CMBI Total Market Series Methodology

Version 1.0

Last Revised: November 22, 2022

0 Change Log

Release	Date	Changes
Version 1.0	November 22, 2022	Finalized CMBI Total Market Series Methodology

1 Introduction

Coin Metrics' mission is to provide transparent and actionable cryptoasset market and network (on-chain) data. As one of the early providers of both market and network data, Coin Metrics is uniquely positioned to provide investors with a high quality suite of crypto indexes.

The Coin Metrics Bletchley Indexes ("CMBI") are designed to provide cryptoasset markets with a diverse range of market capitalization-weighted, equal-weighted and network data-weighted indexes to measure performance of the largest and most utilized global cryptoassets. CMBI products are operated and calculated by Coin Metrics and are designed to serve as an independent, transparent, and comprehensive measure of crypto market performance.

Indexes are weighted and calculated using a robust and resilient methodology that is resistant to manipulation and designed to align with international best practices for financial benchmarks, including the International Organization of Securities Commissions' (IOSCO) Principles for Financial Benchmarks. The Coin Metrics Oversight Committee (the "Oversight Committee") protects the integrity of the CMBI indexes and ensures that the indexes serve as a source of transparent and independent benchmarking.

This document is intended to be read in conjunction with other Coin Metrics methodologies that inform many of the data inputs. These include:

- [CM Real-Time Reference Rate Methodology](#)
- [CM Reference Rate Methodology](#)
- [CM Estimated Market Cap Methodology](#)
- [CM Network Data Overview](#)
- [CM Market Selection Framework](#)

2 Description

The CMBI Total Market Series is reflective of the returns an investor would expect by purchasing all of the cryptoassets at the corresponding weights for each index. All assets in the index series are members of the datonomy, a classification system for digital assets created jointly by Coin Metrics, Goldman Sachs, and MSCI. Index prices are quoted in real-time and assets are rebalanced at 16:00 ET on the first business day of every month. Index constituents are reconstituted on the third-to-last business day of every March, June, September, and December. Quarterly reconstitution ensures that all crytpoassets are correctly represented in their appropriate index. Rebalancing relates to the weightings of the assets, while reconstitution relates to the assets' membership in the index.

Coin Metrics conducts a comprehensive assessment of all cryptoassets to ensure that the indexes represent the full breadth of investment opportunities in the global cryptoasset market. Coin Metrics formally defines a cryptoasset as any digital asset that exhibit the following characteristics:

1. The use of a distributed ledger to allow remote peer-to-peer transfer of native units of the cryptoasset

2. The state of the distributed ledger is maintained by distributed consensus and does not require a central authority or trusted intermediary to function

3. Ownership of native units of the cryptoasset can be proven by cryptography

Provided these requirements are met, the cryptoasset can be issued on any underlying blockchain architecture and use any distributed consensus mechanism.

Given the early stages and financial immaturity of the cryptoasset market, trading infrastructure, custody solutions, liquidity or other financial services have yet to reach the level of development to support the long tail of cryptoassets. Many of these factors have gone into the design of CMBI products and the methodology outlined below to create a suite of truly investable indexes. As the ecosystem evolves and becomes more developed, other indexes may become investable.

Index levels are available through the Coin Metrics website (https://coinmetrics.io/cm-indexes/), major financial quote vendors, and print and electronic media outlets. Detailed index data is provided monthly to licensees of CMBI products.

3 Eligibility Criteria

The index construction process begins by defining the set of cryptoassets that are eligible for inclusion as index constituents. This process involves the creation of the cryptoasset universe, derived by screening cryptoassets against a set of investability criteria. This screen is applied so that market participants can construct a portfolio of the index constituents at their proper weights without undue impediments and track the performance of the indexes with minimal tracking error.

To be included as a constituent in the CMBI Total Market Series universe, a cryptoasset must pass each of the criteria outlined below.

3.1 Datonomy

The CMBI Total Market Series leverages the [datonomy](#) to establish its market universe. All assets in the datonomy that meet the following eligibility criteria are included in the CMBI Total Market Index and are eligible to be included in the CMBI Sector Even Indexes and CMBI Sub-Sector Even Indexes. The Oversight Committee will review quarterly the assets that are added to datonomy for inclusion in the CMBI Total Market Series.

