CCData

CCIX Aggregate Index Validation

March 2024

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Introduction

The CCData's Aggregated Index ("CCIX", or formerly "CCCAGG") refers to the real-time index calculation methodology, the purpose of which is to show the best price estimation for cryptocurrency traders and investors to value their portfolio at any time. CCIX is CCData''s proprietary index calculation methodology for digital assets, based on 24-hour volume weighted average calculation, time-penalty factor and outlier methodology. It aggregates transaction data from more than 250 exchanges, using a 24 hour volume weighted average. The CCIX is calculated for each cryptocurrency in each market it is trading in (example: CCIX BTC-USD).

Find the full methodology here:
https://ccdata.io/methodology-docs/ccix-methodology

Goal of the Report

The goal of this report is to show that the CCIX index is representative and replicable by conducting a series of tests and benchmarking.

Thus this report is focused on the following key areas:

- CCIX methodology validation
    - Price consistency
    - Price stability
- Backtesting results
    - Recalculate daily CCIX values using raw trade data for the last 3 months
- Constituent exchange review
    - Summary of changes for this month's review
    - CCIX behaviour vs constituent exchanges behaviour

Executive Summary

In the March 2024 validation report, these are the main takeaways:

Price consistency

- For 92% of a total of 762 pairs, the daily CCIX price was less than 0.5% away from the median market price on average for the last 3 months.

Price stability

- When comparing the volatility of CCIX to the volatility of individual exchanges, 78% of the 762 pairs included in this test had a negative difference. This means CCIX was less volatile than the average of the individual exchanges across the last 3 months.
- Of the 22% that had a positive difference, 90% of the CCIX pairs were less than 1% more volatile than the individual exchange average.

Backtesting

- For all 200 pairs where CCIX was replicated there was less than a 0.5% average difference from the real time price over the 90 day period. Any differences may be a result of backfilled or late trades that were excluded from the real time calculation.

Constituent review

- On average, 165 million USD in volume was added to CCIX per day through the monthly review of constituent exchanges in March. This caused a 4.5% change in the volume on average across all pairs which received a change in exchange constituents.

Data

CCIX covers over 6,000 active pairs, however, the majority of this validation report focuses on a subset of more liquid pairs, which are defined as the following:

- Have traded volume during the last 90 days
- Have more than 3 constituent exchanges

The methodology validation section of this report includes a total of 762 pairs which fulfil these criteria for the March 2024 report.

Data used to create this report consists of:

- Historical daily, hourly and minute OHLC data for all exchanges and CCIX
- Raw trades from all exchanges

The full review result dataset is available in CSV form upon request.

Methodology validation

CCIX methodology ensures that the index is robust to outliers. The following methodology features help achieve this goal:

- 24 hour volume weighting:
    - Ensures CCIX gives greater weight to liquid market prices, and price impact of illiquid (and therefore more volatile) markets is negligible.
- Time penalty factor
    - Ensures that exchanges that suspend trading or trade infrequently have an expiring price impact.
- Outlier Detection
    - Excludes trades that deviate significantly from the previous index price

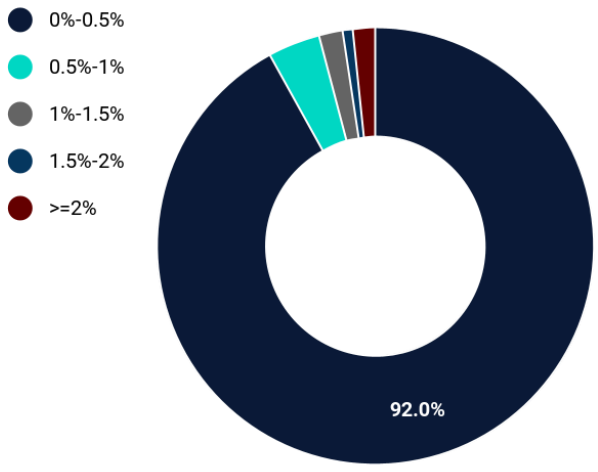
Thus, it is expected that:

- CCIX follows the market median price closely
- CCIX is less volatile than each individual exchange

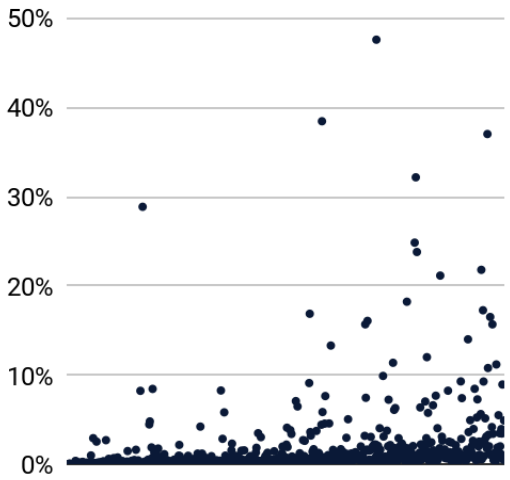
Price consistency

We measure price consistency by comparing daily CCIX values for the last 3 months with the median market price of the constituent exchanges. We expect the CCIX price to be close to the market median, but there may be bigger deviations for illiquid markets.

