CCData

CCData Coindesk Reference Rate Indices Validation

June 2025

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CCData

Introduction

CCData administers three real-time methodologies for single assets: CCIX, CCIXB and SDA.

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).

CCData Blended Prices (CCIXB, including CCIXBE and CCIXBER) are digital asset reference rates similar to CCIX, that combine fiat and converted stablecoin pair traded prices. The methodology is calculated as a 24-hour volume-weighted average price using a customised selection of exchanges and an outlier detection methodology, converting the final prices into USD.

The CCData CoinDesk Single Digital Asset Price Index Series (SDAs) provides 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.

Find all CCData methodology documents here:
https://indices.coindesk.com/documentation-and-governance

Goal of the Report

The goal of this report is to show that CCData Coindesk reference rate indices are representative and replicable by conducting a series of tests and benchmarking.

Thus this report is focused on the following key areas:

- Methodology validation
    - Price consistency
    - Price stability
- Backtesting results
    - Recalculate daily values using raw trade data for the last 3 months
    - Recalculate daily DA Fixings values using CCIX prices for the last 3 months
- Constituent exchange review
    - Summary of changes for this month's review
    - CCIX behaviour vs constituent exchanges behaviour
    - CCIX behaviour vs other single asset methodologies (CCIXBE, CCIXBER and SDA)

Executive Summary

In the June 2025 validation report, these are the main takeaways:

Price consistency

- For 96% of a total of 1128 pairs, the daily CCIX price was less than 0.5% away from the median market price on average for the last 3 months.
- For all 142 CCIXBE pairs and all 25 CCIXBER pairs, the price was less than 0.5% away from the median market price on average.
- For all 16 SDA indices, the price was also less than 0.5% away from the median market on average.

Price stability

- When comparing the volatility of CCIX to the volatility of individual exchanges, 61% of the 1128 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 39% that had a positive difference, 88% of the CCIX pairs were less than 1% more volatile than the individual exchange average.
- For CCIXBE and CCIXBER pairs, respectively, 90% and 96% of the pairs were less volatile than the average of individual exchanges over the last 3 months. All of the pairs with more volatility than the market average were less than 1% more volatile.
- For SDA indices, 15 out of 16 indices were less volatile than the average of their constituent exchanges over the last 3 months. All of the pairs with more volatility than the market average were less than 1% more volatile.

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.
- For all 200 pairs where DA Fixings were recalculated, there was less than 0.5% average difference from the historical values over the 90 day period.
- For all CCIXBE pairs and all CCIXBER pairs, the replicated prices were on average less than 0.5% different from the real-time prices over the last 90 days.

- For all 16 SDA indices the replicated prices were less than 0.5% different from the real-time calculation over the last 90 days.

Constituent review

- On average, 262 million USD in volume was added to CCIX per day through the monthly review of constituent exchanges in June. This caused a 20% increase 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 1128 CCIX pairs which fulfil these criteria for the June 2025 report.

Besides CCIX, this report also includes all instruments on CCIXBE and CCIXBER (reduced blended versions of CCIX) and all of CCData Coindesk's single asset indices (SDAs).

Data used to create this report consists of:

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

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

Methodology validation

CCIX methodology (and similarly CCIXBE and CCIXBER), ensure 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 the 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, CCIXBE and CCIXBER follow the market median price closely
- CCIX, CCIXBE and CCIXBER are less volatile than individual exchanges

SDA methodology establishes different measures to ensure the index's quality. These measures are:

- 24 hour volume weighting:
    - Like CCIX, using 24 hour volumes gives more weight to liquid markets and minimizes the illiquid markets effect on the index.
- Staleness multiplier:
    - Reduces the weight of exchanges with old trades and stale prices.
- Distance multiplier:
    - Assigns less weight to the exchanges whose prices are more distant to the market average.

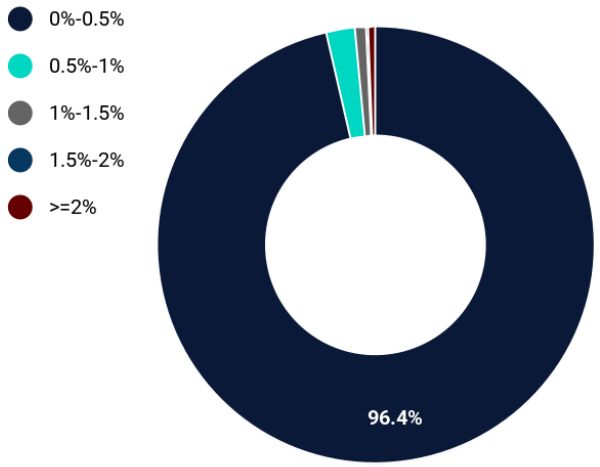
Therefore, like the CCIX markets, we expect SDA indices to follow the market median closely and be less volatile than individual markets.

Price consistency

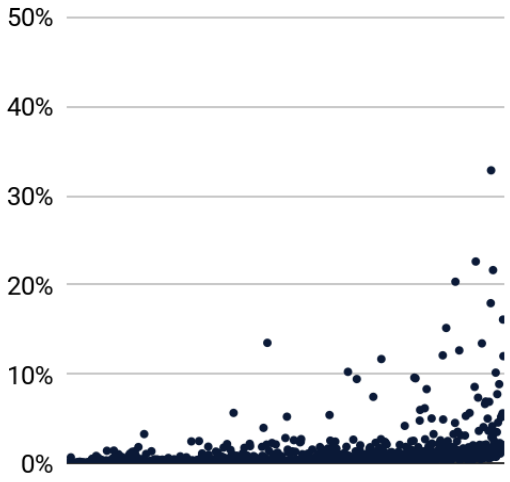
CCIX

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



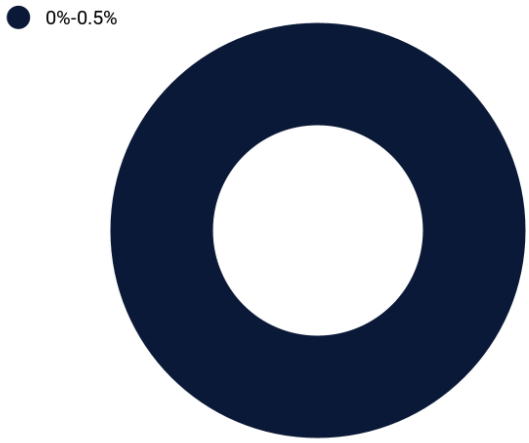
Left chart: Pie chart depicting the average difference between CCIX price and the median price of all constituent exchanges for the last 3 months. Right chart: Scatterplot depicting the maximum difference between CCIX price and the median price of all constituent exchanges over the last 3 months.

For 96% of 1128 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.

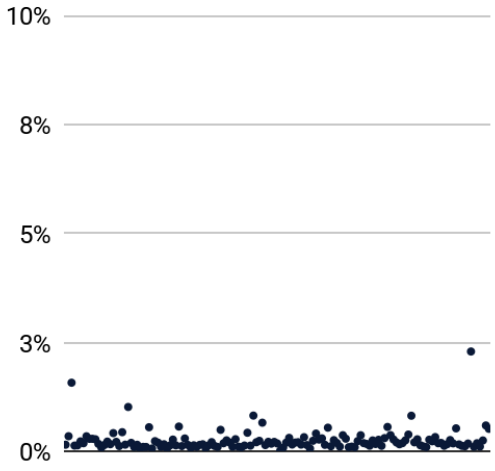
CCIXBE

Similar to CCIX, we compare CCIXBE values for the last 3 months with the median market price of the constituent exchanges. Since CCIXBE markets are mostly liquid, we expect to see smaller deviations compared to CCIX markets.

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



Max difference for each pair - last 3 months

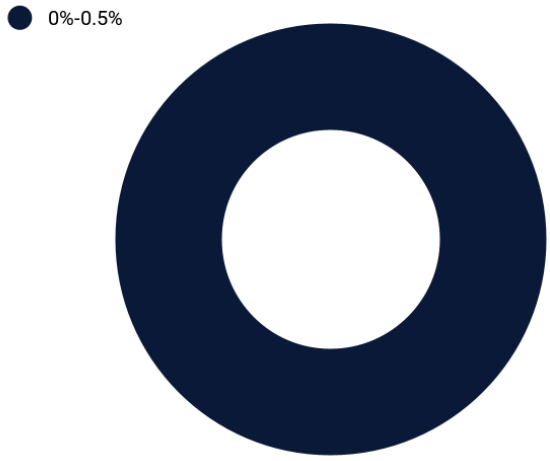


All 142 CCIXBE pairs, the daily CCIX price is less than 0.5% away from the median market price, on average over the last 3 months. The scatter plot shows that the maximum daily differences on CCIXBE are much smaller than CCIX.

