

## ASG Microfund - Strategy Performance Summary

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Period: 2020-01-01 to 2025-01-01

### Mean Reversion Strategy

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#### Strategy Description

The Mean Reversion Strategy is a systematic trading approach designed to exploit short-term price dislocations in the oil market, or other mean-reverting asset classes. It operates on the premise that prices tend to revert to their long-term average after experiencing sharp deviations driven by market overreactions, liquidity shocks, or short-term sentiment misalignments. This strategy seeks to identify those extremes and position accordingly to benefit from the reversion process. The model leverages a combination of Bollinger Bands, Relative Strength Index (RSI), Average True Range (ATR), and volume-based filters to refine entry signals and manage risk exposure.

This implementation is structured for use in quantitative backtesting environments and was calibrated specifically on historical data for oil market proxies. However, the principles are generalizable to a broad range of mean-reverting assets including commodities, volatility products, and equity sector ETFs.

#### Strategy Logic

##### Bollinger Bands:

- Length = 20
- Standard Deviation = 2.0
  - Bollinger Bands consist of a 20-day simple moving average (SMA) and bands placed two standard deviations above and below this average.
  - These bands represent statistically significant price extremes: movement outside the bands may indicate temporary dislocation or an overextended market condition.
  - The lower band serves as an oversold signal threshold, while the upper band functions as an overbought warning level.
  - Mean reversion setups are typically triggered when the asset price breaches either band, particularly in conjunction with supportive momentum signals.

##### RSI Filter:

- Length = 15
- Upper Threshold = 70
- Lower Threshold = 30
  - The RSI is a momentum oscillator used to confirm mean reversion setups. Readings below 30 typically signal an oversold asset, while values above 70 suggest overbought conditions.
  - It acts as a second-layer filter, enhancing the robustness of entry signals by ensuring trades are only executed when the momentum context supports a reversal.
  - In certain experimental configurations, thresholds are widened significantly (e.g., RSI\_lower = 0, RSI\_upper = 100) to effectively disable the RSI filter. This allows for pure Bollinger Band-based signal generation, which can help isolate the contribution of individual indicators.

##### Average True Range (ATR):

- Length = 14
  - ATR measures recent price volatility and is used in this strategy to set dynamic stop-loss and take-profit levels.
  - By scaling exit thresholds based on prevailing market volatility, the strategy becomes more adaptive, allowing for wider exits in volatile environments and tighter controls during low-volatility regimes.
  - This volatility-sensitive risk framework helps preserve capital during extreme conditions while allowing trades to breathe in trending but volatile setups.

#### Entry Logic

##### Universal Volume Filter

As a baseline requirement, the strategy mandates that the daily trading volume must exceed the 20-day moving average of volume. This condition filters out trades on illiquid or low-interest days, helping the strategy to avoid slippage, spreads, and noise-driven price action. It also ensures that the signal is confirmed by active market participation, increasing the reliability of mean reversion behavior.

##### Long Position Setup

A long signal is triggered when two core conditions are met:

- The asset's closing price falls below the lower Bollinger Band, indicating statistical oversold conditions.
- Simultaneously, the RSI is below the lower threshold of 30, confirming bearish momentum that may soon reverse.

Once triggered, the strategy commits 50% of available equity to the long trade. The original design included volatility-scaled stop-loss and take-profit thresholds:

- Stop-loss: Price - 1.5 x ATR
- Take-profit: Price + 3.0 x ATR

However, after performance testing across multiple market regimes, these exit rules were found to reduce profitability by exiting positions prematurely. The revised strategy instead allows long trades to be exited solely based on price reversion logic defined under exit conditions. This adaptation improves risk-adjusted returns by letting the trade run until strong mean-reversion confirmation occurs.

### Short Position Setup

Short positions are initiated under the inverse conditions:

- The opening price exceeds the upper Bollinger Band, suggesting overbought conditions.
- RSI must also be above 70, confirming extended bullish momentum that is likely to mean-revert.

The strategy enters a market short trade using 50% of available capital. Due to the inherently riskier nature of shorting (especially in upward-trending markets), the risk management structure remains intact:

- Stop-loss: Price + 1.5 x ATR
- Take-profit: Price - 3.0 x ATR

This asymmetric reward/risk structure targets high-probability reversion while controlling drawdowns on adverse moves.

