

# CRYPTOCURRENCY QUANTILE TRADING ON VOLATILITY, NLP, AND SOPR

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# STRATEGY AND INVESTMENT UNIVERSE

# STRATEGY OUTLINE

- Our strategy will exploit a combination of traditional and crypto-specific indicators
- The trading signals will be generated from volatility models, technical analysis, natural language processing and crypto currency-specific indicators called UTXO and SOPR
- Cryptocurrency have high volatility and asset appreciation which make translates to high risk but very high return opportunities
- The strategy will be based on a daily review of buy, sell and hold signals on 12 cryptocurrencies

	Mean	Sharpe
<b>SPX</b>	12.20%	0.68
<b>VIX</b>	99.21%	0.69
<b>SVXY</b>	16.44%	0.26
<b>BTC-USD</b>	95.57%	1.28
<b>ADA-USD</b>	173.76%	1.15
<b>ETH-USD</b>	99.92%	1.02
<b>SOL-USD</b>	373.38%	2.29
<b>AVAX-USD</b>	291.56%	1.85
<b>DOT-USD</b>	223.04%	1.53
<b>MATIC-USD</b>	356.98%	2.00
<b>LTC-USD</b>	112.81%	1.00
<b>ATOM-USD</b>	149.12%	1.07
<b>LINK-USD</b>	197.69%	1.38
<b>DOGE-USD</b>	251.67%	1.11
<b>SHIB-USD</b>	1146.15%	1.99

# INVESTMENT PROCESS

- We will be focusing on the 10 largest cryptocurrencies by market cap and 2 “meme-coins” as they have accumulated significant asset appreciation
- Initial capital of USD 1M with 2x leverage finance at TED spread
- We will use Binance perpetual futures where available and CME otherwise. These futures contracts eliminate the need to roll our contracts and not worry about incurring excessive bid/offer costs
- Risk mitigation protocol utilizing SVXY ETF as a macro hedge

# DATA

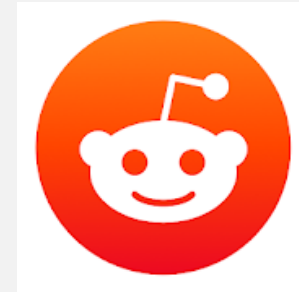
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Daily Crypto prices: Yahoo Finance 2015-2022



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12 Cryptos



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Buy 2 / Sell 2



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NLP Sentiment Analysis: Reddit

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Glassnode: UTXO and SOPR

# INVESTMENT UNIVERSE



Bitcoin (BTC)



Ethereum (ETH)



Cardano (ADA)



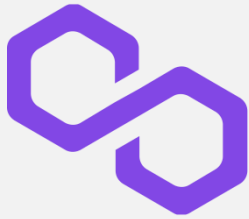
Solano (SOL)



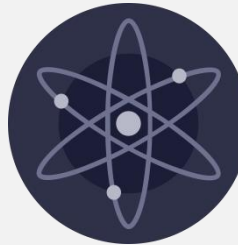
Avalanche (AVAX)



Polkadot (DOT)



Polygon (MATIC)



Cosmos (ATOM)



Litecoin (LTC)



Chainlink (LINK)



DogeCoin (DOGE)



Shiba Inu Coin (SHIB)

