CCData

CCCAGG Aggregate Index Validation

December 2023

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CCData

Introduction

The Crypto Coin Comparison Aggregated Index (“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. CCCAGG 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 CCCAGG is calculated for each cryptocurrency in each market it is trading in (example: CCCAGG BTC-USD).

Find the full methodology here:
https://ccdata.io/methodology-docs/ccdata-aggregate-index-methodology-2022

Goal of the Report

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

Thus this report is focused on the following key areas:

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

Executive Summary

In the December 2023 validation report, these are the main takeaways:

Price consistency

- For 90% of a total of 752 pairs, the daily CCCAGG 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 CCCAGG to the volatility of individual exchanges, 77% of the 752 pairs included in this test had a negative difference. This means CCCAGG was less volatile than the average of the individual exchanges across the last 3 months.
- Of the 23% that had a positive difference, 90% of the CCCAGG pairs were less than 1% more volatile than the individual exchange average.

Backtesting

- For all 200 pairs where CCCAGG 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, 146 million USD in volume was added to CCCAGG per day through the monthly review of constituent exchanges in December. This caused a 4.5% change in the volume on average across all pairs which received a change in exchange constituents.

Data

CCCAGG 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 752 pairs which fulfil these criteria for the December 2023 report.

Data used to create this report consists of:

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

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

Methodology validation

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

- 24 hour volume weighting:
    - Ensures CCCAGG 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

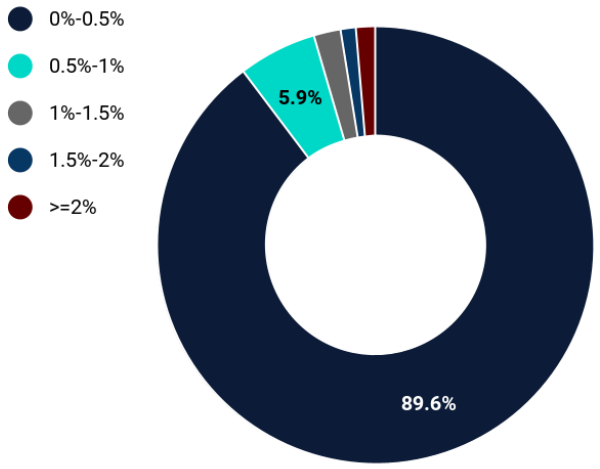
Thus, it is expected that:

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

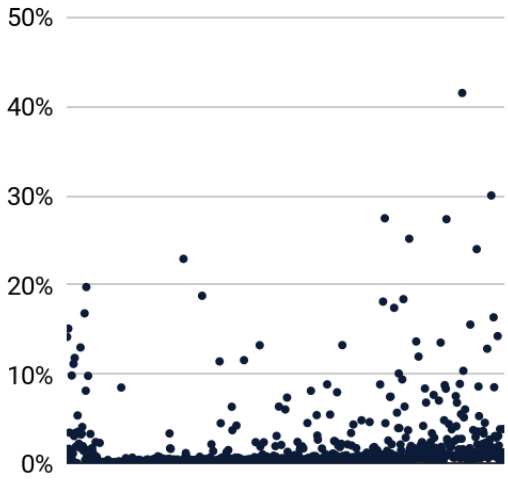
Price consistency

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

Average difference CCCAGG 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 CCCAGG price and the median price of all constituent exchanges for the last 3 months. Right chart: Scatterplot depicting the maximum difference between CCCAGG price and the median price of all constituent exchanges over the last 3 months.

For almost 90% of a total of 752 pairs, the daily CCCAGG 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.

