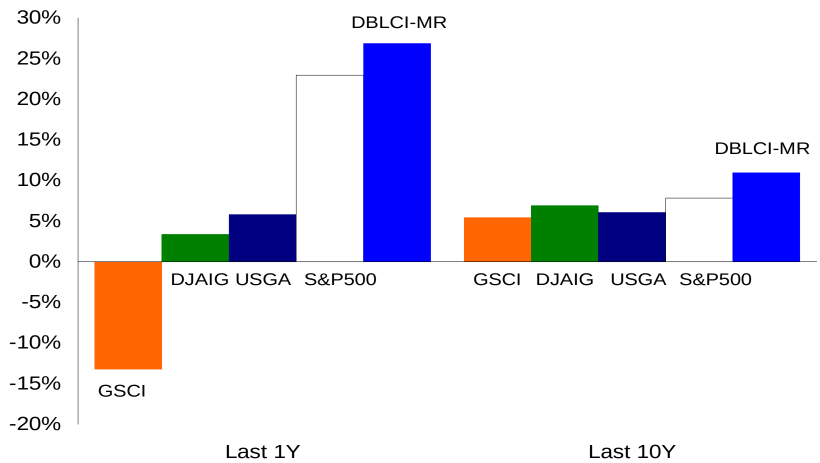
Figure 1: DBLCI-MR leads the pack in 2006



Source: DB Global Markets Research, Bloomberg

We believe the strong performance of the DBLCI-MR index is mainly due to its dynamic asset allocation mechanism which attempts to underweight "expensive" commodities and overweight "cheap" commodities. This approach compares to the more traditional approach of a fixed asset allocation among different sectors of the commodity complex. In essence, the DBLCI-MR is a strategy to buy low and sell high, with the aim of taking profits gradually in a bull run and re-investing into cheaper commodities.

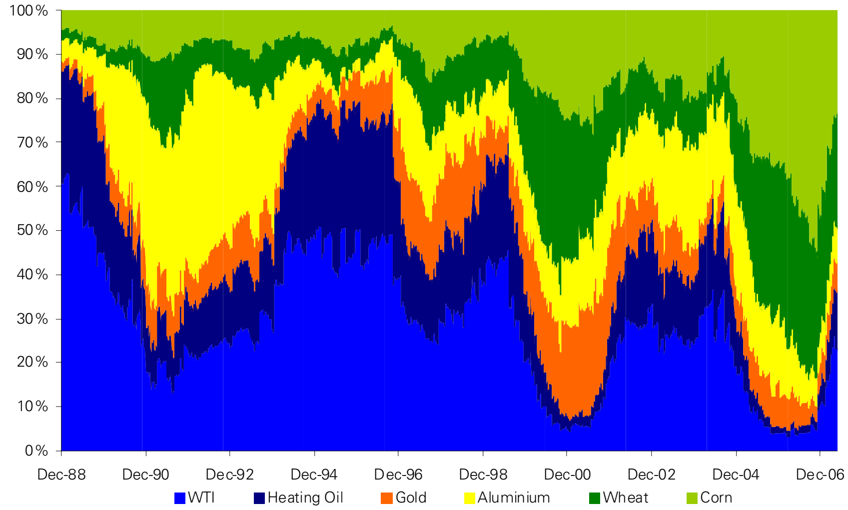
Figure 2: Annualised returns across various asset classes



Source: DB Global Markets Research, Bloomberg

The dynamic allocation process of the DBLCI-MR index is illustrated in Figure 3. We find that the allocation to corn and wheat was just above 80% in the middle of last year when grain prices were trading close to 20-year lows. As a result, the index was well positioned to benefit from the rapid price appreciation that has taken place in grain prices over the past nine months. As grain prices have rallied so the DBLCI-MR's allocation to corn and wheat has been cut to just over 40% currently. The energy sector has been the main beneficiary of the DBLCI-MR's reduction in its allocation to grains, which has, with the exception of the January sell-off in energy price, coincided with the oil price rising to approximately USD65/bbl.

Figure 3: The DBLCI-MR's secret recipe: dynamic asset allocation

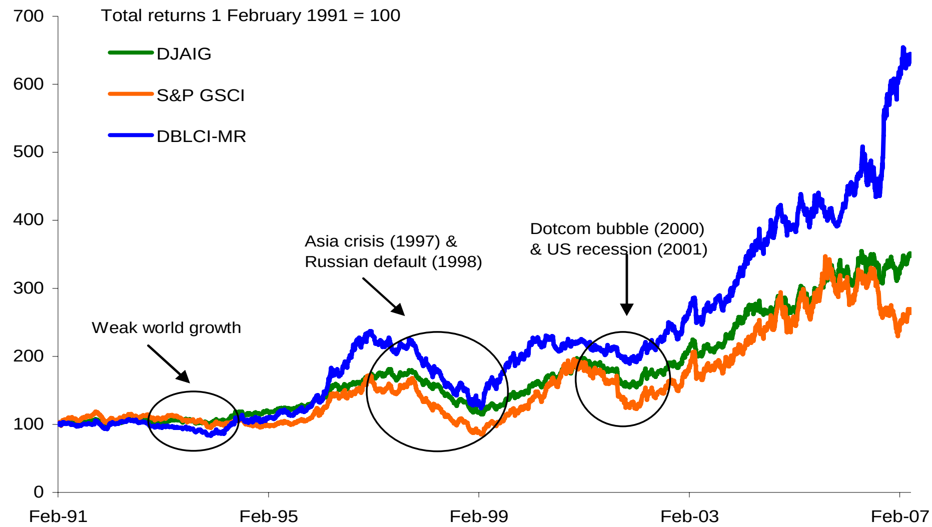


Source: DB Global Markets Research

Commodities not immune from cyclic downturns

Despite the DBLCI-MR's successful track record in switching out of losing commodities and into winning ones, the DBLCI-MR's long only strategy exposes it to a more widespread sell-off in commodity markets. Indeed commodity returns can suffer prolonged periods of negative returns, particularly in environments where global demand is weak, Figure 4.

Figure 4: Commodities do experience prolonged periods of negative returns



Source: DB Global Markets Research, Bloomberg

Introducing the DBLCI-MR 'Plus' & hedging downturn risk

The DBLCI-MR 'Plus', or simply the MR 'Plus', is a trading strategy which aims to achieve an optimal asset allocation between a commodity index, in this case the DBLCI-MR, and T-bills (cash) by detecting cyclical upswings and cyclical downturns in global commodity markets. The MR 'Plus' is designed to capture the full upside of a commodity rally while significantly reducing the risk of being caught in a downturn.

One can therefore view the difference as:

- The DBLCI-MR attempts to optimise the asset allocation between different commodity sectors.
- While the MR 'Plus' optimises the asset allocation to commodities at any point in time.

1. The MR 'Plus' strategy explained

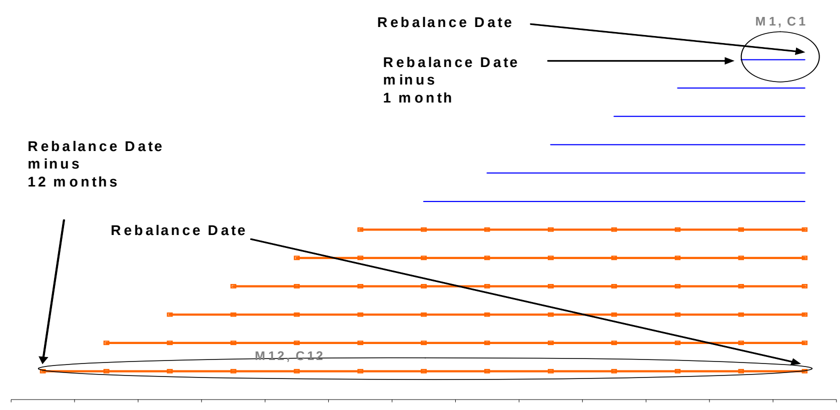
The MR 'Plus' attempts to detect longer term commodity cycles by differentiating between short term price moves (noise) and long term trends. A strategy that is sensitive to cyclical moves, but, not too sensitive to short term trading noises so that it minimises the number of rebalances.

That is, in periods when exposure to commodities is relatively high, any sharp drop in the MR will lead to an immediate and significant reduction in the exposure to commodities. Alternatively, a series of moderate, negative returns over time will lead to a gradual reduction in the exposure to commodities. And vice versa during upturns when exposure to commodities is relatively low.

Consequently, the MR 'Plus' index combines the DBLCI-MR's successful approach to optimising sector-allocation in commodities, with a quantitative rule-based momentum strategy that immunizes returns from downturns in global commodity markets.

The MR 'Plus' is a dynamic asset allocation strategy based on the DBLCI-MR index and T-bills. Rebalancing takes place on the 8th business day of each month. At each rebalance date, the allocation between the DBLCI-MR and cash is determined based on the relative performance of the two indices over the previous 12 months. Twelve performance indicators for each of the two indices are constructed and each indicator reflects the performance of the DBLCI-MR and cash over the 12th, 11th … up to the most recent month. The allocation to commodities is proportional to the number of times the DBLCI-MR indicators outperform the cash indicators. The more times the DBLCI-MR outperforms cash the higher the allocation to commodities. But as soon as the DBLCI-MR starts to under-perform cash the allocation to commodities starts to be reduced. Details of the rebalancing equations can be found in the Appendix and is illustrated in Figure 5.

