

Fact Sheet Overview : Altcoin Volatility Surface

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COLLECTIVELY WRITTEN BY



GRÉGOIRE
MAGADINI



EUAN
SINCLAIR



SAMNEET
CHEPAL

Methodology overview

“The Equity Basket Bootstrap”

STEP 1

Take the entire equity universe and narrow it down to stocks with liquid option markets and reasonably tight option spreads. This subset is referred to as the **Calibration Basket**.

STEP 2

Ensure all the stocks in the **Calibration Basket** have smooth volatility surfaces for Amberdata’s bootstrapping methodology to reference. These surfaces are referred to as the **Smoothed Equity Surfaces**.

STEP 3

All eligible Altcoins must have at least 180-days of price data. We begin the process by running Cointegration tests between the Altcoin and every stock found in the **Calibration Basket**.

STEP 4

We rank order all the Cointegration test scores between the Altcoin and **Calibration Basket** stocks, finding the top five stocks with the highest Cointegration test score. This new subset of stocks is now referred to as the **Curated Basket**.

STEP 5

We extract a volatility surface for the Altcoin from an equal weighting of all the **Smoothed Equity Surfaces** found in the **Curated Basket**. This provides us the Altcoin volatility surface shape.

STEP 6

Next, we need to scale-up or scale-down the level of the volatility surface. The Altcoin historical volatility must be taken into account and scaled appropriately. Using a GARCH (1,1) model, we calculated the historically observed volatility of the Altcoin and use GARCH (1,1) in order to project estimated volatility levels for 7-DTE and 30-DTE, our supported model maturities.

STEP 7

Finally we create confidence boundaries by observing the various Altcoin price distribution moments. We calculate the range of historical volatility, the historical correlation between volatility and price returns (a measure of skew) and finally the volatility-of-volatility. Measuring the value ranges gives us a good estimate of the observable stability of the moments. Based on this dispersion we adjust our confidence in the Altcoin Surface by widening or narrowing the bid/ask spreads around our theoretical volatility “marks”.



Available Endpoints

ALTCOIN SVI

<https://docs.amberdata.io/reference/svi-altcoin>

What does it do?

This endpoint returns the volatility surface in SVI parameter form for both 7-days to expiration and 30-days to expiration (DTE), for the select Altcoin of choice.

Having the SVI format is useful because it allows users to price continuous strike selection.

ALTCOIN STATISTICS TABLE

<https://docs.amberdata.io/reference/altcoin-svi-statistics-table>

What does it do?

This endpoint is a valuable “utility” endpoint. It returns many useful statistics.

In a single call users can return all supported Altcoin statistics.

- A Delta Surface for both the 7-DTE and 30-DTE calibrations
- A family of GARCH(1,1) estimates, both historical and projected.
- The Curated Basket used for the Altcoin in question. Allowing users to see equities referenced.
- Median Spot/Vol relationships measured historically (an estimate of Skew).

ALTCOIN STRIKE MARKS

<https://docs.amberdata.io/reference/altcoin-strike-marks>

What does it do?

This endpoint allows users to pass a supported Altcoin and automatically generate an option chain of synthetic options with multiple strike prices.

Every synthetic option strike will include a Mark IV, as well as a Bid/Ask spread.

An option index price (spot market) value is included at the time of calibration, as well as a synthetic futures price with a basis premium/discount that is averaged from Bitcoin and Ethereum on Deribit.

Advantages of methodology

The standard methodology currently employed by market participants is to begin with a liquid crypto volatility surface, such as BTC or ETH, and adjust the shape for Altcoin volatility by calculating the realized moments (Volatility, Skew, and Kurtosis (or Vol-of-vol)) and calculating a ratio between the BTC or ETH and the Altcoin.

(Example) Level of Volatility

If the Altcoin has higher Volatility than ETH, adjust the ETH volatility surface proportionally higher.

(Example) Tilt of Volatility Wing Skew

If spot/vol correlation (a measure of skew) is different in the Altcoin, adjust the “tilt” to be more or less positively biased.

(Example) Steepness of Volatility Wings

Finally, higher volatility-of-volatility, introduces “jump risk” and requires the volatility wing slopes to be either steeper or flatter, based on the Altcoin readings.

Amberdata chooses to use The Equity Basket Bootstrap methodology for many reasons.

First, when calculating the realized moments for a given Altcoin we found the values to be very noisy. Depending on the measurement window used or when the measurements are conducted, there’s a lot of fluctuations from in the individual realized values.

The measurements are extremely unstable. This reduces our confidence that the appropriate scaling ratio is being applied to the reference surface. Such a discrepancy in estimates means the mythology becomes very subjective.

Second, the fourth moment, Kurtosis (or volatility-of-volatility), is an especially tricky statistical distribution moment to measure historically. Kurtosis is a measure of unexpected “fat tails”. Which means the events which affect the measurements are very far and few in-between by nature.

(Example) Think about the famous “Day in the life of a Turkey” meme. Without the complete dataset, which is realistically never achievable, we cannot measure the true nature of the distribution.

This effect is reflected in existing surfaces as option participants price in this potential for “jump risk” / unforeseeable “fat tails”.

A pure scaling-up or scaling-down of the reference surface is too sensitive to measurement risk and therefore the scaling coefficient is unstable.

Extracting well priced surface shapes from Cointegrated peers is more robust and consistent methodology in our opinion.

Lastly, Amberdata believes that our methodology is unique and extremely hard to reproduce due to all the pre-requisite ingredients needed for this approach. It also provides customers with a truly differentiated “second opinion” of the accurate market Altcoin volatility surface.

This method is robust, consistent and not subject to individual assumptions or biases.

We believe the entire industry can rely on the Amberdata’s Equity Basket Bootstrap methodology for unbiased and consistent volatility surface marks.



amberdata.io

docs.amberdata.io

hello@amberdata.io