

Empirical Evaluation of Trend Filters and Exit Configurations in a Renko-Based Algorithmic Trading System

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Short Report

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Abstract

This study presents a controlled empirical evaluation of a Renko-based algorithmic trading strategy under six alternative trend-filter mechanisms and two exit configurations. The strategy was implemented in Pine Script and evaluated with the TradingView Strategy Tester on approximately one year of historical BITSTAMP:BTCUSD data using a 1-minute Heikin Ashi chart. The Renko representation was generated internally by the strategy rather than by applying TradingView's native Renko chart type. The six trend filters were Renko higher-high/higher-low (HH-HL), EMA200, moving-average crossover, MACD trend, Supertrend, and ADX trend. Each filter was evaluated first with the strategy's base reverse-logic exit mechanism and then with an explicit risk-management configuration comprising a 400-point take-profit, 100-point stop-loss, and trailing stop activated at 100 points with a 100-point trail distance. Across the twelve experiments, the six base configurations produced positive simulated net profit, whereas all six explicit risk-management configurations produced negative simulated net profit and profit factors below one. The results indicate a substantial difference in simulated strategy behaviour associated with the tested exit architecture. The findings are limited to the specified instrument, period, implementation, and TradingView simulation environment and should not be interpreted as evidence of live-trading profitability.

1 Introduction

Algorithmic trading systems commonly combine a signal-generation mechanism with one or more trend, confirmation, and exit rules. Technical indicators such as moving averages, MACD, ADX and trend-following rules have been extensively studied as systematic trading rules. Earlier empirical work demonstrated that simple technical rules can produce statistically distinguishable historical return patterns in some datasets, while subsequent research highlighted the importance of data snooping and model-selection bias when many rules are evaluated on the same historical sample (Brock et al., 1992; Sullivan et al., 1999; White, 2000).

Renko representations provide an alternative way of describing price movement by emphasizing price displacement rather than fixed time intervals. In practical algorithmic systems, however, the interaction between a Renko representation, a trend filter and an exit mechanism can materially affect trade frequency, holding periods and simulated transaction costs. The present study therefore focuses on the experimental behaviour of a single strategy architecture under controlled changes to its trend filter and exit configuration.

The research question is: How does the choice of trend filter and exit configuration affect the simulated behaviour of a Renko-based trend breakout strategy under a common historical backtesting environment?

The contribution is deliberately empirical rather than predictive. Six trend filters are compared within the same strategy framework, and each is tested under two exit configurations, producing twelve controlled experiments. The analysis does not attempt to identify a universally superior trading strategy. Instead, it

documents the observed differences in net profit, profit factor, expectancy, trade count, drawdown, win rate and transaction-cost burden.

A further methodological consideration is that the experiments were performed on a 1-minute Heikin Ashi chart while using an internally generated Renko representation. TradingView explicitly cautions that strategy results based on non-standard chart types can differ from real-market execution because such charts contain synthetic price representations (TradingView, 2026a, 2026b). Accordingly, all reported results are treated as outputs of the specified historical simulation rather than as estimates of executable live performance.

2 Materials and Methods

2.1 Strategy architecture

The evaluated system is the Renko Trend Breakout Strategy 3.6.2. The strategy is implemented in Pine Script version 5 and uses fixed position size of one unit, initial capital of USD 100,000, pyramiding limited to one, and a commission setting of 0.01% per transaction in the TradingView strategy configuration. The strategy permits both long and short positions. Orders are processed on bar close, with order-fill and realtime calculation options enabled in the implementation.

The strategy does not use TradingView's native Renko chart. Instead, it maintains an internal Renko representation. The internal brick size is calculated from an ATR-based rule, with ATR length 14 and multiplier 1.0 in the reported configuration. The implementation can generate multiple bricks within a source bar, subject to a safety cap. The resulting internal Renko close is used by several of the trend-filter calculations.