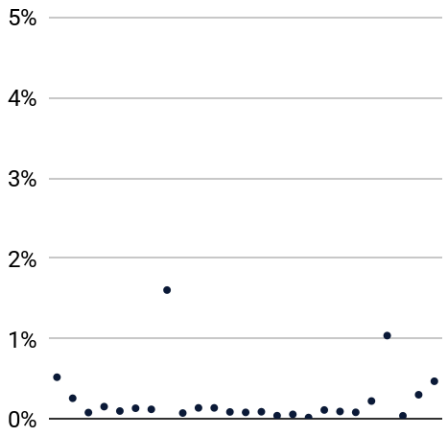
CCIXBER

CCIXBER is a smaller index family which only tracks the top largest asset by market capitalisation. We compare CCIXBER values for the last 3 months with the median market price of the constituent exchanges.

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



Max difference for each pair - last 3 months

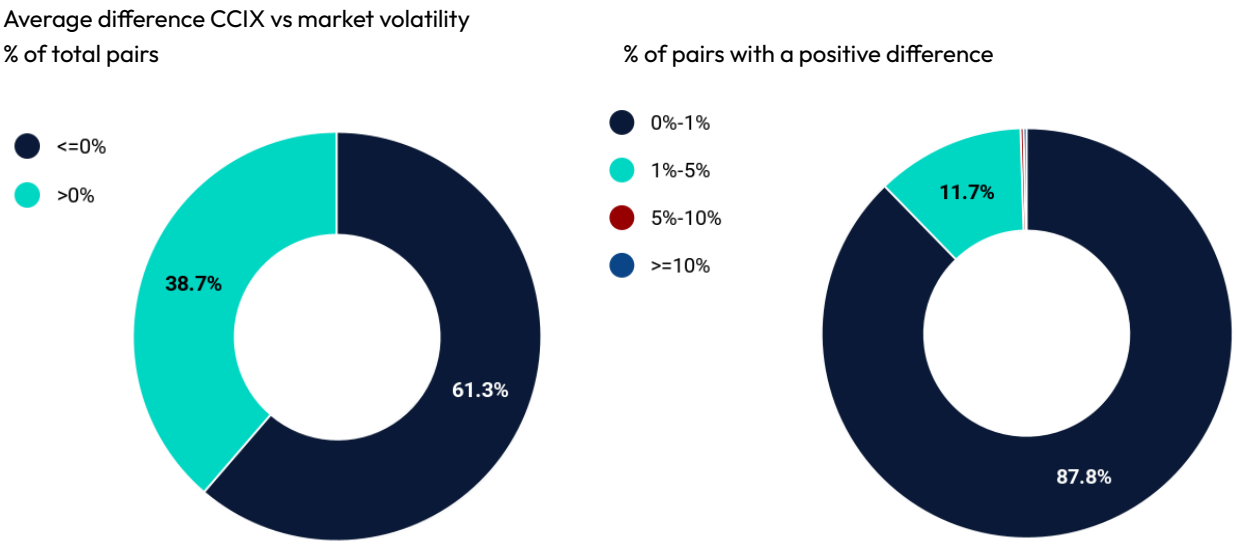


As seen in the chart, 100% of the 25 CCIXBER pairs were within 0-0.5% away from the median market.

Price stability

CCIX

Price stability is measured by comparing hourly CCIX volatility to market volatility in the last 3 months. In this report, we measure volatility as the ratio of the high and low prices during each hour. 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.



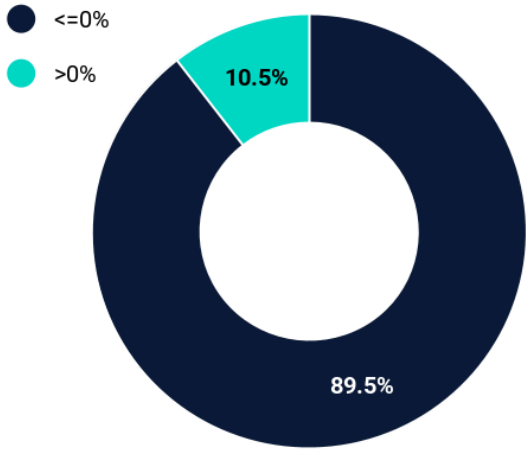
Left chart: Percentage of pairs that have either a positive or negative percentage difference between CCIX and market volatility. Right chart: Breakdown of the percentage difference of pairs which have a positive difference between CCIX and market volatility.

Of the 1128 pairs included in this test, 61% had a negative difference, meaning CCIX was less volatile than the average of the individual exchanges across the last 3 months. Of the 39% that had a positive difference, around 88% were less than 1% more volatile than the individual exchange average. This positive difference generally occurs in less liquid markets, where individual exchanges have infrequent updates, but combine into more frequent updates for the aggregate index.

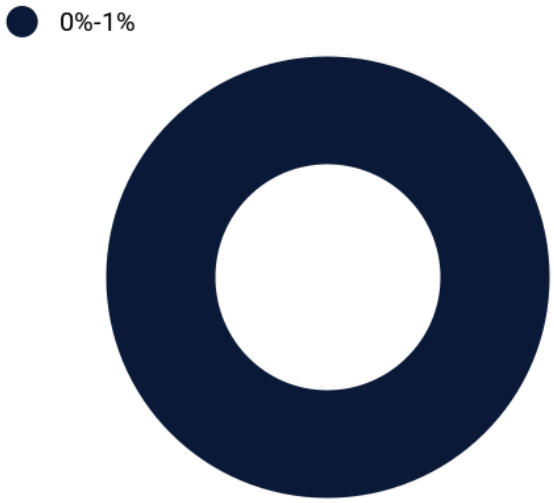
CCIXBE

Similar to CCIX, now we compare the CCIXBE volatility with the average market volatility across the past 3 months.

Average difference CCIXBE vs market volatility
% of total pairs



% of pairs with a positive difference



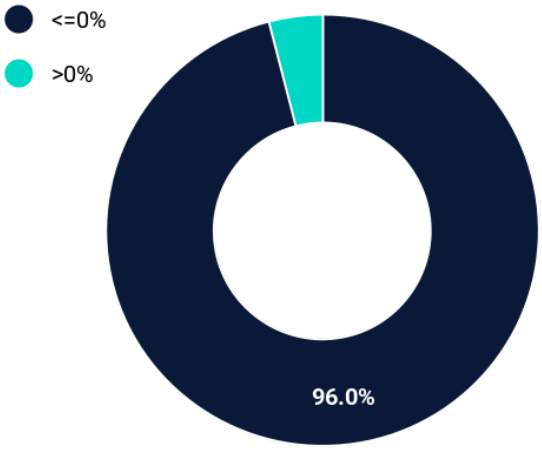
Left chart: Percentage of pairs that have either a positive or negative percentage difference between CCIXBE and market volatility. Right chart: Breakdown of the percentage difference of pairs which have a positive difference between CCIXBE and market volatility.

Of the 142 pairs included in this test, around 90% had a negative difference, meaning CCIXBE was less volatile than the average of the individual exchanges across the last 3 months. All of the 10% that had a positive difference were less than 1% more volatile than the individual exchange average.
The share of pairs with positive difference is less than CCIX, because CCIXBE includes more liquid markets, so there is a lower chance of an illiquid market having infrequent updates and stable prices while being stale.

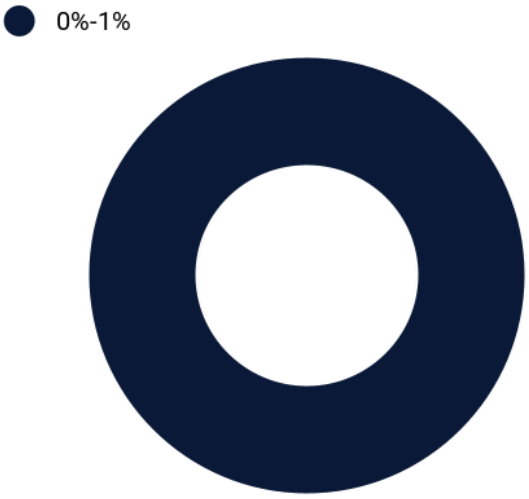
CCIXBER

Similarly for CCIXBER, we compare its volatility against the average market for the last 3 months.

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

Of the 25 pairs, 96% had a negative difference, indicating that CCIXBER was less volatile than the market average. Of the ones with positive differences, all pairs were less than 1% volatile.
The share of pairs with positive differences here is less than for CCIX for two reasons. First, CCIXBER exchanges are selected from top markets with highest liquidity and data quality, which are more likely to have liquid and stable prices compared to the rest of the market. Second, CCIXBER only includes the top largest asset by market capitalisation, so there is a low chance that individual markets have infrequent updates and remain more stable than the aggregate index.

