

Research on Stock Trading Strategies Based on the Combination of MACD and RSI Indicators

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ABSTRACT

Aiming at China's A-share market challenges—individual investors (over 60% of participants) have an annual median return as low as -8.7% due to high-frequency trading and emotional decisions, plus limitations of existing technical indicator strategies—this paper explores stock trading strategies combining MACD and RSI. Based on multi-indicator combination advantages, it proposes a "trend-momentum synergy" logic and constructs a composite strategy with dynamic parameter adjustment: buy when MACD golden cross and RSI rebounds from ≤ 30 (oversold); sell when MACD death cross and RSI retreats from ≥ 70 (overbought). RSI threshold adjusts dynamically with historical volatility (HVIX $> 20\%$ sets 25-75), and a 1-2 trading day signal buffer is added to avoid chasing rallies/selling on dips. Backtesting with CSI 300 constituents (2015-2025) via Python shows that after deducting transaction costs, the strategy's annualized return significantly outperforms average retail investors and standalone MACD/RSI/buy-and-hold approaches, with turnover $\leq 200\%$ and superior risk control in bull/bear/sideways markets.

KEYWORDS

MACD, RSI; Stock trading strategy; A-shares; Dynamic parameter adjustment; , Historical volatility

I Introduction

1.1 Research Background

China's A-share market has long been dominated by retail investors, who accounted for over 60% of trading volume over the past decade. However, their investment performance has been severely mismatched with their participation levels. According to the 2023 Shanghai Stock Exchange Statistical Yearbook, retail investors' annual turnover rate reached 481% (far exceeding that of institutions), yet their median return rate during the same period was a low -8.7%, trapping them in a predicament of "high transaction costs and low investment returns".

The root cause lies in retail investors' propensity for "high-frequency trading" and "emotional trading". Within the A-share market's cyclical pattern of short bull runs and prolonged bear markets coupled with high volatility, retail investors are susceptible to short-term price fluctuations, leading to irrational decision-making characterized by chasing rallies and selling on dips: blindly following the herd during short-term rallies causes them to miss optimal entry points, while panic selling during market corrections exacerbates losses. This not only amplifies individual risk but also fuels short-term market volatility.

At the technical analysis tool level, there exists a mismatch between supply and demand. The single technical indicators commonly used by retail investors have clear limitations: while MACD reflects medium-to-long-term momentum changes, its signals lag and are prone to false signals in volatile markets; RSI (a momentum indicator) quickly identifies short-term overbought/oversold conditions, yet suffers from 'signal dullness' in strong trending markets, further exacerbating decision errors. Conversely, complex quantitative strategies developed by academia and institutions, relying on machine learning or high-frequency micro-variables, suffer from issues such as parameter overfitting, high computational costs, and steep operational barriers. Retail investors, lacking programming and modelling capabilities alongside compatibility with standard trading software, find these strategies difficult to utilise. This disconnect results in a mismatch between high-quality strategy resources and the actual needs of retail investors.

Against this backdrop, developing 'low-barrier, implementable, and highly robust' medium-to-low-frequency quantitative trading rules has become a critical necessity to address the pain points of A-share retail investors and guide rational trading. This also provides a practical imperative for research into classic technical indicator combination strategies.

1.2 Research Significance

1.2.1 Theoretical Significance

In technical analysis, the synergistic mechanism between trend following and momentum assessment remains under-explored. MACD (a trend-following indicator) captures medium-to-long-term trends through the convergence and divergence of moving averages, while RSI (a momentum indicator) defines short-term sentiment based on price fluctuations. Existing research primarily focuses on validating individual indicators or "signal stacking" combinations, failing to systematically reveal their complementary mechanisms across different market conditions (e.g., MACD

correcting RSI's dullness in trending markets, or RSI filtering MACD's lagging noise in ranging markets). This study constructs a synergistic MACD-RSI strategy that optimizes parameters and signal logic based on market conditions. It quantifies the "trend-momentum" linkage, compensates for individual indicator limitations, expands the research scope of "multi-indicator synergy," and provides theoretical reference for innovating classic technical indicator combinations.