The Oversight Committee will also review quarterly changes to the Sector and Sub-Sector categorization. To be eligible for an index, a Sector or Sub-Sector must include at least eight unique cryptoassets.

3.2 Pricing

Cryptoassets are required to meet the following price criteria to ensure there are reliable and robust sources and trade pairs on which to derive an asset's fair price.
- Assets must have been traded at least once in the past 30 days on at least 25% of the eligible exchanges designated by the *Market Selection Framework*.
- Existing index constituents must be traded at least once in the past 30 days on at least 10% of eligible exchanges (minimum of 2).
- Cryptoassets must have a free floating price (i.e. not pegged to any underlying real or digital asset).

3.3 Volume

Cryptoassets are required to meet minimum liquidity requirements to ensure that a given cryptoasset has appropriate liquidity to facilitate trading and portfolio management with acceptable levels of market impact. Liquidity is measured by the 30-day and 180-day annualized traded value ratio (ATVR). The ATVR is designed to measure normal levels of liquidity and is robust to outliers where extremely high or low levels of volume may be observed on a given day. The 30-day ATVR and 180-day ATVR are used to evaluate a cryptoasset's liquidity over a short-term and intermediate-term period.

The ATVR is calculated for a given cryptoasset using the following steps:

1. For each day, the daily traded value is first calculated as the sum of the number of units traded of the given cryptoasset from markets traded on the set of eligible exchanges where the base asset is the given asset and the quote asset is the U.S. dollar, Bitcoin or Ethereum multiplied by the price in U.S. dollars of the given cryptoasset at the end of the daily interval. The price in U.S. dollars is obtained from the Coin Metrics Reference Rates.
2. For each day, the daily traded value ratio is calculated as the daily traded value divided by the asset's free float market capitalization.
3. The annualized traded value ratio is calculated as the median of the daily traded value ratios over the given time window, annualized by multiplying the median by 365.

A cryptoasset is required to have a 30-day ATVR and 180-day ATVR of over 5 percent to be eligible for inclusion as an index constituent.

3.4 New Token Eligibility

Newly created cryptoassets, by means of an initial coin offering, initial exchange offering, new blockchain launch, or other similar methods are subject to a minimum length of trading requirement. A cryptoasset is required to be traded on an eligible exchange for a minimum of 30 days to be eligible for inclusion as an index constituent.

A newly created asset that is created by means of a fork of an existing cryptoasset are excluded from the minimum length of trading requirement. Forked assets are eligible for inclusion as an index constituent in the following rebalance provided all other investability requirements are met.

4 Index Construction and Maintenance

4.1 Approach

There are two steps involved in calculating the CMBI Total Market Series: reconstitution and rebalancing. Reconstitution is the process by which crypto assets are re-evaluated for inclusion in market indexes, and subsequently added or removed. Rebalancing is the method by which index constituent weights are reset to their benchmark weight.

Total Market Series indexes are rebalanced monthly at 16:00 ET on the first business day of the month ("Effective Date"). The rebalancing reference date ("Reference Date") is three business days prior to the rebalancing day at midnight UTC. Business days are defined as Monday through Friday excluding public holidays, as defined by the New York Stock Exchange (NYSE) holidays and trading hours calendar.

Total Market Series indexes are reconstituted quarterly in March, June, September, December at 16:00 ET on the corresponding Reference Date. At each reconstitution, all cryptoassets that meet the criteria outlined in *3 Eligibility Criteria* are selected as the possible investment universe of CMBI Total Market Series products.

4.2 CMBI Total Market Index

The rebalancing process is as described below:
1. <u>Universe</u>: The total market universe comprises all assets included in the datonomy.
2. <u>Constituent Selection</u>: Eligible index members are datonomy assets not classified as *On-Chain Derivatives*. This effectively excludes stablecoins and asset-backed tokens ("wrapped coins").
3. <u>Weighting</u>: Constituents are weighted by their Estimated Market Capitalization.