Figure 5: MR 'Plus' allocation strategy

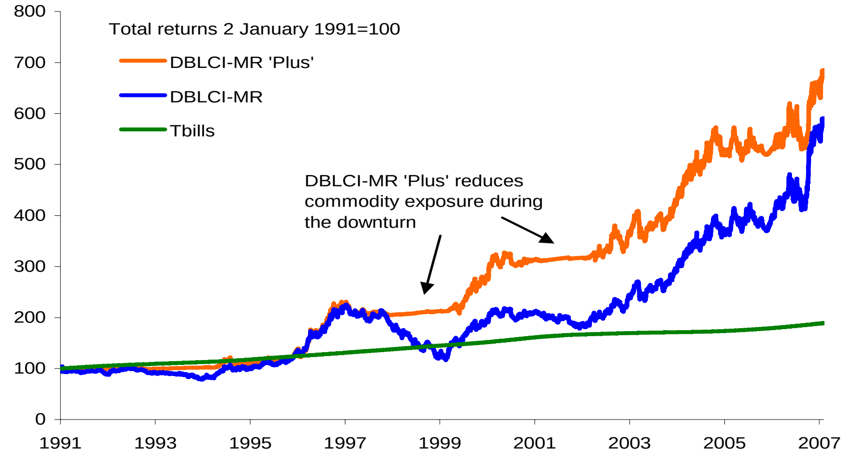


Source: DB Global Markets Research

2. DBLCI-MR & DBLCI-MR 'Plus' compared

Back-testing result shows that the MR 'Plus' strategy is able to capture and exploit commodity cycles and consequently generate superior returns, Figure 6.

Figure 6: DBCLI-MR & DBLCI-MR 'Plus' returns compared

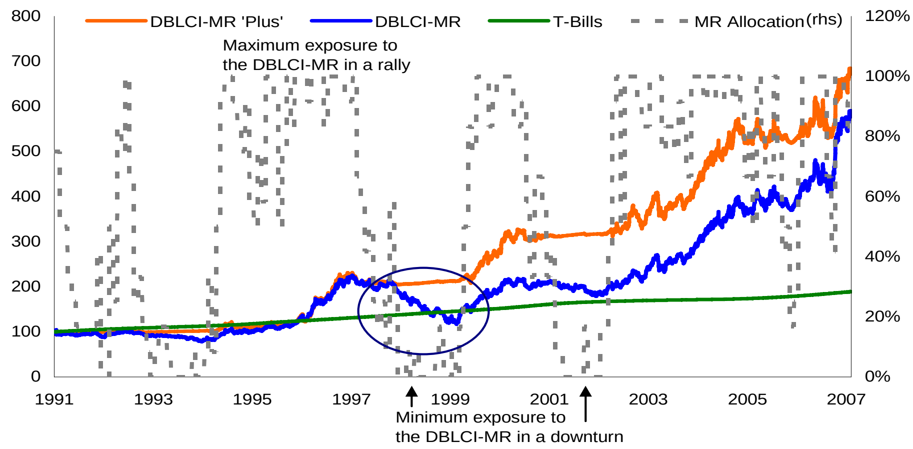


Source: DB Global Markets Research

First, we find that the MR 'Plus' has consistently outperformed returns on the DBLCI-MR since 1991. Second, the MR 'Plus' has successfully detected the commodity downturns in 1988 and 2001. The MR 'Plus' managed to lock-in positive returns by reducing its exposure to commodities during the downturns. Third, the allocation to commodities was increased in a timely fashion when a rally was detected.

Figure 7 describes in greater detail how the MR 'Plus' strategy works. The allocation to the DBLCI-MR is highlighted in the dotted grey line. In a rally, the allocation to commodities is close to 100%, thus achieving our target of full participation in the rally. On the other hand, when commodities experienced a downturn, for example between January 1997 and December 1998, the exposure to commodities via the MR 'Plus' was cut to an average of 21% over this period and was completely eliminated during the most severe sell-off. Similarly between the 2000 and 2001 downturn, the average exposure to commodities was only 31%.

Figure 7: Allocation to the DBLCI-MR is cut significantly during commodity downturns



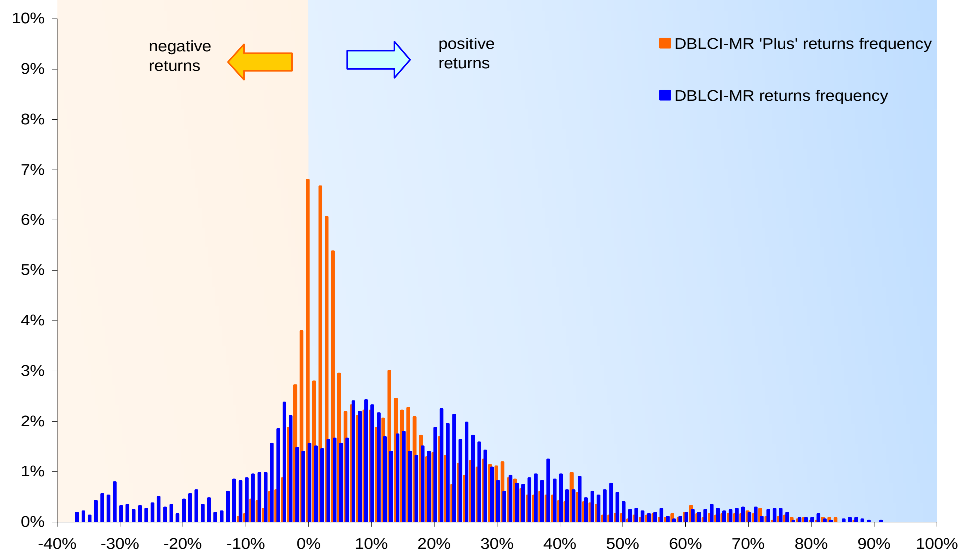
Source: DB Global Markets Research

1-year and 5-year returns

Figure 8 and 9 summarise the back-testing results since 1991. The 1-year (or 5-year) returns are charted assuming we enter the trade at the beginning of each week since 1991 and exit the trade 1-year (or 5-years) later. In both cases, the MR 'Plus' returns are positively skewed and have a higher concentration above the mean.

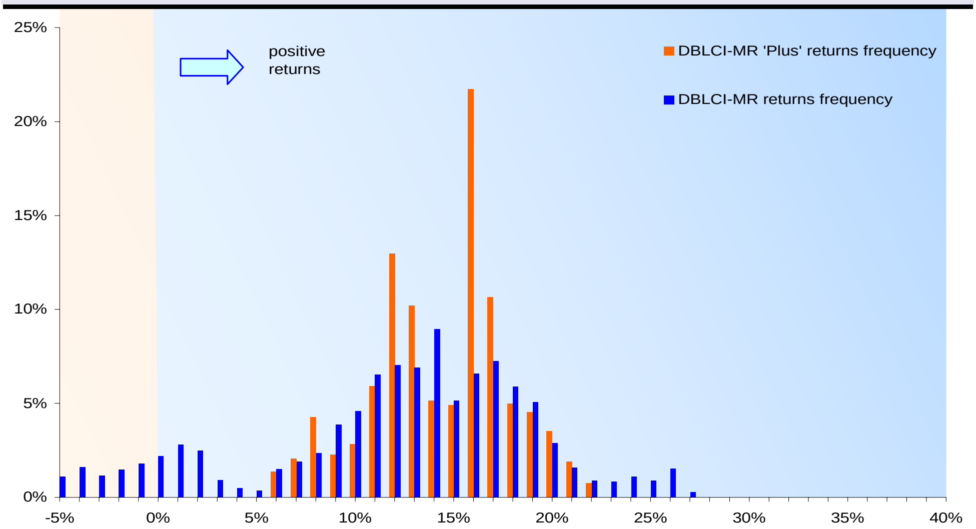
Over a 5-year horizon, the historical returns are always positive with a minimum return of 3.71%.

Figure 8: MR 'Plus' vs. DBLCI-MR 1-year returns distribution



Source: DB Global Markets Research

Figure 9: MR 'Plus' vs. DBLCI-MR 5-year returns distribution

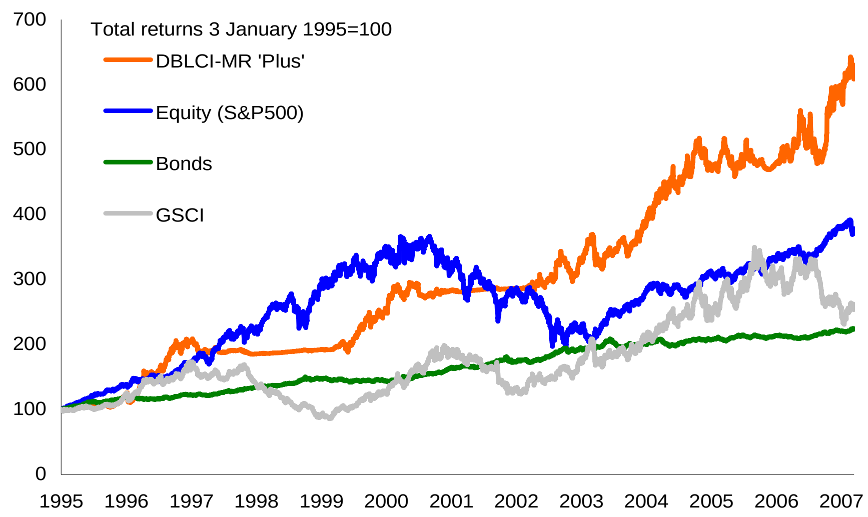


Source: DB Global Markets Research

3. Correlation, returns, volatility, and Sharpe ratios compared

We find the MR 'Plus' offers higher returns than equities or bonds as shown in Figure 10. The MR 'Plus' has outperformed equities and bonds in most instances since 1995 and only underperforming equities in the 1997-99 "dot com" bubble.

