



Cboe Continuous Futures Funding Amount Methodology

Funding Amount Calculation

The Funding Amount (*FA*) is a daily cash adjustment applied daily to open positions in a Cboe Continuous Futures contract as part of the daily and final settlement processes through Cboe Clear U.S., LLC. The purpose of the daily cash adjustment is to adjust positions in Cboe Continuous Futures as necessary to be representative of a position in the underlying. The magnitude and whether the daily cash adjustment is a debit or credit is a function of the extent to which futures prices deviate from the underlying value and whether the net position is long or short.

The *FA* is applied to a net position of *N* contracts, where a long net position is positive and a short net position is negative, multiplied by a per-contract Funding Amount (*PCFA*), pursuant to the following formula:

$$FA = N * PCFA$$

The *PCFA* is calculated once per day based on the following formula:

$$PCFA = ROUND(-1 * CFR * FDSP * CS)$$

where:

CFR = Clamped Funding Rate

FDSP = Futures Daily Settlement Price¹

CS = Contract Size of the Continuous Futures product

ROUND = Round any half penny to the nearest even penny (utilizing banker's rounding)

The Clamped Funding Rate (*CFR*) is calculated from the Funding Rate (*FR*) with a clamp applied that limits the value to not be less than a product-specific minimum clamp value and to not exceed a product-specific maximum clamp value (e.g., [(0.002), 0.002]).

The *FR* is a weighted average value of the Basis between the futures price and the underlying value computed once per-minute throughout a trading day according to the following formula:

$$FR = \frac{\sum i * Basis(i)}{\sum i}$$

where:

i = Count of the minutes for which a valid Basis value is calculated

¹ On the final settlement date of an expiring Continuous Futures contract, the FDSP is equal to the Final Settlement Value.

$$Basis(i) = \frac{FuturesPrice(i) - UnderlyingPrice(i)}{UnderlyingPrice(i)}$$

UnderlyingPrice(i) = The product-specific Cboe-Kaiko Reference Rate value sampled at the end of the i'th minute

FuturesPrice(i) = If the last trade price of the current trade date is within the prevailing best bid and best offer price (prevailing bid-ask spread) at the end of the minute, the last trade price is used, regardless of whether the last trade occurred within the current minute. If the last trade price is outside the prevailing bid-ask spread or a trade has not occurred in the applicable Continuous Futures Contract during the applicable trading day prior to the end of the minute, the midpoint of the prevailing bid-ask spread at the end of the minute is used. For this purpose, the prevailing bid-ask spread is the last valid two-sided market within the minute. A valid two-sided market includes both a pending bid with a non-zero value and a pending offer with a non-zero value. A two-sided market will not be considered valid if it includes either no bid or no offer. If a valid two-sided market does not exist within the current minute, then a valid Basis value for the current minute cannot be calculated, and a Basis value for that minute will not be included in the *FR* calculation.

If the midpoint normalized bid-ask spread (*MNBAS* defined below) at the end of the minute exceeds a product-specific threshold (e.g., 0.005) then a valid futures price does not exist for this purpose and a valid Basis value for the current minute cannot be calculated. In that case, a Basis value for that minute will not be included in the *FR* calculation.

$$MNBAS = \frac{FuturesAsk - FuturesBid}{\frac{FuturesAsk + FuturesBid}{2}}$$

The Contract Size, maximum clamp value, applicable Cboe Kaiko Reference Rate, and MNBAS threshold for a Continuous Futures product may be found in the product specifications for that Continuous Futures product.

The Funding Amount is designed so that, if the incrementally weighted average of the futures price minus the underlying value over the course of a trading date is above (below) the underlying value, then the value of the cash adjustment will be negative (positive) for net long positions.

If the incrementally weighted average of the futures price minus the underlying value over the course of a trading date is above (below) the underlying value, then the value of the cash adjustment will be positive (negative) for net short positions.

Hours, Weekends, Holiday, and Market Halts Calculations

Per-minute Basis values will be calculated as inputs to the Funding Amount for a trading day from 5:00 p.m. Chicago time (previous day) until 3:00 p.m. Chicago time:

Type of Trading Hours	Monday – Friday	Per-minute Basis Values Calculated
Extended	5:00 p.m. (previous day) to 8:30 a.m.	Yes
Regular	8:30 a.m. to 3:00 p.m.	Yes
Extended	3:00 p.m. to 4:00 p.m.	No

Per-minute Basis values will not be calculated when the market is not open in the applicable product, including when the market is not open in that product on weekends, holidays, and during trading halts and suspensions. Per-minute basis calculations will resume when trading resumes following a time frame in which the market is not open in that product. No adjustments will be made to the Basis calculations to account for the time frame in which the market was closed in that product due to a weekend, holiday, or trading halt.

