

Trading Strategy Report

Target Market: VN30F1M

Strategy Group: Momentum, Mean-Reversion

Data Frequency: Daily/1-Minute

Hypotheses

Hypothesis: Combining Momentum and Mean Reversion

Financial markets often oscillate between trending and sideways conditions, and no single strategy excels under all market circumstances. While momentum strategies perform well in trending markets, mean reversion strategies shine in sideways conditions. However, both strategies tend to underperform in opposing market conditions. Since market conditions are inherently unpredictable, a combined approach that integrates momentum and mean reversion is proposed. By balancing these two approaches, the combined strategy aims to reduce risk and ensure that if one underperforms, the other compensates for potential losses, creating a more robust and resilient framework.

Hypothesis 1: Momentum

The momentum factor has consistently proven to generate abnormal returns, capturing the attention of investors and researchers alike. Inspired by Professor Moskowitz's Time Series Momentum, this hypothesis posits that assets with strong past performance will likely continue to perform well in the subsequent period. In order to have a safer option, we set a shorter term SMA to be a benchmark. To adapt this approach to the high volatility of futures trading:

- Open a Long position if the rolling window of the last 21 days exceeds a benchmark and the current price is higher
- Open a Short position in similar condition when the trend is going down

Hypothesis 2: Mean Reversion

Mean reversion strategies aim to achieve consistent, long-term profits with relatively lower risk compared to momentum strategies. However, blindly buying assets below a benchmark is risky, as strong momentum continuation can lead to significant losses. To mitigate this, the strategy incorporates additional conditions:

- Enter a Long position when the price is oversold, begins to show signs of recovery, and crosses a specified moving average (MA).
 - Enter a Short position under similar conditions when the price is overbought.
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Entry and Exit Rules

Strategy 1: Mean Reversion

When to open:

- Long: Enter when prices fall below the lower Bollinger Band and subsequently cross the 15-period SMA (simple moving average) from below.
- Short: Enter when prices rise above the upper Bollinger Band and subsequently cross the 15-period SMA from above.

When to close:

- Use a trailing stop loss of 0.5% from the local maximum/minimum price. For example, with a trailing stop of 10%, if the current price is 100, the stop-loss level is 90. If the price rises to 150, the stop-loss level moves to 135. If the price then falls to 140, the stop-loss remains at 135.
- Close the position if an opposing position condition is met (rare due to tight stop-loss settings).

Strategy 2: Momentum

When to open:

- Long: Enter when the cumulative return over the last 21 days exceeds 3%.
- Short: Enter when the cumulative return over the last 21 days is below -7%.

When to close:

- Same rules as Strategy 1 for trailing stop loss and opposing positions.
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Optimization

- **Framework:** Use Optuna for optimization.
- **Dataset Division:** Train (60%), Validation (10%), Test (30%).
- **Objectives:**
 - Maximize Objective Value (= Shape Ratio (IS) + 50 * max(0, sharpe_diff - sharpe_diff_max) + 200 * max(0, drawdown_is - max_drawdown)) → **Penalty for Underperformance**
 - Minimize maximum drawdown.
 - Minimize the Sharpe difference (Sharpe in-sample – Sharpe validation).

After evaluation, Strategy 2 demonstrates stronger profit potential and will serve as the primary strategy. Strategy 1 will be adjusted to support risk management and minimize maximum drawdown.

Backtesting Result

Daily Data (08/2017- Now)

Strategies 1:

In sample:

Annulized Return: 4.18%	Volatility: 39.4 %
Beta: 0.101	Alpha: 3.36%
Sharpe: -0.021	Sortino: 0.081
VaR: 87.4%	CVaR: 99.94%
VaR/cVaR: 1.143	Drawdown: 45.88%

Out sample

Annulized Return: 1.53%	Volatility: 30.93 %
Beta: -0.223	Alpha: 4.54%
Sharpe: -0.112	Sortino: 0.037
VaR: 70.87%	CVaR: 81.06%
VaR/cVaR: 1.144	Drawdown: 18.02%

Overall

	Year	Return	Volatility	Sharpe	Max Drawdown	Beta	Alpha	Sortino	VaR	cVaR
0	2018	0.396485	0.336281	1.030345	-0.115632	0.025712	0.402294	1.681528	0.386442	0.500445
1	2019	0.351843	0.459140	0.657410	-0.219771	-0.017386	0.349400	0.754712	0.713081	0.879924
2	2020	-0.125254	0.396643	-0.441842	-0.240434	-0.118843	-0.132765	-0.159222	1.051039	1.191059
3	2021	-0.272406	0.371013	-0.868987	-0.348591	-0.061515	-0.279945	-0.606841	1.135938	1.258153
4	2022	0.712865	0.949596	0.698049	-0.446791	0.284158	0.708570	0.629158	1.496873	1.806560
5	2023	0.327763	0.264277	1.051028	-0.095305	-0.124928	0.294694	0.868849	0.289234	0.380091
6	2024	-0.186474	0.291177	-0.812132	-0.181592	-0.029935	-0.192694	-0.417508	0.865396	0.966183