The underlying chart for the reported experiments is BITSTAMP:BTCUSD at a 1-minute timeframe with Heikin Ashi representation. The experimental period is approximately 1 October 2025 through 2 October 2026. Trade direction is BOTH, and the multi-timeframe direction filter is disabled. The MTF Renko configuration uses ATR mode with length 14; the 1-minute setting is enabled in the tested configuration while higher timeframes are disabled.

2.2 Trend-filter configurations

Six mutually selectable trend-filter mechanisms were evaluated:

1. Renko HH-HL: identifies directional structure using the most recent internal Renko bricks.
2. EMA200: evaluates the internal Renko close relative to its 200-period exponential moving average.
3. MA Crossover: uses a fast 50-period EMA and a slow 200-period EMA applied to the internal Renko close.
4. MACD Trend: uses MACD with parameters 12, 26 and 9 on the internal Renko representation.

5. 5. Supertrend: uses period 10 and multiplier 3.0.
6. 6. ADX Trend: uses ADX length 14 and threshold 20.

The strategy contains additional optional filters and visual components. The reported experiments are defined by the controlled trend-filter and exit configurations described here; settings not forming part of the experimental factor are held constant according to the corresponding TradingView export configuration.

2.3 Exit configurations

Two exit configurations were compared. The first is termed the Base / Reverse-Logic Exit Configuration. It uses the strategy's intrinsic reversal-based exit behaviour, in which an opposing strategy signal provides the principal mechanism for changing directional exposure. The term "Base" is therefore not intended to mean "without risk management"; it denotes the reference exit architecture used by the strategy.

The second configuration is termed the Explicit Risk-Management Configuration. It adds a fixed take-profit of 400 points, a stop-loss of 100 points, and a trailing stop that activates at 100 points and uses a 100-point trail distance. The same explicit parameters are applied to each of the six trend filters.

2.4 Experimental design

The same strategy architecture was evaluated with six trend filters under two exit configurations, producing twelve controlled experiments.

Source: Authors' analysis and experimental design.

2.5 Backtesting and evaluation metrics

Historical trades were simulated using the TradingView Strategy Tester. TradingView describes strategy scripts as programs that simulate historical and realtime orders and provide a strategy report containing performance measures (TradingView, 2026a). The reported evaluation uses net profit, return, total trades, win rate, profit factor, expectancy, average winning and losing trade, maximum drawdown and commission where available in the exported reports.

The profit factor is defined as

$$PF = \text{Gross Profit} / |\text{Gross Loss}|. \quad (1)$$

Expectancy is reported using the strategy tester's per-trade expectation measure. No claim of statistical significance is made from the twelve aggregate backtests. The analysis is descriptive and comparative. Because the same historical period is reused across configurations, the results should not be interpreted as independent statistical observations.

Use of Artificial Intelligence Tools

Generative AI tools were used during manuscript preparation to assist with language refinement, organization, formatting, and editorial drafting. The authors reviewed and verified the scientific content, experimental results, interpretations, references, and final manuscript and remain fully responsible for its accuracy and integrity.

3 Results

3.1 Base / Reverse-Logic Exit Configuration

Table 1 summarizes the six base experiments. All six configurations produced positive simulated net profit over the reported historical period. Net profit ranged from USD 38,442.20 for the MA Crossover configuration to USD 354,575.82 for the ADX configuration. Profit factors ranged from 1.081 to 1.324.

Table 1
Results for the Base / Reverse-Logic Exit Configuration

Trend filter	Net profit	Return (%)	Trades	Win rate (%)	PF	Expectancy
Renko HH-HL	254,414.57	254.41	18,165	37.18	1.210	14.00
EMA200	177,554.90	177.55	9,156	22.07	1.284	19.39
MA Crossover	38,442.20	38.44	2,540	29.57	1.081	15.13
MACD Trend	99,167.69	99.17	9,892	34.67	1.107	10.03
Supertrend	206,013.16	206.01	12,241	36.70	1.215	16.83
ADX Trend	354,575.82	354.58	17,718	38.18	1.324	20.01

Source: Authors’ analysis of TradingView Strategy Tester export data.