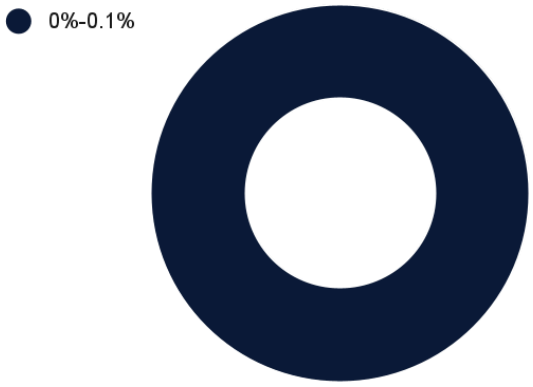
Backtesting results

CCIX

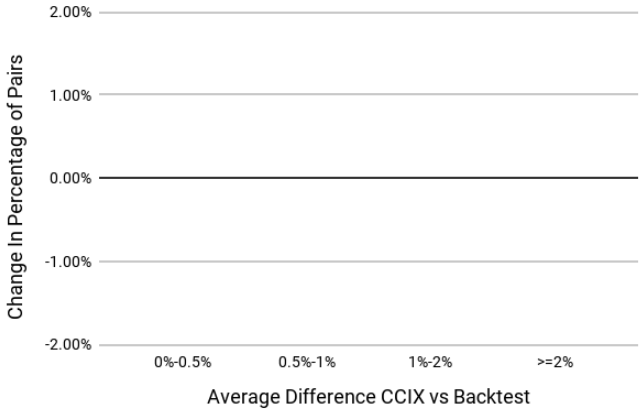
CCIX should by nature be replicable as it is calculated from raw trade data. To demonstrate this the CCIX end-of-day value was re-calculated for the past 90 days, for the top 200 pairs by volume. This was done with an entirely separate script to the ones used to calculate CCIX in real-time. The results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

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



Change from March 2025 to June 2025 report



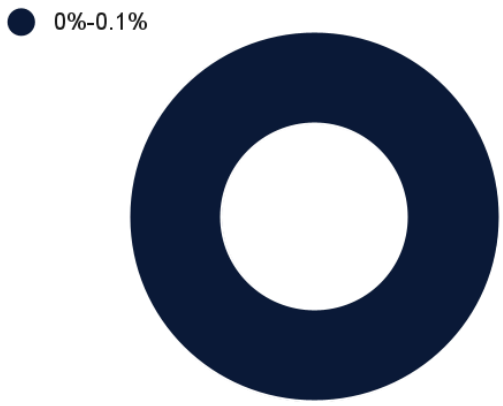
Left Chart: average difference between CCIX real-time values and backtesting for the top 200 pairs by volume. Right Chart: change in the results from the previous to the current report.

All 200 pairs had less than a 0.1% average difference over the 90 days. This has been unchanged since last quarter.

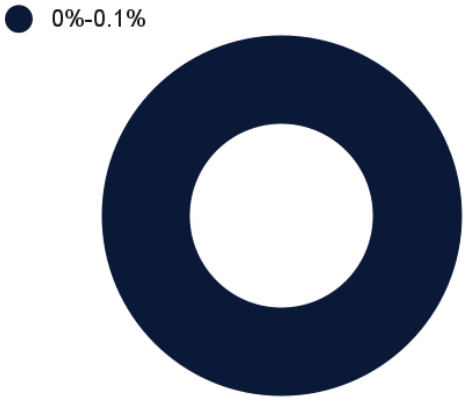
CCIXBE & CCIXBER

As a similar methodology, CCIXBE and CCIXBER should be also replicable by nature. This section includes the recalculation results for all CCIXBE and CCIXBER end-of-day values. Like CCIX, the differences against the real-time values could be due to backfilling, internal latency or discarding the late trades.

Average difference - CCIXBE real-time vs backtest



Average difference - CCIXBER real-time vs backtest



All CCIXBE and CCIXBER pairs had less than a 0.1% average difference over the 90 days.

Single Digital Assets (SDAs) review

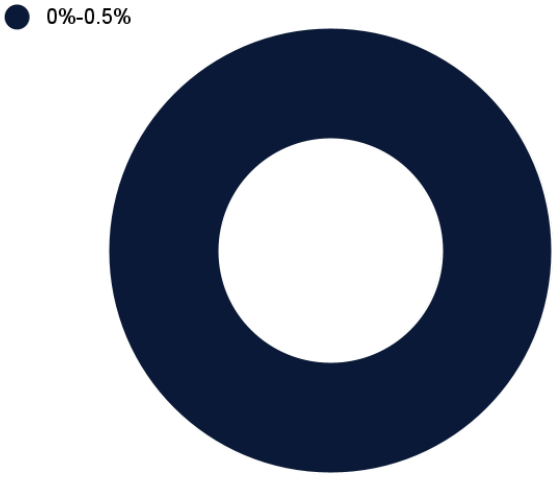
The CoinDesk Single Digital Asset Price Index series (the "Indices") provide USD denominated reference rates for spot prices for digital asset tokens. The Indices leverage real-time prices from multiple exchanges to provide a representative spot price for each digital asset. Constituent exchanges are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

Here is the full methodology:
https://indices.coindesk.com/documentation-and-governance

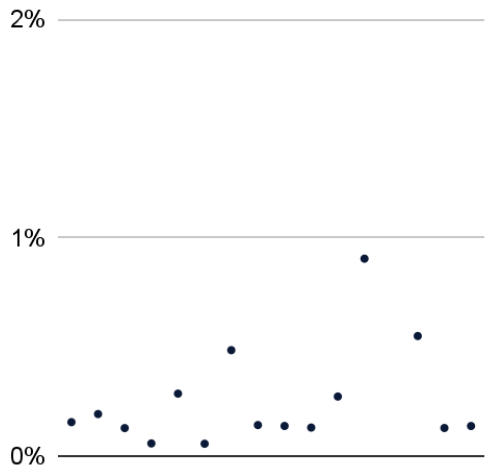
Price consistency

The price consistency of SDA indices is measured by comparing daily SDA values for the last 3 months with the median market price of the constituent exchanges. We expect the SDA price to be close to the market median.

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

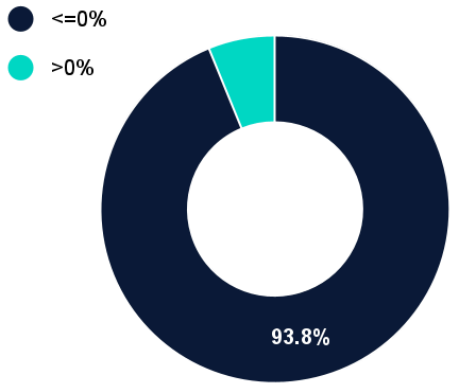
All 16 SDA indices are less than 0.5% away from the market median. Additionally, all of them have had less than 1% difference on any day during the last 3 months.

Price stability

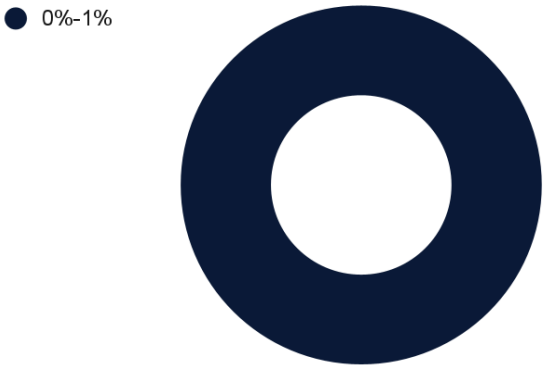
Price stability is measured by comparing daily SDA volatility to market volatility in the last 3 months. We compare the SDA volatility (daily high to low ratio) with the average constituent markets volatility across

the past 3 months. A negative difference means SDA is less volatile than the average of the individual exchanges in the constituent markets.

Average difference SDA vs market volatility - % of total pairs



% of pairs with a positive difference



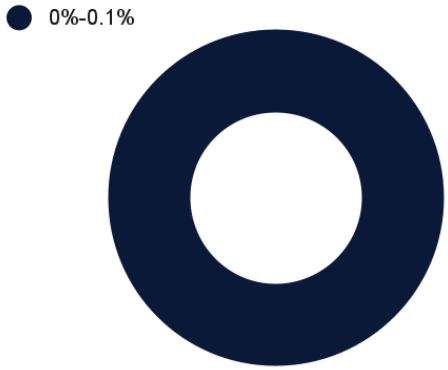
Left chart: Percentage of pairs that have either a positive or negative percentage difference between SDA and constituent markets volatility. Right chart: Breakdown of the percentage difference of pairs which have a positive difference between SDA and market volatility.

For 15 out of 16 SDA indices have had less volatility against the average constituent markets over the last 90 days. That only one index had a positive difference was less than 1% more volatile than the individual exchange average.

Backtesting results

Single Digital Asset (SDA) indices are replicable using the historical input data. To backtest these indices, we recalculate daily end-of-day values of SDA indices.

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



All 16 SDA indices had less than a 0.1% average difference over the last 90 days.

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.

