

DYDX Pairs Trading Bot Build With Python

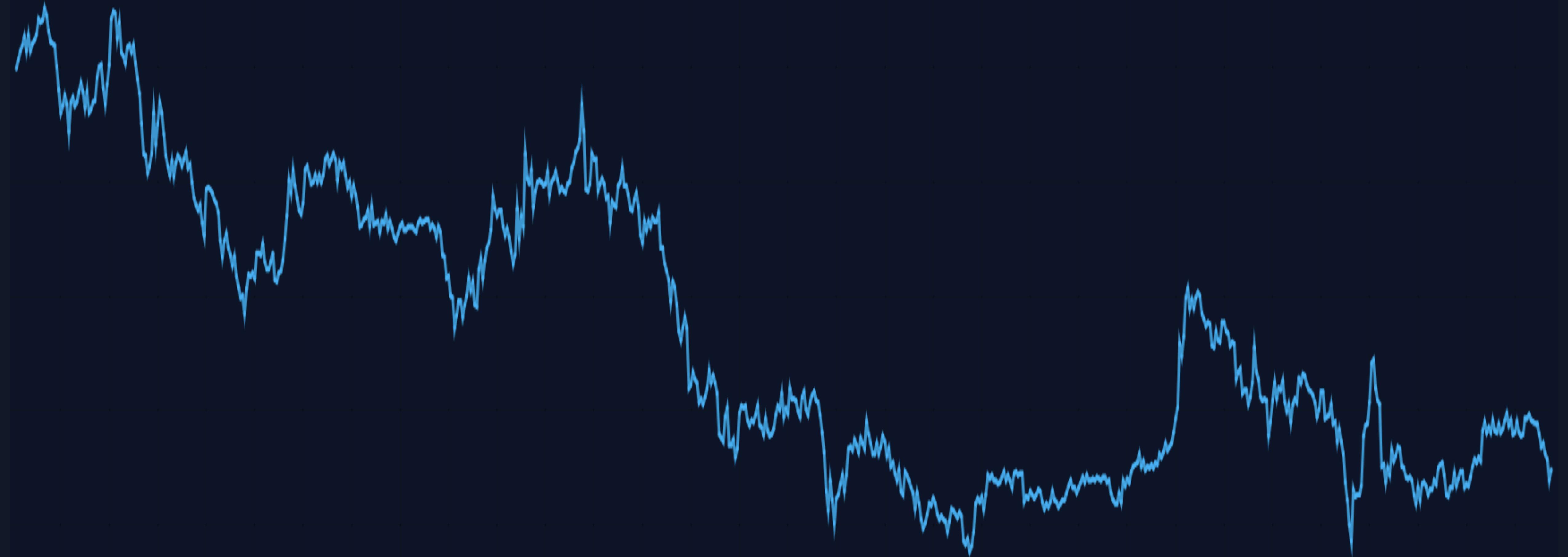
Featuring Messaging and Cloud Hosting



CryptoWizards.net



QNT-USDT





XRP-USDT



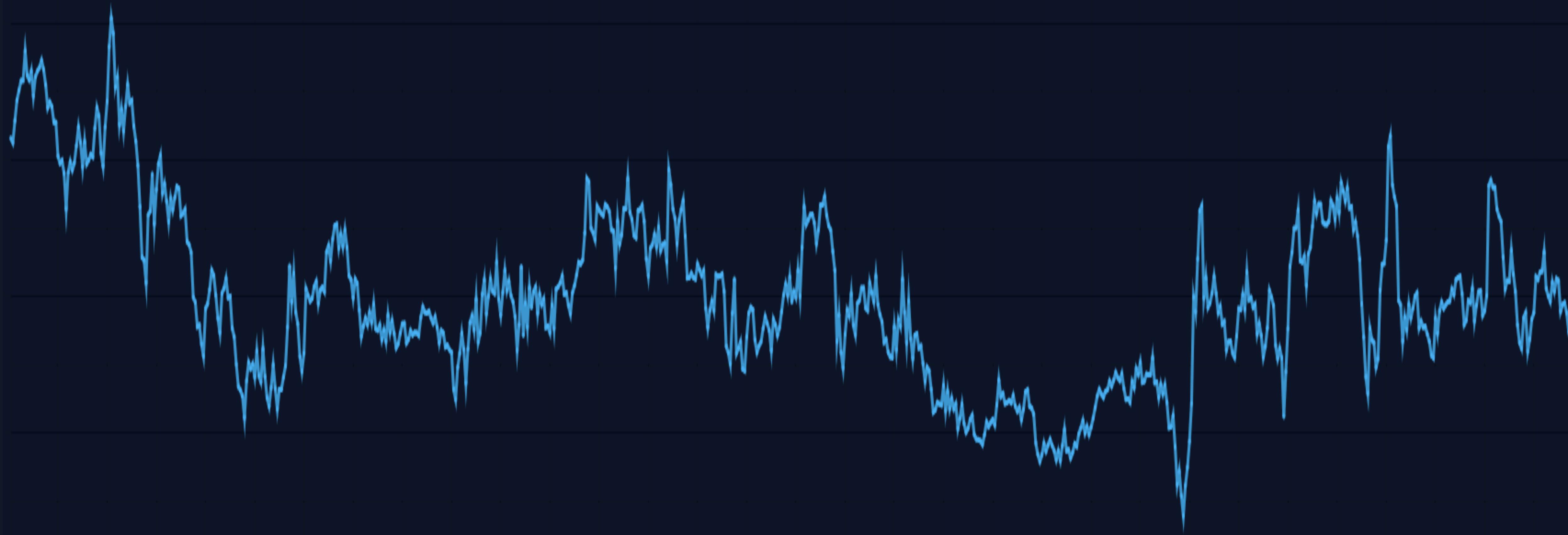


QNT-USDT vs XRP-USDT



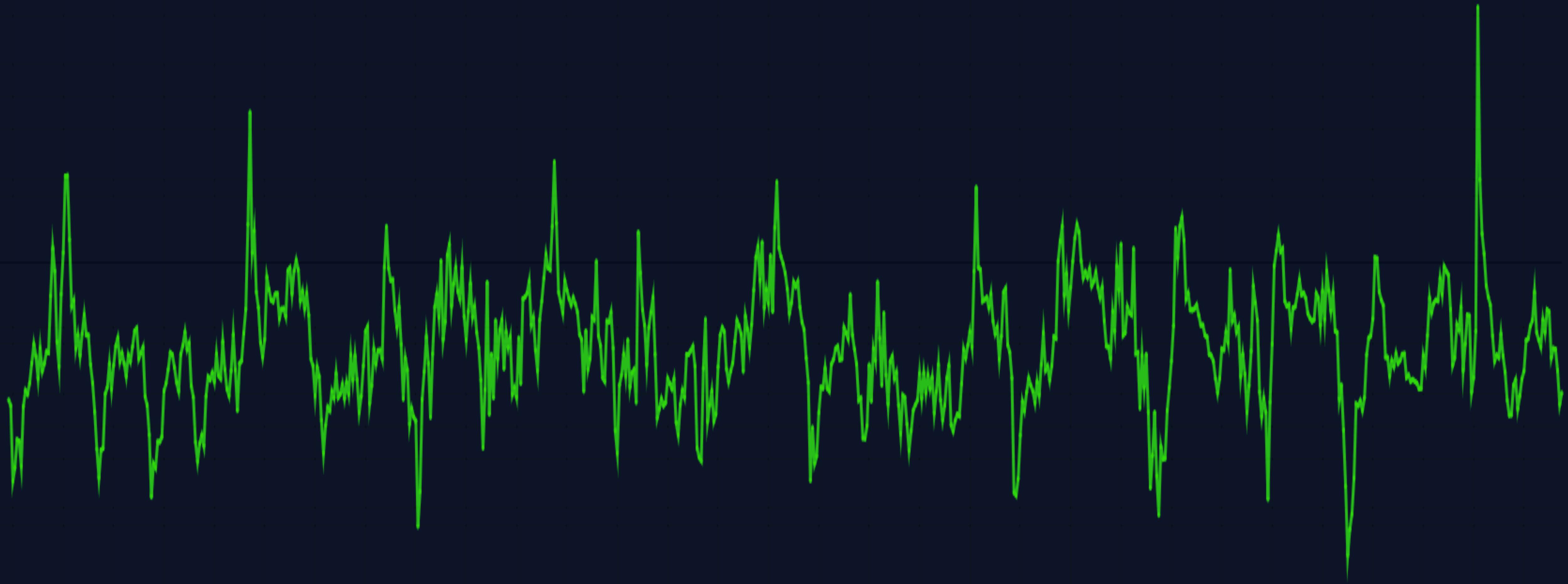


Spread



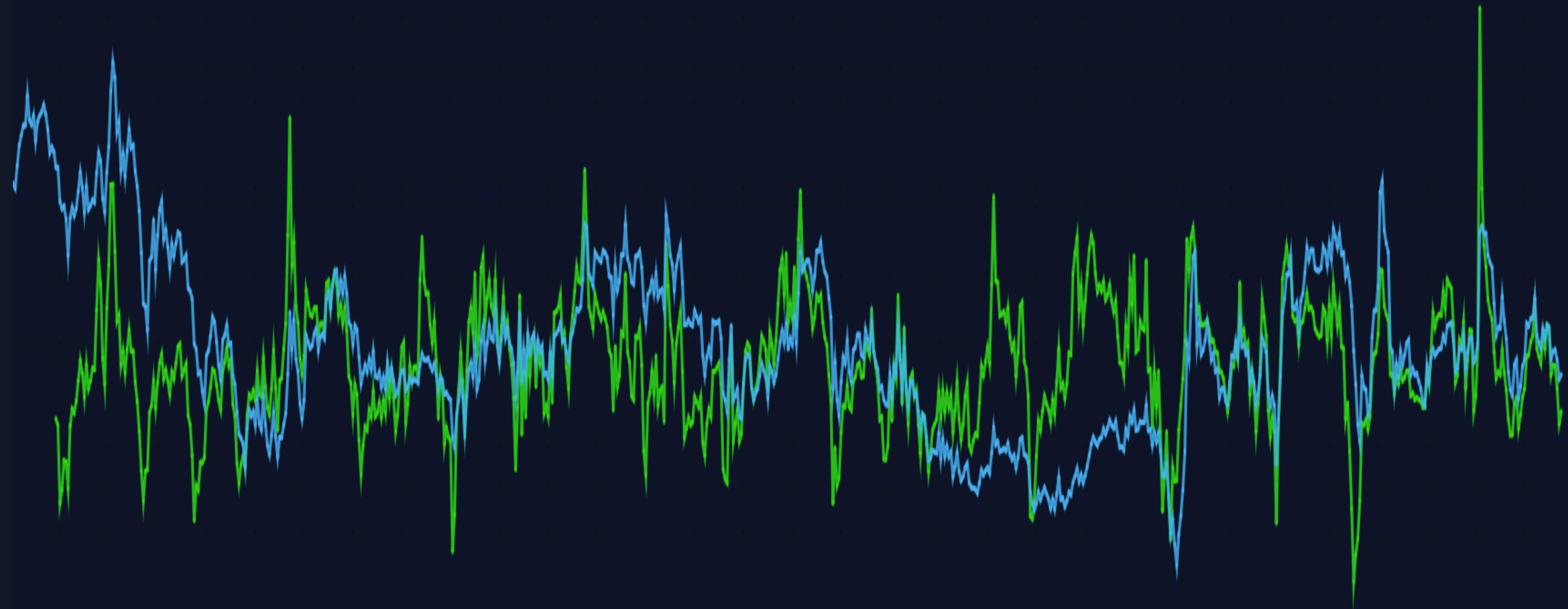


Z-Score





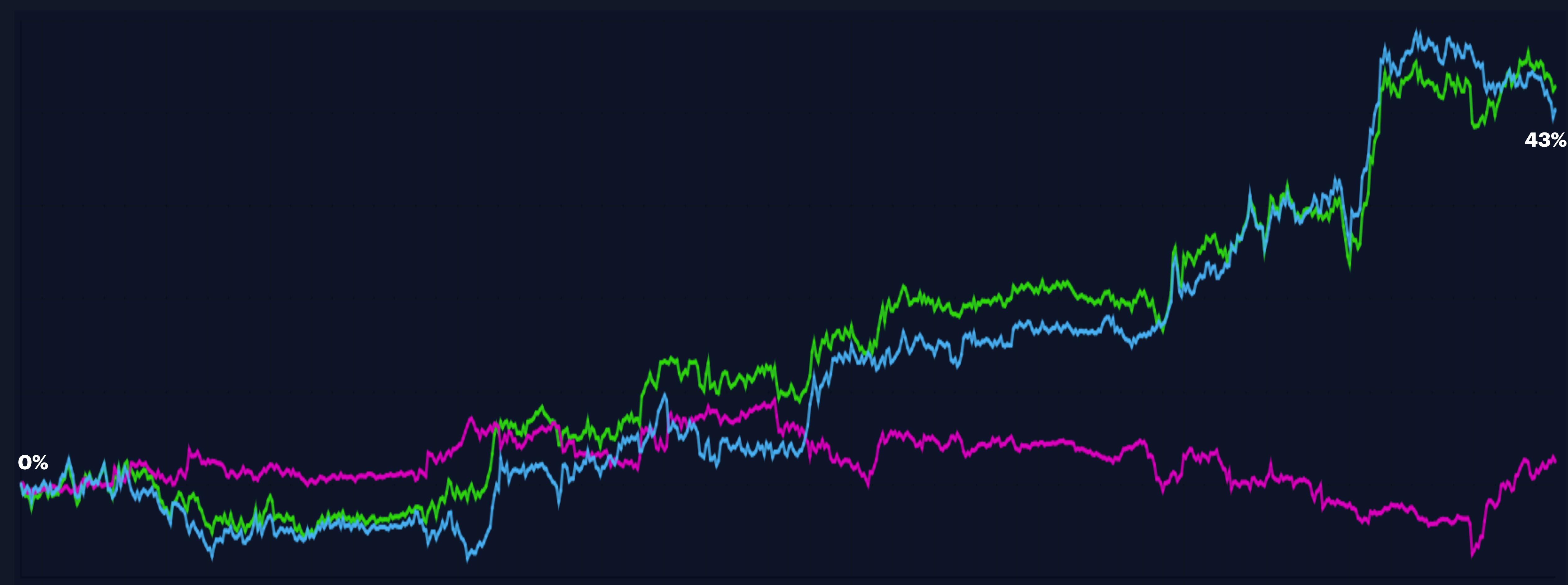
Spread & Z-Score





Backtest

Coint	P-Value	T Check	Hedge Ratio	Half Life	net sharpe ratio	net win rate %	zscore (-) win rate %	trades opened	zscore (-) opened	zscore (+) opened	net average return %	net total return %	net max dd %
🚩	0.00	✓	313.34000	19.0	1.2	71.0	71.0	29	15	14	14.0	43.0	-31.8





Crypto Has Many Opportunities

Results (Binance - 1h interval)
Using 1 month period

Date	Ticker 1	Ticker 2	P-Value	Coint	Profile Match	Hedge Ratio	Z-Score	AD Fuller	Half Life
2023-01-03 17:16:37	QNTUSDT	XRPUSDT	0.001	Yes	Yes	Yes	-0.94	-4.47	14
2023-01-03 17:17:04	UNIUSDT	FTMUSDT	0.018	Yes	No	Yes	-1.65	-3.37	18
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2023-01-03 17:16:59	DASHUSDT	XRPUSDT	0.014	Yes	Yes	Yes	-1.2	-3.78	22

- ZScore Thresh 1.5 + ZScore Thresh 1.5

No Force Close Ignore

Sharpe 0.8 win rate % 72.0 opened 30 average % 8.5 total % 25.0 net mdd % -22.0 hedge ratio 122.5180

