



Compass Crypto Reference Indices

Methodology

November 22nd, 2021

Version History

Readers can access other versions of the methodology for the Compass Crypto Reference Indices online when they become available on Compass Financial Technologies website (www.compass-ft.com).

Date	Version	Change	Author(s)
22/04/2021	1.0	Methodology Publication	Guillaume Le Fur and Edouard Mouton (Compass Financial Technologies)
22/11/2021	1.1	Add new coins	Guillaume Le Fur and Edouard Mouton (Compass Financial Technologies)

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1 Introduction

The Compass Crypto Reference Indices (the *CCRI*, the *Indices* or the *Index*) measure hourly crypto exchange rates against US Dollars for the main cryptocurrencies.

Indices are computed hourly, every day of the year. They are calculated at the end of every hour and are published around 5 minutes after the end of the hour.

CCRI Indices can be accessed online on the Compass Financial Technologies website (www.compass-ft.com) or on Bloomberg or Refinitiv.

The Compass Crypto Reference Indices have been designed to provide institutional investors with independent and robust cryptocurrency reference prices. Based on a resilient and BMR compliant methodology, they serve as independent and transparent reference prices to value cryptocurrency portfolio or as benchmarks for investors willing to issue investment products tracking cryptocurrencies prices.

Compass Crypto Reference Indices are owned by Compass Financial Technologies SA. The Index Administrator and Calculation Agent is Compass Financial Technologies (France).

CCRI available as of November 22nd 2021 are listed in Table 2 section 11.

2 Data Source

2.1 Data Provider

The daily price levels of the CCRI Indices are based on the historical tick-by-tick trade data provided by Kaiko (www.kaiko.com).

Kaiko is an independent digital assets market data provider based in Paris since 2014. Kaiko collects, normalizes, stores, and delivers raw, normalized trade and quote data on 74 exchanges and more than 9,000 pairs. Kaiko has worked with over 300 customers globally, including, funds, institutions, regulators, academics and crypto start-ups. Kaiko’s methodology is fully public and can be found on their website. Their data collection runs on multiple redundant global centers, which ensures the consistency of data delivery and their data is versioned to avoid being impacted by breaking changes.

2.2 Eligible Exchanges

The CCRI pricing methodology is performed through tracking a subset of exchanges. Eligible Exchanges must offer CryptoCurrency against USD markets and be approved by the Compass Crypto Reference Indices Steering Committee.

The current list of Eligible Exchanges used in CCRI calculations is composed of the following exchanges:

Eligible Exchanges
Bistamp
Bitfinex
BitFlyer
Bittrex
BinanceUS
Coinbase
Gemini
ItBit
Kraken
Lmax
Okcoin

Table 1: Compass Crypto Reference Indices Eligible Exchanges

3 Index Calculation

3.1 Trading venues selection process

For each Compass Crypto Reference Index, a dynamic fully systematic algorithm selects among the list of eligible exchanges the trading venues which will contribute to the computation of the CRRI for the coming month.

On the last day of each month, for each cryptocurrency c , the algorithm computes the last 180 days average volume for each eligible exchange where cryptocurrency c is traded against USD. (For the avoidance of doubt, the last data used in the computation refer to the day preceding the last business day of the month).

The process keeps exchanges with a corresponding average volume representing at least 5% of the total aggregated volume over all eligible exchanges for cryptocurrency c .

Only trades from the selected exchanges (the "Selected Exchanges") will be considered in the CRRI computation for the coming month.

3.2 Calculation formula

Each day, Compass Crypto Reference Indices are calculated based on the collection of all observable transactions of all respective Selected Exchanges. The calculation methodology of the Compass Crypto Reference Index level for cryptocurrency c on date t for the hour h_i follow the steps below:

1. For each Selected Exchange k_c , we create a dataset of all USD denominated trades occurring during the hourly time-period $[h_{i-1}, h_i]$.
2. Each dataset is divided in 12 time-equally sized partitions of trade records.
3. Volume-weighted median of trade prices are calculated for each partition and each Selected Exchange.
4. For each partition l , if the absolute percentage deviation of the Volume-weighted median price of a Selected Exchange from the median price computed on all Eligible Exchanges is above 5%, the data of that exchange is considered anomalous. The exchange is then excluded from the Selected Exchanges for this partition.
5. For each partition l , a Partition Reference Price $P_{c,t,h_i,l}$ is computed as the exchange volume weighted average over partition l of the volume-weighted median prices computed in step above.
6. The final Compass Crypto Reference Index level is given by the arithmetic average of the computed Partition Reference Prices.

