BStreet Index 100 Methodology (BSI 100)

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Abstract

The BSI 100 Index is designed to be a robust cryptocurrency index similar to the S&P 500 to act as a guiding benchmark for cryptocurrency investors.

1. What it Means

The intention of the index is to represent the overall health of the cryptocurrency market. BStreet seeks to be a trusted source of cryptocurrency information, particularly with altcoins. Thus, the methodology of this index will highlight a wide variety of coins.

1.1. Other Indexes

We can first look to other Methodologies of index creation to see which approach works best. Multiple methodologies currently exist in index funds like Bitwise [3] and Bloomberg [1] as well as coin checking sites like CryptoCompare [2]. There are multiple strategies that these indexes use which can be dissected.

1.2. Input Consideration

A price index is a weighted average of price for a given class of goods and services over a given interval of time. The given class of goods are coins which have both a price and a way to be weighted. Each coin has a price based on volumes and prices at multiple exchanges and a market capitalization based upon circulating supply. Thus, a market capitalization weighted price index formula can be created for coins.

1.3. Price

Each individual coin's price input is determined by a volume-weighted average price formula as shown in the CryptoCompare methodology. Volume-weighted average prices are currently pulled from external APIs while the infrastructure to retrieve prices directly from exchanges is Currently in development at BStreet. The main input into the formula will be percentage changes to these prices.

1.4. Market Capitalization

Market Capitalization is determined by the price of a coin multiplied by its circulating supply. Market capitalization is representative of the size of a coin and an important indicator in the weighting of a price index. A simple way to do this is by creating a threshold with a hard capped n coins to be changed based on factors every set amount of time. p_i would represent the price of coin i and MC_i would represent the Market Capitalization of coin i.

$$Index = \sum_{j=1}^{n} p_j \left(\frac{MC_j}{\sum_{i=1}^{n} MC_i}\right)$$

This formula represents a summed fraction of price based on fraction of Market Cap of n coins. This can be used to find weighted average price in simple terms but runs into a lot of problems.

1.5. Stablecoins

Stablecoins are coins, both centralized and decentralized, pegged to fixed points in pricing. These include fiat collateralized stablecoins such as Tether, bitUSD, bitGOLD, and others; non-fiat collateralized stablecoins such Dai; and non-collateralized stablecoins. These stablecoins remain pegged to external reference points. Therefore, even with increases in their Market Capitalization, stablecoins may throw a weighted average of cryptocurrency prices off. Thus, similar to the Bitwise index fund, they should be excluded in the index calculations.

1.6. Bitcoin Dominance

Bitcoin holds nearly a 40% market dominance. Many current indexes and index funds place a great amount of importance on Bitcoin with good reason. As the most dominant store of value, Bitcoin's gains and losses represent most crypto earnings. While many methods to dampen this effect

are explored later, the BStreet Team feels that the eventual diversification and maturity of the cryptocurrency market will solve this problem as Altcoins gain more traction and begin to diverge from Bitcoin.

1.7. The Bitconnect Crash or Meteoric Rises and Falls

As one of the most famous scams in recent times Bitconnect saw massive gains for half a year before crashing down in early 2018. Now, do we consider this in our index? At its highest point, Bitconnect made it to the top 20 highest Market Capitalization which is well within our considerations for the index. These massive rises and falls can have a dramatic impact on an index value. For a lot of these smaller "pump and dumps", we could consider manual re-balancing and addition of coins depending upon their presence in a certain market cap threshold for a period of time. However, Bitconnect still qualifies for all of these. Therefore, its massive drop would show as a massive drop in the index. This is not necessarily a problem, large companies fail all the time and their effects should be shown. However, we at BStreet will do our best to remove coins confirmed as scams immediately from our index.

1.8. Final Considerations

It's important to understand that BStreet is not a fund. The creation of this index is not concerned with a passive approach to wealth generation. The BSI 100 index therefore, looks for the health of the cryptocurrency market as an overall weighted representation of changes in percentage.