Price Comparison

Spread and Z-Score

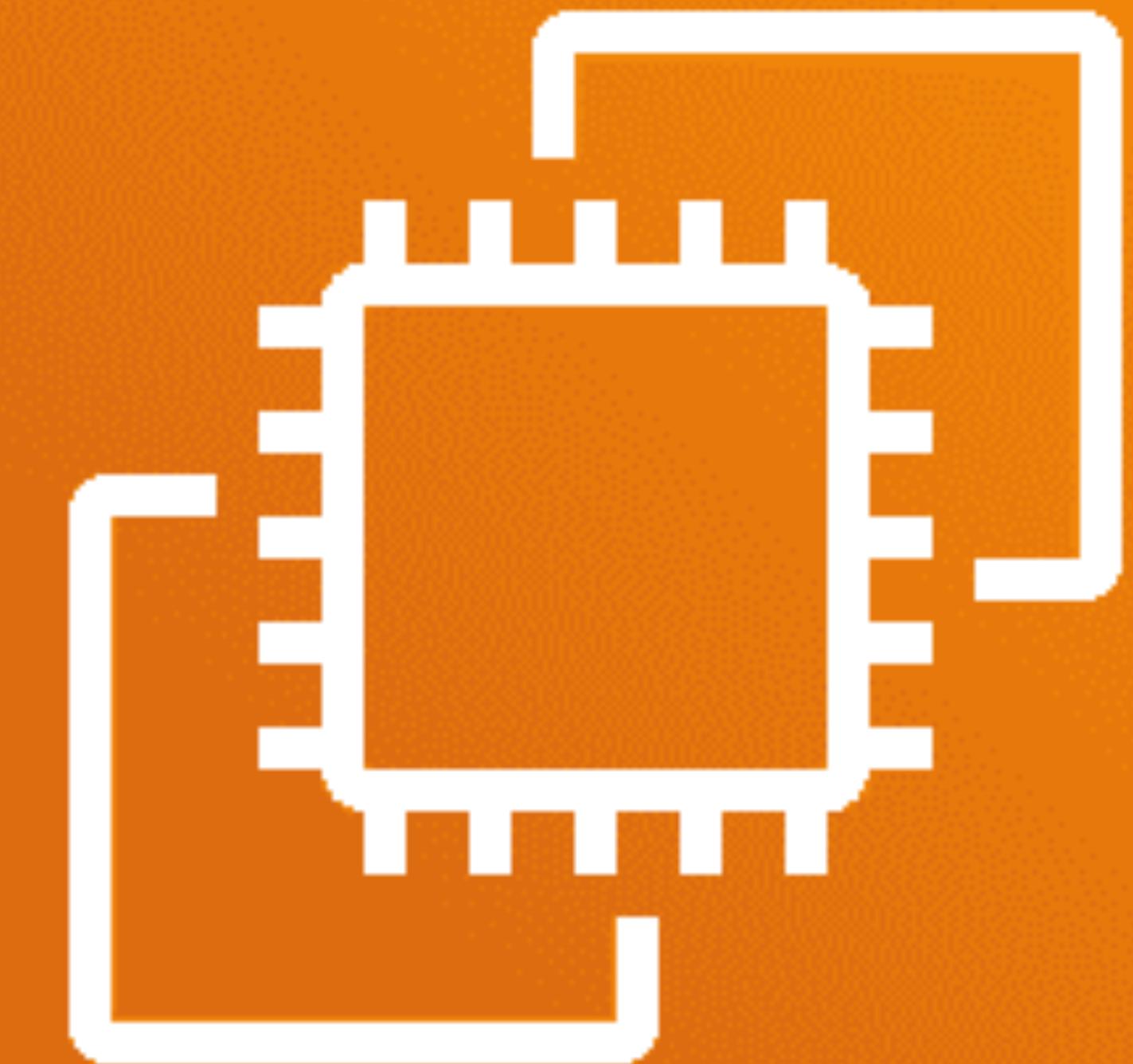


Messaging





Cloud Hosting





What NOT To Expect





Plan of Attack

Phase I

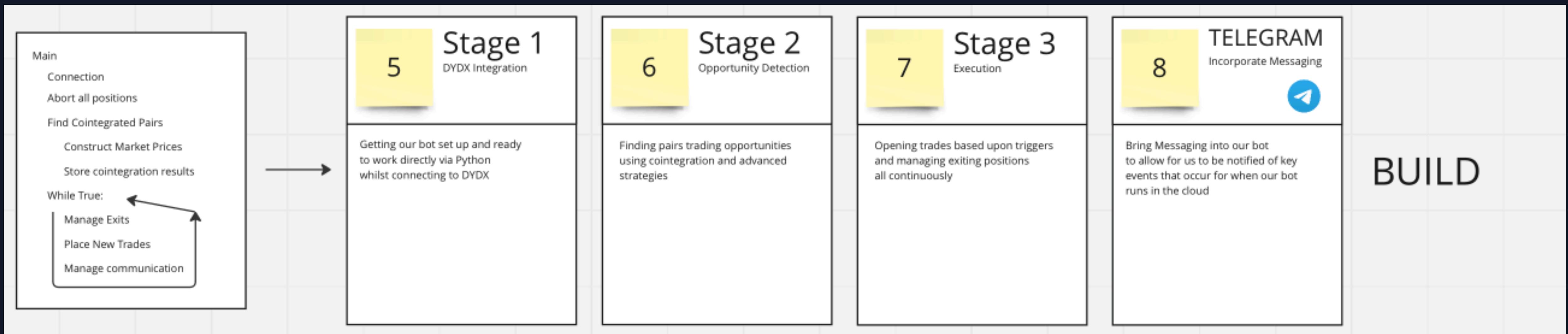
1	Intro Course Introduction and Resources	2	Strategy Strategy, Risk Management and Exchange Selection	3	DYDX FastTrack with CheatSheet	4	ENV SETUP Preparing IDE, GitHub and ENV Variables
	Welcome What to Expect & Strategy Plan of Attack Discord and Resources Exchange Selection - Why DYDX? About DYDX Advantages Disadvantages		Pairs Trading and Statistical Arbitrage About Cointegration About Hedge Ratio About Half Life Position Sizing and Risk Management		MetaMask and Alchemy API Setup Connecting to DYDX Pulling Candlestick Data Placing an order Closing a position		VS Code and Python Venv GitHub Repo Setup Adding .env Variables

PREPARE



Plan of Attack

Phase II





Plan of Attack

Phase III

9

AWS Cloud

Running Bot
Continuously



Creating security groups

Launching an EC2 instance

Connecting to EC2 and Install Python

Downloading and Testing our Bot

Making Code Updates

Full Bot Automation

10

Next Steps

Where to go next

Getting our bot set up and ready
to work directly via Python
whilst connecting to DYDX

LAUNCH



Discord

Screenshot of a Discord server interface showing the general channel and various server settings.