Given date t , cryptocurrency c , partition l and time-period $[h_{i-1}, h_i]$, the Partition Reference Price $P_{c,t,h_i,l}$ is expressed as:

$$P_{c,t,h_i,l} = \frac{\sum_{k=1}^{n_{c,t}} Volume_{c,t,h_i,l,k} \times vwmp_{c,t,h_i,l,k}}{\sum_{k=1}^{n_{c,t}} Volume_{c,t,h_i,l,k}} \quad (1)$$

Where,

- $n_{c,t}$ is the number of Selected Exchanges for cryptocurrency c on date t
- $Volume_{c,t,h_i,l,k}$ is the total volume traded of cryptocurrency c against USD on date t during partition l on the Selected Exchange k
- $vwmp_{c,t,h_i,l,k}$ is the volume-weighted median price of partition l on t for cryptocurrency c , using all the trades on Selected Exchange k . It is equal to the price of trade pair m in partition l , $P_{c,t,h_i,l,k}$, that satisfies:

$$\sum_{j=1}^{m-1} Volume_{c,t,h_i,k,j} \leq \frac{\sum_{j=1}^{N_l} Volume_{c,t,h_i,k,j}}{2} \quad \text{and} \quad \sum_{j=m+1}^{N_l} Volume_{c,t,h_i,k,j} < \frac{\sum_{j=1}^{N_l} Volume_{c,t,h_i,k,j}}{2} \quad (2)$$

- N_l in (2) is the number of executed trades in partition l

Then the Compass Crypto Reference Index level for cryptocurrency c for fixing h_i on t is computed as:

$$CCRI_{t,h_i,c} = \frac{\sum_{l=1}^{12} P_{c,t,h_i,l}}{12} \quad (3)$$

3.3 Data Filters - Clean Data

Data is identified as erroneous and therefore discarded when reported in the wrong format (trade price or trade size that are non-numeric, non-positive, or in a format that deviates from the expected one).

3.4 Delayed and Missing Data

The transactions that cannot be retrieved by the Index calculation time are disregarded. If, for any cryptocurrency, no transactions occur or can be retrieved for any exchange on a specific partition, this exchange is disregarded for the calculation of the affected Indices on that day for the specific hour. Any delay or absence of trade data is reported to the Compass Crypto Reference Indices Steering Committee and the selected course of action is formally announced.

3.5 Exceptional Circumstances

The calculation of the Compass Crypto Reference Indices is obstructed when there are no reported transactions or all transactions are rejected as suspicious on all of the Selected Exchanges, or when no data is provided from the data provider, or due to any other unforeseen events.

In the event of failure of the data provider to deliver relevant data, the Compass Crypto Reference Indices Steering Committee will do its best effort to determine relevant cryptocurrency prices from alternative providers that are readily available.

In this scenario, Indices levels will be based on the cryptocurrency price determined by the Compass Crypto Reference Indices Steering Committee.

If, for any cryptocurrency, no transactions occur or can be retrieved for more than 3 consecutive business days, a Compass Crypto Reference Indices Steering Committee meeting will be called to determine the most appropriate action.

3.6 Rounding of Data

Indices values are computed with all decimals available and are published according to rounding policy defined in Table 2 section 11.

3.7 Calculation Frequency and Dissemination

The Compass Crypto Reference Indices are computed hourly, every day of the year. They are calculated at the end of every hour and are published 15 minutes after the end of the hour.

Indices levels are published on the Compass Financial Technologies website (www.compass-ft.com) and are distributed to Bloomberg and Refinitiv under the ticker symbols listed in table 2.