Figure 10: MR 'Plus' vs. equities, bonds & the S&P GSCI



Source: DB Global Markets Research, Bloomberg

Diversification: The MR 'Plus' also provides diversification benefits with the correlation to equity and bond returns both negative.

Figure 11: MR 'Plus' is negatively correlated with US equities and bonds

Correlation	**MR 'Plus'**
Equities	-1.33%
Bonds	-0.61%

Source: DB Global Markets Research, Bloomberg; Data from Jan-1995

[*] Equities are proxied by the S&P500 total returns index, and Bonds by USGATR

Higher Sharpe ratio: The MR 'Plus' provides a superior risk-adjusted returns profile than both equities and bonds. The MR 'Plus' historical returns are highest among the three asset classes while the vol is significantly lower than equity vol implying a higher Sharpe Ratio.

Figure 12: Returns analysis: MR 'Plus; US equities and US bonds

	MR 'Plus'	**Equities[*]**	**Bonds[*]**
Mean	15.50%	12.40%	6.74%
Volatility	13.30%	16.70%	4.65%
Sharpe Ratio	**86.80%**	**50.50%**	**53.90%**

Source: DB Global Markets Research

[*] Equities are proxied by the S&P500 total returns index, and bonds by USGATR

Limited drawdown: The MR 'Plus' offers an efficient hedge against downturns in commodity returns and thus manages to help limit the drawdown. Figure 13 compares the probability of negative returns for the various asset classes since 1995. We find that the MR 'Plus' strategy reduces the likelihood of negative returns from 25.5% under the traditional DBLCI-MR approach to 13.6% with the enhanced 'Plus' technology.

Figure 13: Worst case scenario distribution

Probability return <x%	DBLCI-MR 'Plus'	DBLCI-MR	Equity	Bonds
-5%	3.0%	18.9%	20.1%	0.0%
-2%	4.7%	23.3%	22.0%	3.5%
0%	13.6%	25.5%	22.5"	8.1%

Source: DB Global Markets Research

[*]Equities are proxied by the S&P500 total returns index, and bonds by USGATR

Conclusion

As the current commodity boom has unfolded so the risks to a reversal in prices have escalated. Indeed at some point investors will need to position for either a cyclical or structural downturn in commodity prices. In order to position for such a scenario we have designed the DBLCI-MR 'Plus'. Its trading strategy attempts to detect commodity cycles and thus hedge against potential downturns in commodity returns. We find that the DBLCI-MR 'Plus' strategy combines the DBLCI-MR's successful approach to inter-sector allocation in commodities, with a quantitative rule-based momentum strategy that aims at immunizing returns from downturns in commodity markets

Trade Recommendation:

To gain full participation to the commodity rally while hedging against any potential downturn:

- **Long DBLCI-MR 'Plus'**

Appendix: DBLCI-MR 'Plus' Mechanics

The MR 'Plus' is a dynamic asset allocation strategy based on the DBLCI-Mean Reversion index and T-bills ("cash"). The allocation between the DBLCI-MR and cash is determined based on the relative performance of the two assets over the 12 months preceding the rebalance date and it is adjusted on a monthly basis.

At any date t the value of the MR 'Plus' index $I^+(t)$ is given by:

$$I^+(t) = I^+(t_b) + W_t^{mr}\left(\frac{I^{mr}(t)}{I^{mr}(t_b)} - 1\right) + W_t^{tb}\left(\frac{I^{tb}(t)}{I^{tb}(t_b)} - 1\right)$$

where

$I^{mr}(t)$ and $I^{tb}(t)$ are the closing values of the MR and a T-bill based index on date t respectively,

t_b is the last rebalance date preceding t ,

$$W_t^{\ mr} = \frac{1}{12}\sum_{i=1}^{12} 1_{\{R(t_i,t_b)>TB(t_i,t_b)\}} ,$$

$$W_t^{\ tb} = 1 - W_t^{\ mr} ,$$

t_i is the closest business day of the i^{th} month preceding t,

$R(t_i,t) = \dfrac{I^{mr}(t)}{I^{mr}(t_i)} - 1$ is the return of the MR between t_i and t,

$TB(t_i,t) = \dfrac{I^{tb}(t)}{I^{tb}(t_i)} - 1$ is the return of the T-bill index between t_i and t,

$1_{\{R>TB\}}$ is equal to 1 if $R > L$ and 0 otherwise.

Weight rebalancing takes place on a monthly basis.

Long DBLCI-OY vs. Short DBLCI

Introduction

- Traditionally all commodity indices in the marketplace roll their underlying contracts according to a predefined schedule.
- However, the changing nature of term structures across the entire commodity complex over the past few years has meant that this traditional mechanistic approach has become an increasingly inferior strategy for passive long only commodity index investing.
- To tackle the dynamic nature of commodity forward curves in 2006 we designed a new set of commodity index products, called the Deutsche Bank Liquid Commodities Indices Optimum Yield, or DBLCI-OY.
- We believe a spread trade to go long the DBLCI-OY index and short the DBLCI base index is well positioned to arbitrage the different rolling mechanism of the two indices without taking any directional view on the commodity complex.
- We believe this spread trade performs best when energy markets are in contango and metal and grain markets are in backwardation. In the worst case, we would expect the two indices would perform equally well over the medium term given the flexibility of the Optimum Yield technology.

Market neutral: alpha play

Both the DBLCI and DBLCI-OY commodity indices have the same components and individual commodities weights, the only difference between the two indices is the rolling mechanism of the future contracts. While the DBLCI has a pre-determined and fixed rolling mechanism, the DBLCI-OY is designed to dynamically roll the futures contracts to optimize roll returns. Figure 1 summarise the latest weightings and contract expiry of DBLCI and DBLCI-OY.

Figure 1: Weights and contracts expiry month of DBLCI and DBLCI-OY

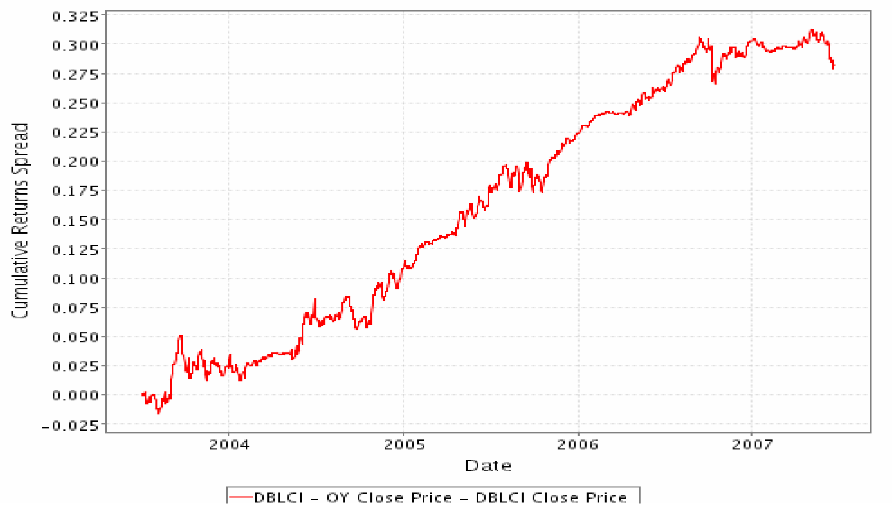
	DBLCI	DBLCI weights	DBLCI-OY	DBLCI-OY weights
WTI	Jul'07	35.00%	Apr'08	35.00%
Heating oil	Jul'07	20.00%	May'08	20.00%
Aluminium	Dec'07	12.50%	Nov'07	12.50%
Gold	Dec'07	10.00%	Aug'07	10.00%
Wheat	Dec'07	11.25%	Jul'08	11.25%
Corn	Dec'07	11.25%	Dec'07	11.25%

Source: DB Global Markets Research

Consequently, by going long one commodity index versus short the other with identical weights in each commodity sector, this spread trade takes no directional view on commodities and so it is immune from the ups and downs of underlying commodities prices. It is an alpha strategy and a pure play on the commodities term structure.

