

CF Bitcoin Compounding Basis Index

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1 Version History

Version	Date Issued	Summary of Change	Owner
v1.0	4 May 2026	N/A	CF Benchmarks Management

2 Overview

The CF Bitcoin Compounding Basis Index is a benchmark that combines spot Bitcoin performance with a systematic futures basis overlay. By holding constant Bitcoin exposure via the Bitcoin Reference Rate (BRR) and simultaneously managing positions in CME Bitcoin Futures, the Index isolates and compounds the recurring premium between futures and spot markets — providing a transparent and replicable measure of basis trading returns without altering the underlying Bitcoin exposure.

Underlying Economic Reality

The CF Bitcoin Compounding Basis Index is intended to measure the underlying economic reality of a delta-neutral strategy that harvests the cost-of-carry premium embedded in CFTC-regulated CME Bitcoin Futures contracts. This premium, commonly known as basis, arises from the structural difference between the price at which Bitcoin can be bought or sold today and the price implied by futures contracts for delivery at a future date, and represents a quantifiable source of return that is independent of Bitcoin price direction. The Index takes a short position when the market is in contango and a long position when in backwardation, with directionality determined systematically from observed transaction data on the CME, where price discovery is facilitated by the GLOBEX central limit order book system and transactions are centrally cleared.

3 Definitions

- **API:** Application programming interface.
- **Front Contract:** CME Bitcoin Futures contract which is closest to its expiry date.
- **Next Contract:** CME Bitcoin Futures contract with expiry date after the Front Contract expiry date.
- **Expiry Day:** The last Friday of the Front Contract's month. If this is not either a UK or a U.S. business day, the contract expiry day will take place on the immediately preceding business day which is either a UK or a U.S. business day.
- **Expiry Datetime:** 4:00 pm London on the Expiry Day.
- **Index Basis Portfolio:** Portfolio of weighted constituents representing the index basis overlay, consisting of Front Contract and Next Contract.
- **Roll Interval:** The period between two consecutive Expiry Datetimes.
- **Roll Day:** Any day on which the index changes its constituent weights.
- **Roll Period:** Each set of Roll Days within a Roll Interval.
- **Non-Roll Day:** Any day on which the Index Portfolio does not change its constituent weights.
- **Non-Roll Period:** Each set of Non-Roll Days within a Roll Interval.
- **Roll Step:** Each Roll Interval can be comprised in a timely ordered series of steps over which the Index Portfolio's weights are adjusted. The Roll Step refers to the position of a step in this ordered series.
- **Index Calculation Day:** Any day for which the index is calculated and published at least once.
- **Index Calculation Time:** Time of the day at which the index is calculated.
- **Index Calculation Datetime:** The combination of Index Calculation Day and the outer join of Index Calculation Time and Roll Time.
- **Index Publication Datetime:** Each datetime when the index value is published.
- **Relevant Transactions:** All Transactions in outright futures contracts and calendar spreads related to those futures contracts during the Roll Time.

4 Methodology

4.1 Index Calculation

The index value on day T is calculated as a combination of Spot Performance and Basis Performance according to the following formulas:

$$I_T = I_{LastRollDate} \cdot (1 + \alpha_{Spot,T} + \alpha_{Basis,T}) \quad (\text{Eq. 1.1})$$

$$\alpha_{Spot,T} = \frac{BRR_T - BRR_{LastRollDate}}{BRR_{LastRollDate}} \quad (\text{Eq. 1.2})$$

$$\alpha_{Basis,T} = w_{Front,T} \cdot d_{Front,T} + w_{Next,T} \cdot d_{Next,T} \quad (\text{Eq. 1.3})$$

For each Futures contract expiry c , the basis value change is calculated as:

$$d_{c,T} = \frac{\frac{1}{AF_{c,T}} \cdot BRR_T \cdot FIB_{c,T} - \frac{1}{AF_{c,LastRollDate}} \cdot BRR_{LastRollDate} \cdot FIB_{c,LastRollDate}}{BRR_{LastRollDate}} \quad (\text{Eq. 1.4})$$

where

$$AF_{c,T} = \frac{365}{ACT_{c,T}} \quad (\text{Eq. 1.5})$$

The above formulas are calculated based on the following conventions: simple compounding, UK Money Market day count fraction (ACT/365).