Server Information:

- Name:** Crypto Wizards
- Members:** 198
- Events:** 1
- Moderator-only:** 62
- INFORMATION:**
 - announcements
 - rules
 - # udemy-courses (2)
 - # github-links
- TEXT CHANNELS:**
 - # general (selected)
 - # triangular-arbitrage (3)
 - # statistical-arbitrage (5)
 - # flash-loan-arbitrage (6)
 - # machine-learning (1)
 - # programming-general (4)
 - # rust-mastery-🦀 (1)
- VOICE CHANNELS:** +

General Channel (December 25, 2022):

- Welcome, **Stevenje**. We hope you brought pizza. 12/24/2022 7:38 AM
Wave to say hi!
- Fabri just showed up! 12/25/2022 7:22 AM
Wave to say hi!
- Welcome, **Kai R**. We hope you brought pizza. 12/25/2022 8:22 PM
Wave to say hi!
- Glad you're here, **kebomix**. 12/25/2022 8:43 PM
Wave to say hi!
- Glad you're here, kebomix. 12/25/2022 11:06 PM
kebomix

General Channel (December 26, 2022):

- A wild **nsect** appeared. Yesterday at 3:46 PM
Wave to say hi!

General Channel (December 27, 2022):

- Good to see you, **codinggeek**. Today at 9:16 AM
Wave to say hi!
- Everyone welcome **Yash N**! Today at 9:17 AM
Wave to say hi!



Resources

See Resources In Section I

Discord:

<https://discord.gg/kG4aCx56xA>

GitHub Full Bot:

<https://github.com/CryptoWizardsNet/dydx-trading-bot.git>

Google Colab DYDX Example:

https://colab.research.google.com/drive/14B_0khx0GOApiUYnEq-cJqYpIWnqtsv?usp=sharing

DYDX API Documentation:

<https://dydxprotocol.github.io/v3-teacher/#terms-of-service-and-privacy-policy>

Useful Blog for Obtaining DYDX API Keys:

<https://docs.hummingbot.org/exchanges/dydx-perpetual/#connection>

Goerli Testnet Transaction Viewer:

<https://goerli.etherscan.io/tx/0x3e80b5dd5d47f6324e8ecd14f0306440023a63b41c2199f7d0d2db70ba1b9da9>

DYDX Python Examples:

Includes All Links

GitHub Directory

File Download (if preferred)



POWERED BY STARKWARE

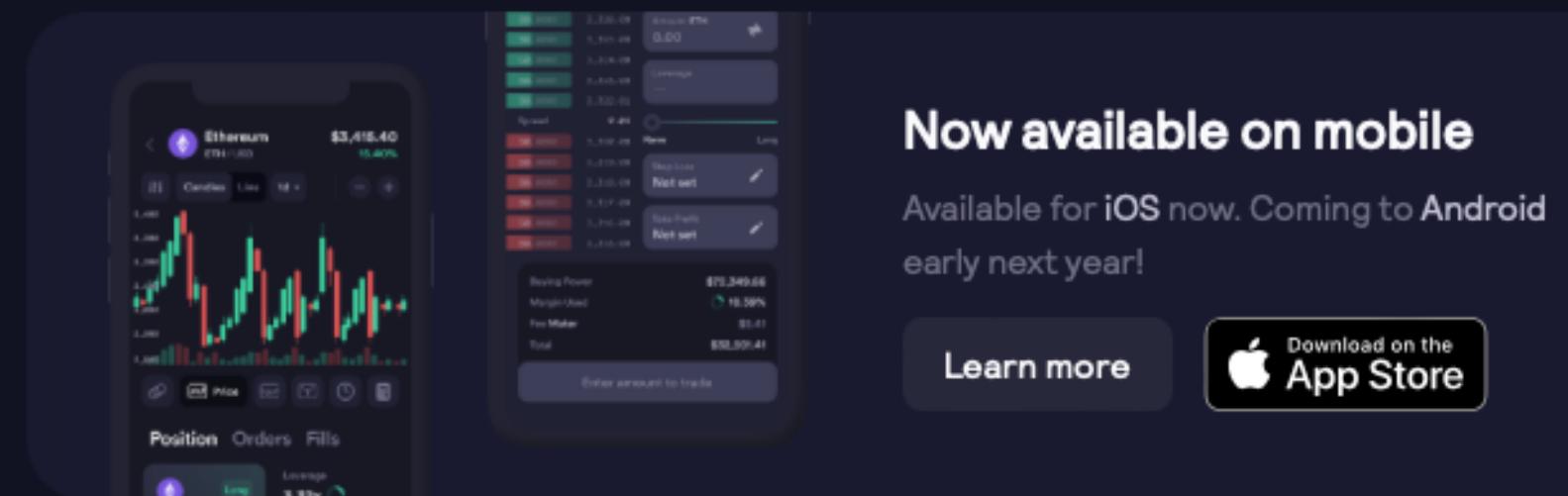
Trade for free*

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Trade now

[Learn more](#)

[Use the API ↗](#) [Join Discord ↗](#)



Now available on mobile

Available for iOS now. Coming to Android early next year!

[Learn more](#)



The screenshot displays the OXAd platform's trading interface for ETH-USD. At the top, a navigation bar includes links for Perpetuals, English, Trade (selected), Portfolio, Markets, Rankings, Vote, Settings, and various social media and utility icons. The main header shows ETH-USD at \$1,759.80 (+4.05%), Mark Price at \$1,758.81, 24h Change at +\$43.31, 24h Volume at \$121,340,512, Open Interest at \$164,594,008, 8h Funding at +0.0213%, and Predicted at -0.0113%.

The left sidebar provides account information: Buying Power (\$1,000.00 → \$734.74), Free Collateral (\$100.00 → \$82.12), Margin Usage (0.00% → 12.18%), and Account Leverage (0.00x → 2.33x). It also includes a market selection dropdown (Market, Limit, Stop) and a large green "Buy" button. Below these are fields for Amount (ETH), Price (.15), and Leverage (Up to 10x, currently 2.33x).

The central area features an Order Book for ETH, showing bids and asks at \$1,322.00 for 50.0000 units. To the right is a detailed candlestick chart for ETH-USD 1D, spanning from January 11 to February 21, with various technical indicators like moving averages and volume bars.