No additions or deletions are made to the index between rebalancings, except in scenarios as articulated in the Contingency Rules section.

4.3 CMBI Market Sector Even Indexes

CMBI Market Sector Even Indexes leverage the Layer 2 Sectors as described in the datonomy. For a sector to be eligible for an index, it must include a minimum of eight unique assets. Current, CMBI Market Sector Even Indexes include:

Index Name	Index Ticker	Datonomy Sector Name
CMBI Application Utilities Sector Even	CMBIAUE	Application Utilities
CMBI Blockchain Utilities Sector Even	CMBIBUE	Blockchain Utilities
CMBI Business Services Sector Even	CMBIBSE	Business Services
CMBI Decentralized Finance Sector Even	CMBIDFIE	Decentralized Finance

CMBI Information Technology Sector Even	CMBIITE	Information Technology
CMBI Intermediated Finance Sector Even	CMBIIFE	Intermediated Finance
CMBI Media Services Sector Even	CMBIMSE	Media Services
CMBI Metaverse Sector Even	CMBIMTAE	Metaverse
CMBI Smart Contracts Platform Sector Even	CMBISCPE	Smart Contracts Platform
CMBI Specialized Coins Sector Even	CMBISCE	Specialized Coins
CMBI Value Transfer Coins Sector Even	CMBIVTCE	Value Transfer Coins

The rebalancing process is as described below:
1. <u>Universe</u>: CMBI Market Sector Even Indexes include all assets in the Layer 2 Sector of the datonomy.
2. <u>Constituent Selection</u>: All assets in a Sector of the Datonomy.
3. <u>Weighting</u>: Constituents for each CMBI Market Sector Even Index are assigned an equal weight at each rebalance.

No additions or deletions are made to the index between rebalancings, except in scenarios as articulated in the Contingency Rules section.

4.4 CMBI Market Sub-Sector Even Indexes

CMBI Market Sub-Sector Even Indexes leverage the Layer 2 Sectors as described in the datonomy. For a Sub-Sector to be eligible for an index, it must include a minimum of eight unique assets. Current, CMBI Market Sub-Sector Even Indexes include:

Index Name	Index Ticker	Datonomy Sub-Sector Name
CMBI Decentralized Exchanges Sub-Sector Even	CMBIDEXE	Decentralized Exchanges
CMBI Network Scaling Sub-Sector Even	CMBINSE	Network Scaling
CMBI NFT Ecosystem Sub-Sector Even	CMBINFTE	NFT Ecosystem

The rebalancing process is as described below:
1. <u>Universe</u>: CMBI Market Sub-Sector Even Indexes include all assets in the respective Layer 3 Sub-Sector of the datonomy.
2. <u>Constituent Selection</u>: All assets in a Sector of the datonomy.
3. <u>Weighting</u>: Constituents for each CMBI Market Sub-Sector Even Index are assigned an equal weight at each rebalance.

No additions or deletions are made to the index between rebalancings, except in scenarios as articulated in the Contingency Rules section.

4.5 Currency of Calculation

The CMBI levels are calculated in U.S. dollars and Bitcoin.

For real time index pricing, the Bitcoin price is determined using the CM Real-Time Reference Rate U.S. dollar Bitcoin price.

For the end of day pricing, the Bitcoin price is determined using the closing U.S. dollar price of Bitcoin as represented by the CM Reference Rates.

4.6 Historical Availability and Base Values

Index history availability and values are shown in the table below.