The mathematical representation is as follows:

Symbol	Name	Description	Type
T	Calculation Day	The day on which the Index is calculated	Parameter
$LastRollDate$	Position Reference Date	The most recent roll date if T is not within a roll period. If T is within a roll period, then the Position Reference Date is the previous calculation date	Input
$\alpha_{Spot,T}$	Spot Performance	Performance of the spot component in the portfolio	Output
$\alpha_{Basis,T}$	Basis Performance	Performance of the basis overlay component in the portfolio	Output
BRR_T	Bitcoin Reference Rate (BRR)	The benchmark Bitcoin price calculated at time T	Input
c	Contract Expiry	Contract Expiry c	Input
$w_{c,T}$	Basis Weight	Futures basis exposure weight for the relevant Futures contract c	Output
$d_{c,T}$	Basis Change	Change in the value of basis for the relevant Futures contract c	Output
$AF_{c,T}$	Annualization Factor	The annualization factor for the relevant Futures contract c at time T	Output
$ACT_{c,T}$	Actual Days	The actual number of days to maturity for the relevant Futures contract c at time T	Input
$FIB_{c,T}$	Futures Implied Basis	The annualized Futures Implied Basis for the relevant Futures contract c at time T	Output

4.1.1 Futures Implied Basis Calculation

The Futures Implied Basis is calculated based on the transaction data observed during the TWAP Period and calculated on Calculation Day as follows on any given Calculation Day:

1. Divide all Relevant Transactions observed during the TWAP Period into equally sized partitions.
2. For each partition separately, calculate a volume-weighted median implied basis (WM) from the implied basis and sizes of all observed Relevant Transactions. A volume-weighted median differs from a standard median in that a weighting factor, in this case trade size, is factored into the calculation.
3. The final futures implied basis is then calculated as the equally-weighted average

of the calculated WMs .

The Futures Implied Basis $b_{c,k,i}$ corresponding to the i -th price in partition k for calculation for the relevant Futures contract c at time T is given by:

$$b_{c,k,i} = \left[\frac{p_{c,k,i} - BRTI_{k,i}}{BRTI_{k,i}} \right] \cdot AF_T \quad (\text{Eq. 2.1})$$

For each relevant Futures contract c , for each partition k , the volume-weighted median implied rate $WM_{c,k}$ is individually calculated from Relevant Transactions as:

$$WM_{c,k} = b_{c,k,j} \text{ where } j \text{ satisfies } \sum_{i=1}^{j-1} s_{c,k,i} < \frac{1}{2} \sum_{i=1}^{I_{c,k}} s_{c,k,i} \text{ and } \sum_{i=j+1}^{I_{c,k}} s_{c,k,i} < \frac{1}{2} \sum_{i=1}^{I_{c,k}} s_{c,k,i}$$

$$\text{If } s_{c,k,1} \geq \frac{1}{2} \sum_{i=1}^{I_{c,k}} s_{c,k,i} \text{ then } WM_{c,k} = b_{c,k,1}$$

$$\text{If } \sum_{i=j+1}^{I_{c,k}} s_{c,k,i} = \frac{1}{2} \sum_{i=1}^{I_{c,k}} s_{c,k,i} \text{ then } WM_{c,k} = \frac{b_{c,k,j} + b_{c,k,j+1}}{2} \quad (\text{Eq. 2.2})$$

The Final Futures Implied Basis as of the Calculation Day T for the relevant Futures contract c is then given by:

$$FIB_{c,T} = \frac{1}{K} \sum_{i=1}^K WM_{c,k} \quad (\text{Eq. 2.3})$$

The mathematical representation is as follows:

Symbol	Name	Description	Type
τ	TWAP period length	The length of the time-period during which transaction data is collected	Parameter
$\hat{\tau}$ with $\hat{\tau} \leq \tau$	Partition length	The length of the time periods into which the TWAP period length is partitioned	Parameter
K	Number of partitions	The number of partitions, given by $K = \tau/\hat{\tau}$	Output
k with $k \in (1, \dots, K)$	Partition	The k th partition	Output
$X_{c,k}$ for $k \in (1, \dots, K)$	TWAP period trades	The price-ordered collection of price / size trade pairs observed in the k th partition for the relevant Futures contract c	Input
$I_{c,k}$	TWAP period trades count	The number of trades in the k th partition for the relevant Futures contract c	Output
$x_{c,k,i}$ with $x_{c,k,i} = (p_{c,k,i}, s_{c,k,i})$ and $x_{c,k,i} \in X_{c,k}$	TWAP period trade	The i th price / size trade pair of the k th partition for the relevant Futures contract c	Input
$p_{c,k,i}$	TWAP period trade price	The futures price of the i th price/size trade pair of the k th partition for the relevant Futures contract c	Input
$s_{c,k,i}$	TWAP period trade size	The size of the i th price/size trade pair of the k th partition for the relevant Futures contract c	Input
$BRTI_{k,i}$	Bitcoin Real Time Index (BRTI)	The price of the Bitcoin Real Time Index with corresponding timestamp that is closest to the timestamp of the i th price/size trade pair of the k th partition	Input
$b_{c,k,i}$	TWAP period trade basis	The annualized implied basis corresponding to the i th price/size trade pair of the k th partition for the relevant Futures contract c	Output
$WM_{c,k}$	Weighted median	The weighted median implied rate of the k th partition for the relevant Futures contract c	Output

