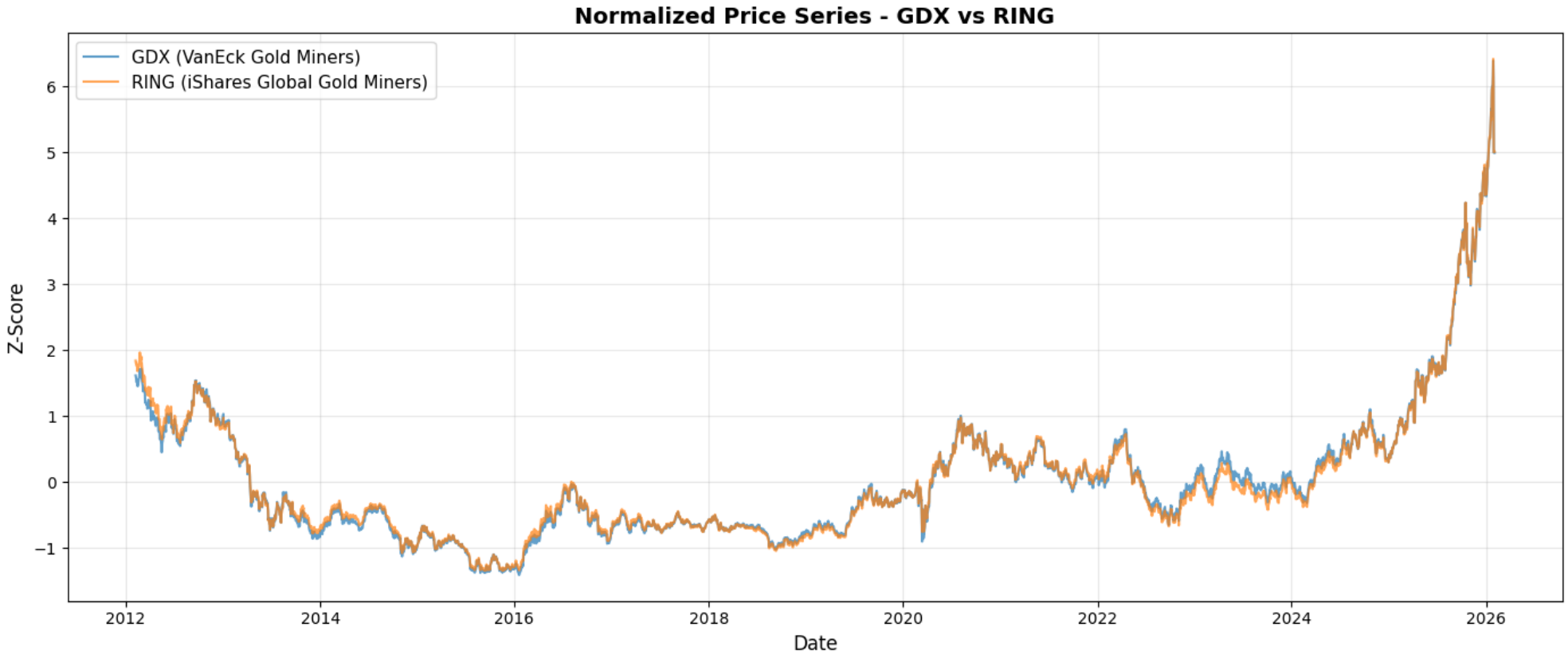
Normalized Price Series - GDX vs RING
GDX (VanEck Gold Miners)
RING (iShares Global Gold Miners)
Z-Score
6
5
4
3
2
1
0
−1
2012
2014
2016
2018
2020
2022
2024
2026
Date

