

Risk-Managed Bitcoin Fund Strategy Framework

January 2021

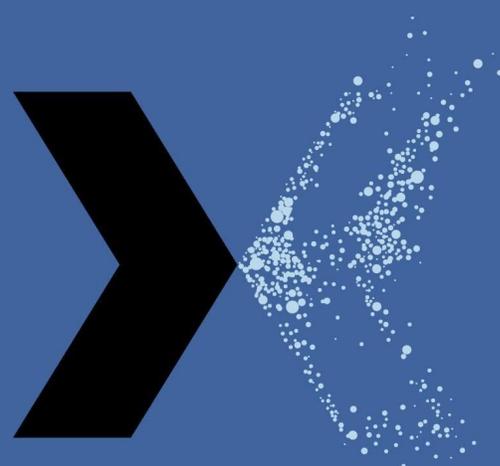




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Background and Motivation

Despite increasing publicity in recent years, Bitcoin has yet to gain significant traction with large traditional financial institutions such as banks and hedge funds. However, interest is growing rapidly among institutional *investors*, particularly family offices and high-net worth individuals.¹ In addition, the concentration of Bitcoin wealth has continued its trend downward. Market liquidity has increased contemporaneously with this redistribution of wealth which suggests that broad-based adoption is increasing. The following chart shows the percentage of the float of Bitcoin owned by the 100 richest addresses from 2011 through 2020:²

Richest 100 Bitcoin Addresses as % of Float



However, Bitcoin is notoriously volatile compared to traditional asset classes. During its short history, Bitcoin has undergone many significant changes with respect to liquidity, supply schedule, market structure, and regulation. Some changes are abrupt and others occur gradually over time. While the underlying trends have had an overall positive effect on the Bitcoin ecosystem, it should be kept in mind that unexpected events in a non-mature market can have an amplifying effect on volatility and the value of Bitcoin.

Many funds have emerged to attempt to capitalize on the volatility of Bitcoin. The majority of existing actively-managed crypto funds are new, and therefore have short track records. According to reports published by PWC and Elwood Capital Management, approximately 63% of currently active funds were launched in 2018 or 2019.³ The study also suggests that the rate of attrition may bias the statistics collected in the study:

“There is an inherent element of survivorship bias in the fund universe surveyed, as the report only includes crypto hedge funds that were in operation in Q1 2020. Funds that were forced to shut down prior to this date due to the difficult market conditions of 2019 have been excluded.”⁴

¹ [PWC and Elwood - 2020 Crypto Hedge Fund Report](#)

² <https://bitinfocharts.com/comparison/top100cap-btc.html>

³ [PWC and Elwood - 2020 Crypto Hedge Fund Report](#)

⁴ Ibid.



Crypto fund performance has been mixed. According to the PWC-Elwood report, median returns of crypto funds (excluding index funds and venture capital funds) for 2018 (across 100 funds) were -46%⁵ versus Bitcoin returns of -73%; median returns for 2019 (across 150 funds) were 30%⁶ versus Bitcoin returns of 94%.

The Exos team comes from a range of technical backgrounds and has extensive experience in the financial markets, from low-latency quantitative algorithmic trading in equities to macro and relative-value trading in rates. In addition, Exos has been directly involved in the crypto space in various capacities including proof-of-work mining, staking, and trading. We believe that this combination of expertise gives us our edge. In the following sections, we will discuss existing attempts to value Bitcoin, our approach to research, and our infrastructure.

Valuing Bitcoin

Bitcoin is a difficult asset to value. From a fundamental valuation perspective, there is not much “intrinsic value” other than the cost of production. Bitcoins are “mined” by rewarding miners (operators of specialized computer hardware) for validating blocks of transactions. The computer hardware, or ASICs (application-specific integrated circuits), are designed to perform one kind of computation as fast as possible. Much like personal computers, ASICs vary in computational power, energy efficiency, and price. In addition, the wide variability of these factors, differences in energy costs across different geographical regions, and opaqueness of the ASIC market make valuation difficult. Even if a precise cost of production for Bitcoin can be calculated, it does not imply that someone will be willing to pay that price.

Many have attempted to value Bitcoin on the basis of its adoption and utilization. Metcalfe’s Law, borrowed from the telecommunications industry, states that the effect (in this case, value of Bitcoin) of a network is proportional to the square of the number of interconnected users. While this analysis may seem compelling on the surface,⁷ estimating the number of unique users via Bitcoin addresses is virtually impossible given users are often encouraged to create a new address for each *transaction*.