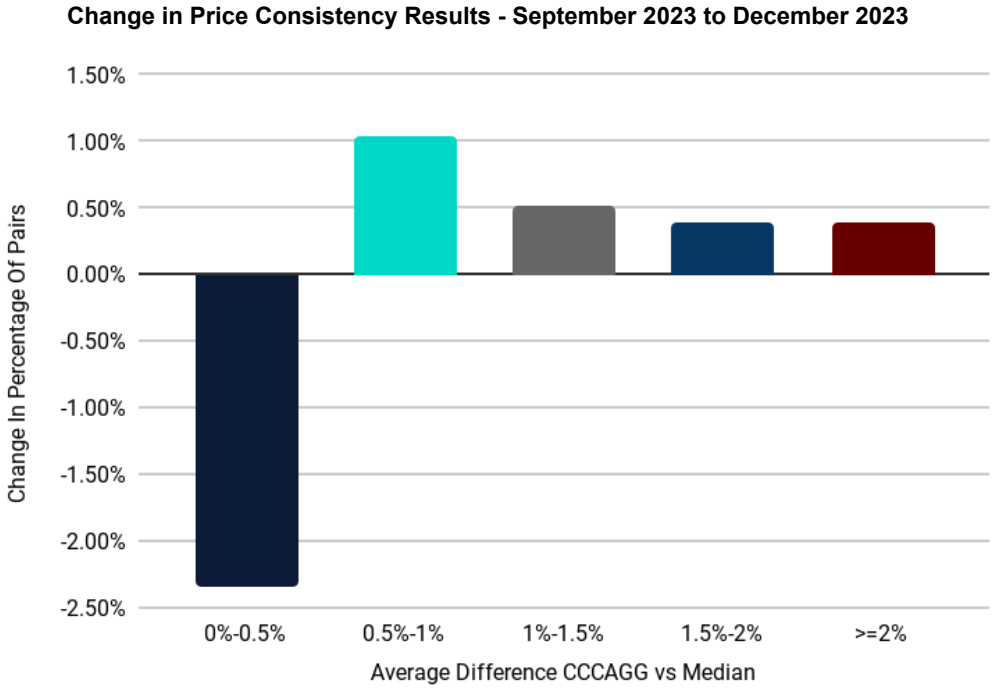


Chart showing the changes in the percentage of pairs that fall into each bracket of difference between CCCAGG price and the median market price, from the previous report to this one.

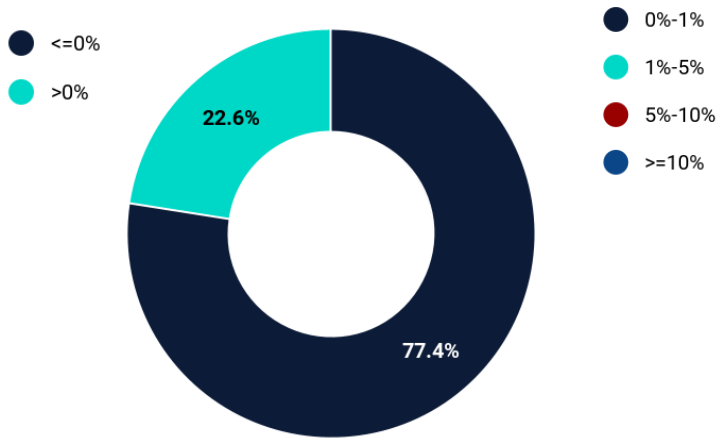
Compared to last quarter's report the number of CCCAGG pairs whose price was less than 1% away from the market median has decreased by 2%.

Price stability

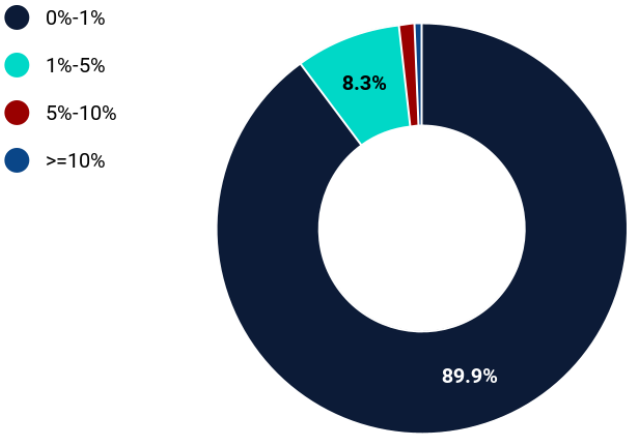
Price stability is measured by comparing daily CCCAGG volatility to market volatility in the last 3 months. In this report, we measure volatility as the ratio of the high and low price during each day. We compare the CCCAGG volatility with the average market volatility across the past 3 months. A negative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

Average difference CCCAGG 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 CCCAGG and market volatility. Right chart: Breakdown of the percentage difference of pairs which have a positive difference between CCCAGG and market volatility.

Of the 752 pairs included in this test, 77% had a negative difference, meaning CCCAGG was less volatile than the average of the individual exchanges across the last 3 months. Of the 23% 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.