Figure 1

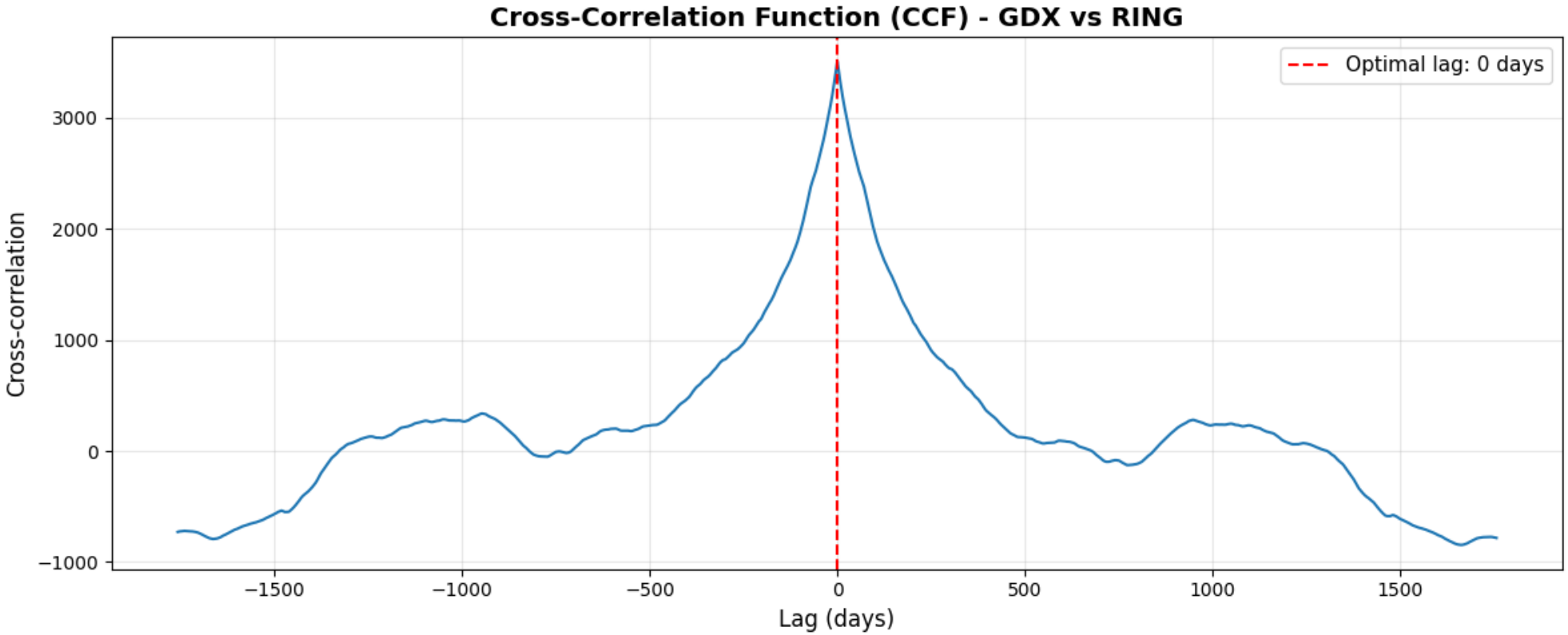
Cross-Correlation Function (CCF) - GDX vs RING
Optimal lag: 0 days
Cross-correlation
3000
2000
1000
0
−1000
−1500
−1000
−500
0
500
1000
1500
Lag (days)