The concept of stock-to-flow, borrowed from macroeconomics⁸, has also been applied to arrive at a “fundamental value” of Bitcoin.⁹ Since the supply schedule of Bitcoin has been programmatically set, we know both the outstanding float (stock) and the rate at which coins are created (flow). The relationship between price and the stock-to-flow ratio can be graphed:¹⁰

⁵ [PWC and Elwood - 2019 Crypto Hedge Fund Report](#)

⁶ [PWC and Elwood - 2020 Crypto Hedge Fund Report](#)

⁷ [Bitcoin Spreads Like a Virus by Timothy Peterson](#)

⁸A “stock” is the amount of a quantity at a given period of time (e.g. number of outstanding shares, size of the Fed portfolio, number of circulating Bitcoin); “flow” is the rate of change of that quantity over time (e.g. amount of equity raised in a year, rate of Fed asset purchases, rate at which Bitcoin is mined). These factors are sometimes used to model and draw inferences about an asset price or a macroeconomic effect.

⁹ [Modeling Bitcoin Value with Scarcity](#)

¹⁰ [Bitcoin Stock to Flow Model - S2F Live Chart \(PlanB\)](#)



While this is an interesting high-level observation, the magnitude of the deviations from the logarithmic fit are massive and make it impractical for making short to medium term investment decisions.

A model that explains the price of Bitcoin on a fundamental basis remains elusive. While these ideas yield some interesting insights, it is difficult to argue that they collectively or individually are the primary driver of prices. In the absence of a compelling fundamental valuation method, we conclude that Bitcoin prices are largely driven by investor activity and market sentiment.

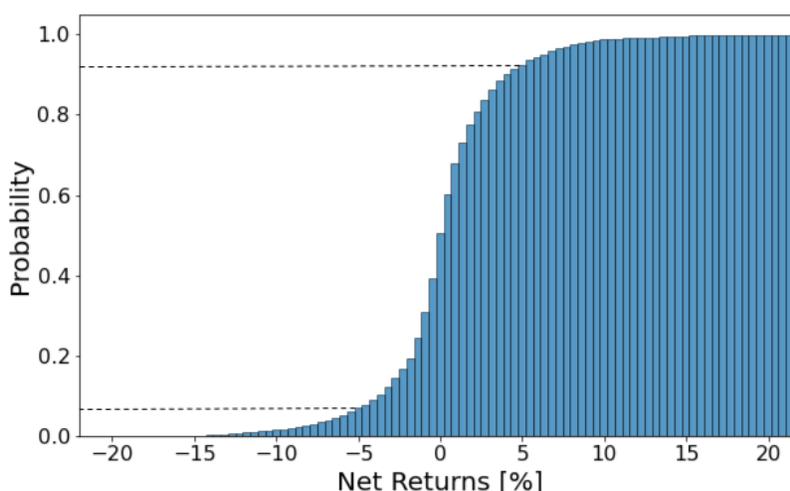
Data-Driven Insight

Good research requires good data. Exos supplements granular third-party market data with order book data from major exchanges collected with our own in-house data collection infrastructure. The fine level of detail in data allows the research team to create proprietary indicators of exchange activity that go beyond the typical aggregated price bars and trading volume available on the market. Book data also enables more precise analysis of execution strategy over a variety of time horizons. In addition, Exos uses its infrastructure to gather data



from alternative sources such as low-level blockchain transaction data¹¹ and chat messages from crypto discussion channels. These crypto domain-specific data sources can be useful in validating hypotheses and understanding investor behavior.

The madness of crowds creates boom and bust cycles that present strong opportunities for fast enrichment, but can also result in significant loss of capital. The Risk-Managed Bitcoin Fund strategy leverages the empirically-observed positive skewness of the BTC cumulative distribution of daily returns from May 2015 to December 2020:



The graph illustrates that the probability of a daily return below -5% is 6.5% and the probability of a daily return over 5% is 7.9%. Stated a different way, we can expect to observe a daily return of magnitude 5% or more about once a week on average.

Strategy Development

In nature, simple organisms often prove more robust over a wider range of environments than complex ones. Our approach to trading strategies draws from the same concept. As a governing principle, we favor simple strategies that perform well over a range of environments and rely heavily on our systematic development process to ensure that correlations are not spurious. The relative immaturity of the crypto markets enables the use of similar trading techniques that have historically proven successful in traditional rates and equity markets.