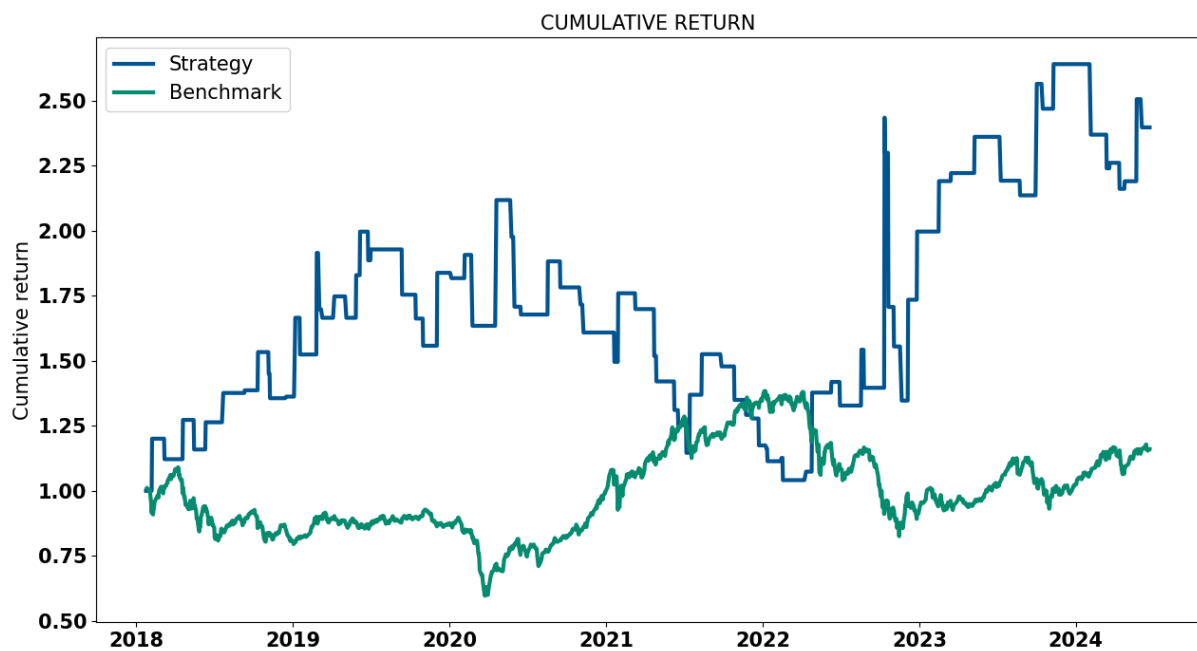
Annulized Return: 14.62% Volatility: 50.35 %

Beta: 0.148 Alpha: 14.27%

Sharpe: 0.191 Sortino: 0.217

VaR: 102.26% CVaR: 120.3%

VaR/cVaR: 1.176 Drawdown: 50.83%



Note: The overall return is high because of the extraordinary high return in the validation phase.

Strategies 2:

