Bloomberg Professional Services

Indices

Bloomberg Bitcoin and Ethereum Market Cap-Weighted Index Methodology

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Bloomberg

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Introduction

The Bloomberg Bitcoin and Ethereum Market Cap-Weighted Index ("Index") is designed to measure the performance of both Bitcoin and Ethereum weighted by their Market Capitalization based on the Circulating Supply. The index is denominated in USD. The index is owned and administered by Bloomberg Index Services Limited ("BISL" or the "Administrator").

BISL administers the Index according to three guiding principles:

1. Data Integrity	Digital Asset Research (DAR) is the source of daily pricing, classification, and market value. DAR maintains high quality data with processes in place to detect manipulation. Price sources are subjected to a rigorous vetting process and multiple quality control tests to avoid exchanges involved in market manipulation. (See DAR Vetting and Pricing methodology)
2. Representative	The Index seeks to provide a proxy for the broader Cryptocurrency market.
3. Continuity	The Index is intended to be responsive to the changing nature of the market in a manner that does not completely reshape the character of the Index from year to year.

Section 1: Index Construction

Input Data

Input data is for this index is sourced from Digital Asset Research, (DAR). BISL utilizes the DAR Close Price as the input data used in the calculation.

DAR takes pricing from eligible exchanges based on the **DAR exchange vetting Methodology**.
This process aims to identify trustworthy exchange platforms and encourage best practices by gathering, recording, and comparing a series of quantitative and qualitative data points. DAR's team of researchers and technical experts work closely with exchanges, regulators, and investors to collect public and non-public data points that are used to reach a reasoned determination on each of the methodology's criterion. The Exchange Vetting Methodology is reviewed quarterly and updated as required to reflect the maturing digital asset marketplace and the needs of its participants.

The DAR Close Price is a time-weighted average price (TWAP) derived from eligible, non-outlier trades that occur within a 30-minute window prior to the specified close time. The specified close time is 4pm and is calculated as per the DAR close price and Hourly Price Methodology:

Further details on the Input Data calculation and methodology surrounding the DAR closing price can be found here.

Currency

Input data is priced and calculated in US Dollars (USD).

Rebalance Schedule

The Index is rebalanced monthly. Index weights are calculated and announced on the business day preceding the second-to-last Friday of the month ("Rebalance Announcement Day") and implemented on the business day preceding the last Friday of the month ("Rebalance Implementation Day").

Weighting Scheme

Both Bitcoin and Ethereum are all initially weighted by their Market Capitalization based on the Circulating Supply. Thereafter, weights are calculated using end-of-day prices from Digital Asset Research on the day preceding the second-to-last Friday of the month.

Index Calculation

The Index level is calculated using the following formula:

$$Index_t = \frac{\sum_{i=1}^{x} P_{i,t} \times CS_{i,m}}{D}$$

Where

$Index_t$ = Index level on day t
$P_{i,t}$ = end of the day price for Constituent i on day t, expressed in Cryptocurrency per index currency (e.g. Bitcoin per USD)
$CS_{i,m}$ = Circulating Supply of Constituent i in month m of the current year
D = Index Divisor

-

x = Number of constituents

The base level for the Index was set at 1000 on May 31, 2018.

Initial Divisor is calculated as:

$$D_0 = \frac{\sum_{i=1}^{x} P_{i,0} \times CS_{i,0}}{1000}$$

Where

D_0 = Divisor on May 31, 2018
$P_{i,0}$ = price for Constituent i on May 31, 2018, expressed in Cryptocurrency per Index currency (e.g. Bitcoin per USD).
$CS_{i,0}$ = Circulating Supply of Constituent i on May 31, 2018
x = Number of constituents

Divisor Adjustment

Changes in the Circulating Supply, addition or deletions of Constituents should not change the level of the Index. If the Index closes at a level of 1000 and after the market close a Constituent is replaced by another Constituent, the Index will still open at the 1000 level. This is accomplished by adjusting the Index divisor. Any changes to the Constituent that alter the total market value of the Index while holdings Constituent prices constant, require a divisor adjustment. The Index divisor is simply a scaled representation of the adjusted Market Capitalization of the Index.

$$D_{new} = D_{old} * \frac{\sum_{i=1}^{x} P_{i,t} \times CS_{i,m}}{\sum_{i=1}^{n} P_{i,t} \times CS_{i,r}}$$

Where

$P_{i,t}$ = Constituent i on day t, expressed in Cryptocurrency per Index currency (e.g. Bitcoin per USD)
$CS_{i,m}$ = Circulating Supply of Constituent i in month m of the current year
$CS_{i,r}$ = Circulating Supply of Constituent i in month m-1 of the current year
D_{old} = Old Index Divisor in month m-1 of current year
x = New number of Constituents in month m
n = Old number of Constituents in month m – 1