4 Index Governance

4.1 Index Administrator

Compass Financial Technologies (France) is the Administrator of the Index ("the Index Administrator"). The Index Administrator is responsible for the day-to-day management of the Index and is also responsible for decisions regarding the interpretation of these rules.

4.2 Index Calculation Agent

Compass Financial Technologies (France) is the Calculation Agent of the Compass Crypto Reference Indices. It is responsible for the day-to-day management of Indices computation according to this methodology.

4.3 Index Committees – Supervisor

Compass Financial Technologies has established governance functions to review and provide challenges on all aspects of the Indices determination process. Governance functions are managed by the Compass Oversight Committee and by the Compass Crypto Reference Indices Steering Committee.

Compass Oversight Committee:

The Compass Oversight Committee oversees all areas of the benchmark determination processes. It is responsible for supervising and controlling the Index operations team on all Compass Indices. It is also responsible for:

1. Periodic review of incidents
2. Making final decisions in case the Index operations team are not capable or allowed to take decisions
3. Defining and implementing organisation procedures for the Index operations team
4. Defining and overseeing measures that allow for mitigation of operational risks
5. Supervising internal or external audit results
6. The implementation and supervision of the potential codes of conduct that have to be implemented

The Committee is comprised of senior representatives of Compass Financial Technologies and external industry experts.

Compass Crypto Reference Indices Steering Committee:

The Compass Crypto Reference Indices Steering Committee is responsible for:

1. Determining the calculation methodology and the rules governing the publication of the Compass Crypto Reference Indices
2. Making periodic reviews of the Compass Crypto Reference Indices to validate the robustness of the methodology and to analyse the impact of methodology changes
3. Organising consultation with Compass Crypto Reference Indices stakeholders if necessary
4. Ensuring that Compass Crypto Reference Indices offers a reliable and representative view of the market

The Compass Crypto Reference Indices Steering Committee is composed of members from Compass and may include individuals or representatives of companies, academics, external counsels, or market participants.

The Compass Crypto Reference Indices Steering Committee assembles once a year in April. However, at the request of a member of the committee, the Committee may meet on any other day of the year to discuss potential "market emergency" and "force majeure" events or any other situation, which makes an extraordinary meeting necessary.

All Committee decisions will be published without delay following the Committee decision.

The Compass Crypto Reference Indices Steering Committee members as of April 2021 are:

- Edouard Mouton, Compass Financial Technologies
- Guillaume Le Fur, Compass Financial Technologies
- Laurence Black, The Index Standard
- Michael Petch, CoinShares

As of April 22nd, 2021, Edouard Mouton chairs the Compass Crypto Reference Indices Steering Committee.

5 Methodology Changes - Maintenance

This methodology may be supplemented, amended in whole or in part, revised or withdrawn at any time. Supplements, amendments, revisions and withdrawals may also lead to changes in the way the Index is compiled or calculated or affect the Index in another way.

In the absence of exceptional circumstances affecting the Index calculation or methodology, this Methodology is reviewed annually. The review will include, inter alia, the following points:

1. Verify if the methodology and computation are still in line with the original purpose of the Indices
2. Make sure the quality and quantity of the input data remain sufficient

Changes made to this methodology are published after the review date and implemented on a reasonable time horizon.

Compass Financial Technologies may terminate a Compass Crypto Reference Index due to certain extraordinary market circumstances. These circumstances include, but are not limited to:

1. The liquidity in one of the underlying cryptocurrencies of a Compass Crypto Reference Index declines and becomes not sufficient enough to provide an efficient market
2. The underlying cryptocurrency of a Compass Crypto Reference Index experiences a contentious hard fork in which both forks survive

Changes or termination will be subject to the review and approval of the Compass Crypto Reference Indices Steering Committee which will receive all the information related to the change or termination. In case of material changes, a notice will be provided at least two weeks in advance.

The results of the Compass Crypto Reference Indices Steering Committee will be published in a press release on Compass Financial Technologies website and distributed timely to data vendors and major news sources.