4.1.2 Index Basis Portfolio Weights

The Index Basis Portfolio's directionality is determined by the prevailing term structure of the Futures market. Specifically, when the market is in backwardation, the portfolio is in a long position; conversely, when the market is in contango, the portfolio maintains a short position. Furthermore, before rolling into a new month's position, the portfolio requires confirmation of the historical basis trend. Specifically, if, at the time of weight determination, the current Front Futures Implied Basis signum does not align with the majority of signum of the previous h days' Front Futures Implied Basis, the portfolio will not enter a position.

The weight and direction remain unchanged during non-Roll Interval. Within each Roll Interval, during the Roll Period, the Basis Portfolio's weight is shifted from Front Contract to Next Contract gradually.

For $T = 0$ (not a roll day):

$$\begin{aligned} w_{Front,0} &= -sgn(FIB_{Front,0}) \cdot w_{Front,Initial} \\ w_{Next,0} &= -sgn(FIB_{Front,0}) \cdot w_{Next,Initial} \end{aligned} \quad (\text{Eq. 3.1})$$

If T is not a roll day, for $T > 0$:

$$\begin{aligned} w_{Front,T} &= w_{Front,LastRollDate} \\ w_{Next,T} &= w_{Next,LastRollDate} \end{aligned} \quad (\text{Eq. 3.2})$$

If T is a roll day, for $T > 0$:

$$w_{Target} = -sgn(FIB_{Front,T_-}) \cdot \mathbb{1}_{\{sgn(FIB_{Front,T_-}) = sgn(\sum_{j=1}^h sgn(FIB_{Front,T_-j}))\}} \cdot w_{Front,Initial} \quad (\text{Eq. 3.3})$$

Then, the weights are calculated as:

$$\begin{aligned} w_{Front,rsT} &= w_{Front,T_-} \cdot \left(1 - \frac{rsT}{|rs|}\right) \\ w_{Next,rsT} &= w_{Next,T_-} + \frac{rsT}{|rs|} \cdot (w_{Target,rsT} - w_{Next,T_-}) \end{aligned} \quad (\text{Eq. 3.4})$$

The mathematical representation is as follows:

Symbol	Name	Description	Type
T_-	Pre-Roll Calculation Date	The final calculation date just before the start of the Roll Period	Input
rs_T	Roll Step	The number of Roll Step of T within the Roll Interval	Input
$ rs $	Total Roll Step	The total number of Roll Steps within a Roll Interval	Parameter
$w_{Front,Initial}$	Initial Front Basis Weight	The weighting of the Front Contract at $T = 0$	Parameter
$w_{Next,Initial}$	Initial Next Basis Weight	The weighting of the Next Contract at $T = 0$	Parameter
h	Historical Number of Days	The number of lookback days to check for Front Futures Implied Basis signum trend	Parameter
w_{Target}	Target Front Basis Weight	The target weighting of the Front Contract post Roll Interval	Output
$w_{Front,rsT}$	Roll Step Front Basis Weight	The weighting of the Front Contract Basis Portfolio on Roll Step of T during the Roll Days	Output
$w_{Next,rsT}$	Roll Step Next Basis Weight	The weighting of the Next Contract on Roll Step of T during the Roll Days	Output

4.1.3 Index Calculation Dates

The index is calculated each day on which the CME is open for CME Bitcoin Futures trading and a CME Bitcoin Futures Settlement Rate is published. Days where the CME closes early or has generally reduced trading hours (also known as Half Days) are treated as holidays for index calculation purposes if such day falls on a roll day. Any non-roll day where it is known ex ante that a CME settlement rate will not be published constitutes a holiday for index calculation purposes.