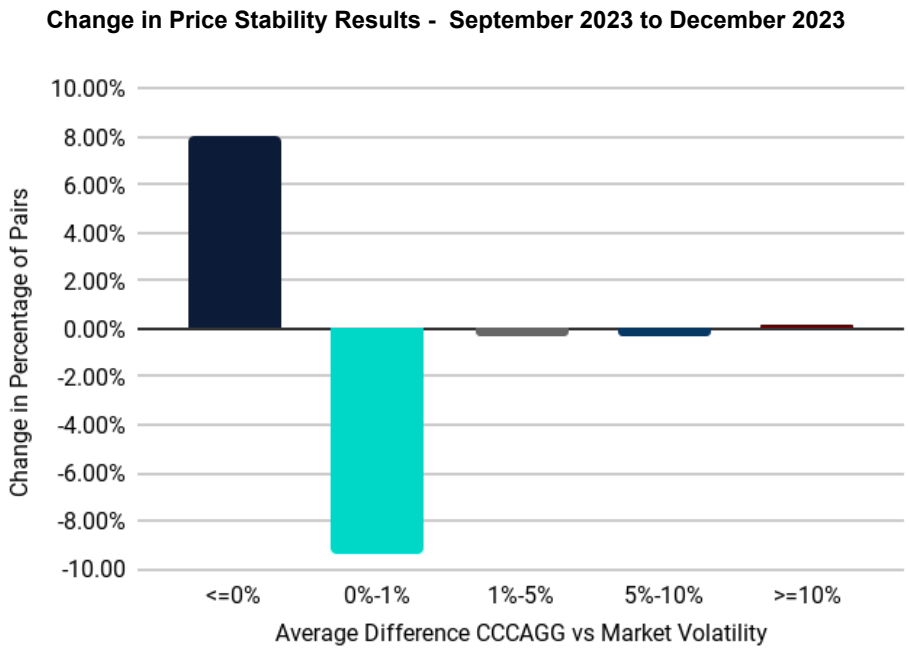


Chart showing the changes in the percentage of pairs that fall into each bracket of difference between CCCAGG volatility and the average market volatility, from the previous report to this one.

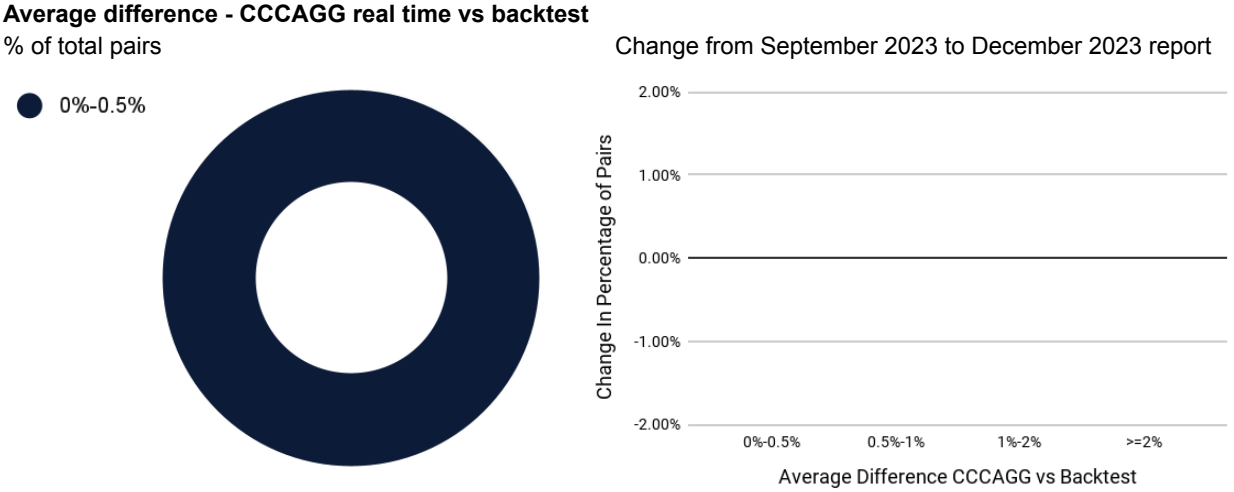
Compared to last quarter's report we saw an increase of 8% in the number of pairs with negative differences, meaning the CCCAGG is relatively less volatile compared to the last quarter's review.

Backtesting results

CCCAGG should by nature be replicable as it is calculated from raw trade data. To demonstrate this the CCCAGG 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 CCCAGG in real time. The results from this were compared to the real time CCCAGG calculation. Any differences might be due to:

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

Average difference - CCCAGG real time vs backtest



Left Chart: average difference between CCCAGG 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.

Constituent exchange review

Each month the CCCAGG 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 CCCAGG Index Methodology.

Volume and price impact of review

In this section, we compare CCCAGG aggregate volumes and prices after the review against CCCAGG 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 December review, we added on average 146 million USD a day in volume to CCCAGG.
Find the full list of removed and added constituents here:

https://ccdata.io/methodology-docs/ccdata-aggregate-index-methodology-2022

Values in millions of USD	October	November	December
Average volume added	217	649	146
Average volume removed	(0)	(174)	(5)
Average change in volume	217	475	141
% Volume Change*	59.4%	5.8%	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 CCCAGG price - last 30 days
% of pairs where a change in constituents occurred.