Average difference CCIX vs median - last 3 months
% of total pairs



Max difference for each pair - last 3 months



Left chart: Pie chart depicting the average difference between CCIX price and the median price of all constituent exchanges for the last 3 months. Right chart: Scatterplot depicting the maximum difference between CCIX price and the median price of all constituent exchanges over the last 3 months.

For 92% of a total of 762 pairs, the daily CCIX price is less than 0.5% away from the median market price, on average over the last 3 months. The scatter plot shows pairs that have at least one day in the period with a much higher percentage difference - these are illiquid pairs where we prioritise price discovery, thus, certain days can be more volatile.

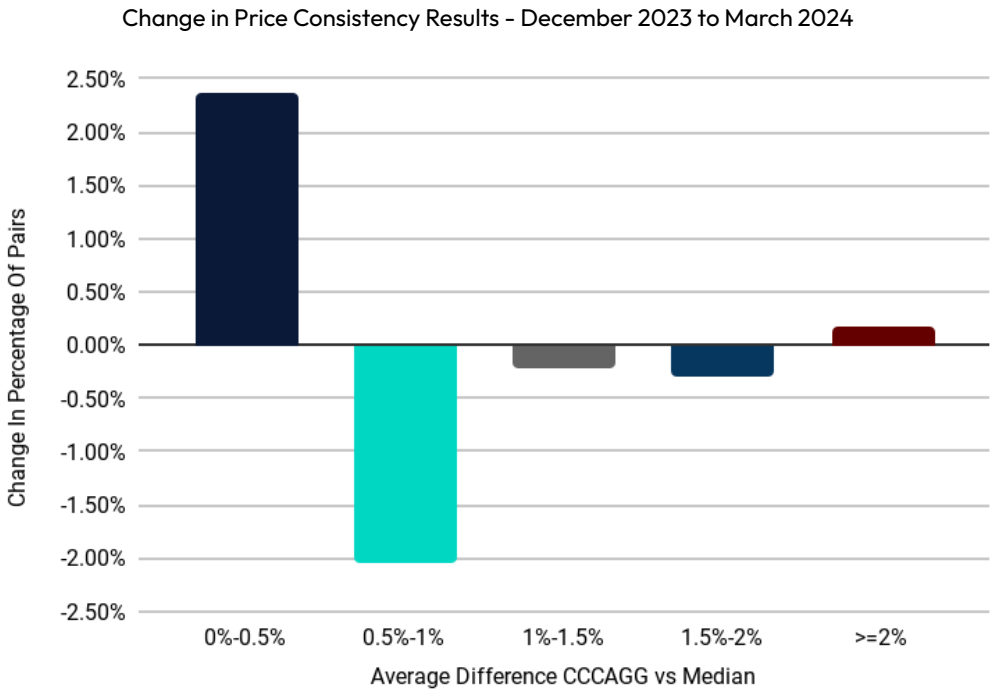


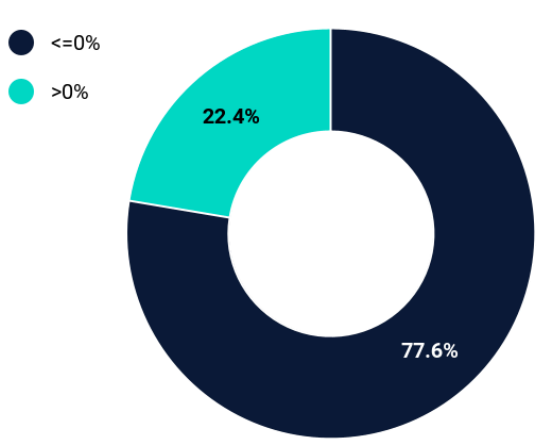
Chart showing the changes in the percentage of pairs that fall into each bracket of difference between CCIX price and the median market price, from the previous report to this one.

Compared to last quarter's report the number of CCIX pairs whose price was less than 1% away from the market median has increased by more than 2%, showcasing more consistent prices relative to the last quarter.

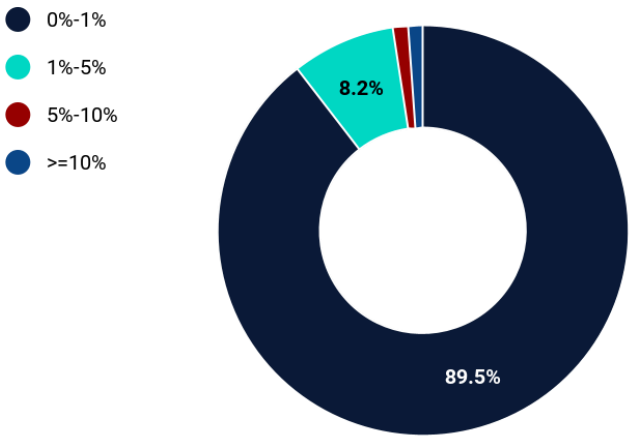
Price stability

Price stability is measured by comparing daily CCIX volatility to market volatility in the last 3 months. In this report, we measure volatility as the ratio of the high and low price during each day. We compare the CCIX volatility with the average market volatility across the past 3 months. A negative difference means CCIX is less volatile than the average of the individual exchanges in the market.

Average difference CCIX vs market volatility
% of total pairs



% of pairs with a positive difference



Left chart: Percentage of pairs that have either a positive or negative percentage difference between CCIX and market volatility. Right chart: Breakdown of the percentage difference of pairs which have a positive difference between CCIX and market volatility.