Our goal is to create a robust, future-proof, and representative index that depicts the overall market trend of cryptocurrencies.

2. The Numerical Consideration

Representing all coins as a price fails because it doesn't take into account the supply or market cap of the coin. The end result is largely dictated by the price of Bitcoin. Instead, the overall health of the cryptocurrency market is much better represented as a trend which changes based on weighted percentage changes to price. The S&P 500 already has a system where the change of their index utilizes weighted percentage changes of Market Capitalization to individual companies. With MC_i representing the market capitalization of the i-th company the S&P calculates its index as such with a Divisor to set it at an arbitrary value at its initial point.

$$\frac{\sum_{i=1}^{500} MC_i}{Divisor}$$

This has worked to show the trend of the 500 companies selected by Standard and Poor's. However, this formula cannot necessarily be used with cryptocurrencies. First, there is not enough variety of categories and industries spanned by cryptocurrencies with high enough market capitalizations. Second, Bitcoin currently holds nearly 40% market dominance. Take 100 coins and most other changes to market capitilization will be so dilluted that an index represented by applying the Standard and Poor's methodology onto 100 cryptocurrencies will essentially yield the market trend of Bitcoin.

2.1. The Simplest Formula

Using the inputs:

- arbitrary amount of coins n
- arbitrary starting index value c
- individual coin Market Capitalization, MC_i
- individual coin Percentage Change, PC_i
- arbitrary time interval

Every arbitrary amount of time, a multiplier is created which will multiply the previous index point, creating a new value. This multiplier should be influenced by the percentage change of price of coins. However this will be a weighted influence based on the fraction of Market Capitalization it holds. This fraction is described as such.

$$\frac{MC}{\sum_{i=1}^{n} MC_i}$$

Thus, percentage change given as either $+12\%$ or -2.4%, can be numerically described by PC_i as .12 or $-.024$. The weighted percentage change is given as such.

$$\frac{MC_j}{\sum_{i=1}^{n} MC_i} PC_j$$

The base multiplier at a point in time is 1. This base multiplier will change based upon the n weighted percentage changes. The percentage change must

be placed into a multiplicative form by adding 1. Then, the multiplier will be a multiplication of all of these coin percentage change multipliers.

$$\prod_{j=1}^{n}(1+\frac{MC_j}{\sum_{i=1}^{n}MC_i}PC_j)$$

After an arbitrary amount of time, the new index value, if the previous value was c, will be this.

$$c\prod_{j=1}^{n}(1+\frac{MC_j}{\sum_{i=1}^{n}MC_i}PC_j)$$

When implemented, an iterator can retrieve the Percent Change and Market Cap data from the BStreet Backend. During each iteration, the inputs can be sanitized for stablecoins and a Market Cap summation can be conducted. Iterating through the collection of coins can obtain each multiplier.

Underneath In Figure 1 an example of this formula in action uses weekly Market Cap data and percentage changes of the top 100 coins from CoinMarketCap, n = 100, with an arbitrary starting index value of c = 100.