Updates to Methodology

The Funding Amount Methodology may be updated from time to time. Any changes to the Funding Amount Methodology will be communicated via Exchange Notice and are subject to any required regulatory filings.

Funding Calculation Examples

Example Funding Amount for a Positive Funding Rate

CFR	0.00025
FDSP	116,747
CS	0.01
PCFA	0.29

Position (N)	Funding Amount (FA)	Description
1	(\$0.29)	\$0.29 is debited from an account with 1 net long contract
(1)	\$0.29	\$0.29 is credited to an account with 1 net short contract
12	(\$3.48)	\$3.48 is debited from an account with 12 net long contracts
(12)	\$3.48	\$3.48 is credited to an account with 12 net short contracts

Example Funding Amount for a Negative Funding Rate

CFR	(0.00018)
FDSP	118,324
CS	0.01
PCFA	(0.21)

Position (N)	Funding Amount (FA)	Description
1	\$0.21	\$0.21 is credited to an account with 1 net long contract
(1)	(\$0.21)	\$0.21 is debited from an account with 1 net short contract
25	\$5.25	\$5.25 is credited to an account with 25 net long contracts
(25)	(\$5.25)	\$5.25 is debited from an account with 25 net short contracts

Example Use of Futures Spread Midpoint for Basis Calculation

Bid	83,910.30
Ask	83,910.40
MNBAS Threshold	0.005
MNBAS	0.0000012
Last	83,915.00
FuturesPrice(i)	83,910.35

Since the midpoint normalized bid-ask spread (MNBAS) is less than the threshold value of 0.005, a valid futures price can be calculated. Since the last trade price is outside the prevailing bid-ask spread, the midpoint of the bid-ask spread (83,910.35) is the FuturesPrice(i) used in the Basis calculation.

Example Use of Futures Last Price for Basis Calculation

Bid	83,965.80
Ask	83,965.90
MNBAS Threshold	0.005
MNBAS	0.0000012
Last	83,965.80
FuturesPrice(i)	83,965.80

Since the midpoint normalized bid-ask spread (MNBAS) is less than the threshold value of 0.005, a valid futures price can be calculated. Since the last trade price is within the prevailing bid-ask spread, the last trade price (83,965.80) is the FuturesPrice(i) used in the Basis calculation.

Example Sample Weights

In this example, the MNBAS for all 5 samples are within the threshold value of 0.005, thus a valid FuturesPrice(i) value can be calculated for each sample. As a result, the sample weights i are incrementing integers with no gaps.

Underlying	Futures Bid	Futures Ask	Futures Last	FuturesPrice(i)	Basis	i
83,916.03	83,910.30	83,910.40	83,915.00	83,910.35	(0.000068)	1
83,983.13	83,965.80	83,965.90	83,965.80	83,965.80	(0.000206)	2
83,990.16	83,986.00	83,986.10	84,000.00	83,986.05	(0.000049)	3
83,999.21	83,994.50	83,994.60	83,994.60	83,994.60	(0.000055)	4
84,048.32	84,007.90	84,008.00	84,007.90	84,007.90	(0.000481)	5

Example Sample Weights When Unable to Calculate a Basis Value

In this example, the MNBAS for the third sample (0.00501) exceeds the threshold value of 0.005, thus a valid FuturesPrice(i) value cannot be calculated for the sample. As a result, a valid Basis value for the sample does not exist and the sample will not be included in the Funding Rate calculation. In this case the sample weight i for the subsequent sample (3) increments from the value of the previous valid Basis sample (2).

Underlying	Futures Bid	Futures Ask	Futures Last	FuturesPrice(i)	Basis	i
83,916.03	83,910.30	83,910.40	83,915.00	83,910.35	(0.000068)	1
83,983.13	83,965.80	83,965.90	83,965.80	83,965.80	(0.000206)	2
83,990.16	83,566.10	83,986.10	84,000.00	-	-	-
83,999.21	83,994.50	83,994.60	83,994.60	83,994.60	(0.000055)	3
84,048.32	84,007.90	84,008.00	84,007.90	84,007.90	(0.000481)	4

Example of Funding Rate Clamp Application

The Funding Rate calculation may result in a value outside of the product-specific clamp range (e.g., [(0.002), 0.002]), in which case the Funding Rate will be set to the upper or lower clamp based on which clamp is exceeded. In the example below, the funding rate for the third sample exceeds a lower product-specific clamp range value of (0.002) and as a result, the Clamped Funding Rate is set to the lower clamp value of (0.002).

Funding Rate	Clamped Funding Rate
(0.00197614)	(0.00197614)
(0.00195004)	(0.00195004)
(0.00214873)	(0.00200000)