Market Data Documentation

Version 1.0.2

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Contents

1 Introduction

This document provides an overview of the data concepts and coverage universe from the Coin Metrics Market Data Feed, Coin Metrics Reference Rates, and Coin Metrics Bletchley Indexes (CMBI).

2 Data Concepts

Coin Metrics provides data for the following data concepts:

- Trades
- Candles
- Quotes
- Order Books
- Reference Rates
- Real-Time Reference Rates
- Index Levels
- Index Constituents

In the following sections, we provide a conceptual definition and background information for each data concept. A sample of the data concept is provided followed by a description of each field within the data sample. Each section concludes by describing the coverage universe of the data concept.

2.1 Trades

2.1.1 Conceptual Definition

Trades represent the exchange of a financial asset between a buyer and seller from a market on a trading exchange. In this context, a financial asset can be a cryptoasset, a fiat currency, or a cryptoasset derivatives contract.

Markets can be categorized into spot and derivatives markets. A spot market represents a trading pair in which a buyer exchanges units of one asset in return for units of another asset in amounts specified by the market's price or exchange rate. By convention, the exchange rate consists of a base asset and a quote asset and represents the number of units of the quote asset needed to buy one unit of the base asset. Cryptoassets and fiat currencies can serve as either base assets or quote assets, depending on the market.

Derivatives markets represent a venue where contracts of a financial derivative are bought and sold. Instead of an exchange rate, the price of a derivatives market represents the price of one contract. Each financial derivatives contract has unique contract specifications which describe how the contract is quoted and the amount of notional exposure that a contract represents.

2.1.2 Data Sample

A sample of the trades data from Coinbase's Bitcoin-U.S. Dollar spot market is provided below.

time	market	coin_metrics_id	amount	price	database_time	side
2020-06-13 01:10:03	coinbase-btc-usd-spot	94653752	0.0200000	9430.61	2020-06-13 01:10:03	buy
2020-06-13 01:10:03	coinbase-btc-usd-spot	94653753	0.0200000	9430.59	2020-06-13 01:10:04	sell
2020-06-13 01:10:03	coinbase-btc-usd-spot	94653754	0.0523966	9430.01	2020-06-13 01:10:04	sell
2020-06-13 01:10:07	coinbase-btc-usd-spot	94653755	0.0135406	9430.60	2020-06-13 01:10:07	buy
2020-06-13 01:10:08	coinbase-btc-usd-spot	94653756	0.0139308	9430.59	2020-06-13 01:10:08	sell

Field Descriptions:

- **`time`**: The exchange reported time in ISO 8601 date-time format.
- **`market`**: The id of the market. Market ids use the following naming convention: exchangeName-baseAsset-quoteAsset-marketType.
- **`coin_metrics_id`**: Identifier of a trade that is unique per exchange. We use the exchange reported value if exchange reports a numeric trade id, otherwise we convert to numeric using bijective mapping from exchange reported trade id's string.
- **`amount`**: The amount of the base asset traded for spot markets or the number of contracts of a financial derivative.
- **`price`**: The price of the base asset quoted in the quote asset that the trade was executed at for spot markets or the price of one contract for derivatives markets.
- **`database_time`**: The time that the trade was inserted into our database in ISO 8601 date-time format.
- **`side`**: The side that is taking liquidity. A value of "buy" means that an ask was removed from the order book by an incoming buy order, while "sell" means that a bid was removed from the order book by an incoming sell order.

2.1.3 Coverage Universe

The coverage universe for trades consists of the following:

- 1,061 assets
- 31 exchanges
- 6,558 spot markets
- 1,452 futures markets

For a full list of assets, exchanges, spot markets, and futures markets, please consult the Coin Metrics Data Coverage file.

The coverage universe by exchange including the number of spot and futures markets and when coverage began for these markets is presented below. Certain exchanges do not allow users to query historical data, so data for those exchanges begin at the date that Coin Metrics began collection. Other exchanges allow users to query all historical data, so our coverage for these exchanges begins at exchange inception.