The base configurations also differed materially in trade frequency. MA Crossover generated 2,540 trades, whereas Renko HH-HL generated 18,165 and ADX generated 17,718. Thus, positive net performance was observed across configurations with substantially different levels of trading activity. For example, EMA200 had the lowest win rate among the six configurations (22.07%) while retaining a profit factor above one, illustrating that win rate alone does not describe the simulated outcome.

3.2 Explicit Risk-Management Configuration

Table 2 summarizes the six experiments using the fixed 400/100/100/100 exit configuration. In contrast with the base configuration, every experiment produced negative simulated net profit and a profit factor below one.

Table 2

Results for the Explicit Risk-Management Configuration. TP = take-profit; SL = stop-loss; TSL = trailing stop

Trend filter	Net profit	Return (%)	Trades	Win rate (%)	PF	Expectancy
Renko HH-HL	-400,658.74	-400.66	31,625	34.25	0.694	-12.67
EMA200	-290,067.89	-290.07	25,175	38.67	0.743	-11.52
MA Crossover	-223,595.20	-223.60	18,902	43.61	0.759	-11.83
MACD Trend	-287,670.02	-287.67	23,809	40.24	0.738	-12.08
Supertrend	-319,734.34	-319.73	27,193	38.17	0.734	-11.76
ADX Trend	-343,343.58	-343.34	30,938	34.42	0.721	-11.10

Source: Authors' analysis of TradingView Strategy Tester export data.

The explicit risk-management experiments generally generated substantially more trades than their corresponding base configurations. For example, Renko HH-HL increased from 18,165 to 31,625 trades, while ADX increased from 17,718 to 30,938. The increase in trading activity occurred together with negative expectancy and profit factors below one in every explicit-risk-management experiment.

3.3 Comparative results

Figure 2 displays the net-profit comparison. The direction of the observed difference is consistent across all six trend filters: the base configuration is positive in the historical simulation, whereas the explicit fixed-exit configuration is negative.

Source: Authors' analysis and experimental design.

Figure 3 compares profit factors. All six base configurations have PF greater than one, while all six explicit risk-management configurations have PF below one.

Source: Authors' analysis and experimental design.

4 Discussion

The principal empirical observation is the consistency of the configuration-level difference. The base / reverse-logic exit configuration produced positive simulated net profit for every tested trend filter, whereas the fixed explicit risk-management configuration produced negative simulated net profit for every tested trend filter. This pattern suggests that, within the particular historical simulation examined, the exit architecture materially altered the behaviour of the system.

Several mechanisms could plausibly contribute to this observation, but they are not separately identified by the present experiment. First, a fixed 100-point stop or trailing distance may terminate positions

before a trend signal has time to develop. Second, explicit exits can increase the number of completed trades and therefore increase the accumulated commission burden. Third, fixed point distances may interact differently with the dynamically sized internal Renko representation across changing volatility regimes. Fourth, the reverse-logic exit may allow positions to remain open until the strategy receives an opposing directional condition, whereas fixed exits impose additional termination conditions. These explanations should be treated as hypotheses for future controlled experiments rather than established causal findings.

The results also illustrate why win rate should not be interpreted in isolation. In the base experiments, EMA200 had a win rate of only 22.07%, yet its profit factor was 1.284 and expectancy was positive. In the explicit risk-management experiments, MA Crossover had the highest win rate at 43.61%, but its profit factor remained below one and expectancy was negative. Thus, the distribution of winning and losing trade magnitudes and the resulting gross-profit/gross-loss relationship are important components of the observed outcome.

The transaction-cost component is also relevant. The high-frequency configurations accumulated substantial simulated commissions. This is particularly important because the study uses 1-minute source data and some configurations generated tens of thousands of trades. Consequently, the reported net results should be interpreted together with commission rather than gross profit alone.

The experiment should not be interpreted as evidence that explicit stop-loss or trailing-stop mechanisms are intrinsically inferior. The study tests only one fixed parameterization: TP 400, SL 100, and TSL activation/trail 100. Other distances, volatility-scaled exits, position sizing rules, or adaptive exit mechanisms could produce different outcomes. Similarly, the six trend filters represent selected implementations rather than the full universe of possible trend measures.