In sample

Annulized Return: 67.87% Volatility: 74.59 %

Beta: 0.125 Alpha: 66.46%

Sharpe: 0.843 Sortino: 1.164

VaR: 105.98% CVaR: 132.29%

VaR/cVaR: 1.248 Drawdown: 57.32%

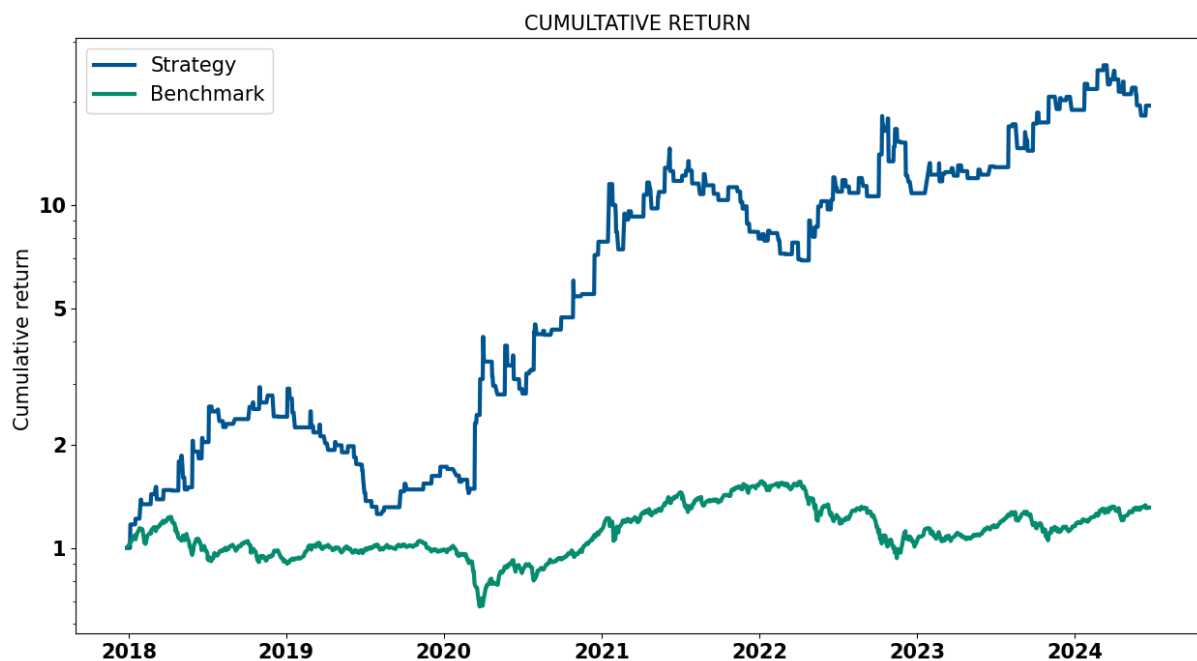
Out sample

Annulized Return: 47.22%	Volatility: 59.7 %
Beta: 0.184	Alpha: 44.32%
Sharpe: 0.707	Sortino: 0.808
VaR: 91.09%	CVaR: 110.75%
VaR/cVaR: 1.216	Drawdown: 28.37%

Overall

	Year	Return	Volatility	Sharpe	Max Drawdown	Beta	Alpha	Sortino	VaR	cVaR
0	2017	0.000000	0.000000	-inf	0.000000	NaN	NaN	NaN	-0.000000	-0.000000
1	2018	1.443826	0.672312	2.073182	-0.202722	0.215661	1.456306	2.219067	0.104297	0.337070
2	2019	-0.286450	0.403033	-0.834796	-0.568974	-0.396322	-0.239793	-0.728722	1.217158	1.354262
3	2020	3.552905	1.016236	3.446941	-0.321116	0.291560	3.572509	5.215279	-1.204107	-0.870433
4	2021	0.020977	0.758074	-0.038285	-0.454138	-0.058215	0.008058	0.034050	1.730625	1.990120
5	2022	0.362634	0.765561	0.408373	-0.404345	-0.242923	0.400064	0.414999	1.434398	1.681142
6	2023	0.763300	0.606115	1.176839	-0.163244	0.352161	0.738926	1.268745	0.642192	0.844325
7	2024	0.064005	0.505554	0.027703	-0.287000	-0.407767	0.168691	0.153751	1.110437	1.289831

Annulized Return: 58.12%	Volatility: 71.47 %
Beta: 0.227	Alpha: 57.15%
Sharpe: 0.743	Sortino: 0.905
VaR: 108.11%	CVaR: 132.57%
VaR/cVaR: 1.226	Drawdown: 57.32%



2 Strategies combined

In sample:

Annulized Return: 37.25%		Volatility: 41.9 %	

Beta: 0.122		Alpha: 35.88%	
Sharpe: 0.77		Sortino: 1.316	

VaR: 59.95%		CVaR: 74.56%	
VaR/cVaR: 1.244		Drawdown: 30.75%	

Out sample:

Annulized Return: 26.61%		Volatility: 40.24 %	

Beta: -0.137		Alpha: 28.25%	
Sharpe: 0.537		Sortino: 0.904	

VaR: 67.84%		CVaR: 81.24%	
VaR/cVaR: 1.198		Drawdown: 21.72%	

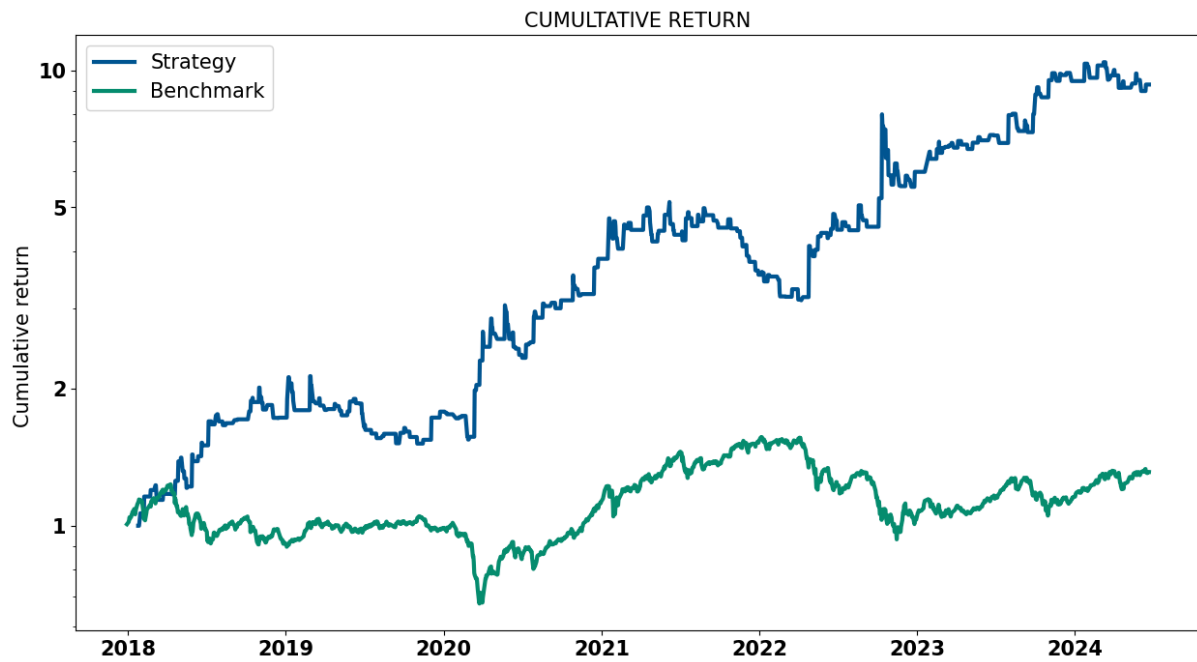
Overall

	Year	Return	Volatility	Sharpe	Max Drawdown	Beta	Alpha	Sortino	VaR	cVaR
0	2018	0.805274	0.362844	2.081537	-0.142917	-0.060725	0.803272	2.775410	0.035390	0.156472
1	2019	0.030986	0.332965	-0.057104	-0.288861	0.095086	0.010407	0.137202	0.747559	0.863841
2	2020	1.171200	0.530198	2.114682	-0.233364	-0.517335	1.367202	3.328862	0.060945	0.247462
3	2021	-0.078186	0.418051	-0.306628	-0.307542	0.271063	-0.129235	-0.286495	1.049528	1.188438
4	2022	0.695016	0.720490	0.895245	-0.306803	0.046569	0.692982	1.411015	1.002722	1.237728
5	2023	0.592950	0.320981	1.691531	-0.089077	0.010253	0.596486	2.175240	0.149249	0.255089
6	2024	-0.036902	0.282962	-0.307116	-0.135581	-0.150487	0.029499	-0.141776	0.696208	0.791816