	Spot Markets		Futures Markets	
Exchange Name	Count	Start Date	Count	Start Date
Bibox	202	2019-04-24	NA	NA
Binance	739	2017-07-14	25	2019-09-08
Binance.US	69	2019-09-23	NA	NA
Bitbank	8	2017-02-14	NA	NA
Bitfinex	404	2013-01-14	3	2019-07-03
bitFlyer	6	2019-05-28	NA	NA
Bithumb	91	2013-12-27	NA	NA
Bitstamp	28	2011-08-18	NA	NA
Bittrex	467	2019-03-21	NA	NA
CEX.IO	90	2013-12-27	NA	NA
Coinbase	68	2014-12-01	NA	NA
FTX	30	2020-04-02	208	2019-03-05
Gate.io	414	2017-09-29	NA	NA
Gatecoin	80	2014-11-11	NA	NA
Gemini	24	2018-10-16	NA	NA
HitBTC	1026	2013-12-27	NA	NA
Huobi	527	2019-03-15	689	2019-10-11
itBit	7	2019-03-13	NA	NA
Kraken	172	2013-09-10	NA	NA
KuCoin	318	2020-04-02	NA	NA
LBank	141	2017-09-29	NA	NA
Liquid	371	2014-07-17	NA	NA
LocalBitcoins	109	2013-03-11	NA	NA
Mt.Gox	16	2010-07-17	NA	NA
OKEx	356	2019-11-24	270	2020-04-02
Poloniex	181	2014-01-18	NA	NA
TheRockTrading	21	2011-11-09	NA	NA
Upbit	361	2019-03-14	NA	NA
ZB.COM	232	2019-03-04	NA	NA
BitMEX	NA	NA	207	2014-11-22
Deribit	NA	NA	50	2017-01-06

2.2 Candles

2.2.1 Conceptual Definition

Candles consist of summary statistics that describe the trading activity of a market over an interval of time. Coin Metrics engineers six statistics based on trades data that occurred over an interval of time: the opening price, the high price, the low price, the close price, the volume-weighted average price, and the total volume. Candles are generated at regular time intervals and at a time granularity that is suitable for charting and analysis. For instance, several technical analysis indicators can be calculated using data in candles format.

2.2.2 Data Sample

A sample of the candles data from Coinbase's Bitcoin-U.S. Dollar spot market is provided below.

time	market	price_open	price_close	price_high	price_low	vwap	volume
2020-06-08	coinbase-btc-usd-spot	9750.12	9781.51	9815.00	9632.79	9721.903	8533.836
2020-06-09	coinbase-btc-usd-spot	9781.51	9780.61	9886.00	9567.33	9720.675	10329.877
2020-06-10	coinbase-btc-usd-spot	9779.70	9894.04	10018.67	9690.00	9828.720	12965.426
2020-06-11	coinbase-btc-usd-spot	9894.35	9268.16	9973.25	9050.00	9507.733	26779.879
2020-06-12	coinbase-btc-usd-spot	9266.61	9464.17	9552.87	9227.00	9406.766	10992.516

Column definitions:

- **`time`**: The time at the beginning of the candle's time interval in ISO 8601 date-time format.
- **`market`**: The id of the market. Market ids use the following naming convention: exchangeName-baseAsset-quoteAsset-marketType.
- **`price_open`**: The opening price of the candle.
- **`price_high`**: The high price of the candle.
- **`price_low`**: The low price of the candle.
- **`price_close`**: The closing price of the candle.
- **`vwap`**: The volume-weighted average price of the candle.
- **`volume`**: The volume of the candle in units of the base asset.

2.2.3 Coverage Universe

Coin Metrics produces candles at the following time granularities:

- 5 minutes
- 10 minutes
- 15 minutes
- 30 minutes
- 1 hour
- 4 hours
- 1 day

Coin Metrics derives candles directly from trades. Candles are only generated if there are trades in the underlying interval. Therefore, gaps in candles data through time are normal and to be expected. To construct gapless candles, the user should fill forward candles through time, setting the open, high, low, and close to the close of the previous candle, setting the vwap to the vwap of the previous candle, and setting the volume to zero. Forward filling in this manner allows windowing functions to be applied to the data and eliminates any look ahead bias.

