Trading Regime Shifts: Identifying Breakouts with Order Flow Pressure Signals.

Paul de Fressenel, Quantitative Researcher Intern
Edo Theory

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Motivation

- Price breakouts can mark regime shifts but generate many false positives in crypto's noisy order-books.
- A simultaneous **volume spike** confirms genuine order-flow pressure and "breakout with conviction".

Objective

- Identify price breakouts confirmed by a simultaneous surge in trading volume, signalling genuine order-flow momentum rather than random noise.
  We test this dual-filter on eight large-cap coins: ADA, AVAX, BTC, BNB, DOGE, ETH, SOL, XRP.

Strategy Specification

1st Indicator: Max-High Breakout.

$$M_{i,t}^{(W)} = \max_{0 \le k < W} H_{i,t-k}, \qquad W = 30.$$

$$\text{Breakout}_{i,t} = \begin{cases} 1, & H_{i,t} > M_{i,t-d}^{(W)}, \\ 0, & \text{otherwise.} \end{cases} \qquad d = \text{shift}.$$

2nd Indicator: Volume Spike.

$$\bar{V}_{i,t}^{(W)} = \frac{1}{W} \sum_{k=0}^{W-1} V_{i,t-k},$$

$$\text{VolSpike}_{i,t} = \begin{cases} 1, & O_{i,t} > \kappa \, \bar{V}_{i,t-d}^{(W)}, \\ 0, & \text{otherwise,} \end{cases} \qquad \kappa = \text{volume multiplier}.$$

Strategy Specification

Entry Signal.

$$\text{Entry}_{i,t} = \text{Breakout}_{i,t} \times \text{VolSpike}_{i,t}.$$

Exit Signal

- We exit positions using stop loss and take profit. We have, given a `stop_loss_pct` of δ and `take_profit_pct` of τ:

$$\text{Take Profit: } O_{i,t} \geq P_i^{\text{ent}}(1+\tau)$$

$$\text{Stop Loss: } O_{i,t} \leq P_i^{\text{ent}}(1-\delta)$$

- P_i^{ent} is the open price of the coin $O_{i,t}$ when entering position.

