DB Commodity Vol Premium Index

Summary

The DB Commodity Vol Premium index aims to extract the volatility risk premium in commodity markets by implementing a fully rules-based and systematic strategy of selling delta-hedged straddles on a universe of 6 commodities selected from the energy, industrial and precious metals sectors. The commodities include Brent Crude, WTI, Natural Gas, Copper, Nickel and Gold.

The weights allocated to the individual commodity components are shown in Table 2 on the next page. The rationale for these weights is to ensure that the index represents a diversified universe of liquid commodities in the energy, precious metals and industrial metals sectors. The commodity sector allocations are similar to those seen in other ex-agriculture commodity benchmark indices.

The DB Commodity Vol Premium index assigns fixed weights to each of the individual commodity short vol component indices. Each underlying commodity short volatility index, except for gold, is a composite of 3 equally weighted sub-indices based on different rolling schedules. Each such sub-index replicates a strategy to sell straddles on 3 month futures on the underlying. The gold short volatility index comprises of 2 equally weighted sub indices which sell straddles on 4 months futures on the underlying.

The delta of the straddles in each sub-index is calculated on a daily basis and hedged by the corresponding futures contract daily at the market close. The straddle position is held to option expiry and then rolled forward. For further details on any of the sub indices please refer to the index guide for corresponding index.

Index Suite

The index is calculated and published to Bloomberg:

Index Name	Return Type	Currency	Bloomberg Ticker
DB Commodity Vol Premium Index	ER	USD	DBCMCVPU
DB Commodity Vol Premium EUR hedged ER Index	ER	EUR	DBCMCVPE
DB Commodity Vol Premium EUR ERAC Index	ER	EUR	DBCMCVEN

Index Development Contacts:

London: +44 (0)207 545 0505
Hong Kong: +852 2203 6786
New York: +1 212 250 8998

Key Index Information

Index Inception Date

Index Name	Inception Date	Currency	Bloomberg Ticker
DB Commodity Vol Premium Index	11-Dec-2007	USD	DBCMCVPU
DB Commodity Vol Premium EUR hedged ER Index	11-May-2009	EUR	DBCMCVPE
DB Commodity Vol Premium EUR ERAC Index	11-May-2009	EUR	DBCMCVEN

Index Live Date

Index Name	Live Date	Currency	Bloomberg Ticker
DB Commodity Vol Premium Index	12-Sep-2014	USD	DBCMCVPU
DB Commodity Vol Premium EUR hedged ER Index	22-Jul-2015	EUR	DBCMCVPE
DB Commodity Vol Premium EUR ERAC Index	10-May-2016	EUR	DBCMCVEN

Index Calculation Holiday Calendar

LDN, NYM

Index Rebalancing Date

The DB Commodity Vol Premium Index rebalances monthly on the day corresponding to the relevant Option Expiry Date of the listed Brent crude oil options. If such day is not an index business day, the index will rebalance on the following business day. Up to and including February 2016, listed Brent crude oil options expire on the 5th last business day from the day that falls 14 calendar days prior to the 1st calendar day of the month corresponding to the contract month.

From March 2016 onwards, the listed Brent crude oil options will expire on the 4th last business day of the second month preceding the relevant contract month (for instance the listed option on the March contract will expire in January). If an option expiry date falls either on (a) the business day preceding Christmas day or (b) the business day preceding New Year's Day, the expiry date will be shifted to the previous business day.

The DB Commodity Vol Premium EUR hedged ER Index rebalances on the last business day of every month.

The DB Commodity Vol Premium EUR ERAC Index rebalances on the last business day of every year.

Index Rules and Calculations

Market Data Sources

Commodity future and option prices are based on exchange close settlement prices for the relevant contract and exchange.

Underlying Indices and the weights

Table 2

Index	BBG Ticker	Weight
DB Commodity Brent Short Vol II Index	DBCMBSV2	16%
DB Commodity WTI Short Vol II Index	DBCMWSV2	16%
DB Commodity Natural Gas Short Vol II Index	DBCMHSV2	14%
DB Commodity Copper Short Vol II Index	DBCMCSV2	18%
DB Commodity Nickel Short Vol II Index	DBCMNSV2	18%
DB Commodity Gold Short Vol II Index	DBCMGSV2	18%

Index Calculation

DB Commodity Vol Premium Index is calculated on each valid business day as follows,

$$IL(t) = IL(t-1) + \sum_{i=1}^{6}[I(i,t) - I(i,t-1)] \times N(t-1,i)$$

Where:

IL(t) = Index level of DB Commodity Vol Premium Index on day t

I(i,t) = Index level of Short vol index for commodity i on day t

N(t,i) = Notional holdings of Short vol index for commodity i on day t

Notional Holdings

On any day apart from the rebalancing day the notional holdings remain constant,

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

It t is the rebalancing date

$$N(t,i) = W(i) * \frac{IL(t)}{I(i,t)}$$

Where, W(i) is the weight of commodity i on the rebalance date as given in table 2.

DB Commodity Vol Premium EUR Hedged ER Index Calculation

Excess return EUR index levels are calculated based on WM FX data. The excess return hedged index levels represent the returns of the USD excess returns converted into the target currency. Excess return un-hedged index levels are not calculated.

The hedged index is expressed as

$$IL_{EUR}(t) = \left(1 + \mathrm{Re}\,tIL(t) + \mathrm{Re}\,tILer(t) * FXr(t)\right) * ILher(r)$$

Where:

$IL_{EUR}(t)$ = DB Commodity Vol Premium EUR Hedged ER Index level on day t

$IL_{EUR}(r)$ = DB Commodity Vol Premium EUR Hedged ER Index level on last business day of last month r

$$\mathrm{Re}\,tILer(t) = \frac{IL(t)}{IL(r)} - 1$$

IL(t) = DB Commodity Vol Premium Index level on day t

IL(r) = DB Commodity Vol Premium Index level on last business 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 business day of last month r quoted Index Currency: Hedge Currency

DB Commodity Vol Premium EUR ERAC Index Calculation

The after-cost index is expressed as:

$$IL_{AC}(t) = \left[IL_{AC}(r) + \left(IL_{EUR}(t) - IL_{EUR}(r)\right) * N(t-1)\right] * \left(1 - RC * \frac{d(r,t)}{365}\right)$$

Where:

$IL_{AC}(t)$ = After-cost index level on day t

$IL_{EUR}(t)$ = DB Commodity Backwardation Simplified USD ER Index level on day t

N(t) = DB Commodity Backwardation Simplified USD ER Index unit holdings on day t

t	=	Calculation date t
r	=	Last rebalancing date, which is last index business day of previous year
RC	=	Running Cost (=0.40%)
d(r,t)	=	Number of calendar days from and excluding r to and including t

Notional Holdings

The index is re-weighted on the last business day of each year. The new holding is expressed as;

$$N(t) = \frac{IL_{AC}(t)}{IL_{EUR}(t)}$$

For all other days the holding remains constant.

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

DB Commodity Brent Short Volatility II Index

Summary

The DB Commodity Brent Short Volatility index is based on a systematic short volatility strategy. The Index comprises of 3 equally weighted sub-indices reweighted on an annual basis. Each sub-index replicates a strategy to sell straddles on 3 month futures on Brent. The delta of the straddles in each sub-index is calculated on a daily basis and hedged at the market close. The straddle position is held to option expiry and then rolled for further 3 months. The index return is based on the return from straddle position and the delta hedged position.

