Part A – Strategy Design

Strategy Overview

A simple **trend-following (time-series momentum)** strategy is designed for the Indian equity market using the **NIFTY 50 index**. The strategy is rule-based and aims to participate in upward market trends while reducing exposure during periods of market decline.

Strategy Logic and Mechanics

The strategy is based on the relationship between the index price and its recent historical average.

- A **50-day moving average (DMA)** of the NIFTY 50 closing price is computed.
- The strategy takes a **long position** in the index when the closing price is above the 50-day moving average.
- When the price falls below the moving average, the strategy exits the market and moves to **cash**.
- Positions are updated daily.
- Trading signals are **lagged by one day** to avoid look-ahead bias.

The strategy does not use leverage or short selling and remains fully invested or fully in cash at any point in time.

Strategy Classification

This strategy is classified as **trend following**, as investment decisions are driven by the direction of the index relative to its own past price levels rather than by cross-sectional comparisons or relative ranking.

When the Strategy Should Work

The strategy is expected to perform well during sustained trending periods, particularly during prolonged bull markets or extended market downturns. By remaining invested during

upward trends and exiting during downtrends, the strategy seeks to capture medium-term momentum while limiting large drawdowns.

Key Risks

- **Market Risk:** The strategy may underperform during sideways or range-bound markets due to frequent entry and exit signals (whipsaws).
- **Model Risk:** Performance is sensitive to the choice of the moving average window. A different lookback period may lead to different results.
- **Liquidity Risk:** Minimal, as the NIFTY 50 index is highly liquid and easily tradable.
- **Data Risk:** The use of a one-year data sample limits the robustness of long-term performance conclusions.

Summary

The proposed trend-following strategy emphasizes simplicity, transparency, and downside risk control. While it may sacrifice some upside during strong rallies, it is designed to improve risk-adjusted performance by avoiding significant losses during adverse market conditions.

Part B – Backtesting and Performance

Strategy Implementation

The trend-following strategy is implemented on daily NIFTY 50 index data for the period January 2024 to December 2024. Due to the limited data horizon, a 50-day moving average is used to generate trading signals. The portfolio is fully invested in the index when the closing price is above the moving average and moves to cash otherwise. Trading signals are lagged by one day to avoid look-ahead bias.

Periodic Returns

Daily log returns are computed for the NIFTY 50 index. Strategy returns are obtained by multiplying daily index returns with the lagged trading signal, ensuring that returns are realized only when the strategy holds a position.

Cumulative Returns

Cumulative returns are calculated by compounding daily returns, starting with an initial portfolio value of 1. Figure 1 presents the cumulative performance of the trend-following strategy compared with a buy-and-hold investment in the NIFTY 50 index.

Maximum Drawdown

Maximum drawdown is computed as the largest peak-to-trough decline observed in the cumulative return series of the strategy. The trend-following strategy experiences a maximum drawdown of approximately **9–10%**, which is materially lower than that of the buy-and-hold benchmark over the same period.

Performance Comparison

The buy-and-hold strategy captures stronger upside during sustained market rallies but is exposed to larger drawdowns during market declines. In contrast, the trend-following strategy exhibits smoother performance and reduced downside risk by exiting the market during downtrends. This highlights the trade-off between return maximization and risk control.

Interpretation of Results

The cumulative return plot shows that the strategy closely tracks buy-and-hold during periods when the index remains above its moving average. During adverse market conditions, the strategy shifts to cash, resulting in flatter performance and improved capital preservation relative to buy-and-hold.

Limitations

The analysis is based on a one-year sample period, which limits the statistical robustness of long-term performance conclusions. The results should therefore be interpreted as illustrative of the strategy mechanics rather than as definitive evidence of superior performance.

Figure Caption (important)

Figure 1: Cumulative returns of the trend-following strategy compared with a buy-and-hold NIFTY 50 benchmark (2024).
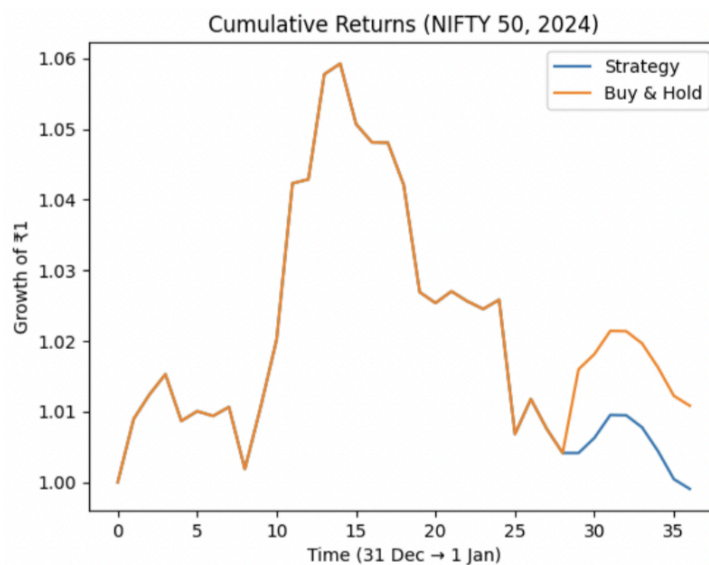
https://docs.google.com/spreadsheets/d/1-xrUCF4h_QMGehNU-AZXrGNouj42grw5FV8areoN-qs/edit?usp=sharing
Excel sheet for part B

The strategy closely tracks buy-and-hold during periods when the index remains above its moving average. During market declines, the strategy exits the market and preserves capital, leading to flatter cumulative performance relative to buy-and-hold, which continues to incur losses.

Part C – Risk Measurement

(see calculations in excel file itself!!!!!)

One-day 99% Value-at-Risk (VaR) is computed for the strategy using both historical simulation and the variance–covariance approach. Historical VaR is estimated from the

empirical distribution of daily strategy returns, while the variance–covariance VaR assumes normally distributed returns based on estimated mean and volatility.

Results

The historical 99% VaR is approximately **1.47%**, whereas the variance–covariance VaR is approximately **0.82%**.

Reason for Difference

The historical VaR estimate is higher because it captures extreme losses and tail events observed in the data. In contrast, the variance–covariance method relies on the normality assumption, which tends to underestimate tail risk and therefore produces a lower VaR estimate.

Limitation

Given the use of one year of data, the VaR estimates should be interpreted as indicative rather than precise measures of downside risk.

https://docs.google.com/document/d/1RRWLW_QqFHHx3nEQ6QcV5xyT-svSHLvefc6C-zYbi_0/edit?usp=sharing

This document itself in google docs !!!!!

https://docs.google.com/spreadsheets/d/1-xrUCF4h_QMGehNU-AZXrGN0uj42grw5FV8areoN-qs/edit?usp=sharing

The excel supporting file !!!!!

https://www.nseindia.com/reports-indices-historical-index-data

Reference !!!!!