DBIQ Diversified Agriculture Index

Summary

DBIQ Diversified Agriculture Index is based on 11 commodities drawn from the agriculture sectors. Of the 11 commodities comprising the index, 5 commodities (Corn, Soybeans, Sugar, Wheat and Kansas Wheat) employ the Optimum Yield (OY) technology to select future contracts and 6 commodities (Feeder Cattle, Live Cattle, Lean Hogs, Cocoa, Coffee and Cotton) employ a predefined rolling schedule to select future contracts.

Deutsche Bank Liquid Commodities Indices Optimum Yield (DBLCIOY) are designed to maximize potential roll returns by selecting, for each commodity, the futures contract with the highest implied roll yield. The OY technology aims to maximize the potential roll benefits in backwardated markets and minimize the loss from rolling down the curve in contango markets.

This index rebalances yearly to fixed weights on the 6th Business day of November according to the index holiday calendar.

Index Information

Table 1: Index Suite

Index Name	Return Type	Currency	Bloomberg Ticker
DBIQ Diversified Agriculture Index TR	TR	USD	DBLCDBAT
DBIQ Diversified Agriculture Index ER	ER	USD	DBLCDBAE

Source: DBIQ

Table 2: Key Index Information

Index Inception Date	Index Live Date	Index Business Day
02-Dec-88	12-Sep-09	Index business days are defined as days on which the New York Mercantile Exchange (NYMEX) is open for business.

Source: DBIQ

Table 3: Index Selection Day

Index Name	Index Selection Day
DBIQ Diversified Agriculture Index	For each component index on the first index 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”).

Source: DBIQ

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Table 4: Index Rebalancing Day

Index Name	Index Rebalancing Day
DBIQ Diversified Agriculture Index	The main index is rebalanced yearly on the 5th business day of November each year according to the index holiday calendar

Source: DBIQ

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The Overview is available on the DBIQ homepage under the following URL (the "DBIQ Website"):

https://index.db.com

Index Publication

The level of each Index on each relevant Index Business Day shall be published:

1) on the DBIQ Website; and

2) where applicable, on Bloomberg under the Bloomberg ticker in respect of such Index as set out in Table 1 above.

Any such publication may be restricted by means determined as appropriate for such purpose by the Index Administrator in its sole and absolute discretion including, but not limited to, password protection on the DBIQ Website restricting access to a limited set of persons in accordance with arrangements agreed between the Index Administrator and such person. The Index Administrator may, at any time and without notice, change the frequency or method publication of an Index, as the case may be. The Index Administrator accepts no legal liability to any person for publishing or not continuing to publish for any period of time and level in respect of an Index at any particular place or any particular time.

Index Rules and Calculations

DBIQ Diversified Agriculture Index is based on 11 commodities drawn from agriculture sectors. The 11 index components of the index are Corn, Soybeans, Sugar, Wheat and Kansas Wheat employing the OY contract selection methodology and Feeder Cattle, Live Cattle, Lean Hogs, Cocoa, Coffee and Cotton employing a predefined rolling schedule.

The DBIQ Diversified Agriculture Index employs a rule based approach for each of its index components when it 'rolls' from one futures contract to another for each commodity in the index. For the OY index components rather than select the new future based on a predefined schedule (e.g. monthly) the index rolls to that future (from the list of tradable futures which expire in the next thirteen months) which generates the maximum implied roll yield. These component indices aim to maximize the potential roll benefits in backwardated markets and minimize the loss from rolling down the curve in contago markets.

If the price of a future is greater than the spot price, the market is in contango. If the price of a future is below the spot price, the market is in backwardation. In a contango market, as the futures time to expiry decreases in general, the price will tend towards the spot price. Assuming a flat spot price, this results in the future price falling. The opposite is true for a market in backwardation. A contango market will tend to cause a drag on an index while a market in backwardation will tend to cause a push on an index.

For the component indices employing the OY technology the selected index future contract is rolled to a new contract, when the existing contract is close to expiry. For the remaining component indices, the contract roll follows a predefined rolling schedule. For full details on the roll convention refer to Contract Selection Section.

