

Whitepaper: LCI 20

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1 Outline

We propose the Lykke Crypto Index 20 (LCI 20) to be a weighted average of the 20 largest crypto currencies’ market capitalization.¹ The purpose of our index is to closely follow the value of crypto-currencies in comparison to the US dollar. We address crypto-currency-specific problems as there are. For example, the distinct market behavior around currency-splits is addressed by adaptively smoothing prices of affected assets.

In comparison to Trimborn and Härdle (2016), we choose keeping the amount of assets included to be fixed. This has the advantage of interpreting currencies included being among the 20th most “important” crypto-assets.

We will proceed as follows: First, notation and our index calculation are introduced. Second, we discuss pros and cons of our method. Third, a reduced-form example of our index on daily data is presented.

1.1 Definition

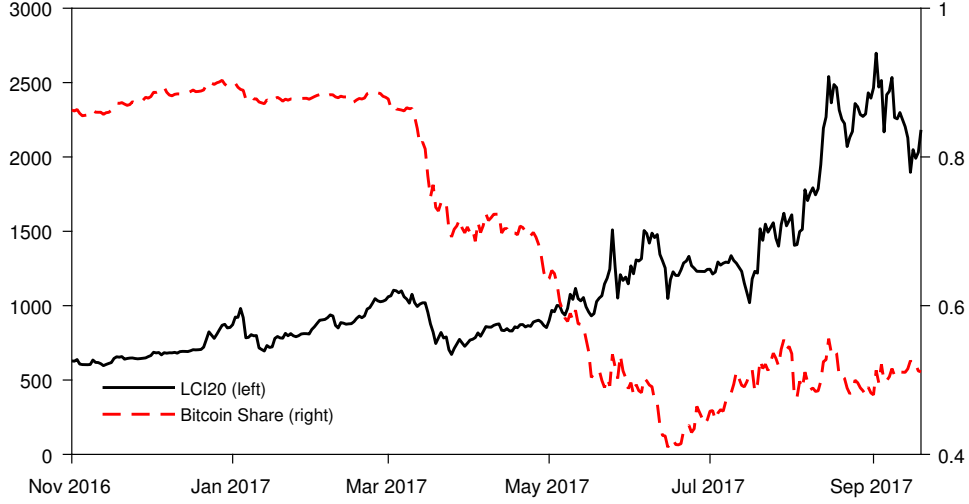
Let t denote our (possibly continuous) time index starting at time t_0 . Moreover, $\mathcal{C}_t \in \mathbb{N}$ is the set of coins that are tradable at time t across $M \in \mathbb{N}$ relevant market places for crypto-assets. The price of asset i at time t is calculated as the mean of the bid-ask spread’s midpoint across all M markets. Quantity $q_{i,t}$ denotes the overall number of currently mined shares/items of asset i at time t . Last, we need a measure of market capitalization $c_{i,t}$. Whereas $p_{i,t}$ and $q_{i,t}$ are “hard facts”, market capitalization is a more vague term.

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¹Code and L^AT_EX-files can be found at <https://github.com/onnokleen/crypto-index>

Figure 1: Evolution of LCI20



Note: In this figure, our daily LCI 20 and the dominance index with respect to bitcoins are depicted ?? **Referenz und Formel für Dominanzindex??**.

Regarding stock markets, only shares that are actively tradable, the “public float”, are included in calculating indices. This is commonly done by excluding shares held by strategic long-term investors, e.g. founding shareholders or government. As there is no public record, at least for now, to which person or institution shares in cryptocurrencies belong, we propose to use only (partial) coins that have been traded in the last four years. Even though the cut-off at four years can be considered to be somewhat arbitrary, it takes care of another problem when calculating the value of cryptocurrencies: “zombie coins”.

As some users lose their personal wallet, e.g. by an irreparable hard-drive failure, those coins are typically gone and cannot be restored.² Hence, one should not use them when calculating market capitalization as there is no one who could sell them at any point in the future.

In the next subsection, we will define the calculation steps of our proposed LCI 20.

²See, for example <https://letstalkbitcoin.com/blog/post/rise-of-the-zombie-bitcoins>.

1.2 Six steps for calculating LCI 20

Our index is defined as a standardized ratio of weighted sums relative to its initial value:

$$\text{LCI20}_t = 100 * \frac{\widetilde{\text{LCI20}}_t}{\widetilde{\text{LCI20}}_{t_0}} \quad (1)$$

1. Calculate each coins market share $s_{i,t}$.
2. Truncate market shares by maximum \bar{s} : $\bar{s}_{i,t} = \max\{s_{i,t}, \bar{s}\}$
3. Rescale them, so weights sum up to one: $w_{i,t} = \frac{\bar{s}_{i,t}}{\sum_{i \in \mathcal{C}_t} \bar{s}_{i,t}}$.
4. Calculate the weighted average

$$\widetilde{\text{LCI20}}_t = \sum_{i \in \mathcal{C}_t} w_{i,t} c_{i,t}$$

5. The initial value of the weighted sum is given by

$$\widetilde{\text{LCI20}}_{t_0} = \sum_{i \in \mathcal{C}_{t_0}} w_{i,t_0} c_{i,t_0}$$