Index Suite

The index is calculated and published to Bloomberg in the following versions;

Index Name	Return Type	Currency	Bloomberg Ticker
DB Commodity Brent Short Volatility II Index	ER	USD	DBCMBSV2
DB Commodity Brent Short Volatility II Sub index I	ER	USD	DBCMBS12
DB Commodity Brent Short Volatility II Sub index II	ER	USD	DBCMBS22
DB Commodity Brent Short Volatility II Sub index III	ER	USD	DBCMBS32

Key Index Information

Index Inception Date

11- Dec-2007

Index Live Date

24-Mar-2014

Index Calculation Holiday Calendar

London City

Index Rebalancing Date

The business day corresponding to the relevant December Option Expiry Date. The convention for the Option Expiry Dates is described below under 'Sub Index Rebalancing Date'.

Sub Index Rebalancing Date

The index rebalances monthly on the day corresponding to the relevant Option Expiry Date of the listed Brent crude oil options. If such day is not an index business day, the index will rebalance on the following business day. Up to and including February 2016, listed Brent crude oil options expire on the 5th last business day from the day that falls 14 calendar days prior to the 1st calendar day of the month corresponding to the contract month. Specifically, Sub Index 1 will rebalance on the day that falls 14 calendar days prior to the 1st calendar day of March, June, September and December. Sub Index 2 will rebalance on the day that falls 14 calendar days prior to the 1st calendar day of February, May, August and November. Sub Index 3 will rebalance on the day that falls 14 calendar days prior to the 1st calendar day of January, April, July and October.

From March 2016 onwards, the listed Brent crude oil options will expire on the 4th last business day of the second month preceding the relevant contract month (for instance the listed option on the March contract will expire in January). If an option expiry date falls either on (a) the business day preceding Christmas day or (b) the business day preceding New Year's Day, the expiry date will be shifted to the previous business day. Specifically, Sub Index 1 will rebalance on the 4th last business day of January, April, July and October. Sub Index 2 will rebalance on the 4th last business day of March, June, September and December. Sub Index 3 will rebalance on the 4th last business day of February, May, August and November.

Index Rules and Calculations

Market Data Sources

Commodity future and option prices are based on exchange close settlement prices for the relevant contract and exchange.

Sub index Calculation

Each of the three sub-indices will have an identical construction with the exception of the Rebalance Date.

Each of the sub indices sells an equal number of call options and put options on the rebalance date (Straddle position). Every day the delta position implied by these options is hedged by buying the delta amount of underlying future. At the expiry date of the option, the index rolls into the next future contract in the index.

The 3 sub indices roll their position based on following month's futures on rebalance dates

Index Name	Future Contract Roll schedule
DB Commodity Brent Short Volatility II Sub Index 1	H-M-U-Z
DB Commodity Brent Short Volatility II Sub Index 2	G-K-Q-X
DB Commodity Brent Short Volatility II Sub Index 3	F-J-N-V

The index Level for each of the sub index on a day t is sum of 1)the index level on previous day, 2) the sum product of a)number of options sold on previous rebalance date and b) the change in option price from previous day, for each of the call and put, 3) product of a) Number of options sold, b) The implied delta position on previous day, c) The change in underlying future price from previous day

We calculate each of the sub Index ER level on all valid London City business days as follows.

$$IL(t) = IL(t-1) + U_{S,r,t} \times [(S_t - S_{t-1})]$$
$$+ U_{O,r,t} \times [C(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC}) + P(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})]$$

Where:

IL(t) = Index level on day t

r = Rebalancing Date immediately preceding t. In case t is a rebalancing day, r will be the previous rebalancing date.

S_t = The respective future price for the Brent future on day t

$U_{S,r,t}$ = Unit holdings for the underlying future for the respective sub index.

On any day t, the new unit holdings for the underlying future are adjusted by the delta of the options on previous day. This amount is calculated as,

$$U_{S,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r} \times (\Delta_{t-1}^{call} + \Delta_{t-1}^{put})$$

$$\Delta_t^{call} = \Phi(d_1)$$

$$\Delta_t^{Put} = \Phi(d_1) - 1$$

Φ is the standard normal cumulative distribution function and d_1 is defined in section Option Price Calculation.

$U_{O,r,t}$ = Unit holdings for the call and put options for the respective sub index.

On the rebalance day r the amount of call and put options to be sold are calculated as,

$$U_{O,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r}$$

T is equal to the time to maturity(ACT/365 basis) of the option on rebalance date r. It is calculated as,

$$T = \frac{E - r}{365}$$

T_{r+1} = The next rebalancing date of the sub index (also the expiry of the option)

S_r = The respective future price for the Brent future on rebalance day r

$C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a call option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its call option price, which is calculated as max (0,S_r - K_r). The prices for old security on the expiry date are not published by exchange.

$P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a put option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its put option price, which is calculated as max (0,K_r - S_r).. The prices for old security on the expiry date are not published by exchange.

Option Price Calculation

For each sub index the strike of the option on the rebalance date is calculated as the closest integer strike to the at the money future price on such date. The index sells a call and a put at this strike on rebalance date for the option related to respective future. The expiry of these options is the option expiry corresponding to the future.

The exchange publishes the option prices corresponding to each integer strike. The below formulae are used to calculate the price using the after cost volatility.

$$\boldsymbol{C}\left(\boldsymbol{t}, T_{R+1}, \boldsymbol{S}_t, \boldsymbol{K}_r, \boldsymbol{\sigma}_t^{\boldsymbol{AC}}\right) = S_t\Phi(d_1) - K_r\Phi(d_2)$$

$$P\left(\boldsymbol{t}, T_{R+1}, \boldsymbol{S}_t, \boldsymbol{K}_r, \boldsymbol{\sigma}_t^{\boldsymbol{AC}}\right) = K_r\Phi(-d_2) - S_t\Phi(-d_1)$$

$$d_1 = \frac{\ln\left(\frac{S_t}{K_r}\right) + \frac{1}{2}(\boldsymbol{\sigma}_t^{\boldsymbol{AC}})^2(T_{R+1} - t)}{\boldsymbol{\sigma}_t^{\boldsymbol{AC}}\sqrt{T_{R+1} - t}}$$

$$d_2 = \frac{\ln\left(\frac{S_t}{K_r}\right) - \frac{1}{2}(\boldsymbol{\sigma}_t^{\boldsymbol{AC}})^2(T_{R+1} - t)}{\boldsymbol{\sigma}_t^{\boldsymbol{AC}}\sqrt{T_{R+1} - t}}$$

σ_t^{AC} is the after cost implied volatility of the relevant option and it is obtained from the implied volatility of the relevant exchange traded option. Details about the cost calculation are available from us on request. Please contact index.data@db.com for any such request.

σ_t is the volatility of the call option which has strike K_r and is calculated using standard Black's model.

K_r = Option strike. It is the integer value closest to the at the money forward future price on the rebalance date r. For avoidance of any doubt, the strike will be rounded up in case of a tie.