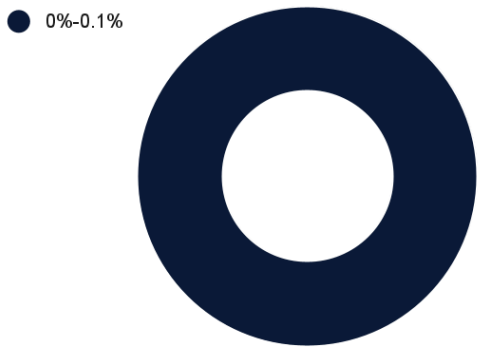
Find the full methodology here:

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 - DA Fixings vs backtest % of total pairs



Change from March 2025 to June 2025 report

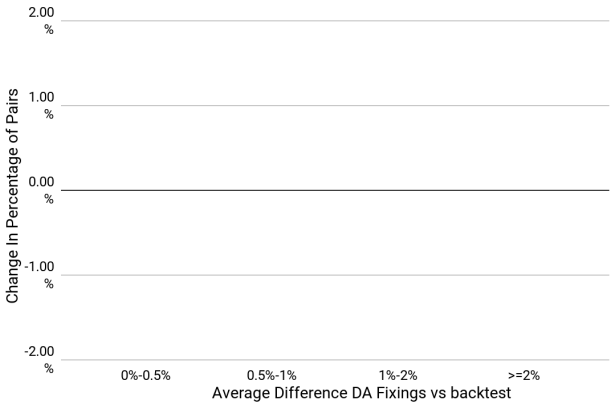


Chart: average difference between backtested DA Fixings and historical values for the top 200 pairs by volume.

All 200 pairs had less than a 0.1% average difference over the 90 days. This has stayed the same since the last review.

CCData

CCIX 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 June review, we added on average 262 million USD daily in volume to CCIX. This was due to an extensive review based on our latest Exchange Benchmark report in which a few exchanges with high trading volumes were downgraded to lower-tier grades, consequently getting excluded from liquid CCIX pairs.

Find the full list of removed and added constituents here:

CCData Aggregate Index Constituent Reviews

Values in millions of USD	April	May	June
Average volume added	181	2318	262
Average volume removed	(0)	(45)	(35)
Average change in volume	181	2273	227
% Volume Change*	33%	4.5%	19.5%

* 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.

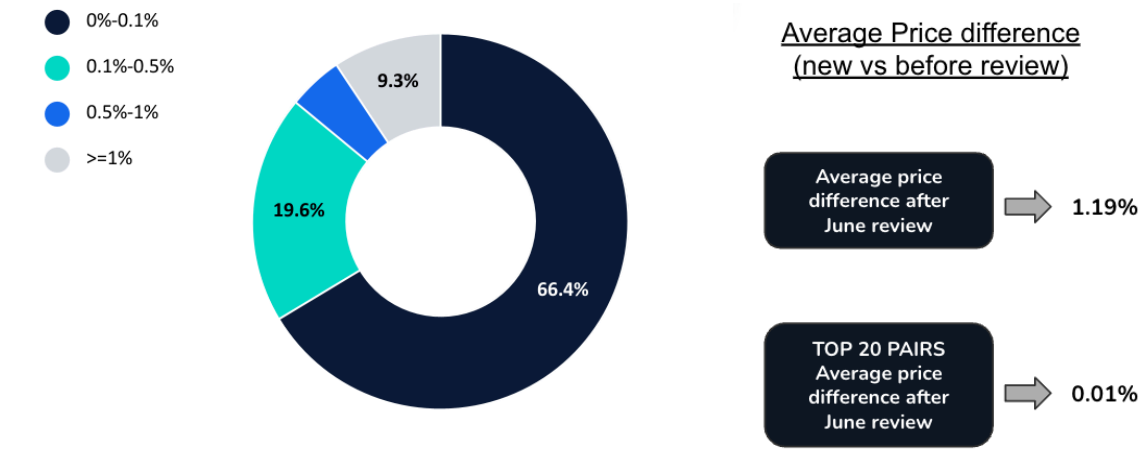


Chart depicting the average difference between CCIX price before the review and CCIX price after the review during the last 30 days.

On average for all reviewed pairs that received a change in constituents, the CCIX price saw a change of 1.19%. Meanwhile, this change for the top 20 pairs by volume within this group was 0.01%.

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 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

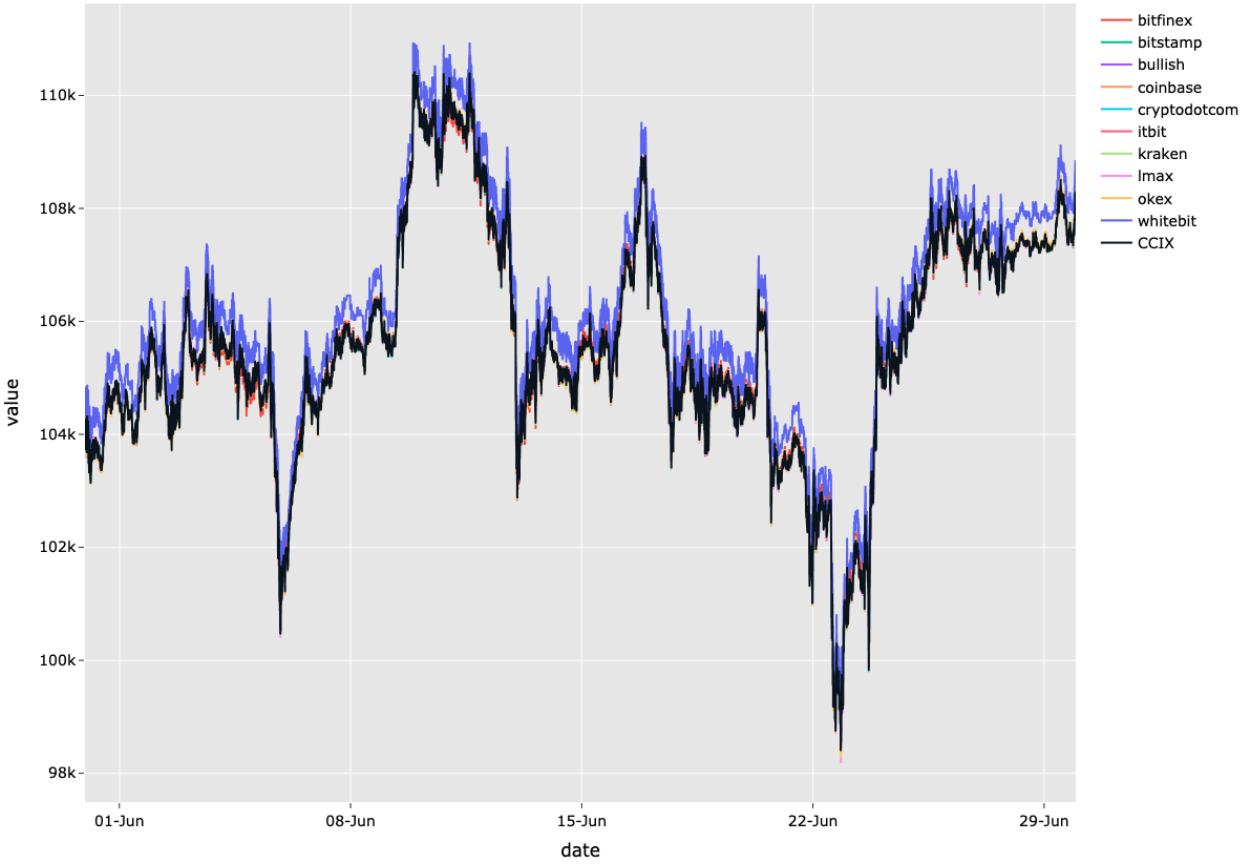


Chart depicting minute BTC-USD CCIX and constituent exchange prices for the last 30 days.

In this chart, we can see that CCIX follows the median market price, and is not affected by Whitebit's high price premium due to the volume-weighted nature of the index.

