Multi-Asset Strategy Backtesting with EMA Crossover and ATR Filter

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Abstract

This report evaluates a multi-asset trading strategy combining a 50-period and 200-period exponential moving average (EMA) crossover with an Average True Range (ATR) volatility filter. The strategy was tested on four anonymized datasets with an initial capital of 1,000,000 and transaction costs of 0.03% per side. Results highlight differences in performance across assets and the importance of risk management.

1 Introduction

Multi-asset trading strategies aim to diversify risk and capture opportunities across different market instruments. This report focuses on a trend-following EMA crossover system enhanced with an ATR filter for volatility-based trade selection. The approach is rooted in prior work by Brock et al. (1992) and volatility-based position sizing concepts from Kaufman (2013).

2 Methodology

2.1 Data

Four anonymized OHLCV datasets were used. Indicators were computed on daily closing prices.

2.2 Strategy Rules

- Go long when 50 EMA crosses above 200 EMA and ATR filter passes.
- Go short when 50 EMA crosses below 200 EMA and ATR filter passes.
- Position size: volatility-adjusted to risk a maximum of 2% of portfolio per trade.
- Stop-loss: multiple of ATR.
- Brokerage: 0.03% per side.

2.3 Risk Management

Portfolio risk was capped at 10% aggregate exposure, with individual trade risk determined by ATR-based stop placement.

3 Results

Dataset	Final Equity	Net Return (%)	Ann. Return (%)	Sharpe	Trades	Max DD (%)
Dataset1	1,080,568.86	8.057	1.492	0.355	58	12.35
Dataset2	980,853.03	-1.915	-0.279	-0.028	61	10.31
Dataset3	981,835.97	-1.816	-0.348	-0.055	46	11.80
Dataset4	1,032,455.79	3.246	0.498	0.138	56	10.64

Table 1: Performance summary by dataset

Dataset1 achieved the highest net return of 8.06%, while Dataset2 and Dataset3 showed small losses. All strategies experienced maximum drawdowns between 10% and 12.35%.

4 Discussion

Results indicate that the EMA crossover with ATR filter performs inconsistently across assets. Higher returns in Dataset1 may be due to stronger trending behavior. Sharpe ratios are modest, suggesting low risk-adjusted returns.

5 Limitations and Future Work

- Parameter sensitivity analysis not conducted.
- No walk-forward or out-of-sample validation.
- Market regime dependency should be further studied.

6 Conclusion

The tested strategy shows potential in certain market conditions but suffers in sideways or low-volatility markets. Risk management through ATR-based sizing limits drawdowns effectively.

References

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