

HKEX Virtual Asset Index Series Index Methodology

Version History

Version	Version Date	Description
1.0	November 2024	Initial Version

Contents

Introduction	4
Index Construction	4
Constituent Exchange Eligibility Requirements	4
Semi-annually Constituent Exchange Review	5
Quarterly Inclusion	5
Index Calculation	5
HKEX Virtual Asset Reference Index (“Reference Index”)	5
HKEX Virtual Asset Reference Rate (“Reference Rate”)	7
Data Source, Format and Validation	7
Policies	7
Methodology Review and Any Changes to Methodology	7
Index Schedule	8
Fork Policy	8
Governance	8
Index Oversight Committee	8
Expert Judgement and Discretion	8
Dissemination	8
Disclaimer	9
Contact Information.....	10

Introduction

- 1 This document outlines the ground rules of the HKEX Virtual Asset Index Series.
- 2 The HKEX Virtual Asset Index Series (the “Index Series”) is developed by HKEX and is administered and calculated by CC Data Limited (“CCData”), a registered benchmark administrator authorized by UK Financial Conduct Authority.
- 3 The Index Series is designed to measure the price performance of each single virtual assets, including Bitcoin and Ether, providing both real-time and daily reference prices in Asia time zone. The real-time Reference Index is a 24-hour volume weighted reference spot price using prices aggregated from the major virtual asset exchanges.
- 4 The daily Reference Rate, also known as the daily fixing, is designed for the settlement of financial products. It is calculated once a day at 4:00 pm Hong Kong.

- 5 The Index Series includes:

Index Name	Base Date	Base Currency
HKEX Bitcoin Reference Index	31 Dec 2016	USD
HKEX Bitcoin Reference Rate	31 Dec 2016	USD
HKEX Ether Reference Index	31 Dec 2016	USD
HKEX Ether Reference Rate	31 Dec 2016	USD

- 6 The launch date of the Index Series is 15 November 2024, with the following semi-annual review scheduled for June 2025.

Index Construction

- 1 The Index Series utilizes the Exchange Benchmark Report¹ to evaluate the eligibilities of virtual asset exchanges, enhancing transparency and accountability. The report is updated semi-annually to reflect the fast-changing virtual asset landscape, evaluating more than 200 qualitative and quantitative metrics.

Constituent Exchange Eligibility Requirements

- 1 A virtual asset exchange (“Exchange”) is eligible for selection if it fulfils all below criteria:
 - Rated AA or A in the latest two Exchange Benchmark Reports
 - Be licensed and regulated
 - Provide U.S. dollar direct trading pair
- 2 The top five eligible Exchanges in terms of score on Exchange Benchmark Report are selected as constituent exchanges to contribute market data to the Index Series, subject to the selection process below.

¹ Exchange Benchmark Report is published semi-annually by CC Data Limited. For more details, please refer to

<https://ccdata.io/research/exchange-benchmark-rankings>

- 3 All indices in the Index Series are subject to a minimum of three and maximum of five constituent exchanges.

Semi-annually Constituent Exchange Review

- 1 Constituent exchanges are reviewed semi-annually in June and December (“Review Month”) based on the eligibility requirements and the Exchange Benchmark Report.
- 2 Existing constituent exchange ranked below 7th will be removed from the index, while non-constituent exchange ranked 3rd or above will be added. Exchanges will be added to or removed from the index to maintain the number of constituent exchanges at 5.
- 3 All changes are implemented after the index close on the first Monday of the Review Month.

Quarterly Inclusion

- 1 Quarterly inclusion is conducted in March and September. Non-constituent exchange with the highest rank is added to the index until the number of constituent exchanges of 5 is met. All changes are implemented after the index close on the first Monday of March and September.

Index Calculation

HKEX Virtual Asset Reference Index (“Reference Index”)

- 1 The real-time Reference Index is a 24-hour volume weighted reference spot price of a single virtual asset, i.e. Bitcoin or Ether, using prices aggregated from constituent exchanges. The Reference Index is calculated using transactional data and disseminated approximately every second with closing at 4:00 pm Hong Kong.

Reference Index	Ticker	Trading Pair	Frequency
HKEX Bitcoin Reference Index	HKEXBTC	BTC/USD	Real-time
HKEX Ether Reference Index	HKEXETH	ETH/USD	Real-time

- 2 24-hour Volume Weighted

The Reference Index takes into account both 24-hour trading volume and price in its calculation, assigning more weight to the constituent exchanges with higher trading volumes. This weighting scheme ensures that more liquid Exchanges have a greater impact on the index, thereby increasing its replicability.