# EVALUATING POTENTIAL TRADES

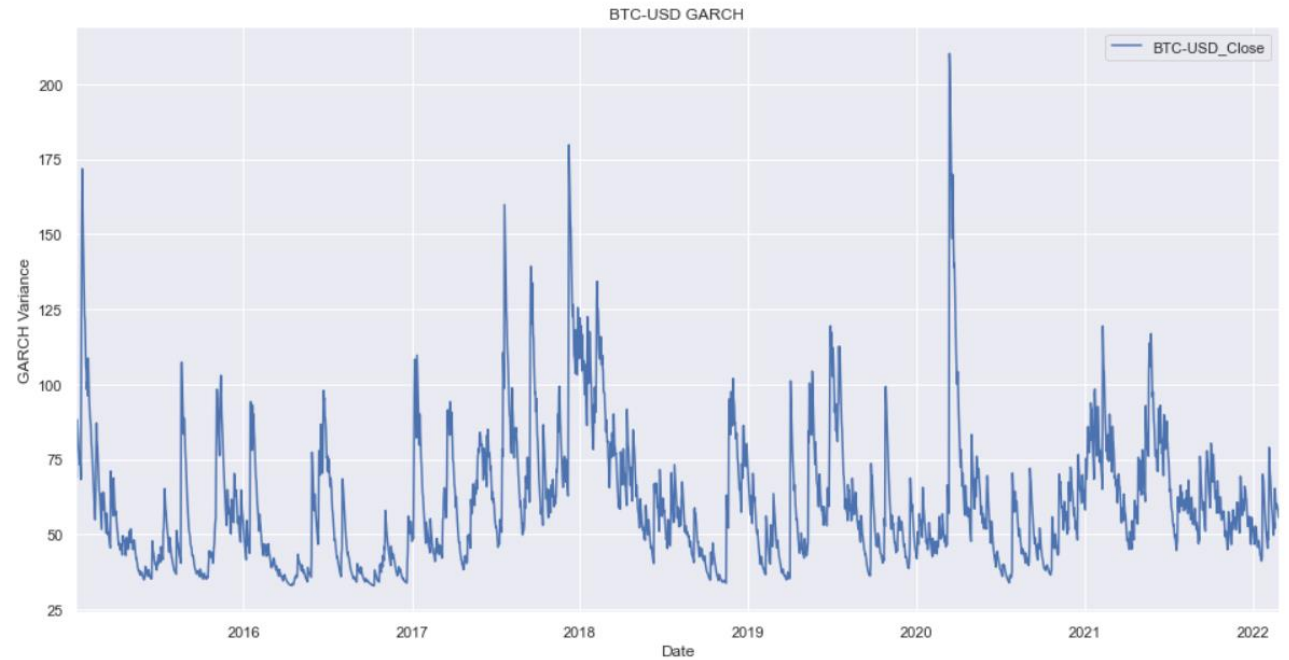


# OVERVIEW

- Our trading strategy consists of utilizing signals to determine optimum entry and exit points
- The trading signal will be constructed using volatility, NLP (sentiment scores) and UTXO and SOPR (crypto currency-specific indicators )
- The trading signal will be generated through a majority voting rule of each of the indicators mentioned above