6 Expert Judgment

The Compass Crypto Reference Indices are based on written and transparent rules and procedures with the purpose of minimising as much as possible the exercise of discretion and expert judgment.

The Compass Crypto Reference Indices are built from input data that is not interpolated, extrapolated or adjusted. In case of lack of data, the last available data is employed.

Nevertheless, the exercise of expert judgment may become necessary in case of errors and Index restatements, delayed and missing data, hard forks, airdrops, or unexpected situations arising from market stress.

In the event that expert judgment is exercised, this will be done by resorting to the written procedures reported in the methodology and by communicating the decisions taken to the Compass Crypto Reference Indices Steering Committee and the Internal Compliance Function in order to prevent conflicts of interest and to protect the integrity and the independence of the Index determinations. In addition, the interest of the Index users and the market integrity will be taken into account.

7 Errors and Recalculations

Even though the process of Index calculation is completely automated and pre-defined, an error can be discovered after the publication of the Index.

In case of a material error the Index will be redetermined, and the Index clients will be notified about the error and the date of the publication of the redetermined Index. An error is considered material on the basis of its size, the dates of its discovery and of its occurrence, and the impact of the Index redetermination on the users. The discovery of any error is reported to Compass Crypto Reference Indices Steering Committee. In case a material error is discovered and the Administrator recognises a manipulation or an attempted manipulation of the Index level or the input data it will be reported to the regulator.

8 Potential Limitations

The issues presented in the following non-exhaustive list may limit the ability of some of the Indices to represent the market they are intended to measure, the ease of replication by investors, and more generally the usefulness of the Indices to users.

- The market the Index is meant to measure is volatile. In particular, cryptocurrencies may be subject to market movements much more than traditional asset classes such as stocks and bonds as a consequence of illiquidity, market trends and changes to market structure.
- The input data provider may fail to provide accurate and timely data.
- Cryptocurrency prices are derived from several trading venues, each of which is characterised by a different market structure and the price of a cryptocurrency may sometimes be different across different trading venues. In addition, cryptocurrency exchanges may suffer problems that usually do not affect regulated asset exchanges, such as distributed denial-of-service, trading halt, hacking of private keys, lack of standards comparable to those of regulated exchanges, rapidly evolving technology and uncertain legal frameworks. Finally, the publication of the Indices may cease. Should this occur, the regulation regarding user transitions will be followed, but the existence of a suitable substitute is not assured.

9 Cases not covered in rules

In cases which are not expressly covered in these rules, operational adjustments will take place along the lines of the aim of the index. Operational adjustments may also take place if, in the opinion of the Index Administrator, it is desirable to do so to maintain a fair and orderly market in derivatives on this index and/or this is in the best interests of the investors in products based on the Index and/or the proper functioning of the markets. The Index Administrator will report to the Supervisor if it took a decision about a case which is not specifically covered in the rules for comments and review.

10 Liability

The Index Administrator and the Supervisor are not liable for any losses resulting from supplementing, amending, revising or withdrawing the rules for the index. The Administrator will do everything within its power to ensure the accuracy of the composition, calculation, publication and adjustment of the Index in accordance with relevant rules. However, neither the Index Administrator, nor the Supervisor are liable for any inaccuracy in index composition, calculation and the publication of the Index, the information used for making adjustments to the Index and the actual adjustments. Furthermore, the Index Administrator and the Supervisor do not guarantee the continuity of the composition of the Index, the continuity of the method of calculation of the Index, the continuity of the dissemination of the index levels, and the continuity of the calculation of the Index.