1.3 Addressing splits

For anticipated splits/forks we propose an adaptive smoothing technique for addressing “insane” price movements in direct aftermath. We propose to use one-hour averaged prices for currencies that are anticipated to split when calculating LCI20 beginning one day in advance and ending one day after split

1.4 Questions to address

- Why 20 currencies? 19-09-2017 14:41 20th market capitalization (STEEM) is only \$286.382.955 and 24 hour trading volume of \$686. Further, the 20 currencies with the highest market capitalization have a share of 92 % of the total market capitalization and a 24 hour trading volume of 94 % of the total trading volume of September 22, 2017. If we add another 30 currencies, the 24 hour trading volume increases by 2 percentage points where we think that a smaller but better traceable index outweighs an index with a larger but more volatile currency base.

Figure 2: LCI20 vs. Bitcoin price

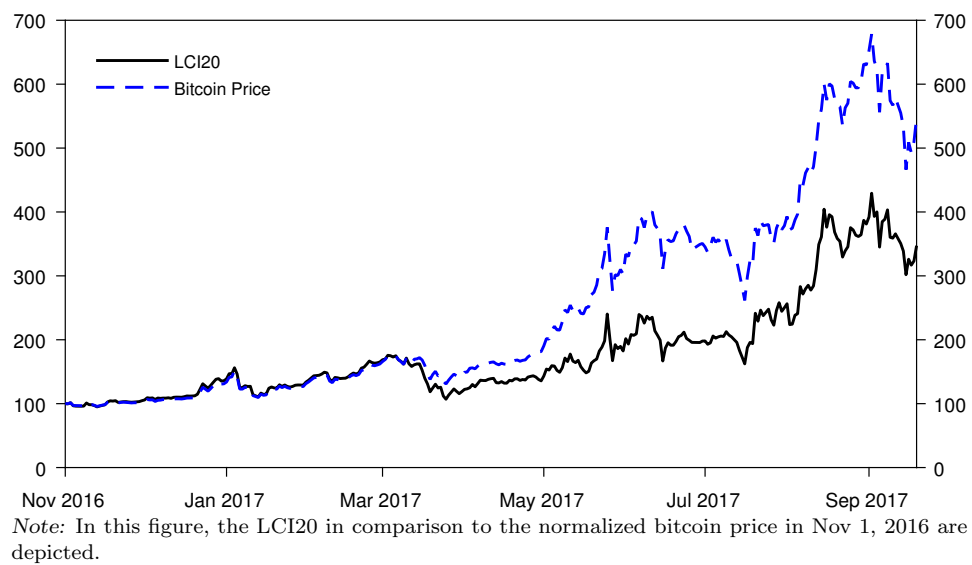
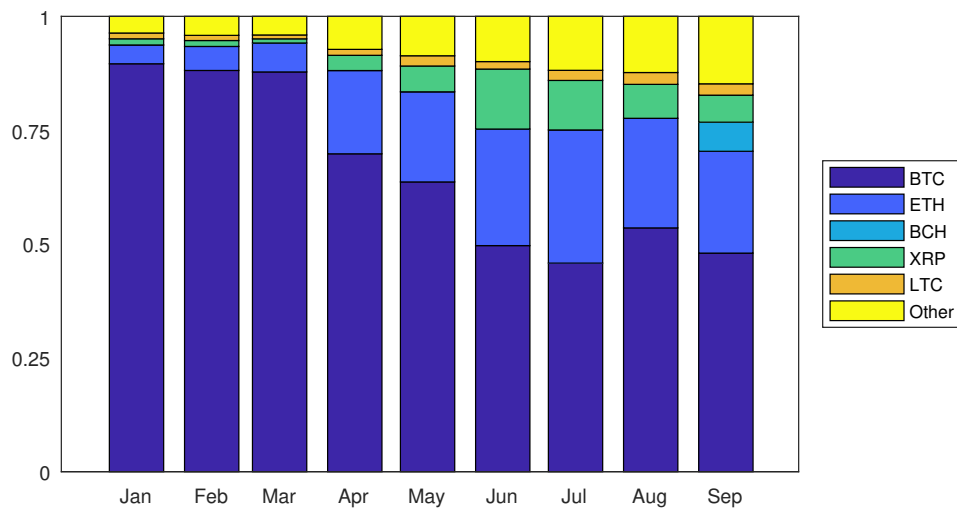


Figure 3: Currency shares along 2017



Notes: ?? Warum BCH nicht im August ??

- “Dead coins” a problem?
- If there is a split (like Bitcoin), new currency is part of Lykke 20 but is part of constituents-check at the end of the week.
- Basis: 100 Punkte?
- How to get market capitalization of public float?
- Maximal weight maybe 20%? DAX: Maximum weight 10%.