The following scenarios may trigger a divisor adjustment. Given that the digital assets space is still a developing asset class, we suspect there may be other scenarios, aside from the ones listed directly below, that could also lead to an adjustment:

1. Hard Fork - Digital asset forks are defined as changes in the underlying protocol of a digital asset network or as the situations that occur "when two or more blocks have the same block height". A fork impacts the validity of the rules. Forks are typically conducted in order to add new features to a Blockchain, unwind the impact of a hack or fix catastrophic bugs. The adjustment factor for a Hard Fork is to be derived based on the analysis of the changes to the Blockchain and the value of the original and post-fork digital asset.
2. Change in pricing calculation – when a change in pricing methodology occurs, including splits or reverse splits, a divisor adjustment must be used to enforce the continuity of the index levels (i.e. prevent a gap in index levels on the day of the change).

Section 3: Publication

End-of-Day Index Level

The official end-of-day Index level is calculated based on the time-weighted average pricing of the underlying assets from 15:30:00 ET to 16:00:00 ET and is disseminated promptly thereafter, using a two decimal place rounding.

Intraday Index Level

The intraday Index Level is calculated using Bloomberg BGN prices and will be calculated and published on the Bloomberg Terminal from 18:15:00 ET to 16:15:00 ET (22 hours).

The BGN is a sophisticated pricing algorithm that produces accurate indications of bid and ask quotes that are derived from multiple approved Cryptocurrency Pricing Sources.

BGN prices are designed to track executable bid and ask input rates from a select subset of Bloomberg's bitcoin pricing sources, which have met selection criteria such as pricing consistency, frequency, and quality. Pricing sources are anonymous to users and the sources themselves and the pricing sources change from time-to-time depending on the quality of data they provide. Each source is assigned a quality score based on numerous factors including update frequency and spike frequency. Price inputs are not limited to quotes from market making firms; rather, price inputs include quotes from any market participant whose quotes are executable on a pricing source's market.

Bloomberg undertakes a periodic review of the appropriateness of specific data used in the calculation and validation of the BGN rates.

This review is intended, among other things to assist in ensuring the BGN rates are based on reliable and observable market data that reflect the economic reality of a given market.

The BGN construction is designed to consistently produce levels without interpolation or extrapolation of input data. In addition, as noted above, sources are anonymous to users and the sources themselves at each pricing point and the data received is ancillary to the source's primary purpose of soliciting bitcoin transactions from the market.

Approved bitcoin pricing sources have, at a minimum, represented to Bloomberg that they have documented compliance programs that include, but are not limited to, Anti-Money Laundering (AML) and Know Your Customer (KYC) policies, and have provided Bloomberg with an organizational and/or ownership chart.

Errors related to intraday levels will not be restated, as real time levels are considered indicative only. Intraday index levels are calculated from 18:15:00 ET to 16:15:00 ET on every Index Business Day.

Index Publication Days

The Index is published on New York Stock Exchange trading days[1], also referred to as Index Business Days.

Stress Events

If a DAR price is unavailable due to unforeseen events, the Index will be calculated using the last available DAR price. If a DAR price is unavailable for more than three consecutive Index Business Days, escalation to the PROC will be made to determine the publication of index levels.

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[1] https://www.nyse.com/markets/hours-calendars

Section 4: Risks and limitations

Limitations of the index

Though the Indices are Index is designed to be representative of the markets they it measures or otherwise aligns with their its stated objective, they it may not be representative in every case or achieve their its stated objective in all instances. The Index is y are designed and calculated strictly to follow the rules of this Methodology, and any Index Level or other output is limited in its usefulness to such design and calculation.

Markets can be volatile, including those market interests which the Indices intend to measure or upon which the Indices are dependent in order to achieve their stated objective. For example, illiquidity can have an impact on the quality or amount of data available to the Index Administrator for calculation and may cause the Indices to produce unpredictable or unanticipated results.

In addition, market trends and changes to market structure may render the objective of the Index unachievable or to become impractical to replicate by investors.

Specifically, the Index measures the performance of the Bitcoin and Ethereum priced on the vetted exchanges. The Index is therefore subject to the volatility and illiquidity of certain digital assets. The sector has tended to be more volatile over both the long-term and the short-term compared to others with index presence including, but not limited to, fixed income and equities. In addition, prices are gathered through third-party sources for the purpose of establishing index Constituent valuations. This is an additional operational risk as the quality of Constituent valuation is predicated upon receiving accurate or timely pricing.

