

BitSkew Index Methodology

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Define the BitSkew Index as a linear function of an arithmetic skewness swap rate, denoted S . More specifically,

$$\text{Skew Index} = 100 - 10 * S$$

S is calculated from a portfolio of BTC options that resembles the fair payoff of a 30-day arithmetic skewness swap. It is derived by interpolation or extrapolation from S_1 and S_2 , the price skewness at adjacent BTC monthly expirations:

$$S = wS_1 + (1 - w)S_2 \quad \text{where} \quad w = \frac{t_2 - t_M}{t_2 - t_1}$$

Here t_1 and t_2 are respectively the time (in seconds) to the near and next-term expiration, while t_M is the number of seconds in 30 days ($30 \times 86,400 = 2,592,000$).

The skewness estimates $S_{1,2}$ are calculated using arithmetic skewness swap approximation:

$$S_{1,2} = \frac{2 \left\{ 3 \sum_i (K_i - F) \Delta K_i p_i + [(p_{ATM}^c - p_{ATM}^p)]^3 \right\}}{\left\{ 2 \sum_i \Delta K_i p_i - [(p_{ATM}^c - p_{ATM}^p)]^2 \right\}^{3/2}}$$

Where

K_{ATM}	Strike closest to the point where linearly interpolated BTC call and put prices intersect;
p_{ATM}^c	US Dollar Price of the at-the-money (ATM) BTC call option;
p_{ATM}^p	US Dollar Price of the ATM BTC put option;
F	Forward price defined as $F = K_{ATM} + (p_{ATM}^c - p_{ATM}^p)$;
K_i, p_i	A list of unique BTC options strikes, ordered from lowest to highest, and the corresponding BTC options prices; of a call if $K_i > K_{ATM}$; and of a put if $K_i < K_{ATM}$; if $K_i = K_{ATM}$ then an average of the ATM BTC put and call prices;
ΔK_i	Half the difference between the strikes on either side of K_i :

$$\Delta K_i = \frac{K_{i+1} - K_{i-1}}{2}$$

For the last (highest and lowest) selected strikes, ΔK_i is simply the absolute difference between K_i and the nearest selected option's strike.

Option expiration, strike and price selection for the BitSkew index is identical to that used for the BitVol Index, except the rule used to cut off the tails is slightly different (see #3 below). In summary:

1. When the closest monthly expiration is too close to expiry (less than two full days), rolling to the third monthly expiration occurs.
2. BTC option prices (called Cash Reference Prices, or CRPs) are determined using the proprietary “price dragging” technique.
3. When two consecutive options with CRPs of 0.001 BTC or less (0.001 ETH or less for EthSkew) are reached, exclude all options further away from the money at both tails. For this tail elimination step only, the option premiums are measured in BTC (or ETH for EthSkew) instead of US Dollars, in order to include only the most relevant strikes and limit the impact of long tails (particularly on the upside, which is unbounded in theory and could blow out significantly for this asset class).

Similarly, the EthSkew Index is computed utilizing ETH options, using the same methodology.

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