ETH - USD price - Last 30 days - Minute data

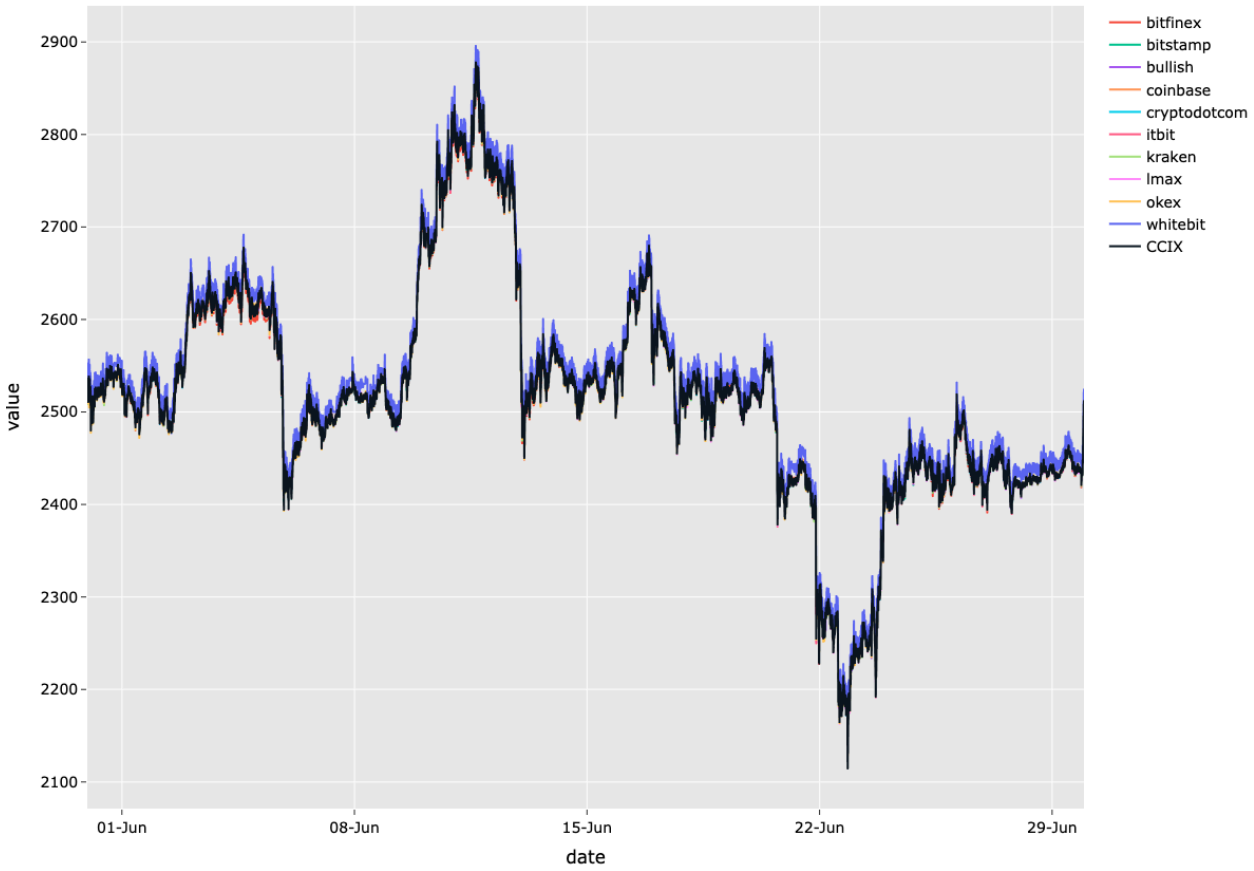


Chart depicting minute ETH-USD CCIX and constituent exchange prices for the last 30 days.

It is evident that CCIX tracks the market price well throughout the period and is not affected by the price premiums on Whitebit.

XRP - USD price - Last 30 days - Minute data

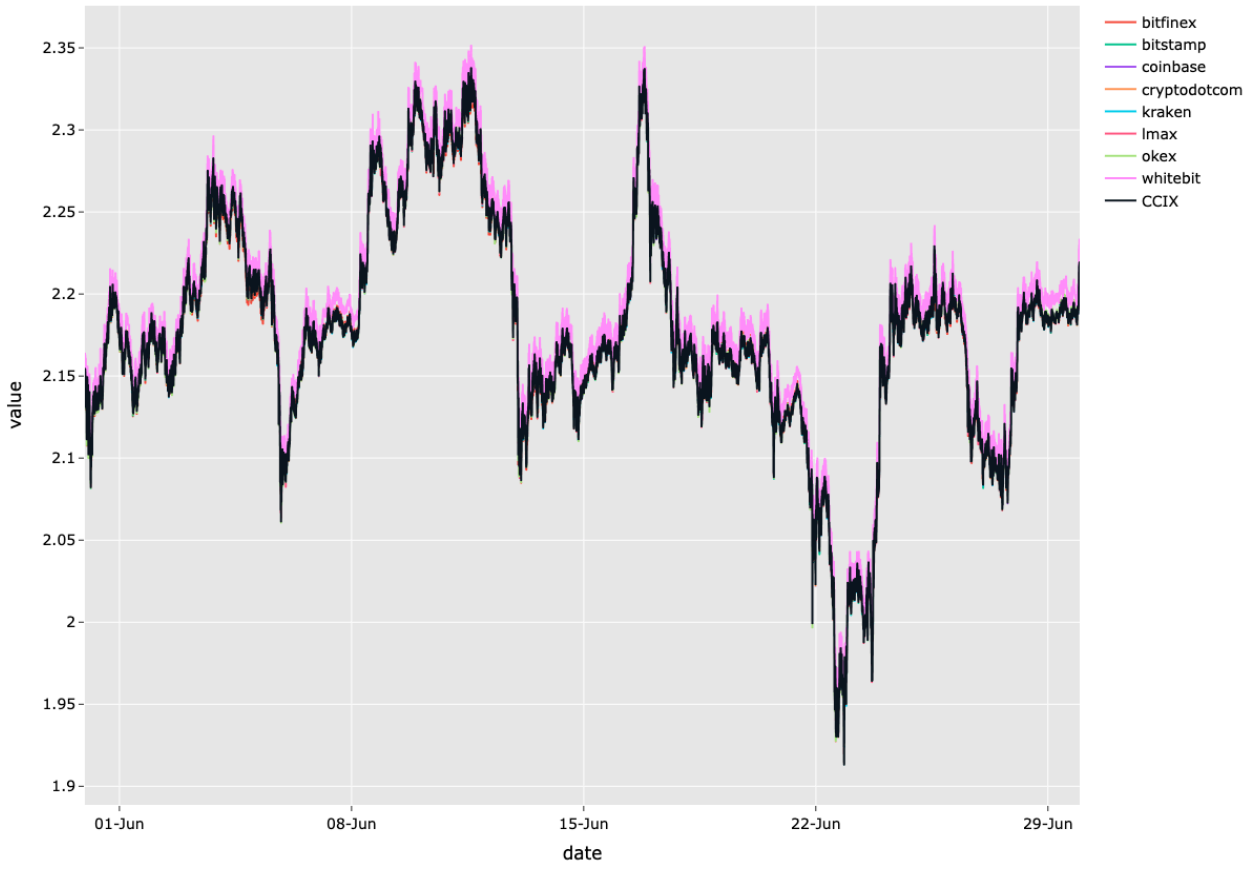


Chart depicting minute XRP-USD CCIX and constituent exchange prices for the last 30 days.

Once again CCIX price follows the median market closely and it's not affected by Whitebit's high premium.

SOL - USD price - Last 30 days - Minute data

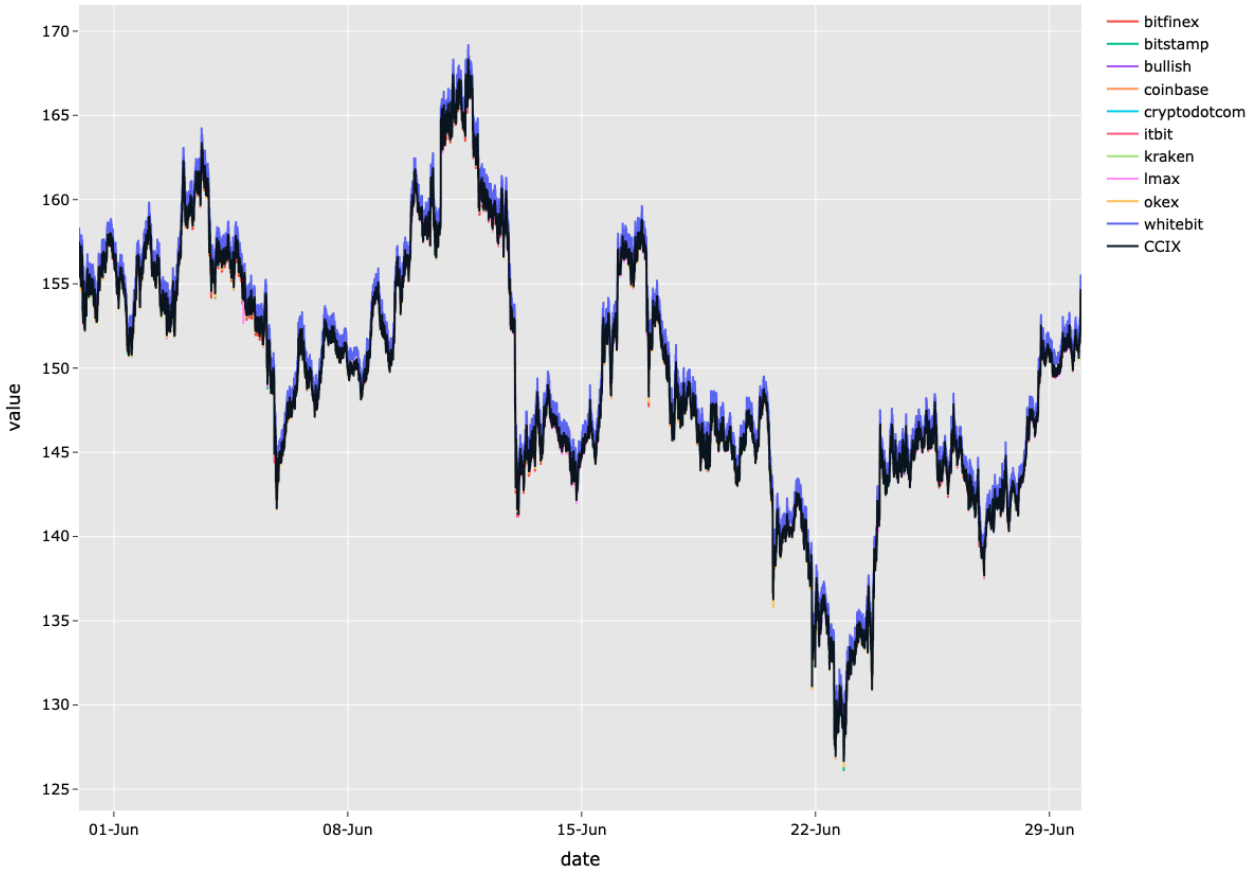


Chart depicting minute SOL-USD CCIX and constituent exchange prices for the last 30 days.