Main index Calculation

DB Commodity Brent Short Volatility II Index is calculated on each valid London city business day as follows,

$$IL(t, ER) = IL(t-1, ER) + \sum_{i=1}^{3}[I(i,t,ER) - I(i,t-1,ER)] \times N(t-1,i)$$

Where:

IL(t,ER) = Index level of DB Commodity Brent Short Volatility II Index on day t

I(i,t,ER) = Index level of sub index i on day t

N(t,i) = Notional holdings of sub index i on day t

Notional Holdings

The index rebalances on the option expiry date of Z contract of Brent Crude every year. On any other day the notional holdings remain constant,

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

If t is the rebalancing date, then

$$N(t,i) = \frac{IL(t,ER)}{3*(I(i,t,ER)}$$

DB Commodity WTI Short Volatility II Index

Summary

The DB Commodity WTI Short Volatility index is based on a systematic short volatility strategy. The Index comprises of 3 equally weighted sub-indices reweighted on an annual basis. Each sub-index replicates a strategy to sell straddles on 3 month futures on WTI. The delta of the straddles in each sub-index is calculated on a daily basis and hedged at the market close. The straddle position is held to option expiry and then rolled for further 3 months. The index return is based on the return from straddle position and the delta hedged position.

Index Suite

The index is calculated and published to Bloomberg in the following versions;

Index Name	Return Type	Currency	Bloomberg Ticker
DB Commodity WTI Short Volatility II Index	ER	USD	DBCMWSV2
DB Commodity WTI Short Volatility II Sub index I	ER	USD	DBCMWS12
DB Commodity WTI Short Volatility II Sub index II	ER	USD	DBCMWS22
DB Commodity WTI Short Volatility II Sub index III	ER	USD	DBCMWS32

Key Index Information

Index Inception Date

14- Dec-2006

Index Live Date

11-Jul-2014

Index Calculation Holiday Calendar

NYM

Index Rebalancing Date

The business day corresponding to the relevant December Option Expiry Date, which falls on the 7th last index business day from 26th November every year.

Sub Index Rebalancing Date

The business day corresponding to the expiry date of the option held by the respective sub index. WTI options expire on the 7th last index business day from the 26th of each calendar month. Specifically, Sub Index 1 will rebalance on the 7th last index business day from the 26th of March, June, September and December. Sub Index 2 will rebalance on the 7th last index business day from the 26th of February, May, August and November. Sub Index 3 will rebalance on the 7th last index business day from the 26th of January, April, July and October.

Index Rules and Calculations

Market Data Sources

Commodity future and option prices are based on exchange close settlement prices for the relevant contract and exchange.

Sub index Calculation

Each of the three sub-indices will have an identical construction with the exception of the Rebalance Date.

Each of the sub indices sells an equal number of call options and put options on the rebalance date (Straddle position). Every day the delta position implied by these options is hedged by buying the delta amount of underlying future. At the expiry date of the option, the index rolls into the next future contract in the index.

The 3 sub indices roll their position based on following month's futures on rebalance dates

Index Name	Future Contract Roll schedule
DB Commodity WTI Short Volatility II Sub Index 1	H-M-U-Z
DB Commodity WTI Short Volatility II Sub Index 2	G-K-Q-X
DB Commodity WTI Short Volatility II Sub Index 3	F-J-N-V

The index Level for each of the sub index on a day t is sum of 1)the index level on previous day, 2) the sum product of a)number of options sold on previous rebalance date and b) the change in option price from previous day, for each of the call and put, 3) product of a) Number of options sold, b) The implied delta position on previous day, c) The change in underlying future price from previous day

We calculate each of the sub Index ER level on all valid London City business days as follows.

$$IL(t) = IL(t-1) + U_{S,r,t} \times [(S_t - S_{t-1})]$$
$$+ U_{O,r,t} \times [C(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC}) + P(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})]$$

Where:

IL(t) = Index level on day t

r = Rebalancing Date immediately preceding t. In case t is a rebalancing day, r will be the previous rebalancing date.

S_t = The respective future price for the WTI future on day t

$U_{S,r,t}$ = Unit holdings for the underlying future for the respective sub index.

On any day t, the new unit holdings for the underlying future are adjusted by the delta of the options on previous day. This amount is calculated as,

$$U_{S,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r} \times (\Delta^{call}_{t-1} + \Delta^{put}_{t-1})$$

$$\Delta^{call}_{t} = \Phi(d_1)$$

$$\Delta^{Put}_{t} = \Phi(d_1) - 1$$

Φ is the standard normal cumulative distribution function and d_1 is defined in section Option Price Calculation.

$U_{O,r,t}$ = Unit holdings for the call and put options for the respective sub index.

On the rebalance day r the amount of call and put options to be sold are calculated as,

$$U_{O,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r}$$

T is equal to the time to maturity(ACT/365 basis) of the option on rebalance date r. It is calculated as,

$$T = \frac{E - r}{365}$$

T_{r+1} = The next rebalancing date of the sub index (also the expiry of the option)

S_r = The respective future price for the WTI future on rebalance day r

$C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a call option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its call option price, which is calculated as max (0,S_r - K_r). The prices for old security on the expiry date are not published by exchange.

$P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a put option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its put option price, which is calculated as max (0,K_r - S_r).. The prices for old security on the expiry date are not published by exchange.

Option Price Calculation

For each sub index the strike of the option on the rebalance date is calculated as the closest integer strike to the at the money future price on such date. The index sells a call and a put at this strike on rebalance date for the option related to respective future. The expiry of these options is the option expiry corresponding to the future.

The exchange publishes the option prices corresponding to each integer strike. The below formulae are used to calculate the price using the after cost volatility.

$$\boldsymbol{C}\left(\boldsymbol{t}, T_{R+1}, \boldsymbol{S}_t, \boldsymbol{K}_r, \boldsymbol{\sigma}_t^{\boldsymbol{AC}}\right) = S_t\Phi(d_1) - K_r\Phi(d_2)$$

$$P\left(\boldsymbol{t}, T_{R+1}, \boldsymbol{S}_t, \boldsymbol{K}_r, \boldsymbol{\sigma}_t^{\boldsymbol{AC}}\right) = K_r\Phi(-d_2) - S_t\Phi(-d_1)$$

$$d_1 = \frac{\ln\left(\frac{S_t}{K_r}\right) + \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2(T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}}\sqrt{T_{R+1} - t}}$$

$$d_2 = \frac{\ln\left(\frac{S_t}{K_r}\right) - \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2(T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}}\sqrt{T_{R+1} - t}}$$

σ_t^{AC} is the after cost implied volatility of the relevant option and it is obtained from the implied volatility of the relevant exchange traded option. Details about the cost calculation are available from us on request. Please contact index.data@db.com for any such request.

σ_t is the volatility of the call option which has strike K_r and is calculated using standard Black's model.

K_r = Option strike. It is the integer value closest to the at the money forward future price on the rebalance date r. For avoidance of any doubt, the strike will be rounded up in case of a tie.

Main index Calculation

DB Commodity WTI Short Volatility II Index is calculated on each valid London city business day as follows,

$$IL(t, ER) = IL(t-1, ER) + \sum_{i=1}^{3}[I(i,t,ER) - I(i,t-1,ER)] \times N(t-1,i)$$

Where:

IL(t,ER) = Index level of DB Commodity WTI Short Volatility II Index on day t

I(i,t,ER) = Index level of sub index i on day t

N(t,i) = Notional holdings of sub index i on day t

Notional Holdings

The index rebalances on the option expiry date of Z contract of WTI Crude every year. On any other day the notional holdings remain constant,

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

It t is the rebalancing date

$$N(t,i) = \frac{IL(t,ER)}{3*(I(i,t,ER)}$$

DB Commodity Natural Gas Short Volatility II Index

Summary

The DB Commodity Natural Gas Short Volatility index is based on a systematic short volatility strategy. The Index comprises of 3 equally weighted sub-indices reweighted on an annual basis. Each sub-index replicates a strategy to sell straddles on 3 month futures on Natural Gas. The delta of the straddles in each sub-index is calculated on a daily basis and hedged at the market close. The straddle position is held to option expiry and then rolled for further 3 months. The index return is based on the return from straddle position and the delta hedged position.