Annulized Return: 41.08%		Volatility: 45.94 %	

Beta: 0.192		Alpha: 40.26%	
Sharpe: 0.785		Sortino: 1.243	

VaR: 65.59%		CVaR: 81.15%	
VaR/cVaR: 1.237		Drawdown: 39.15%	



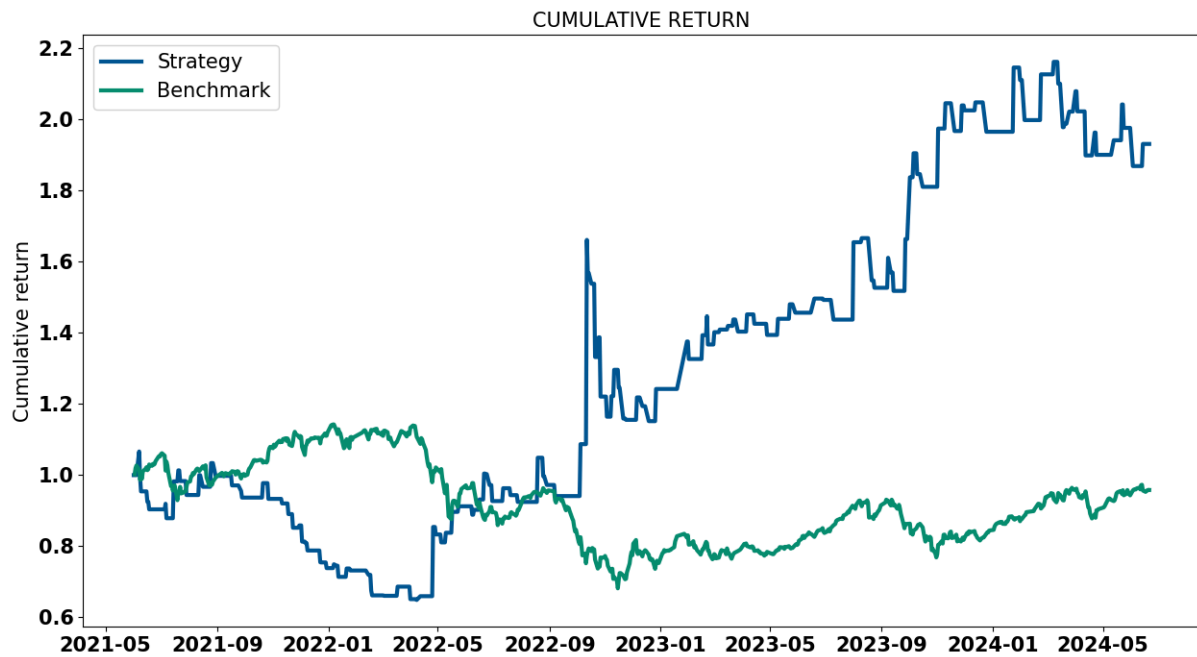
```
> ✓ 0.0s
[147] ... 0.13668606826576193
```

```
#Compute the correlation
returns_all1["Asset"].corr(returns_all2["Asset"])
```

Note: The Strategies performs well in the validation phase (year 2022) leading to a higher performance overall.

Result after 06/2021

```
Annualized Return: 24.04%   Volatility: 48.43 %   -----
Beta: 0.248               Alpha: 24.39%
Sharpe: 0.393             Sortino: 0.657
-----
VaR: 89.16%              CVaR: 105.82%
VaR/cVaR: 1.187          Drawdown: 39.15%
-----
```



5 Minute Data

Strategies 1:

In sample

```
Annulized Return: -6.2%      Volatility: 36.99 %
-----
Beta: -0.208      Alpha: -7.89%
Sharpe: -0.303     Sortino: -0.223
-----
VaR: 91.36%      CVaR: 103.58%
VaR/cVaR: 1.134   Drawdown: 43.22%
-----
```

Out sample

```
Annulized Return: -25.23%    Volatility: 28.7 %
-----
Beta: 0.33   Alpha: -28.09%
Sharpe: -1.053   Sortino: -1.222
-----
VaR: 91.28%      CVaR: 100.89%
VaR/cVaR: 1.105   Drawdown: 36.39%
-----
```

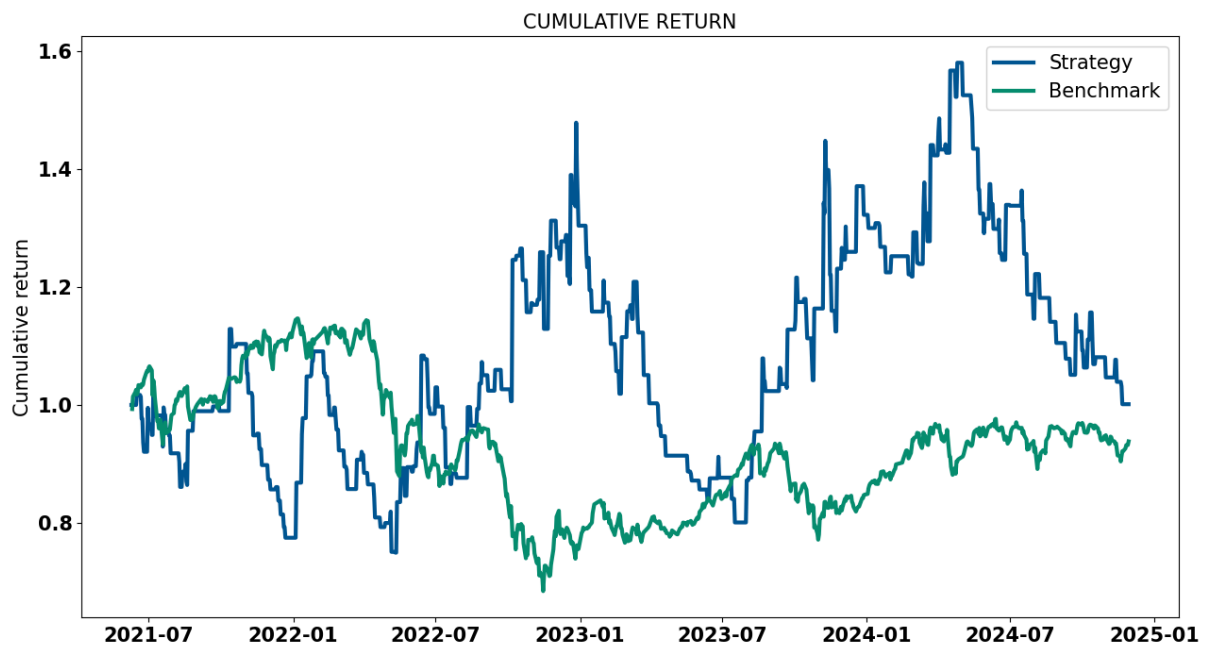
Overall:

	Year	Return	Volatility	Sharpe	Max Drawdown	Beta	Alpha	Sortino	VaR	cVaR
0	2021	-0.365485	0.052978	-7.842656	-0.313793	0.000000	-0.365485	-1.820179	0.488135	0.505339
1	2022	0.696337	0.077431	8.347220	-0.338561	0.018169	0.693968	2.505974	-0.516750	-0.490600
2	2023	0.014302	0.061962	-0.576124	-0.386088	0.003200	0.014125	0.053881	0.130598	0.151309
3	2024	-0.263711	0.048792	-6.429609	-0.366507	-0.032618	-0.257408	-1.356225	0.377980	0.394910

Annulized Return: -6.2% Volatility: 36.99 %

Beta: -0.208 Alpha: -7.89%
Sharpe: -0.303 Sortino: -0.223

VaR: 91.69% CVaR: 104.07%
VaR/cVaR: 1.135 Drawdown: 43.22%



Strategies 2:

In sample

Annulized Return: 255.27% Volatility: 59.91 %

Beta: -0.338 Alpha: 252.24%
Sharpe: 4.178 Sortino: 6.107

VaR: -116.28% CVaR: -97.6%
VaR/cVaR: 0.839 Drawdown: 29.02%

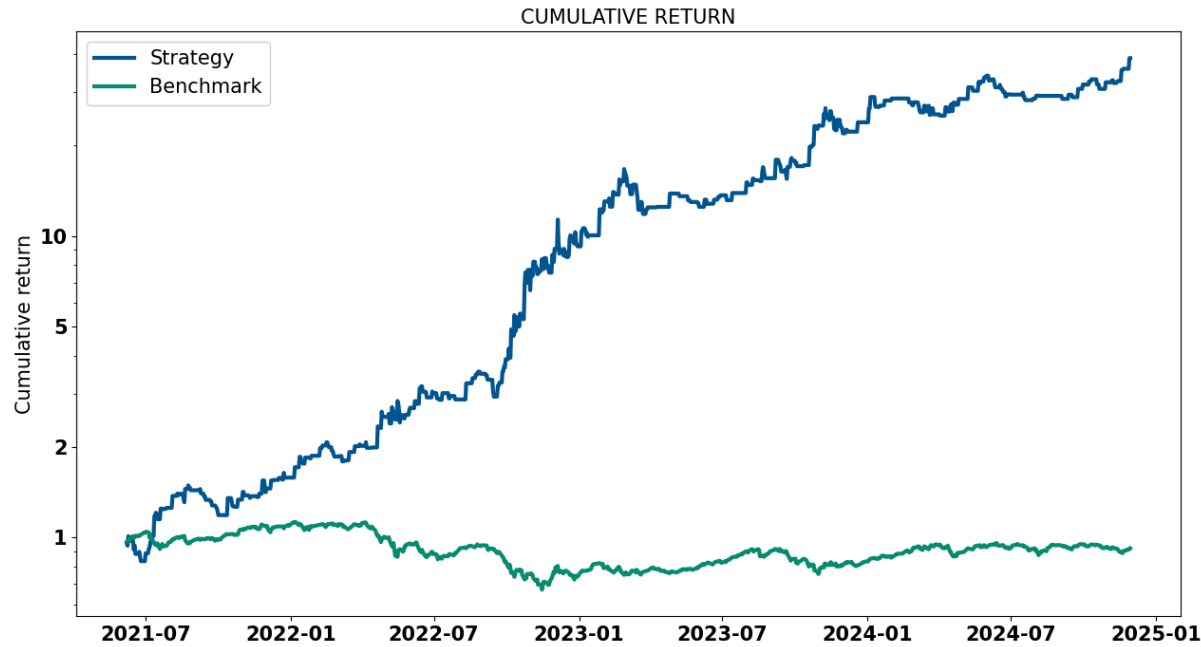
Out sample

Annulized Return: 38.19%	Volatility: 26.85 %
Beta: 0.065	Alpha: 37.62%
Sharpe: 1.236	Sortino: 1.473
VaR: 24.16%	CVaR: 32.87%
VaR/cVaR: 1.36	Drawdown: 16.84%