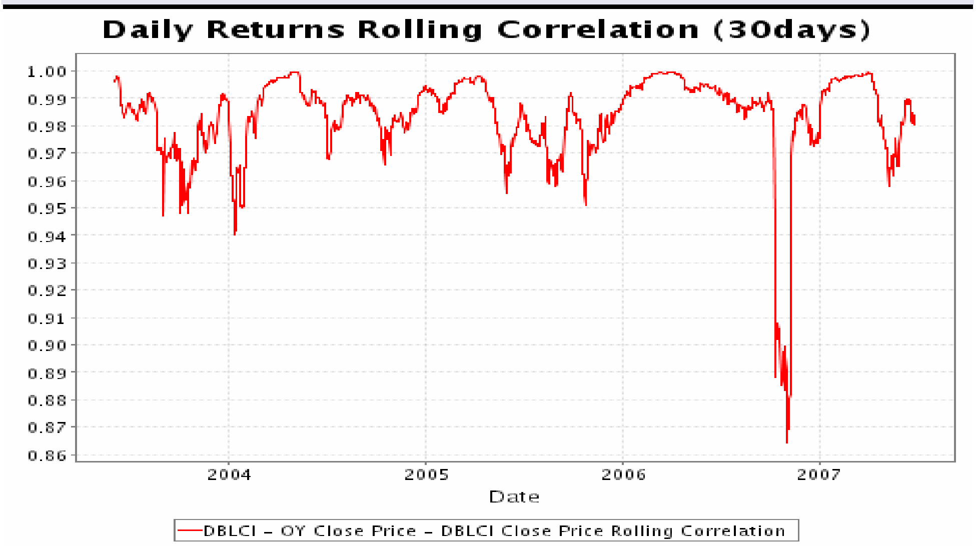
The cumulative return spread over the past three year is shown in Figure 2. We find that the trade has generated positive returns consistently over time. Given the identical sector weights of the two indices, we would expect an extremely high correlation. Indeed, the lowest point of the correlation is 86% as shown in Figure 3.

Figure 2: Cumulative returns spread of DBLCI-OY and DBLCI



Source: DB Global Markets Research

Figure 3: Strong correlation of the two indices – lowest point is 86%



Source: DB Global Markets Research

Trade Recommendation:

- **Long DBLCI-OY vs. Short DBLCI**

Long DBLCI-OY vs. Short DBLCI Sub-Indices

Long DBLCI-OY Crude vs. Short DBLCI Crude

Investors can express a specific term structure view on a particular commodity via the DBLCI-OY and the DBLCI sub-indices. For example, a direct play on the contangoed crude oil term structure could be implemented by going long the DBLCI-Crude Oil sub-index (CL-OY) and short the DBLCI Crude oil sub-index (CL). Indeed, this CL-OY vs. CL spread trade worked extremely well when the WTI crude oil market was in contango over the past few years.

The balance of risk has traditionally been skewed to the physical players, such that commodity index investors have historically only be able to benefit from backwardation, but, not from contango. This reflects the fact that an index investor is conveniently placed to receive the positive roll returns resulting from a backwardated term structure. On the other hand, in a contango market a lack of access to storage facilities deprives the investor the access to arbitrage free profit from storing the commodity and selling higher priced futures contract at the same time.

The launch of the OY technology has offered an alternative way to trade contango.

Profiting from the oil contango term structure

Other than owning a storage tank (buy spot and sell future at the same time to lock in a substantial profit, the spread between M01 and M04 crude oil contract averaged USD3 between Jan-06 to Jun-07), another way to profit from the oil contango term structure is to go long the DBLCI-Optimum Yield index and short the base DBLCI index.

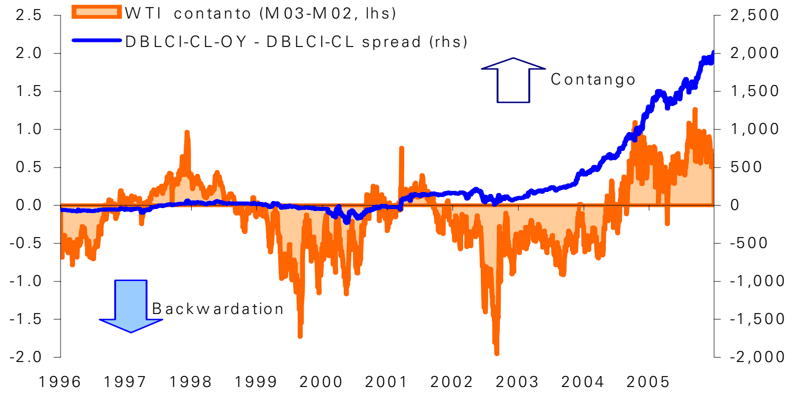
- In terms of returns, CL-OY yields an annualised returns of 58% versus 38% of CL between July 2003 and July 2006, with a realised vol of 27% and 31% respectively. CL-OY is the clear winner offering higher returns with a lower vol.
- The CL-OY vs. CL spread rallied from 92.23 three years ago in July 2003 to 2,019.58 three years later, with an annualised returns of 193%, an annualised vol of 36%, and a sharpe ratio of over 5.

The risk to this index RV trade is a flip in the oil curve to backwardation. Despite the risk that the forward curve term structure can change over time, we believe the trade is unlikely to generate substantial losses. That is because any spike in the oil price resulting from geopolitics or weather is unlikely to be sustainable while a more likely trigger for the oil curve to flip back into backwardation over an extended period of time, namely a sharp fall in the oil price and an associated cut in OPEC production is, in our view, a distant prospect and in any event we would expect to have plenty of time to monitor inventory positions, term structures as well as close out the trade before incurring significant losses.

Trade Recommendations:

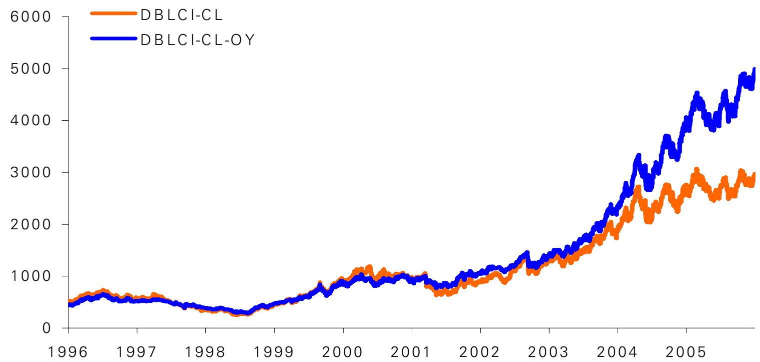
- **Long DBLCI-Crude Oil-OY vs. Short DBLCI-Crude Oil**

Figure 1: A pure play on the crude oil term structure – profiting from the contangoed oil term structure without owning a storage tank



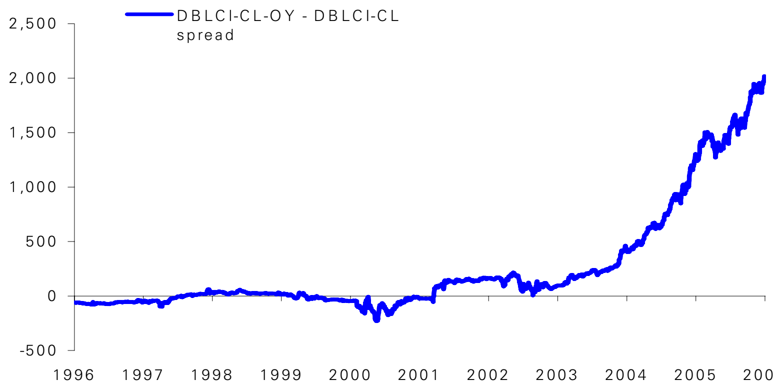
Source: DB Global Markets Research

Figure 2: DBLCI-CL failed to participate in the crude oil rally because of the contangoed oil term structure, which is not the case for the DBLCI-CL-OY



Source: DB Global Markets Research

Figure 3: The DBLCI-CL-OY and DBLCI-CL spread has exploded ever since the crude oil moved into contango since late 2004



Source: DB Global Markets Research

Long DBLCI-OY Heating oil vs. Short DBLCI Heating oil

Profiting from the seasonality of the heating oil term structure

While the crude oil term structure could be in contango or in backwardation depending on the prevailing level of inventories, the heating oil term structure has a more predictable pattern because of the extra seasonality element associated with heating oil prices. That is, heating oil prices tend to be higher in the winter as it is used as heating fuel and lower in the summer when demand is skewed more to gasoline during the summer US driving season.

By using a similar rationale for the crude oil contango trade, we expect the OY-HO index to outperform the HO index in a contangoed environment. For heating oil contango tends to the market feature for roughly half of the year under normal circumstances.

The DBLCI-HO-OY and DBLCI-HO spread has risen substantially ever since the heating oil curve moved into steep contango in 2005. Indeed, the contango situation is so serious that heating oil has spent almost the entire winter trading in contango, while backwardation has rarely occurred over the past two years. The heating oil curve is now skewed to contango, as opposed to being skewed to backwardation as it was before 2005.