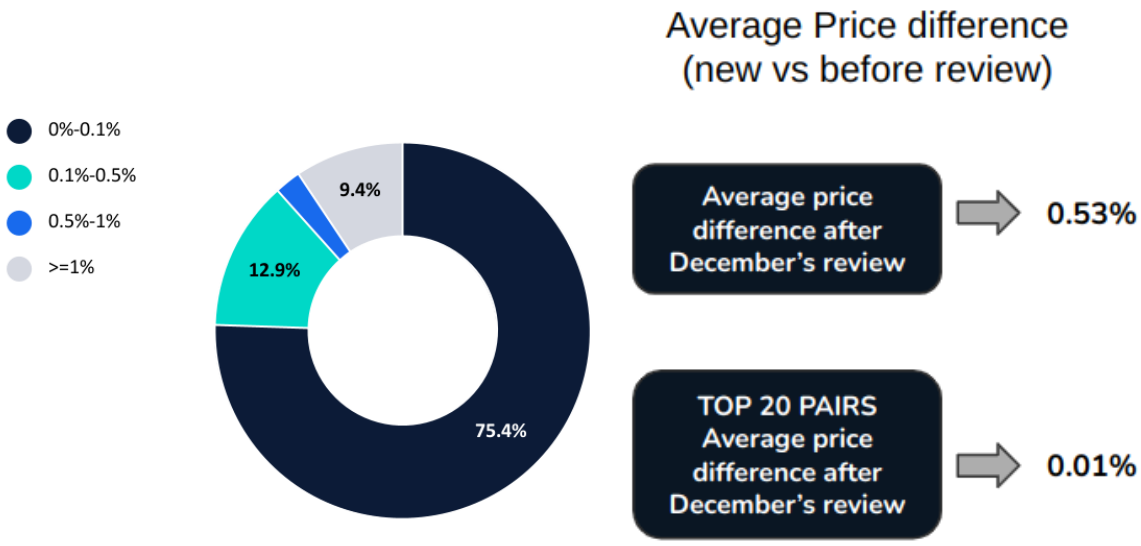


Chart depicting the average difference between CCCAGG price before the review and CCCAGG price after the review during the last 30 days.

On average for all reviewed pairs that received a change in constituents, the CCCAGG price saw a change of 0.53%. Meanwhile, this change for the top 20 pairs by volume within this group was almost zero.

CCCAGG Behaviour vs Constituent Exchange Behaviour

In this section, we chart the CCCAGG 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 CCCAGG price is affected by any significant price movements in any of the constituent exchanges during the time period. It is expected that CCCAGG is not significantly affected by unusual price changes in the constituent markets.