An additional limitation follows from the use of a Heikin Ashi source chart. TradingView notes that non-standard chart types use synthetic price representations and that strategy results can differ from actual market execution (TradingView, 2026b). The present study therefore treats the backtest as a computational experiment on the specified representation. It does not claim that the reported P\&L could be reproduced through live BTCUSD execution.

The study also evaluates multiple configurations on the same historical sample. This creates a potential data-snooping concern. The literature on technical trading rules has emphasized that repeated evaluation of rules on a common dataset can produce apparently attractive historical results by chance (Sullivan et al., 1999; White, 2000). The present work does not apply White's Reality Check or another multiple-comparison correction. Consequently, the findings should be regarded as exploratory empirical evidence about the tested configurations rather than as statistically validated evidence of predictive superiority.

5 Conclusion

This study evaluated a Renko-based algorithmic trading strategy using six trend filters and two exit configurations, resulting in twelve controlled historical backtests on BITSTAMP:BTCUSD. The six trend filters were Renko HH-HL, EMA200, MA Crossover, MACD Trend, Supertrend and ADX Trend. The two exit configurations were the strategy's Base / Reverse-Logic Exit and an explicit 400-point take-profit, 100-point stop-loss and 100/100 trailing-stop configuration.

Under the specified TradingView simulation conditions, all six base configurations produced positive simulated net profit and profit factors above one. All six explicit risk-management configurations produced negative simulated net profit, negative expectancy and profit factors below one. The consistent direction of this difference across the six trend filters is the principal empirical finding of the study.

The results do not establish that reverse-logic exits are universally superior, nor that fixed risk-management parameters are generally detrimental. They demonstrate the behaviour of the tested configurations under one instrument, one historical period, one strategy implementation and one simulation environment. Future work should examine multiple assets and market regimes, alternative volatility-scaled exit parameters, independent out-of-sample periods, execution assumptions based on actual market prices, and formal statistical procedures for assessing data-snooping and robustness.

Declarations

Competing Interests:

The authors declare no relevant financial or non-financial competing interests.

Ethics Approval:

Not applicable. This study did not involve human participants, human data, animals or identifiable personal information.

Consent to Participate:

Not applicable.

Consent to Publish:

Not applicable.

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Author Contribution

Author Contributions Statement V.M.R.A. conceived the study, designed the experimental framework, developed and implemented the trading strategy, conducted the computational experiments and backtesting, analyzed the experimental results, and prepared the initial manuscript. P.K.P. contributed to the research supervision, reviewed the experimental methodology and interpretation, and provided critical intellectual feedback on the manuscript. V.M.R.A. and P.K.P. reviewed and approved the final manuscript and take responsibility for the integrity of the work. Initials: V.M.R.A. — Venkata Maheswara Rao Atchula P.K.P. — Pawan Kumar Pareek

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The authors acknowledge the use of the TradingView Strategy Tester as the computational environment for the historical simulations.

Data Availability

Data Availability: This study used historical BTCUSD market data accessed through TradingView for computational backtesting. The data were analyzed using the TradingView Strategy Tester under the experimental configurations described in the manuscript. The underlying market data are subject to the availability and access conditions of the data provider. The aggregated backtesting results reported in this study are provided in the manuscript. The Pine Script implementation used for the experiments is proprietary and is therefore not publicly available.

Code Availability:

The Pine Script implementation used in this study is proprietary and is not publicly available. The manuscript provides the methodological description, parameter settings, experimental configurations and backtesting conditions used to generate the reported results.

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Figures

Common strategy architecture

6 trend filters

Renko HH-HL | EMA200 | MA Crossover | MACD | Supertrend | ADX

× 2 exit configurations → 12 controlled experiments

Figure 1

Experimental design and workflow

Source: Authors’ analysis and experimental design.