Since candles are derived from trades, the coverage universe of assets, exchanges, spot markets, and futures markets for candles is identical to the coverage universe of trades described in Section 2.1.3.

2.3 Quotes

2.3.1 Conceptual Definition

Quotes consist of the best bid and the best ask for a market at a given point in time. The best bid represents the highest price that a buyer is willing to pay for one unit of the base asset for a spot market or one contract for a derivatives market. The best ask represents the lowest price that a seller is willing to sell.

2.3.2 Data Sample

A sample of the quotes data from Coinbase's Bitcoin-U.S. Dollar spot market is provided below.

time	market	coin_metrics_id	ask_price	ask_size	bid_price	bid_size
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9432.77	11.9172037	9432.76	0.0280644
2020-06-13 01:09:57	coinbase-btc-usd-spot	1591994771694389-1995521	9432.77	12.2268287	9432.76	0.0015644
2020-06-13 01:10:01	coinbase-btc-usd-spot	1591995970942730-1857576	9431.67	9.8525344	9431.66	0.0200000
2020-06-13 01:10:07	coinbase-btc-usd-spot	1591994771694389-1996638	9430.60	4.4600000	9430.59	0.0200000
2020-06-13 01:10:12	coinbase-btc-usd-spot	1591995970942730-1858432	9430.60	0.0311344	9430.59	0.7090691

Column definitions:

- **`time`**: The exchange reported time in ISO 8601 date-time format.
- **`market`**: The id of the market. Market ids use the following naming convention: exchangeName-baseAsset-quoteAsset-marketType.
- **`coin_metrics_id`**: Unique identifier of the quotes snapshot.
- **`ask_price`**: The limit price of the top ask on the order book.
- **`ask_size`**: The size of the top ask on the order book in units of the base asset for a spot market or number of contracts for a derivatives market.
- **`bid_price`**: The limit price of the top bid on the order book.
- **`bid_size`**: The size of the top bid on the order book in units of the base asset for a spot market or number of contracts for a derivatives market.

2.3.3 Coverage Universe

Coin Metrics stores historical quotes snapshots approximately every 5 seconds for the following 19 markets.

Exchange Name	Market ID	Start Date
Binance.US	binance.us-btc-usd-spot	2020-01-27
Bitfinex	bitfinex-btc-usd-spot	2019-03-25
Bitfinex	bitfinex-eth-usd-spot	2019-03-25
bitFlyer	bitflyer-btc-usd-spot	2019-12-06
Bitstamp	bitstamp-btc-usd-spot	2019-03-25
Bitstamp	bitstamp-eth-usd-spot	2019-03-25
Bittrex	bittrex-btc-usd-spot	2019-03-25
Bittrex	bittrex-eth-usd-spot	2019-03-25
CEX.IO	cex.io-btc-usd-spot	2019-12-06
Coinbase	coinbase-btc-usd-spot	2019-03-25
Coinbase	coinbase-eth-usd-spot	2019-03-25
Gemini	gemini-btc-usd-spot	2019-03-25
Gemini	gemini-eth-usd-spot	2019-03-25
itBit	itbit-btc-usd-spot	2019-03-25
itBit	itbit-eth-usd-spot	2019-03-25
Kraken	kraken-btc-usd-spot	2019-03-25
Kraken	kraken-eth-usd-spot	2019-03-25
Liquid	liquid-btc-usd-spot	2019-03-25
Liquid	liquid-eth-usd-spot	2019-03-25

2.4 Order Books

2.4.1 Conceptual Definition

An order book represents the list of buy orders and the list of sell orders for a given market organized by price level. In this context, a buy order or sell order indicates the amount of the base asset that a buyer or seller wishes to trade for a spot market or the amount of contracts for a derivatives market. By using the order book, a trader is able to observe the amount that other traders are willing to buy or sell at given price levels.