Trade Recommendations:

- **Long DBLCI-Heating Oil-OY vs. Short DBLCI-Heating Oil**

Figure 4: Seasonality is the norm in the oil products market

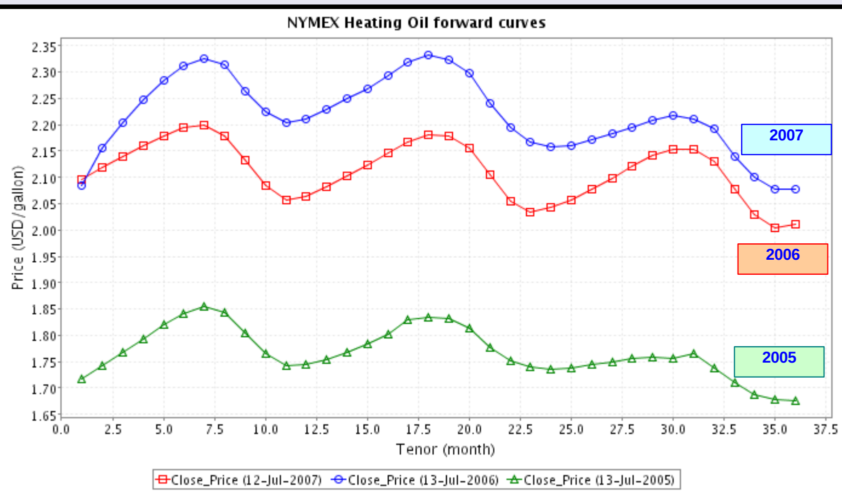
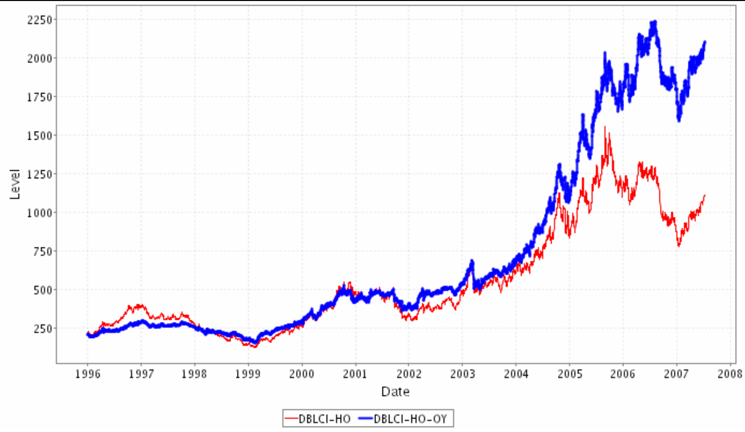
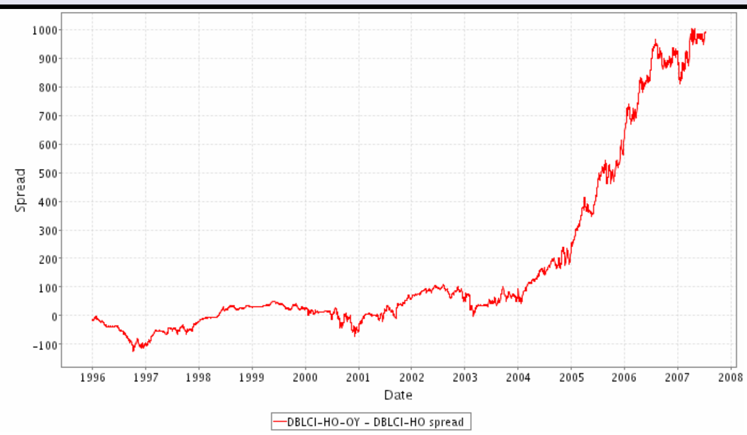


Figure 5: DBLCI-HO failed to participate in the heating oil rally because of the contangoed term structure. This was not the case for DBLCI-HO-OY



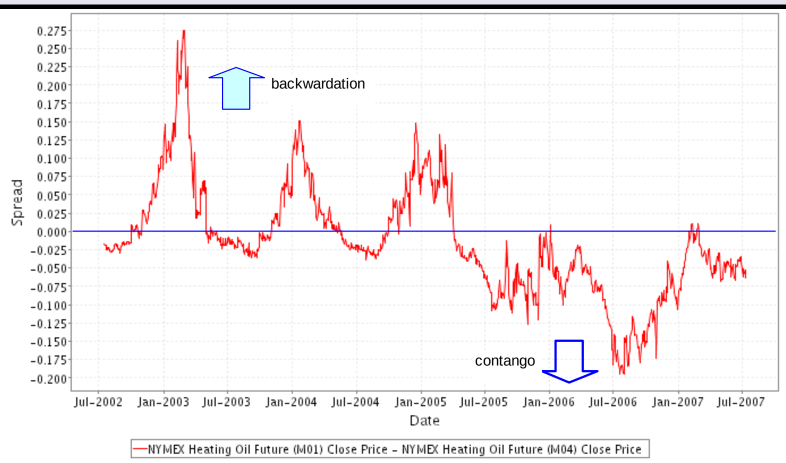
Source: DB Global Markets Research

Figure 6: The DBLCI-HO-OY and DBLCI-HO spread has surged ever since the heating oil curve moved into steep contango



Source: DB Global Markets Research

Figure 7: The heating oil curve is now skewed to contango, as opposed to being skewed towards backwardation before 2005



Source: DB Global Markets Research

Appendix

The Deutsche Bank Commodity Index Suite

Bloomberg Codes For The Suite Of Deutsche Bank's Commodity Indices

Index	Total Returns	Excess Returns
Deutsche Bank Liquid Commodity Index	DBLCMAVL <Index>	DBLCMACL <Index>
DBLCI-Optimum Yield	DBLCOYTR <Index>	DBLCOYER <Index>
DBLCI-Mean Reversion	DBLCMMVL <Index>	DBLCMMCL <Index>
DBLCI-OY Broad	DBLCBRTR <Index>	DBLCBRER <Index>
DBLCI-OY Balanced	DBLCBBTR <Index>	DBLCBBER <Index>
Energy		
DBLCI-OY Energy	DBLCYTEN <Index>	DBLCYEEN <Index>
DB Crude Oil Index	DBRCLTR <Index>	DBRCL <Index>
DB Crude Oil Index-Optimum Yield	DBLCOCLT <Index>	DBLCOCLE <Index>
DB Heating Oil Index	DBRHOTR <Index>	DBRHO <Index>
DBLCI-OY Heating Oil	DBLCOHOT <Index>	DBLCOHOE <Index>
DBLCI-OY RBOB	DBLCYTRB <Index>	DBLCYERB <Index>
DBLCI-OY Natural Gas	DBLCYTNG <Index>	DBLCYENG <Index>
DBLCI-OY Brent Crude	DBLCYTCO <Index>	DBLCYECO <Index>
DBLCI-OY Gasoil	DBLCYTGO <Index>	DBLCYEGO <Index>
Precious Metals		
DBLCI-OY Precious Metals	DBLCYTPM <Index>	DBLCYEPM <Index>
DB Gold Index	DBRGCTR <Index>	DBRGC <Index>
DBLCI-OY Gold	DBLCOGCT <Index>	DBLCOGCE <Index>
DBLCI-OY Silver	DBLCYTSI <Index>	DBLCYESI <Index>
Industrial Metals		
DBLCI-OY Industrial Metals	DBLCYTIM <Index>	DBLCYEIM <Index>
DB Aluminium Index	DBRMALTR <Index>	DBRMAL <Index>
DBLCI-OY Aluminium	DBLCOALT <Index>	DBLCOALE <index>
DBLCI-OY Copper	DBLCYTCU <Index>	DBLCYECU <Index>
DBLCI-OY Lead	DBLCYTPB <Index>	DBLCYEPB <Index>
DBLCI-OY Nickel	DBLCYTNI <Index>	DBLCYENI <Index>
DBLCI-OY Zinc	DBLCYTZN <Index>	DBLCYEZN <Index>
Agriculture		
DBLCI-OY Agriculture	DBLCYTAG <Index>	DBLCYEAG <Index>
DB Wheat Index	DBRWTR <Index>	DBRW <Index>
DBLCI-OY Wheat	DBLCOWTT <Index>	DBLCOWTE <Index>
DB Corn Index	DBRCTR <Index>	DBRC <Index>
DBLCI-OY Corn	DBLCOCNT <Index>	DBLCOCNE <Index>
DBLCI-OY Soybeans	DBLCYTSS <Index>	DBLCYESS <Index>
DBLCI-OY Sugar	DBLCYTSB <Index>	DBLCYESB <Index>
DBLCI-OY Coffee	DBLCYTKC <Index>	DBLCYEKC <Index>
DBLCI-OY Cotton	DBLCYTCT <Index>	DBLCYECT <Index>
DBLCI-OY Cocoa	DBLCYTCC <Index>	DBLCYECC <Index>
DBLCI-OY Kansas Wheat	DBLCYTKW <Index>	DBLCYEKW <Index>
Livestock		
DBLCI-OY Live Cattle	DBLCYTLC <Index>	DBLCYELC <Index>
DBLCI-OY Lean Hogs	DBLCYTLH <Index>	DBLCYELH <Index>
DBLCI-OY Feeder Cattle	DBLCYTFC <Index>	DBLCYEFC <Index>