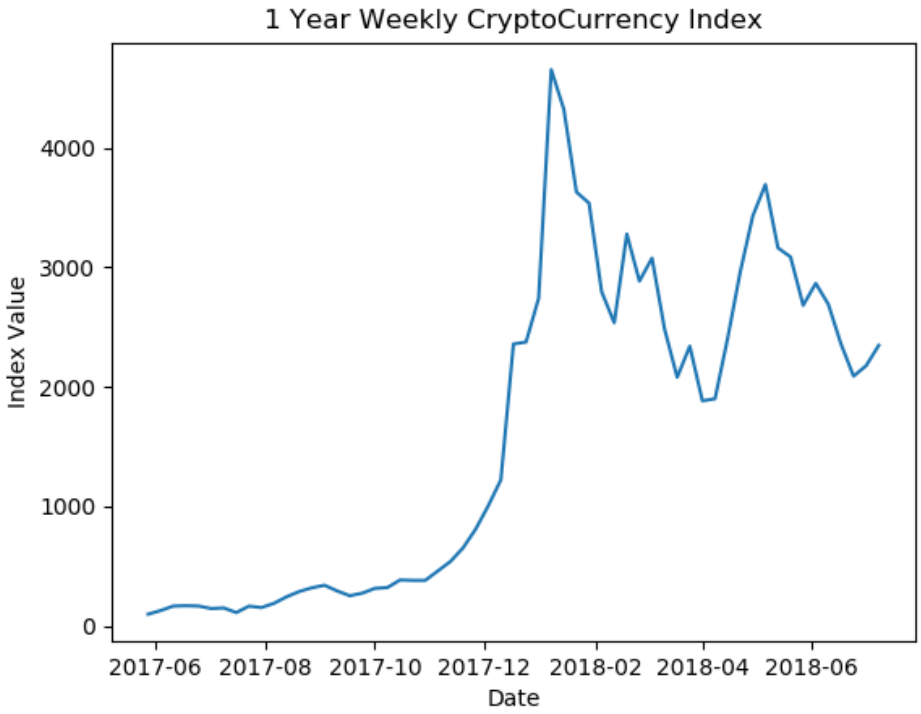

Figure 1: Simple Formula 6/04/17 to 7/08/18

This is a simple formula for 10 coins but it does run into problems. The problems referenced in 1.6 and 1.7 still occur. Bitcoin is still a dominator of this index due to its large Market Cap and, especially at higher values of n, this index formula is highly sensitive to market volatility due to the exorbitant increases of smaller coins in the top 100. However, most other index formulas have these problems. Therefore, BStreet has decided to use this formula. Other formulas are listed below as considerations.

2.2. Excluding Bitcoin

Perhaps the prevention of this index becoming solely a measurement of Bitoin can be achieved by ignoring Bitcoin and not including its percentage changes in the formula.

2.2.1. Excluding Bitcoin and Ethereum

For this formula, Bitcoin and Ethereum were excluded and the same Market Cap Weighted percentage changes on the index for the n rest of the coins was used.

$$c\prod_{j=3}^{n}(1+\frac{MC_j}{\sum_{i=3}^{n}MC_i}PC_j)$$

This methodology was simulated with 100 coins, excluding Bitcoin and Ethereum. This week to week, weighted percentage change index with arbitrary starting value of c = 100 can be seen in Figure 2 below.