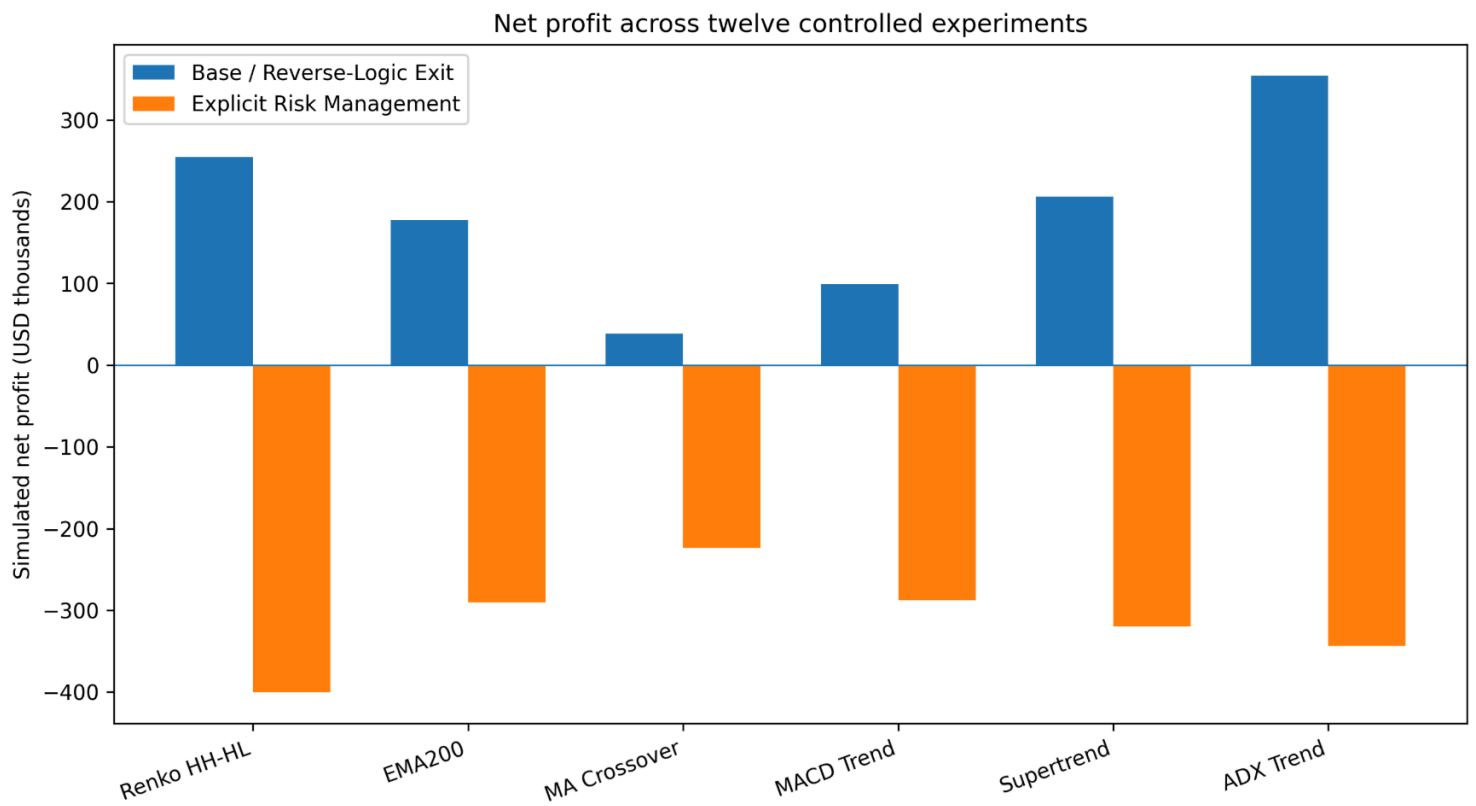


Figure 2

Simulated net profit across the twelve experiments. The values are outputs of the specified TradingView historical simulation and are not presented as live-trading returns

Source: Authors' analysis and experimental design.