3 Time Discount Factor

Time Discount Factor is applied to minimize the impact of outdated traded price in the Reference Index. In the event that a constituent exchange lacks new trading data or activities, the weighting of that exchange is reduced based on the minutes passed since the last trade, as illustrated in the following matrix.

Minutes passed since last trade on constituent exchange e (m_e)	Time Discount Factor $_t^e$
$m_e < 5$	100%
$5 \leq m_e < 10$	80%
$10 \leq m_e < 15$	60%
$15 \leq m_e < 20$	40%
$20 \leq m_e < 25$	20%
$m_e \geq 25$	0.1%

m_e is the minutes passed since last trade on constituent exchange e
 Time Discount Factor $_t^e$ is the time discount factor of constituent exchange e at time t

4 Outlier Exclusion Factor

Outlier Exclusion Factor is applied to exclude a price deemed to be an outlier (i.e. abnormal price) in the index calculation. A traded price from a constituent exchange that exceeds or falls below an absolute range of 10% compared to the previous index value is deemed outlier and is excluded from the index calculation.

Traded Price	Outlier Exclusion Factor $_t^e$
Outlier	0
Non-outlier	1

Outlier Exclusion Factor $_t^e$ is the outlier exclusion factor of constituent exchange e at time t

5 Calculation Formula

Index value at time t , Index $_t$, is defined as:

$$\text{Index}_t = \sum_{e \in E_t} \text{Traded Price}_t^e \cdot \text{Weighting}_t^e$$

$$\text{Weighting}_t^e = \frac{\text{Volume}_t^e \cdot \text{Time Discount Factor}_t^e \cdot \text{Outlier Exclusion Factor}_t^e}{\sum_{e \in E_t} \text{Volume}_t^e \cdot \text{Time Discount Factor}_t^e \cdot \text{Outlier Exclusion Factor}_t^e}$$

Where:

t is a point in time

Index $_t$ is the index value at time t

e denotes a constituent exchange in set E_t

E_t is the set of all constituent exchanges used in the index calculation at time t

Traded Price $_t^e$ is, with respect to constituent exchange e at time t , the price of the last trade to contribute to Index

Weighting $_t^e$ is the weighting of constituent exchange e at time t

Volume $_t^e$ is the 24-hour volumes of constituent exchange e at time

Time Discount Factor $_t^e$ is the time discount factor of constituent exchange e at time t

Outlier Exclusion Factor $_t^e$ is the outlier exclusion factor of constituent exchange e at time t , determines whether a traded price from a constituent exchange should be included (assigned a value of 1) or deemed an outlier and excluded (assigned a value of 0).

HKEX Virtual Asset Reference Rate (“Reference Rate”)

- 6 The daily Reference Rate, also known as the daily fixing, is designed for the settlement of financial products. The primary considerations are to utilize a method which is most familiar to participants and resilient to manipulation. The daily Reference Rate is calculated once per day at 4:00 pm Hong Kong Time using a 1-hour window, defined as the simple average of the respective Reference Index of every 5 minutes over the preceding 1 hour of the day close, from 3:00 pm to 4:00 pm Hong Kong.

Reference Rate	Ticker	Trading Pair	Frequency
HKEX Bitcoin Reference Rate	HKEXBRR	BTC/USD	Daily
HKEX Ether Reference Rate	HKEXERR	ETH/USD	Daily

The HKEX Virtual Asset Reference Rate as of time t , $VARR_T$, is defined as:

$$VARR_T = \frac{1}{x} \sum_{p=1}^x Index_p$$

Where:

$VARR_T$ is the respective Reference Rate as of 4:00 pm Hong Kong on day T

x is the number of observations, i.e. 12;

$Index_p$ is the value of respective Reference Index of the p^{th} observation

Data Source, Format and Validation

- 7 Transactional data (historical trades) is collected from each constituent exchange via public REST API or websocket endpoints by CCData. All collected data will be standardized, stored and backed up in servers.
- 8 Each trade is validated for the following:
- Price and Volume are positive
 - Timestamp is not in the future
 - Trades are not duplicated
 - Each field has the correct data format (e.g. numerical price and amount)

Policies

Methodology Review and Any Changes to Methodology

- 1 HKEX reviews the ground rule at least on annual basis to ensure the Index Series continues to best reflect the stated aims. All changes to the methodology are subject to the approval of the Index Oversight Committee. The ground rules may also be amended or supplemented from time to time as appropriate in response to market development. HKEX will announce the proposed changes as soon as practicable to the market prior to implementation.

Index Schedule

- 2 The Index Series is calculated and disseminated every day including business holidays.

