

# Obolus Enhanced Cryptocurrency Index

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## Contents

<b>1</b>	<b>Introduction</b>	<b>3</b>
1.1	Index Funds and ETFs . . . . .	3
1.1.1	Excess Return and Tracking Error . . . . .	3
1.2	Other Digital Asset Indices . . . . .	4
<b>2</b>	<b>Economics</b>	<b>5</b>
2.1	Correlation between Digital Assets . . . . .	5
2.2	Correlation to Traditional Market Indices . . . . .	6
2.3	Dividends, Staking, Inflation, Chain Splits, and Airdrops . . . . .	6
2.4	Advantage of Investing in an Index Fund . . . . .	7
<b>3</b>	<b>Obolus Enhanced Cryptocurrency Index</b>	<b>8</b>
3.1	Index Methodology . . . . .	8
3.1.1	Index Constituents, Weightings and Capping Factors . . . . .	9
3.1.2	Index Calculation . . . . .	9
3.1.3	Index Divisor . . . . .	9
3.2	Data Source . . . . .	9
3.3	Universe Selection, Costs, and Market Impact . . . . .	10
<b>4</b>	<b>Conclusion</b>	<b>11</b>

## 1 Introduction

Since the late 19<sup>th</sup> century, market indices have been used as a proxy for a measurement of the overall performance of the economy. The calculation method varies from index to index, but often consists of a selection rule for instruments and a rule to calculate how much weight each component contributes to the overall index value. A well known example is the S&P500 Index that combines the value of the 500 largest companies in the US economy weighted by market capitalisation.

In this report, we propose the Obolus Enhanced Cryptocurrency Index as a proxy to measure the overall performance of the cryptocurrency and digital asset market. We also argue that the index is attractive as an investment strategy when compared to other indexes for the same market.

### 1.1 Index Funds and ETFs

Funds tracking indices are well established investment instruments in traditional markets (as opposed to digital asset markets). It has been shown in many studies that passively-managed investment vehicles oftentimes outperform actively-managed strategies. For exam-

ple Forbes<sup>1</sup> reports that 82% of the actively-managed strategies underperformed compared to a portfolio of index funds. The main factors to consider for index funds as compelling investment vehicles are roughly 1% lower management expenses than for active strategies and tax savings to due to fewer liquidations.

Exchange traded funds (ETFs) are common because they are easily accessible to all participants on an exchange and can be used as a hedging tool for many trading strategies. In the digital asset space, a few proposals have been made to publicly list a Bitcoin ETF. Most notably the Winklevoss Bitcoin Trust. However, recently in July 2018 BATS BZX Exchange made a second attempt at listing the trust and the Securities and Exchange Commission (SEC) has rejected the attempt. A similar decision has been further delayed in August. A multi-constituent digital asset index as an ETF is not expected to be listed in the near future.

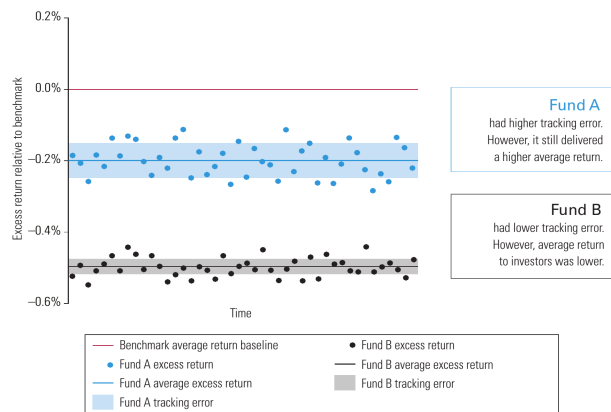
#### 1.1.1 Excess Return and Tracking Error

Due to the trading fees, management fees, and rebalancing process, the returns of a index tracking fund can differ from the actual index performance. Vanguard found in a study from 2017 that the excess return based on 15 years of data

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<sup>1</sup><https://www.forbes.com/sites/rickferri/2012/08/20/index-fund-portfolios-reign-superior>

Figure 1: Excess returns (baseline shift) and tracking error (standard deviation). Source: <https://www.vanguard.com/jumppage/international/web/pdfs/INTUTE.pdf>



has a median of about -1% for large and -2% for mid and small cap stocks. For other asset classes this can be even lower<sup>2</sup>. The tracking error is usually smaller and about 0.4%. A visual representation of the two quantities can be found in Fig. 1.