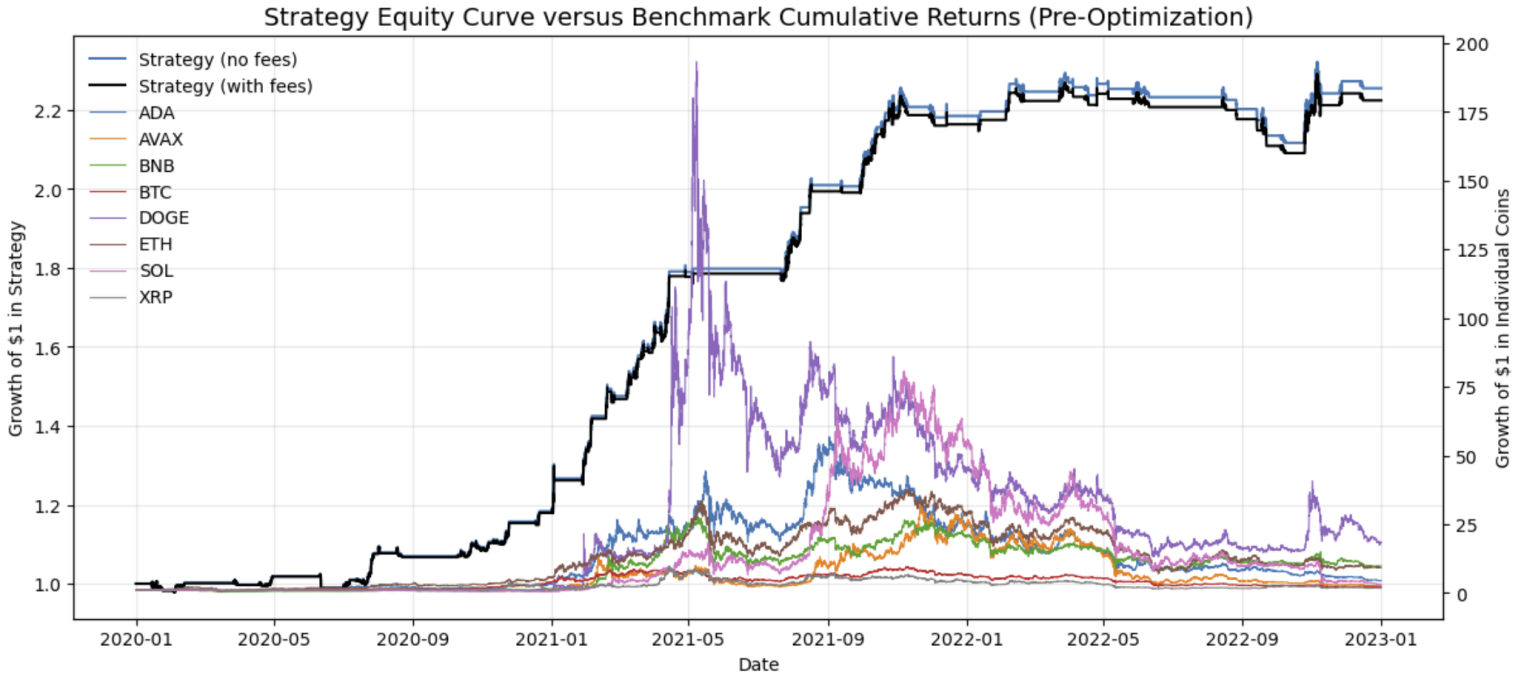
Position Sizing

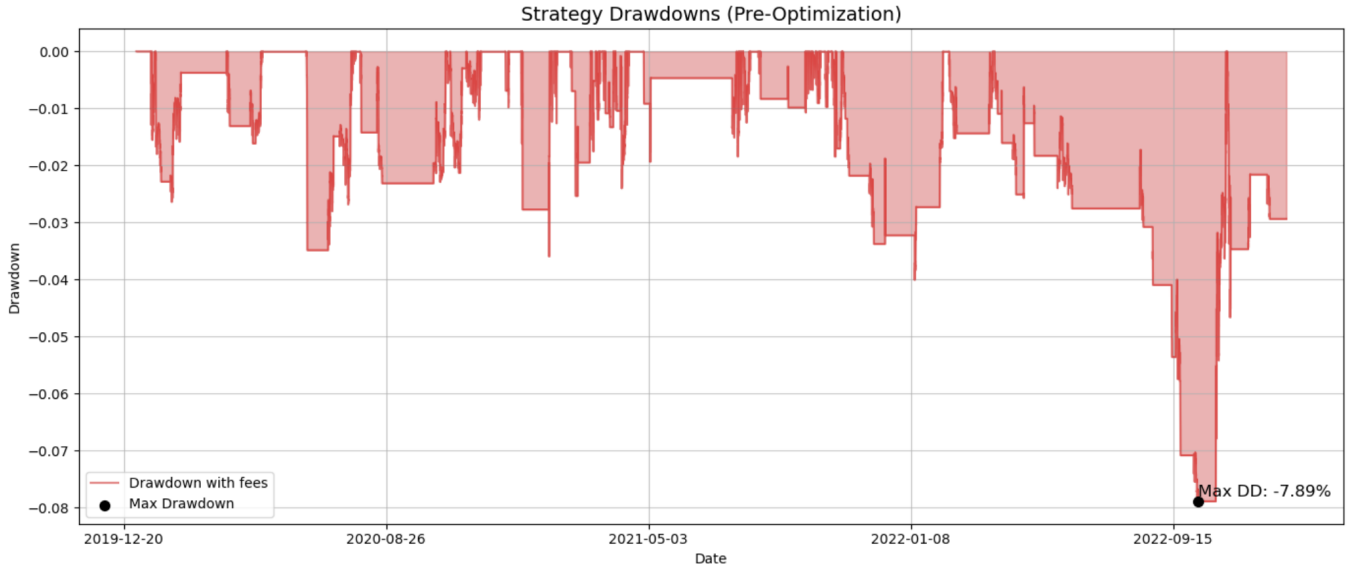
- Portfolio weight for each active coin: $w_{i,t} = \frac{\text{Signal}_{i,t}}{\#\{\text{active coins}\}}$.

Parameter Summary

Parameter	Symbol	Value
Rolling window	W	30 periods
Signal delay	d	4 period
Volume multiplier	κ	1.5
Take-profit	τ	10 %
Stop-loss	δ	5 %

Training Set Performance (1 Jan 2020 - 31 Dec 2022)