Index Suite

The index is calculated and published to Bloomberg in the following versions;

Index Name	Return Type	Currency	Bloomberg Ticker
DB Commodity Natural Gas Short Volatility II Index	ER	USD	DBCMHSV2
DB Commodity NG Short Volatility II Sub index I	ER	USD	DBCMHS12
DB Commodity NG Short Volatility II Sub index II	ER	USD	DBCMHS22
DB Commodity NG Short Volatility II Sub index III	ER	USD	DBCMHS32

Key Index Information

Index Inception Date

14- Dec-2006

Index Live Date

27-Aug-2014

Index Calculation Holiday Calendar

NYM

Index Rebalancing Date

The main index rebalances on business day corresponding to the relevant December Option Expiry Date, which is 4th last index business day of November.

Sub Index Rebalancing Date

With respect to each sub-index, the 4th last index business day of the month during which the options held by the respective sub-index expire. Specifically, Sub Index 2 rebalances on the 4th last index business day of February, May, August and November. Sub Index 3 rebalances on the 4th last index business day of January, April, July and October. Sub Index 1 rebalances on the 4th last index business day of March, June, September and December.

Index Rules and Calculations

Market Data Sources

Commodity future and option prices are based on exchange close settlement prices for the relevant contract and exchange.

Sub index Calculation

Each of the three sub-indices will have an identical construction with the exception of the Rebalance Date.

Each of the sub indices sells an equal number of call options and put options on the rebalance date (Straddle position). Every day the delta position implied by these options is hedged by buying the delta amount of underlying future. At the expiry date of the option, the index rolls into the next future contract in the index.

The 3 sub indices roll their position based on following month's futures on rebalance dates

Index Name	Future Contract Roll schedule
DB Commodity NG Short Volatility II Sub Index 1	H-M-U-Z
DB Commodity NG Short Volatility II Sub Index 2	G-K-Q-X
DB Commodity NG Short Volatility II Sub Index 3	F-J-N-V

The index Level for each of the sub index on a day t is sum of 1)the index level on previous day, 2) the sum product of a)number of options sold on previous rebalance date and b) the change in option price from previous day, for each of the call and put, 3) product of a) Number of options sold, b) The implied delta position on previous day, c) The change in underlying future price from previous day

We calculate each of the sub Index ER level on all valid London City business days as follows.

$$IL(t) = IL(t-1) + U_{S,r,t} \times [(S_t - S_{t-1})]$$
$$+ U_{O,r,t} \times [C(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC}) + P(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})]$$

Where:

IL(t) = Index level on day t

r = Rebalancing Date immediately preceding t. In case t is a rebalancing day, r will be the previous rebalancing date.

S_t = The respective future price for the NG future on day t

$U_{S,r,t}$ = Unit holdings for the underlying future for the respective sub index.

On any day t, the new unit holdings for the underlying future are adjusted by the delta of the options on previous day. This amount is calculated as,

$$U_{S,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r} \times (\Delta^{call}_{t-1} + \Delta^{put}_{t-1})$$

$$\Delta^{call}_{t} = \Phi(d_1)$$

$$\Delta^{Put}_{t} = \Phi(d_1) - 1$$

Φ is the standard normal cumulative distribution function and d_1 is defined in section Option Price Calculation.

$U_{O,r,t}$ = Unit holdings for the call and put options for the respective sub index.

On the rebalance day r the amount of call and put options to be sold are calculated as,

$$U_{O,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r}$$

T is equal to the time to maturity(ACT/365 basis) of the option on rebalance date r. It is calculated as,

$$T = \frac{E - r}{365}$$

T_{r+1} = The next rebalancing date of the sub index (also the expiry of the option)

S_r = The respective future price for the NATURAL GAS future on rebalance day r

$C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a call option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its call option price, which is calculated as max (0,S_r - K_r). The prices for old security on the expiry date are not published by exchange.

$P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a put option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its put option price, which is calculated as max (0,K_r - S_r).. The prices for old security on the expiry date are not published by exchange.

Option Price Calculation

For each sub index the strike of the option on the rebalance date is calculated as the closest integer strike to the at the money future price on such date. The index sells a call and a put at this strike on rebalance date for the option related to respective future. The expiry of these options is the option expiry corresponding to the future.

The exchange publishes the option prices corresponding to each integer strike. The below formulae are used to calculate the price using the after cost volatility.

$$\boldsymbol{C}\left(\boldsymbol{t}, T_{R+1}, \boldsymbol{S}_t, \boldsymbol{K}_r, \boldsymbol{\sigma}_t^{\boldsymbol{AC}}\right) = S_t\Phi(d_1) - K_r\Phi(d_2)$$

$$P\left(\boldsymbol{t}, T_{R+1}, \boldsymbol{S}_t, \boldsymbol{K}_r, \boldsymbol{\sigma}_t^{\boldsymbol{AC}}\right) = K_r\Phi(-d_2) - S_t\Phi(-d_1)$$

$$d_1 = \frac{\ln\left(\frac{S_t}{K_r}\right) + \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2(T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}}\sqrt{T_{R+1} - t}}$$

$$d_2 = \frac{\ln\left(\frac{S_t}{K_r}\right) - \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2(T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}}\sqrt{T_{R+1} - t}}$$

σ_t^{AC} is the after cost implied volatility of the relevant option and it is obtained from the implied volatility of the relevant exchange traded option. Details about the cost calculation are available from us on request. Please contact index.data@db.com for any such request.

σ_t is the volatility of the call option which has strike K_r and is calculated using standard Black's model.

K_r = Option strike. It is the integer value closest to the at the money forward future price on the rebalance date r. For avoidance of any doubt, the strike will be rounded up in case of a tie.

Main index Calculation

DB Commodity Natural Gas Short Volatility II Index is calculated on each valid London city business day as follows,

$$IL(t, ER) = IL(t-1, ER) + \sum_{i=1}^{3}[I(i,t,ER) - I(i,t-1,ER)] \times N(t-1,i)$$

Where:

IL(t,ER) = Index level of DB Commodity NATURAL GAS Short Volatility II Index on day t

I(i,t,ER) = Index level of sub index i on day t

N(t,i) = Notional holdings of sub index i on day t

Notional Holdings

The index rebalances on the option expiry date of Z contract of Natural Gas every year. On any other day the notional holdings remain constant,

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

It t is the rebalancing date

$$N(t,i) = \frac{IL(t,ER)}{3 * (I(i,t,ER)}$$

DB Commodity Copper Short Volatility II Index

Summary

The DB Commodity Copper Short Volatility index is based on a systematic short volatility strategy. The Index comprises of 3 equally weighted sub-indices reweighted on an annual basis. Each sub-index replicates a strategy to sell straddles on 3 month futures on Copper. The delta of the straddles in each sub-index is calculated on a daily basis and hedged at the market close. The straddle position is held to option expiry and then rolled for further 3 months. The index return is based on the return from straddle position and the delta hedged position.

