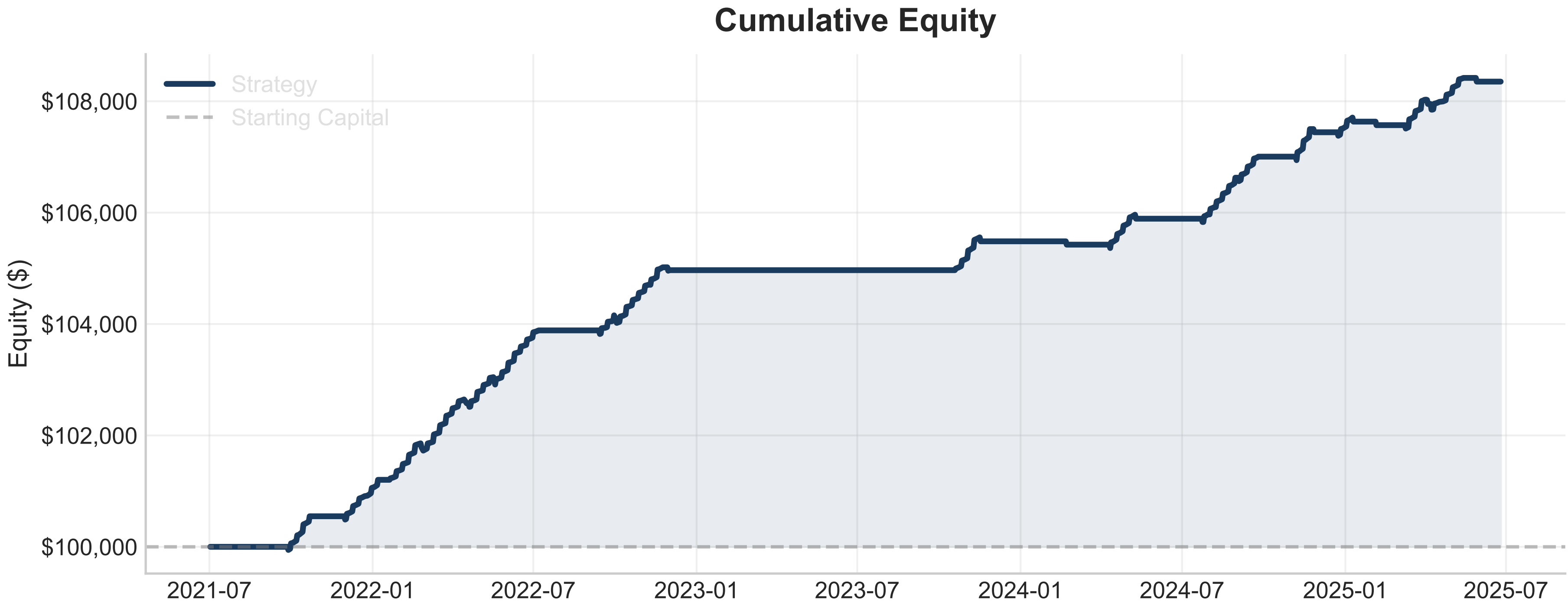
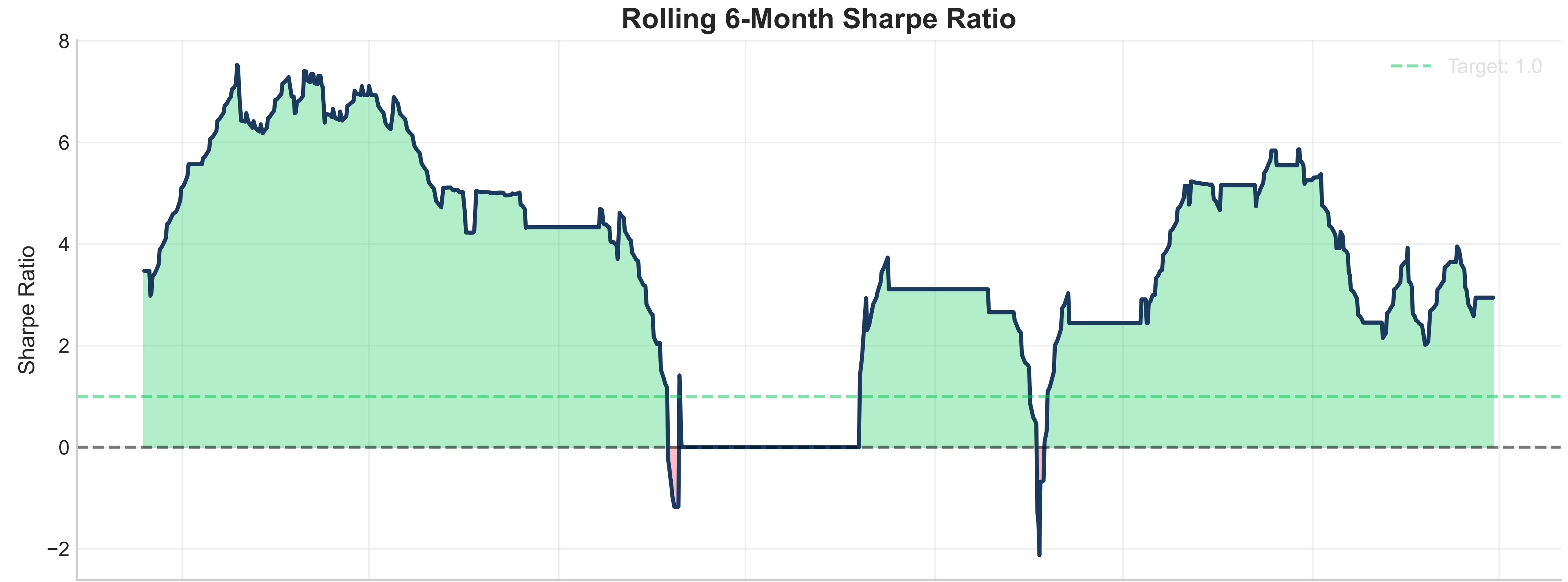
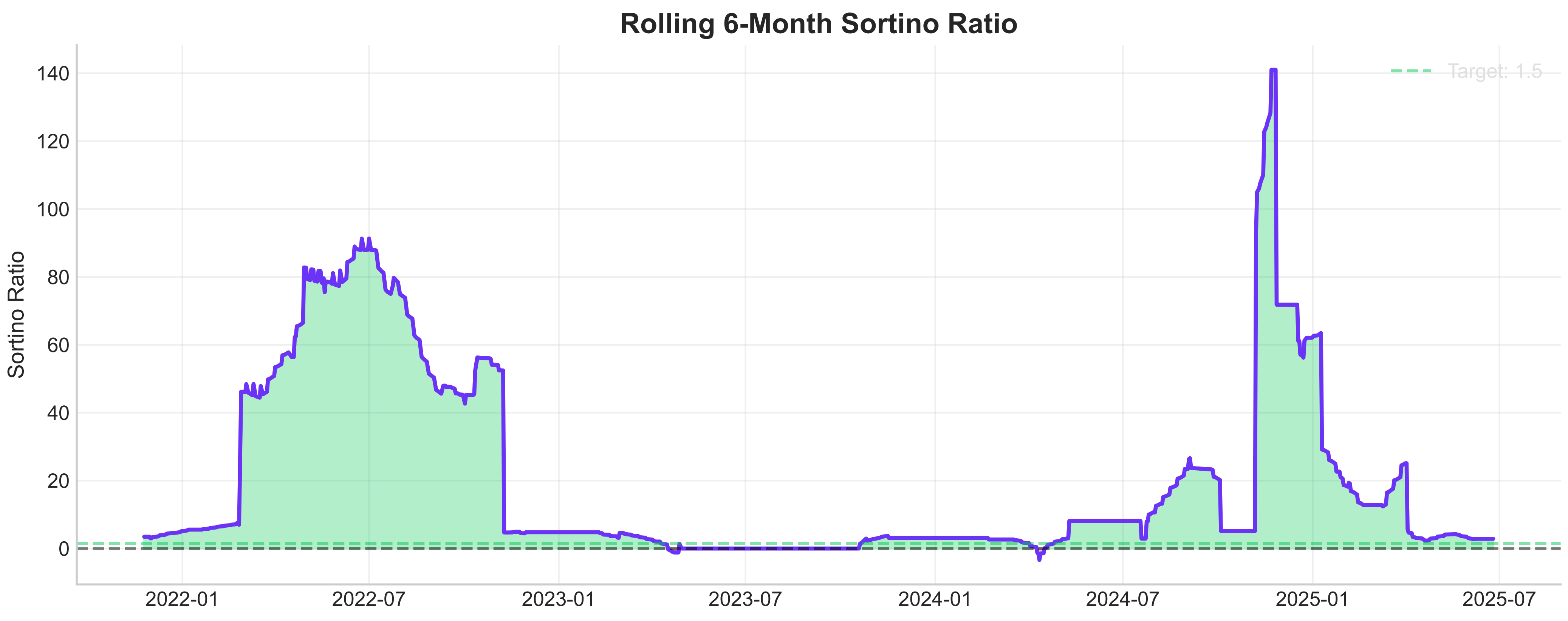
USA500.IDXUSD