Of the 762 pairs included in this test, almost 78% had a negative difference, meaning CCIX was less volatile than the average of the individual exchanges across the last 3 months. Of the 22% that had a positive difference, around 90% were less than 1% more volatile than the individual exchange average. This positive difference generally occurs on less liquid markets, where individual exchanges have infrequent updates, but combine to more frequent updates for the aggregate index.

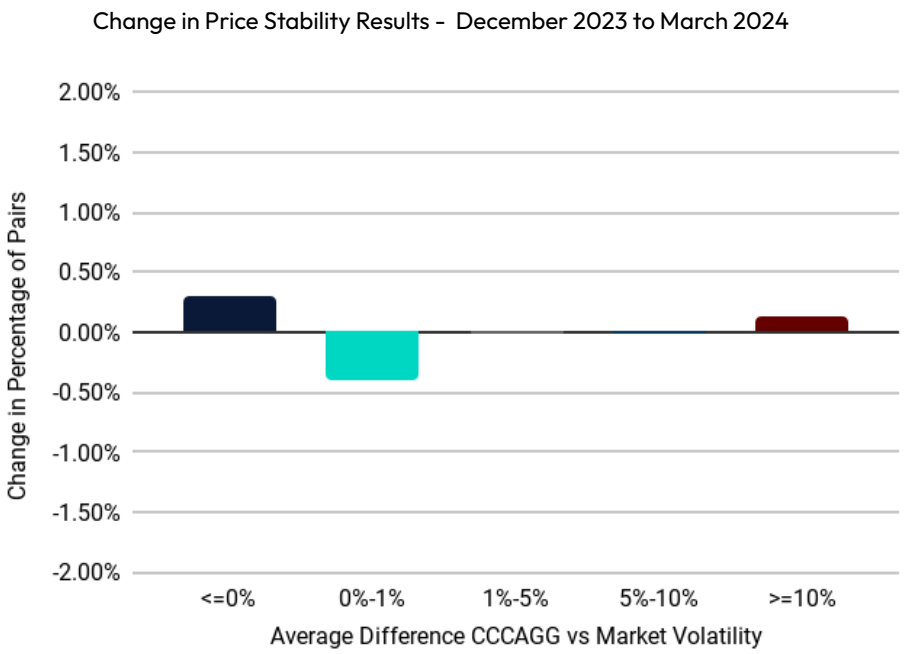


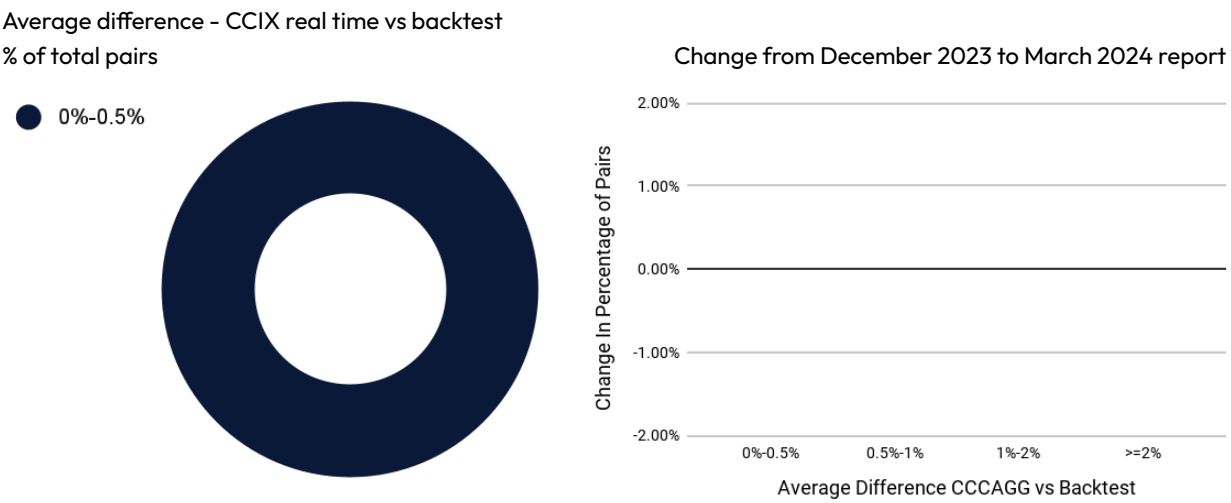
Chart showing the changes in the percentage of pairs that fall into each bracket of difference between CCIX volatility and the average market volatility, from the previous report to this one.

Compared to last quarter's report we saw a slight increase in the number of pairs with negative differences.

Backtesting results

CCIX should by nature be replicable as it is calculated from raw trade data. To demonstrate this the CCIX end of day value was re-calculated for the past 90 days, for the top 200 pairs by volume. This was done with an entirely separate script to the ones used to calculate CCIX in real time. The results from this were compared to the real time CCIX calculation. Any differences might be due to:

- Backfilled trades
- Late trades not taken into account
- Internal latency



Left Chart: average difference between CCIX real time values and backtesting for the top 200 pairs by volume. Right Chart: change in the results from the previous to the current report.

All of 200 pairs had less than a 0.5% average difference over the 90 day period. This is unchanged since last quarter.