BTC - USD price - Last 30 days - Minute data

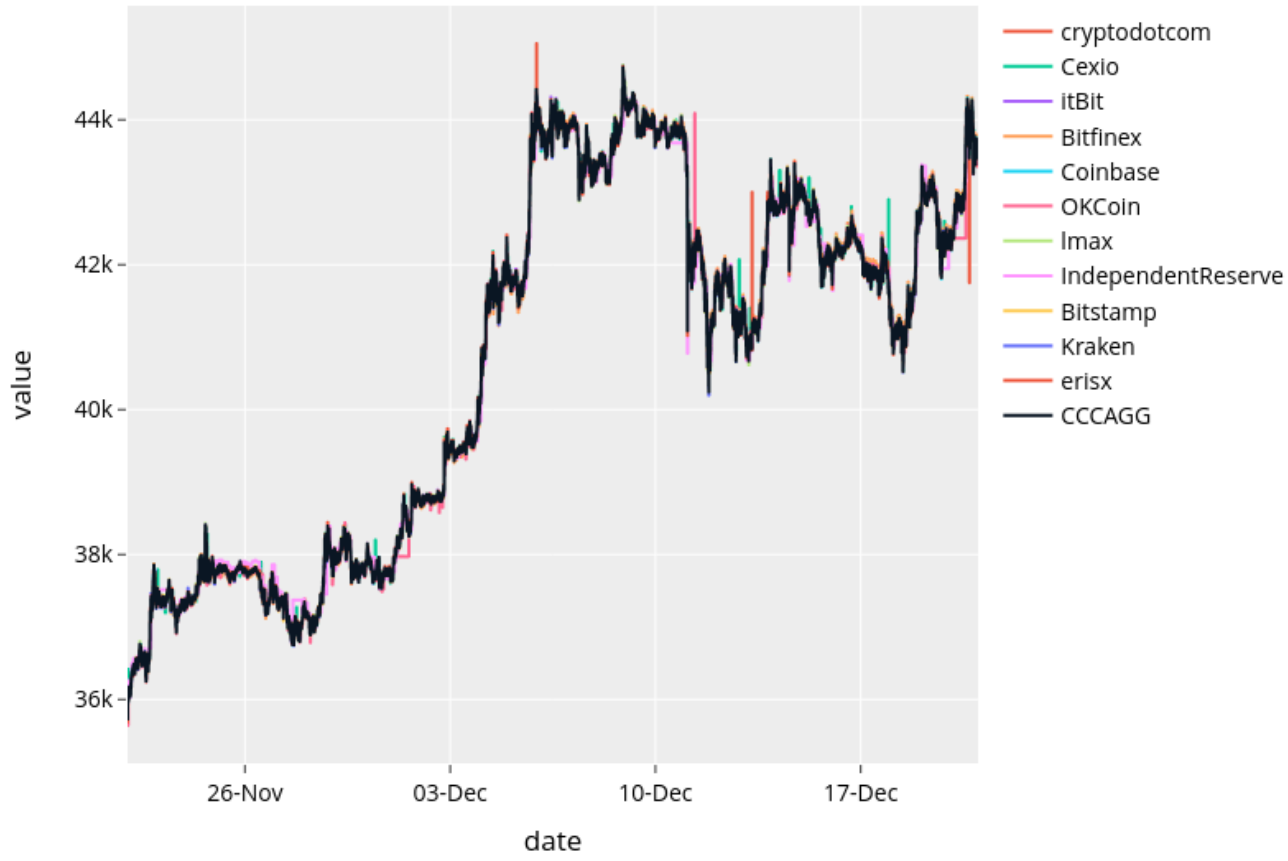


Chart depicting minute BTC-USD CCCAGG and constituent exchange prices for the last 30 days.

It is clear that the CCAGG price follows the market and is not affected by volatile prices on OKCoin, Erisx and Cexio or stale prices on OKCoin.