The chart shows that CCIX closely follows the market median price and is not affected by the higher premiums on Whitebit exchange.

SUI - USD price - Last 30 days - Minute data

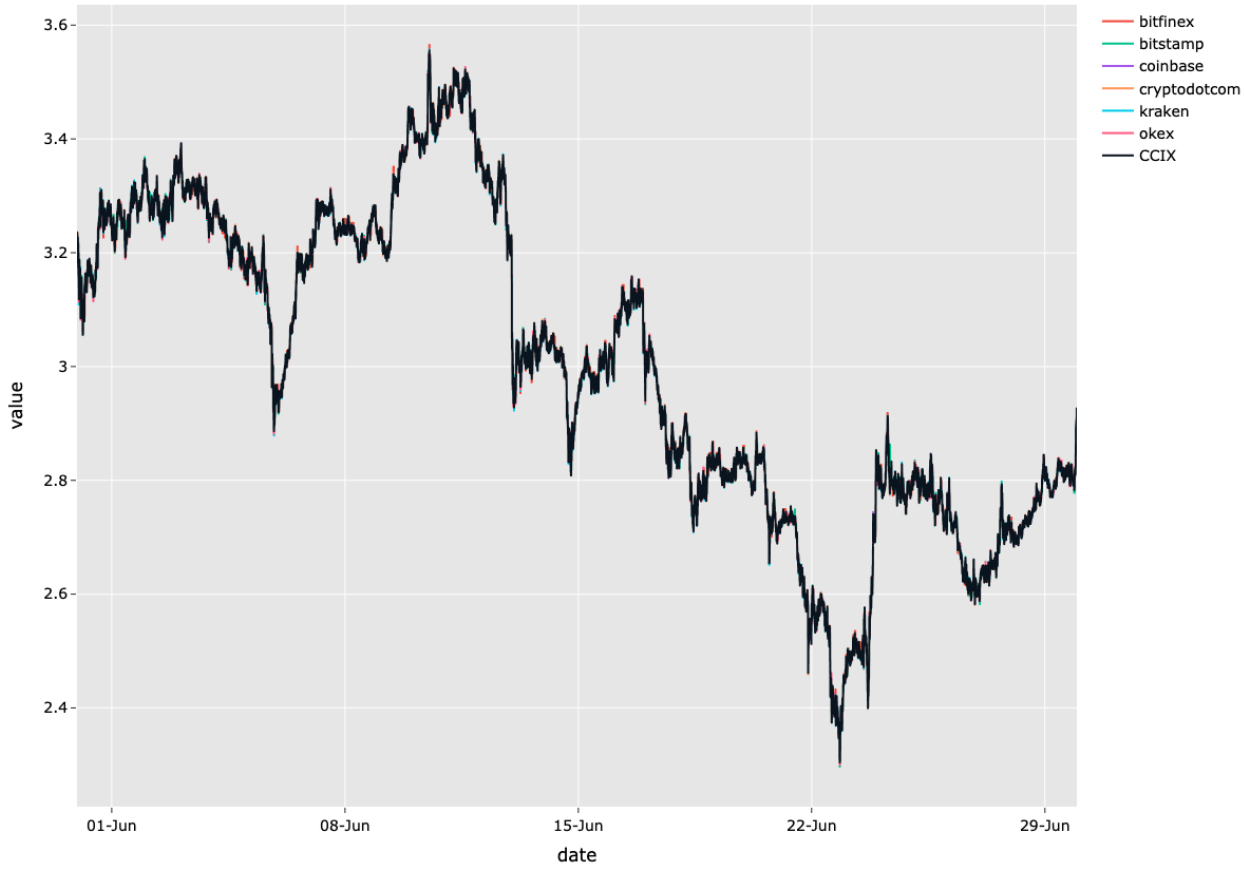


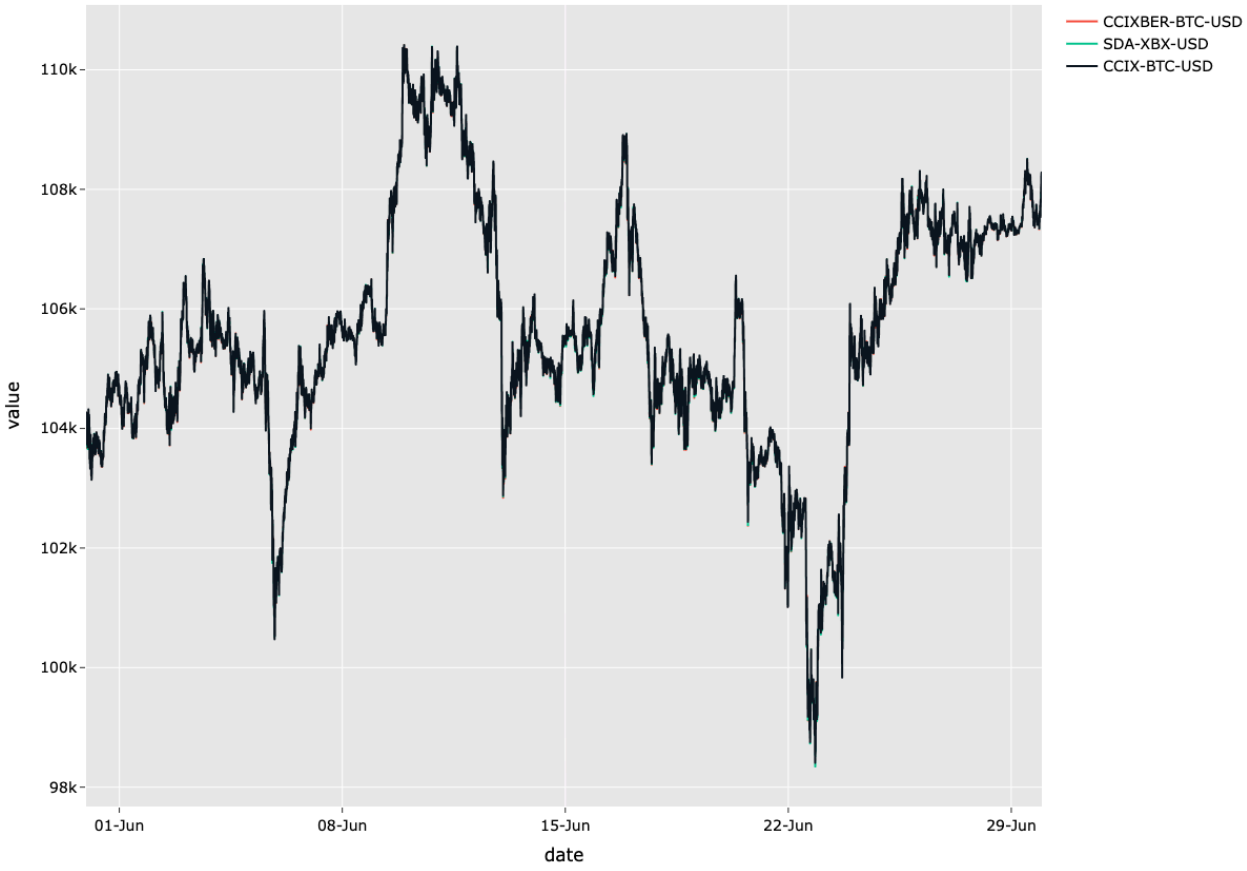
Chart depicting minute SUI-USD CCIX and constituent exchange prices for the last 30 days.

Again here, CCIX follows the median market price and it is not affected by the other exchanges prices.