Fork Policy

- 3 The forked token pair shall be included in the Eligible Pairs (BTC/USD and ETH/USD) if the following conditions are met:
 - **Pre- and Post-fork Criteria:** the forked token pair is trading on at least 3 eligible Exchanges.
 - **Post-fork Criteria:** Satisfactory Trading Activity - assuming the forked token pair is listed on at least 3 eligible Exchanges, at least 100 trades must occur per day and forked token pair volume should represent at least 10% of the combined trading volume of the original token pair and forked token pair.
 - **Post-fork Criteria:** Significant Market Value - the forked token pair must trade at a price greater than or equal to 10% of the combined price of the original token pair and the forked token pair.

For more information, please refer to the Hard Fork Policy².

Governance

Index Oversight Committee

- 1 HKEX Virtual Asset Index Series is overseen by the Index Oversight Committee (the “Committee”), which includes members of HKEX and the index administrator, CCData. The Committee is responsible for overseeing the index maintenance and ensuring the index is operated strictly adhering to the index methodology. In addition, the Committee is responsible for reviewing the index design and methodology, as well as endorsing any changes made to the index methodology.

Expert Judgement and Discretion

- 2 The Committee reserves the right to recommend, review and endorse actions deviating from the index methodology under exceptional circumstances, if deemed necessary, providing reasonable advance notice prior to the implementation date.

Dissemination

- 1 The HKEX Virtual Asset Reference Index is calculated real-time and is disseminated approximately every second. The index is disseminated in USD and the closing time is 4:00 pm Hong Kong.

² For more details about Hard Fork Policy, please refer to <https://ccdata.io/methodology-docs/hard-fork-policy-2019>

2 The HKEX Virtual Asset Reference Rate is calculated and disseminated in USD once per day.

3 Vendor Codes:

Index Name	Frequency	Refinitiv	Bloomberg
HKEX Bitcoin Reference Index	Real-time	.HKEXBTC	HKEXBTC
HKEX Ether Reference Index	Real-time	.HKEXETH	HKEXETH
HKEX Bitcoin Reference Rate	Daily	.HKEXBRR	HKEXBRR
HKEX Ether Reference Rate	Daily	.HKEXERR	HKEXERR

Disclaimer

This document and any information contained herein (“Information”) is for informational purpose only and may not be used for any other purpose. Without limitation to the foregoing, the Information or any data or values relating thereto may not be used to create derivative works or to verify or correct other data or information including without limitation to create risk models, analytics, or to issue or offer any financial products whether based on, linked to, tracks or otherwise derived from the Information or any data or values relating thereto. Whilst this document is the exclusive property of HKEX Indices and Benchmarks Limited (“HKEX-IB”), CC Data Limited (“CCData”) may from time to time make contributions to this document. Information may be changed from time to time without notice. To the maximum extent permitted by law, although the Information is obtained or compiled from sources believed to be reliable, none of HKEX-IB or CCData makes any claim, prediction, warranty or representation in any way with respect to any Information or any data or values relating thereto or results to be obtained therefrom including without limitation as to its accuracy, validity, timeliness, completeness, reliability, merchantability, fitness for any particular purpose. To the maximum extent permitted by law, none of HKEX-IB or CCData accepts any liability (whether in tort or contract or otherwise) whatsoever to any person for any damage or loss of any nature, directly or indirectly, arising from or as a result of use or reliance on any Information or any data or values relating thereto, or any delays, errors or omissions in any Information or any data or values relating thereto. Indices cannot be invested in directly. Inclusion of an asset in an index is not a recommendation to buy, sell or hold that asset. Prospective investors should also note that value of securities and investments can go down as well as up, back-tested performance is not actual performance and past performance is not necessarily indicative of future performance. The Information does not constitute an offer, solicitation, inducement, invitation or recommendation to subscribe for, buy or sell securities, futures and options contracts, or other products or to provide any investment advice or service of any kind. Investment involves risks. Prospective investors should seek independent investment, financial, legal or professional advice to ensure that any of their decisions is made with regard to their own investment objectives, financial circumstances and other particular needs. Investors shall be fully responsible for any loss or profits resulting from their investment decision.

The intellectual property rights in this document remain the exclusive property of HKEX-IB. Without prior written permission of HKEX-IB, no part of this document may be reprinted, reproduced, published, redistributed or used to create any derivative work or in any way other than expressly permitted herein. All rights reserved.

Contact Information

For further details on HKEX Virtual Asset Index Series, please contact:

HKEX Indices and Benchmarks Limited
8/F, Two Exchange Square
8 Connaught Place, Central, Hong Kong
www.hkex.com.hk
indices@hkex.com.hk

Hong Kong Exchanges and Clearing Limited

8/F, Two Exchange Square,
8 Connaught Place,
Central, Hong Kong

hkexgroup.com | hkex.com.hk

info@hkex.com.hk
T +852 2522 1122
F +852 2295 3106