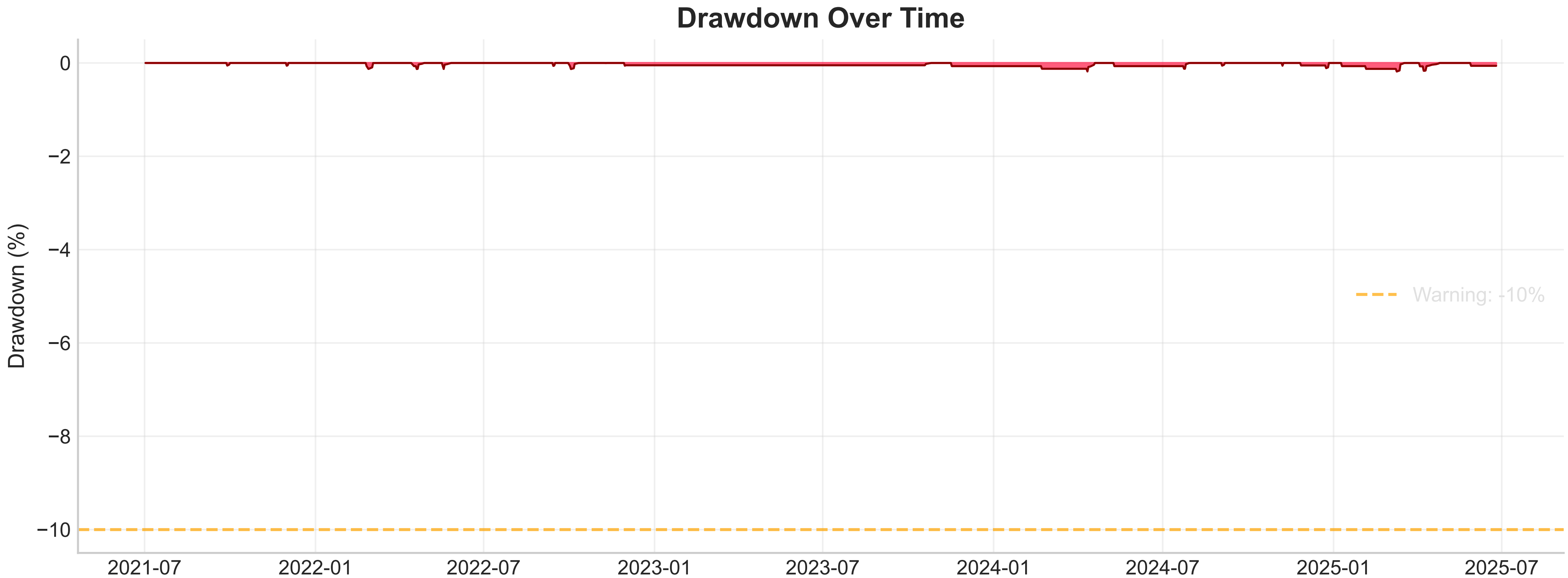
Scientific Options Framework v4.9 — Performance Report



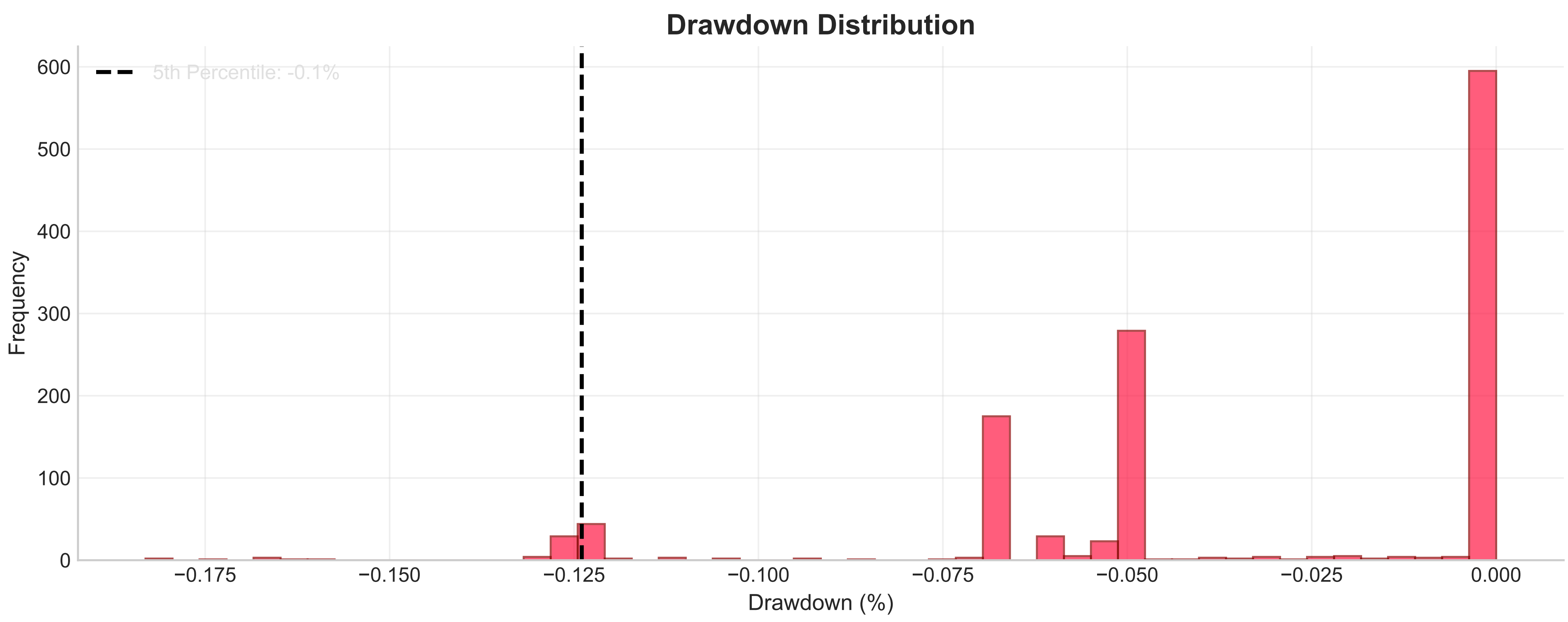
Sharpe Ratio	3.942 □	Sortino Ratio	6.046
Total Return	+8.35%	CAGR	+1.64%
Max Drawdown	-0.18%	Win Rate	93.4%
ML OOS AUC	0.4926	Sharpe p-value	0.0000


Rolling 6-Month Sharpe Ratio
Target: 1.0
Sharpe Ratio
8
6
4
2
0
−2

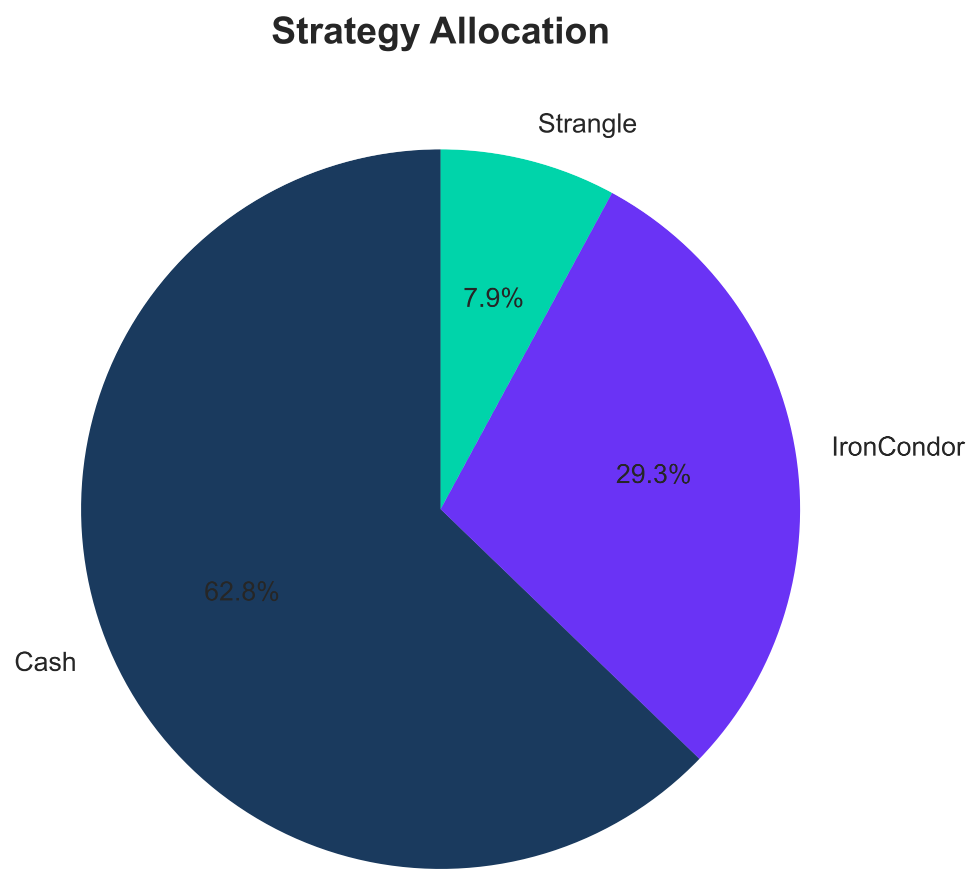

Rolling 6-Month Sortino Ratio
Target: 1.5
Sortino Ratio
140
120
100
80
60
40
20
0
2022-01
2022-07
2023-01
2023-07
2024-01
2024-07
2025-01
2025-07



