

# DB Commodity Momentum Alpha Index

## Summary

The Momentum Alpha Long and the Momentum Alpha Short indices are based on the weights generated by the DB Commodity Momentum Alpha ER index DBCMMAUE. The DBCMMAUE index is a dynamic allocation strategy with underlying as the 13 S&P GSCI 3-month forward indices, where the weights are based on the idea that the duration of price momentum varies across commodities and that a decay factor is applied to the past data in order to measure the momentum duration such that the recent price performance is assigned a higher weight than past performance.

The Momentum Alpha Long and the Momentum Alpha Short indices defined as follows -

- a) Difference in the weights of the Momentum Alpha Long minus Momentum Alpha Short equals the weight of the Momentum Alpha index for the corresponding period
- b) The relative weights in Momentum Alpha Long and Momentum Alpha Short indices are such that the largest component has a relative weight of 28% or less and all other components have a relative weight of 18.5% or less. Components are defined as Oil (WTI, Brent, Gasoil, Heating Oil, Gasoline) and all other single commodities

## Index Suite

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

**Table 1: Index Suite**

Index Name	Return Type	Currency	Bloomberg Ticker
DB Commodity Momentum Alpha Long Index	ER	USD	DBCMMALE
DB Commodity Momentum Alpha Short Index	ER	USD	DBCMMASE

### Index Development Contacts:

London: +44 (0)207 545 0505  
New York: +1 212 250 8998



### Key Index Information

Index Inception Date

3-Jan-2002

Index Live Date

8-Feb-2016

Index Calculation Holiday Calendar

NYM

Index Selection and Rebalancing Date

Index Name	Rebalancing pattern
DB Commodity Momentum Alpha Long Index	2nd and 12th business day of each month
DB Commodity Momentum Alpha Short Index	2nd and 12th business day of each month

### Index Rules and Calculations

Market Data Sources

Commodity future prices are based on exchange close settlement prices for the relevant contract and exchange. The official S&P GSCI 3-month forward index levels are published on Bloomberg, the tickers for which are:

Table 2: Commodities and S&P GSCI Indices

Sector	Commodity Name	S&P GSCI Index Ticker
<b>Energy</b>	WTI Crude Oil	SG3MCLP
	Brent Crude	SG3MBRP
	Heating Oil	SG3MHOP
	Natural Gas	SG3MNGP
	Gasoil	SG3MGOP
	RBOB Gasoline	SG3MHUP
<b>Industrial Metals</b>	Aluminium	SG3MIAP
	Copper	SG3MICP
	Nickel	SG3MIKP
	Zinc	SG3MIZP
	Lead	SG3MILP
<b>Precious Metals</b>	Gold	SG3MGCP
	Silver	SG3MSIP

## Index Calculation

### DB Commodity Momentum Alpha Long Index

The DB Trend Alpha Index is calculated on valid NYM business days and is calculated as follows:

$$ILL(t) = ILL(t-1) + \sum_{i=1}^{13} (ILO(t,i) - ILO(t-1,i)) * UI(t,i)$$

Where:

ILL(t)	= DB Commodity Momentum Alpha Long Index level on day t
ILO(t,i)	= S&P GSCI 3-month Index level on day t for commodity i
UI(t,i)	= S&P GSCI 3-month Index holding on day t for commodity i
t-1	= Previous calculation date

The index is re-weighted on the 2nd and 12th business day of each month. The S&P GSCI 3-month forward index holdings are expressed as:

$$UI(t+1,i) = w(l,i) * \frac{ILL(t)}{ILO(t,i)}$$

For all other days the holding remains constant:

$$UI(t+1,i) = UI(t,i)$$

### DB Commodity Momentum Alpha Short Index

The DB Trend Alpha Index is calculated on valid NYM business days and is calculated as follows:

$$ILS(t) = ILS(t-1) + \sum_{i=1}^{13} (ILO(t,i) - ILO(t-1,i)) * US(t,i)$$

Where:

ILS(t)	= DB Commodity Momentum Alpha Short level on day t
ILO(t,i)	= S&P GSCI 3-month Index level on day t for commodity i
US(t,i)	= S&P GSCI 3-month month Index holding on day t for commodity i
t-1	= Previous calculation date