Figure 2

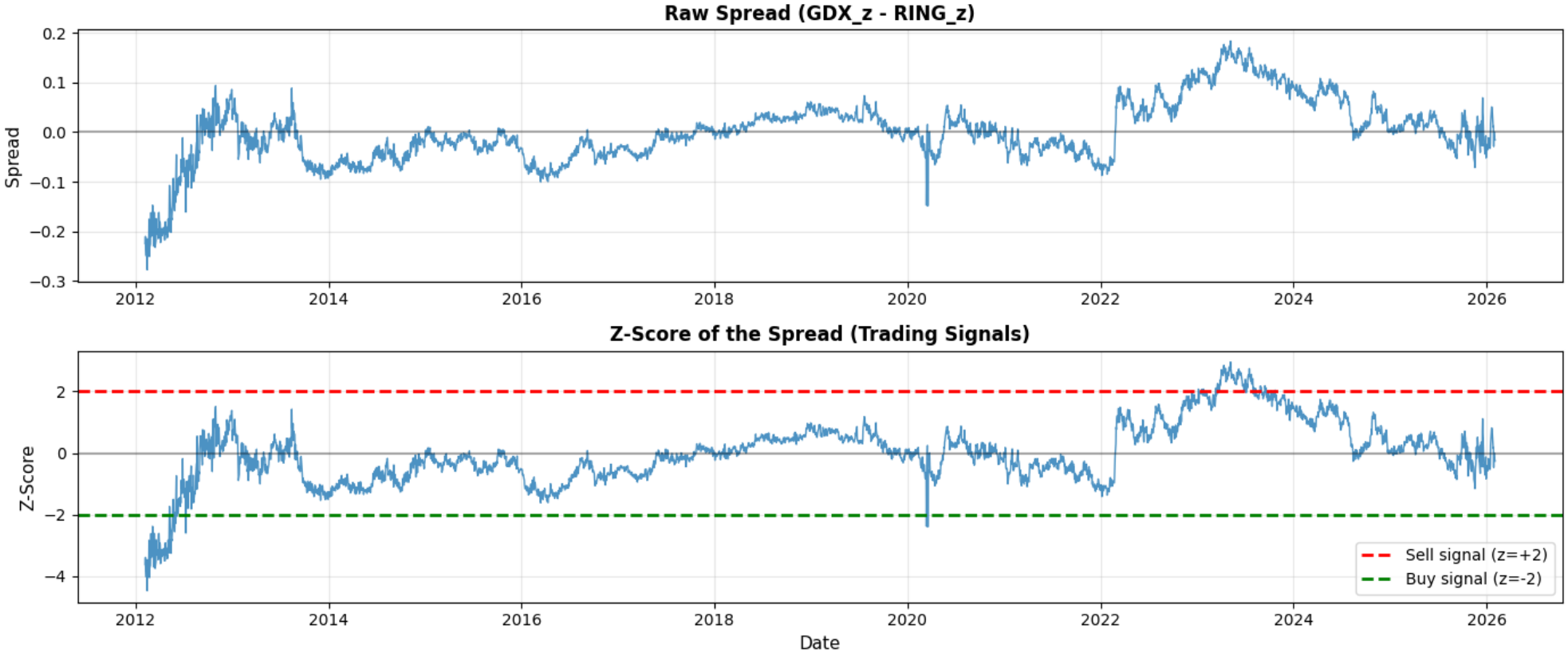
Raw Spread (GDX_z - RING_z)
Spread
0.2
0.1
0.0
−0.1
−0.2
−0.3
2012
2014
2016
2018
2020
2022
2024
2026
Z-Score of the Spread (Trading Signals)
Z-Score
2
0
−2
−4
Sell signal (z=+2)
Buy signal (z=-2)
Date

Figure 3

Raw Dollar Spread (GDX - β×RING)
Spread ($)
Spread with Rolling Mean and Bollinger Bands
Raw Spread
Rolling Mean (30d)
±2 Std Dev
Rolling Z-Score (Trading Signals)
Z-Score
Sell signal (z=+2)
Buy signal (z=-2)
Date