At the bottom right, a summary box details the trade: Notional Value (\$0.00 → \$263.85), Risk-Reward (\$0.00 → \$263.85), Break Even (\$1759.80), Leverage (0.00x → 4.96x), Realized PNL (\$0.00), Unrealized PNL (\$0.00), and Last Funding (\$0.00). Social sharing icons for LinkedIn, YouTube, and others are also present.



Trading, for everyone.

Our mission is to democratize access to financial opportunity.

A next generation exchange.

We're building a powerful and professional exchange for trading perpetuals. While trading on our platform, traders enjoy the security, privacy, and decentralization benefits of Starkware zero-knowledge proofs.

Empowering traders, worldwide.

Few have access to advanced tools & products in the existing financial system. We believe in empowering more traders, in more places, with powerful, transparent, and fair financial products.



Pairs Trading and Statistical Arbitrage





NOT Pairs Trading and Statistical Arbitrage



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About Cointegration





About Cointegration

Coint	P-Value	T Check	Hedge Ratio	Half Life	net sharpe ratio	net win rate %	zscore (-) win rate %	trades opened	zscore (-) opened	zscore (+) opened	net average return %	net total return %	net max dd %
■	0.00	✓	313.34000	19.0	1.2	71.0	71.0	29	15	14	14.0	43.0	-31.8

COINTEGRATION: A SIMPLE EXAMPLE

IF c_t AND y_t ARE BOTH $I(1)$, BUT THERE EXISTS A VECTOR β , SUCH THAT $\beta^T x_t = (\alpha_1 \ \alpha_2) \begin{pmatrix} c_t \\ y_t \end{pmatrix} = \beta_1 c_t + \beta_2 y_t \sim I(0)$, THEN c_t AND y_t ARE COINTEGRATED WITH COINTEGRATION VECTOR β .

- BIVARIATE MODEL FOR c_t AND y_t :

$$y_t = y_{t-1} + \varepsilon_{yt}$$

$$c_t = b y_{t-1} + \varepsilon_{ct}$$

$$x_t = \begin{pmatrix} c_t \\ y_t \end{pmatrix} \sim I(1)$$

- INT REPR:

$$y_t = y_0 + \sum_{i=1}^t \varepsilon_{yi}$$

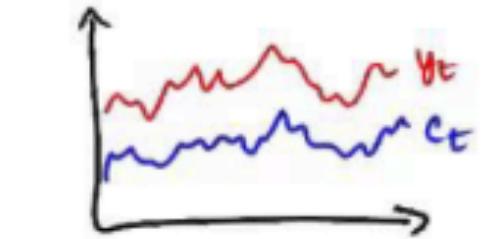
$$c_t = b(y_0 + \sum_{i=1}^{t-1} \varepsilon_{yi} - \varepsilon_{yt}) + \varepsilon_{ct} = b y_0 + b \sum_{i=1}^{t-1} \varepsilon_{yi} + \varepsilon_{ct} - \varepsilon_{yt}$$

- FIRST-DIFFS

$$\Delta y_t = \varepsilon_{yt} \sim I(0)$$

$$\Delta c_t = b \Delta y_{t-1} + \varepsilon_{ct} = \varepsilon_{ct} + b \varepsilon_{yt-1} \sim I(0)$$

NOTE:
STATIONARY COMPONENT
STOCHASTIC TREND
THE INITIAL VALUES



Econometrics II — Fall 2015 — An Introduction to Cointegration — Slide 2/2

An Introduction to Cointegration: A Simple Example Watch

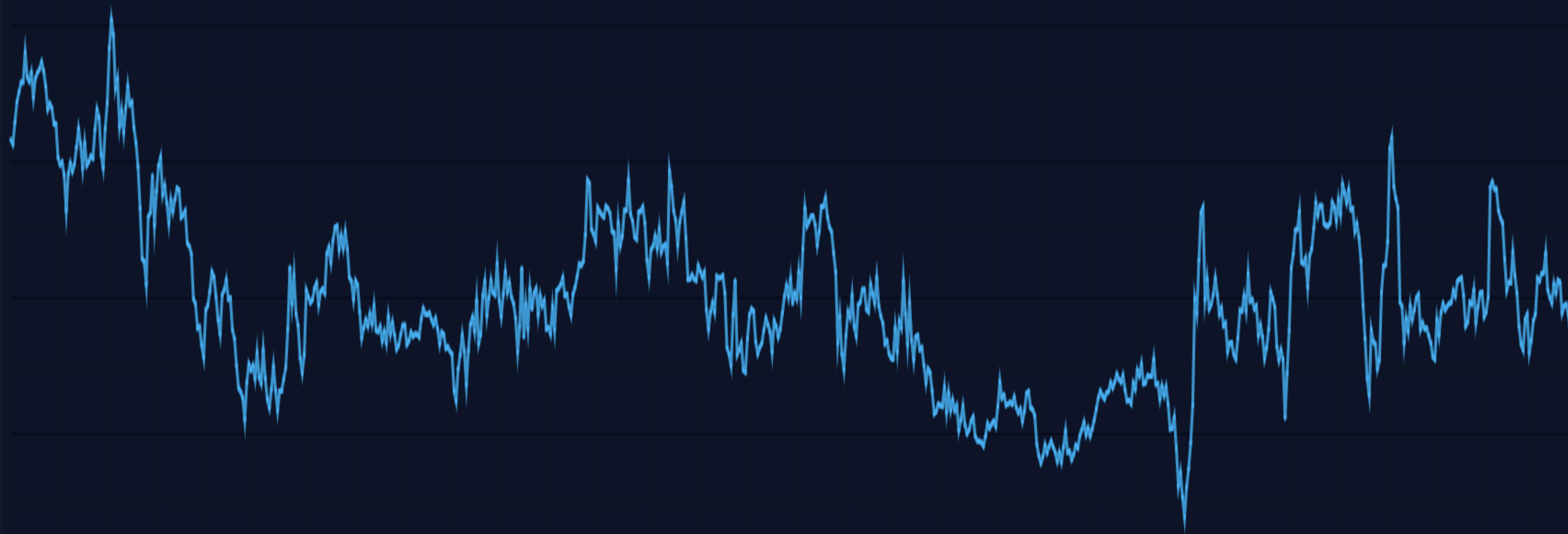


About Cointegration

```
from statsmodels.tsa.stattools import coint  
coint_res = coint(series_1, series_2)
```