The strategy is fully exposed to Bitcoin (beta) when several risk-reward metrics (alphas) suggest a future rise in price. Conversely, exposure is reduced when its indicators suggest a future fall in price. It is important to understand when sentiment is reversing and to increase or mitigate exposure accordingly. There are several ways to potentially achieve risk mitigation, but our analysis has highlighted the difficulties of hedging a portfolio

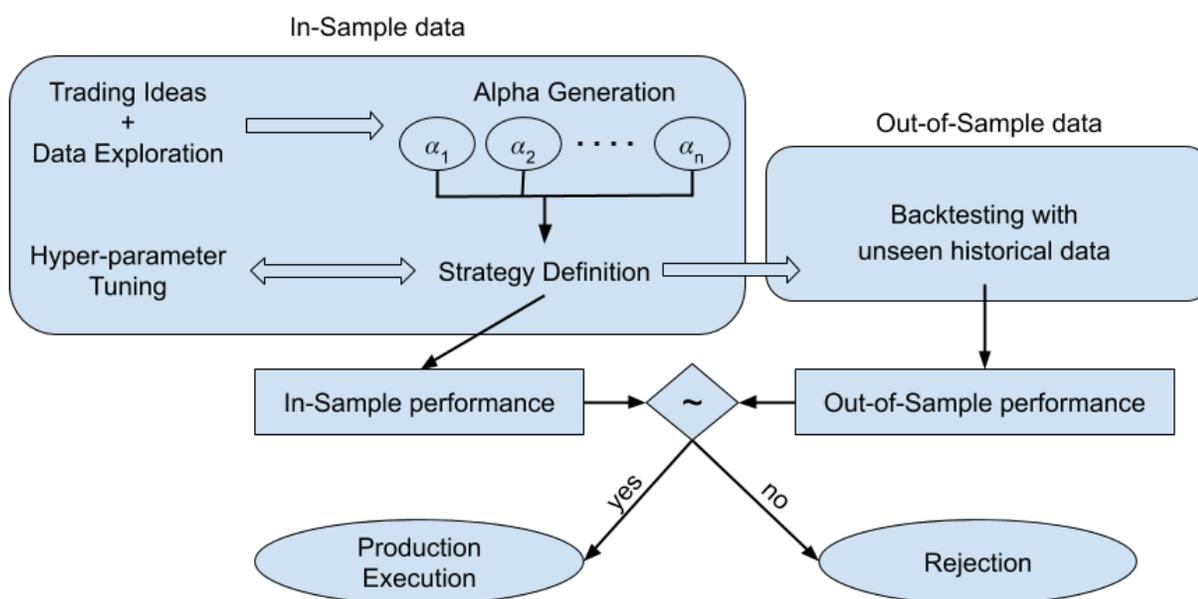
¹¹ Low-level Bitcoin blockchain data can be obtained from running a full Bitcoin “node.” A node maintains an up to date copy of the entire blockchain which includes details such as transaction fees and pending transactions. For more information visit: <https://bitcoin.org/en/full-node>



that includes Bitcoin. For example, a classical idea like mean-variance portfolio optimization¹² does not perform well in this context because of the non-stationary nature of the correlations between Bitcoin and other cryptocurrencies or traditional financial instruments. Historical data show that during bust cycles, the vast majority of cryptocurrencies tend to be correlated with Bitcoin, and that risk mitigation through diversification is a mirage of a market condition which no longer holds. Exos has developed alphas which can potentially enable us to mitigate losses during downturns without sacrificing too much of the upside potential of Bitcoin.

The paradigm - *data in, trading decision out* - is the cornerstone of our research process. Each alpha is directly computed from data with no human decision involved at any stage of the pipeline. Moreover, we strongly believe that each alpha must stand on its own and needs to provide a statistically significant edge to the main strategy in terms of information ratio. Blending individual alphas into a fully automated trading strategy can be more art than science so we lean on our trading intuition to make some decisions.

The flowchart below outlines our strategy development process. Extensive data exploration allows us to highlight market inefficiencies and generate trading signals (alphas) that can be blended together into a more complex trading strategy. Trade ideas generally originate from intuitions that are supported by quantifiable observations in the data.



In the final step of the in-sample process, we explore the hyper-parameter space by extensive in-sample backtests and select the values that optimize performance metrics such as Sharpe ratio and maximum drawdown, to name a few. We also check for stability and consistency of the results through sensitivity analysis of the hyper-parameters.

¹² Mean-variance portfolio optimization is a method of portfolio construction that seeks to maximize risk-adjusted returns by selecting the optimal portfolio weight of an asset by weighing its risk (variance) against its return (expected value, or mean).



The dangers of backtest overfitting cannot be overstated, and at Exos we take these risks very seriously. We are extremely parsimonious when testing alphas with out-of-sample data. We eschew from a fast and repetitive cycle of in-sample fitting and out-of-sample testing since bias can potentially be introduced with knowledge of the out-of-sample test results.