Figure 4

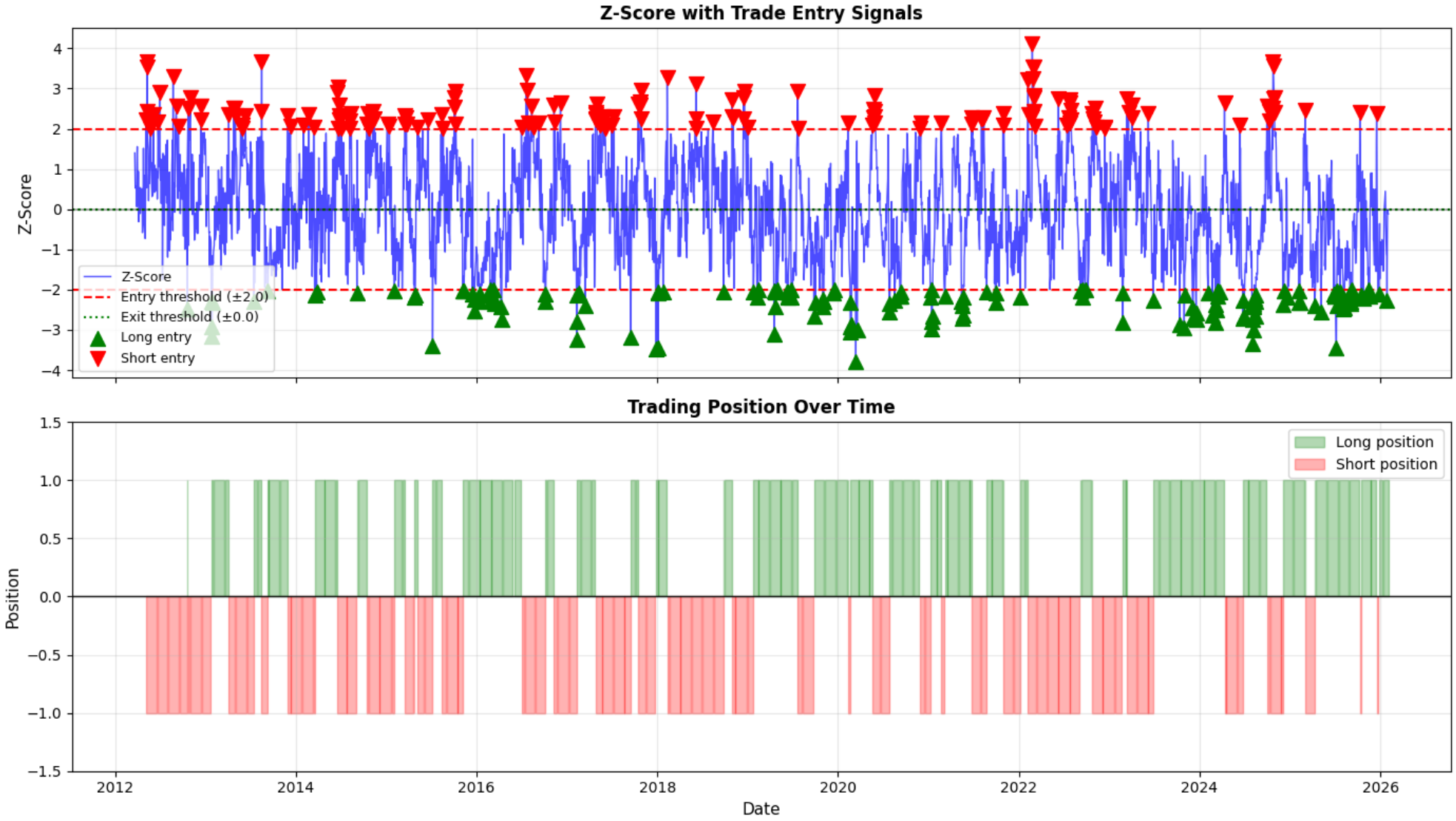
Z-Score with Trade Entry Signals
Z-Score
Z-Score
Entry threshold (±2.0)
Exit threshold (±0.0)
Long entry
Short entry
Trading Position Over Time
Position
Long position
Short position
Date
2012
2014
2016
2018
2020
2022
2024
2026