Overall:

Annulized Return: 186.37%	Volatility: 51.86 %
Beta: -0.276	Alpha: 185.72%
Sharpe: 3.498	Sortino: 4.889
VaR: -65.51%	CVaR: -47.74%
VaR/cVaR: 0.729	Drawdown: 29.02%

	Year	Return	Volatility	Sharpe	Max Drawdown	Beta	Alpha	Sortino	VaR	cVaR
0	2021	1.240465	0.082691	14.396463	-0.214517	0.031174	1.241113	6.219245	-1.047641	-1.019528
1	2022	5.002097	0.133537	37.084014	-0.255279	-0.381986	5.091189	17.478448	-4.692627	-4.645034
2	2023	1.615274	0.086376	18.121675	-0.290166	-0.066111	1.608747	6.866881	-1.414948	-1.386544
3	2024	0.714518	0.050624	13.126605	-0.170325	-0.031156	0.710282	3.850936	-0.596013	-0.579398



2 Strategies combined

In sample

Annulized Return: 188.13% Volatility: 50.45 %

Beta: -0.322 Alpha: 185.25%

Sharpe: 3.63 Sortino: 5.591

VaR: -70.9% CVaR: -53.53%

VaR/cVaR: 0.755 Drawdown: 24.59%

Out Sample

Annulized Return: 23.56% Volatility: 23.46 %

Beta: 0.119 Alpha: 22.52%

Sharpe: 0.791 Sortino: 1.147

VaR: 30.5% CVaR: 38.38%

VaR/cVaR: 1.258 Drawdown: 16.29%

2 Strategy combined

Annulized Return: 141.5% Volatility: 44.11 %

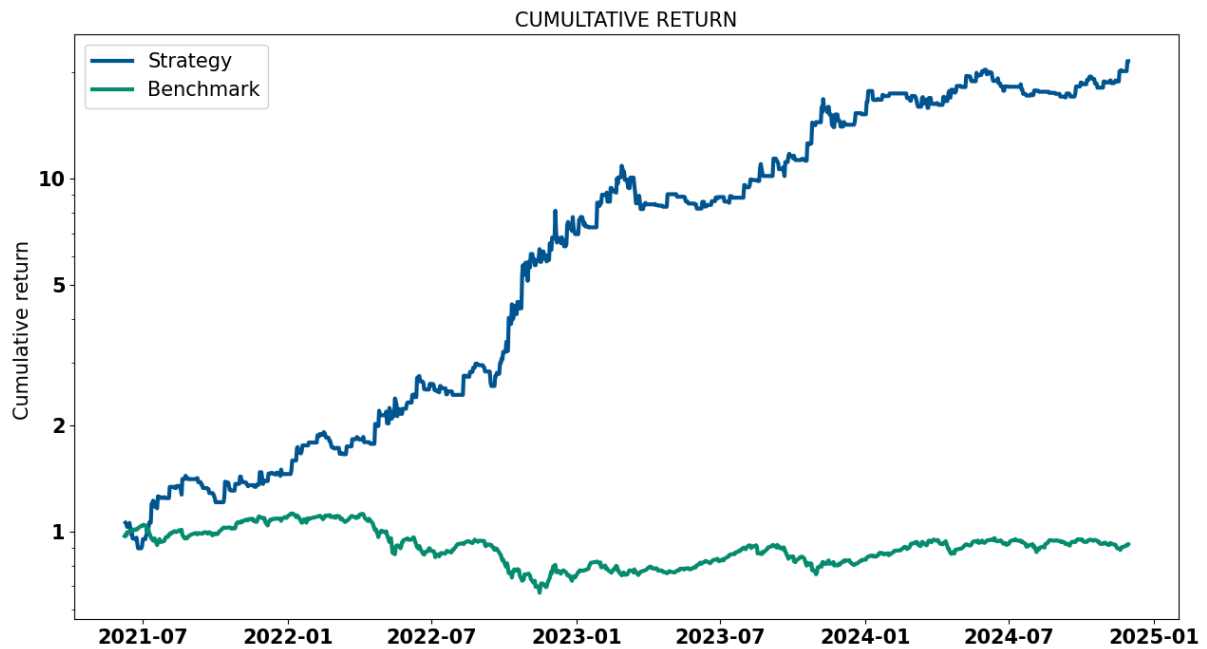
Beta: -0.261 Alpha: 140.88%

Sharpe: 3.094 Sortino: 4.638

VaR: -38.24% CVaR: -23.68%

VaR/cVaR: 0.619 Drawdown: 24.59%

	Year	Return	Volatility	Sharpe	Max Drawdown	Beta	Alpha	Sortino	VaR	cVaR
0	2018	0.805274	0.362844	2.081537	-0.142917	0.248273	0.883220	2.775410	0.041089	0.163020
1	2019	0.030986	0.332965	-0.057104	-0.288861	-0.075243	0.023416	0.137202	0.749583	0.859894
2	2020	1.171200	0.530198	2.114682	-0.233364	-0.523906	1.162991	3.328862	0.062293	0.250357
3	2021	-0.078186	0.418051	-0.306628	-0.307542	0.279087	-0.024686	-0.286495	1.052946	1.194878