The price and amount that a trader is willing to buy is referred to as the bid. The price and amount that a trader is willing to sell is referred to as the ask. When a trade is executed between a buyer and a seller, an order is removed from the order book. While an order book is constantly updated in real-time as traders post new orders, this data concept represents a snapshot of the order book at a given moment in time.

2.4.2 Data Sample

A sample of the order book data from Coinbase's Bitcoin-U.S. Dollar spot market is provided below. The bid side of the order book and the ask side of the order book are displayed in separate tables.

time	market	coin_metrics_id	bids_price	bids_size
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9432.76	0.0280644
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9430.47	0.1590202
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9430.46	0.0100000
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9430.45	0.0400000
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9430.24	0.9581307

time	market	coin_metrics_id	asks_price	asks_size
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9432.77	11.9172037
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9433.00	0.0017887
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9433.14	0.0264000
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9433.18	0.0785697
2020-06-13 01:09:51	coinbase-btc-usd-spot	1591995970942730-1856622	9433.49	4.4500000

Column definitions:

- `time`: The time of the order book snapshot in ISO 8601 date-time format.
- `market`: The id of the market. Market ids use the following naming convention: exchangeName-baseAsset-quoteAsset-marketType.
- `coin_metrics_id`: Unique identifier of object.

- `asks_price`: The limit price of the ask order on the order book.
- `asks_size`: The size of the ask order on the order book in units of the base asset.
- `bids_price`: The limit price of the bid order on the order book.
- `bids_size`: The size of the bid order on the order book in units of the base asset.

2.4.3 Coverage Universe

The coverage universe for order books is identical to the coverage universe for quotes described in section 2.3.3.

2.5 Reference Rates

2.5.1 Conceptual Definition

The Reference Rates are designed to represent the price of a cryptoasset in an arms length transaction between a willing buyer and willing seller. It is designed to represent the price where the majority of trades took place for a given cryptoasset using multiple markets as input data sources. A systematic framework evaluates and selects a unique set of constituent markets for each cryptoasset and the methodology utilizes volume-weighted median and time-weighted average price techniques. The Reference Rates utilizes a 61-minute window to calculate prices once an hour, every hour, including on weekends and holidays. The Reference Rates can be used for portfolio accounting, as settlement prices for financial derivative contracts, and as closing prices for investment products.

For more information on the Reference Rates, please consult the Coin Metrics Data Coverage file.

2.5.2 Data Sample

A sample of the reference rates data for Bitcoin is provided below.

asset	time	ReferenceRate
btc	2020-06-12 21:00:00	9450.434
btc	2020-06-12 22:00:00	9452.191
btc	2020-06-12 23:00:00	9461.060
btc	2020-06-13 00:00:00	9456.162
btc	2020-06-13 01:00:00	9441.094

Column definitions:

- `time`: The reference time in ISO 8601 date-time format.
- `asset`: The id of the asset.
- `ReferenceRate`: The reference rate value.

2.5.3 Coverage Universe

Reference rates are generated for 224 assets. For the full list of assets in the reference rates coverage universe, please consult the Coin Metrics Reference Rates Methodology document.

2.6 Real-Time Reference Rates

2.6.1 Conceptual Definition

Similar to the Reference Rates described in section 2.5.1, the Real-Time Reference Rates are designed to represent the price of a cryptoasset in an arms length transaction between a willing buyer and willing seller. Rather than being calculated once an hour, the Real-Time Reference Rates utilize a separate methodology that utilizes volume-weighted median and inverse price variance weighting techniques to calculate prices once a second, every second, including on weekends and holidays.