Index Suite

The index is calculated and published to Bloomberg in the following versions;

Index Name	Return Type	Currency	Bloomberg Ticker
DB Commodity Copper Short Volatility II Index	ER	USD	DBCMCSV2

Key Index Information

Index Inception Date

7- Dec-2005

Index Live Date

24-Aug-2014

Index Calculation Holiday Calendar

London City

Index Rebalancing Date

The index rebalances on business day corresponding to the relevant December Option Expiry Date, which is the 1st Wednesday in December of each year.

Sub Index Rebalancing Date

With respect to each sub-index, the 1st Wednesday of the month during which the options held by the respective sub-index expire. Specifically, Sub Index 1 rebalances on the 1st Wednesday of February, May, August and November. Sub Index 2 rebalances on the 1st Wednesday of January, April, July and October. Sub Index 3 rebalances on the 1st Wednesday of March, June, September and December.

Index Rules and Calculations

Market Data Sources

Commodity future and option prices are based on exchange close settlement prices for the relevant contract and exchange.

Sub index Calculation

Each of the three sub-indices will have an identical construction with the exception of the Rebalance Date.

Each of the sub indices sells an equal number of call options and put options on the rebalance date (Straddle position). Every day the delta position implied by these options is hedged by buying the delta amount of underlying future. At the expiry date of the option, the index rolls into the next future contract in the index.

The 3 sub indices roll their position based on following month's futures on rebalance dates,

Index Name	Future Contract Roll schedule
DB Commodity Copper Short Volatility II Sub Index 1	G-K-Q-X
DB Commodity Copper Short Volatility II Sub Index 2	F-J-N-V
DB Commodity Copper Short Volatility II Sub Index 3	H-M-U-Z

The index Level for each of the sub index on a day t is sum of 1)the index level on previous day, 2) the sum product of a)number of options sold on previous rebalance date and b) the change in option price from previous day, for each of the call and put, 3) product of a) Number of options sold, b) The implied delta position on previous day, c) The change in underlying future price from previous day

We calculate each of the sub Index ER level on all valid London City business days as follows.

$$IL(t) = IL(t-1) + U_{S,r,t} \times [(S_t - S_{t-1})]$$
$$+ U_{O,r,t} \times [C(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC}) + P(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})]$$

Where:

IL(t) = Index level on day t

r = Rebalancing Date immediately preceding t. In case t is a rebalancing day, r will be the previous rebalancing date.

S_t = the respective future price for the Copper future on day t

$U_{S,r,t}$ = Unit holdings for the underlying future for the respective sub index.

On any day t, the new unit holdings for the underlying future are adjusted by the delta of the options on previous day. This amount is calculated as,

$$U_{S,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r} \times (\Delta^{call}_{t-1} + \Delta^{put}_{t-1})$$

$$\Delta^{call}_{t} = \Phi(d_1)$$

$$\Delta^{Put}_{t} = \Phi(d_1) - 1$$

Φ is the standard normal cumulative distribution function and d_1 is defined in section Option Price Calculation.

$U_{O,r,t}$ = Unit holdings for the call and put options for the respective sub index.

On the rebalance day r the amount of call and put options to be sold are calculated as,

$$U_{O,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r}$$

T is equal to the time to maturity (ACT/365 basis) of the option on rebalance date r. It is calculated as,

$$T = \frac{E - r}{365}$$

T_{r+1} = The next rebalancing date of the sub index (also the expiry of the option)

S_r = The respective future price for the Copper future on rebalance day r

$C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a call option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its call option price, which is calculated as max (0,S_r - K_r). The prices for old security on the expiry date are not published by exchange.

$P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a put option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its put option price, which is calculated as max (0,K_r - S_r).. The prices for old security on the expiry date are not published by exchange.

Option Price Calculation

For each sub index the strike of the option on the rebalance date is calculated as the strike in multiples of 25 which is closest to the at the money future price on such date. The index sells a call and a put at this strike on rebalance date for the option related to respective future. The expiry of these options is the option expiry corresponding to the future.

The LME exchange publishes the volatilities corresponding to 10% delta and 25% delta for call and -10% delta and -25% delta for put along with 50% delta option (ATM). We calculate the strike corresponding to each of these option volatilities in following manner.

For call options

$$K_{t,i} = S_t * \exp\left[\frac{\sigma_t^2 * (T_{R+1} - t)}{2} - \Phi^{-1}(\Delta_i) * \sigma_t * \sqrt{(T_{R+1} - t)}\right]$$

For put options

$$K_{t,i} = S_t * \exp\left[\frac{\sigma_t^2 * (T_{R+1} - t)}{2} + \Phi^{-1}(-\Delta_i) * \sigma_t * \sqrt{(T_{R+1} - t)}\right]$$

On the rebalance date the strike of the straddle options is calculated and fixed until the next rebalance as the strike in multiple of 25 which is closest to the at the money future price on that date.

On any index day t (excluding the rebalance date), the implied volatility σ_t corresponding to the strike fixed on the previous rebalance date is calculated using a linear interpolation (in strike) from LME published "delta" volatilities. If the fixed strike has a delta greater than -10% for puts or less than 10% for calls, the respective LME 10 delta implied volatility will be used.

On any day t, a linear interpolation is done on the volatilities captured for the 5 different delta options with the strikes calculated as above on the straddle strike (K_r). This gives us the volatility σ_t which is used in calculating σ_t^{AC} .

σ_t^{AC} is the after cost implied volatility of the relevant option and it is obtained from the implied volatility of the relevant exchange traded option. Details about the cost calculation are available from us on request. Please contact index.data@db.com for any such request.

σ_t is the volatility of the call option which has strike K_r and is calculated using standard Black's model.

The below formulae are used to calculate the price using the after cost volatility.

$$C(t, T_{R+1}, S_t, K_r, \sigma_t^{AC}) = \exp\left[-r_t * (T_{R+1} - t)\right] * \left[S_t * \Phi(d1) - K_r * \Phi(d_2)\right]$$
$$P(t, T_{R+1}, S_t, K_r, \sigma_t^{AC}) = \exp\left[-r_t * (T_{R+1} - t)\right] * \left[K_r * \Phi(-d_2) - S_t * \Phi(-d1)\right]$$

where

$$d_1 = \frac{\ln\left(\frac{S_t}{K_r}\right) + \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2 (T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}} \sqrt{T_{R+1} - t}}$$

$$d_2 = \frac{\ln\left(\frac{S_t}{K_r}\right) - \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2 (T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}} \sqrt{T_{R+1} - t}}$$

K_r = Option strike. It is a value in multiple of 25, which is closest to the at the money forward future price on the rebalance date r. For avoidance of any doubt, the strike will be rounded up in case of a tie.

r_r = 3 month Libor interest rate on day t as published by ICE (US0003M Index on Blooomberg)

Main index Calculation

DB Commodity Copper Short Volatility II Index is calculated on each valid London city business day as follows,

$$IL(t, ER) = IL(t-1, ER) + \sum_{i=1}^{3} [I(i, t, ER) - I(i, t-1, ER)] \times N(t-1, i)$$

Where:

IL(t,ER) = Index level of DB Commodity Copper Short Volatility II Index on day t

I(i,t,ER) = Index level of sub index i on day t

N(t,i) = Notional holdings of sub index i on day t

Notional Holdings

The index rebalances on the option expiry date of Z contract of LME Copper every year. On any other day the notional holdings remain constant,

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

It t is the rebalancing date

$$N(t,i) = \frac{IL(t,ER)}{3*(I(i,t,ER)}$$

DB Commodity Nickel Short Volatility II Index

Summary

The DB Commodity Nickel Short Volatility index is based on a systematic short volatility strategy. The Index comprises of 3 equally weighted sub-indices reweighted on an annual basis. Each sub-index replicates a strategy to sell straddles on 3 month futures on Nickel. The delta of the straddles in each sub-index is calculated on a daily basis and hedged at the market close. The straddle position is held to option expiry and then rolled for further 3 months. The index return is based on the return from straddle position and the delta hedged position.