CCIX Behaviour vs other single asset methodologies

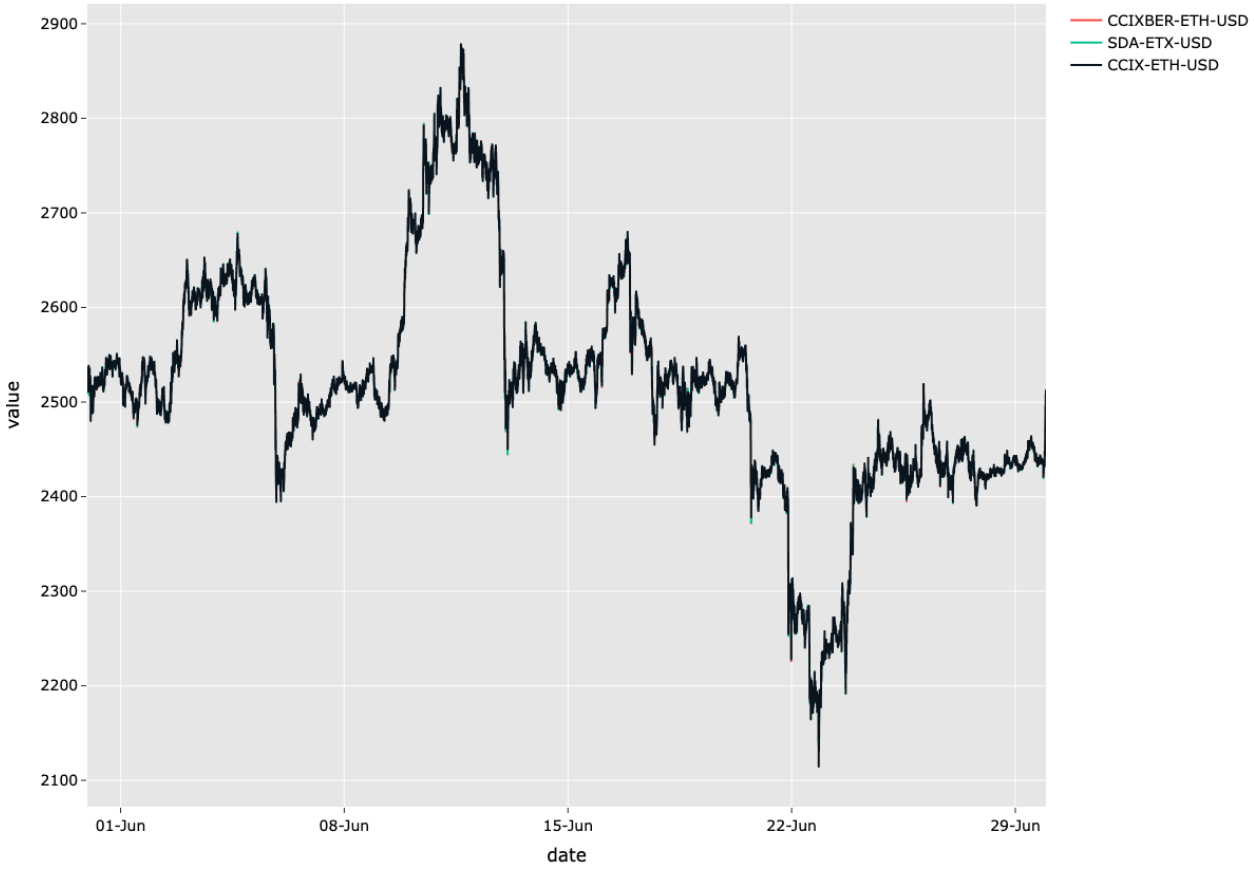
Here we chart the CCIX price vs other methodologies (CCIXBER and SDA) for the top 5 pairs traded in USD across the last 30 days on all three. The goal is to verify that for the most liquid pairs, these methodologies produce close prices.

BTC - USD price - Last 30 days - Minute data



As shown in the chart, the Bitcoin prices across all three methodologies have been very similar.

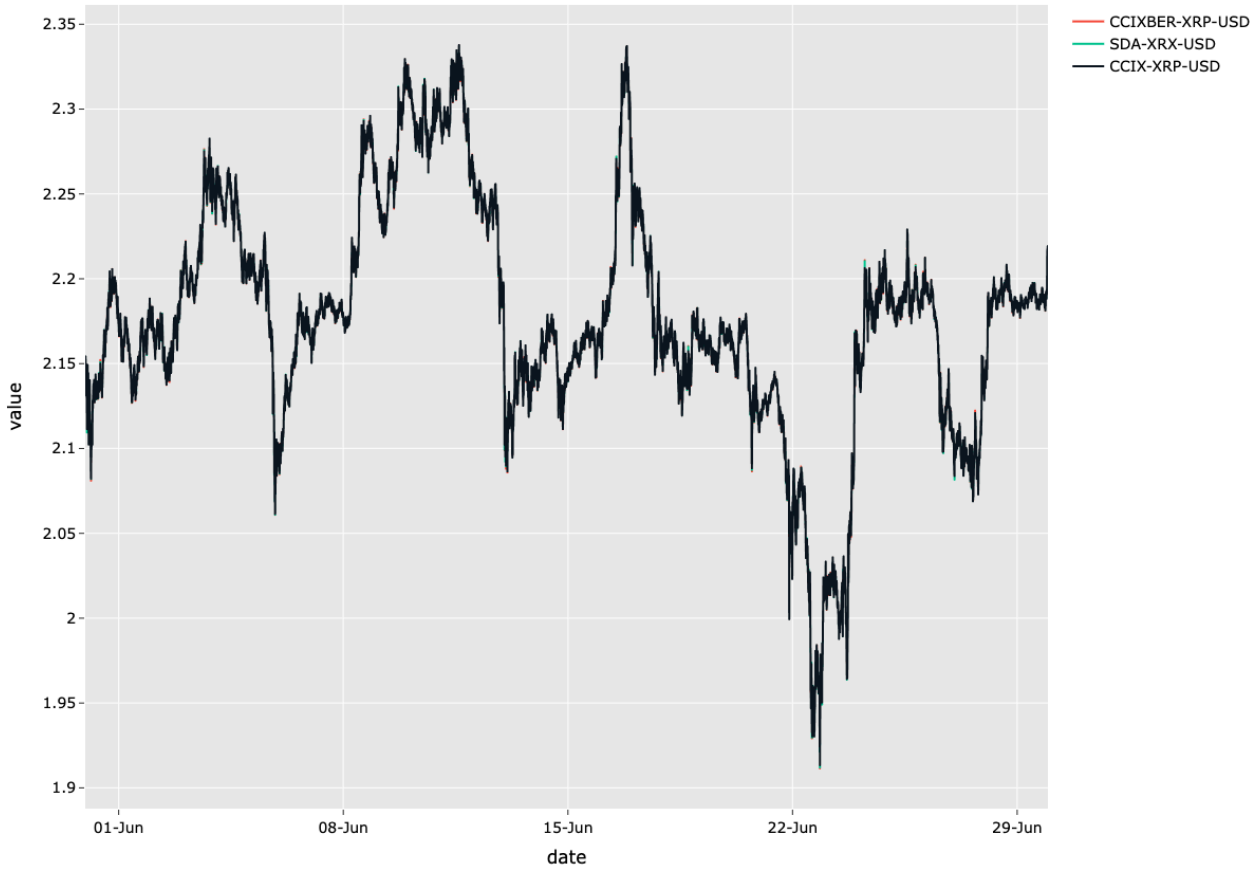
ETH - USD price - Last 30 days - Minute data



Looking at the chart, it is evident that Ethereum prices on CCIX, CCIXBER and SDA have been very close over the last 30 days.