In addition, digital assets' pricing sources face heightened risks relative to traditional stock and commodity exchanges, including but not limited to, cyber-attacks, errors resulting from the lack of standards and naming convention for symbols, and other risks stemming from a complex technological and legal environments (causing changes in fee structure, blocking of funds withdrawal, etc.). Suspension or disruption of market trading in digital assets may adversely affect the value of the Index.

Section 5: Benchmark Oversight and Governance

Benchmark Governance, Audit and Review Structure

Please refer to the "Governance Structure" section in BISL Benchmark Procedures Handbook available here.

Index and Data Reviews

Please refer to the "Index and Data Reviews" section in BISL Benchmark Procedures Handbook available here.

Cessation Policy

Please refer to the "Cessation Policy" section in BISL Benchmark Procedures Handbook available here

Expert Judgement & Discretion

Please refer to the "Expert Judgment and Discretion" section in BISL Benchmark Procedures Handbook available here

Conflicts of Interest

Please refer to the "Conflicts of Interest" section in BISL Benchmark Procedures Handbook available here.

Restatement Policy

Please refer to the "Restatement Policy" section in BISL Benchmark Procedures Handbook available here

Glossary Of Terms

Administrator: means BISL.

BGN: BGN refers to Bloomberg Generic price. The BGN is a sophisticated pricing algorithm that produces accurate indications of quotes that are derived from multiple quality sources.

- For a BGN to be computed for a Cryptocurrency, the Cryptocurrency must be priced by at least two approved Pricing Sources
- The BGN algorithm calculates the BGN median bid and median ask prices for the Cryptocurrency
- The BGN mid-price is the average of the BGN bid and BGN ask prices

Data from Pricing Sources are the executable bid and ask prices - not executed trade prices.

Blockchain: Blockchain is a digitized, decentralized, public ledger of all Cryptocurrency transactions.

Bloomberg Index Services Limited or BISL: the Index owner and administrator.

Bloomberg: Bloomberg L.P. and its affiliates, including BISL.

BOC: Benchmark Oversight Committee.

Circulating Supply: Circulating Supply, or available supply, is the best approximation of the number of coins that are circulating in the market and are available for trade, provided by DAR.

Constituent: Cryptocurrency that is a member of the Index.

Cryptocurrency: A Cryptocurrency is a digital asset designed to work as a medium of exchange that uses cryptography to secure its transactions, to control the creation of additional units, and to verify the transfer of assets.

Hard Fork: A hard fork occurs when a Blockchain protocol is radically changed, such that it becomes incompatible with older versions. In effect, participants taking part in transactions on the old Blockchain must upgrade to the new one in order to continue validating transactions in the new Blockchain. However, participants that do not upgrade may continue to support and validate transactions on the old Blockchain protocol separately. The result: a Blockchain splits into two - hence the name "hard fork". If there are nodes permanently supporting the new chain, then the two chains will co-exist. Users that once held digital assets on an older Blockchain before the protocol change at a pre-specified Blockchain length will now also hold an amount of new coins on the altered Blockchain. This new Cryptocurrency has essentially been derived from an older Cryptocurrency as well as its associated Blockchain's transaction history. As per the Index methodology, hard forks are considered to be new Constituents.

Index: Bloomberg Bitcoin and Ethereum Market Cap-Weighted Index

Index Business Day: Days on which the Index is published (New York Stock Exchange trading days).

Index Weight: The percent weight of an individual Constituent in the Index. The sum of all Index weights adds to 100%.

Liquid: A liquid asset can be converted into cash with minimal impact to the price received in the open market. Liquidity is measured by 30-day median daily value traded in USD.

Market Capitalization: Market capitalization, measured in USD, is calculated as the product of each

Cryptocurrency's Circulating Supply, and DAR pricing.

Pricing Sources: Pricing Sources are trading platforms that facilitate buying and selling Cryptocurrencies online. Many Pricing Sources refer to themselves as "exchanges," which can give the misimpression that they are regulated or meet regulatory standards of a national securities exchange. Many of the U.S.-based digital Cryptocurrency trading platforms have elected to be state-regulated "money-transmission services". Traditionally, from an oversight perspective, these predominantly state-regulated payment services have not been subject to direct oversight by the SEC or the CFTC.

PROC: Product, Risk & Operations Committee.

Rebalance Announcement Day: The business day preceding the second-to-last Friday of the month.

Rebalance Implementation Day: The business day preceding the last Friday of the month.

Version tracker:

Date	Update
2024/31/5	Bloomberg Bitcoin and Ethereum Market Cap-Weighted Index methodology draft written.

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