Index Suite

The index is calculated and published to Bloomberg in the following versions;

Index Name	Return Type	Currency	Bloomberg Ticker
DB Commodity Nickel Short Volatility II Index	ER	USD	DBCMNSV2

Key Index Information

Index Inception Date

7- Dec-2005

Index Live Date

24-Aug-2014

Index Calculation Holiday Calendar

London City

Index Rebalancing Date

The index rebalances on business day corresponding to the relevant December Option Expiry Date, which is on the 1st Wednesday in December of each year.

Sub Index Rebalancing Date

With respect to each sub-index, the 1st Wednesday of the month during which the options held by the respective sub-index expire. Specifically, Sub Index 1 rebalances on the 1st Wednesday of February, May, August and November. Sub Index 2 rebalances on the 1st Wednesday of January, April, July and October. Sub Index 3 rebalances on the 1st Wednesday of March, June, September and December.

Index Rules and Calculations

Market Data Sources

Commodity future and option prices are based on exchange close settlement prices for the relevant contract and exchange.

Sub index Calculation

Each of the three sub-indices will have an identical construction with the exception of the Rebalance Date.

Each of the sub indices sells an equal number of call options and put options on the rebalance date (Straddle position). Every day the delta position implied by these options is hedged by buying the delta amount of underlying future. At the expiry date of the option, the index rolls into the next future contract in the index.

The 3 sub indices roll their position based on following month's futures on rebalance dates,

Index Name	Future Contract Roll schedule
DB Commodity Nickel Short Volatility II Sub Index 1	G-K-Q-X
DB Commodity Nickel Short Volatility II Sub Index 2	F-J-N-V
DB Commodity Nickel Short Volatility II Sub Index 3	H-M-U-Z

The index Level for each of the sub index on a day t is sum of 1)the index level on previous day, 2) the sum product of a)number of options sold on previous rebalance date and b) the change in option price from previous day, for each of the call and put, 3) product of a) Number of options sold, b) The implied delta position on previous day, c) The change in underlying future price from previous day

We calculate each of the sub Index ER level on all valid London City business days as follows.

$$IL(t) = IL(t-1) + U_{S,r,t} \times [(S_t - S_{t-1})]$$
$$+ U_{O,r,t} \times [C(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC}) + P(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})]$$

Where:

IL(t) = Index level on day t

r = Rebalancing Date immediately preceding t. In case t is a rebalancing day, r will be the previous rebalancing date.

S_t = the respective future price for the Nickel future on day t

$U_{S,r,t}$ = Unit holdings for the underlying future for the respective sub index.

On any day t, the new unit holdings for the underlying future are adjusted by the delta of the options on previous day. This amount is calculated as,

$$U_{S,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r} \times (\Delta^{call}_{t-1} + \Delta^{put}_{t-1})$$

$$\Delta^{call}_{t} = \Phi(d_1)$$

$$\Delta^{Put}_{t} = \Phi(d_1) - 1$$

Φ is the standard normal cumulative distribution function and d_1 is defined in section Option Price Calculation.

$U_{O,r,t}$ = Unit holdings for the call and put options for the respective sub index.

On the rebalance day r the amount of call and put options to be sold are calculated as,

$$U_{O,r,t} = \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r}$$

T is equal to the time to maturity (ACT/365 basis) of the option on rebalance date r. It is calculated as,

$$T = \frac{E - r}{365}$$

T_{r+1} = The next rebalancing date of the sub index (also the expiry of the option)

S_r = The respective future price for the Nickel future on rebalance day r

$C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a call option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its call option price, which is calculated as max (0,S_r - K_r). The prices for old security on the expiry date are not published by exchange.

$P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a put option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its put option price, which is calculated as max (0,K_r - S_r).. The prices for old security on the expiry date are not published by exchange.

Option Price Calculation

For each sub index the strike of the option on the rebalance date is calculated as the strike in multiples of 25 which is closest to the at the money future price on such date. The index sells a call and a put at this strike on rebalance date for the option related to respective future. The expiry of these options is the option expiry corresponding to the future.

The LME exchange publishes the volatilities corresponding to 10% delta and 25% delta for call and -10% delta and -25% delta for put along with 50% delta option (ATM). We calculate the strike corresponding to each of these option volatilities in following manner.

For call options

$$K_{t,i} = S_t * \exp\left[\frac{\sigma_t^2 * (T_{R+1} - t)}{2} - \Phi^{-1}(\Delta_i) * \sigma_t * \sqrt{(T_{R+1} - t)}\right]$$

For put options

$$K_{t,i} = S_t * \exp\left[\frac{\sigma_t^2 * (T_{R+1} - t)}{2} + \Phi^{-1}(-\Delta_i) * \sigma_t * \sqrt{(T_{R+1} - t)}\right]$$

On the rebalance date the strike of the straddle options is calculated and fixed until the next rebalance as the strike in multiple of 25 which is closest to the at the money future price on that date.

On any index day t (excluding the rebalance date), the implied volatility σ_t corresponding to the strike fixed on the previous rebalance date is calculated using a linear interpolation (in strike) from LME published "delta" volatilities. If the fixed strike has a delta greater than -10% for puts or less than 10% for calls, the respective LME 10 delta implied volatility will be used.

On any day t, a linear interpolation is done on the volatilities captured for the 5 different delta options with the strikes calculated as above on the straddle strike (K_r). This gives us the volatility σ_t which is used in calculating σ_t^{AC} .

σ_t^{AC} is the after cost implied volatility of the relevant option and it is obtained from the implied volatility of the relevant exchange traded option. Details about the cost calculation are available from us on request. Please contact index.data@db.com for any such request.

σ_t is the volatility of the call option which has strike K_r and is calculated using standard Black's model.

The below formulae are used to calculate the price using the after cost volatility.

$$C(t, T_{R+1}, S_t, K_r, \sigma_t^{AC}) = \exp\left[-r_t * (T_{R+1} - t)\right] * \left[S_t * \Phi(d1) - K_r * \Phi(d_2)\right]$$
$$P(t, T_{R+1}, S_t, K_r, \sigma_t^{AC}) = \exp\left[-r_t * (T_{R+1} - t)\right] * \left[K_r * \Phi(-d_2) - S_t * \Phi(-d1)\right]$$

where

$$d_1 = \frac{\ln\left(\frac{S_t}{K_r}\right) + \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2 (T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}} \sqrt{T_{R+1} - t}}$$

$$d_2 = \frac{\ln\left(\frac{S_t}{K_r}\right) - \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2 (T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}} \sqrt{T_{R+1} - t}}$$

K_r = Option strike. It is a value in multiple of 25, which is closest to the at the money forward future price on the rebalance date r. For avoidance of any doubt, the strike will be rounded up in case of a tie.

r_r = 3 month Libor interest rate on day t as published by ICE (US0003M Index on Blooomberg)