4	2022	0.695016	0.720490	0.895245	-0.306803	0.143620	0.726276	1.411015	0.983516	1.223106
5	2023	0.592950	0.320981	1.691531	-0.089077	-0.239374	0.680840	2.175240	0.157134	0.266974
6	2024	-0.036902	0.282962	-0.307116	-0.135581	-0.080774	-0.055904	-0.141776	0.695260	0.790366



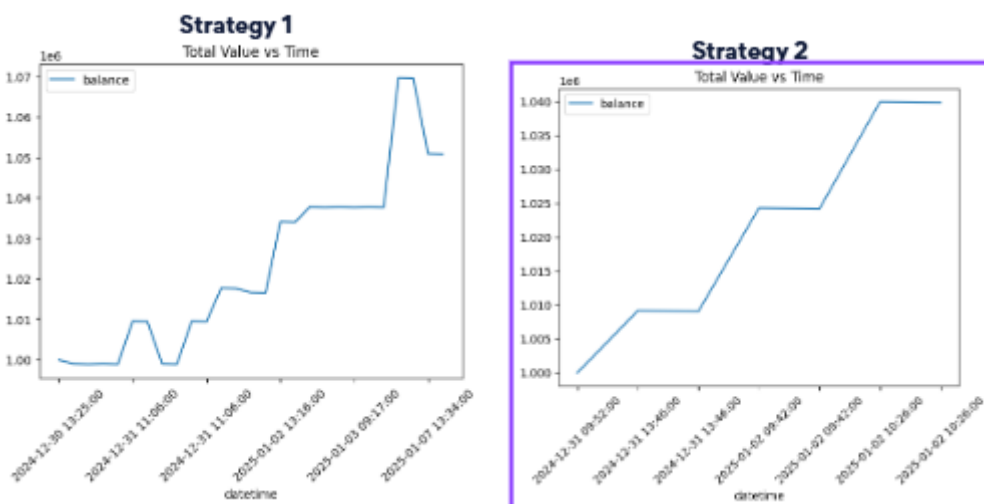
```
#Compute the correlation
daily_returns_all1["Asset"].corr(daily_returns_all2["Asset"])
✓ 0.0s
0.3146398326222717
```

Comments on 5-Minute Interval:

Clearly, the parameters of the strategies exhibits overfitting leading the big difference in the sharpe ratio of the in-sample and out-sample

Paper Trading Result

Because we only have a few days for paper trading, we can use one-minute data frequency for both strategies to generate enough trades that have fluctuations in the balance account.





Appendix:

Data

Data 5 minutes taken from database

Daily Data: taken from Vnstock (TCBS)

Metric Calculation

Sharpe Ratio= (Annualized Return - Risk-free Rate)/Volatility

Annualized Return = (Asset value at $t=n$ – Asset value at $t=0$)/Asset value at $t=0^{(1/n)}$ where n is time (years)

Volatility= standard deviation of daily returns

Beta= $\text{cov}(r_m, r_p) / \text{var}(r_m)$

Sortino = Annualized Return/ Beta

Alpha= Annualized Return - Beta* Market Return

Maximum Drawdown:

Function

Volatility_targeting: dynamically changing the market exposure based on current market volatility

If the volatility increases, the number of contracts will goes down, the parameters is decided on the optimization phased (the max contracts still be in the max limit)

Trailing Stop Loss: create a maximum stop loss that is up once the position is positive to protect the profit.