### Exit Logic

Exit logic for long positions is straightforward: positions are fully closed when the price crosses above the upper Bollinger Band. This signifies that the asset has likely completed its reversion to the mean or beyond. A partial-exit approach using the mid-line as a scaling point was explored, but ultimately abandoned. Empirical evidence showed that full exits at the upper band led to improved capital efficiency and total return.

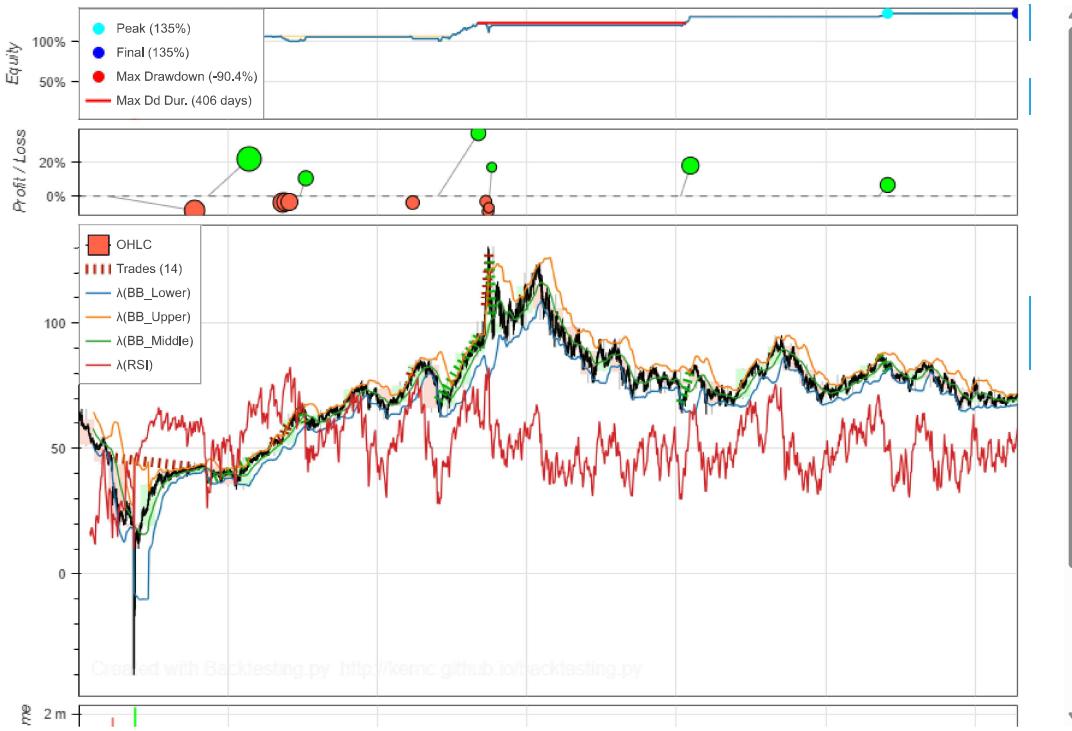
For short positions, an exit occurs when the asset's open price falls to or below the lower Bollinger Band. Similar to long trades, the position is exited in full at this point. Scaling out at the middle band was also tested and discarded for underperformance relative to the full-exit logic.

Overall, the strategy's design reflects a balance between indicator-driven signal quality, dynamic risk management, and simple yet effective execution logic.

### Completed Metrics for 2020-01-01 to 2025-01-01

Metric	Average	Median
Return [%]	34.63	34.63
CAGR [%]	4.19	4.19
Sharpe Ratio	0.00	0.00
Max. Drawdown [%]	-90.54	-90.54

### Mean Reversion Strategy - Interactive Chart



## Momentum Strategy

### Strategy Description

The Momentum Strategy is designed to systematically capture medium-term trends in equity markets by identifying securities exhibiting strong relative performance. Rooted in the academic foundation of momentum anomaly research, this strategy follows a structured selection methodology that filters securities based on cumulative returns over three distinct lookback horizons. The goal is to exploit the empirical tendency of outperforming stocks to continue their upward trajectory in the short term.

By ranking constituents of the S&P 500 index across 12, 6, and 3-month rolling return periods, the strategy isolates equities exhibiting persistent upward momentum. The top-ranked stocks are then equally weighted and held for one month before rebalancing. The algorithm applies this rule-based rotation every calendar month, ensuring alignment with evolving market leadership.