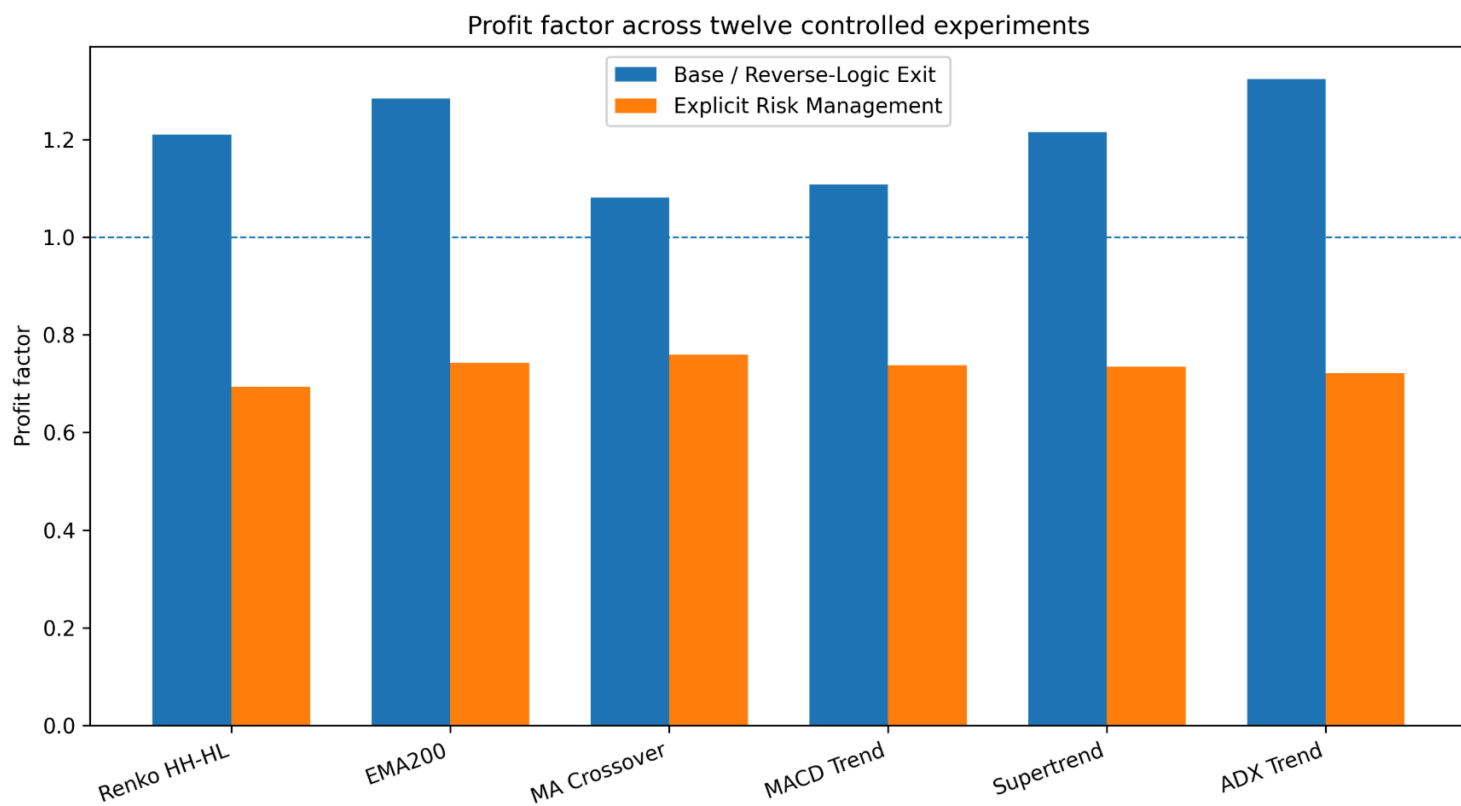


Figure 3

Profit-factor comparison for the six trend filters under the two exit configurations

Source: Authors' analysis and experimental design.