Wikipedia: In general, the large holdings of founding shareholders, corporate cross-holdings, and government holdings in partially privatized companies are excluded when calculating the size of a public float.

<https://www.coindesk.com/rethinking-bitcoin-market-cap/>: In 2014, NVIDIA engineer John Ratcliff theorized that approximately 30% of the current bitcoin supply is made up of “zombie” bitcoins that have been inactive for more than a year. This number includes bitcoins connected to inaccessible wallets, government-seized bitcoins, “burned” bitcoins and bitcoins abandoned during the early days of bitcoins, including Nakamoto’s mythical stash of over a million bitcoins.

1.5 How does it work in other indices

- DAX: Weighting based on market capitalization of public float (bedeutet Streubesitz, keine Aktien von Langzeitanlegern wie Familie Porsche/Quant).

1.6 Features

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- Constituent changes each week. Maybe Friday? Maybe based on trade volume in last 7 days? Good against “dead coins”.

2 Discussion

Immaturity of market may lead right now to frequent changes of assets included in the lower ranks of our index. However, we want our definition of the LCI 20 to be “future-proof” and expect volatility among ranking of crypto-assets in terms of market capitalization should to decrease in the upcoming two years.

Table 1: Proposal vs. example

Issue	Our proposal	Example
Frequency	Real-time	Daily
Split-smoothing	Not necessary due to real-time weighting	Not necessary due to daily data
Public float	Only use coins that have been traded the last 4 years	Not implemented
“Zombie coins”	Only use coins that have been traded the last 4 years	Only use 0.30% of coins

Notes: In this table differences in implementation of our example and our actual proposal are reported. Problems addressed in our proposal are reported in the first column, our solution to these in are summarized in the second column and last, we report our reduced-form example’s compromise.

3 Example: Daily LCI 20

3.1 Data

We download daily closing prices and market capitalization from *coincap.com* via their Rest API. Our data set includes up to 33 different cryptocurrencies listed on *coincap.com* in between .2017 and 19.09.2017.³ We exclude days on which there is no price for Bitcoin or Ethereum.

Something nice to illustrate:

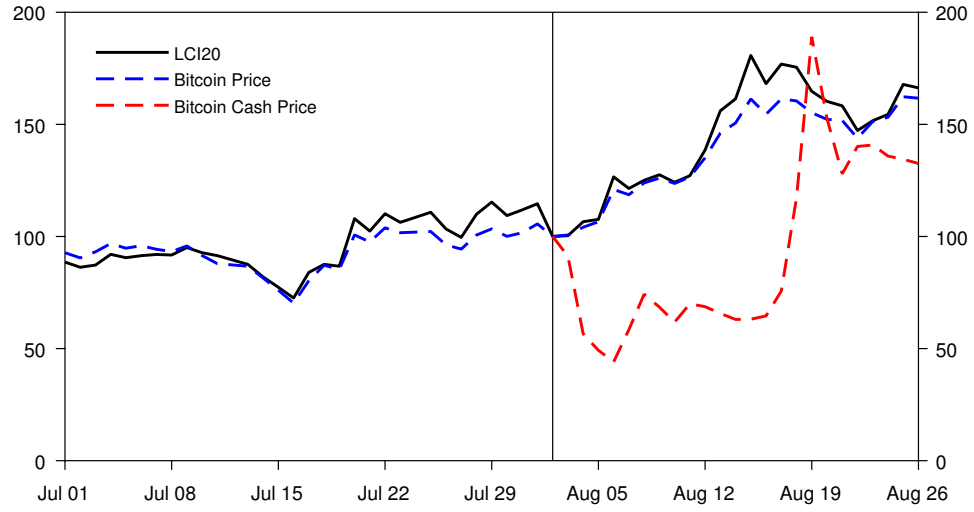
- Volatility in August (Bitcoin-split versus July). Show new composition after split.

4 Splits

The volatility of the index increases in times shortly before and after a split. For example, the index dropped on August 2, 2017, the day after the hard fork of Bitcoin Cash by -12.7% which is due to the price drop of Bitcoin (-5%) and the lower price of Bitcoin Cash (roughly $1/6$ of Bitcoin). At this point, investors which held Bitcoin, get the same amount of Bitcoin Cash. However, both currencies share the same transaction history. If one incautiously pushes now a transaction containing only old coins to the wrong transaction chain, one will lose the pushed value in both currencies. Therefore, private investors are usually advised not to trade their old coins or newly gained currency in the days after a split but to wait until it is settled if the new currency becomes accepted.

³Currencies are included if they were among the currencies with the largest market capitalization at ...

Figure 4: LCI20 at Bitcoin Cash split



Note: In this figure LCI20 and BTC/BCH prices normalized to 100 in Aug 2, 2017 are depicted.

References

TRIMBORN, S. and HÄRDLE, W. (2016). CRIX: an index for blockchain based currencies, *SFB 649 Discussion Paper 2016-021*.