4.1.4 Index Calculation Time

On days where the CME is maintaining regular trading hours for Bitcoin Futures, the index shall be calculated once a day at 4:00 pm London Time. The Index Calculation Time shall be amended by the Index Administrator on days where the CME is maintaining limited trading hours for Bitcoin Futures.

4.1.5 Calendar Spread Implied Transaction Prices

Transaction Prices embedded in executed calendar spread trades are extracted by matching the execution timestamp of the relevant calendar spread trade to the nearest execution timestamp of the contract with the earlier expiration date (the nearby contract) that form part of said calendar spread transaction. Once a match has taken place, the price of the executed calendar spread is used to determine the Transaction Price of the other contract. Specifically, the timestamp matching process is as follows:

1. For every calendar spread transaction executed in partition m , identify the most recently executed outright transaction in partition m of the nearby contract which were executed on or before the calendar spread execution, as long as the age of the most recent outright transaction relative to the respective calendar spread transaction does not exceed the Outright Trade Lag Threshold.
2. If there is no outright transaction matching the criteria in 1. in partition m , identify the immediately following outright transaction execution in partition m of the nearby contract as long as the age of the respective calendar spread transaction relative to the respective outright transaction does not exceed the Outright Trade Lag Threshold.
3. If there is no outright transaction matching the criteria in 2. in partition m , the respective calendar spread transaction is excluded from the calculation of the index.
4. Matching can only take place between outright futures transactions (not “unpacked” outright futures transactions from calendar spreads) and calendar spread transactions that have individually been established to not be potentially erroneous.
5. Calendar spread trades where the expiration date of either the first or second leg exceeds the expiration date of the contract included in the roll price calculation with the farthest expiration date are ignored in the calculation of the index.

For the avoidance of doubt, a spread trade price represents buying the second leg and selling the first leg. For example, executed spread trade transaction BTCF8-BTCH8 @ +130 means that contract BTCH8 (leg 2) was bought and BTCF8 leg 1 was sold at a net price of +130. Therefore, if the identified transaction in BTCF8 (the nearby contract) was \$20,000 and the size of the spread was 1 contract, the implied transactions are BTCF8: \$20,000 @ 1 contract and BTCH8: \$20130 @ 1 contract at the calendar spread execution time.

5 Contingency Calculation Rules

5.1 Delayed Data and Missing Data

Delayed data and missing data are treated according to the following rules:

1. Where Relevant Transactions occur but cannot be retrieved from the CME proprietary data feed before the Index Publication Time then they will be disregarded from the relevant index calculation for that Calculation Day. Where there are less than two (2) Relevant Transactions in the referenced Contract within a specified partition (as defined in section 4.1.1), that partition will be ignored in the calculation of the final Futures Implied Basis on that Calculation Day.
2. If there are no partitions with viable trade data on a day, the final trade price for the referenced Contract will be the CME Settlement Price.
3. If no CME settlement Price is published in a referenced Contract or the published price is erroneous on any Calculation Day, then a Calculation Failure Event shall be declared by the Administrator (see Section 5.6).

5.2 Erroneous Data

All Relevant Transactions retrieved by the Administrator for the determination of a Reference Price on a given Calculation Day are subject to an automated screening for erroneous data according to the following rules:

1. If a Relevant Transaction in outright futures (whether captured as an outright transaction or implied from a calendar spread trade) shows a non-numeric or non-positive Transaction Price or trade size, it is flagged as erroneous. Executed prices of Relevant Transactions in calendar spread trades can be positive, negative or zero.
2. If a Relevant Transaction is reported in a format that deviates from the expected format such that it cannot be parsed, it is flagged as erroneous.

All Relevant Transactions flagged as erroneous for a given Calculation Day are disregarded in the calculation of the Reference Price, and hence index, on that Calculation Day.

5.3 Potentially Erroneous Data

All Relevant Transactions retrieved by the Administrator for a given Calculation Day are subject to automated screening for potentially erroneous data according to the

following rules:

1. The first two trades in any partition are marked as potentially erroneous if either of those trades differ by more than the Outright Futures Potentially Erroneous Data Threshold (see parameter section 7) from the average of the two trades. In that event, the first trade is discarded and the next trade in the partition is evaluated until a first viable trade pair is found. The trade immediately following the first viable trade pair is potentially erroneous if its price exceeds the price of the second trade in that pair by more than the Outright Futures Potentially Erroneous Data Threshold.
2. Beyond the first viable trade pair in a partition, a Relevant Transaction observed for any Reference Price determination differs in price by more than the Outright Futures Potentially Erroneous Data Threshold from the previous Relevant Transaction utilised in the Reference Price determination is flagged as erroneous. Any transaction that triggers the provisions of this rule will be discarded from consideration in assessing any subsequent Relevant Transaction for this rule.