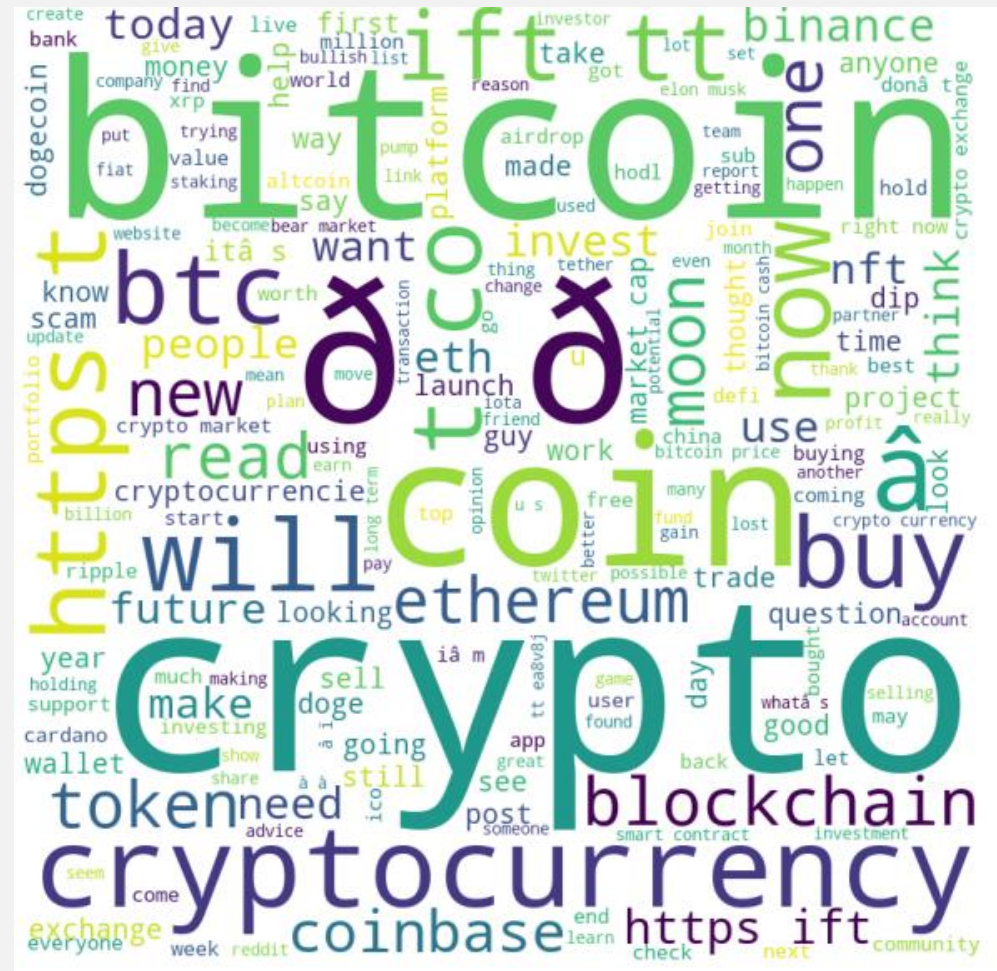
# VOLATILITY

- We estimate the volatility of each individual coin, example BTC (right) and attempt to trade based on the expected volatility
- This particular model will also allow us to estimate volatility further into the future. This volatility level can be incorporated into our risk calculations



# NLP SIGNALS

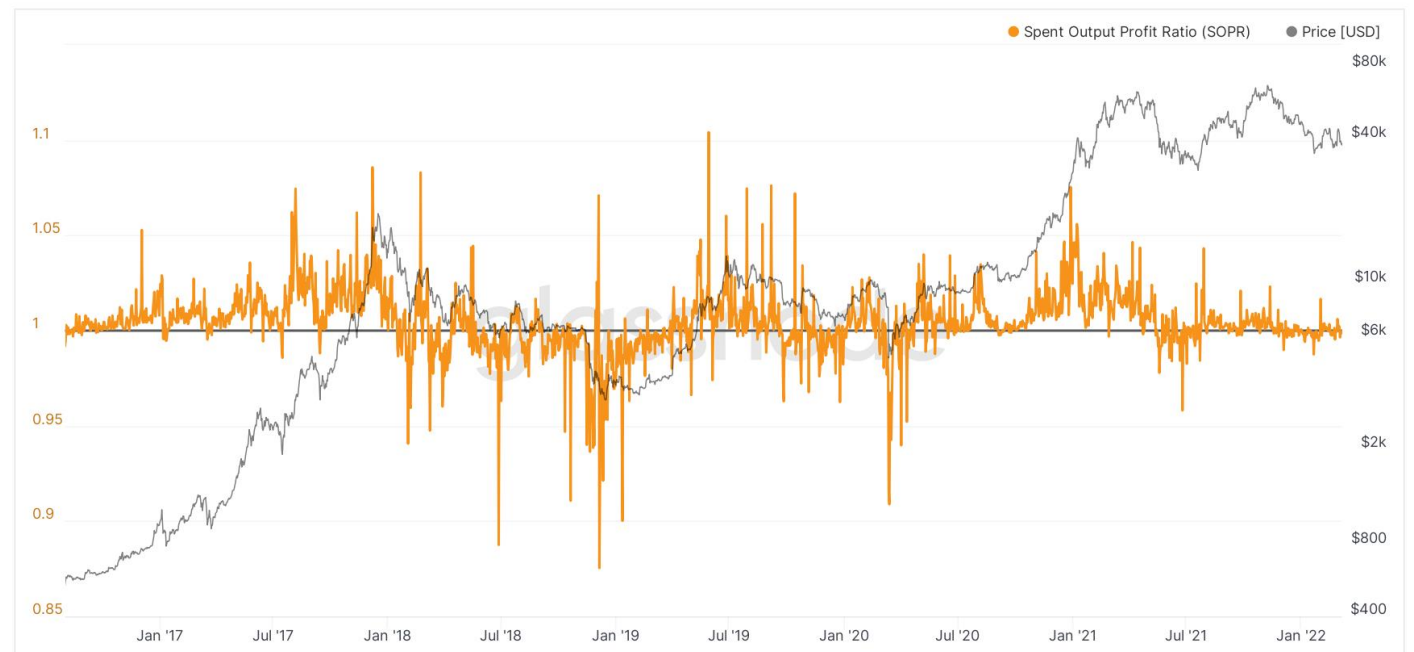
- We analyze the social media sentiment of 12 Cryptocurrencies from 2017 to 2022 for over a million posts on Reddit.
- We calculate sentiment scores based on VADER and trade based on the sentiment scores