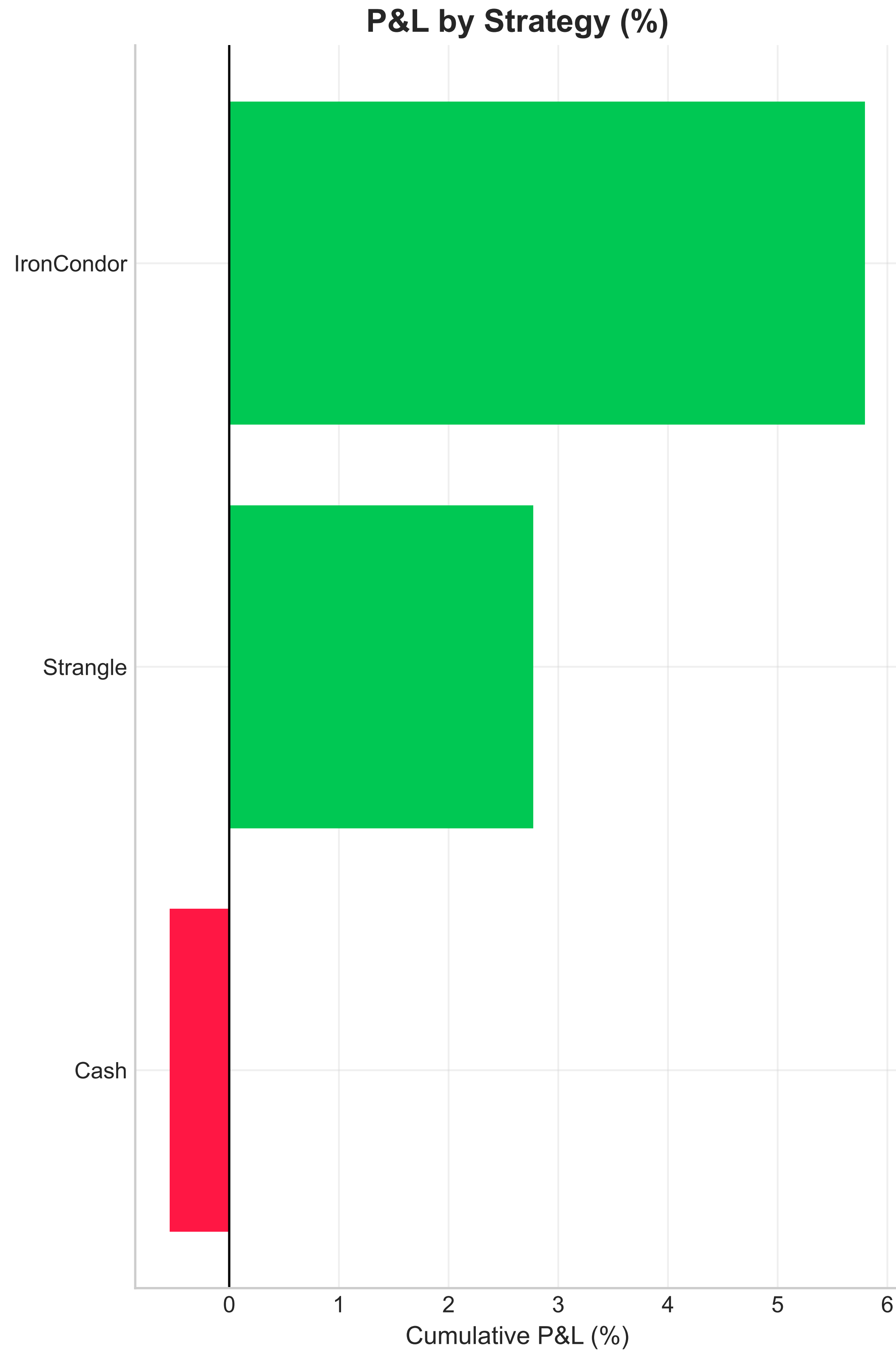
Drawdown Over Time
Drawdown (%)
0
−2
−4
−6
−8
−10
Warning: -10%
2021-07
2022-01
2022-07
2023-01
2023-07
2024-01
2024-07
2025-01
2025-07



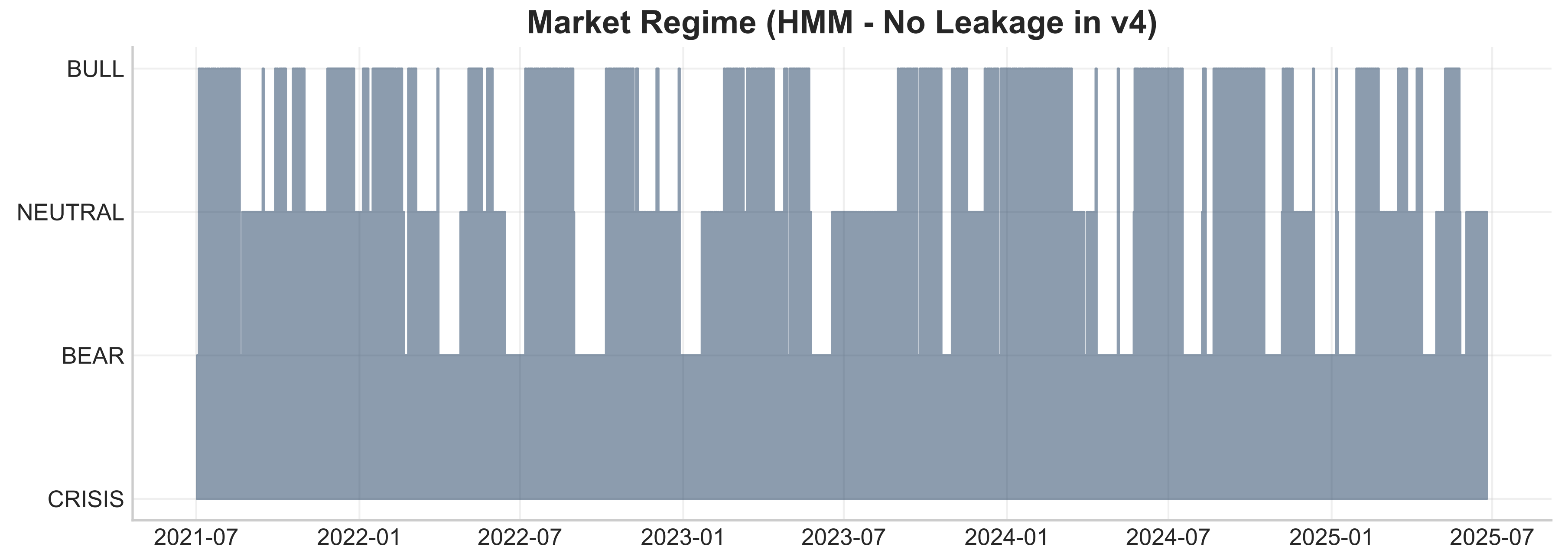
Drawdown Distribution
Frequency
600
500
400
300
200
100
0
5th Percentile: -0.1%
−0.175
−0.150
−0.125
−0.100
−0.075
−0.050
−0.025
0.000
Drawdown (%)

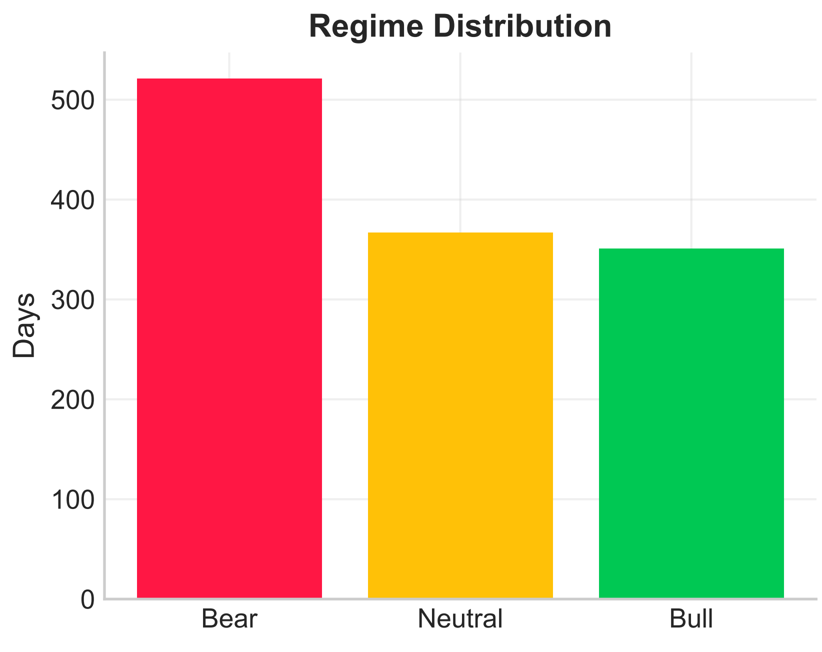


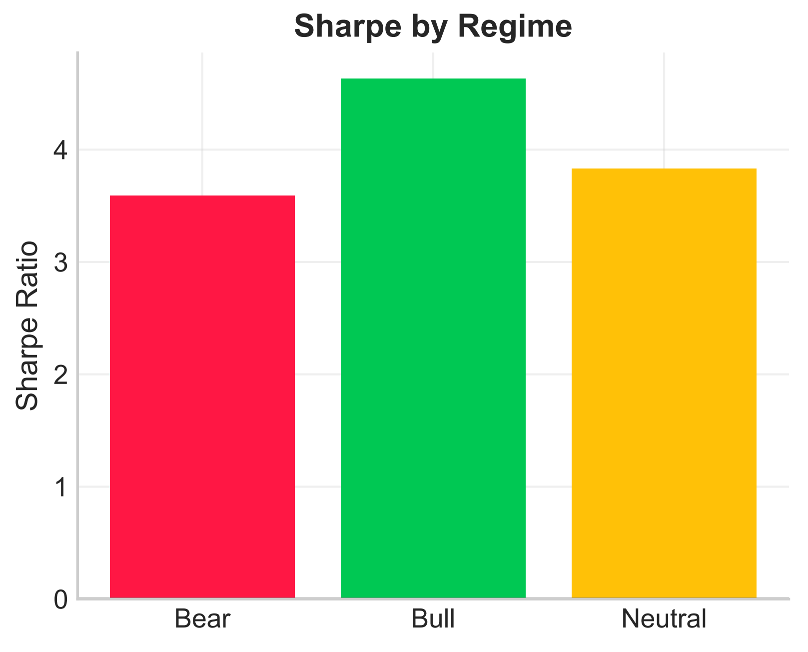
Strategy Allocation
Strangle
7.9%
IronCondor
29.3%
62.8%
Cash