The following changes are made to the above steps for calendar spread trades:

1. The Outright Futures Potentially Erroneous Data Threshold only applies if either the most recent or the current (or both) executed calendar spread trade prices are outside the Calendar Spread Potentially Erroneous Data Range.
2. If both the most recent spread trade price and the current spread trade price are inside the Calendar Spread Potentially Erroneous Data Range, then the Calendar Spread Potentially Erroneous Data Threshold as an absolute threshold applies instead of the Outright Futures Potentially Erroneous Data Threshold for the purpose of potentially erroneous data calculation.

For the avoidance of doubt, the above potentially erroneous data calculation applies separately to both the initial set of outright futures trades and the initial set of calendar spread trades for a partition on any given Calculation Day before any matching and unpacking of calendar spread trades takes place. There is no additional potential erroneous data calculation after the unpacking methodology is completed.

All Relevant Transactions flagged as potentially erroneous for a given Calculation Day are disregarded in the calculation of the Reference Price on that Calculation Day. The occurrence of any such flag is reported to the CF Oversight Function.

5.4 Delayed Calculation & Publication

Where for any reason the Administrator is not able to calculate and publish the index within the Publication Time on any given Calculation Day then the Administrator shall

clearly communicate to all licensees via Statuspage informing index users that calculation and publication has been delayed. The Administrator will seek to publish the index for that Calculation Day as soon as it is able to. Should the Administrator not be able to calculate and publish the index by 23:59:59 London time then the provisions of Rule 5.6 shall come into effect.

5.5 Expert Judgment

The Administrator does not utilise Expert Judgement in the day-to-day calculation of the Reference Rates. In extraordinary circumstances Expert Judgement may be exercised by the Administrator in accordance with its codified policies and processes which are available upon request.

5.6 Calculation Failure

If the Index cannot be calculated for a given Calculation Day before 23:59:59 London time, for instance because:

- sufficient Relevant Transactions occur but for any reason cannot be retrieved from the relevant input sources, or
- all Relevant Transactions retrieved by the Administrator are flagged as erroneous or potentially erroneous (see Section 5.2); or any other reason or circumstance that prevents the orderly calculation of the index

then the index for that Calculation Day undergoes Calculation Failure and NO index value is published for that day, subject to Restatement & Republishing Rules.

The occurrence of a calculation failure of the index is reported to the CF Oversight Function.

6 Restatement & Republishing

The Administrator may restate and republish the index value where the published value is found to be incorrect. This will only occur if both the below conditions are met:

1. Timeliness – where the Administrator can RESTATE and REPUBLISH the index value before 23:59:59 of the given Calculation Day.
2. Materiality – where the RESTATED index value average has an absolute variance greater than 0.20% for the average value for the given Calculation Day.

Example:

- The index on a given Calculation Day is published as 1234.56
- The index will only be RESTATED if the average is:
 - Greater than 1237.03
 - OR
 - Less than 1232.09

Where the above conditions are met the Administrator shall announce on its website that a restatement and republishing of the index will take place for that Calculation Time.

The Administrator shall restate the index as soon as possible and shall do so by overwriting the previously published index. The restated index will carry no mark when published and will be final and not subject to any further change or republication.

7 Parameters

Parameter	Value
Roll Days	[4,3,2] days prior to Expiry Day of Front Contract
Index Publication Time	4:00 pm London Time
TWAP Period Length (τ)	60 minutes
TWAP Period	3:00pm to 4:00 pm London time
Partition Length ($\hat{\tau}$)	10 minutes
Number of Partitions (K)	6
Historical Number of Days (h)	5
Total Roll Steps ($ rs $)	3
Initial Front Basis Weight ($w_{Front,Initial}$)	1.00
Initial Next Basis Weight ($w_{Next,Initial}$)	0.00
Rounding	2 decimals
Outright Futures Potentially Erroneous Data Threshold	20%
Calendar Spread Potentially Erroneous Data Threshold	\$40
Calendar Spread Potentially Erroneous Data Range	[-\$200,+\$200]
Outright Trade Lag Threshold	10 seconds

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