ETH - USD price - Last 30 days - Minute data

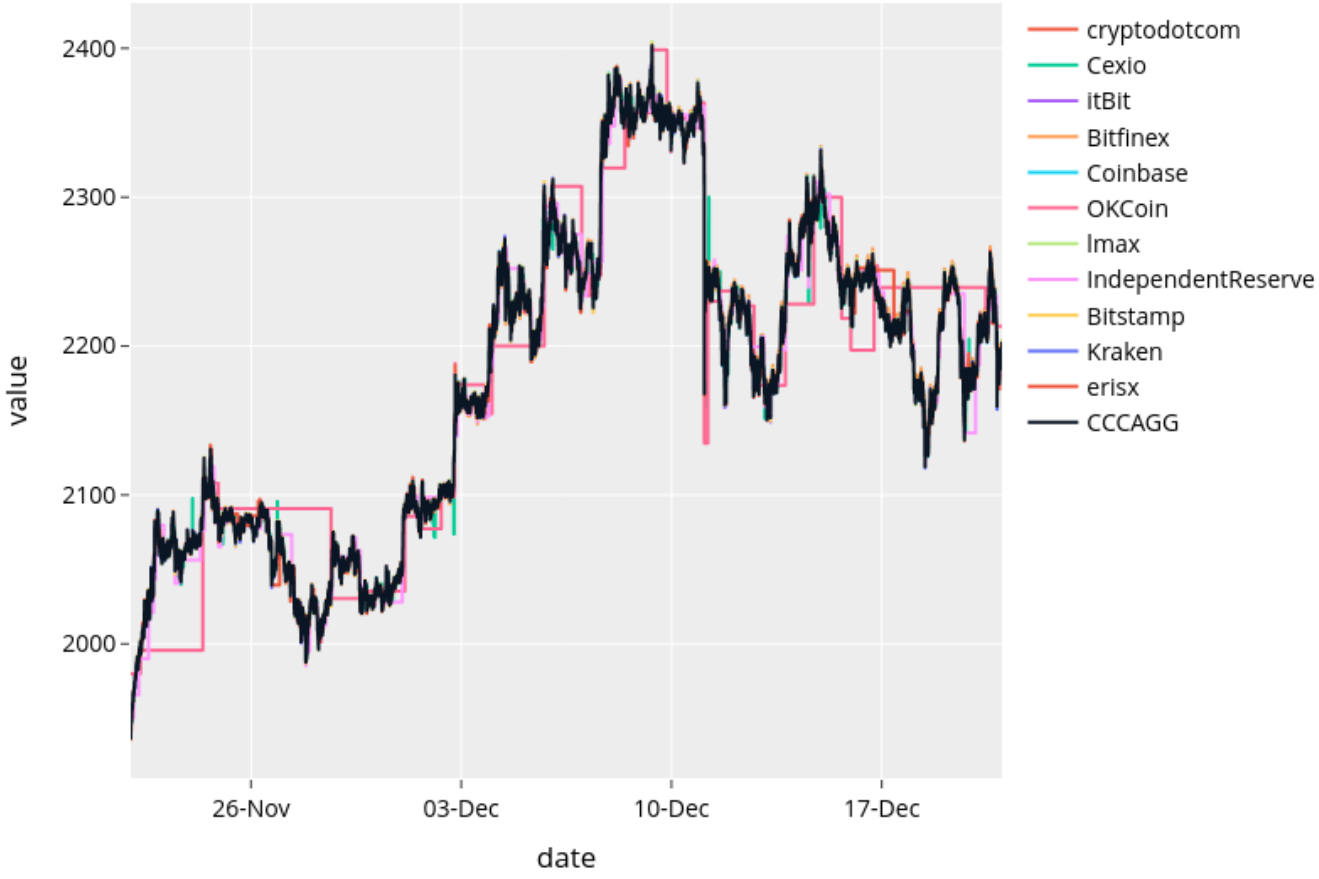


Chart depicting minute ETH-USD CCCAGG and constituent exchange prices for the last 30 days.

CCAGG 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

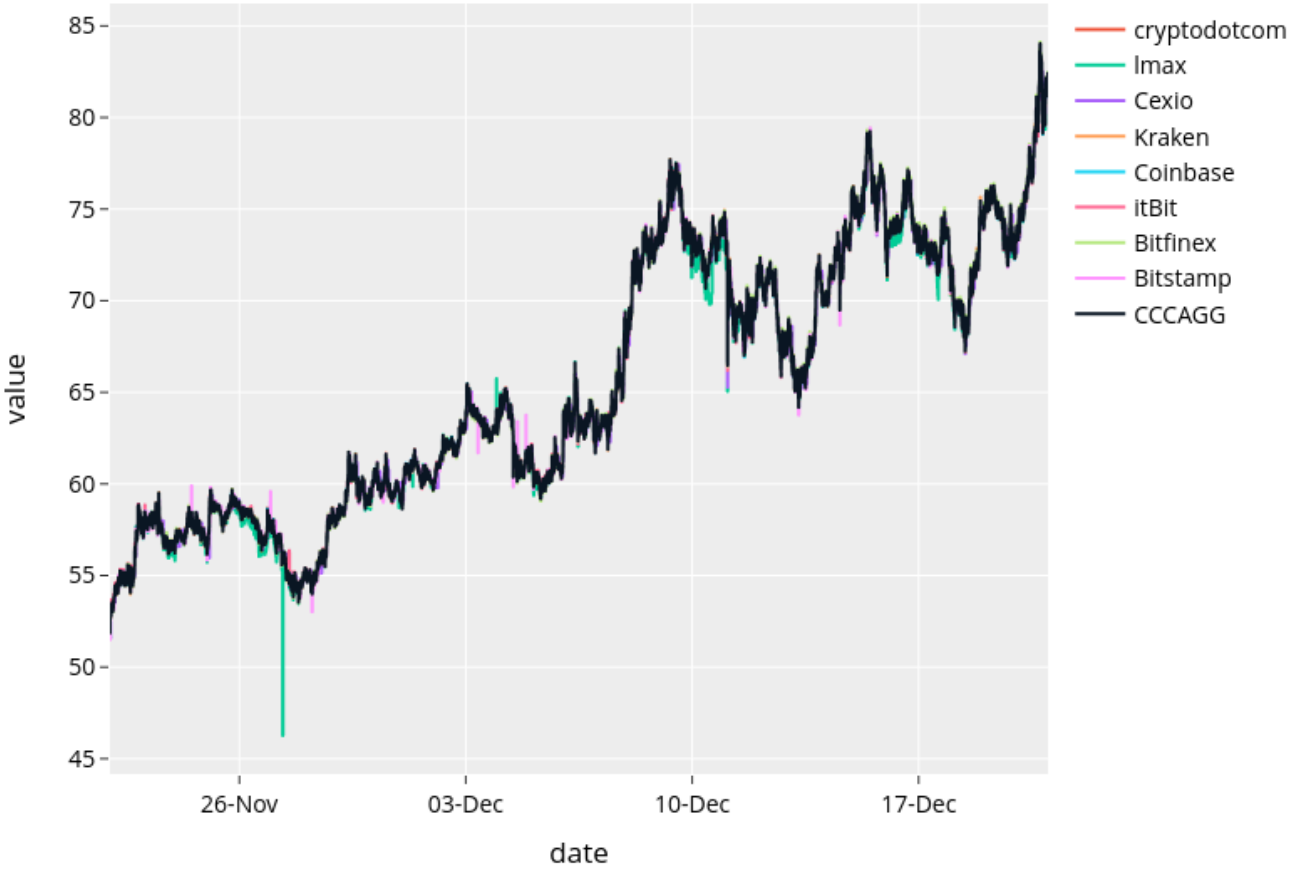


Chart depicting minute SOL-USD CCCAGG and constituent exchange prices for the last 30 days.