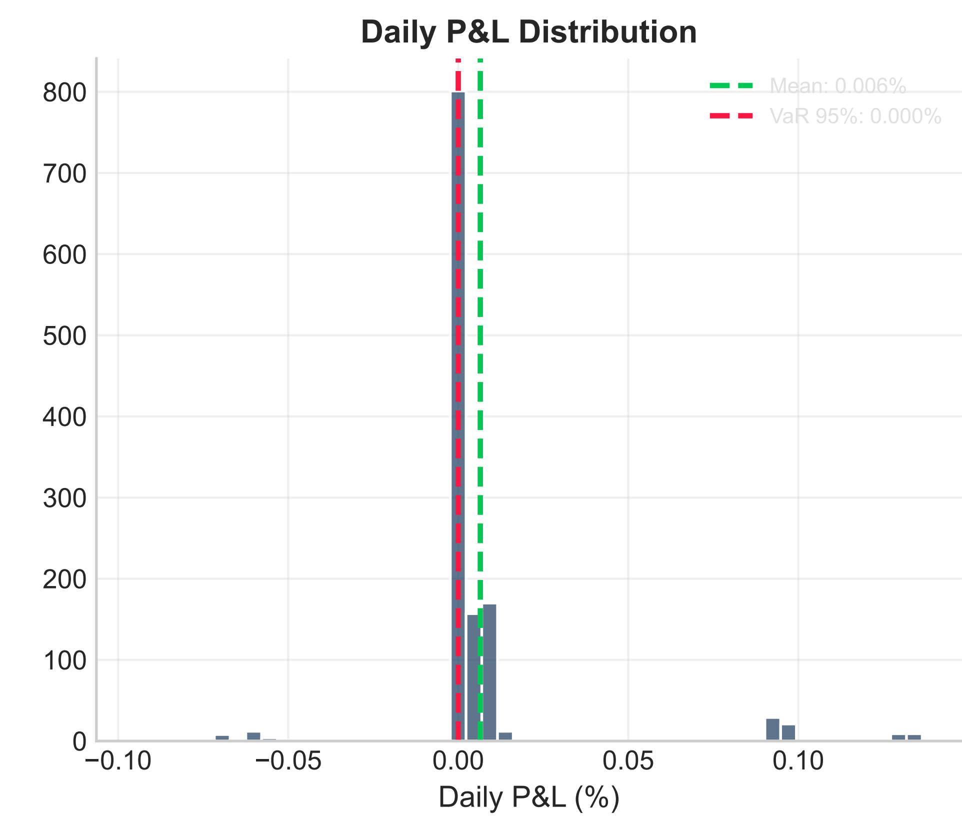


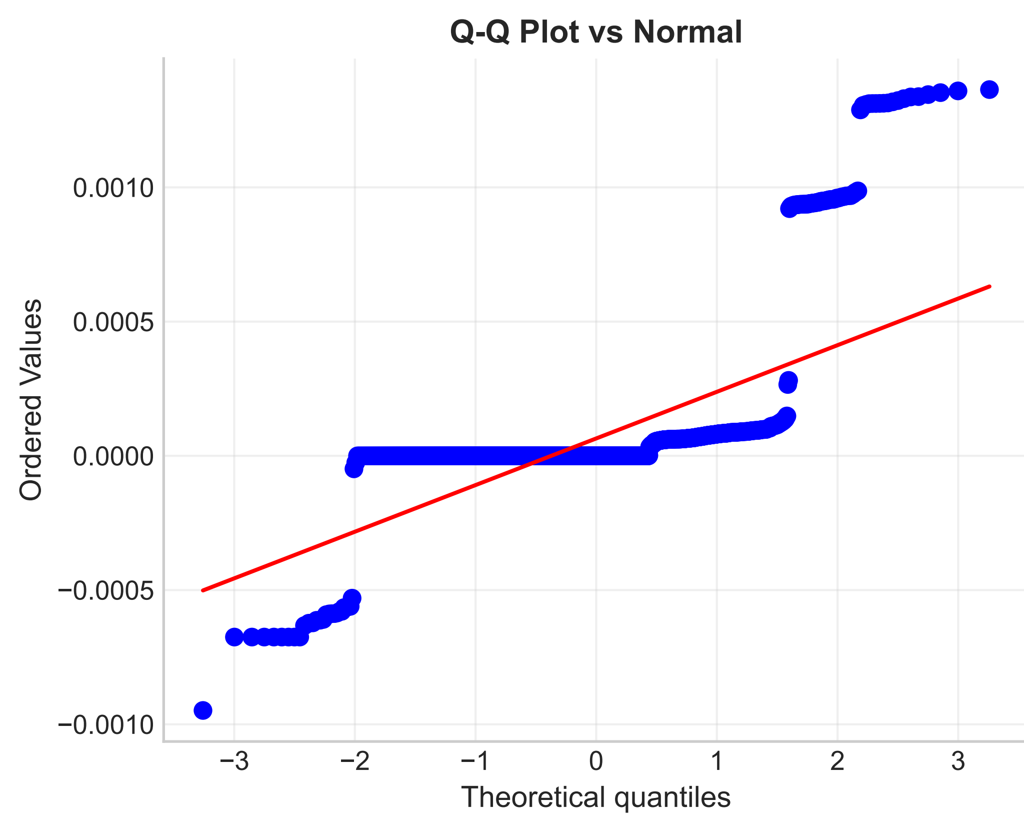
P&L by Strategy (%)
IronCondor
Strangle
Cash
0
1
2
3
4
5
6
Cumulative P&L (%)

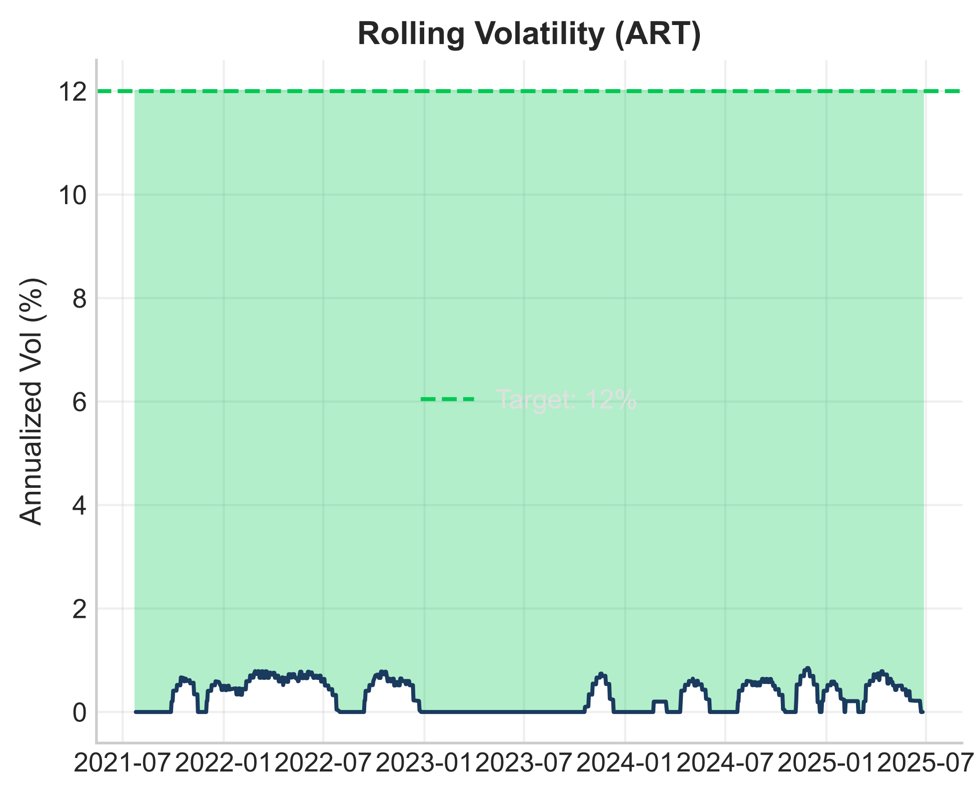

Market Regime (HMM - No Leakage in v4)
BULL
NEUTRAL
BEAR
CRISIS
2021-07
2022-01
2022-07
2023-01
2023-07
2024-01
2024-07
2025-01
2025-07