Trading fees for digital assets are currently still up to 10 times higher than for traditional assets. However, the digital assets are traded on many (typically more than 10) exchanges. A fund has possibilities to optimise the trading strategy to increase the expected return. The actual gains are still to be determined but are expected to be

<sup>2</sup><https://www.aesinternational.com/hubfs/Vanguard%20low-cost%20index-fund.pdf>

small compared to the absolute market returns given current price volatility.

## 1.2 Other Digital Asset Indices

A few indices for digital assets are published regularly. Each have different inclusion criteria and, thus, strengths and weaknesses.

- The CRIX<sup>3</sup> was one of the first indices available for crypto currencies. It follows up to 75 constituents and has a low threshold for inclusions of an issued asset. Due to the high number of constituents and their low liquidity it is unsuitable for tracking the index by a fund.
- Bloomberg Galaxy Crypto Index<sup>4</sup> measures the broader cryptocurrency performance. Up to twelve currencies can be included in the index. Each constituent is capped between 1 and 30 percent. Monthly rebalancing.
- Crypto20<sup>5</sup> is an ERC20-based index fund. The fund proxy also uses a capped market capitalisation weighted methodology but consists of more (20) assets and has weekly rebalancing periods. According to the study shown here, both values for the parameters

<sup>3</sup><http://thecrix.de/>

<sup>4</sup>Bloomberg lookup symbol BGCI

<sup>5</sup><https://crypto20.com>

result in unnecessary trading costs. The difference between the fund NAV per share and the actual index value are not differentiated.

The index described in this paper is longer in existent than the Bloomberg variant. It is also easily available without any subscription and published on the Obolus website and API.

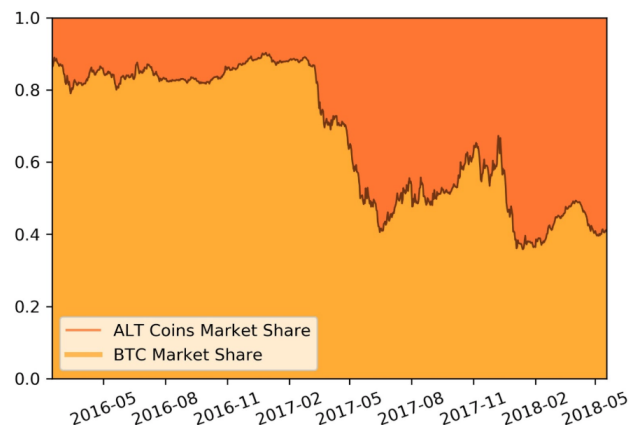
## 2 Economics

Bitcoin is currently the single largest coin in the digital asset space. However, the share of the market capitalisation has been decreasing over the previous years (see Fig. 2). With alternative blockchains bringing new use cases, providing more on-chain transactions per seconds, and specialising on features such as smart contracts, storage or decentralised computing power, investments in these assets became popular among investors speculating on large price increases as more users adopt the technology. In almost all countries regulations have not caught up with the new technology and it is unclear if different blockchains will be governed by different regulations.

### 2.1 Correlation between Digital Assets

The regulatory hurdle is one of the main reasons for a significant correlation between the price

Figure 2: Bitcoin market share compared to the sum of all other cryptocurrencies (*altcoins*).



evolution of digital assets. Depending on the time period correlation coefficients are between 0.6 and 0.8 for year 2017 and 2018. In June 2018, the SEC ruled that Ethereum is not a security. The ruling might not apply to other coins such as Ripple's XRP but it shows that SEC will look at the technology case-by-case. We expect a significant lower correlation in the upcoming market conditions. The high correlation among digital *security* assets might exist until G20 states come to a conclusion of how to treat decentralised minting of currency that is not controlled by a state.

## 2.2 Correlation to Traditional Market Indices

Correlation to indices of traditional markets such as S&P500 or VIX are very low (absolute correlation coefficients less than 0.2). Digital assets have, thus, a very reasonable argument as a new asset class that can compliment existing investment portfolios. A plot showing the digital asset to digital asset correlation, as well as digital asset correlation to traditional indices is shown in Fig. 3.

