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Introduction

Index Objective

The CoinDesk Single Digital Asset Price Index series (the “Indices”) provide USD-denominated reference rates for spot prices for digital asset tokens. The Indices leverage real-time prices from multiple exchanges to provide a representative spot price for each digital asset. Constituent exchanges are weighted proportional to their trailing 24-hour liquidity with adjustments for price variance and inactivity.

The list of Indices is provided in Table 1 below. CoinDesk Indices reserves the right to create and publish additional single digital asset indices.

Additional Details

Given the potential for anomalies or manipulation at individual exchanges, constituent weights may dynamically adjust using CoinDesk Indices proprietary Constituent Weighting Adjustment Algorithm (CWAA). The algorithm is designed to calculate a real-time index which is an accurate and reliable reflection of the market price of each digital asset using multi-sourced spot prices and dynamically reduce the weights of individual exchanges with lower liquidity, inactivity and higher price variance. Please refer to the Index Calculation section for more details.

These indices were officially rebranded from TradeBlock to CoinDesk on April 20, 2021. There were no modifications to the index rules or historical data because of this rebranding.

This methodology was created by CoinDesk Indices (“CDI”) to achieve the Index Objective stated above. There may be circumstances or market events which require CDI, in its sole discretion, to deviate from these rules to ensure each Index continues to meet its Objective. This document should be read in conjunction with the CoinDesk Digital Asset Indices Policy Methodology.

Table 1: List of Price Indices

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Ticker</th>
<th>Trading Pair</th>
<th>Launch Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoinDesk Bitcoin Price Index</td>
<td>XBX</td>
<td>XBT/USD</td>
<td>11/03/2014</td>
</tr>
<tr>
<td>CoinDesk Ether Price Index</td>
<td>ETX</td>
<td>ETH/USD</td>
<td>03/02/2018</td>
</tr>
<tr>
<td>CoinDesk Bitcoin Cash Price Index</td>
<td>BCX</td>
<td>BCH/USD</td>
<td>03/02/2018</td>
</tr>
<tr>
<td>CoinDesk Litecoin Price Index</td>
<td>LTX</td>
<td>LTC/USD</td>
<td>03/02/2018</td>
</tr>
<tr>
<td>CoinDesk Cardano Price Index</td>
<td>ADX</td>
<td>ADA/USD</td>
<td>06/30/2021</td>
</tr>
</tbody>
</table>
Eligibility Criteria

Exchange Eligibility

To be eligible, an exchange must first meet the Exchange Eligibility criteria outlined in the CoinDesk Digital Asset Policy Methodology. For each Price Index, the following additional criteria is used to establish eligible exchanges.

1. Prior three-month trading volume (as measured by base currency) on the exchange must represent a target minimum percentage of total trading volume across all eligible exchanges for the trading pair as follows:
   a. For current contributing exchanges, the minimum percentage is 4.0%.
   b. For non-contributing exchanges not on the current watchlist, the minimum percentage is 10.0%.
   c. For non-contributing exchanges on the current watchlist, the minimum percentage is 5.0%.

2. Must support USD-denominated trading for the single asset.

For each index, the list of exchanges that pass all eligibility criteria listed above form the Selection Universe.

All non-contributing exchanges not selected as index constituents that have a minimum percentage of 4.0% will be included on the new watchlist that will be used for the following reconstitution.
Index Construction

Exchange Selection

All exchanges in the Selection Universe are included in the index subject to a minimum of three and maximum of five contributing exchanges based on the following steps:

1. Rank exchanges in descending order by three-month trading volume
2. Select the highest ranked exchanges subject to a maximum of five exchanges
3. If Step 2 results in fewer than three exchanges, the three-month trading volume requirement is relaxed for current contributing exchanges and Watchlist exchanges until three exchanges are selected.
4. If Step 3 results in fewer than three exchanges, the Index Committee will determine the appropriate action.

Exchange Weighting

Contributing exchanges are weighted proportional to their trailing 24-hour liquidity with adjustments for price variance and inactivity as described in Index Calculation.

Index Calculation

The Indices utilize the most recently available trade data from contributing exchanges to calculate and publish a weighted-average index price approximately once every second.

Calculating single digital asset price indices represents unique challenges as various market participants do not adhere to regulatory oversight, market standards, or follow pre-set guidelines. This can lead to concerns around data integrity vis-à-vis exchange sources, including, but not limited to unintended errors, manipulated pricing feeds, and/or issues with reported trading volumes.

To account for potential data anomalies or lack of trading volume from an exchange, CDI’s Constituent Weighting Adjustment Algorithm (CWAA) is designed to calculate a volume weighted price for each constituent exchange as well as adjust constituent weights in real-time to minimize the impact of localized exchange issues on calculated index levels. The following are key steps employed by the algorithm:

1. **Data Cleansing**: Before applying the index algorithm to real-time market data, all inputs are cleaned for duplicates, relevancy, and appropriateness.
2. **Binning Ticks**: Certain exchanges often process several trades within a short span of time (one second), which may unduly influence the index value. By binning several ticks, the algorithm synthesizes the data into a single trade.

3. **Liquidity Weighting**: Exchanges with greater 24-hour liquidity are more heavily weighted in the index, increasing the ability to replicate the index. This also mitigates the impact of ‘trade bursts’ or movements during off-peak trading hours.

4. **Price Variance Weighting**: Exchange weights are discreetly adjusted in proportion to the variance of their respective prices from the mean price. As the price at a particular exchange diverges from the rest of the data points, its influence on the index consequently decreases.

5. **Time-based coefficient**: The algorithm penalizes inactivity on an exchange. If an exchange does not have new trading data after a certain period, its weighting is gradually reduced, until it reaches 0%.