Source: DB Global Markets Research; Bloomberg page DBCM, DBC; Reuters page DBLCI

Databank

Total returns: Performance of commodity & other benchmark indices

USD terms	29-Jun-07	% mom	% QTD	2007 YTD	Sharpe*	2003	2004	2005	2006
DBLCI-OY	1126.34	1.23%	1.44%	5.26%	0.06	26.86	38.27	31.96	16.96
DBLCI	1017.50	4.92%	4.13%	8.66%	0.00	23.68	27.87	17.54	8.12
DBLCI-MR	1407.53	5.39%	6.75%	11.73%	2.05	22.46	27.60	6.25	46.05
DBLCI-OY Broad	451.24	1.47%	3.41%	7.44%	0.01	28.34	38.58	44.19	15.12
DBLCI-OY Balanced	346.91	0.46%	3.07%	5.56%	0.32	25.93	29.28	37.65	24.67
Components of the DBLCI-Optimum Yield									
Crude Oil	4369.37	4.81%	-0.19%	4.11%	-0.63	40.99	66.12	47.56	2.31
Heating Oil	2019.48	3.04%	2.40%	12.26%	-0.43	26.12	63.76	61.43	0.74
Aluminium	251.48	-1.27%	1.49%	5.09%	0.67	20.04	27.01	22.98	37.61
Gold	158.30	-2.01%	-2.43%	1.63%	0.23	19.40	5.21	18.21	21.91
Wheat	123.53	3.46%	18.87%	9.79%	0.81	23.73	-15.99	4.04	26.59
Corn	73.88	-8.50%	-7.43%	-4.06%	1.27	0.56	-20.51	-13.36	55.67
Components of the DBLCI									
Crude Oil	2281.08	9.26%	0.43%	4.11%	-0.95	30.57	47.84	22.26	-16.28
Heating Oil	1069.24	8.42%	8.14%	22.05%	-0.73	28.43	44.15	33.49	-24.90
Aluminium	179.52	-0.71%	2.33%	6.21%	0.75	17.18	25.89	24.79	39.46
Gold	166.34	-2.01%	-2.37%	1.69%	0.23	19.45	5.52	17.97	22.55
Wheat	224.23	12.85%	29.13%	22.22%	1.90	22.36	-19.11	-1.38	46.42
Corn	76.06	-8.50%	-7.43%	-4.06%	1.26	4.01	-20.51	-13.38	55.67
Performance of other benchmark indices									
S&P GSCI	5999.78	3.22%	1.34%	6.54%	-0.92	20.72	17.28	25.55	-15.04
DJ-AIG	328.03	-1.40%	-0.13%	4.46%	-0.04	23.93	9.15	21.36	2.07
S&P 500	2338.25	-1.66%	6.28%	6.96%	1.44	28.68	10.88	4.91	15.79
EFFAS US Bond	254.60	-0.04%	-0.40%	1.00%	0.21	2.93	3.47	2.70	3.12

The Sharpe Ratio is calculated from year-on-year returns as of Jun-07; For quotes and compositions see Reuters: DBLCI and Bloomberg: DBCM
Source: DB Global Markets Research

Excess returns: Performance of commodity & other benchmark indices

USD terms	29-Jun-07	% mom	% QTD	2007 YTD	Sharpe*	2003	2004	2005	2006
DBLCI-OY	494.60	0.85%	0.23%	2.69%	0.06	25.57	36.37	27.83	11.49
DBLCI	446.81	4.53%	2.88%	6.01%	0.00	22.42	26.11	13.89	3.06
DBLCI-MR	618.12	5.00%	5.47%	9.00%	1.95	21.21	25.85	2.96	39.22
DBLCI-OY Broad	317.47	1.09%	2.17%	4.82%	0.01	27.03	36.68	39.69	9.73
DBLCI-OY Balanced	244.07	0.09%	1.83%	2.98%	0.30	24.64	27.50	33.35	18.84
Components of the DBLCI									
Crude Oil*	1001.72	8.86%	-0.77%	1.57%	-0.90	29.24	45.80	18.47	-20.20
Heating Oil*	469.50	8.02%	6.84%	19.07%	-0.69	27.13	42.17	29.35	-28.42
Aluminium*	78.81	-1.08%	1.10%	3.62%	0.72	15.99	24.16	20.92	32.93
Gold*	73.02	-2.37%	-3.53%	-0.79%	0.22	18.24	4.07	14.31	16.81
Wheat*	98.44	12.43%	27.59%	19.24%	1.81	21.12	-20.23	-4.44	39.57
Corn*	33.39	-8.84%	-8.54%	-6.40%	1.20	2.95	-21.61	-16.07	48.39
Performance of other benchmark indices									
S&P GSCI	605.54	2.83%	0.12%	4.00%	-0.88	19.48	15.65	21.61	-19.07
DJ-AIG	169.67	-1.77%	-1.33%	1.90%	-0.03	22.66	7.64	17.55	-2.71
S&P 500	1503.35	-1.78%	5.81%	6.00%	1.72	26.38	8.99	3.00	13.62

The Sharpe Ratio is calculated from year-on-year returns as of Jun-07; For quotes and compositions see Reuters: DBLCI and Bloomberg: DBCM
Source: DB Global Markets Research

DBIQ Guide: Formulas For The DB Commodity Index Suite

DBLCI Benchmark Index Rebalancing and Rolls

Commodity future positions are adjusted during the annual index rebalancing period and the monthly index rolls. The rebalancing and rolls occur between the 2nd and 6th index business day of the month.

When neither an annual index rebalancing nor a monthly index roll is occurring, the notional holding of each commodity future remains constant.

$$N(t,i) = N(t-1,i)$$

Annual Index Rebalancing Period

The annual index rebalancing takes place between the 2nd and 6th business day of the rebalancing month. From November 2004 the rebalancing month is November; prior to November 2004 it is December. The new Sweet Light Crude Oil (CL) and Heating Oil (HO) futures contracts are selected as the future contracts with an expiry month two months following the rebalancing month. The new Gold (GC), Aluminium (MAL), Corn (C) and Wheat (W) futures contracts are selected as the future contracts with an expiry in the December of the following year.

On each day during the rebalancing period the new notional holding of each commodity is calculated. The calculations for the old commodities that are leaving the index and the new commodities that are entering are different.

The notional of the old commodities is expressed as:

$$N(t,i) = N(t-1,i) * \frac{6-db(t)}{7-db(t)}$$

The notional of the new commodities is expressed as:

$$N(t,j) = N(t-1,j) + \frac{MVo(t) * CW(j)}{PC(t,j) * (7-db(t))}$$

$$MVo(t) = \sum_i PC(t,i) * N(t-1,i)$$

where

N(t-1,i)	= Notional holding of old commodity future i on index calculation day t-1
N(t,i)	= Notional holding of old commodity future i on index calculation day t
N(t-1,j)	= Notional holding of new commodity future j on index calculation day t-1
N(t,j)	= Notional holding of new commodity future j on index calculation day t
db(t)	= Number of index business days in the month up to and including day t
MVo(t)	= Total market value of all old commodities in index on day t
CW(j)	= Rebalancing weight for commodity j
PC(t,i)	= Close price of old commodity future i on day t
PC(t,j)	= Close price of new commodity future j on day t

Monthly Index Roll Period

On each month that is not an annual index rebalancing, the monthly index roll occurs. This takes place between the 2nd and 6th business day of the month. During the roll, the old commodity future contracts for Sweet Light Crude Oil and Heating Oil are substituted with new contracts. The new Sweet Light Crude Oil and Heating Oil contracts are selected as the contracts that expire in two months.

On each day during the roll period the new notional holdings of the Sweet Light Crude Oil and Heating Oil contracts are calculated. The calculations for the old commodities that are leaving the index and the new commodities that are entering are different.

The notional of the old commodities is expressed as:

$$N(t,i,c) = N(t-1,i,c) * \frac{6-db(t)}{7-db(t)}$$

The notional of the new commodities is expressed as:

$$N(t,j,c) = N(t-1,j,c) + \frac{PC(t,i,c) * N(t-1,i,c)}{PC(t,j,c) * (7-db(t))}$$

where

N(t-1,i,c)	= Notional holding of old commodity future i of commodity type c on index calculation day t-1
N(t,i,c)	= Notional holding of old commodity future i of commodity type c on index calculation day t
N(t-1,j,c)	= Notional holding of new commodity future j of commodity type c on index calculation day t-1
N(t,j,c)	= Notional holding of new commodity future j of commodity type c on index calculation day t
db(t)	= Number of index business days in the month up to and including day t
PC(t,i,c)	= Close price of old commodity future i of commodity type c on day t
PC(t,j,c)	= Close price of new commodity future j of commodity type c on day t

For all other commodity future contracts the notional holding of the commodity future remains constant.

$$N(t,i) = N(t-1,i)$$

Initial Index Notional

The index inception date is 01-Dec-1988. On this date the initial commodity notionals were calculated using:

$$N(t,i) = \frac{100 * CW(i)}{PC(t,i)}$$

where

N(t,i)	= Notional holding of commodity future i on index calculation day t
CW(i)	= Rebalancing weight for commodity i
PC(t,i)	= Close price of commodity future i on day t

DBLCI MR Index Rebalancing and Rolls

The DBLCI MR index has a systematic weight strategy based on the commodities' moving averages. The systematic weight changes occur when a divergence tick for one of the commodities changes. As with the DBLCI benchmark index, commodity future positions are adjusted during the annual index rebalancing period and the monthly index rolls. The rebalancing and rolls occur between the 2nd and 6th index business day of the month. Systematic weight changes cannot occur during the rebalancing or roll periods.

When neither an annual index rebalancing nor a monthly index roll nor a systematic weight change is occurring, the notional holding of each commodity future remains constant.

$$N(t,i) = N(t-1,i)$$

Annual Index Rebalancing and Monthly Index Roll Periods

The commodity weights are maintained throughout the annual rebalancing and monthly roll periods. The calculation of the notional holding for each commodity contract is the same for the annual rebalancing and monthly roll.

The annual index rebalancing takes place between the 2nd and 6th business day of the rebalancing month. From November 2004 the rebalancing month is November; prior to November 2004 it is December. The new Sweet Light Crude Oil (CL) and Heating Oil (HO) futures contracts are selected as the future contracts with an expiry month two months following the rebalancing month. The new Gold (GC), Aluminium (MAL), Corn (C) and Wheat (W) futures contracts are selected as the future contracts with an expiry in the December of the following year.