About Spread



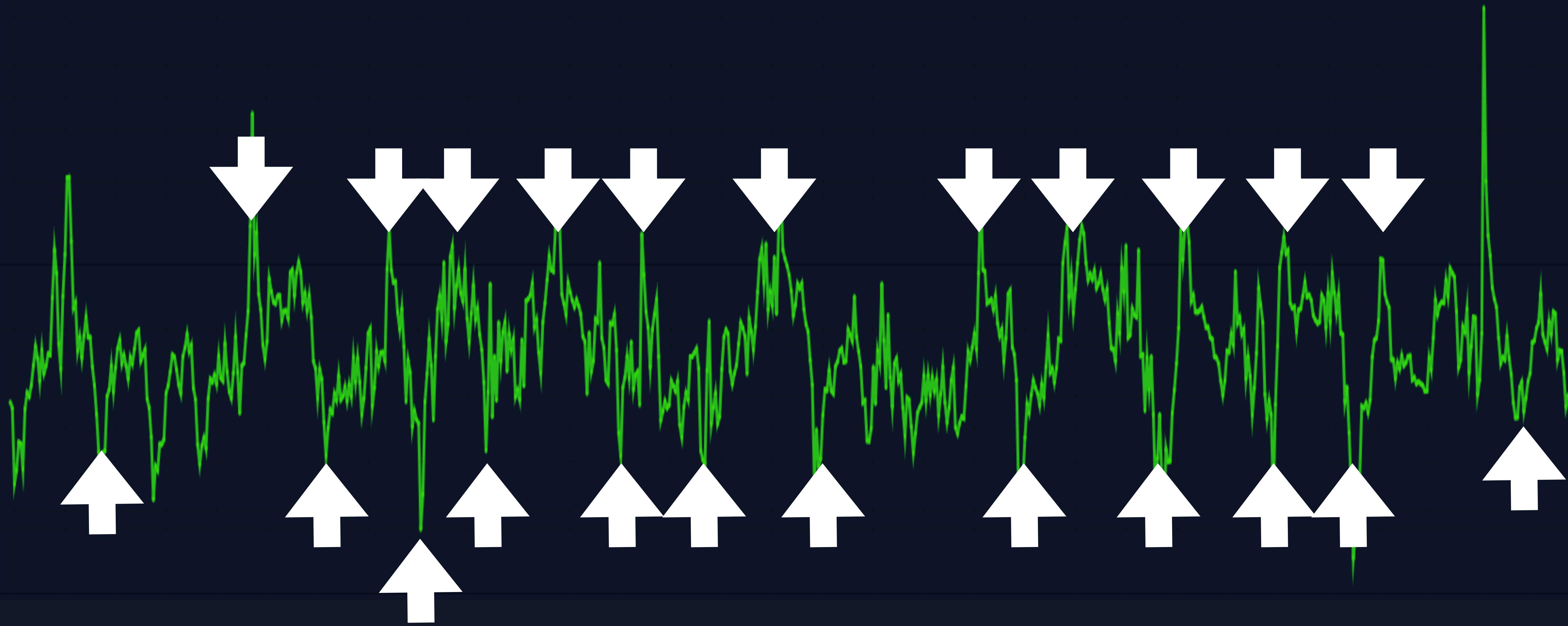


About Spread

```
spread = series_1 - (hedge_ratio * series_2)
```

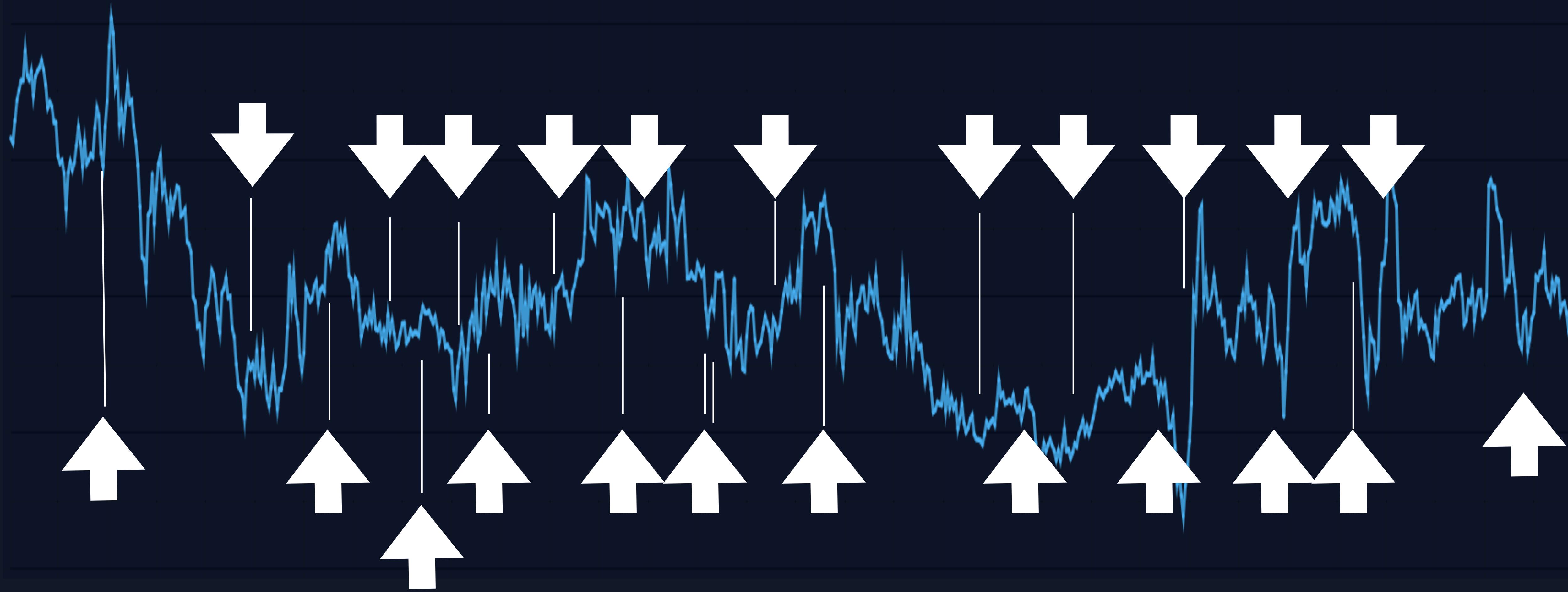


Z-Score





Spread



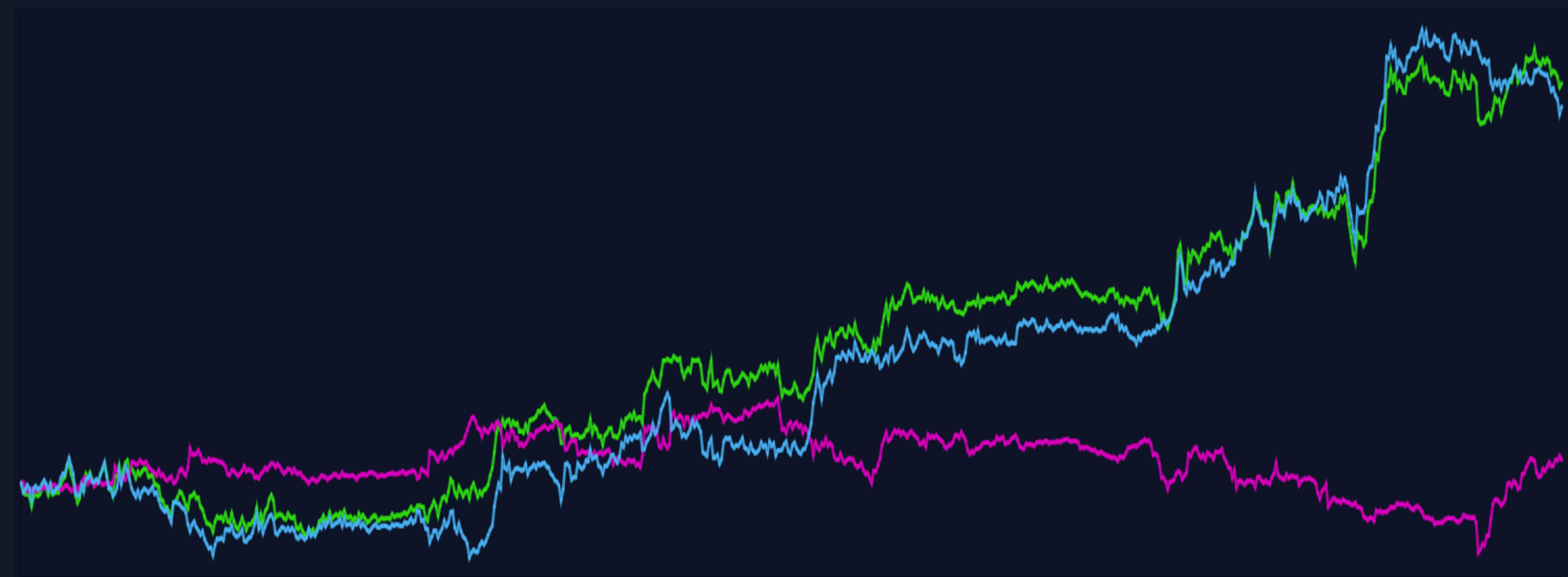


About Z-Score

$$\text{zscore} = (x - \text{mean}) / \text{std}$$



Equity Curve





More Examples

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Using 1 month period

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- ZScore Thresh: 1.5 + ZScore Thresh: 1.5

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Price Comparison

Spread and Z-Score



About Hedge Ratio





About Hedge Ratio

```
hedge_ratio = model.params[0]
```



\$16,639

13.73

13.77



\$1,208



About Half-Life

HALF-LIFE FORMULA

$$N(t) = N_0 \left(\frac{1}{2} \right)^{\frac{t}{t_{1/2}}}$$

$N(t)$ = quantity remaining

N_0 = initial quantity

t = elapsed time

$t_{1/2}$ = half-life of the substance

```
def calculate_half_life(spread):
    df_spread = pd.DataFrame(spread, columns=["spread"])
    spread_lag = df_spread.spread.shift(1)
    spread_lag.iloc[0] = spread_lag.iloc[1]
    spread_ret = df_spread.spread - spread_lag
    spread_ret.iloc[0] = spread_ret.iloc[1]
    spread_lag2 = sm.add_constant(spread_lag)
    model = sm.OLS(spread_ret, spread_lag2)
    res = model.fit()
    halflife = round(-np.log(2) / res.params[1], 0)
    return halflife
```





Position Sizing and Risk Management



Kelly Criterion and Optimal Position Sizing - Excel Example

2K views • 9 months ago



Crypto Wizards

Position Sizing can make or break your trading results. Use the Kelly Criterion to identify the



Kelly Criterion | Position Sizing Matters | Fractional Kelly Criterion | The Kelly Cr

https://www.youtube.com/results?search_query=kelly+criterion+crypto+wizards



Position Sizing and Risk Management