The CCCAGG price tracks the market price well throughout the period, and it's not affected by price spikes on Lmax and Bitstamp.

XRP - USD price - Last 30 days - Minute data

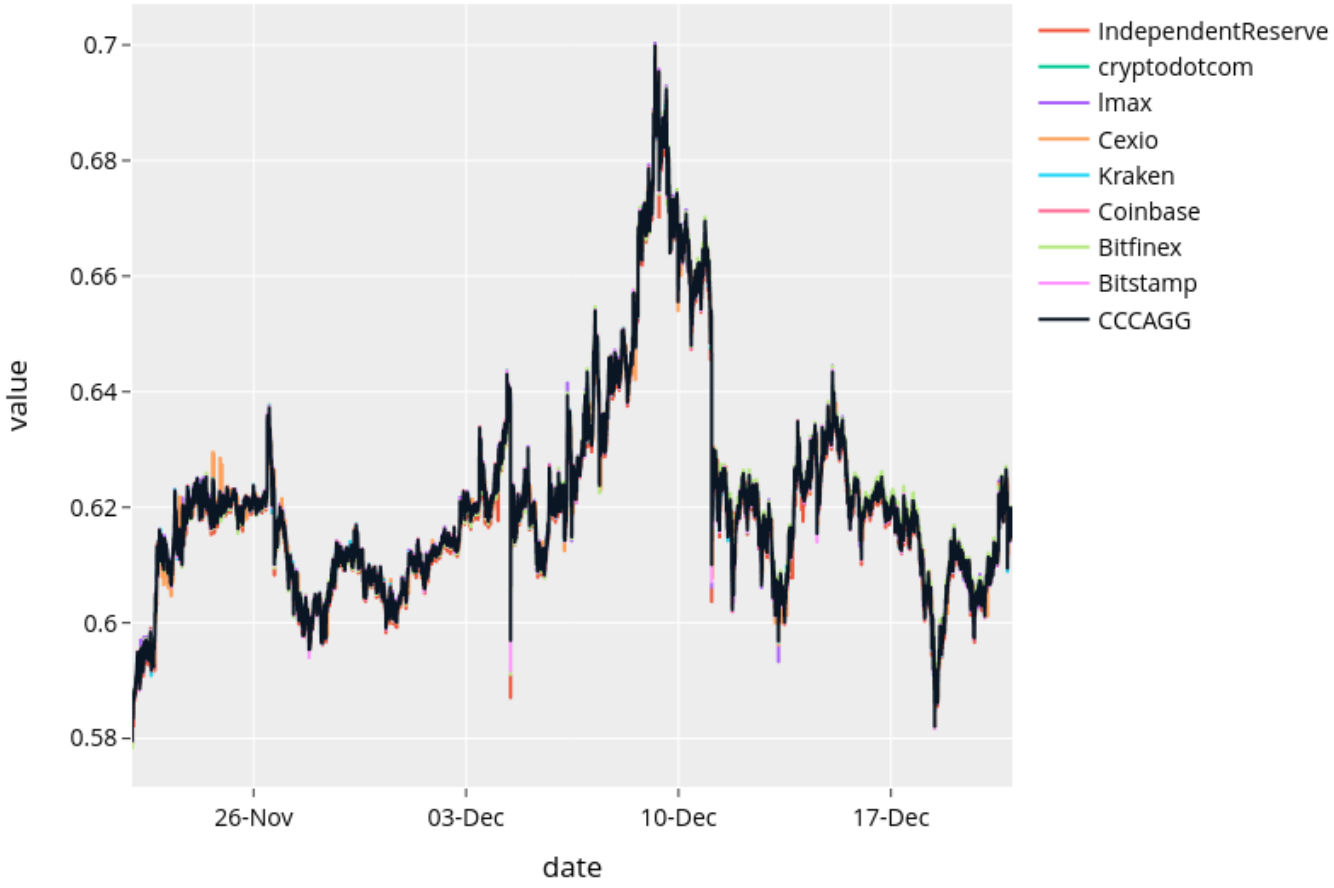


Chart depicting minute XRP-USD CCCAGG and constituent exchange prices for the last 30 days.