The index is re-weighted on the 2nd and 12th business day of each month. The S&P GSCI 3-month forward index holdings are expressed as:

$$US(t+1,i) = w(s,i) * \frac{ILS(t)}{ILO(t,i)}$$

For all other days the holding remains constant:

$$US(t+1,i) = US(t,i)$$

### Weight Calculation

The individual commodity weights are back calculated using the inverse of the matrix in table 3 in order to separate out the long commodities from the short commodities. The individual weights for the Momentum long/short indices are then multiplied with the matrix in table 3 so as to calculate the weights assigned to the individual S&P GSCI 3-month forward indices in each of the Trend long and the Trend short indices.

Consider the 13 weights generated using the Commodity Momentum Alpha strategy to be the vector  $\mathbf{W}$  with dimensions 13x1 and table 3 to be the matrix  $\mathbf{A}$ , whose inverse is matrix  $\mathbf{A}^{-1}$  with dimensions 13x13. The individual commodity weights derived, denoted by vector  $\mathbf{V}$  with dimensions 13x1, is calculated as follows:

$$\mathbf{V} = \mathbf{A}^{-1} \times \mathbf{W}$$

The positive and negative weights are separated into 2 different vectors  $\mathbf{V}^+$  and  $\mathbf{V}^-$  respectively, without altering the vector size by performing the following operation:

$$\mathbf{V}^+ = \max(\mathbf{V}, \mathbf{0}) \text{ and } \mathbf{V}^- = -\min(\mathbf{V}, \mathbf{0})$$

Where,  $\mathbf{0}$  is a null vector with dimensions of 13x1 and the max/min functions are compared vector component wise

Finally, if we consider the weights of the individual S&P GSCI 3-month forward indices in the Trend long index and the Trend short index to be in the vector forms as  $\mathbf{W}_L$  and  $\mathbf{W}_s$ , we calculate them as follows:

$$\mathbf{W}_L = \mathbf{A} \times \mathbf{V}^+ \text{ and } \mathbf{W}_s = \mathbf{A} \times \mathbf{V}^-$$

The weights generated in vectors  $\mathbf{W}_L$  and  $\mathbf{W}_s$  includes the weights  $w(l,i)$  and  $w(s,i)$  respectively, used to calculate the index holdings of the individual S&P GSCI 3-month forward indices.

**Table 3: S&P GSCI Single Commodity index constituents**

	Silver index	Gold index	Heating oil index	WTI crude index	RBOB Gasoline index	Aluminum index	Zinc index	Nickel index	Natural gas index	Lead index	Copper index	Gas oil index	Brent index
Silver	28.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%
Gold	9.00%	28.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%
Heating Oil	1.80%	1.80%	28.00%	0.00%	0.00%	1.80%	1.80%	1.80%	1.80%	1.80%	1.80%	0.00%	0.00%
WTI	1.80%	1.80%	0.00%	28.00%	0.00%	1.80%	1.80%	1.80%	1.80%	1.80%	1.80%	0.00%	0.00%
RBOB Gasoline	1.80%	1.80%	0.00%	0.00%	28.00%	1.80%	1.80%	1.80%	1.80%	1.80%	1.80%	0.00%	0.00%
Aluminum	9.00%	9.00%	9.00%	9.00%	9.00%	28.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%
Zinc	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	28.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%
Nickel	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	28.00%	9.00%	9.00%	9.00%	9.00%	9.00%
Natural Gas	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	28.00%	9.00%	9.00%	9.00%	9.00%
Lead	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	28.00%	9.00%	9.00%	9.00%
Copper	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	28.00%	9.00%	9.00%
Gas oil	1.80%	1.80%	0.00%	0.00%	0.00%	1.80%	1.80%	1.80%	1.80%	1.80%	1.80%	28.00%	0.00%
Brent crude	1.80%	1.80%	0.00%	0.00%	0.00%	1.80%	1.80%	1.80%	1.80%	1.80%	1.80%	0.00%	28.00%

## 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](http://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 considers 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.

Copyright © 2016 Deutsche Bank AG