Digital Assets (DA) Fixing review

CCData's Digital Asset Fixing Indices ("DA Fixings") for a given Currency Pair refers to the end-of-day index calculation methodology, the purpose of which is to show the best price estimation for traders and investors to value their portfolios using a reliable and market-representative price. DA Fixings are calculated as a 10-minute time-weighted-average price (TWAP) of CCData's CCIX reference prices, making the indices representative, highly difficult to manipulate, and easy to replicate.

Find the full methodology here:

https://ccdata.io/methodology-docs/da-fixings-methodology

Backtesting results

Given that DA Fixings are built on top of CCIX, this report also analyses the consistency of these prices. To review DA Fixings, prices were re-calculated for the past 90 days closing at 4 P.M. London time (official close time), for the top 200 pairs by volume. The results from this were compared to the historical DA fixing values on our API.

Average difference - CCIX real time vs backtest % of total pairs

Chart: average difference between recalculated DA Fixings and historical values for the top 200 pairs by volume.

All of 200 pairs had less than a 0.5% average difference over the 90-day period.

Constituent exchange review

Each month the CCIX index constituents are reviewed, according to the Constituent Selection Criteria. Constituents are selected based on their Exchange Benchmark grade, trading volume and price stability. Read the full selection methodology under Chapter 6 in the CCIX Index Methodology.

Volume and price impact of review

In this section, we compare CCIX aggregate volumes and prices after the review against CCIX aggregate volumes and prices before the review (all volumes in USD). To do this we:

- Compute the total difference for the last 30 days (net volume we add or remove after the review)
- Calculate the average volume change each day
- Calculate the average price change each day

After the March review, we added on average 146 million USD a day in volume to CCIX.
Find the full list of removed and added constituents here:

CCData Aggregate Index Constituent Reviews

Values in millions of USD	January	February	March
Average volume added	128	120	165
Average volume removed	(5)	(22)	(17)
Average change in volume	123	98	148
% Volume Change*	3.6%	3.8%	4.5%

* Note: The base value for the calculation is the total volume traded of the pairs where we added or removed exchanges. This can vary each month.

Average difference CCIX price - last 30 days
% of pairs where a change in constituents occurred.

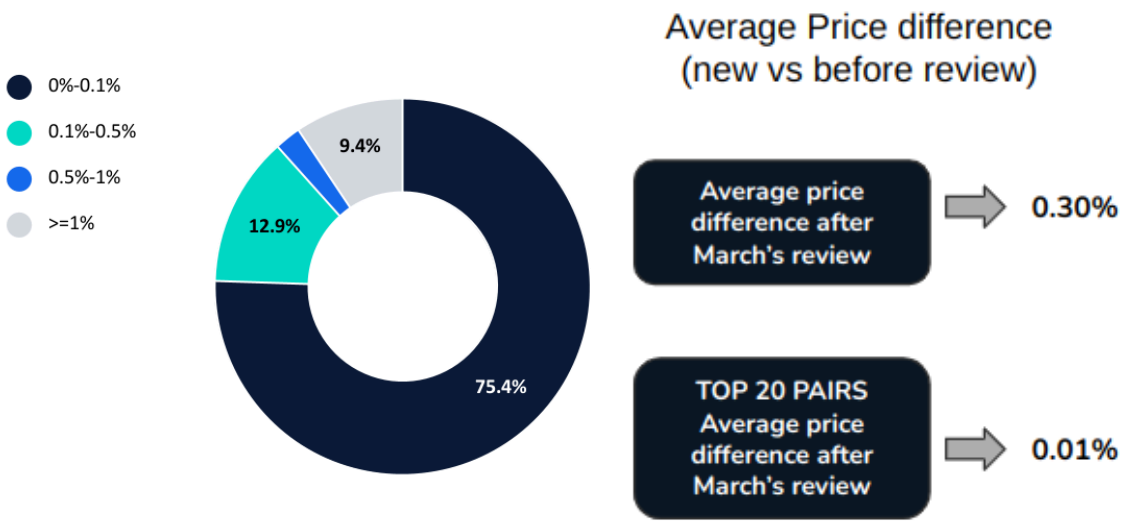


Chart depicting the average difference between CCIX price before the review and CCIX price after the review during the last 30 days.

On average for all reviewed pairs that received a change in constituents, the CCIX price saw a change of 0.3%. Meanwhile, this change for the top 20 pairs by volume within this group was almost zero.

CCIX Behaviour vs Constituent Exchange Behaviour

In this section, we chart the CCIX price vs constituent exchange prices for the top 5 pairs traded in USD across the last 30 days. The goal is to show how the CCIX price is affected by any significant price movements in any of the constituent exchanges during the time period. It is expected that CCIX is not significantly affected by unusual price changes in the constituent markets.