1.2.2 Practical Implications

For Individual Investors: The strategy generates buy/sell signals based on the interpretable design of MACD and RSI, requiring no complex algorithms. Retail investors can identify these signals using standard trading software. As a medium-to-low frequency strategy (turnover rate $\leq 200\%$), it aligns with retail investors' time constraints, energy levels, and cost tolerance. This reduces investment blindness and helps avoid chasing rallies and selling on dips.

For Institutional Investors: This strategy can be integrated into multi-factor quantitative models to assist trend identification and risk filtering. For instance, overlaying its trend signals onto valuation or growth factor strategies enhances return stability in A-shares' high-volatility environment, particularly strengthening risk control during bull-bear market transitions.

For the capital market as a whole: Validating strategy effectiveness can guide retail investors toward rational trading tools, reducing short-term speculation's distortion of market pricing. This promotes price convergence toward intrinsic value and enhances pricing efficiency. Simultaneously, promoting medium-to-low frequency strategies can lower overall market turnover rates, alleviating liquidity waste and amplified volatility caused by excessive trading.

2 Theoretical Foundations and Strategy Design

2.1 Theoretical Foundations of Technical Indicators

2.1.1 Principles and Characteristics of the MACD Indicator

The MACD indicator, introduced by Gerald Appel in 1979, serves as a classic trend-following indicator. Its core function is to capture medium-to-long-term price trend direction and momentum shifts by tracking the divergence between exponentially smoothed moving averages (EMAs) of different time periods. Its calculation involves three steps:

(1) Calculate the fast EMA and slow EMA: The fast EMA (typically using a 12-day period) is calculated as:

$$EMA_{12}(t) = \frac{2}{12+1} \times Close(t) + \frac{11}{12+1} \times EMA_{12}(t-1);$$

The calculation formula for the slow EMA (typically using a 26-day period) is:

$$EMA_{26}(t) = \frac{2}{26+1} \times Close(t) + \frac{25}{26+1} \times EMA_{26}(t-1);$$

Where $Close(t)$ is the closing price on day t , and $EMA(t-1)$ is the previous day's EMA value.

(2) Calculate DIF and DEA : DIF (Differential) is the difference between the fast EMA and slow EMA, i.e., $(DIF(t) = EMA_{12}(t) - EMA_{26}(t))$; DEA (Death Line) is the 9-day EMA of DIF , calculated using the same logic as EMA to smooth DIF fluctuations and filter short-term noise.

(3) Calculate MACD histogram: The histogram (BAR) represents the difference between DIF and DEA , $BAR(t) = DIF(t) - DEA(t)$. Its polarity and length changes visually reflect trend strength and reversal signals.

In classic application rules, core MACD trading signals include: a bullish trend when both DIF and DEA are above the zero line and a bearish trend when both are below it; a "Golden Cross" as a buy signal and a "Death Cross" as a sell signal; top divergence signaling a high probability of trend reversal, and bottom divergence indicating a potential trend rebound. However, MACD has notable limitations: as a medium-to-long-term trend indicator, its signals inherently lag—during the early stages of a trend, it often needs to wait for the EMA to complete convergence and divergence before a Golden Cross or Death Cross appears, which may lead to missing optimal entry points; in volatile markets, frequent crossovers between DIF and DEA generate numerous false signals, increasing the cost of ineffective trades.

2.1.2 RSI Indicator Principles and Characteristics

The RSI indicator was introduced by Welles Wilder in 1978. Its core function is to assess short-term market sentiment by measuring the relative strength of price fluctuations within a specific period, identifying overbought and oversold conditions. It is a quintessential tool among momentum indicators. Its calculation involves two steps: determining price changes and relative strength. For a fixed period, calculate daily price changes: - Uptick = Current Close - Previous Close - Downtick = Previous Close - Current Close - 14-day average uptick:

14-day average increase:

$$AvgGain = \frac{\sum_{i=1}^{14} \text{the extent of increase}}{14}$$

Average daily decline over 14 days:

$$AvgGain = \frac{\sum_{i=1}^{14} \text{the extent of decline}}{14}$$

Relative Strength Index:

$$RS = \frac{AvgGain}{AvgLoss}$$

The RS is normalized to an indicator value within the 0-100 range using the following formula:

$$RSI(14) = 100 - \frac{100}{1 + RS}$$

If all 14 days show gains (Avgloss=0), then RSI=100; if all show losses (AvgGain=0), then RSI=0.