Figure 5

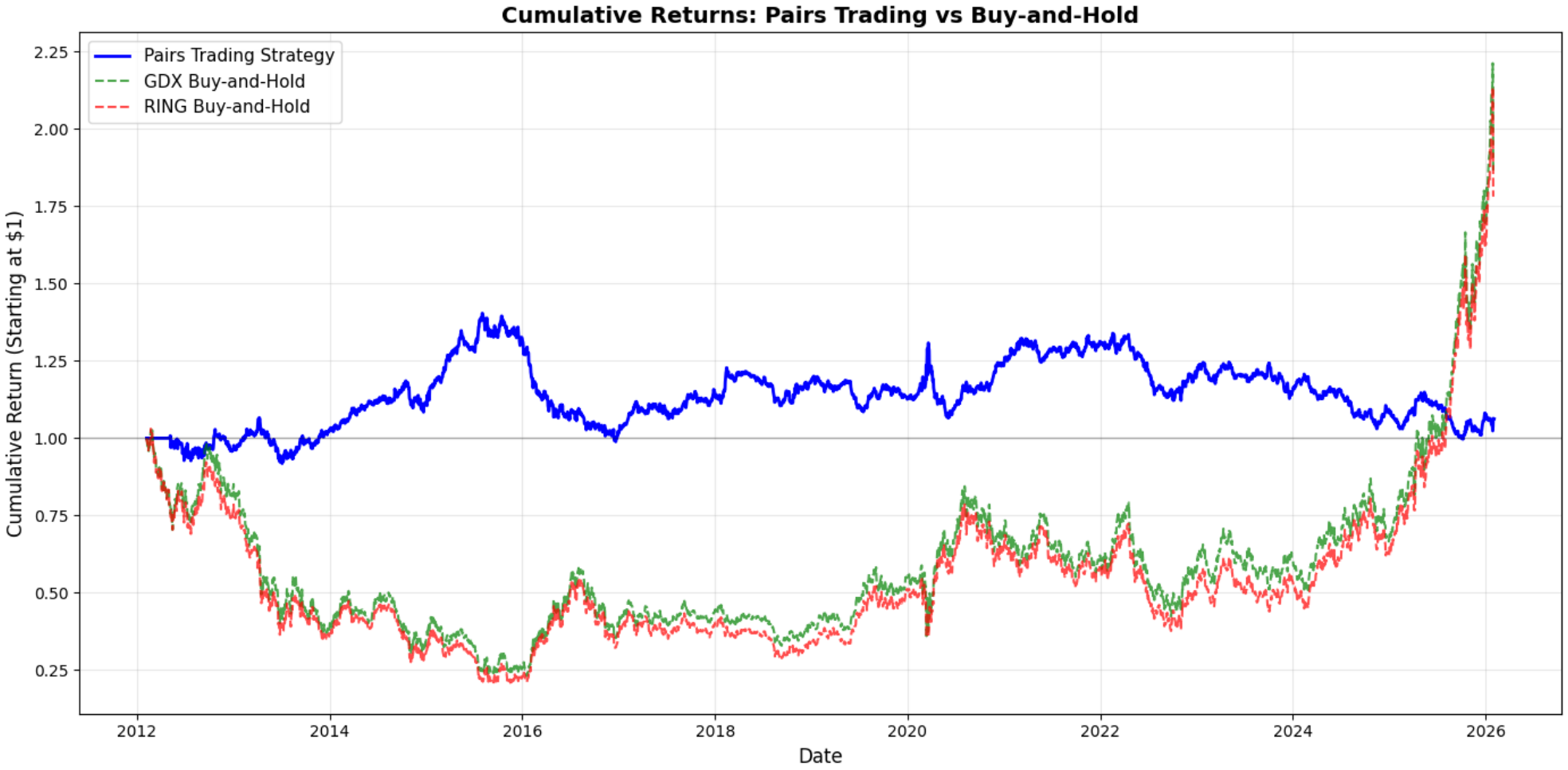
Cumulative Returns: Pairs Trading vs Buy-and-Hold
Pairs Trading Strategy
GDX Buy-and-Hold
RING Buy-and-Hold
Cumulative Return (Starting at $1)
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
2012
2014
2016
2018
2020
2022
2024
2026
Date