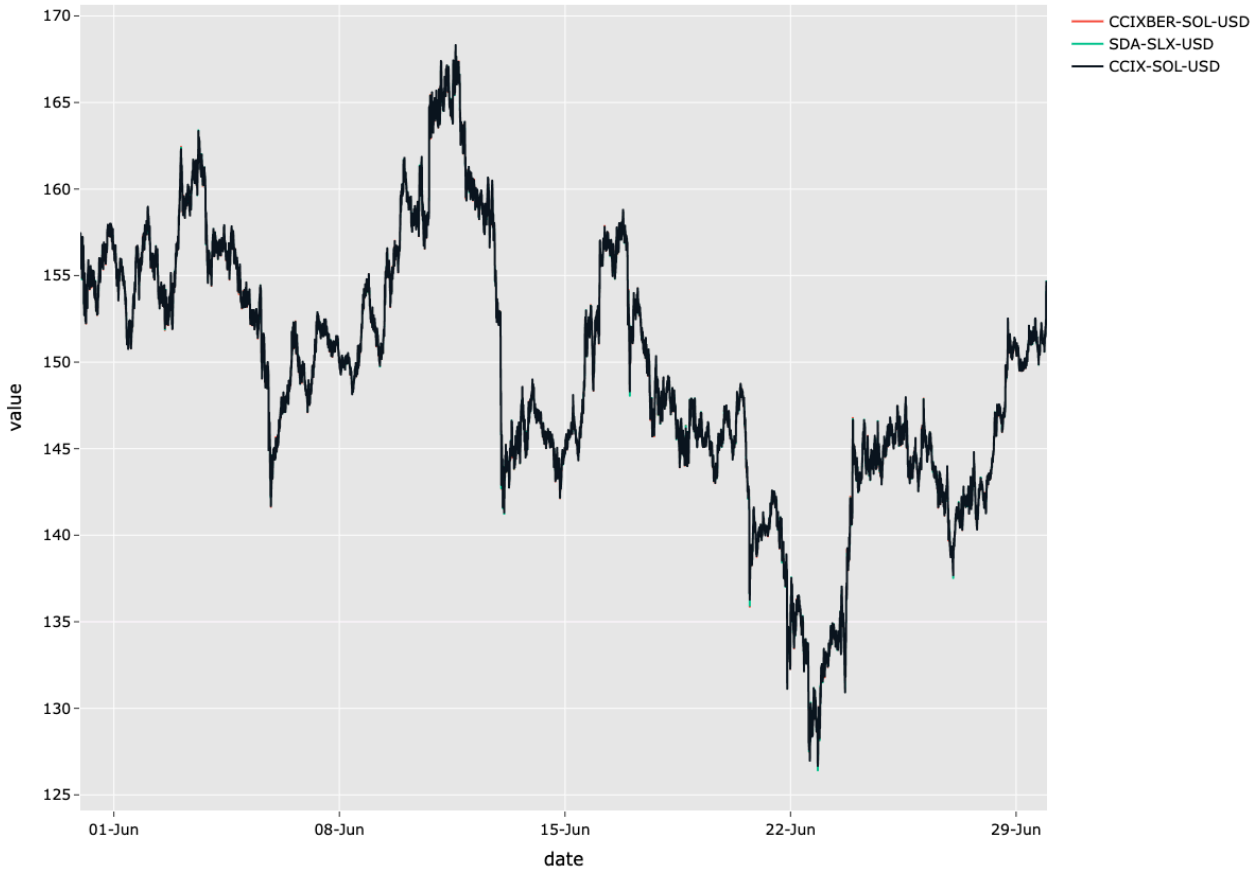
CCData

XRP - USD price - Last 30 days - Minute data



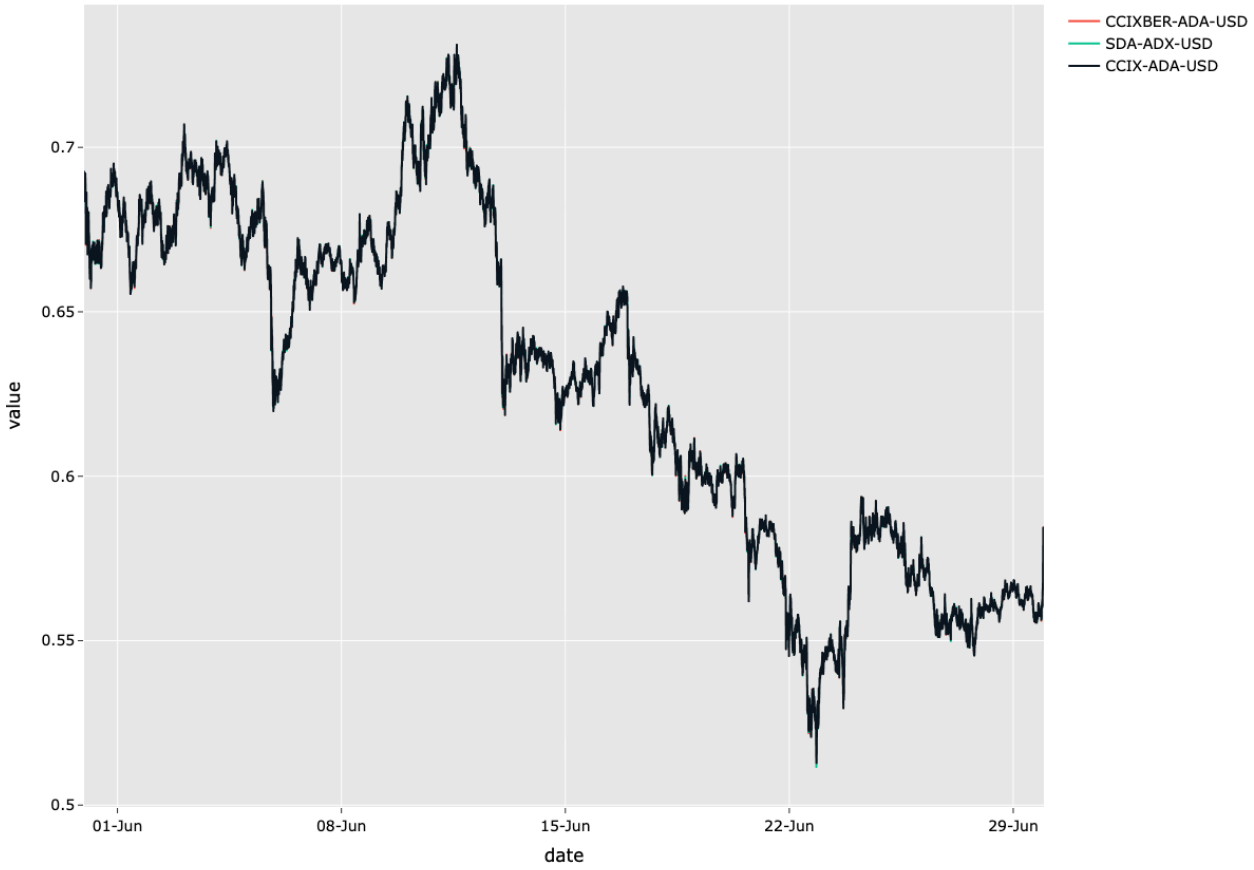
Ripple's prices on CCIX, CCIXBER and SDA have been also very similar in the last 30 days.

SOL - USD price - Last 30 days - Minute data



Looking at the Solana's chart, we can see the prices across different methodologies have been very close.

ADA - USD price - Last 30 days - Minute data



Like previous pairs, CCIX, CCIXBER and SDA have had very close prices for Cardano over the last 30 days.

Summary of top pairs

CCIX

	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%	0.00%	0.00%
ETH-USD	0.01%	-0.05%	0.00%
XRP-USD	0.01%	0.14%	0.00%
SOL-USD	0.01%	0.34%	0.00%
DOGE-USD	0.02%	0.18%	0.00%
SUI-USD	0.03%	0.64%	0.00%
ADA-USD	0.02%	0.32%	0.00%
HBAR-USD	0.03%	0.60%	0.00%
LTC-USD	0.02%	0.30%	0.00%
LINK-USD	0.03%	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

CCIXBER

(CCIXBER includes the top liquid pairs, CCIXBE is for less liquid pairs)

	Price consistency	Price stability	Backtesting
Pair	CCIXBER vs market median	CCIXBER volatility vs average market volatility	Real time CCIXBER value vs Re-calculated CCIXBER value
	mean absolute difference	mean difference	mean absolute difference
BTC-USD	0.01%	-0.03%	0.00%
ETH-USD	0.01%	-0.10%	0.00%
XRP-USD	0.01%	0.00%	0.00%
SOL-USD	0.01%	0.01%	0.00%
DOGE-USD	0.02%	0.00%	0.00%
SUI-USD	0.02%	-0.02%	0.00%
ADA-USD	0.02%	-0.05%	0.00%
HBAR-USD	0.04%	0.00%	0.01%
LTC-USD	0.02%	-5.78%	0.00%
LINK-USD	0.02%	-0.09%	0.00%

SDA

		Price consistency	Price stability	Backtesting
Index	**Pair**	SDA vs market median	SDA volatility vs average market volatility	Real time SDA value vs Re-calculated SDA value
		mean absolute difference	mean difference	mean absolute difference
XBX-USD	**BTC-USD**	0.01%	-0.03%	0.00%
ETX-USD	**ETH-USD**	0.01%	-0.15%	0.00%
XRX-USD	**XRP-USD**	0.02%	-0.11%	0.01%
SLX-USD	**SOL-USD**	0.01%	-0.12%	0.00%
BCX-USD	**BCH-USD**	0.03%	-0.25%	0.00%
ECX-USD	**ETC-USD**	0.09%	-0.14%	0.00%
ADX-USD	**ADA-USD**	0.02%	-0.12%	0.00%
UNX-USD	**UNI-USD**	0.05%	-0.18%	0.00%
LTX-USD	**LTC-USD**	0.03%	-0.24%	0.00%
LNX-USD	**LINK-USD**	0.02%	-0.10%	0.00%

Contact

If you are interested in using our single asset indices (CCIX, CCIXBE, CCIXBER or SDA) in your products, please get in touch at data@ccdata.io.

Resources

CCData Coindesk Single assets methodologies
https://indices.coindesk.com/documentation-and-governance

CCData Coindesk Exchange Benchmark
https://data.coindesk.com/reports/exchange-benchmark-april-2025

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