BTC - USD price - Last 30 days - Minute data

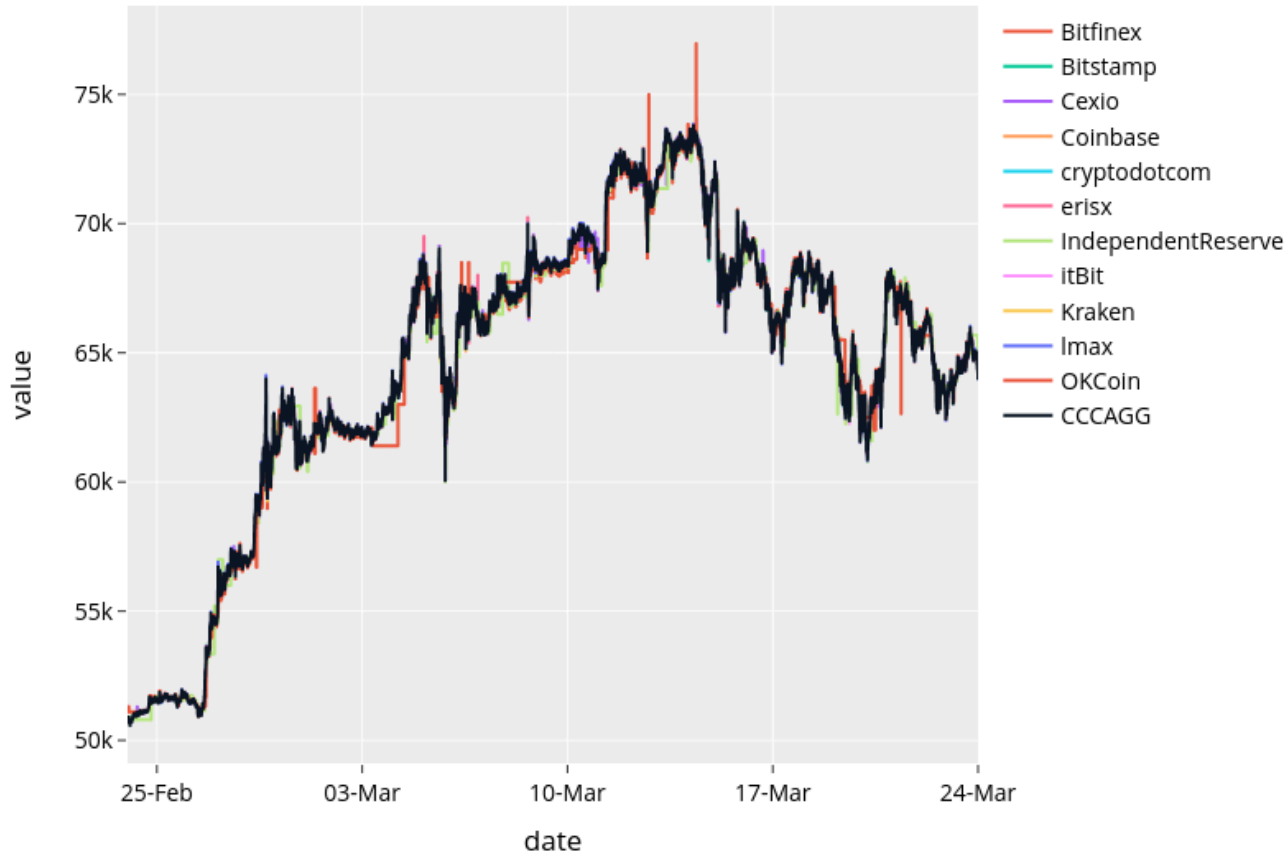


Chart depicting minute BTC-USD CCIX and constituent exchange prices for the last 30 days.

It is clear that the CCIX price follows the market and is not affected by occasionally stale prices and price spikes on OKCoin.