Alphas selected for out-of-sample backtesting must deliver a statistically significant performance and be robust to hyper-parameter perturbations. If these criteria are met, the strategy is promoted to out-of-sample backtesting to determine whether it will ultimately be added to our portfolio. Trivially, even from a large number of potential portfolio strategies, we can find statistically significant winners that survive out-of-sample testing yet do not provide the portfolio significant additional risk-adjusted performance. The Exos team also assumes, as is the case historically, that alphas have a tendency to decay over time and ongoing research is required to maintain and improve overall model performance.

Strategy Deployment and Monitoring

When strategies are deployed to production, they are deployed into Exos' custom cloud-based infrastructure. Given the 24/7 nature of the cryptocurrency market, it is imperative to ensure that deployed strategies run reliably in production. Exos primarily relies on its own data pipeline which collects data directly from the relevant exchanges. In addition, real-time data feeds from third party distributors ensure redundancy.

The Exos infrastructure allows for the creation of custom dashboards to monitor strategies and related metrics in real-time. Below is such an example:¹³



If there is a change in market conditions or a strategy signals an imminent trade, the team is alerted automatically by the system. The dashboards also allow the team to evaluate the performance of the strategies or areas of interest that might warrant further study.

¹³ This particular dashboard has been obfuscated slightly to protect proprietary strategy information.



Strategy Performance

Since the Fund benchmark is the return of Bitcoin, the amount of alpha added is sensitive to the prevailing price of Bitcoin at time of entry, particularly in the short term. Much of the strategy alpha, according to our backtests, has been shown to be generated through tactical risk reduction to avoid losses during market downturns. While boom and bust cycles tend to cancel out over time, this benchmarking effect can influence short-term returns.

The Fund strategy may not always show an immediate advantage over a passive buy-and-hold strategy, but the backtest analysis has shown outperformance over time, fairly independent of entry point. While past performance is never a guarantee of future results, we believe the results of our backtests are supportive of our process.



Disclosures

These materials are based on current data and historical trends and from sources believed to be reliable. The performance of the asset class is subject to inherent risks and uncertainties, some of which are described below. Nothing contained in this material is, or should be, relied upon as a representation as to past or future performance of Bitcoin, and no assurance, promise, or representation can be made as to actual returns. Actual results could be impacted by future events which cannot be predicted or controlled. These materials are valid only for the purpose stated herein and as of the date of such materials. No obligation is assumed to revise this report to reflect changes, events or conditions, which occur subsequent to the date hereof.

These materials do not represent investment advice, nor does it constitute an offer to purchase interests in Bitcoin or in any Funds investing in Bitcoin. Such an offer may only be made to qualifying investors pursuant to a Private Placement Memorandum and upon completion of a Subscription Agreement in form and substance satisfactory to the Fund's Administrator.

There is no guarantee that any targets, trends or projections contained herein will be met, and the contents of this material should not be unduly relied upon. This material is not meant to be, nor shall it be construed as, an attempt to define all terms and conditions of any transaction or to contain all information that is or may be material to an investor. Neither Exos Securities LLC nor Morgan Creek Capital Management, LLC (or their respective affiliates) is soliciting any action based upon this material, and this material is not meant to be, nor shall it be construed as, an offer or solicitation of an offer for the purchase or sale of any security or advisory or other service. If in the future any security or service is offered or sold, such offer or solicitation shall be made exclusively to qualified purchasers in a private offering exempt from registration under all applicable securities and other laws, and a decision to invest therein and sale thereof should be made solely on the basis of a definitive disclosure document. Any such disclosure document shall contain material information not contained herein, and shall supplement, amend, and/or supersede in its entirety the information referred to herein.

Digital Assets such as Bitcoin were introduced within the past decade and, as a result, the medium to long-term value of Bitcoin is uncertain. Its value could ultimately be subject to a number of factors relating to the capabilities and development of blockchain technologies, which are also uncertain. Additional risks of investing in Bitcoin or in any Fund investing in Bitcoin shall be included in the Confidential Private Offering Memorandum. The allocation of capital to only one asset – Bitcoin - could increase the risk of investing in Bitcoin or in any Fund investing in Bitcoin due to a lack of diversification in the portfolio.