Name	Ticker	Return Type	Launch Date	First Value Date	Base Date	Base Value (USD)
CMBI Total Market Index	CMBITM	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Application Utilities Sector Even Index	CMBIAUE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Blockchain Utilities Sector Even Index	CMBIBUE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Business Services Sector Even Index	CMBIBSE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Decentralized Finance Sector Even Index	CMBIDFIE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Information Technology Sector Even Index	CMBIITE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Intermediated Finance Sector Even Index	CMBIIFE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Media Services Sector Even Index	CMBIMSE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Metaverse Sector Even Index	CMBIMTAE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Smart Contract Platforms Sector Even Index	CMBISCPE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Specialized Coins Sector Even Index	CMBISCE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100

CMBI Value Transfer Coins Sector Even Index	CMBIVTCE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Decentralized Exchanges Sub-Sector Even Index	CMBIDEXE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI Network Scaling Sub-Sector Even Index	CMBINSE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100
CMBI NFT Ecosystem Sub-Sector Even Index	CMBINFTE	Price return	November 22, 2022	July 1, 2019	July 1, 2019	100

4.7 Calculation Algorithm

The calculation algorithm of the market capitalization weighted indexes is described below.

The Index level is calculated as follows:

$$Index\ Level_t\ =\ \frac{\sum_{i=1} P_{i,t} \times FF_{i,t}}{Index\ Divisor}$$

Where,

Index Level$_t$	= Index level on day t
$P_{i,t}$	= CM RR 16:00 ET U.S. Dollar price for index constituent i on day t
$FF_{i,t}$	= Circulating supply of index constituent i on day t

The Index Divisor is calculated as follows:

$$Index\ Divisor_0\ =\ \frac{\sum_{i=1} P_{i,0} \times FF_{i,0}}{Base\ Level}$$

Where,

Index Divisor$_0$	= Index Divisor at Base Date
$P_{i,0}$	= CM RR 16:00 ET time U.S. Dollar price for index constituent i on Base Date
$FF_{i,0}$	= Circulating supply of index constituent i on Base Date
Base Level	= Base Value as defined in section 4.6

Adjustments to the Index Divisor

Core to maintaining the integrity and accuracy of the index is adjusting the index divisor. Changes to the circulating supply and constituents of indexes should not impact an index's level. If an index closes at a level of 100, and subsequently a constituent's float increases or the constituents of an index change, the price of the index should open at a level of 100. To determine the required divisor adjustment, asset prices and circulating supply need to remain static during the calculation. As such, it will be assumed that prices and circulating supply at time *t-1* and time *t* remain constant until the new divisor has been determined. To achieve this, adjustments to the divisor are required as described below.

- This process demonstrates the calculations if a constituent is replaced during reconstitution. Expanding the previous equation to show the removed constituent, *m*, from the index:

$$Index\ Level_{t-1} = \frac{\left(\sum_{i=1} p_i \times FF_{i,\,t-1}\right) + P_m \times FF_m}{Index\ Divisor_{t-1}}$$

- Once constituent m is replaced with constituent n the equation reads:

$$Index\ Level_t = \frac{\left(\sum_{i=1} p_i \times FF_{i,t}\right) + P_n \times FF_n}{Index\ Divisor_t}$$

- By definition, since prices and circulating supply are static,

$$Index\ Level_{t-1} = Index\ Level_t$$

- As constituent prices, constituent circulating supplies and Index Divisor$_{t-1}$ are all known quantities, we can calculate the new divisor, Index Divisor$_t$

$$Index\ Divisor_t = Index\ Divisor_{t-1} \times \frac{\left(\sum_{i=1} p_i \times FF_{i,t}\right) + P_n \times FF_n}{\left(\sum_{i=1} p_i \times FF_{i,t-1}\right) + P_m \times FF_m}$$

5 Index Data

5.1 Data Sources

CMBI leverages both Coin Metrics products and external data sources as a means of constructing indexes and calculating the index level of CMBI products.

5.1.1 Real-Time Index Pricing

Real time input price data for CMBI products is sourced from Coin Metrics Real-Time Reference Rates ("CM RTRR"). Refer to the Real-Time Reference Rates Methodology for more information.

5.1.2 End of Day Index Pricing

End of day input price data for CMBI products is sourced from CM Hourly Reference Rates. Refer to the CM Hourly Reference Rates Methodology for more information.

5.1.3 Estimated Market Capitalization

Market capitalization data from which constituent weights are derived, as defined here. Estimated Circulating Supply is sourced from third party APIs. This supply data is reported by the projects themselves and collected by CoinGecko. Estimated Market Capitalization uses end of day pricing sourced from Coin Metrics Hourly Reference Rates.