ETH - USD price - Last 30 days - Minute data

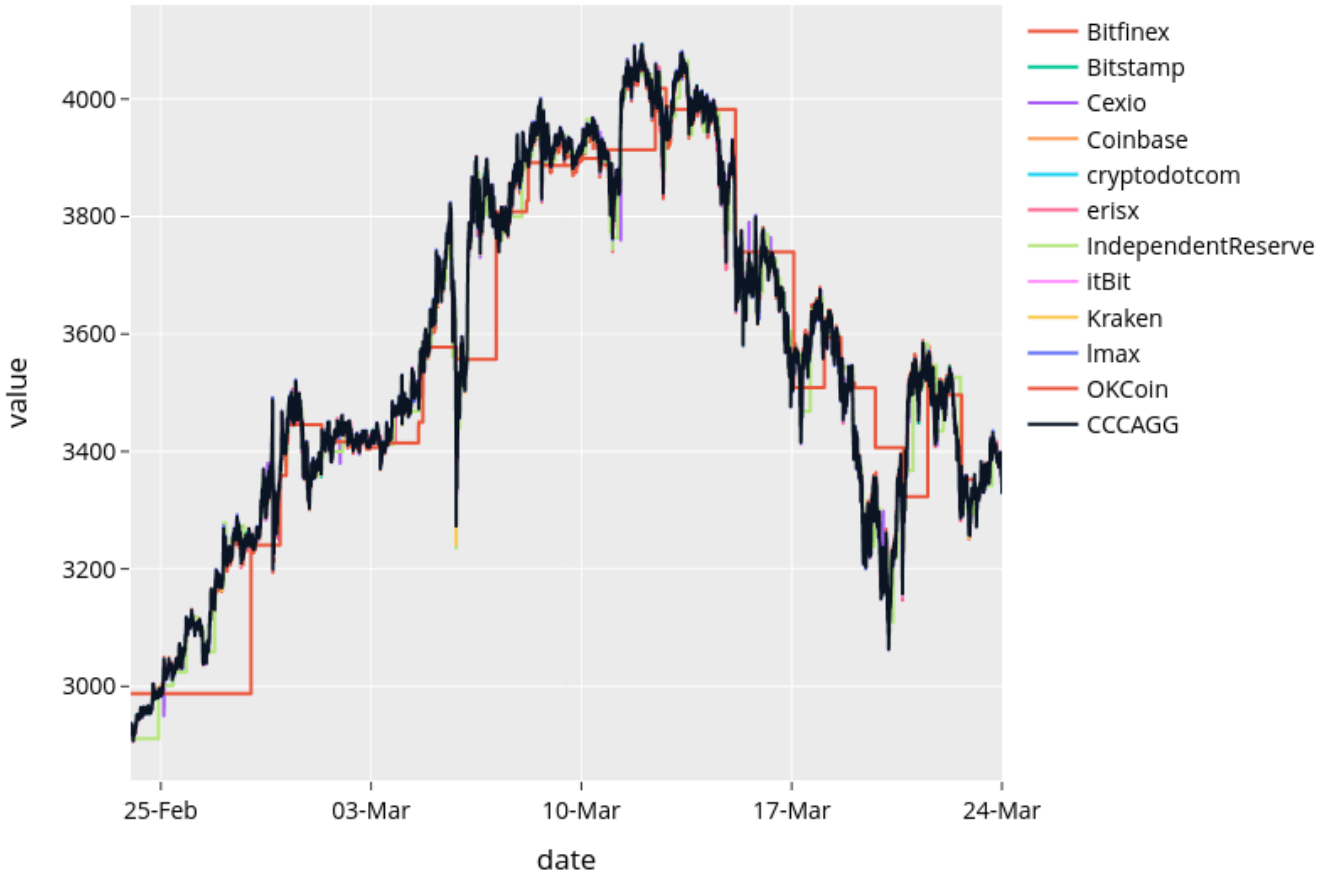


Chart depicting minute ETH-USD CCIX and constituent exchange prices for the last 30 days.

CCIX price is not affected by the stale prices on OKCoin due to the time penalty factor. It also avoids price spikes on Cexio.

SOL - USD price - Last 30 days - Minute data

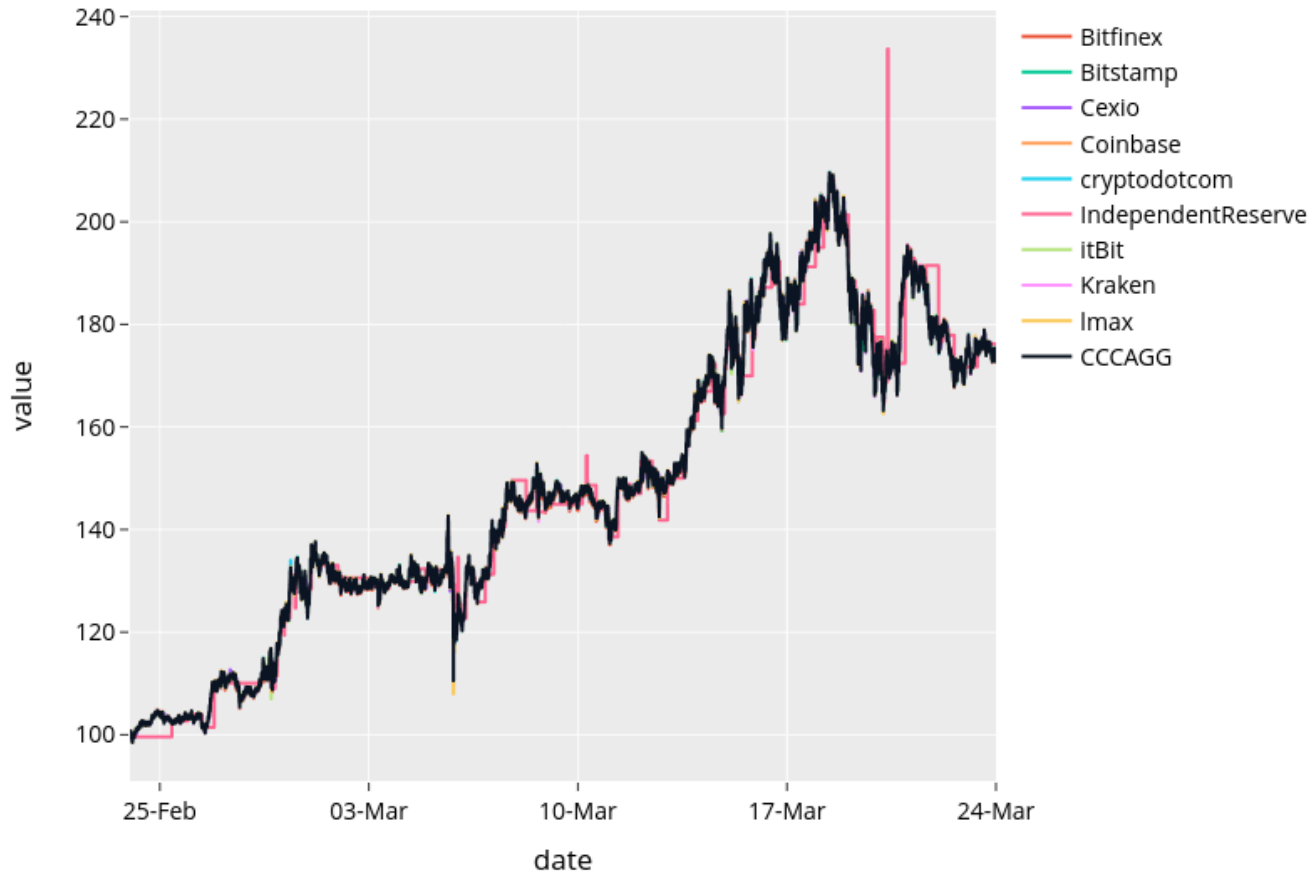


Chart depicting minute SOL-USD CCIX and constituent exchange prices for the last 30 days.