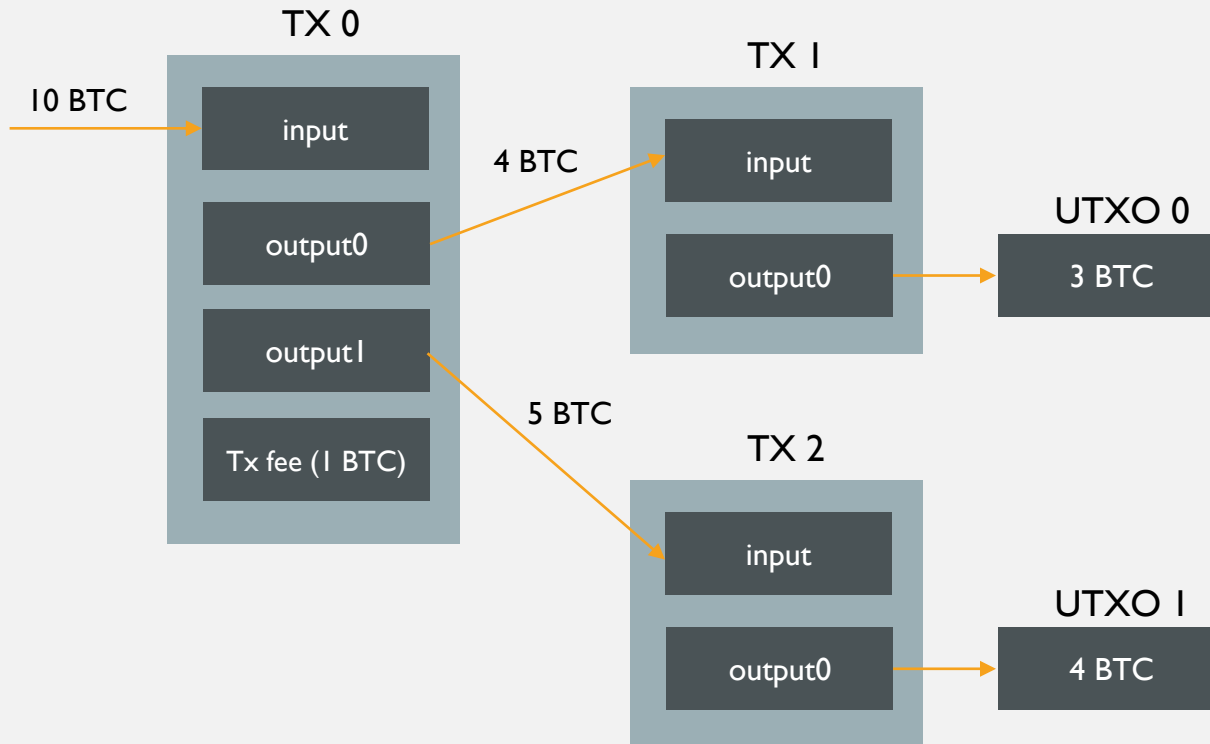
# CRYPTO- SPECIFIC SIGNALS

- We analyze what is called the “on-chain” data that are specific to crypto assets only
- Utilize the concept of Unspent Transaction Output (UTXO), we gauge overall market sentiment and predict potential short-term bottom / top
- More details in the following slides