Main index Calculation

DB Commodity Nickel Short Volatility II Index is calculated on each valid London city business day as follows,

$$IL(t, ER) = IL(t-1, ER) + \sum_{i=1}^{3} [I(i, t, ER) - I(i, t-1, ER)] \times N(t-1, i)$$

Where:

IL(t,ER) = Index level of DB Commodity Nickel Short Volatility II Index on day t

I(i,t,ER) = Index level of sub index i on day t

N(t,i) = Notional holdings of sub index i on day t

Notional Holdings

The index rebalances on the option expiry date of Z contract of LME Nickel every year. On any other day the notional holdings remain constant,

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

It t is the rebalancing date

$$N(t,i) = \frac{IL(t,ER)}{3*(I(i,t,ER)}$$

DB Commodity Gold Short Volatility II Index

Summary

The DB Commodity Gold Short Volatility index is based on a systematic short volatility strategy. The Index comprises of 2 equally weighted sub-indices reweighted on an annual basis. Each sub-index replicates a strategy to sell straddles on 4 month futures on Gold. The delta of the straddles in each sub-index is calculated on a daily basis and hedged at the market close. The straddle position is held to option expiry and then rolled for further 4 months. The index return is based on the return from straddle position and the delta hedged position.

Index Suite

The index is calculated and published to Bloomberg in the following versions;

Index Name	Return Type	Currency	Bloomberg Ticker
DB Commodity Gold Short Volatility II Index	ER	USD	DBCMGSV2
DB Commodity Gold Short Volatility II Sub index I	ER	USD	NA
DB Commodity Gold Short Volatility II Sub index II	ER	USD	NA

Key Index Information

Index Inception Date

25-Jan-2007

Index Live Date

07-July-2014

Index Calculation Holiday Calendar

London City

Index Rebalancing Date

The index rebalances on business day corresponding to the relevant December Option Expiry Date, which is 4th last business day of November, unless such business day is Friday, in which case it will be 5th last business day.

Sub Index Rebalancing Date

With respect to each sub-index, the 4th last index business day (or, in case the 4th last index business day is a Friday, the 5th last index business day) of the month during which the options held by the respective sub-index expire. Specifically, Sub Index 1 rebalances on the 4th last index business day (or, in case the 4th last index business day is a Friday, the 5th last index business day) of March, July and November. Sub Index 2 rebalances on the 4th last index business day (or, in case the 4th last index business day is a Friday, the 5th last index business day) of January, May and September.

Index Rules and Calculations

Market Data Sources

Commodity future and option prices are based on exchange close settlement prices for the relevant contract and exchange.

Sub index Calculation

Each of the two sub-indices will have an identical construction with the exception of the Rebalance Date.

Each of the sub indices sells an equal number of call options and put options on the rebalance date (Straddle position). Every day the delta position implied by these options is hedged by buying the delta amount of underlying future. At the expiry date of the option, the index rolls into the next future contract in the index.

The 2 sub indices roll their position based on following month's futures on rebalance dates,

Index Name	Future Contract Roll schedule
DB Commodity Gold Short Volatility II Sub Index 1	J-Q-Z
DB Commodity Gold Short Volatility II Sub Index 2	G-M-V

The index Level for each of the sub index on a day t is sum of 1)the index level on previous day, 2) the sum product of a)number of options sold on previous rebalance date and b) the change in option price from previous day, for each of the call and put, 3) product of a) Number of options sold, b) The implied delta position on previous day, c) The change in underlying future price from previous day

We calculate each of the sub Index ER level on all valid London City business days as follows.

$$IL(t) = IL(t-1) + U_{S,r,t} \times [(S_t - S_{t-1})]$$
$$+ U_{O,r,t} \times [C(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC}) + P(t-1, T_{r+1}, S_t, K_r, \sigma_t^{AC}) - P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})]$$

Where:

IL(t) = Index level on day t

r = Rebalancing Date immediately preceding t. In case t is a rebalancing day, r will be the previous rebalancing date.

S_t = The respective future price for the Gold future on day t

$U_{S,r,t}$ = Unit holdings for the underlying future for the respective sub index.

On any day t, the new unit holdings for the underlying future are adjusted by the delta of the options on previous day. This amount is calculated as,

$$U_{S,r,t} = 1.5 \times \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r} \times (\Delta^{call}_{t-1} + \Delta^{put}_{t-1})$$

$$\Delta^{call}_{t} = \Phi(d_1)$$

$$\Delta^{Put}_{t} = \Phi(d_1) - 1$$

Φ is the standard normal cumulative distribution function and d_1 is defined in section Option Price Calculation.

$U_{O,r,t}$ = Unit holdings for the call and put options for the respective sub index.

On the rebalance day r the amount of call and put options to be sold are calculated as,

$$U_{O,r,t} = 1.5 \times \sqrt{\frac{\pi}{2*T}} \times \frac{IL(r)}{S_r}$$

T is equal to the time to maturity (ACT/365 basis) of the option on rebalance date r. It is calculated as,

$$T = \frac{E - r}{365}$$

T_{r+1} = The next rebalancing date of the sub index (also the expiry of the option)

S_r = The respective future price for the Gold future on rebalance day r

$C(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a call option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its call option price, which is calculated as max (0,S_r - K_r). The prices for old security on the expiry date are not published by exchange.

$P(t, T_{r+1}, S_t, K_r, \sigma_t^{AC})$ = The price on day t of a put option with expiry T_{r+1}, strike K_r, evaluated using Black's model with volatility σ_t^{AC}, future price S_t, and discount factor equal to 1. These are calculated as given in section Option price calculation except for the rebalance date for the old security. For the old security on rebalance date, the intrinsic value of the option is considered as its put option price, which is calculated as max (0,K_r - S_r).. The prices for old security on the expiry date are not published by exchange.

Option Price Calculation

For each sub index the strike of the option on the rebalance date is calculated as the closest integer strike to the at the money future price on such date. The index sells a call and a put at this strike on rebalance date for the option related to respective future. The expiry of these options is the option expiry corresponding to the future.

The exchange publishes the option prices corresponding to each integer strike. The below formulae are used to calculate the price using the after cost volatility.

$$\boldsymbol{C}\left(\boldsymbol{t}, T_{R+1}, \boldsymbol{S}_t, \boldsymbol{K}_r, \boldsymbol{\sigma}_t^{\boldsymbol{AC}}\right) = S_t\Phi(d_1) - K_r\Phi(d_2)$$

$$P\left(\boldsymbol{t}, T_{R+1}, \boldsymbol{S}_t, \boldsymbol{K}_r, \boldsymbol{\sigma}_t^{\boldsymbol{AC}}\right) = K_r\Phi(-d_2) - S_t\Phi(-d_1)$$

$$d_1 = \frac{\ln\left(\frac{S_t}{K_r}\right) + \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2(T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}}\sqrt{T_{R+1} - t}}$$

$$d_2 = \frac{\ln\left(\frac{S_t}{K_r}\right) - \frac{1}{2}(\boldsymbol{\sigma_t^{AC}})^2(T_{R+1} - t)}{\boldsymbol{\sigma_t^{AC}}\sqrt{T_{R+1} - t}}$$

σ_t^{AC} is the after cost implied volatility of the relevant option and it is obtained from the implied volatility of the relevant exchange traded option. Details about the cost calculation are available from us on request. Please contact index.data@db.com for any such request.

σ_t is the volatility of the call option which has strike K_r and is calculated using standard Black's model.