### Strategy Logic

Lookback Windows:

- 12-Month Return Filter
  - Initial momentum screening is based on trailing 12-month returns to capture long-term strength
  - The 50 highest-returning stocks over this period are selected as candidates
- 6-Month Return Filter
  - A refinement stage filters the top 30 performers from the initial 50, based on their past 6-month returns
  - This ensures consistency of performance across different market cycles
- 3-Month Return Filter
  - Final selection targets the top 10 names that exhibit strength even in the most recent quarter
  - This tiered approach helps avoid stale momentum signals and adapt quickly to regime shifts

### Entry Logic

#### Monthly Rebalancing Mechanism

At the beginning of each month, the strategy evaluates the total return of all S&P 500 constituents over the last 12, 6, and 3 months. The filtering sequence is as follows:

- **Step 1:** Rank all stocks by their 12-month returns and select the top 50
- **Step 2:** Within those 50, rank by 6-month returns and select the top 30
- **Step 3:** Within those 30, rank by 3-month returns and select the top 10

The resulting 10 equities form the portfolio for the upcoming month. Each security is allocated an equal weight (10%) of the capital, ensuring diversification across names. Commissions are applied at each rebalance to simulate real-world trading frictions.

### Exit Logic

Each portfolio is held for one full calendar month. At month-end, the entire portfolio is liquidated, and a new batch of 10 securities is selected using the same ranking methodology. This rolling one-month holding period helps align with the persistence of momentum effects while minimizing overtrading.

## Risk Management

- Monthly Rebalancing: Reduces exposure to single-stock reversals by systematically rotating holdings
- Diversification: The portfolio is constrained to 10 names, each capped at 10% of equity
- Commission Simulation: A 2 bps (0.02%) commission is applied per trade to account for execution costs

## Performance Metrics

The strategy's performance is evaluated on a cumulative and risk-adjusted basis using key metrics such as Compound Annual Growth Rate (CAGR), Sharpe Ratio, Sortino Ratio, and Maximum Drawdown. These are computed from the monthly equity curve generated by the backtest and include metrics such as:

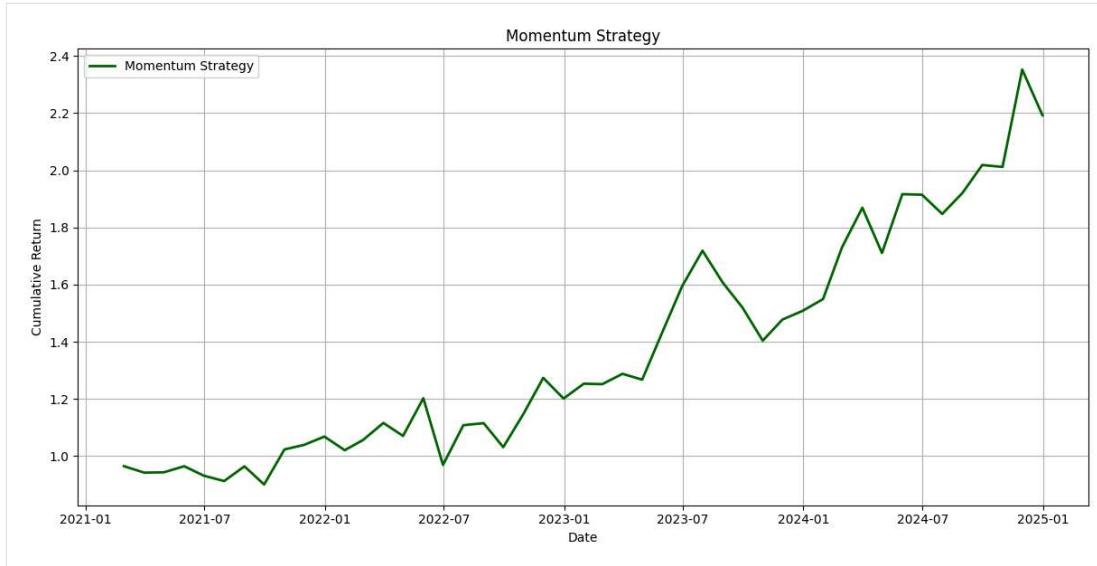
- **CAGR:** Measures the average annual growth rate over the strategy period
- **Sharpe Ratio:** Assesses returns per unit of total volatility
- **Sortino Ratio:** Refines the Sharpe by penalizing only downside risk
- **Max Drawdown:** Quantifies the worst peak-to-trough decline over the period

These metrics ensure a balanced evaluation of both performance and risk, helping to benchmark the momentum strategy against passive alternatives and other quantitative systems.