6 Index Governance

The Coin Metrics Oversight Committee (the "Oversight Committee") and Coin Metrics Index Committee (the "Index Committee") oversee the integrity of the CMBI products.

6.1 Administration

Coin Metrics serves as the administrator for CMBI products and has primary responsibility for all aspects of the index construction processes, including development, definition, determination, dissemination, operation, and governance. All aspects of index production are carried out by Coin Metrics, however, Coin Metrics relies on a few third party agreements to obtain data inputs for index calculation.

Coin Metrics ensures that transparency in relation to significant decisions and associated rationale are published and made available to external stakeholders. Data contingency and exclusion rules are in place to handle certain extraordinary circumstances and external factors beyond the control of Coin Metrics.

6.2 Governance Committees

6.2.1 Coin Metrics Oversight Committee

The Oversight Committee provides independent oversight over the production of CMBI products. The Oversight Committee's responsibilities include regular reviews of the CMBI production process, the CMBI methodologies, the selection of data sources and data inputs, any uses of expert judgment or non-standard procedures, conflicts of interest, the addition or termination of CMBI products, reviewing the results of external and internal audits, and complaints or questions regarding the indexes from external stakeholders. Additional information regarding the responsibilities and membership of the Oversight Committee can be found in the Coin Metrics Governance Committee Charter.

6.2.2 Coin Metrics Index Committee

The Index Committee maintains all CMBI products. Committee members are Coin Metrics employees. The committee meets monthly to review any significant market events, revise index policies as required and review any ongoing consultation results. In the daily maintenance of CMBI products, the Index Committee reserves the right to apply exceptions and make expert judgements as required to maintain the integrity of the indexes. In such an instance where index determination deviates from the standard methodology or policies as defined in this document or supplemental documents, clients will receive sufficient notice when possible. At a minimum, the Index Committee will review the CMBI product methodologies annually to ensure that indexes that follow the process and policies stated within this document continue to achieve their stated objectives. Coin Metrics considers the content discussed at monthly Index Committee meetings to be potentially market moving or material and as such treats minutes as confidential. For information on expert judgment, please refer to the CMBI Policy Documentation.

7 Index Policy

7.1 Announcements

Index constituent data is analyzed for completeness daily. In the case of any significant foreseeable event for any index constituent, an announcement will be distributed via a monthly index report distributed to all clients. For any anomalies that are detected during the daily quality review process, Coin Metrics will develop a plan to notify, solicit comments from, and consult with external stakeholders via email or another pre-defined communication channel.

Press releases such as new index creation or significant changes to existing index construction will be released on the Coin Metrics [product announcements page](#).

7.2 Holiday Schedule

The CMBI indexes are calculated 24 hours a day, 7 days a week, 365 days a year.

Rebalances and reconstitutions are conducted on business days, Monday to Friday, except for holidays as defined by the New York Stock Exchange (NYSE) holidays and trading hours calendar. A complete holiday schedule is available on request.

7.3 Restatement Policy

For information on the Restatement Policy, please refer to the CMBI Policy Documentation.

7.4 Real-Time Pricing

Real-time index pricing does not update an index's level every time a trade occurs, but rather sources data from CM Real-Time Reference Rates whose methodology stipulates that an assets price is determined using a volume weighted-median with inverse price variance weighting of the most recent trade from each of the constituent markets. Further, index real-time levels will be produced every 15 seconds. At each interval, the CM Real-Time Reference Rates will produce pricing for each constituent asset of an index which will inform index level determination. Real-time index prices are provided 24 hours a day, 7 days a week, 365 days a year.

7.5 End of Day Pricing

End of day index pricing sources data from CM Reference Rates, which produce 24 rates daily per asset, one rate at the start of every hour. CMBI indexes utilize the 16:00 ET rate for determination of the end of day index level. The CM Reference Rate Methodology stipulates that an asset's price is determined utilizing a time-weighted and volume-weighted median over a 61 minute window of trade data. The 16:00 ET end of day rate is subject to human review.