K_r = Option strike. It is the integer value closest to the at the money forward future price on the rebalance date r. For avoidance of any doubt, the strike will be rounded up in case of a tie.

Main index Calculation

DB Commodity Gold Short Volatility II Index is calculated on each valid London city business day as follows,

$$IL(t, ER) = IL(t-1, ER) + \sum_{i=1}^{2}[I(i,t,ER) - I(i,t-1,ER)] \times N(t-1,i)$$

Where:

IL(t,ER) = Index level of DB Commodity Gold Short Volatility II Index on day t

I(i,t,ER) = Index level of sub index i on day t

N(t,i) = Notional holdings of sub index i on day t

Notional Holdings

The index rebalances on the option expiry date of Z contract of Gold every year. On any other day the notional holdings remain constant,

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

It t is the rebalancing date

$$N(t,i) = \frac{IL(t,ER)}{2 * (I(i,t,ER)}$$

"**Index Disruption Event**" means, in respect of a relevant exchange instrument, an event that would require the Index Administrator to calculate any Index Level which relies on the relevant exchange instrument on an alternative basis were such event to occur or exist on a day that is an index business day.

If an Index Disruption Event in relation to an exchange instrument continues for a period of five successive index business days, the Index Administrator will, in its discretion, either (i) continue to calculate the relevant Index Level by reference to the closing price of the relevant exchange instrument on the immediately preceding index business day for a further period of five successive index business days or (ii) select a replacement exchange instrument.

In the case of (i) above, if an Index Disruption Event in relation to the relevant exchange instrument continues for the further period of five successive index business days, on the expiry of such period the provisions of (ii) above shall apply.

In the case of a replacement of an exchange instrument as described in (ii) above, the Index Administrator will make such adjustments to the methodology and calculation of the DB Commodity Vol Premium Index as it determines to be appropriate to account for the relevant replacement and will publish such adjustments on its website http://index.db.com or any successor thereto.

Changes in the index methodology

The Index Administrator will, subject as provided below, employ the methodology described above and its application of such methodology shall be conclusive and binding. While the Index Administrator currently employs the above described methodology to calculate the DB Commodity Vol Premium Index, no assurance can be given that fiscal, market, regulatory, juridical or financial circumstances (including, but not limited to, any changes to or any suspension or termination of or any other events affecting any Index Commodity or an Exchange Traded Instrument) will not arise that would, in the view of the Index Administrator, necessitate a modification of or change to such methodology and in such circumstances the Index Administrator may make any such modification or change as it determines appropriate. The Index Administrator may also make modifications to the terms of the DB Commodity Vol Premium Index in any manner that it may deem necessary or desirable, including (without limitation) to correct any manifest or proven error or to cure, correct or supplement any defective provision contained in this Index Guide. The Index Administrator will publish notice of any such modification or change and the effective date thereof on its website http://index.db.com or any successor thereto.

The Index Administrator will not make retrospective changes to previously published index levels, except where required to correct a manifest error.

The Index Administrator does not accept payment from the providers of the various index components for inclusion in the index.

Index Guide Disclaimers

This document is intended for information only and does not create any legally binding obligations on the part of Deutsche Bank AG and/or its affiliates ("DB"). This document is intended to provide a summary of the index it purports to describe. No warranty or representation is made as to the correctness, completeness and accuracy of the information.

Without limitation, this document does not constitute an offer, an invitation to offer or a recommendation to enter into any transaction. When making an investment decision, you should rely solely on the final documentation relating to the transaction. Products based on the index or indices described in this document may not be appropriate for all investors and before entering into any transaction you should take steps to ensure that you fully understand the transaction and have made an independent assessment of the appropriateness of the transaction in the light of your own objectives and circumstances, including the possible risks and benefits of entering into such transaction. Refer to your DB Sales person for product related information. For general information regarding the nature and risks of the proposed transaction and types of financial instruments please go to www.globalmarkets.db.com/riskdisclosures. You should also consider seeking advice from your own advisers in making this assessment. If you decide to enter into a transaction with DB, you do so in reliance on your own judgment. Past performance is no indication of future results.

This material was prepared by DBIQ. It is not investment research, and has not been prepared in accordance with legal requirements designed to promote the independence of such. Any opinions expressed herein may differ from the opinions expressed by other DB departments including the Research Department. DB may engage in transactions in a manner inconsistent with any views discussed herein. DB trades or may trade as principal in instruments (or related derivatives) linked to the index or indices described in this document, and may have proprietary positions in the instruments (or related derivatives). DB may make a market in such instruments (or related derivatives), which may in extreme circumstances affect the levels of the index or indices described.

In no event shall DB have any liability (whether in negligence or otherwise) to any person in connection with such person's use of the Index, unless such use is pursuant to a transaction between that party and DB relating to the Index and such liability results from wilful default and/or gross negligence on the part of DB.

The distribution of this document and availability of related products and services in certain jurisdictions may be restricted by law. You may not distribute this document, in whole or in part, without our express written permission. DB specifically disclaims all liability for any direct, indirect, consequential or other losses or damages including loss of profits incurred by you or any third party that may arise from any reliance on this document or for the reliability, accuracy, completeness or timeliness thereof.

Unless governing law provides otherwise, all transactions should be executed through the Deutsche Bank entity in the investor's home jurisdiction. In the U.S. this report is approved and/or distributed by Deutsche Bank Securities Inc., a member of the NYSE, the NASD, NFA and SIPC. In Germany, this report is approved and/or communicated by Deutsche Bank AG, a joint stock corporation with limited liability incorporated in the Federal Republic of Germany with its principal office in Frankfurt am Main. Deutsche Bank AG is authorised under German Banking Law (competent authority: European Central Bank) and is subject to supervision by the European Central Bank and by BaFin, Germany's Federal Financial Supervisory Authority. In the United Kingdom, this report is approved and/or communicated by Deutsche Bank AG acting through its London Branch at Winchester House, 1 Great Winchester Street, London EC2N 2DB. Deutsche Bank AG in the United Kingdom is authorised by the Prudential Regulation Authority and is subject to limited regulation by the Prudential Regulation Authority and Financial Conduct Authority. Details about the extent of our authorisation and regulation by the Prudential Regulation Authority, and regulation by the Financial Conduct Authority are available from us on request.This report is distributed in Hong Kong by Deutsche Bank AG, Hong Kong Branch, in Korea by Deutsche Securities Korea Co. This report is distributed in Singapore by Deutsche Bank AG, Singapore Branch, and recipients in Singapore of this report are to contact Deutsche Bank AG, Singapore Branch in respect of any matters arising from, or in connection with, this report. Where this report is issued or promulgated in Singapore to a person who is not an accredited investor, expert investor or institutional investor (as defined in the applicable Singapore laws and regulations), Deutsche Bank AG, Singapore Branch accepts legal responsibility to such person for the contents of this report. In Japan this report is approved and/or distributed by Deutsche Securities Inc. The information contained in this report does not constitute the provision of investment advice. In Australia, retail clients should obtain a copy of a Product Disclosure Statement (PDS) relating to any financial product referred to in this report and consider the PDS before making any decision about whether to acquire the product. Deutsche Bank AG Johannesburg is incorporated in the Federal Republic of Germany (Branch Register Number in South Africa: 1998/003298/10). Additional information relative to securities, other financial products or issuers discussed in this report is available upon request. This report may not be reproduced, distributed or published by any person for any purpose without Deutsche Bank's prior written consent. Please cite source when quoting.