It is evident that CCIX price tracks the market price well throughout the period, and it's not affected by stale prices on Independent Reserve or price spikes on Independent Reserve and Lmax.

XRP - USD price - Last 30 days - Minute data

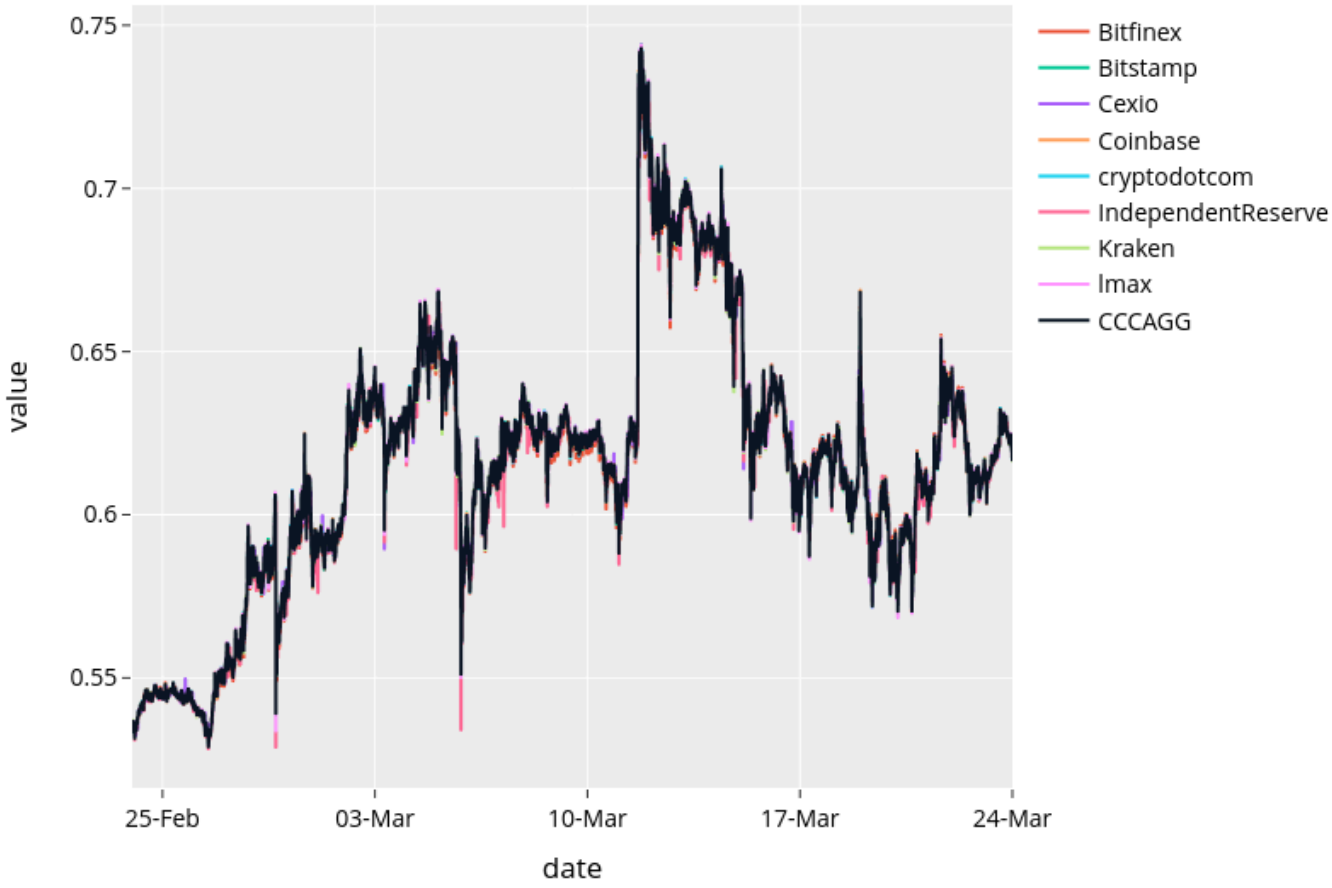


Chart depicting minute XRP-USD CCIX and constituent exchange prices for the last 30 days.

Once again, the CCIX closely follows the market median price and is not affected by price spikes on Independent Reserve and Cexio due to the volume-weighted nature of the index.