## 2.3 Dividends, Staking, Inflation, Chain Splits, and Airdrops

Traditional index funds might obtain a dividend for their investment in equity, bonds or similar products. The dividend is either payed out to the investor or reinvested after tax reductions. This is reflected in the index value by publishing different versions. The *price return* version does not take dividend payouts into account but in the *net return* version the tax corrected payout is added to the index value.

For digital assets the equivalent of dividend payouts exist in some blockchains in the form of *staking*<sup>6</sup>, which can lead to an increase in the

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<sup>6</sup>A portion of the available funds can be used to guarantee certain states in the blockchain, e.g. the inclusion of only valid transactions. The staked amount can be lost if the guarantee fails.

owned amount of held asset. The Obolus Enhanced Cryptocurrency Index follows the definition of *price returns*. Thus disregarding the possibility to stake or lend the controlled assets in the index value.

Some blockchains include artificial inflation, e.g. the mining reward for Bitcoin. The inflation at the current mining reward level is less than 4% and decreasing. The inflation is reflected in the price of the digital asset and, thus, included in the index.

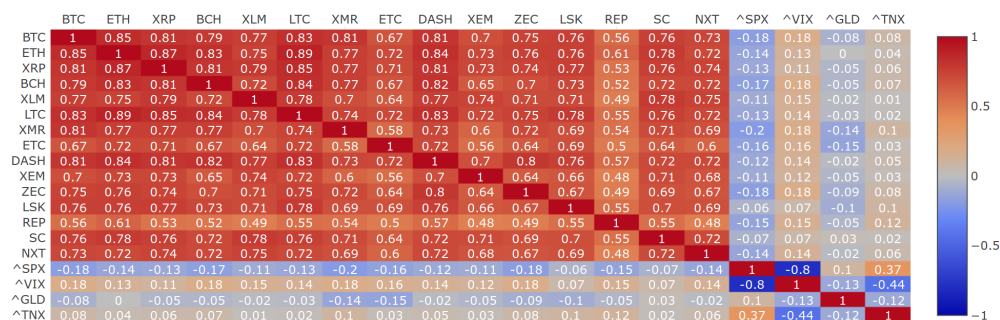
If a chain split occurs due to a hard fork<sup>7</sup>, the network usage is divided between the new and old code basis of the digital asset. This also applies to proof-of-stake systems that penalise misbehaving validators to make chain splits less likely. Under this basic assumption, the combined market capitalisation of two split digital assets is equal to the market capitalisation of the previous single digital asset. For the index this means that the constituents of the next rebalancing period are either both, one or none.

When calculating the index value Obolus disconsiders *airdrops*. Airdrops can be viewed as dividends from a particular blockchain and ignoring them when evaluation the index is aligned

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<sup>7</sup>A code update that is not backward compatible. In this case, the miners need to decide whether to update their software or continue following nodes with the previous version. If both groups find blocks after the hard fork date, a chain split has occurred.

Figure 3: Correlation factor for various digital assets with Source: Sifr. Data from Thu 23 Aug 2018 GMT over the past 180 days.



with the *price return* calculation philosophy. For tracking the Obolus Enhanced Cryptocurrency Index by a fund, the exact procedure should be at the portfolio manager's discretion. Proposals are to sell airdropped assets only once per year, at fund closure (for closed funds) or to not engage in airdrops at all.

## 2.4 Advantage of Investing in an Index Fund

There are a number of advantages in having an automated trading system managing digital assets in an index fund. Among the most relevant advantages are time saving, cost reduction, and empowerment.

**Time saving:** The management of multiple assets and multiple exchanges on a regular basis can be very time consuming. Despite the

easy access to centralised cryptocurrency exchanges (and even easier access to decentralised exchanges), more often than not multiple accounts are needed to be able to trade all assets and adjusting weights can quickly become cumbersome. In most cases it requires transactions between the exchange accounts. The process of managing multiple accounts with multiple assets on a regular basis can be skipped by investing in an index fund.