Regime Distribution
Days
0
100
200
300
400
500
Bear
Neutral
Bull


Sharpe by Regime
Sharpe Ratio
0
1
2
3
4
Bear
Bull
Neutral

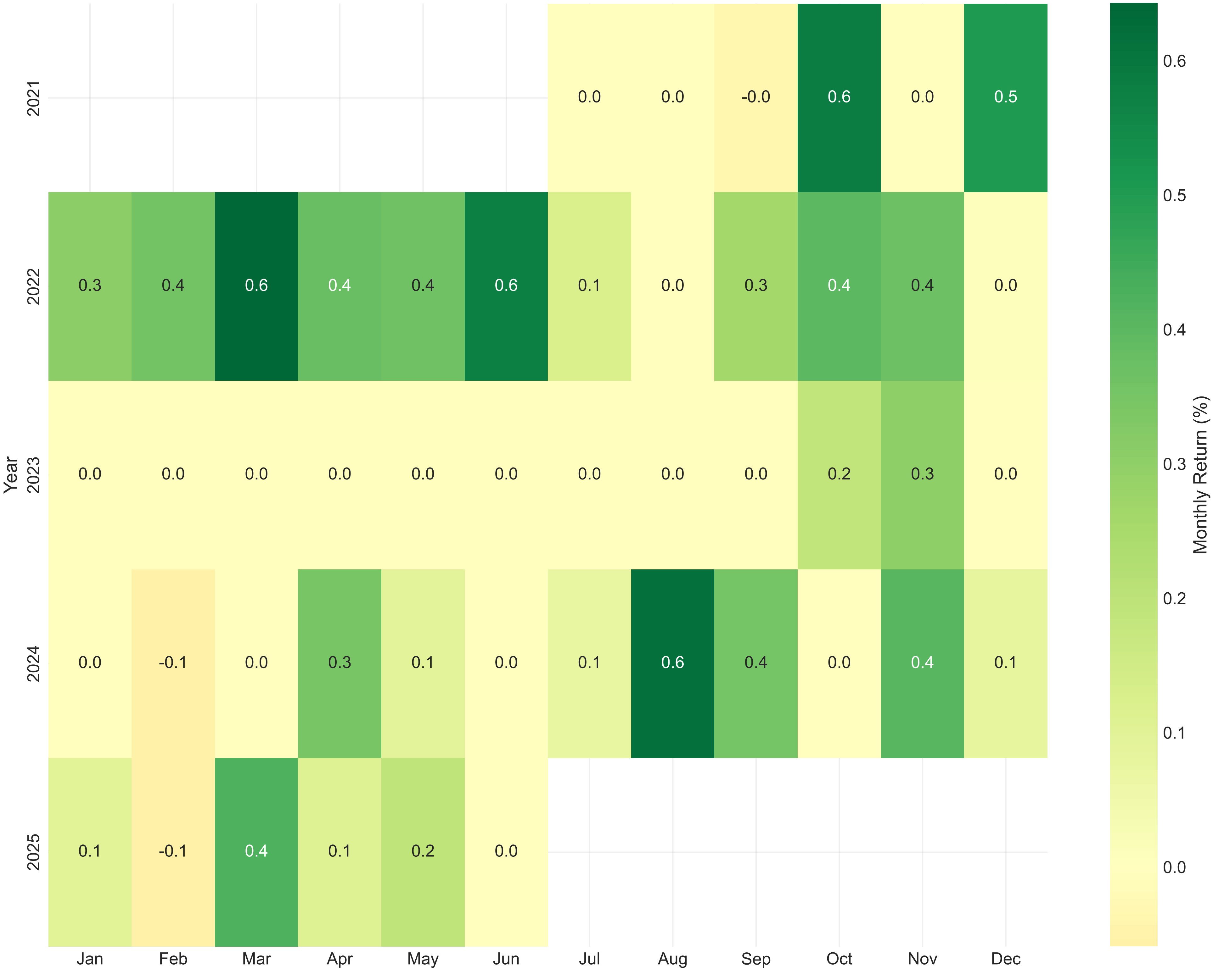






Metric	Value
VaR 95%	0.000%
ES 95%	-0.002%
Skewness	2.775
Kurtosis	11.464
Omega Ratio	5.717
Profit Factor	5.717

Monthly Returns Heatmap (%)



Top 10 Winners & Losers

Rank	Strategy	P&L (%)
1	IronCondor	+0.5690%
2	IronCondor	+0.5086%
3	IronCondor	+0.4917%
4	IronCondor	+0.3992%
5	IronCondor	+0.3747%
6	IronCondor	+0.3116%
7	IronCondor	+0.2775%
8	IronCondor	+0.2677%
9	IronCondor	+0.2602%
10	IronCondor	+0.2577%
B1	IronCondor	-0.0013%
B2	Strangle	-0.0272%
B3	Strangle	-0.0402%
B4	Strangle	-0.0493%
B5	Strangle	-0.0530%
B6	IronCondor	-0.0565%
B7	Strangle	-0.0565%
B8	IronCondor	-0.0588%
B9	IronCondor	-0.0592%
B10	IronCondor	-0.0612%

v4.9 Fixes & Improvements Dashboard

Improvement	Metric	Status
1. Robust ML (Lasso Logistic)	OOS AUC: 0.4926	□□
2. HMM Regime (No Leakage v4)	Fixed: Train-only fitting	□
3. Parkinson/GK Vol Estimators	Using High-Low data	□
4. Vol Percentile (renamed)	Accurate nomenclature	□
5. Auto-Regressive Risk Targeting	Realized: 0.4%	□□
6. Weekend Theta WIRED	Avg Adj: 1.9314	□
7. Strategy Leverage Diff	Per-strategy scaling	□
8. OOS AUC Reporting	Test AUC, not train	□

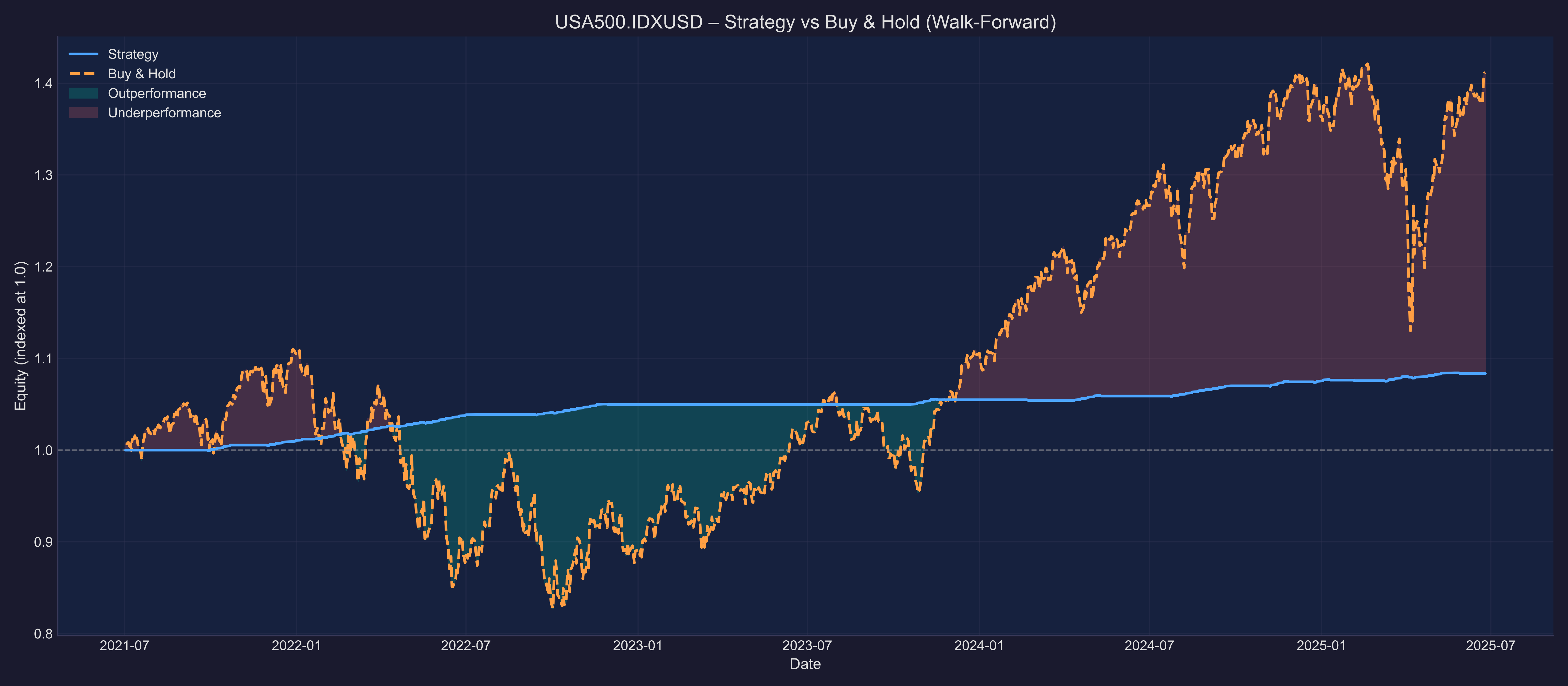
USA500.IDXUSD - FINAL SUMMARY (v4.9)

Core Metrics:
- Sharpe Ratio: 3.9418
- Sortino Ratio: 6.0465
- Total Return: +8.35%
- Max Drawdown: -0.18%

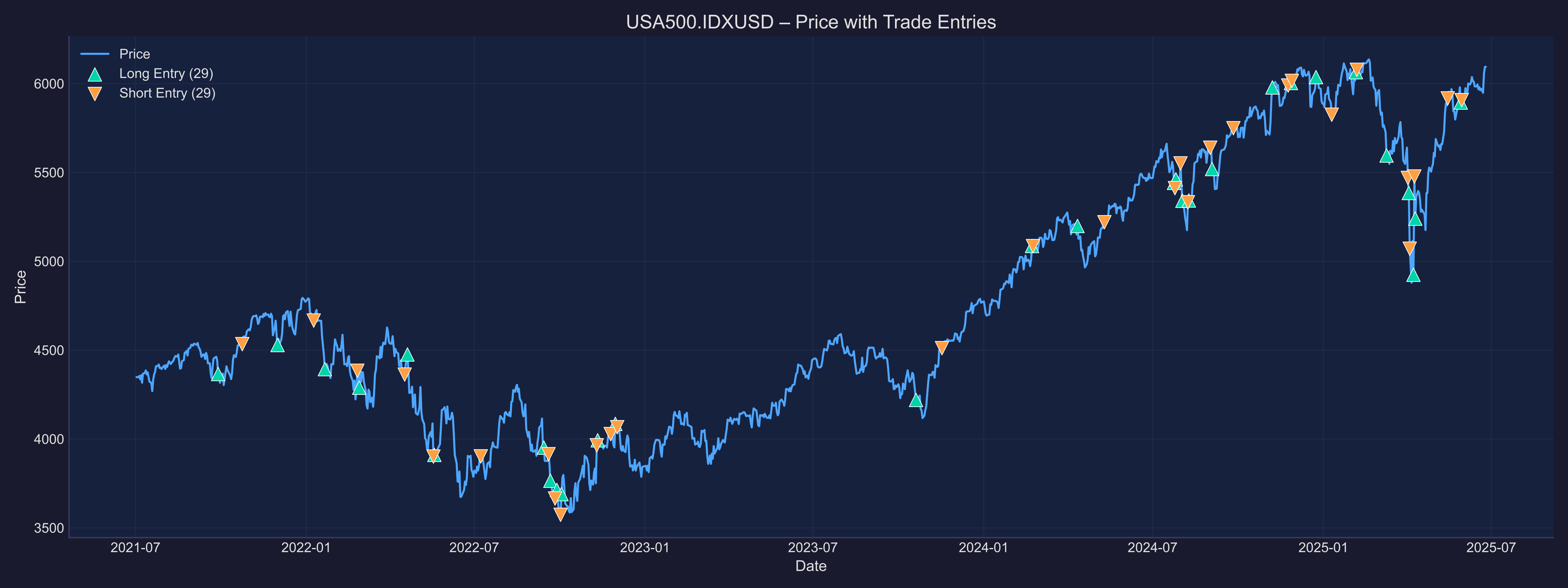
Statistical Significance:
- t-stat: 21.3560
- p-value: 0.000000
- 95% CI: [3.2812, 4.5663]
- Significant: Yes