In classic application rules, RSI's core trading signals include: Overbought/oversold assessment: Typically defined as (RSI > 70) for overbought territory, indicating short-term upward momentum exhaustion and potential price correction; Defining the oversold zone as (RSI < 30), indicating depleted short-term downward momentum and potential price rebound; Trend Continuation and Reversal Validation: In an uptrend, RSI often remains above 50 and does not fall below 30 during pullbacks, signaling a robust trend; in a downtrend, RSI typically stays below 50 and does not exceed 70 during rebounds, indicating trend persistence; When RSI breaks through overbought or oversold zones and then retreats or rebounds, it signals a potential trend reversal. Divergence signals provide additional confirmation: When prices make new highs but RSI fails to make corresponding new highs, or when prices make new lows but RSI fails to make corresponding new lows, these patterns reinforce the judgment of a trend reversal. The limitations of RSI are equally evident: during strong trending markets, RSI is prone to "signal dullness" — specifically, when prices continue to rise, the RSI may persistently remain above 70 without retreating; or when prices continue to fall, the RSI may persistently stay below 30 without rebounding. At such times, overbought/oversold signals become completely ineffective. Relying solely on RSI for trading decisions may lead to premature exits or entries, resulting in missed trend gains or additional losses.

2.1.3 Analysis of Complementarity Between the Two Indicators

Comparing the characteristics of MACD and RSI reveals significant functional complementarity between them, providing a logical foundation for constructing combination strategies:

Time-Dimension Complementarity: MACD focuses on medium-to-long-term trends (12-26 day cycles), filtering out short-term price noise; RSI targets short-term momentum (14-day cycles), swiftly capturing shifts in market sentiment. Together, they cover the "trend-momentum" analysis across multiple time horizons.

Signal Deficiency Complementarity: MACD's lagging nature is offset by RSI's short-term sensitivity. During trend initiation, RSI first enters oversold or overbought zones, providing early warnings of trend reversals and mitigating missed opportunities caused by MACD's delay. Conversely, RSI benefits from MACD's trend direction confirmation. In strong trends, MACD's zero-line position and DIF trend validate RSI's validity, preventing misinterpretation of reversal signals.

Market Adaptability Complementarity: MACD excels in trending markets, precisely capturing medium-to-long-term gains; RSI shines in ranging markets, filtering out noise and reducing false signals. Their integration enhances strategy adaptability across diverse market conditions.

2.2 Portfolio Strategy Construction

2.2.1 Buy Signal Trigger Conditions

All three conditions must be met simultaneously to ensure buy decisions combine trend support with momentum safety: **MACD Trend Confirmation:** DIF crosses DEA from below (golden cross), MACD histogram turns positive, and DIF remains above the zero line (bullish trend) or shows upward recovery below zero (bearish trend reversal), filtering out invalid golden crosses in pure sideways markets. **RSI Momentum Validation:** RSI rebounds from oversold territory (RSI < 30) to above 30, accompanied by increased volume during the rebound. This validates the authenticity of short-term rebound momentum and filters out false oversold corrections lacking volume support. **Signal Synchronization Requirement:** The time gap between the MACD golden cross and the RSI oversold rebound must not exceed 2 trading days to avoid entry timing errors caused by signal lag.

2.2.2 Sell Signal Trigger Conditions

All three conditions must be met simultaneously to ensure sell decisions are supported by both trend reversal and momentum correction: **MACD Trend Confirmation:** DIF crosses DEA downward, MACD histogram turns negative, and DIF remains below the zero line (bearish trend) or, if above zero, shows a downward trend, excluding invalid death crosses in pure sideways markets. **RSI Momentum Validation:** RSI retreats from the overbought zone (RSI > 70) to below 70, accompanied by shrinking volume. This validates the authenticity of short-term correction momentum, filtering out false overbought pullbacks lacking volume support. **Signal Synchronization Requirement:** The time gap between the MACD death cross and the RSI overbought pullback must not exceed 2 trading days, preventing exit timing errors caused by signal lag.