Figure 6

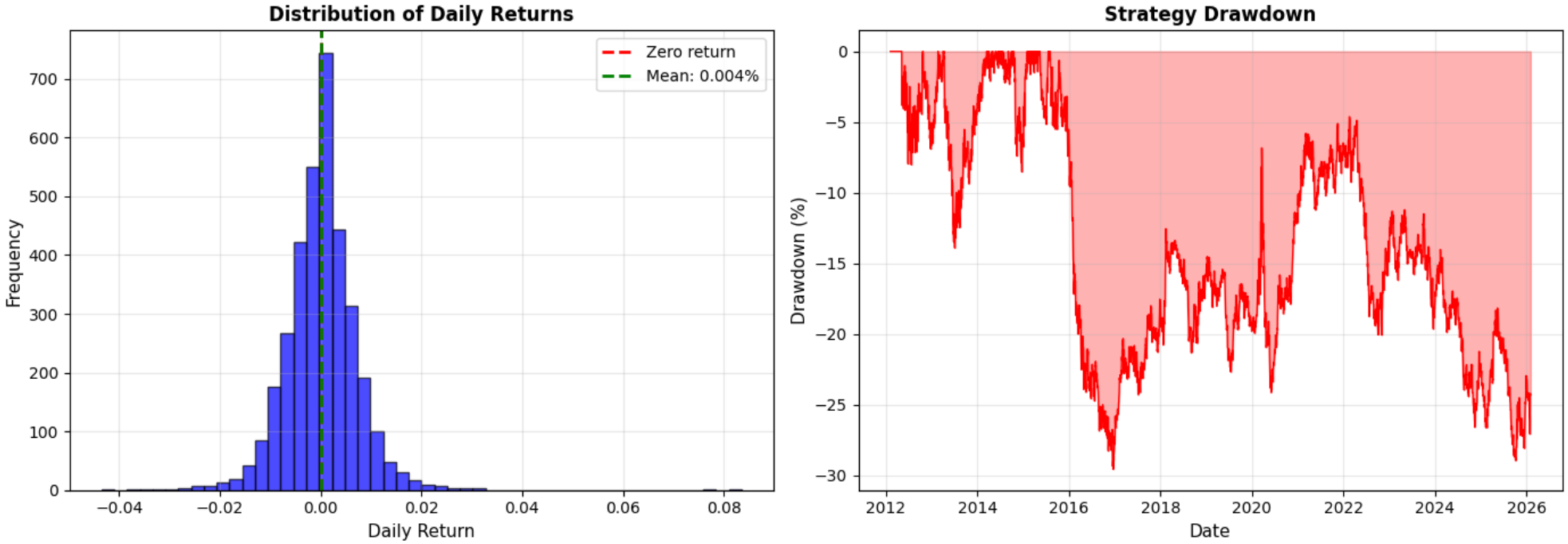
Distribution of Daily Returns
Zero return
Mean: 0.004%
Frequency
Daily Return
0
100
200
300
400
500
600
700
−0.04
−0.02
0.00
0.02
0.04
0.06
0.08
Strategy Drawdown
Drawdown (%)
Date
0
−5
−10
−15
−20
−25
−30
2012
2014
2016
2018
2020
2022
2024
2026

Figure 7

Strategy Performance: GDX vs RING
Pairs Strategy Equity Curve
Cumulative Return
1.4
1.3
1.2
1.1
1.0
0.9
2012
2014
2016
2018
2020
2022
2024
2026
Date