The benchmark DBIQ Diversified Agriculture Index is a yearly rebalanced to fixed weights index of the 11 individual commodity index components.

The index is calculated on each index business day using the exchange closing prices. Index business days are defined as days on which the New York Mercantile Exchange (NYMEX) is open for business.

DBIQ Diversified Agriculture Index Calculation

The benchmark 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

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

Where

$IL(t,rt)$ = Index level on day t with return type rt

$IL(d,rt)$ = Index level on last rebalancing day d with return type rt

$CIL(t,rt)$ = Component index level for commodity cf on day t with return type rt

$CIL(d,rt)$ = Component index level for commodity cf on last rebalancing day d with return type rt

$w(d,cf)$ = Base Weight of commodity cf on last rebalancing day d

Component Index Calculation

For each component index 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 index return is equal to the change in current atoms index levels multiplied by the relevant holdings.

The excess return index level is expressed as

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

Where:

$CIL(t,er)$ = Component Excess Return Index level on day t

$CIL(t-1,er)$ = Component Excess Return Index level on 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 holdings of commodity future i on index calculation day t-1

The total return index level is expressed as

$$CIL(t,tr) = \left(\frac{CIL(t,er)}{CIL(t-1,er)} + Rt(t)\right) * (1 + Rt(t))^{d(t,t-1)} * CIL(t-1,tr)$$

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

Where

$CIL(t,tr)$ = Total Return Index level on day t

$CIL(t-1,tr)$ = Total Return Index level on 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-1excluding day t

$y(t-1)$ = 3-month benchmark T-bill yield on index calculation day t-1

Index Rebalancing

The main index is rebalanced yearly on the 6th business day of November each year according to the index holiday calendar. The index rebalances its index components to fixed base weights as shown in the table below

Table 5: Fixed Weights

Commodity	Rolling Methodology	Base Weight
Cattle(Feeder Cattle)	Predefined Schedule	4.167%
Cocoa	Predefined Schedule	11.111%
Coffee "C"	Predefined Schedule	11.111%
Corn	Optimum Yield	12.500%
Cotton #2	Predefined Schedule	2.778%
Lean Hogs	Predefined Schedule	8.333%
Live Cattle	Predefined Schedule	12.500%
Soybeans	Optimum Yield	12.500%
Sugar #11	Optimum Yield	12.500%
Wheat	Optimum Yield	6.250%
Wheat (Kansas Wheat)	Optimum Yield	6.250%

Source: DBIQ

Index Selection

Contract Selection

Each index component implements one of the two contract selection methodologies as indicated in the weights table above

Component Indices employing Optimum Yield Technology

For each component index on the first index 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 each component 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.

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.

The implied roll yield is expressed as:

$$Y(t,i) = \left(\frac{PC(t,b) * N(t-1,i)}{PC(t,j) * (7 - db(t))}\right)^{\left(\frac{1}{F(t,i,b)}\right)} - 1$$

Where

$Y(t,i)$ = On any day t, the implied roll yield for entering into the commodity futures contract with 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 expiration month i. Calculated as number of calendar days between dates divided by 365

Component Indices employing Predefined Rolling Schedule

On the first Index Business Day of each month, each non-OY Single Commodity Index will select a new futures contract to replace the old futures contract as provided in the following schedule.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cocoa	H	K	K	N	N	U	U	Z	Z	Z	H	H
Coffee	H	K	K	N	N	U	U	Z	Z	Z	H	H
Cotton	H	K	K	N	N	Z	Z	Z	Z	Z	H	H
Live Cattle	J	J	M	M	Q	Q	V	V	Z	Z	G	G
Feeder Cattle	H	J	K	Q	Q	Q	U	V	X	F	F	H
Lean Hogs	J	J	M	M	N	Q	V	V	Z	Z	G	G

Where

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Letter Code	F	G	H	J	K	M	N	Q	U	V	X	Z

Monthly Index Roll Period

For each component index if the current index holding no longer meets the inclusion criteria the monthly index roll unwinds the old contact 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 contract i is expressed as:

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

The notional of the new commodity contract 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. Similarly on all days that are not monthly index roll days the notional holding of each commodity future remains constant.

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

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