ML Performance (OOS):
- Global AUC: 0.4926

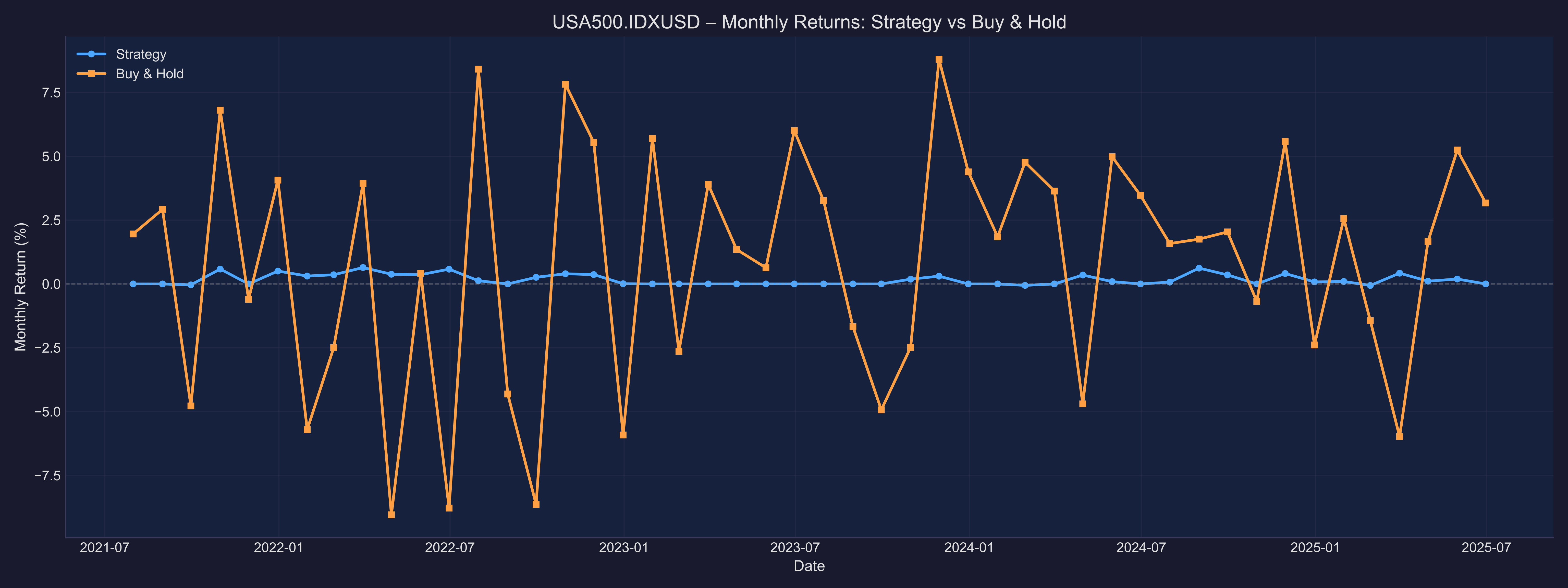
GRADE: EXCELLENT (Significant)



USA500.IDXUSD – Strategy vs Buy & Hold (Walk-Forward)
Strategy
Buy & Hold
Outperformance
Underperformance
Equity (indexed at 1.0)
0.8
0.9
1.0
1.1
1.2
1.3
1.4
2021-07
2022-01
2022-07
2023-01
2023-07
2024-01
2024-07
2025-01
2025-07
Date