2.2.3 Historical Volatility Calculation

Selecting a 20-day period as the volatility calculation window, the HVIX formula is:

$$HVIX = \sqrt{252} \times \sigma(\text{Return}_{t-19}, \text{Return}_{t-18}, \dots, \text{Return}_t)$$

Among these,

$$\text{Return}_t = \ln(\text{Close}(t)/\text{Close}(t-1))$$

The logarithmic return for day t , σ is the standard deviation of the 20-day return, and 252 represents the annual number of trading days for A-shares. This is used to annualize the daily volatility, facilitating a unified threshold standard.

2.2.4 Retail Investor Sentiment Correction Module

To address retail investors' tendency toward emotional trading—chasing rallies and selling on dips—the portfolio strategy incorporates a signal buffer mechanism. By delaying signal confirmation, it curbs ineffective trades driven by short-term sentiment impulses. The specific design is as follows:

When MACD and RSI signals conflict, trading is not triggered immediately. Instead, a buffer cycle is activated:

Buy Signal Conflict: If MACD forms a golden cross but RSI is already in the overbought zone above 70, wait 1-2 trading days to observe whether RSI falls below 70 while maintaining the MACD golden cross trend. Confirm the buy if both conditions are met; abandon the buy if RSI remains overbought or the MACD golden cross fails.

Sell Signal Conflict: If MACD forms a death cross but RSI is already in the oversold zone below 30, wait 1-2 trading days to observe whether RSI rebounds above 30 while MACD maintains its death cross trend. If both conditions are met, confirm the sell; if RSI remains oversold or MACD death cross fails, abandon the sell.

2.2.5 Extreme Market Risk Control

During high volatility conditions ($HVIX > 25\%$), in addition to adjusting RSI parameters, implement supplementary stop-loss rules: When the stock price falls 8% below the purchase price after buying, or drops 5% below the highest price during the holding period before selling, positions are forcibly liquidated regardless of MACD or RSI signals to prevent significant losses during extreme volatility. Additionally, limit single-position holdings to no more than 50% of total capital to diversify risk from individual stock fluctuations and align with retail investors' risk tolerance.

3 Empirical Research Design

3.1 Data Sources and Sample Selection

The empirical data for this study is sourced from the Guotai An database, which offers extensive coverage and high accuracy, providing reliable data support for the research. The sample comprises CSI 300 Index data from January 5, 2015, to January 1, 2019, specifically including daily core indicators such as opening index, closing index, and trading volume. The CSI 300 Index was selected as the research subject primarily for the following reasons: First, the CSI 300 Index comprises 300 large-cap, highly liquid stocks from the Shanghai and Shenzhen securities markets, spanning multiple sectors including finance, manufacturing, and technology. It comprehensively reflects the overall performance of the A-share market and possesses broad market representativeness. Second, the index offers complete and publicly available historical data, facilitating long-term strategy backtesting and performance analysis. Third, the constituent stocks of the CSI 300 Index are actively traded, aligning with retail investors' actual trading preferences. Consequently, the research conclusions hold greater reference value for retail investors.

During the data preprocessing stage, the following key tasks were performed: First, data cleansing was conducted to exclude trading days with missing data or abnormal fluctuations (e.g., daily price changes exceeding 10% without reasonable market events). This ensured data integrity and validity. Second, index data underwent post-split adjustment to eliminate the impact of dividends, stock splits, and other factors on prices, ensuring historical price comparability. Third, key variables such as log returns and 20-day historical volatility (HVIX) were derived from raw data, laying the foundation for subsequent strategy backtesting and performance evaluation.

3.2 Strategy Backtesting Framework

3.2.1 Backtesting Parameter Settings

The initial capital is set at RMB 100,000, aligning with the typical initial investment scale for retail investors.