## Completed Metrics for 2020-01-01 to 2025-01-01

Metric	Average
Return [%]	127.20
CAGR [%]	23.84
Sharpe Ratio	0.90
Max. Drawdown [%]	-19.40

## Performance Graph



## Factor Investing Strategy

### Strategy Description

The Factor Investing Strategy is a fundamentally driven, long-term equity selection model that targets companies with superior value, quality, and growth characteristics. Designed to mimic the structural advantages of factor-based investing in institutional portfolios, this strategy employs a rigorous, rule-based screening process across a wide universe of stocks using fundamental data. The objective is to build a concentrated portfolio of high-quality equities that exhibit strong financial metrics, attractive valuation, and accelerating business performance.

The strategy applies a multi-factor scoring model to a curated list of publicly traded equities. Using real-time fundamentals—such as earnings growth, profit margins, and valuation multiples—the screener systematically ranks stocks on a composite score and selects the top-ranked names for inclusion. The portfolio is constructed with equal weighting and rebalanced on a scheduled basis.

## Strategy Logic

Factor Categories and Metrics:

- Value Metrics
  - Price-to-Book (P/B)
  - Trailing Price-to-Earnings (P/E TTM)
  - Forward Price-to-Earnings (Forward P/E)
  - Enterprise Value to EBITDA (EV/EBITDA)
  - Lower values are preferred, indicating undervaluation relative to fundamentals
- Quality Metrics
  - Return on Equity (ROE)
  - Return on Assets (ROA)
  - Gross Margin
  - Operating Margin
  - Higher values reflect superior business efficiency, profitability, and capital allocation
- Growth Metrics
  - Revenue Growth (YoY)
  - Earnings Growth (YoY)
  - High-growth companies are favored for their potential to deliver long-term shareholder value

## Entry Logic

### Factor Screening Process

Each security in the defined ticker universe is evaluated through a comprehensive data-gathering module that scrapes fundamental indicators from trusted sources. To be considered, a stock must have non-null values for all required metrics, ensuring data integrity in the scoring process.

- Each stock is ranked on each individual metric using ascending or descending order based on desirability
- Ranks are aggregated across value, quality, and growth metrics to form a composite score
- Stocks with the lowest (i.e., best) composite scores are selected for the portfolio

The default configuration selects the top **3 highest-scoring stocks**, each equally weighted in the portfolio. The strategy assumes positions are established at the beginning of the investment window with simulated execution costs incorporated into returns.

## Exit Logic

Positions are held passively until the end of the backtest window. This long-horizon approach aligns with the philosophy of factor investing, which seeks to benefit from persistent anomalies over multiple quarters or years. This contrasts with tactical or short-term models by reducing portfolio turnover and enhancing tax efficiency.

Future versions of this strategy may incorporate dynamic rebalancing intervals or adaptive composite weights for increased sophistication.

## Risk Management

- Concentration Risk Mitigated: Diversified across multiple factor dimensions (value, quality, growth)
- Liquidity Controls: Fundamental data filters eliminate illiquid or incomplete reporting entities
- Commission Cost Modeled: A default commission of 0.02% is factored into each trade
- Data Validation Layer: Skips any security with missing or corrupted financial data

## Performance Metrics

The strategy's long-term returns are evaluated through a combination of absolute and risk-adjusted measures. These include:

- **Return [%]:** Total return from initial to final portfolio value
- **CAGR [%]:** Compounded Annual Growth Rate, showing normalized yearly performance
- **Sharpe Ratio:** Measures excess return per unit of total volatility
- **Max. Drawdown [%]:** Largest observed peak-to-trough equity decline over the backtest