DOGE - USD price - Last 30 days - Minute data

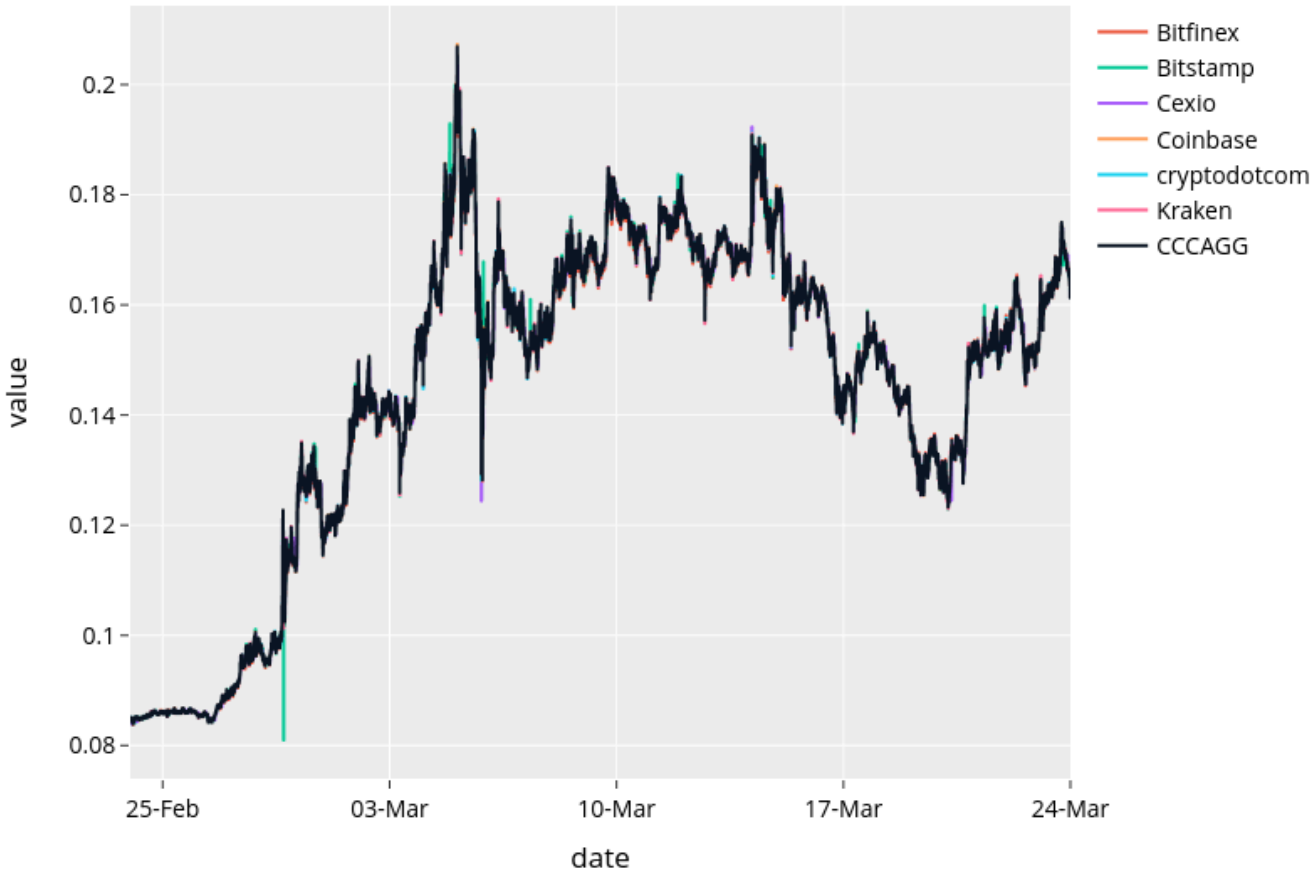


Chart depicting minute DOGE-USD CCIX and constituent exchange prices for the last 30 days.

Again here, CCIX follows the market price avoiding the spikes on Bitstamp and Cexio markets.

Summary of top pairs

	Price consistency	Price stability	Backtesting
Pair	CCIX vs market median (1)	CCIX volatility vs average market volatility (2)	Real time CCIX value vs Re-calculated CCIX value (3)
	mean absolute difference	mean difference	mean absolute difference
BTC-USD	0.01%	-1.09%	0.00%
ETH-USD	0.01%	-1.25%	0.00%
SOL-USD	0.03%	-0.48%	0.00%
XRP-USD	0.06%	-1.01%	0.00%
DOGE-USD	0.05%	-1.90%	0.00%
SHIB-USD	0.02%	-1.43%	0.00%
AVAX-USD	0.04%	-1.59%	0.00%
LINK-USD	0.03%	-0.62%	0.00%
SEI-USD	0.07%	-0.09%	0.00%
ADA-USD	0.02%	-0.12%	0.00%

Notes:

(1) Daily difference calculated as: (CCIX Price / Median Exchange Price) - 1

(2) Volatility calculated as: (Daily high price / Daily low price) - 1

(3) Daily Difference % calculated as: (Real time CCIX value / Re-calculated CCIX value) - 1

Contact

If you are interested in using the CryptoCompare Aggregate Index (CCIX) in your products, please get in touch at data@ccdata.io.

Resources

CCIX Index Methodology
https://ccdata.io/methodology-docs/ccix-methodology

CCData Exchange Benchmark
https://ccdata.io/reports/exchange-benchmark-2023

Disclaimer

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