On each month that is not an annual index rebalancing, the monthly index roll occurs. This takes place between the 2nd and 6th business day of the month. During the roll, the old commodity future contracts for Sweet Light Crude Oil and Heating Oil are substituted with new contracts. The new Sweet Light Crude Oil and Heating Oil contracts are selected as the contracts that expire in two months.

On each day during the rebalancing/roll period the new notional holding of each commodity that is being rebalanced/rolled is calculated. The calculations for the old commodities that are leaving the index and the new commodities that are entering are different.

The notional of the old commodities is expressed as:

$$N(t,i,c) = N(t-1,i,c) * \frac{6-db(t)}{7-db(t)}$$

The notional of the new commodities is expressed as:

$$N(t,j,c) = N(t-1,j,c) + \frac{PC(t,i,c) * N(t-1,i,c)}{PC(t,j,c) * (7-db(t))}$$

where

N(t-1,i,c)	= Notional holding of old commodity future i of commodity type c on index calculation day t-1
N(t,i,c)	= Notional holding of old commodity future i of commodity type c on index calculation day t
N(t-1,j,c)	= Notional holding of new commodity future j of commodity type c on index calculation day t-1
N(t,j,c)	= Notional holding of new commodity future j of commodity type c on index calculation day t
db(t)	= Number of index business days in the month up to and including day t

PC(t,i,c) = Close price of old commodity future i of commodity type c on day t
PC(t,j,c) = Close price of new commodity future j of commodity type c on day t

During the monthly roll, for all other commodity future contracts apart from Sweet Light Crude Oil and Heating Oil the notional holding of the commodity future remains constant.

$$N(t,i) = N(t-1,i)$$

Systematic Weight Strategy

The systematic weight strategy is based on the commodity divergence ticks. The divergence tick is a measure of the ratio of the 5yr and 1yr commodity moving average. The divergence tick is expressed as:

$$dk(t,i) = trunc\left(\frac{MA1(t,i)/MA5(t,i)-1}{f}\right)$$

where:

dk(t,i) = Divergence tick of commodity i on day t
MA1(t,i) = One-year moving average of commodity i on day t
MA5(t,i) = Five-year moving average of commodity i on day t
f = 0.05

The one-year moving average uses the new commodity price from the first business day in the rebalancing/roll month. Prior to December 1988 the one-year average was based off a DB approximation. This average was proportionally weighted in the moving average calculation until December 1989.

The five-year moving average uses the new commodity price from the first of either the day after the old contract's expiry or the first business day in the month following the rebalancing/roll. Prior to December 1988 the five-year average was based off a DB approximation. This average was proportionally weighted in the moving average calculation until December 1993.

When a divergence tick for a commodity changes between t-1 and t, the new target weight is calculated. The target weight is expressed as:

$$W(t,i) = \frac{CW(i) * e^{-dk(t,i)*k}}{\sum_j CW(j) * e^{-dk(t,j)*k}}$$

where:

W(t,i) = Target weight of commodity i on day t
k = 0.3

The DBLCI MR commodities weights will rebalance on the next business day, provided this is not a rebalancing/roll date. The new notional is expressed as:

$$N(t+1,i) = \frac{100 * W(t,i)}{PC(t+1,i)}$$

Initial Index Notional

The index inception date is 01-Dec-1988. On this date the initial commodity notionals were calculated using:

$$N(t,i) = \frac{100 * CW(i)}{PC(t,i)}$$

where

N(t,i) = Notional holding of commodity future i on index calculation day t
CW(i) = Rebalancing weight for commodity i
PC(t,i) = Close price of commodity future i on day t

DBLCI Single Commodity Index Rebalancing and Rolls

As with the DBLCI benchmark index, commodity future positions are adjusted during the annual index rebalancing period. Monthly rolls only occur for the Sweet Light Crude Oil (CL) and Heating Oil (HO) indices. The rebalancing and rolls occur between the 2nd and 6th index business day of the month.

When neither an annual index rebalancing nor a monthly index roll nor a systematic weight change is occurring, the notional holding of each commodity future remains constant.

$$N(t,i) = N(t-1,i)$$

Annual Index Rebalancing and Monthly Index Roll Periods

The annual index rebalancing takes place between the 2nd and 6th business day of the rebalancing month. From November 2004 the rebalancing month is November; prior to November 2004 it is December. The new Sweet Light Crude Oil (CL) and Heating Oil (HO) futures contracts are selected as the future contracts with an expiry month two months following the rebalancing month. The new Gold (GC), Aluminium (MAL), Corn (C) and Wheat (W) futures contracts are selected as the future contracts with an expiry in the December of the following year.

On each month that is not an annual index rebalancing, the monthly index roll occurs for the Sweet Light Crude Oil (CL) and Heating Oil (HO) indices. This takes place between the 2nd and 6th business day of the month. During the roll, the old commodity future contracts for Sweet Light Crude Oil and Heating Oil are substituted with new contracts. The new Sweet Light Crude Oil and Heating Oil contracts are selected as the contracts that expire in two months.

On each day during the rebalancing/roll period the new notional holding of each commodity that is being rebalanced/rolled is calculated. The calculations for the old commodities that are leaving the index and the new commodities that are entering are different.

The notional of the old commodities is expressed as:

$$N(t,i,c) = N(t-1,i,c) * \frac{6 - db(t)}{7 - db(t)}$$

The notional of the new commodities is expressed as:

$$N(t,j,c) = N(t-1,j,c) + \frac{PC(t,i,c) * N(t-1,i,c)}{PC(t,j,c) * (7 - db(t))}$$

where

N(t-1,i,c) = Notional holding of old commodity future i of commodity type c on index calculation day t-1

N(t,i,c) = Notional holding of old commodity future i of commodity type c on index calculation day t
N(t-1,j,c) = Notional holding of new commodity future j of commodity type c on index calculation day t-1
N(t,j,c) = Notional holding of new commodity future j of commodity type c on index calculation day t
db(t) = Number of index business days in the month up to and including day t
PC(t,i,c) = Close price of old commodity future i of commodity type c on day t
PC(t,j,c) = Close price of new commodity future j of commodity type c on day t

Initial Index Notional

The index inception date is 01-Dec-1988. On this date the initial commodity notionals were calculated using:

$$N(t,i) = \frac{100}{PC(t,i)}$$

where

N(t,i) = Notional holding of commodity future i on index calculation day t
PC(t,i) = Close price of commodity future i on day t

DBLCI-OY Index Calculation

The excess return is equal to the percentage change of the underlying commodity futures market values. The indices have two contracts throughout roll periods and one contract on other days.

The excess return index level in USD is expressed as

$$ILer(t) = \frac{\sum_i PC(t,i) * N(t-1,i)}{\sum_i PC(t-1,i) * N(t-1,i)} * ILer(t-1)$$

Where:

ILer(t) = Excess Return Index level on day t
ILer(t-1) = Excess Return Index level on index calculation day t-1
PC(t,i) = Close price of commodity future i on day t
PC(t-1,i) = Close price of commodity future i on index calculation day t-1
N(t-1,i) = Notional holding of commodity future i on index calculation day t-1

The total return index level in USD is expressed as

$$ILtr(t) = \left(\frac{ILer(t)}{ILer(t-1)} + Rt(t) \right) * (1 + Rt(t))^{d(t,t-1)} * ILtr(t-1)$$

$$Rt(t) = \left(1 - \frac{91}{360} y(t-1)\right)^{-\left(\frac{1}{91}\right)} - 1$$

Where:

ILtr(t) = Total Return Index level on day t
ILtr(t-1) = Total Return Index level on index calculation day t-1
Rt(t) = T-bill return on day t
d(t,t-1) = Number of calendar days between day t and index calculation day t-1 excluding day t
y(t-1) = 3-month benchmark T-bill yield on index calculation day t-1

Hedged and Un-Hedged Index Levels

The total and excess return hedged and un-hedged index levels are calculated using a similar methodology. The hedged and un-hedged indices are calculated on a month-to-date basis.

The return from the FX hedge is accrued over the month on an ACT/ACT basis. The hedged index is expressed as

$$ILh(t) = \left[1 + \mathrm{Re}\,tIL(t) + \mathrm{Re}\,tIL(t) * FXr(t) + FXhr(t)\right] * ILh(r)$$

The un-hedged index is expressed as

$$ILuh(t) = \left(1 + \mathrm{Re}\,tIL(t)\right) * \left(1 + FXr(t)\right) * ILuh(r)$$

Where:

ILh(t)	= Hedged return index level on day t
ILh(r)	= Hedged return index level on last calendar day of last month r
ILuh(t)	= Un-hedged return index level on day t
ILuh(r)	= Un-hedged return index level on last calendar day of last month r

$$\mathrm{Re}\,tIL(t) = \frac{ILl(t)}{ILl(r)} - 1$$

ILl(t)	= Local index level on day t
ILl(r)	= Local index level on last calendar day of last month r

$$FXr(t) = \frac{FX(t)}{FX(r)} - 1$$

FX(t)	= FX rate on day t quoted Index Currency: Hedge Currency
FX(r)	= FX rate on last calendar day of last month r quoted Index Currency: Hedge Currency

$$FXhr(t) = \left(\frac{FXh(r)}{FX(r)} - 1\right) * \frac{dy(t)}{TD}$$

FXh(r)	= One-month FX forward rate on last calendar day of last month r quoted Index Currency: Hedge Currency
dy(t)	= Number of calendar days between t and last calendar day of last month r
TD	= Number of calendar days in month

Contract Selection

On the first New York business day of each month (the "Verification Date") each commodity futures contract currently in the index is tested for continued inclusion in the index based on the month in which the contract delivery of the underlying commodity can start (the "Delivery Month"). If, on the Verification Date, the Delivery Month is the next month, a new contract is selected. For example, if the first New York business day is May 1, 2006, and the Delivery Month of a contract currently in the index is June 2006, a new contract with a later Delivery Month will be selected.