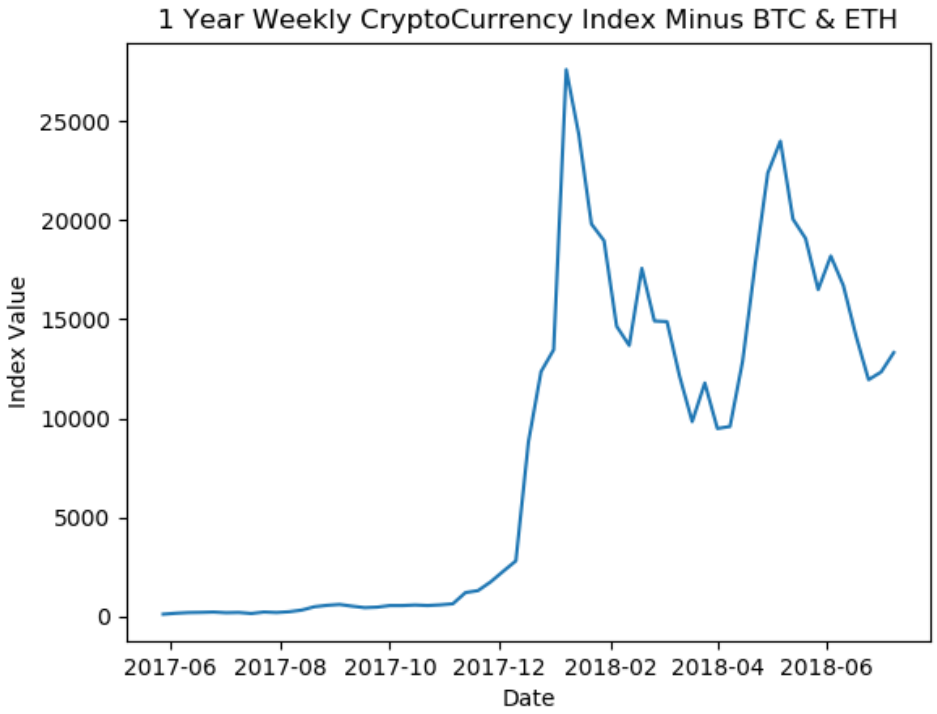

Figure 2: Simple Formula 6/04/17 to 7/08/18 excluding Bitcoin and Ethereum

In comparison to the initial simple formula, there is the increased severity of peaks and troughs. In a sense, it's more volatile. This is accurate as Altcoins tend to be more volatile than Bitcoin. However, the BStreet team

still believes Bitcoin and Ethereum are influential and dominant parts of the cryptocurrency market and cannot, therefore, be ignored.

2.2.2. Excluding the Top 5

The volatility seen in the previous exclusion occurs even more if the top 5 cryptocurrencies are removed and the simple formula is used.

$$c\prod_{j=6}^{n}(1+\frac{MC_j}{\sum_{i=6}^{n}MC_i}PC_j)$$

Below in Figure 3, this week to week weighted percentage change index on 100 coins, n = 105, with arbitrary starting value of c = 100.

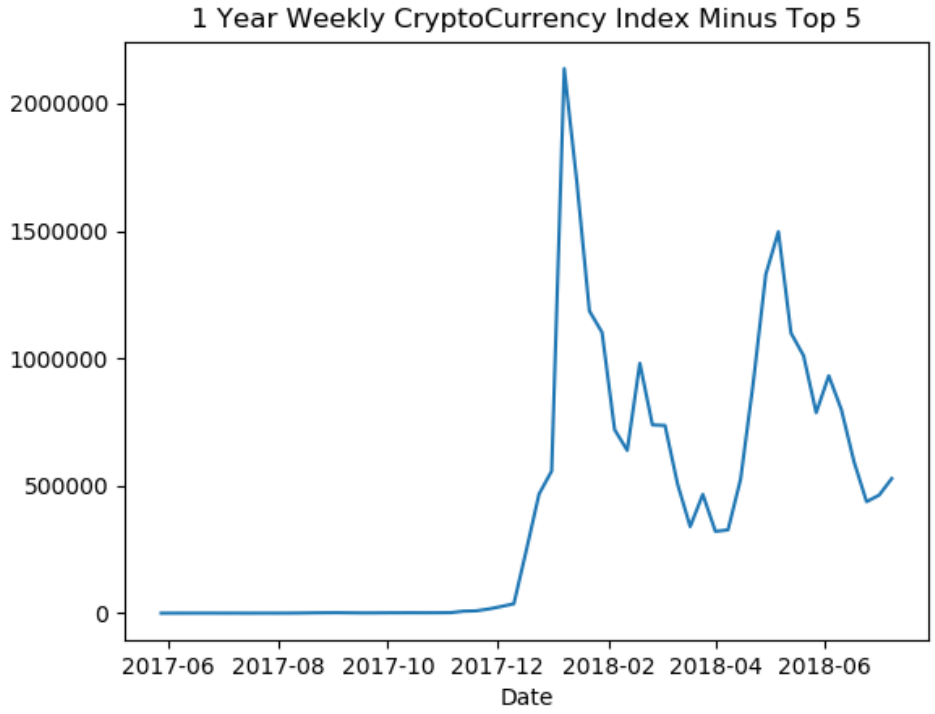

Figure 3: Simple Formula 6/04/17 to 7/08/18 excluding Top 5 CryptoCurrencies

The resulting index is the most volatile. The problem with these exclusion formulas is not only this increased sensitivity, but the fact that excluding

coins removes an important representation of the cryptocurrency market. Perhaps the volatitilty could be solved by curating specific coins, but it would not solve the issue of non-representation.