Prospective Limited Partners should consider the Partnership to be a speculative investment, as it is not intended to be a complete investment program. The Partnership is designed only for sophisticated persons who are able to bear the risk of the loss of their entire investment in the Partnership. Prospective Limited Partners should carefully evaluate the risks described below before making an investment in the Partnership. The Partnership's investment program entails substantial risks and there can be no assurance that its investment objectives will be achieved. The practices of Bitcoin investing, and other investment techniques employed by the Sub-Adviser can, in certain circumstances, maximize the adverse impact to which the Partnership's investment portfolio may be subject. Moreover, the Partnership's investment portfolio will be concentrated in Bitcoin and its returns may vary substantially from period to period.

Bitcoin and Digital Assets Risks - Digital assets such as Bitcoin were only introduced within the past decade, and the medium-to-long term value of the Partnership is subject to a number of factors relating to the capabilities and development of blockchain technologies, such as the infancy of their development, their dependence on the internet and other technologies, their dependence on the role played by miners and developers and the potential for malicious activity.



Bitcoin, cryptocurrencies and other digital assets are loosely regulated and there is no central marketplace for currency exchange. Supply is determined by cryptography, not by a central bank, and prices have been extremely volatile. Digital asset exchanges have been closed due to fraud, failure or security breaches. Any of the Partnership's funds that reside on an exchange that shuts down may be lost.

Bitcoin Network Risk- The cryptography underlying Bitcoin could prove to be flawed or ineffective, or developments in mathematics and/or technology could result in such cryptography becoming ineffective. In any of these circumstances, a malicious actor may be able to take the Partnership's Bitcoin, which would adversely affect the value of the Partnership.

Malicious Actor Risk- If a malicious actor or botnet obtains a majority of the processing power dedicated to mining on the Bitcoin Network, it may be able to alter the Blockchain on which transactions in Bitcoin rely.

Bitcoin Exchange Risk- Negative perception, a lack of stability in the Bitcoin markets and the closure or temporary shutdown of Bitcoin Exchanges due to fraud, business failure, hackers or malware, or government-mandated regulation may reduce confidence in the Bitcoin Network and result in greater volatility in the prices of Bitcoin. Furthermore, the closure or temporary shutdown of a Bitcoin exchange used in calculating the Bitcoin Index Price may result in a loss of confidence in the Partnership's ability to determine its Bitcoin holdings on a daily basis. These potential consequences of such a Bitcoin exchange's failure could adversely affect the value of the Partnership.

Irrevocable Transaction Risk- Bitcoin transactions are typically not reversible without the consent and active participation of the recipient of the transaction. Once a transaction has been verified and recorded in a block that is added to the Blockchain, an incorrect transfer or theft of Bitcoin generally will not be reversible and the Trust may not be capable of seeking compensation for any such transfer or theft. To the extent that the Partnership is unable to seek redress for such error or theft, such loss could adversely affect the value of the Partnership.

Regulatory Change Risk- Ongoing and future regulatory actions with respect to digital assets generally or Bitcoin in particular may alter, perhaps to a materially adverse extent, the nature of an investment in the Shares or the ability of the Trust to continue to operate.

Custodian Risks- The Custodian of the Fund protects the Fund's private keys. If there are breaches to the custodian's securities procedures or collusive fraudulent conduct by employees of the Custodian, the security of the Bitcoin held by the fund could be compromised.

Tax Risks- Due to the new and evolving nature of digital currencies and the absence of comprehensive guidance with respect to digital currencies, many significant aspects of the U.S. federal income tax treatment of digital currency are uncertain, and the Partnership does not intend to request a ruling from the IRS on these issues.

Liquidity Risks- There can be no assurance that a secondary market for Digital Assets will provide the Partnership with liquidity of investment. Such restrictions on liquidation may restrict the Partnership's ability to liquidate such Digital Assets.

Futures Contracts- The Partnership may engage in futures contracts based on Bitcoin. The use of futures contracts will have the economic effect of financial leverage. Financial leverage magnifies exposure to the swings in prices of an asset class underlying an investment and results in increased volatility, which means the Partnership will have the potential for greater losses than if the Partnership did not employ leverage in its investment activity.



Development and Risks of the Sub-Adviser’s Trading Strategy- The development of a trading strategy is a continuous process and the Sub-Adviser’s trading strategy and methods including those to make Bitcoin investments may therefore be modified from time to time. There is no guarantee that the strategies or methods utilized by the Sub-Adviser will result in profitable trading for the Partnership.

Risk of Default or Bankruptcy of Third Parties- The Partnership may engage in transactions in securities and financial instruments that involve counterparties. The Partnership could suffer losses if a counterparty to a transaction were to default or if the market for certain securities and/or financial instruments were to become illiquid. In addition, the Partnership could suffer losses if there were a default or bankruptcy by certain other third parties, including brokerage firms and banks with which the Partnership does business, or to which securities have been entrusted for custodial purposes.