For each commodity in the index, the new commodity futures contract selected will be the contract with the maximum "implied roll yield" based on the closing price for each eligible contract. Eligible contracts are any contracts having a Delivery Month (i) no sooner than the month after the Delivery Month of the commodity future currently in the index, and (ii) no later than the 13th month after the Verification Date. For example, if the first New York business day is May 1, 2006 and the Delivery Month of the contract currently in the index is therefore June 2006, the Delivery Month of an eligible new contract must be between July 2006 and June 2007. The roll yield is expressed as:

$$Y(t,i) = \left(\frac{PC(t,b)}{PC(t,i)}\right)^{\left(\frac{1}{F(t,i,b)}\right)} - 1$$

Where

Y(t,i) = On any day *t*, the implied roll yield for entering into the commodity futures contract with exchange expiration month i
PC(t,b) = Closing price of the base commodity future b
PC(t,i) = Closing price of any eligible futures contract i
F(t,i,b) = Fraction of year between the base futures contract b and the futures contract with exchange expiration month i. Calculated as number of calendar days between dates divided by 365
b = Base commodity future is the commodity future currently in the index

The contract with the maximum roll yield is selected. If two contracts have the same roll yield the contract with the minimum number of months to the exchange expiry month is selected.

Monthly Index Roll Period

If the current index holding no longer meets the inclusion criteria the monthly index roll unwinds the old contract holding and enters a position in the new contract. This takes place between the 2nd and 6th business day of the month.

On each day during the roll period the new notional holdings are calculated. The calculations for the old commodities that are leaving the index and the new commodities that are entering are different.

The notional of the old commodity i is expressed as:

$$N(t,i) = N(t-1,i) * \frac{6 - db(t)}{7 - db(t)}$$

The notional of the new commodity j is expressed as:

$$N(t,j) = N(t-1,j) + \frac{PC(t,i) * N(t-1,i)}{PC(t,j) * (7 - db(t))}$$

where

N(t-1,i) = Notional holding of old commodity future i on index calculation day t-1
N(t,i) = Notional holding of old commodity future i on index calculation day t
N(t-1,j) = Notional holding of new commodity future j on index calculation day t-1
N(t,j) = Notional holding of new commodity future j on index calculation day t
db(t) = Number of index business days in the month up to and including day t

If the current index holding continues to meet the inclusion criteria, no roll occurs and the notional holding is kept constant.

$$N(t,i) = N(t-1,i)$$

On all days that are not monthly index roll days the notional holding of each commodity future remains constant.

$$N(t,i) = N(t-1,i)$$

DBLCI-OY Basket Index Calculation

The basket index is re-weighted on an annual basis on the 6th business day of November.

The index level calculation is the same for both excess and total returns in all currencies. It is expressed as the weighted average return of the underlying indices.

$$IL(t,c,rt) = \left(\sum_{cf} \frac{CIL(t,c,rt,cf)}{CIL(d,c,rt,cf)} * w(d,cf) \right) * IL(d,c,rt)$$

Where:

IL(t,c,rt) = Index level on day t in currency c with return type rt
IL(d,c,rt) = Index level on last rebalancing day d in currency c with return type rt
CIL(t,c,rt) = Component index level for commodity cf on day t in currency c with return type rt
CIL(d,c,rt) = Component index level for commodity cf on last rebalancing day d in currency c with return type rt
w(d,cf) = Weight of commodity cf on last rebalancing day d

Notes

Notes

Certifications

The views expressed in this report accurately reflect the personal views of the undersigned lead analyst(s). In addition, the undersigned lead analyst(s) has not and will not receive any compensation for providing a specific recommendation or view in this report.

Michael Lewis

Regulatory Disclosures

Disclosures required by United States laws and regulations

See company-specific disclosures above for any of the following disclosures required for covered companies referred to in this report: acting as a financial advisor, manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/comanaged public offerings in prior periods; directorships; market making and/or specialist role.

The firm may trade as principal in the fixed income securities (or in related derivatives) that are the subject of this research report.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, in addition to those already made pursuant to United States laws and regulations.

For disclosures pertaining to recommendations or estimates made on securities other than the primary subject of this research, please see the most recently published company report or visit our global disclosure look-up page on our website at http://gm.db.com

Special Disclosure

Analyst compensation: Analysts are paid in part based on the profitability of Deutsche Bank AG and its affiliates, which includes investment banking revenues

Australia: This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act.

EU: A general description of how Deutsche Bank AG identifies and manages conflicts of interest in Europe is contained in our public facing policy for managing conflicts of interest in connection with investment research.

Germany: See company-specific disclosures above for (i) any net short position, (ii) any trading positions (iii) holdings of five percent or more of the share capital. In order to prevent or deal with conflicts of interests Deutsche Bank AG has implemented the necessary organisational procedures to comply with legal requirements and regulatory decrees. Adherence to these procedures is monitored by the Compliance-Department.

Hong Kong: See http://gm.db.com for company-specific disclosures required under Hong Kong regulations in connection with this research report. Disclosure #5 includes an associate of the research analyst. Disclosure #6, satisfies the disclosure of financial interests for the purposes of paragraph 16.5(a) of the SFC's Code of Conduct (the "Code"). The 1% or more interests is calculated as of the previous month end. Disclosures #7 and #8 combined satisfy the SFC requirement under paragraph 16.5(d) of the Code to disclose an investment banking relationship.

Japan: See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Russia: The information, interpretation and opinions submitted herein are not in the context of, and do not constitute, any appraisal or evaluation activity requiring a licence in the Russian Federation.

South Africa: Publisher: Deutsche Securities (Pty) Ltd, 3 Exchange Square, 87 Maude Street, Sandton, 2196, South Africa. Author: As referred to on the front cover. When quoting, please cite Deutsche Securities Research as the source.

Turkey: The information, interpretation and advice submitted herein are not in the context of an investment consultancy service. Investment consultancy services are provided by brokerage firms, portfolio management companies and banks that are not authorized to accept deposits through an investment consultancy agreement to be entered into such corporations and their clients. The interpretation and advices herein are submitted on the basis of personal opinion of the relevant interpreters and consultants. Such opinion may not fit your financial situation and your profit/risk preferences. Accordingly, investment decisions solely based on the information herein may not result in expected outcomes.

United Kingdom: Persons who would be categorized as private customers in the United Kingdom, as such term is defined in the rules of the Financial Services Authority, should read this research in conjunction with prior Deutsche Bank AG research on the companies which are the subject of this research.

Contacts

Name	Title	Telephone	Email	Location
Michael Lewis	Global Head of Commodities Research	+44 20 7545 2166	michael.lewis@db.com	London
Jude Brhanavan	Analyst	+44 20 7547 1558	jude.brhanavan@db.com	London
Mark Lewis	Strategist	+33 1 4495 6761	mark-c.lewis@db.com	Paris
Amanda Lee	Strategist	+852 2203 8376	amanda-ps.lee@db.com	Hong Kong
Joel Crane	Strategist	+1 212 250 5253	joel.crane@db.com	New York
Adam Sieminski	Chief Energy Economist	+1 212 250 2928	adam.sieminski@db.com	New York

Principal Locations

Deutsche Bank AG
London
1 Great Winchester Street
London EC2N 2DB
Tel: (44) 20 7545 8000
Fax: (44) 20 7545 6155

Deutsche Bank AG
New York
60 Wall Street
New York, NY 10005
United States of America
Tel: (1) 212 250 2500

Deutsche Bank AG
Hong Kong
Cheung Kong Center, 2
Queen's Road Central
China
Tel: 852) 2203 8888
Fax: (852) 2203 7300

Deutsche Bank AG
Japan
Sanno Park Tower, 2-11-1
Nagatacho
Chiyoda-ku, Tokyo 100-6171
Tel: (81) 3 5156 6701
Fax: (81) 3 5156 6700

Deutsche Bank AG
Frankfurt
Grosse Gallusstrasse 10-14
Frankfurt am Main 60311
Germany
Tel: (49) 69 910 00
Fax: (49) 69 910 34225

Deutsche Bank AG
Boston
225 Franklin Street
Boston MA 02110
United States of America
Tel: (1) 617 217 6100
Fax: (1) 617 217 6200

Deutsche Bank AG
Singapore
5 Temasek Boulevard
Suntec Tower Five
Singapore 038985
Tel: (65) 6423 8001
Fax: (65) 6883 1615

Deutsche Bank AG
Australia
Deutsche Bank Place, Level 16
Corner of Hunter & Phillip Streets
Sydney NSW 2000
Tel: (61) 2 8258 1234
Fax: (61) 2 8258 1400