Figure 8

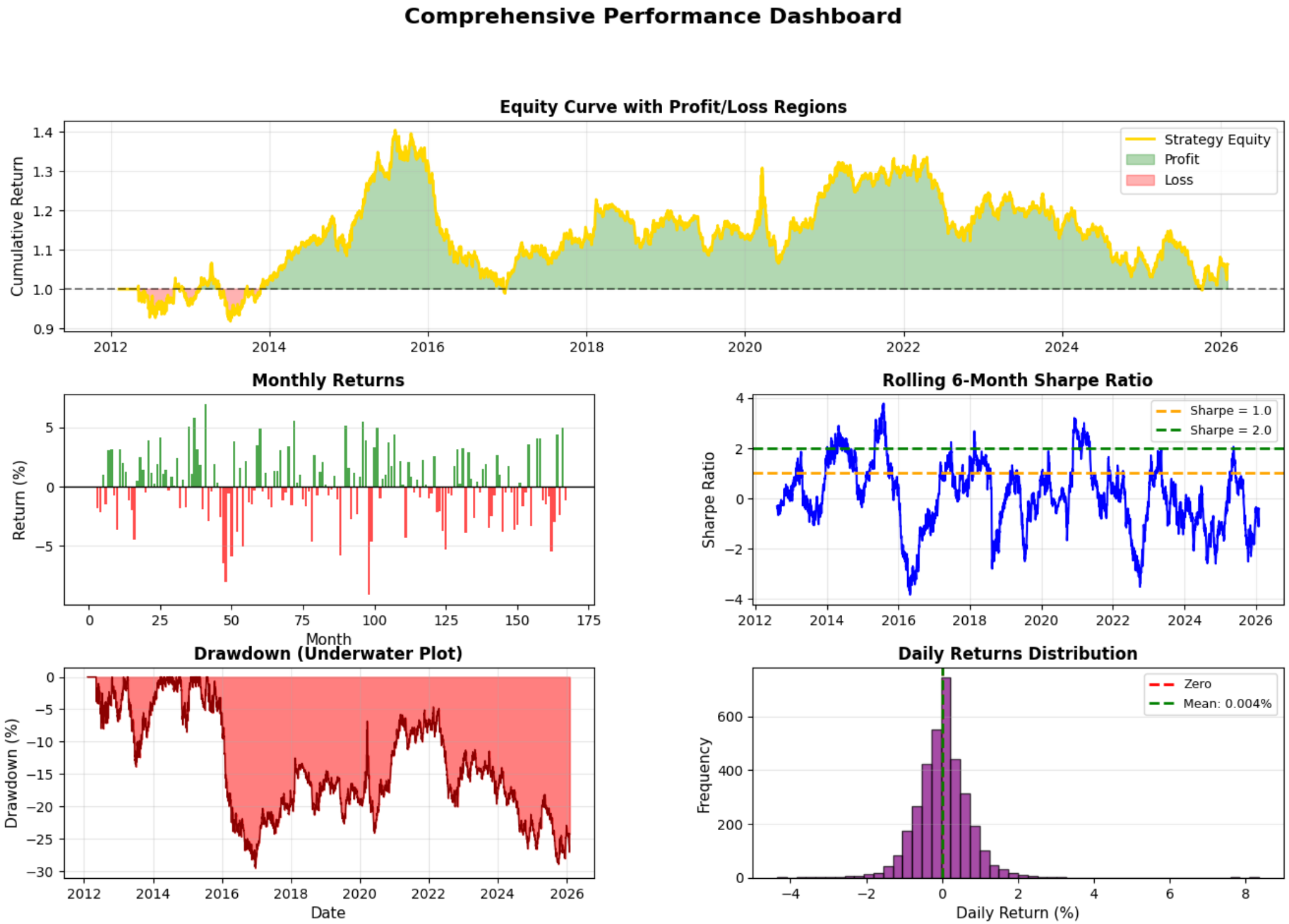
Comprehensive Performance Dashboard
Equity Curve with Profit/Loss Regions
Cumulative Return
Strategy Equity
Profit
Loss
Monthly Returns
Return (%)
Month
Rolling 6-Month Sharpe Ratio
Sharpe Ratio
Sharpe = 1.0
Sharpe = 2.0
Drawdown (Underwater Plot)
Drawdown (%)
Date
Daily Returns Distribution
Frequency
Daily Return (%)
Zero
Mean: 0.004%

Figure 9