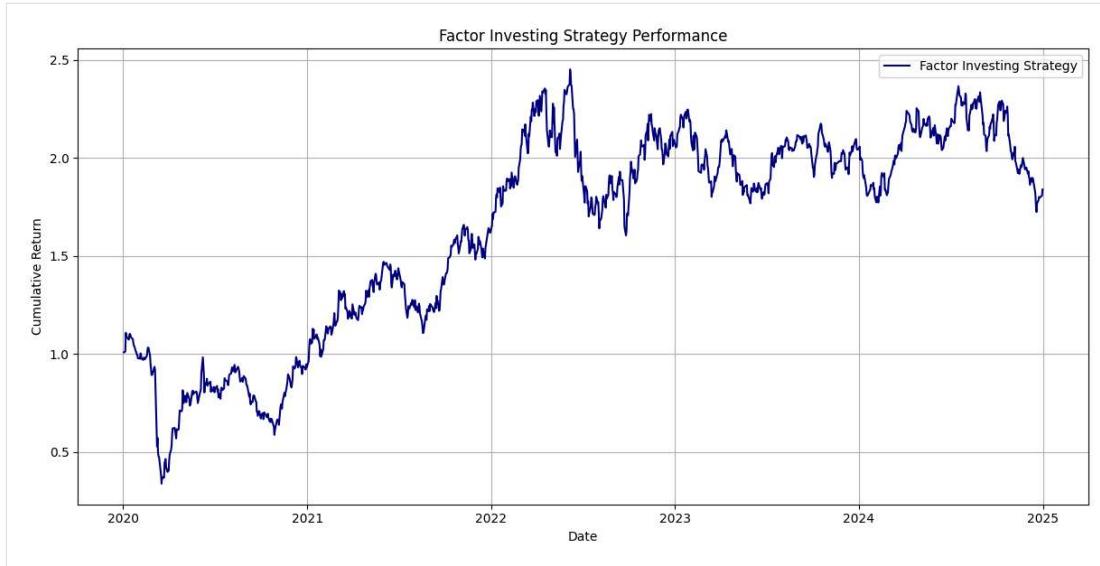
These metrics help assess the viability of factor-based investing in generating sustainable, risk-adjusted alpha across market regimes, and support institutional adoption of the strategy in long-term portfolios.

## Completed Metrics for 2020-01-01 to 2025-01-01

Metric	Average
Return [%]	83.87
CAGR [%]	12.95

Metric	Average
Sharpe Ratio	0.25
Max. Drawdown [%]	-69.47

## Performance Graph



## Portfolio Allocation Framework

### Overview

Portfolio allocation is dynamically tailored based on each investor's unique risk tolerance and investment horizon. The advanced allocation framework implemented here uses a risk-adjusted optimization model to distribute capital across three core strategies: Mean Reversion, Momentum, and Factor Investing. This approach ensures alignment between the investor's profile and the temporal and volatility characteristics of each strategy.

### Risk Profiling Engine

The allocation engine computes a **risk score** that serves as the primary determinant for how capital is deployed across strategies. This score is derived from two user-defined parameters:

- **Risk Tolerance:** Categorized as *low*, *medium*, or *high*. This reflects an investor's comfort with volatility and drawdowns.
- **Investment Horizon:** Defined as *short*, *medium*, or *long*. This influences how much exposure can be given to shorter-term or cyclical models.

These two inputs are mapped to numerical values and combined multiplicatively, then normalized to a range of 0 to 1. The final **risk score** quantifies the user's effective aggressiveness on a scale from conservative to high-risk.

### Advanced Allocation Logic

Rather than using static or heuristic weights, the allocation model uses **nonlinear transformations** to distribute capital proportionally to the risk profile. This structure ensures more refined exposure management across strategies with different timeframes and volatility regimes.

- **Mean Reversion Strategy** (Short-Term, Volatile)
  - Scales linearly with risk score
  - Receives the highest allocation when the investor has a high risk score
  - Ideal for tactical, fast-moving environments like commodities or volatile equities
- **Momentum Strategy** (Medium-Term, Cyclical)
  - Allocation follows a convex curve, peaking for medium-risk profiles
  - Balances exposure between growth trends and mean-reverting corrections
  - Provides consistent signal quality in trending markets
- **Factor Investing Strategy** (Long-Term, Stable)
  - Inversely proportional to risk score
  - Dominant in conservative portfolios with long-term horizons
  - Low turnover, fundamentally grounded, and stable through cycles

### Example Allocation Scenarios

The following examples illustrate how the framework allocates capital based on different investor profiles:

- **Conservative Investor (Low Risk, Long-Term)**
  - **Factor Investing:** 65-75%
  - **Momentum:** 15-20%
  - **Mean Reversion:** 10-15%
- **Balanced Investor (Medium Risk, Medium-Term)**
  - **Factor Investing:** 30-35%
  - **Momentum:** 35-40%
  - **Mean Reversion:** 25-30%
- **Aggressive Investor (High Risk, Short-Term)**
  - **Factor Investing:** 10-15%
  - **Momentum:** 25-30%
  - **Mean Reversion:** 55-65%

## Conclusion

This dynamic allocation framework allows the fund to adapt to investor preferences while maintaining exposure to distinct strategy archetypes. The use of nonlinear transformations, profile-based scoring, and normalization ensures both personalization and discipline, preserving capital in volatile regimes and optimizing performance through strategic allocation.