11 Compass Crypto Reference Indices - Codes - Rounding

Compass Crypto Reference Indices			
Index	Bloomberg Code	Refinitiv Code	Rounding
Compass Crypto Reference Index Bitcoin	CCRIBTC Index	.CCRIBTC	2
Compass Crypto Reference Index Ethereum	CCRIETH Index	.CCRIETH	3
Compass Crypto Reference Index Solana	coming soon	.CCRISOL	5
Compass Crypto Reference Index Cardano	CCRIADA Index	.CCRIADA	5
Compass Crypto Reference Index Ripple	CCRIXRP Index	.CCRIXRP	5
Compass Crypto Reference Index Polkadot	CCRIDOT Index	.CCRIDOT	5
Compass Crypto Reference Index Dogecoin	CCRIDOGI Index	.CCRIDOGI	5
Compass Crypto Reference Index Terra-luna	coming soon	.CCRILUNA	5
Compass Crypto Reference Index Litecoin	CCRILTC Index	.CCRILTC	5
Compass Crypto Reference Index Chainlink	CCRILINK Index	.CCRILINK	5
Compass Crypto Reference Index Uniswap	CCRIUNI Index	.CCRIUNI	5
Compass Crypto Reference Index Bitcoin-cash	CCRIBCH Index	.CCRIBCH	5
Compass Crypto Reference Index Cosmos	CCRIATOM Index	.CCRIATOM	5
Compass Crypto Reference Index Stellar	CCRIXLM Index	.CCRIXLM	5
Compass Crypto Reference Index Tron	CCRITRX Index	.CCRITRX	5
Compass Crypto Reference Index Ethereum-classic	CCRIETC Index	.CCRIETC	5
Compass Crypto Reference Index Tezos	CCRIXTZ Index	.CCRIXTZ	5
Compass Crypto Reference Index The-graph	coming soon	.CCRIGRT	5
Compass Crypto Reference Index Eos	CCRIEOS Index	.CCRIEOS	5
Compass Crypto Reference Index Aave	coming soon	.CCRIAAVE	5
Compass Crypto Reference Index Bitcoin-sv	CCRIBSV Index	.CCRIBSV	5
Compass Crypto Reference Index Maker	coming soon	.CCRIMKR	3
Compass Crypto Reference Index Sushi	coming soon	.CCRISUSHI	5
Compass Crypto Reference Index Dash	CCRIDASH Index	.CCRIDASH	5
Compass Crypto Reference Index Compound	coming soon	.CCRICOMP	5
Compass Crypto Reference Index Loopring	coming soon	.CCRILRC	5
Compass Crypto Reference Index Synthetix	coming soon	.CCRISNX	5
Compass Crypto Reference Index Curve-fi	coming soon	.CCRICRV	5
Compass Crypto Reference Index Yearn-finance	coming soon	.CCRIYFI	2
Compass Crypto Reference Index Bancor	coming soon	.CCRIBNT	5
Compass Crypto Reference Index 0x	coming soon	.CCRIZRX	5
Compass Crypto Reference Index Serum	coming soon	.CCRISRM	5
Compass Crypto Reference Index REN	coming soon	.CCRIREN	5
Compass Crypto Reference Index Perpetual-protocol	coming soon	.CCRIPERP	5
Compass Crypto Reference Index Uma	coming soon	.CCRIUMA	5
Compass Crypto Reference Index Raydium	coming soon	.CCRIRAY	5
Compass Crypto Reference Index linch	coming soon	.CCRIINCH	5

Table 2: Compass Crypto Reference Indices - Publication Codes and Rounding policy

12 Disclaimer

Nothing contained herein shall constitute or shall be deemed to constitute a financial, legal, tax or other advice of any kind, or a solicitation to purchase, sell or invest in any financial products or to engage in any financial strategy. Compass Financial Technologies SA or any of its affiliates (“Compass”) (i) does not guarantee the adequacy, the accuracy, the timeliness, the completeness, the evolution and/or the movements of its indices or any data included therein (the “Indices” or the ”Index”), (ii) shall not have any liability for any errors, omissions, delays or interruptions therein and (iii) makes no warranty, express or implied, as to results to be obtained by owners of any securities, or by any other person or entity from the use of the Indices. Compass does not make any express or implied warranties, and expressly disclaims, all warranties of merchantability or fitness for a particular purpose or use with respect to the Indices. Without limiting any of the foregoing, in no event shall Compass have any liability for any lost profits or indirect, punitive, special or consequential damages or losses, even if notified of the possibility thereof.



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