## BTC SPEND OUTPUT PROFIT RATIO

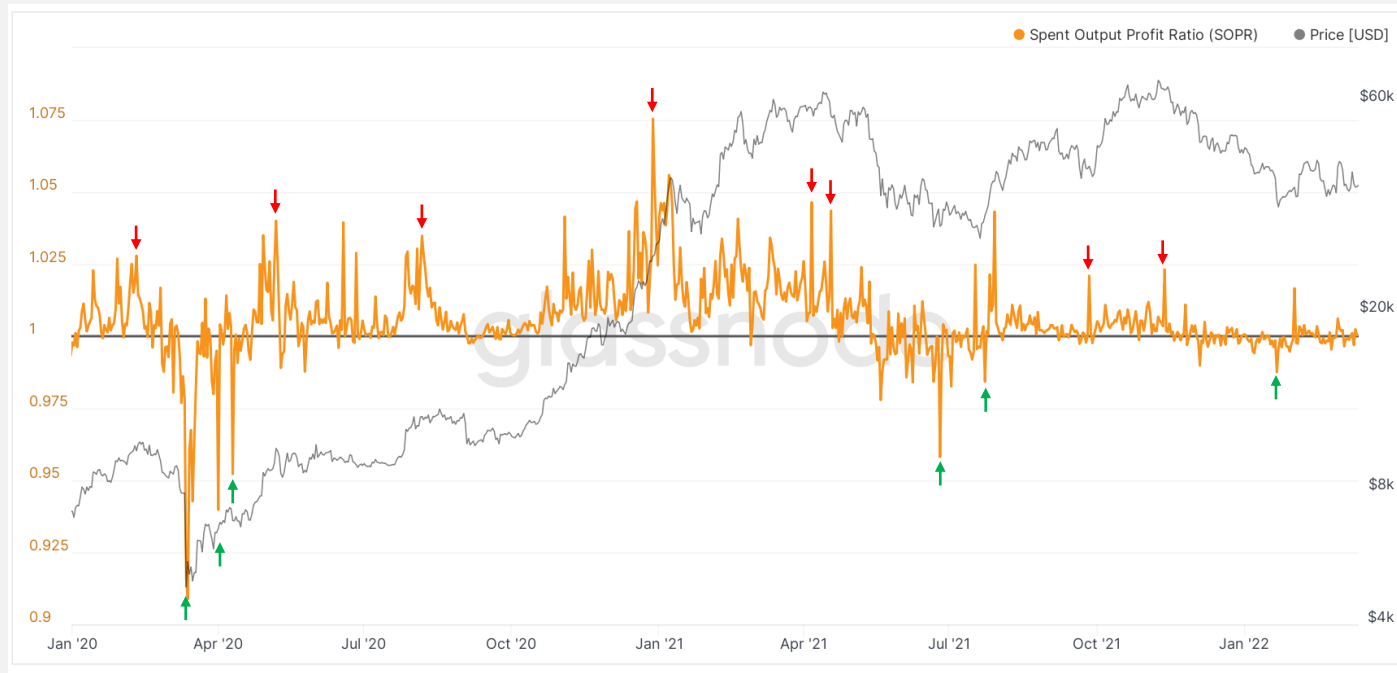


# UNSPENT TRANSACTION OUTPUT (UTXO) AND SPENT OUTPUT PROFIT RATIO (SOPR)



- Assume Tx fee = 1 BTC
- UTXOs are locked up “box” full of BTC
- When bitcoin is spent, a transaction is created that consumes some old UTXOs and creates a bunch of new UTXOs.
- Analogy: For a burger that cost \$6, you spend a \$10 bill, with a change of 4 x \$1 bill. From the burger’s shop perspective, it has \$6 of UTXO
- SOPR = by analyzing the ratio of (value of bitcoin of the UTXO when it is spent) to (value of bitcoin of the UTXO at creation), we can evaluate the overall profit ratio of the whole market participant (formula in jupyter notebook)

# USE OF SOPR WITH PRICE TREND



- Used in combination with the trend of the underlying token to predict potential change of momentum
- When  $SOPR \ll 1$ : people who are deeply out-of-the-money are cutting loss.
- If it happens during market down trend, it signals the end of selling pressure (indicated by green arrows)
- When  $SOPR \gg 1$ : people who are deeply in-the-money are taking profit
- If it happens during market up trend, it signals the beginning of a wave of selling (indicated as red arrows)

# RISK CONTROLS

- Due to the volatile nature of cryptocurrencies, risk controls will be placed to ensure a low probability of ruin
- Stop-loss points will be calculated on a rolling 5% VaR (value-at-risk) which will be based on the long run forecast from our GARCH-model (see volatility slide above)
- Position/weight limits per crypto will also be implemented to ensure sufficient diversification in the portfolio
- Out of sample back tests would be used to decide the optimal parameters for above risk controls
- A key metric would be to make sure that the drawdown of the portfolio does not exceed that of any benchmarks (BTC, BITW, etc.)

# STRATEGY COSTS



# STRATEGY COSTS

- Trading fees will be based on the fee structure provided by Binance where we will execute trades (see below)
- Spot trading fee 0.09% buy/sell crypto fee (friend referral discount)
- TED spread for borrowing rate
- Bitcoin futures trading fee of 0.036%
- Funding on margin for Bitcoin futures of 0.03%
- Our macro hedge which uses SVXY (Short VIX ETF) will incur bid-offer spread costs approx. 2bps

## Spot Trading Fee

Level	30d Trade Volume (BUSD)	and/or	BNB Balance	Maker / Taker	Maker / Taker <a href="#">BNB 25% off</a>
VIP 0	< 1,000,000 BUSD	or	≥ 0 BNB	0.1000% / 0.1000%	0.0750% / 0.0750%
VIP 1	≥ 1,000,000 BUSD	and	≥ 25 BNB	0.0900% / 0.1000%	0.0675% / 0.0750%
VIP 2	≥ 5,000,000 BUSD	and	≥ 100 BNB	0.0800% / 0.1000%	0.0600% / 0.0750%
VIP 3	≥ 20,000,000 BUSD	and	≥ 250 BNB	0.0700% / 0.1000%	0.0525% / 0.0750%
VIP 4	≥ 120,000,000 BUSD	and	≥ 500 BNB	0.0700% / 0.0900%	0.0525% / 0.0675%