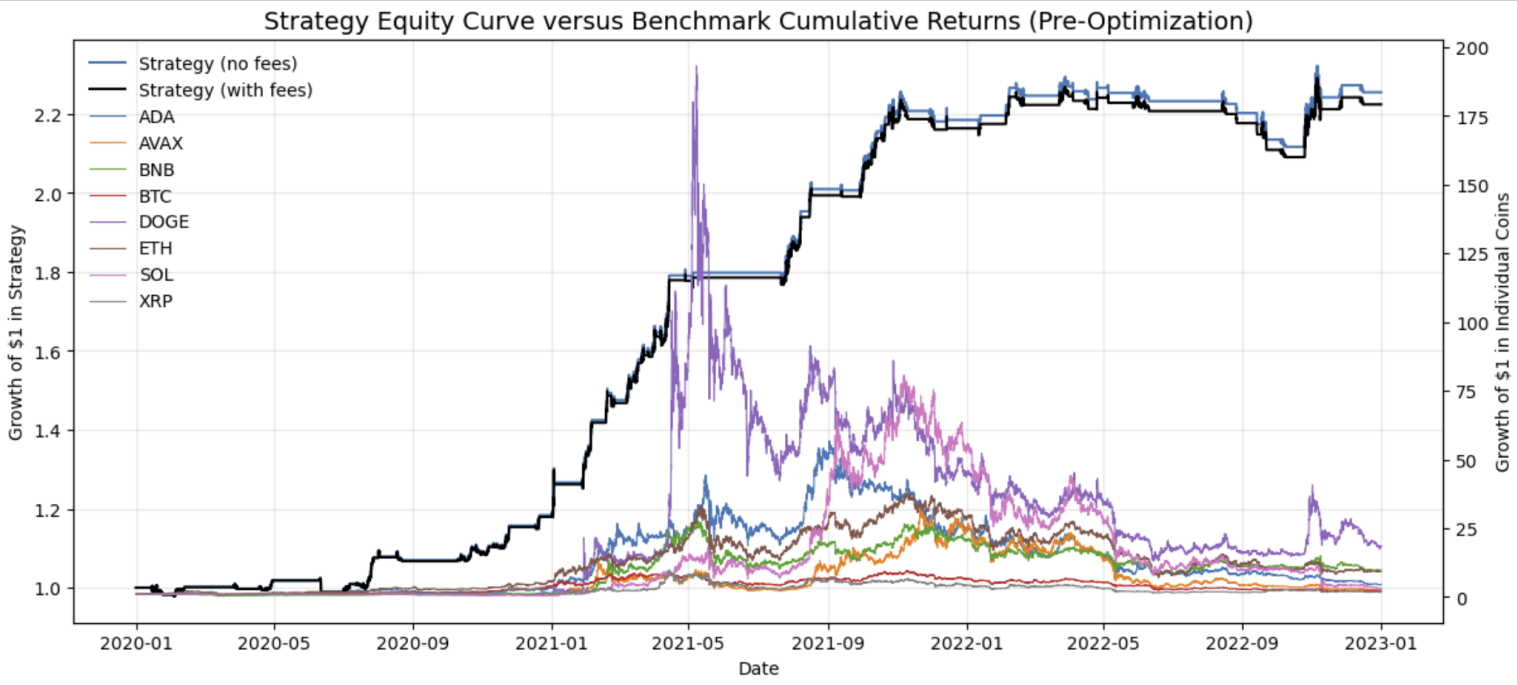


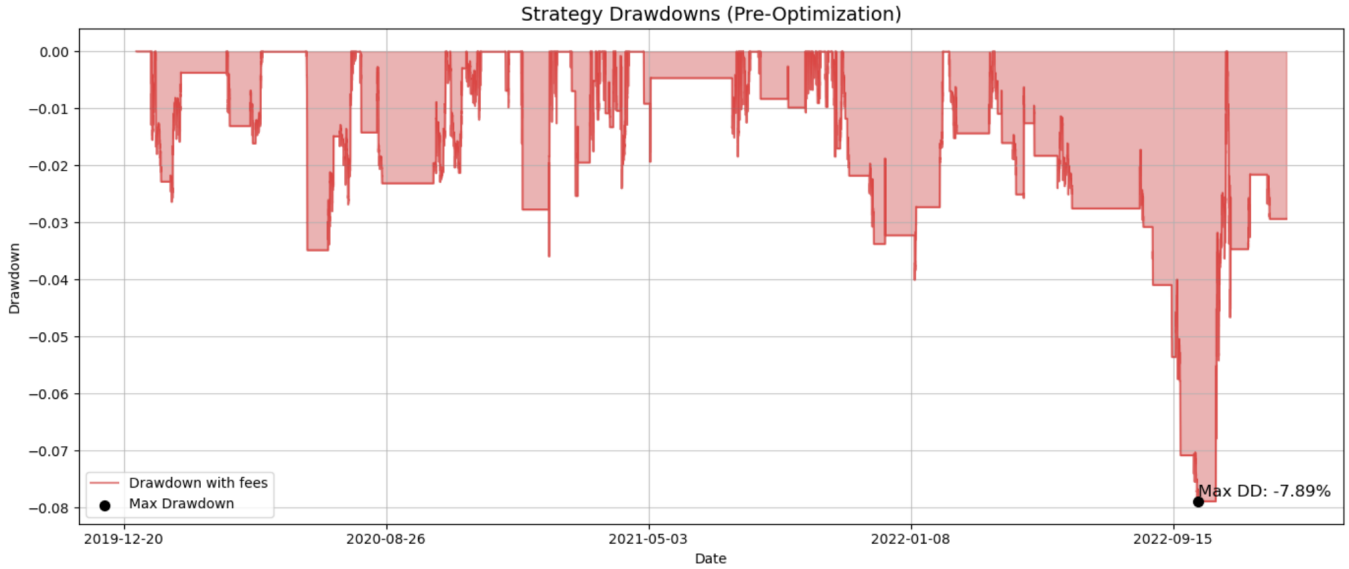


Performance Metrics

Metric	Value
Annualized Return	0.33
Annualized Volatility	0.09
Sharpe Ratio	2.88
Sortino Ratio	2.75
Maximum Drawdown	-0.07
Winning Rate	0.11
Average Holding Period	31 periods
Number of Trades	228

Validation Set Performance (1 Jan 2023 - 31 Dec 2023)





Performance Metrics

Metric	Value
Annualized Return	0.22
Annualized Volatility	0.11
Sharpe Ratio	1.82
Sortino Ratio	1.70
Maximum Drawdown	-0.07
Winning Rate	0.28
Average Holding Period	68 periods
Number of Trades	122