Index licensees may select to utilize and reference an alternate hourly CM Reference Rate for the end of day price of their product, that may not be subject to human review.

7.6 Calculation and Pricing Disruptions

7.6.1 Real-Time Index Calculation

The CM Real-Time Reference Rates Methodology outlines management of special situations where data is delayed, missing, or unavailable due to periods of illiquidity, extraordinary market circumstances, or outside factors beyond the control of Coin Metrics.

7.6.2 End of Day Index Calculation

The CM Reference Rates Methodology outlines management of special situations where data is delayed, missing, or unavailable due to periods of illiquidity, extraordinary market circumstances, or outside factors beyond the control of Coin Metrics.

7.7 Unexpected Exchange Closures

For information on the treatment of unexpected exchange closures, please refer to the CMBI Policy Documentation.

7.8 Treatment of Forks

For detailed information on the treatment of forks, please refer to the CMBI Fork Legitimacy Policies. Coin Metrics do not deem airdrops as eligible for a liquidation event in any CMBI index.

7.9 Index Contingency

7.9.1 Intra Month Asset Removals

Between quarterly reconstitutions, under exceptional circumstances, a cryptoasset can be removed from the index due to network events such as protocol hacks, 51% network attacks, significant blockchain reorganizations or exchange delistings. Such removals are necessary to protect the integrity of the index. At the time of removal, the value of the asset will be held in cash until the next index rebalance.

7.9.2 Intra Month Asset Addition

Between quarterly reconstitutions, a cryptoasset can be added to an index only in the case of a contested hard fork that results in multiple cryptoassets or an airdrop. In these scenarios, if the forked asset meets our eligibility criteria it will be added to the index of which the parent asset is a constituent. During the following reconstitution period, the new asset will undergo the eligibility testing as defined in *Section 3* to determine its eligibility in the CMBI asset universe.

7.9.3 Delayed Forked Asset Addition

In the instance where a forked or airdropped asset is not added to the relevant CMBI index intra month due to failing to meet eligibility criteria, the new asset will be monitored for up to 12 months to determine if a 'liquidation value dividend' event is warranted. If during the 12 month period the new asset meets the above criteria, the Oversight Committee will determine if the asset is to be credited to the index that the parent asset was a constituent of at the time of the event. The 'liquidation value dividend' will be calculated from the closing price on the rebalance reference date following the first date on which the asset met the required fork eligibility, as defined in the [CMBI Fork Legitimacy Policy](#).

7.10 Record Retention

For information on record retention, please refer to the CMBI Policy Documentation.

7.11 Material Changes or Termination

For information on material changes to indexes or termination of indexes, please refer to the CMBI Policy Documentation.

7.12 Conflicts of Interest

For information on Conflicts of Interest, please refer to the Coin Metrics Conflicts of Interest Policy.

7.13 Complaints

Complaints about the calculation methodology of the Indexes or the price of a CMBI product should be submitted in writing to cmbi-support@coinmetrics.io. Coin Metrics will investigate any complaints and respond to the complainant in a fair and timely manner. Any investigation of the complaint will adhere to the following procedures:
1. The personnel receiving and investigating the complaint will be independent of any personnel who may have been involved in the subject of the complaint.
2. All records and documents submitted by the complainant and related to the investigation into the complaint will be retained for a period of at least five years and submitted to the Oversight Committee for review.

7.14 Internal Audit

The Oversight Committee may appoint an independent internal auditor to review the CMBI product's adherence to its stated methodology, compliance with policies, and adherence to the IOSCO's Principles of Financial Benchmarks.

7.15 Internal Controls

Coin Metrics has implemented internal controls to protect the integrity of CMBI products. These controls cover the selection of input data sources, the collection of data from input data sources, and maintaining the integrity of collected data. Staff involved with the design, calculation and dissemination of Indexes have been trained in the proper usage of the data and maintain proper segregation of responsibilities. Any exercise of non-standard procedures is subject to dual approval by staff members, and is logged and reported to the Oversight Committee which periodically reviews any incidents. In addition, Coin Metrics maintains a whistleblowing mechanism to facilitate the reporting of any potential misconduct.