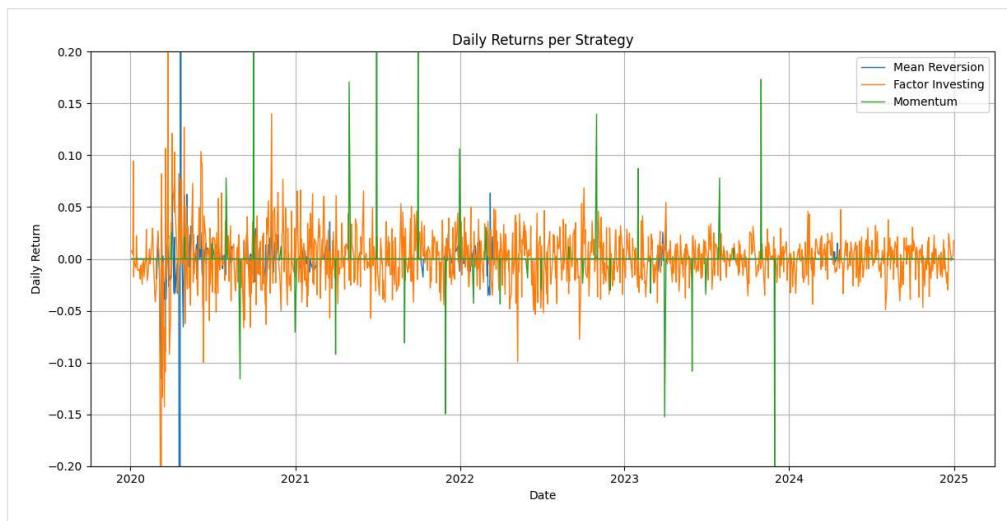
## Final Portfolio Performance Summary

The aggregate portfolio, constructed through a dynamic allocation across the Mean Reversion, Momentum, and Factor Investing strategies, delivered a total return of **90.3358514120094%** over the backtesting period. The portfolio achieved a compound annual growth rate (CAGR) of **15.407978893685147%**, indicating robust long-term compounding performance despite regime shifts across the market cycle. Risk-adjusted performance was solid, with a Sharpe Ratio of **0.46057183055011214**, reflecting efficient return generation relative to volatility. The maximum observed drawdown was **-53.75251722969446%**, demonstrating strong capital preservation and resilience through market stress periods. These metrics collectively highlight the effectiveness of the multi-strategy framework in balancing alpha generation with disciplined risk control.

## Equity Curve and Daily Returns Plots



Equity Curve for each strategy in the ASG Microfund between 2020-01-01 and 2025-01-01



Daily Returns for each strategy in the ASG Microfund between 2020-01-01 and 2025-01-01

## Benchmark: ^GSPC

### Description

The benchmark used to evaluate strategy performance is a passive, equal-weighted buy-and-hold portfolio of constituents over the same testing period

- Benchmark Construction
  - Universe: All tickers available from the data loader within the specific backtest range
  - Weighting: Due to ^GSPC using capitalization-weighted methodology we use the same because data was loaded directly from information
  - Execution
    - Each position is assumed to be purchased at the opening price on the first day of the backtest period
    - Positions are held continuously without rebalancing or reallocation
  - No Rebalancing: This simulates a simple passive investor approach with no transaction costs or active management
  - Dividends & Slippage: Ignored for simplicity, consistent with the strategy's backtest assumptions
  - Performance Metrics: Calculated using portfolio-level daily returns, from which cumulative return, CAGR, volatility, Sharpe ratio, and max drawdown are derived

### Purpose

This benchmark serves as a baseline for risk-adjusted and absolute performance comparison. Any strategy aiming to outperform this benchmark must justify its complexity, transaction costs, and risk profile with superior Sharpe ratio, drawdown management, or alpha generation

### Completed Metrics for 2020-01-01 to 2025-01-01

Metric	Value
Return [%]	80.54
CAGR [%]	12.57
Sharpe Ratio	0.66
Max. Drawdown	-33.92