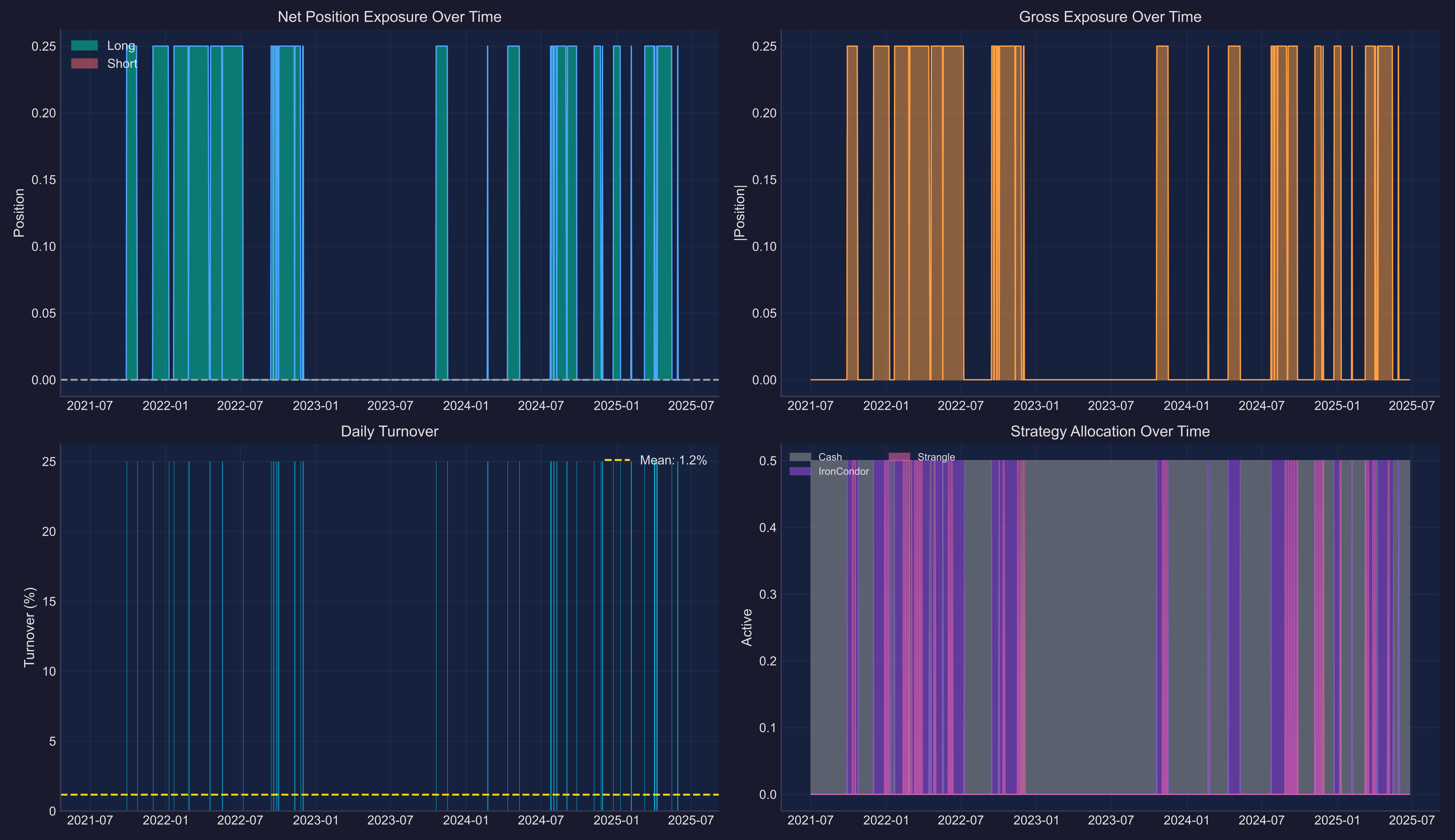


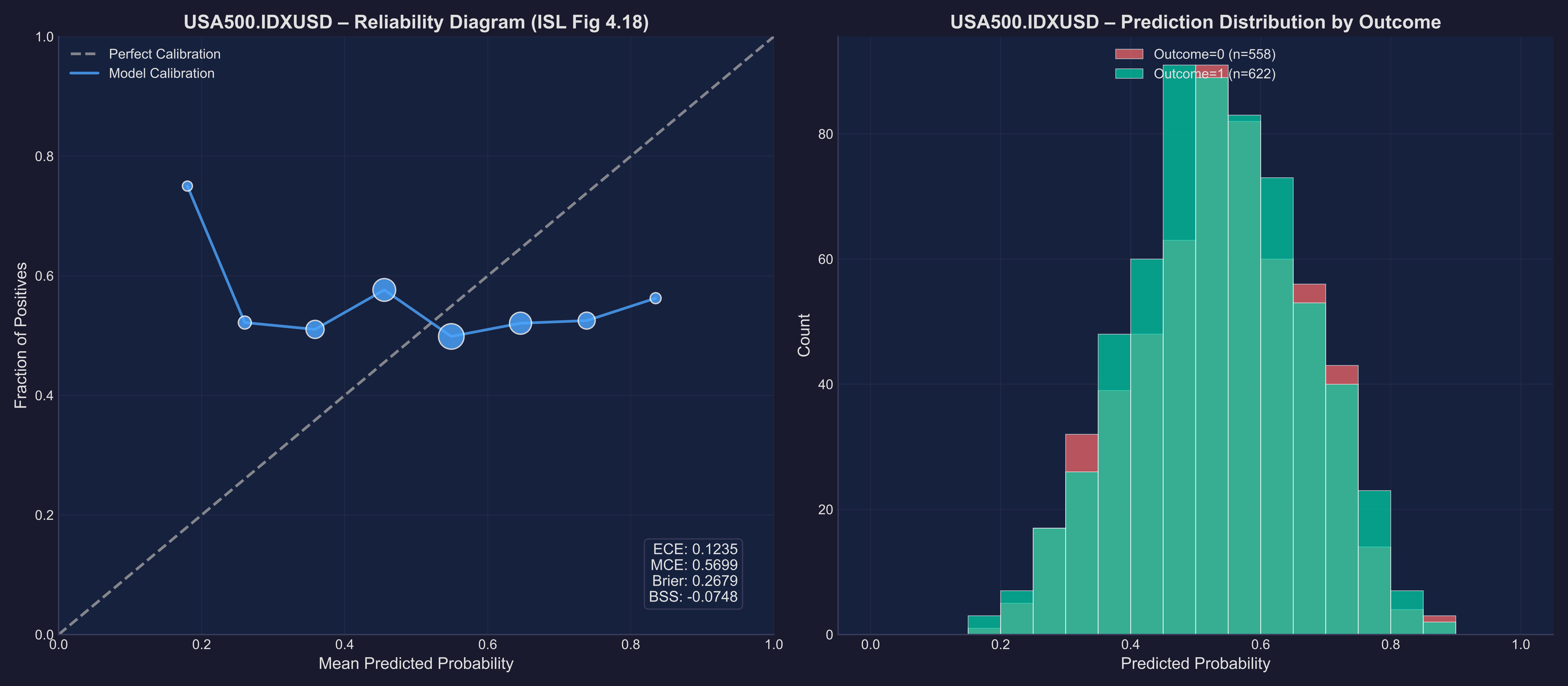
USA500.IDXUSD – Price with Trade Entries
Price
Long Entry (29)
Short Entry (29)
6000
5500
5000
4500
4000
3500
Price
2021-07
2022-01
2022-07
2023-01
2023-07
2024-01
2024-07
2025-01
2025-07
Date



USA500.IDXUSD – Monthly Returns: Strategy vs Buy & Hold
Strategy
Buy & Hold
Monthly Return (%)
7.5
5.0
2.5
0.0
−2.5
−5.0
−7.5
2021-07
2022-01
2022-07
2023-01
2023-07
2024-01
2024-07
2025-01
2025-07
Date

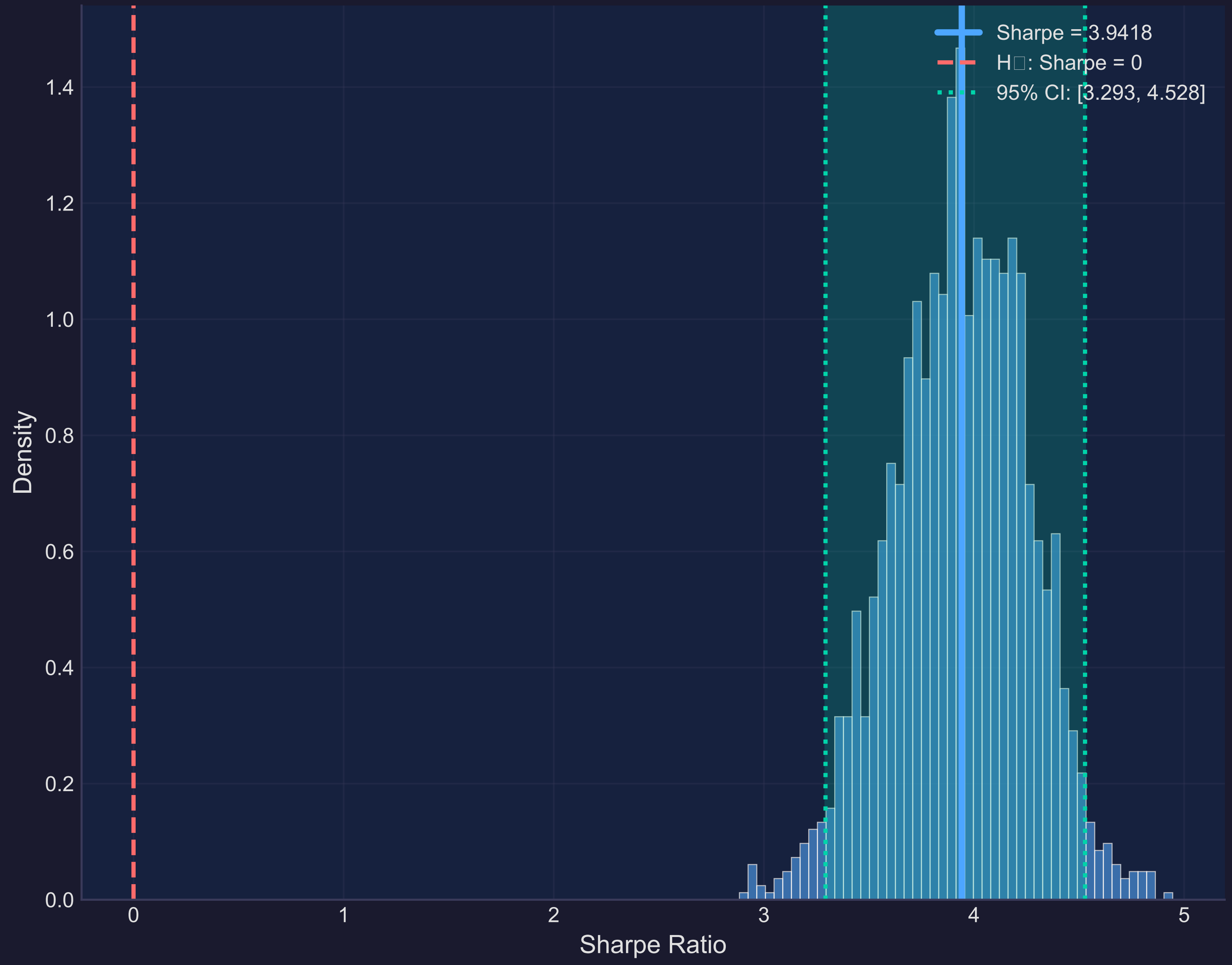
USA500.IDXUSD – Turnover & Exposure Analysis





USA500.IDXUSD – Reliability Diagram (ISL Fig 4.18)
Perfect Calibration
Model Calibration
Fraction of Positives
Mean Predicted Probability
ECE: 0.1235
MCE: 0.5699
Brier: 0.2679
BSS: -0.0748
USA500.IDXUSD – Prediction Distribution by Outcome
Outcome=0 (n=558)
Outcome=1 (n=622)
Count
Predicted Probability

USA500.IDXUSD – Bootstrap Distribution of Sharpe Ratio



USA500.IDXUSD – Sharpe Ratio T-Test Results

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SHARPE RATIO STATISTICAL SIGNIFICANCE TEST

Sample Size (n):            1,239 days

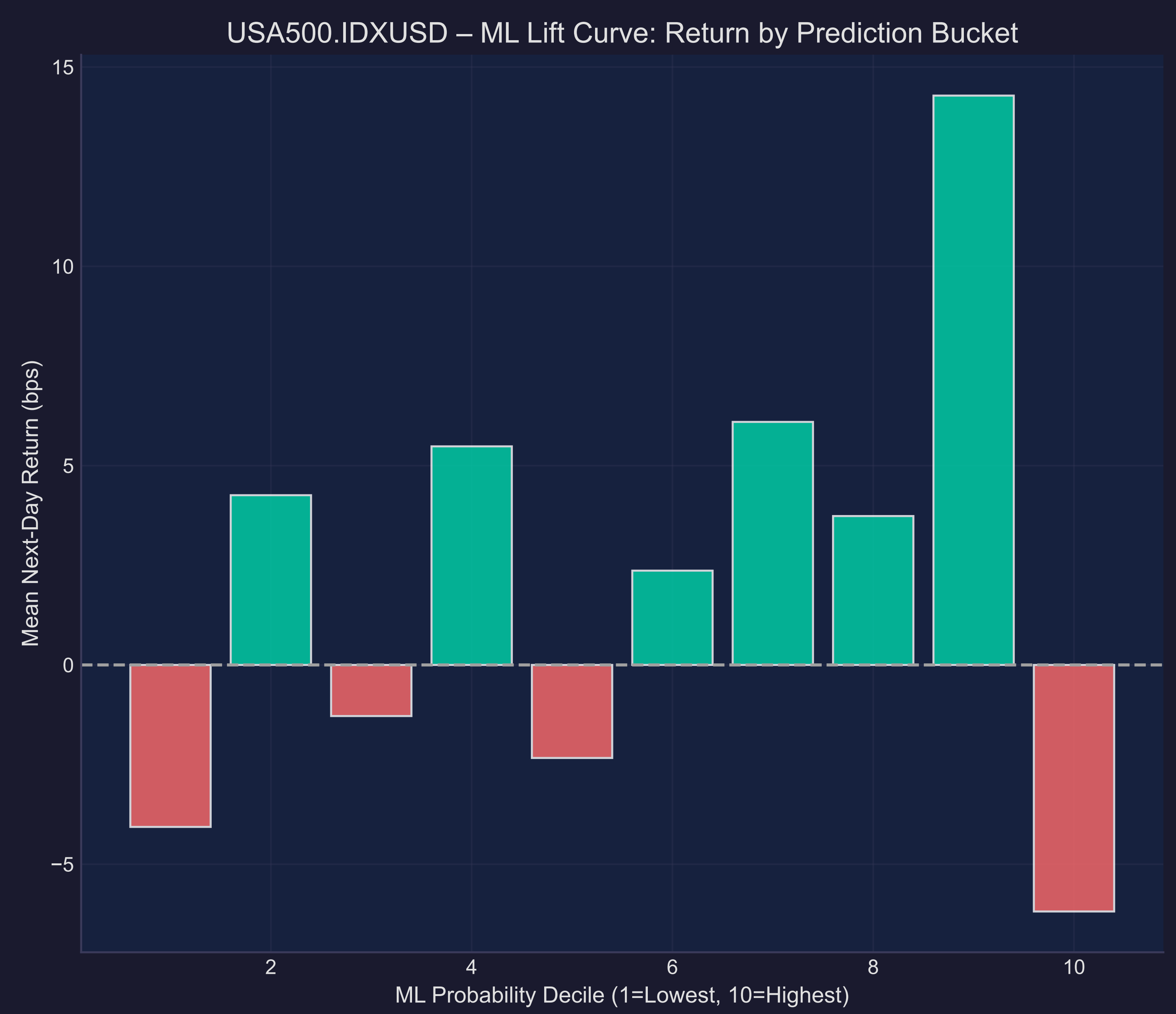
Point Estimate:
  Sharpe Ratio:             3.9418
  Standard Error:           0.1846