**Cost saving:** The costs in exchanging assets and tokens add up over time if one is not careful about market impact and market fees. An efficient algorithm engine can consider the volume in the order book and the time frame when placing orders in any market. Moreover, mutual funds are subject to lower fees when compared to single clients due to increased trading volumes.

**Empowerment:** Some assets are simply impossible to manage for the run-of-the-mill participant due to, mainly, two reasons: accessibility and technology. Not all digital assets are listed in all digital exchanges, so for a participant to buy or sell a number of different assets he or she often needs to subscribe to two or more exchanges (increasing the participant's third-party risk). Territorial restrictions can also become a problem to investors from different countries. Another reason why a participant may be isolated from a particular asset is due to technology. This aspect comes in many forms, an example is Cardano's coin ADA that at the time of the writing of this document does not have a mobile phone application and in its early stages did not have support for multi-signature wallets despite being within the top 10 digital assets in terms of market capitalisation. On the other hand, with an index fund the participant can skip all challenges of early adoption that come with the multiple competing blockchain technologies.

### 3 Obolus Enhanced Cryptocurrency Index

The top 15 digital assets by market capitalisation are set for this strategy to optimally track the market performance. To avoid the risk of

over-concentration when just few assets dominate the market (such as Bitcoin does now, or as others may in the future), each asset in the portfolio is capped at a certain percentage of the total assets.

Since the positions to buy and sell can be of considerable size when assets come in and out of the index, a volume weighted average price strategy should be applied in a tracking fund to minimise market impact. Algorithms that passively place orders at optimal intervals are recommended to reduce slippage and trading fees. Across the financial industry, index funds have consistently demonstrated outperformance when compared to the average actively managed funds, and all while offering lower fees than the standard 2% management fee and 20% performance fee.

#### 3.1 Index Methodology

The Obolus Enhanced Cryptocurrency Index proposes to track an index for cryptocurrencies similar to the on FTSE Russel<sup>8</sup> methodology for capped weights as the best practice in the index space.

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<sup>8</sup>[http://www.ftse.com/products/downloads/Capping\\_Methodology\\_Guide.pdf](http://www.ftse.com/products/downloads/Capping_Methodology_Guide.pdf)



### 3.1.1 Index Constituents, Weightings and Capping Factors

Obolus Index constituents and weightings are published on the first day of each month. For a cryptocurrency to be considered as a candidate for the constituents, it must not be pegged to any assets (e.g. fiat or physical commodity). Additionally the Obolus Index Investment Committee reserves the right to exclude any asset where the market capitalisation cannot be computed or has ambiguities in the circulating supply. All eligible cryptocurrencies are ranked by their average market capitalisation. This value is determined by the time weighted average over the market capitalisation on the last day of the previous months. The top 15 assets are chosen to be the new constituents of the present month.

All constituents are weighted by their average market capital, with a cap of 15% to prevent a single cryptocurrency dominating the index and to promote diversification. If the weight of a constituent before capping exceeds 15%, the excess weight is redistributed to the remaining assets. This process is repeated until no asset has more than 15% weight in the index.

The capping factor is then defined to be the ratio between the weights after and before capping.

### 3.1.2 Index Calculation

The Obolus Index is calculated by the formula

$$\text{Index}(t) = \frac{\sum_i p_i(t) \times s_i \times c_i}{D},$$

where  $p_i$  denotes the current price of the cryptocurrency  $i$ ,  $s_i$  is the circulating supply on the last rebalance day,  $c_i$  the capping factor as defined in the previous section, and the sum is over all constituents of the index. The denominator  $D$  is the index divisor which is described in the next section and is used for normalization purpose.

### 3.1.3 Index Divisor

The index divisor is engineered so that the index is continuous despite changes in weightings on the rebalance day. Its value is defined to be 100 on 1<sup>st</sup> Jan 2016.

$$D_{\text{new}} = D_{\text{old}} \times \frac{\sum p_i \times s_{i,\text{new}} \times c_{i,\text{new}}}{\sum p_i \times s_{i,\text{old}} \times c_{i,\text{old}}}$$

where  $p_i$  is the average price of asset  $i$  on the last day of the previous month,  $s_{i,\text{new}}$  and  $s_{i,\text{old}}$  is the circulating supply on the new calculation day and last calculation day respectively, and  $c_{i,\text{new}}$  and  $c_{i,\text{old}}$  the capping factor of the new and last period respectively.