2.6.2 Data Sample

A sample of the real-time reference rates data for Bitcoin is provided below.

asset	time	ReferenceRate
btc	2020-06-13 01:10:10	9430.59
btc	2020-06-13 01:10:11	9430.59
btc	2020-06-13 01:10:12	9430.60
btc	2020-06-13 01:10:13	9430.60
btc	2020-06-13 01:10:14	9431.25

Column definitions:

- `time`: The reference time in ISO 8601 date-time format.
- `asset`: The id of the asset.
- `ReferenceRate`: The reference rate value.

2.6.3 Coverage Universe

The coverage universe for the Real-Time Reference Rates is identical to the coverage universe for the Reference Rates described in section 2.5.3.

2.7 Index Levels

2.7.1 Conceptual Definition

Index levels represent the level of an index. For more information on the various indexes and what the various index levels represent, please consult the CMBI Single Asset Methodology document, the CMBI Market Cap Weighted Index Methodology document, and the CMBI Bitcoin Hash Rate Index Methodology document.

2.7.2 Data Sample

A sample of the index levels data for the CMBI 10 index is provided below.

time	index	level
2020-06-09	CMBI10	866.1076
2020-06-10	CMBI10	863.5211
2020-06-11	CMBI10	874.2220
2020-06-12	CMBI10	816.1215
2020-06-13	CMBI10	834.9976

Column definitions:

- `time`: The reference time in ISO 8601 date-time format.
- `index`: The id of the index.
- `level`: The index value.

2.7.3 Coverage Universe

The coverage universe for index levels consist of 7 indexes.

Index	Description	Start Time	Frequencies
CMBI10	'CMBI10' index.	2020-06-08 20:12:40	15s, 1d, 1d-ny-close, 1d-sg-close, 1h
CMBIBTC	'CMBIBTC' index.	2010-07-18 20:00:00	15s, 1d, 1d-ny-close, 1d-sg-close, 1h
CMBIBTCT	'CMBIBTCT' index.	2010-07-18 20:00:00	15s, 1d, 1d-ny-close, 1d-sg-close, 1h
CMBIETH	'CMBIETH' index.	2015-08-08 20:00:00	15s, 1d, 1d-ny-close, 1d-sg-close, 1h
CMBIETHT	'CMBIETHT' index.	2015-08-08 20:00:00	15s, 1d, 1d-ny-close, 1d-sg-close, 1h
CMBIHASH	'CMBIHASH' index.	2015-01-01 00:00:00	1d, 1h, 5s
CMBIWORK	'CMBIWORK' index.	2015-01-01 23:59:55	1d, 1h, 5s

2.8 Index Constituents

2.8.1 Conceptual Definition

Certain indexes consist of multiple index constituents. These indexes weight the index constituents by one or more factors to calculate the index. For instance, market capitalization weighted indexes weight index constituents by adjusted free float market capitalization. For each index that utilizes this approach, the index constituents data concept lists the index constituents and their weights at regular intervals.

2.8.2 Data Sample

A sample of the index constituents data for the CMBI 10 index is provided below.

time	index	asset	weight
2020-06-12 21:00:00	CMBI10	bch	0.0168264
2020-06-12 21:00:00	CMBI10	bsv	0.0109660
2020-06-12 21:00:00	CMBI10	btc	0.7543074
2020-06-12 21:00:00	CMBI10	etc	0.0041381
2020-06-12 21:00:00	CMBI10	eth	0.1428105

Column definitions:

- `time`: The reference time in ISO 8601 date-time format.
- `index`: The id of the index.
- `asset`: The id of the index constituent.
- `weight`: The index constituent weight.

2.8.3 Coverage Universe

The coverage universe for the index constituents is identical to the coverage universe for the index levels described in section 2.7.3. Index constituents and weights are calculated once an hour, every hour, including on weekends and holidays.

3 Change Log

1. **Version 1.0.0 on May 5, 2020**: Initial publication of Market Data Documentation Overview.

2. **Version 1.0.1 on May 18, 2020**: Revise data samples to match format in most recent API version 4 specification.

3. **Version 1.0.2 on June 12, 2020**: Revise data samples to match format in most recent API version 4 specification.