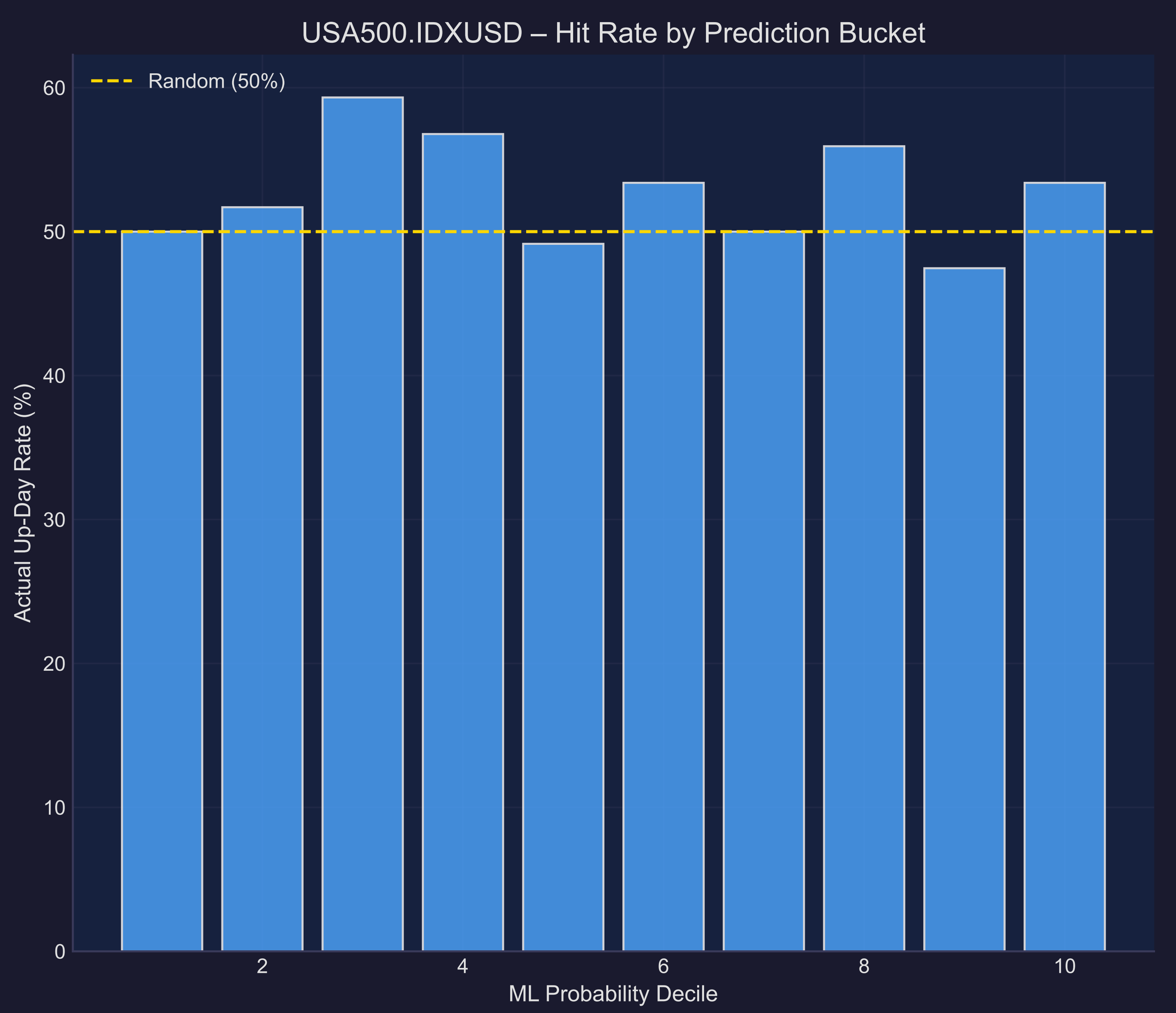
T-Test (H₀: Sharpe = 0):
  t-statistic:              21.3560
  p-value:                  0.000000
  Degrees of freedom:       1238

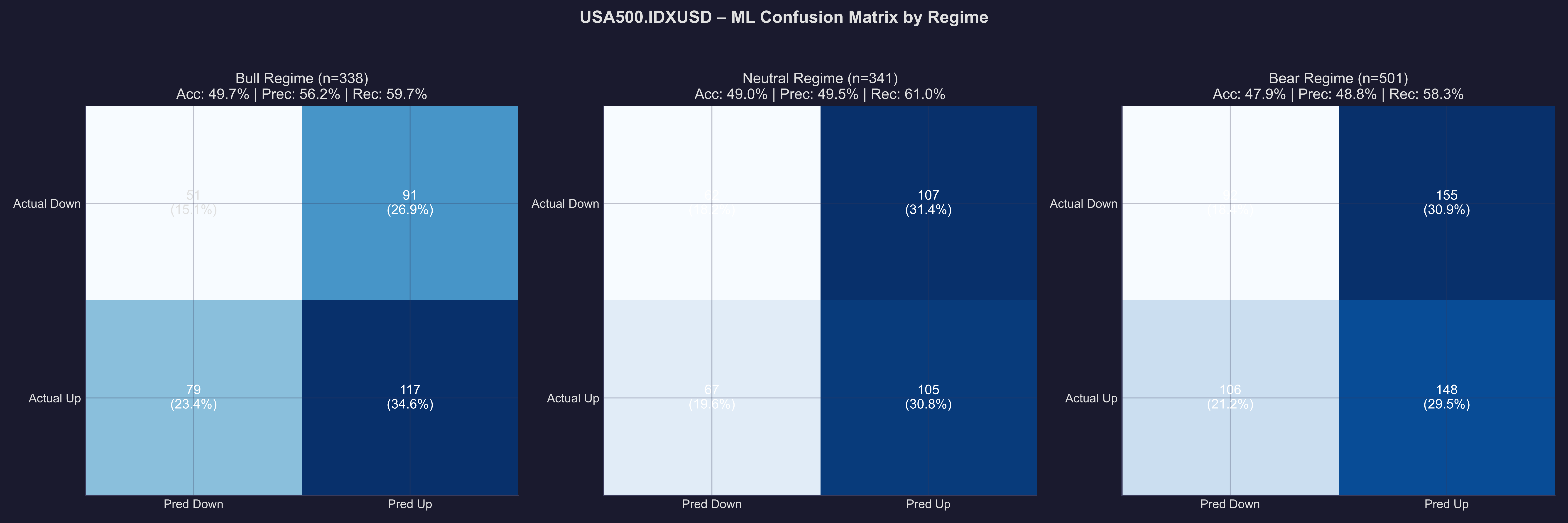
Significance:
  At α = 0.05:              ✓ Yes
  At α = 0.01:              ✓ Yes

Confidence Intervals:
  Analytical 95% CI:        [3.5800, 4.3035]
  Bootstrap 95% CI:         [3.2932, 4.5283]

Bootstrap Statistics:
  Mean:                     3.9368
  Median:                   3.9449
  Std Error:                0.3206
```


USA500.IDXUSD – ML Lift Curve: Return by Prediction Bucket
Mean Next-Day Return (bps)
ML Probability Decile (1=Lowest, 10=Highest)
15
10
5
0
−5
2
4
6
8
10


USA500.IDXUSD – Hit Rate by Prediction Bucket
Random (50%)
Actual Up-Day Rate (%)
ML Probability Decile
60
50
40
30
20
10
0
2
4
6
8
10



USA500.IDXUSD – ML Confusion Matrix by Regime
Bull Regime (n=338)
Acc: 49.7% | Prec: 56.2% | Rec: 59.7%
Actual Down
Actual Up
Pred Down
Pred Up
51
(15.1%)
91
(26.9%)
79
(23.4%)
117
(34.6%)
Neutral Regime (n=341)
Acc: 49.0% | Prec: 49.5% | Rec: 61.0%
Actual Down
Actual Up
Pred Down
Pred Up
62
(18.2%)
107
(31.4%)
67
(19.6%)
105
(30.8%)
Bear Regime (n=501)
Acc: 47.9% | Prec: 48.8% | Rec: 58.3%
Actual Down
Actual Up
Pred Down
Pred Up
92
(18.4%)
155
(30.9%)
106
(21.2%)
148
(29.5%)