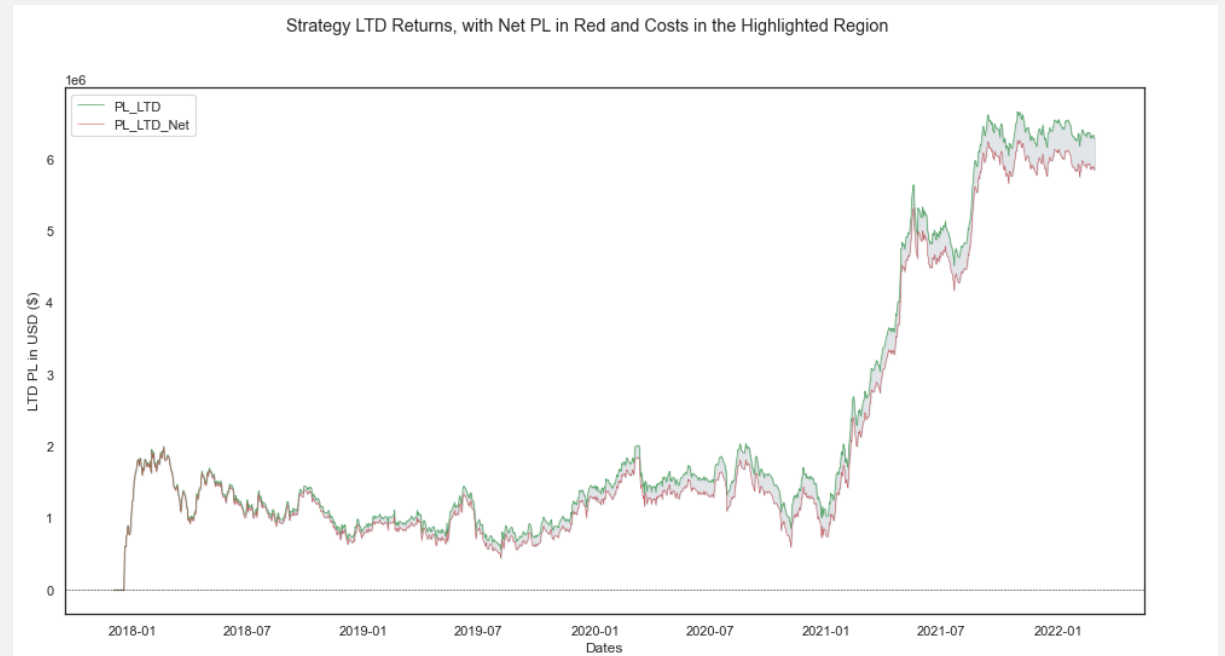
## Futures Trading Fee

Level	30d Trade Volume (BUSD)	and/or	BNB Balance	USDT Maker / Taker	USDT Maker/Taker <a href="#">BNB 10% off</a>	BUSD Maker / Taker	BUSD Maker/Taker <a href="#">BNB 10% off</a>
VIP 0	< 15,000,000 BUSD	or	≥ 0 BNB	0.0200%/0.0400%	0.0180%/0.0360%	-0.0100%/0.0230%	-0.0100%/0.0207%
VIP 1	≥ 15,000,000 BUSD	and	≥ 25 BNB	0.0160%/0.0400%	0.0144%/0.0360%	-0.0100%/0.0230%	-0.0100%/0.0207%
VIP 2	≥ 50,000,000 BUSD	and	≥ 100 BNB	0.0140%/0.0350%	0.0126%/0.0315%	-0.0100%/0.0230%	-0.0100%/0.0207%
VIP 3	≥ 100,000,000 BUSD	and	≥ 250 BNB	0.0120%/0.0320%	0.0108%/0.0288%	-0.0100%/0.0230%	-0.0100%/0.0207%