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

LINK - USD price - Last 30 days - Minute data

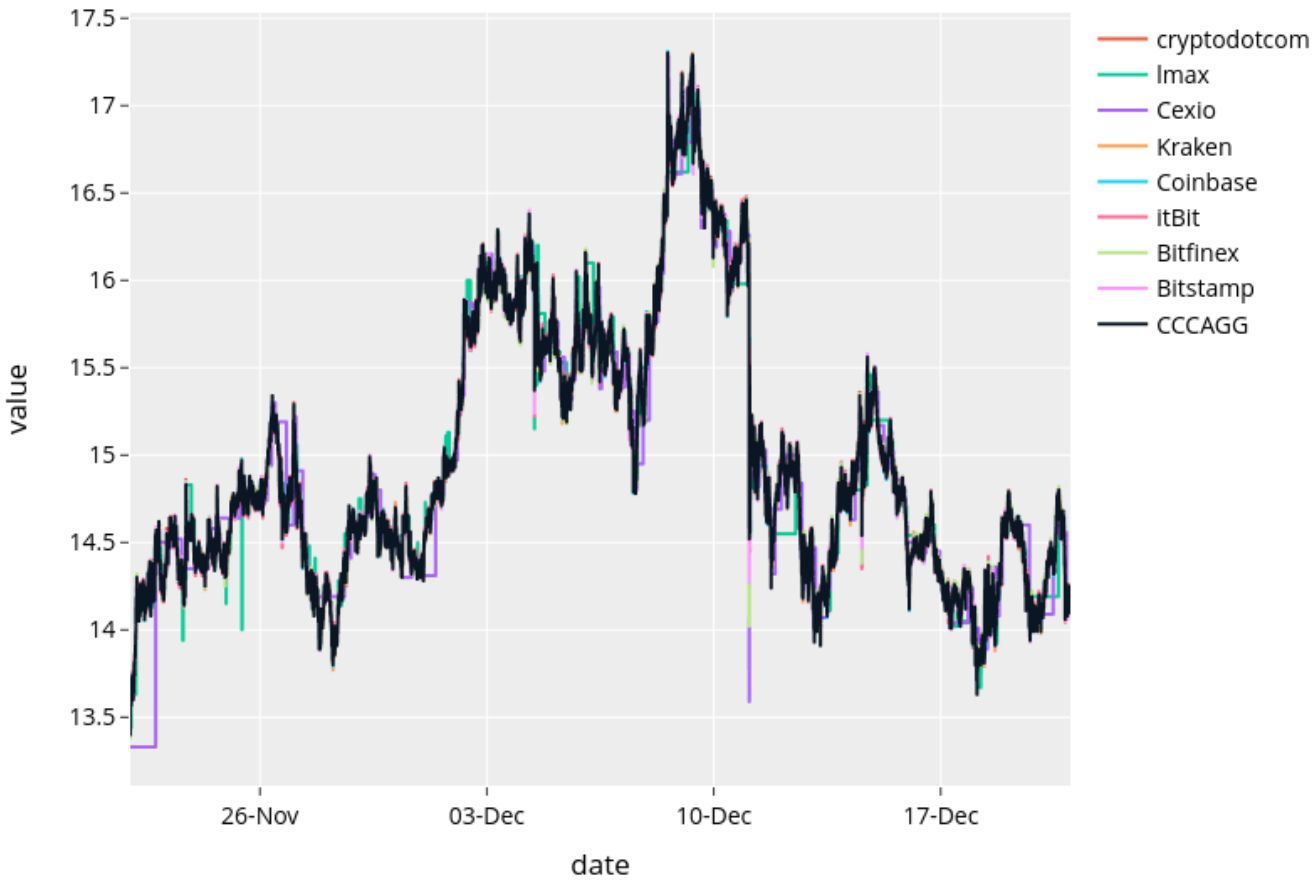


Chart depicting minute LINK-USD CCCAGG and constituent exchange prices for the last 30 days.

CCCAGG follows the market price here as well, avoiding the stale prices and spikes on Lmax and Cexio markets.

Summary of top pairs

	Price consistency	Price stability	Backtesting
Pair	CCCAGG vs market median (1)	CCCAGG volatility vs average market volatility (2)	Real time CCCAGG value vs Re-calculated CCCAGG 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	0.02%	-0.48%	0.00%
XRP-USD	0.01%	-1.43%	0.00%
LINK-USD	0.03%	-0.62%	0.00%
AVAX-USD	0.06%	-1.59%	0.00%
DOGE-USD	0.03%	-1.90%	0.00%
TIA-USD	0.06%	-5.61%	0.00%
ADA-USD	0.02%	-0.12%	0.00%
MATIC-USD	0.02%	-0.29%	0.00%

Notes:

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

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

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

Contact

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

Resources

CCCAGG Index Methodology
https://ccdata.io/methodology-docs/ccdata-aggregate-index-methodology-2022

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

Disclaimer

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