2.3. Weighing Down the Whales

An idea to prevent this index from overwhelmingly representing Bitcoin is to remove previous larger coin's market caps in the divisive summation of market caps. A formula as such will attempt to explain this idea.

$$c\prod_{j=1}^{n}(1+\frac{MC_j}{\sum_{i=j}^{n}MC_i}PC_j)$$

This is a bad idea with perhaps a good underlying concept. Even if Bitcoin still has a .4 weighting on its percentage change the nth coin will have a 100% weighting. Thus, the idea of thresholds takes hold.

2.4. Threshold Weighting

This means that in the underlying divisive Market Cap Summation to determine the weight of a coin's percentage change we choose how many coins are summed based on thresholds. There are many ways to do this but allow me to introduce my favorite idea. The Golden Ratio.

100M, 200M, 300M, 500M, 800M, 1.3B, 2.1B, 3.4B, 5.5B, 8.9B, 14.4B, 23.3B, 37.7B, 61B. So now imagine there's a coin with a market capitalization of 7 Billion USD. Bascially since it lies between 5.5 Billion and 8.9 billion dollars in Market Capitalization it is within that threshold. Now Say MC_i and PC_i are ordered from highest to lowest market capitalizations. Essentially, if MC_c is the first coin with a market capitalization under 8.9B USD, then the weight of the percentage change of this coin is this.

$$\frac{MC_j}{\sum_{i=k}^{n}MC_i}PC_j$$

This can be done with any threshold. Doubling, exponential, and even arbitrary limits all work in this situation. And it looks like this with arbitrary conditional start k.

$$c\prod_{j=1}^{n}(1+\frac{MC_j}{\sum_{i=k}^{n}MC_i}PC_j)$$

However, the main problem this attempts to solve is the Bitcoin problem as well as the Meteoric rise problem. Meteoric rises will be tempered due to

getting weighted down as they approach higher market caps. This does not protect the index from crashes, however.

When simulated, as shown below, a graph appears nearly identical to the simple formula.