The result of these steps may cause a partial or total reduction in the weight of the impacted contributing exchange(s). If this happens, the total percent weight reduced will be proportionally redistributed to contributing exchanges not impacted. As normal activity and trading resumes on the impacted contributing exchange(s), weights of all contributing exchanges will return to normal levels.

In the event of a market stress event or unresponsive input data from contributing exchanges, the algorithm will incorporate at least one input to calculate a benchmark value. In the unlikely event of no input data from all contributing exchanges, the index will default to the most recent value for which one or more inputs were present.

The Index Committee maintains discretion for re-evaluating and updating the algorithm based on market conditions to maintain the quality, reliability, and integrity of the indices.

**Calculation Formula**

\[
IndexValue_t = \sum_{i=1}^{N} P_{i,t} * W_{i,t}
\]

Where:
- \(IndexValue_t\) = Index Value at time \(t\)
- \(P_{i,t}\) = Price of trading pair (as calculated by the CWAA) on exchange \(i\) at time \(t\)
- \(W_{i,t}\) = Weight of constituent exchange \(i\) at time \(t\) as determined by the CWAA
- \(N\) = number of constituent exchanges
Index Maintenance

Index Reconstitution

Each index is reviewed on a quarterly basis during January, April, July and October based on data available up to and including the Reference Date. Contributing exchanges are reselected based on the rules described above. Any changes resulting from the quarterly review are announced two weeks in advance of the effective date and are phased in over a 24-hour implementation period. During the implementation period, the weights of additions will gradually increase from 0% to their target weight and any deletions will decrease from their current weight to 0%. Please see below for the reconstitution timeline including an example.

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Timing</th>
<th>Example Reconstitution Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Date for Input Data</td>
<td>First Friday of Quarter</td>
<td>1/7/2022</td>
</tr>
<tr>
<td>Announcement Date</td>
<td>Second Friday of Quarter</td>
<td>1/14/2022</td>
</tr>
<tr>
<td>Implementation Begins</td>
<td>Saturday at 4PM following Fourth Friday</td>
<td>1/29/2022</td>
</tr>
<tr>
<td>Implementation Complete</td>
<td>Sunday at 4PM following Fourth Friday</td>
<td>1/30/2022</td>
</tr>
</tbody>
</table>

In addition to the quarterly process, exchange constituents are monitored daily for potential anomalies and trading disruptions. Out-of-review monitoring, which would require index modification, only applies in extraordinary circumstances. Incident types that would require one or more index modifications are outlined in the CoinDesk Digital Asset Indices Policy Methodology.

Deletions

If a contributing exchange is removed from an index outside of the schedule reconstitution process its weight will be set to zero on the removal effective date and it will no longer contribute to index returns. The impacted exchange will be considered for inclusion at the next scheduled reconstitution if it meets the Eligibility Criteria.
In the event a digital asset is no longer pricing on at least three Eligible Exchanges the Index Committee will determine the appropriate action which may include termination of the impacted Single Digital Asset Index.

**Additions**

There will be no additions to the index between reconstitutions unless the constituent count drops below three exchanges. In this event, the Index Committee will review the eligible universe and determine the appropriate action.

**Data Distribution**

Real-time index values are calculated 24x7 and are available publicly at https://tradeblock.com and/or https://coindesk.com/indices/ and are also available to subscribers via REST, WebSocket APIs, and scheduled email updates.

**Index Governance**

The CoinDesk Index Committee provides ongoing oversight of the Indices and their Methodology. For more details on the Index Committee, please refer to the Index Governance section of the CoinDesk Digital Asset Indices Policy Methodology.
Appendix 1: Data sources

This section describes data sources used to reconstitute, maintain, and calculate the Index. If data is not available for any reason from the sources described in this appendix, other data sources may be used.

Price data

Prices used to calculate the Indices are sourced from eligible exchanges.

Volume data

Volume data used to weight constituents are sourced from eligible exchanges.

Reconstitution Data

Trading volume is sourced from eligible exchanges.
## Appendix 2: Methodology Changes

The table below provides a summary of modifications to this Index Methodology.

<table>
<thead>
<tr>
<th>Effective Date</th>
<th>Prior Treatment</th>
<th>Updated Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/11/2023</td>
<td>Minimum volume requirement for Eligible Exchanges: -Constituents: 5.0% -Non-constituents: 6% and included on the current watchlist</td>
<td>Minimum volume requirement for Eligible Exchanges: -Constituents: 4.0% -Non-constituents: 10% (fast entry) or 5% and included on the current watchlist</td>
</tr>
<tr>
<td>1/11/2023</td>
<td>Contributing exchanges may drop below three between reconstitutions due to an unexpected removal.</td>
<td>In the event a contributing exchange is deleted between reconstitutions, a replacement exchange will be added if the contributing exchange count would otherwise drop below three.</td>
</tr>
<tr>
<td>4/1/2022</td>
<td>Discretion by Index Committee for the addition of new exchanges when the 5% target trading volume was initially met.</td>
<td>Incorporated standard buffers and a seasoning period for 3-month target trading volume for new exchange constituents.</td>
</tr>
</tbody>
</table>
Appendix 3: Document Revision History

<table>
<thead>
<tr>
<th>Timing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/22/2023</td>
<td>Annual Methodology Review. Updates included in Change Appendix as well as</td>
</tr>
<tr>
<td></td>
<td>minor edits and clarifications.</td>
</tr>
<tr>
<td>5/4/2022</td>
<td>Minor edits</td>
</tr>
<tr>
<td>3/11/2022</td>
<td>Initial Version</td>
</tr>
</tbody>
</table>
Disclaimer

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