## 3.2 Data Source

We use multiple data sources in our index calculation to ensure robustness of our index. As of

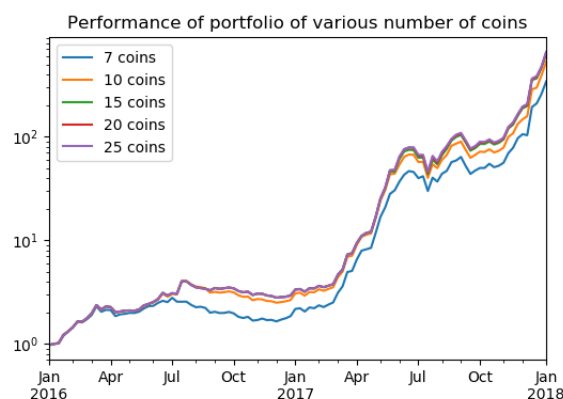
now, our data sources are [www.coinmarketcap.com](http://www.coinmarketcap.com), [coincap.io](http://coincap.io) and [www.coingecko.com](http://www.coingecko.com), and we take the median for the USD nominated price  $p_i$  and supply  $s_i$  for each asset when calculating our index and selecting the 15 top digital assets. An (approximate) real-time index calculated with data from [coincap.io](http://coincap.io) is available on [www.obolus.com](http://www.obolus.com).

### 3.3 Universe Selection, Costs, and Market Impact

The Obolus Enhanced Cryptocurrency Index strategy is designed to capture the  $\beta$  of the digital assets market. The portfolio composition and weights are determined by market capitalisation of each asset taking the 15 top digital assets in market capitalisation. To avoid a small number of assets dominating the index the strategy limits the weight of any particular asset to a maximum of 15%. Moreover, to guarantee full exposure to cryptocurrencies, *stablecoins* pegged to fiat money are disconsidered when selecting the 15 largest digital assets. Finally, it is very important to decrease costs and market impact during rebalance periods.

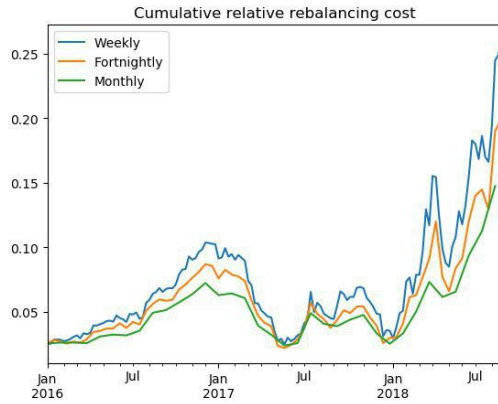
**15 Coins. 15%** To prevent the portfolio from over concentrating on a specific cryptocurrency like bitcoin, we put a cap of 15% on the weight of each asset. To determine the optimal number of

assets in the portfolio, Obolus backtested portfolios with various number of assets with 15% cap. Below is the result of the backtest.



From the graph, we can see that the inclusion of more than 15 assets does not have much effect on the performance of the portfolio. To reduce operational and rebalancing cost, Obolus therefore chooses to include 15 assets in the Obolus Enhanced Cryptocurrency Index.

**Costs and Rebalance Period** To find the optimal timeframe for reconstituting and rebalancing, Obolus evaluated weekly, fortnightly, and monthly rebalancing. Obolus assumes 2.5% slippage in rebalancing (consisting of transaction fees, exchange fees, and spread crossing), and backtest the relative rebalancing cost for each rebalancing period.



The above graph shows the cumulative rebalancing cost but relative to the total fund value. From this, we see that rebalancing monthly is the best choice as the relative rebalancing cost is consistently the lowest.

## 4 Conclusion

The Obolus Enhanced Cryptocurrency Index offers an optimised yet simple method to obtain exposure to 15 different cryptocurrencies. Our methodology based on a market capitalisation weighted index with a 15% cap for 15 digital assets is very attractive in terms of fees and performance.

We further outlined the need of a digital asset index and discussed how a trading system should track this index to make it available as an investment product.