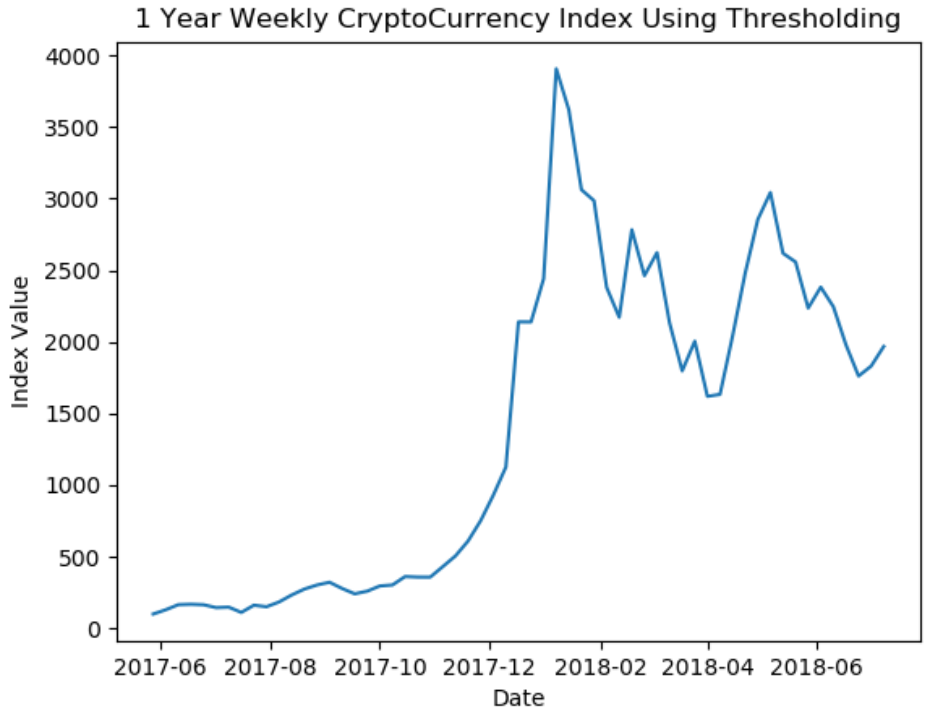

Figure 4: Threshold Weighting using the Golden Ratio 6/04/17 to 7/08/18

3. Vetting and the Add Drop Conundrum

The indexes described above run into the major problem of crossing the threshold of counting. The massive peaks without significant drops are the effect of constant re-balancing. Every single coin that jumped from outside top 100 to inside would see the effect of their increases on the index. However, coins that had the opposite movement would not. The solution is thus to hold a number of coins to represent the index which will be re-balanced after

a certain period of time. The qualifications to be allowed within the pool of coins must then be defined.

3.1. Market Capitalization

Due to BStreet's emphasis on Market Capitalization weighting, a designated qualification should exist based upon Market Capitalization. Therefore, to remain in or be considered a replacement for a coin in the index, a coin must remain in the top 150 coins in terms of Market Capitalization for 20 out of the last 30 days. This exists to ensure that a coin has been stable and high-ranking for enough time.

3.2. Volume

A major determinant of whether a coin should be included is its trade volume. During a re-balancing, we will check that a coin's daily volume has been at least 1 percent of its daily Market Capitalization for 20 days of the previous period. This indicates a certain coin has enough liquidity to support its price level.

3.3. Time

The amount of time before the index is re-balanced must also be determined. Provided the index information can be taken quick enough, there is no reason that a re-balancing shouldn't occur often. Since this index will be increasingly reflective of altcoins, there should be quicker consideration of rising coins than other indexes. Therefore, a monthly re-balance of the index should achieve this.

3.4. Forks

Especially with lower ranked coins, forks can become problematic due to low initial prices and volumes. Whenever a fork occurs in a coin, until re-balancing it will not be considered. After the period ends, this child fork will have to meet the qualifications for being factored into this index.

3.5. Amount

Finally, 100 coins will be placed into this index. The BStreet team believes that 100 coins gives a strong representation of the Altcoin market. At the same time, limiting to the index to 100 coins allows the index to focus on the more proven coins.

3.6. Re-Balancing

On a monthly re-balancing date, new coins are considered on all of the above bases, provided they meet them. Thus, if a coin currently in the index fails to meet one of the above qualifications, then that coin will be dropped from the index. In it's place, all coins that meet the above qualifications are considered for entry into the index. From that point on, selection is up to the discretion of the BStreet team.

4. The Formula

Thus, the formula is as follows. At the genesis of the index, some time between 2016 and 2017, the index takes a value of 100. As described in section 3, for a coin to be considered it must,

1. be in the top 150 Market Capitalizations for 20 days of the previous period.
2. have a daily volume of at least 1 percent of its daily Market Capitalization for 20 days of the previous period.

100 coins are placed in the index based on this criteria. Then, every hour, or more frequently, the index changes based on the equation given by section 2.1, a simple formula for a weighted percentage change multiplier.

$$c\prod_{j=1}^{n}(1+\frac{MC_j}{\sum_{i=1}^{n}MC_i}PC_j)$$

At the end of the month, the index is possibly re-balanced, using the rules of section 3 again.

References

[1] Alan Campbell. *Index Methodology.* [*Bloomberg Galaxy Crypto Index*].

[2] Antonio Madeira. *How does our Cryptocurrecy Index Work.* https://www.cryptocompare.com/coins/guides/how-does-our-cryptocurrecy-index-work/

[3] *Hold 10 Index.* https://www.bitwiseinvestments.com/index