STRATEGY P&L

# STRATEGY RETURNS

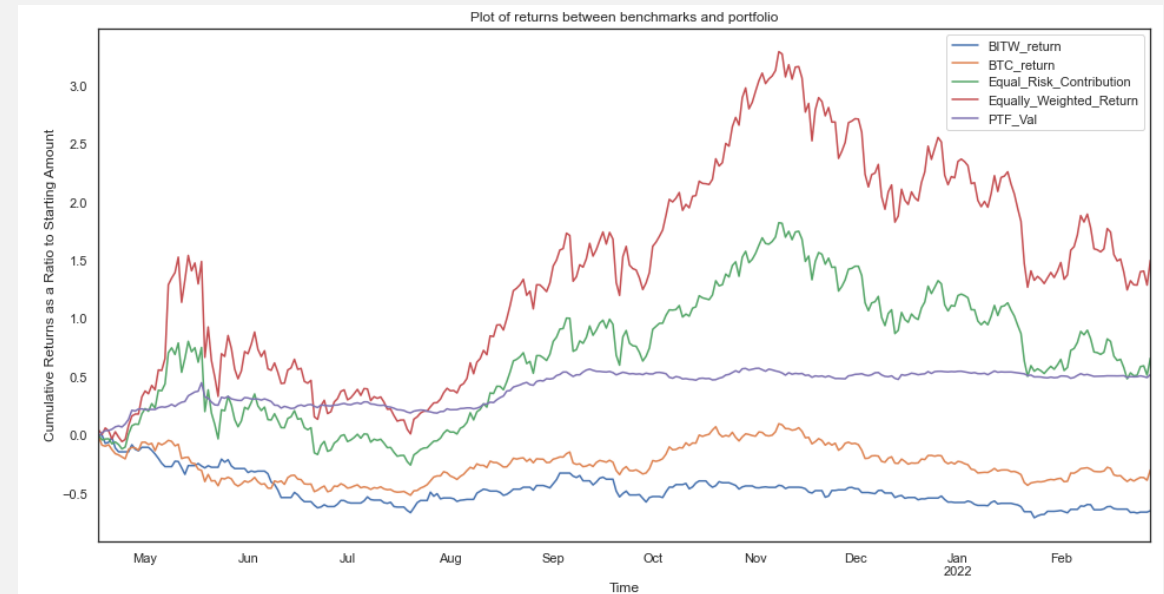
- Dec 2017 – Feb 2022
- Annualized return: 40.17%<sup>†</sup>
- Annualized standard deviation of return: 38.09%
- Sharpe ratio: 1.05
- VaR(5%): 2.53%
- Skewness: 2.26



<sup>†</sup>Past returns are not indicative of future returns

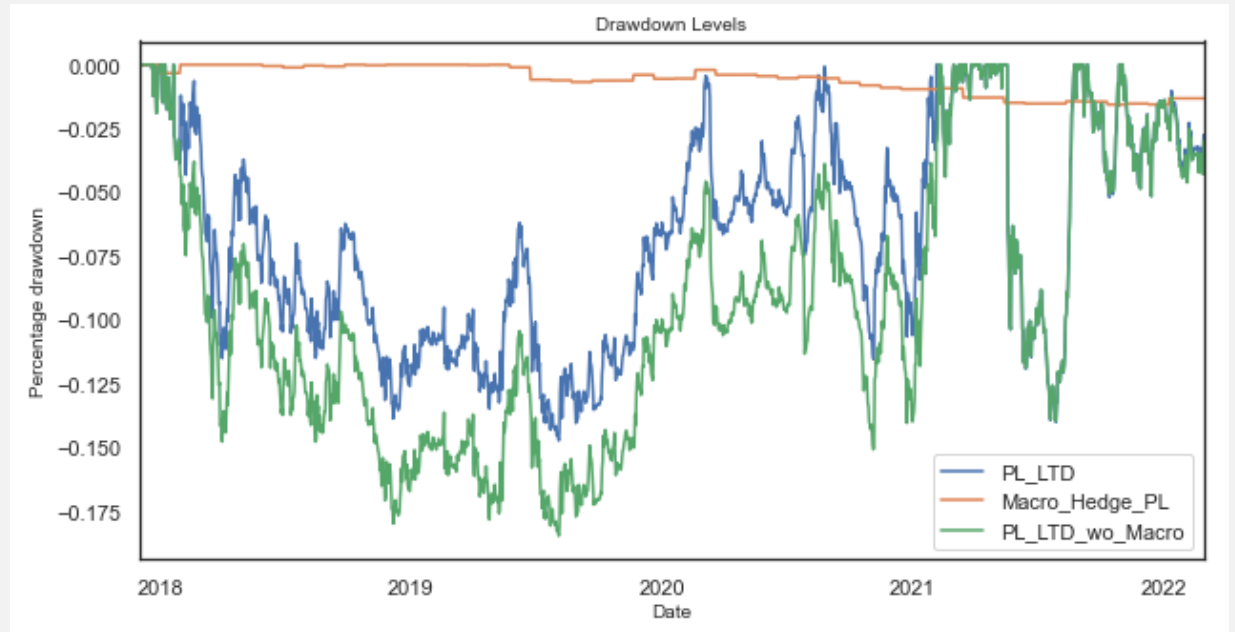
# STRATEGY RETURNS VS BENCHMARK

- Benchmarks used:
  - Equally weighted portfolio  $\frac{1}{N}$  in each asset
  - Equal risk contribution: allocate equal amounts of risk in each asset,  $\frac{1}{N}$  approach but from a risk point of view
  - BITW: An index fund that tracks the top 10 cryptocurrencies by market cap
  - BTC: Bitcoin
- PTF\_Val: Strategy Returns
- For the period from 2021 to February 2022 where we have data on BITW, BTC, and the portfolio, we can see that our strategy outperforms both BTC and BITW. Its return is on par with an equal risk contribution portfolio but underperforms the equally weighted portfolio.



# STRATEGY RETURNS VS BENCHMARK

- Sharpe ratio ~1.05: We find that our strategy has less risk in relation to both benchmarks and comparable portfolios
- Max drawdown of strategy is c.15%
- Our strategy's VaR at the 5% level is c.2.5% which is only a third of the size of other benchmarks/portfolios
- Our strategy exhibits lower average returns but infrequent high returns. (Positive skew and excess kurtosis)



	Mean	Vol	Sharpe	VaR (0.05)	Min	Max	Expected_Shortfall (5%)	Skewness	Excess Kurtosis
BITW_return	0.723470	1.388374	0.521092	-0.083139	-0.330983	0.705644	-0.134850	3.163588	28.576701
BTC_return	0.878615	0.743216	1.182180	-0.060092	-0.371695	0.252472	-0.090427	-0.133973	7.224920
Equal_Risk_Contribution	1.145932	1.049488	1.091896	-0.080805	-0.314075	0.257894	-0.127663	-0.438381	5.292984
Equally_Weighted_Return	1.716654	1.150951	1.491509	-0.083433	-0.330528	0.382018	-0.131532	0.253742	8.609156
PTF_Val	0.401699	0.380894	1.054620	-0.025303	-0.089740	0.278811	-0.039208	2.256085	27.287341

# FUND MANAGERS

RICHMOND FRANKENBERGER graduated as a Dean's List from the Waseda University in 2014 with a Bachelor in Liberal Arts. He is currently completing a Master of Science in Financial Mathematics at the University of Chicago. Prior to starting at the University of Chicago, Richmond was an Associate in Japan at Goldman Sachs. He has 7 years of industry experience in product control role with practical knowledge across various financial products and markets. Richmond is deeply interested in Quantitative Trading, Quantitative Strategies, Portfolio Management and sees Chicago as a great place to progress his career.

CHENG HSUAN CHAING graduated as a Dean's List from the Nation Taiwan University in 2013 with a Bachelor in Business Administration. He is currently completing a Master of Science in Financial Mathematics at the University of Chicago. Prior to starting at the University of Chicago, Cheng was an Economist in Taiwan at Cathay Financial Holdings. He has 6 years of research experience in emerging market economics across fixed income, equity and FX. Cheng is deeply interested in Quantitative Research and sees Chicago as a great place to progress his career.

DEVIN KANDAGE, CFA, CQF graduated as First Class Honours from the University of London in 2019 with a Bachelor of Science in Economics and Finance. He is currently completing a Master of Science in Financial Mathematics at the University of Chicago. Prior to starting at the University of Chicago, Devin was a Senior Associate at Moody's Analytics Knowledge Services. He has 4 years of industry experience as a key member of the model risk management team. Devin is deeply interested in Quantitative Trading, Quantitative Strategies, Portfolio Management and sees Chicago as a great place to progress his career.

VICTOR WONG graduated as a First-Class Honors from the Hong Kong University of Science and Technology in 2016 with a Bachelor in Global Business, and in Finance. He is currently completing a Master of Science in Computer Science at the University of Chicago. Prior to starting at the University of Chicago, Victor was a Trader/Assistant Portfolio Manager in Hong Kong at Pollock Asset Management, a quantitative credit fund with focus in Asian High Yield. He has also worked as an Assistant Trader at Kadensa Capital, a fundamental long-short equity hedge fund. Victor is deeply interested in quant research and sees Chicago as a great place to progress his career.

For additional information please contact Fiji Water Partners on 1-800-800-0000

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