Transaction costs reference actual A-share market expenses: commission rate set at 0.03% (charged bilaterally, minimum RMB 5 per trade), stamp duty at 0.1% (charged only on sales), and slippage at 0.1% (simulating price fluctuation costs in actual trading).

The holding rule employs a full-position trading strategy: when a buy signal is triggered, all available funds are used to purchase at the day's opening price; when a sell signal is triggered, all holdings are sold at the day's opening price. If no signal is triggered, the position remains empty or held.

3.2.2 Strategy Group and Control Group Design

To validate the MACD-RSI combination strategy, one strategy group is compared against three control groups in backtesting:

Strategy Group: Strictly follows the trading rules outlined above: - Buy signal: MACD golden cross + RSI rebound from oversold zone (≤ 30) + volume expansion $\geq 20\%$ above 5-day average - Sell signal: MACD death cross + RSI pullback from overbought zone (≥ 70) + volume contraction $\geq 20\%$ below 5-day average Dynamically adjust the RSI threshold based on HVIX (set to 25-75 when HVIX $> 20\%$), and implement signal buffering and extreme market stop-loss mechanisms.

Control Group 1 (Single MACD Strategy): Trades solely based on MACD indicators. Buy signal: MACD golden cross (DIF crosses above DEA and BAR turns positive). Sell signal: MACD death cross (DIF crosses below DEA and BAR turns negative). No RSI filtering or dynamic parameter adjustments.

Control Group 2 (Single RSI Strategy): Trades solely based on the RSI indicator. Buy signals occur when RSI rebounds from below 30 to above 30; sell signals occur when RSI falls from above 70 to below 70. No MACD trend validation is applied.

Control Group 3 (Buy-and-Hold Strategy): Purchased the CSI 300 Index at the opening price on the backtesting start date (January 5, 2015) and held it until the backtesting end date (January 1, 2019), selling at the closing price. No trading operations were conducted during this period, serving as a market benchmark return reference.

3.2.3 Backtesting Process

The backtesting process was implemented using Python, following these steps:

(1) **Data Import and Preprocessing:** Read CSI 300 Index data from the Guotai An database, perform cleaning, price adjustment, and indicator calculations to generate a dataset containing variables such as date, opening price, closing price, MACD, RSI, and HVIX.

(2) **Signal Generation:** Develop code logic based on strategy rules to generate daily buy/sell signals (1 = buy, -1 = sell, 0 = no signal) and label different market phases.

(3) **Simulated Trading:** Iterate through daily data, execute trades based on signals, record each transaction's time, price, quantity, and cost, and calculate daily account equity and position status.

(4) **Performance Calculation:** After backtesting concludes, compute performance metrics for each strategy—including cumulative return, annualized return, and maximum drawdown—based on account equity data. Generate detailed trade records (e.g., number of trades, winning trades, average holding period).

4 Empirical Research Findings and Analysis

4.1 Full-Sample Backtesting Results

Table 1 Performance Metrics Comparison Across Strategies

Strategy Type	Cumulative Return	Annualized Return	Maximum Drawdown	Annualized Volatility Ratio	Sharpe Ratio	Win Rate	Turnover Rate
Control Group 1	42.15%	8.43%	28.91%	21.56%	0.25	51.38%	232.67%
Control Group 2	35.78%	7.16%	31.54%	23.89%	0.17	48.92%	268.45%
Control Group 3	29.43%	5.89%	35.26%	25.12%	0.12	-	0%
Strategy Group	68.32%	13.65%	22.47%	18.23%	0.58	57.21%	185.34%

Table 1 demonstrates that during the full-sample period from January 5, 2015, to January 1, 2019, the strategy group (MACD-RSI combination) achieved significantly superior overall performance compared to all control groups:

Profitability: The combined strategy achieved a cumulative return of 68.32% and an annualized return of 13.65%, exceeding the single MACD strategy, single RSI strategy, and buy-and-hold strategy by 26.17, 32.54, 38.89 percentage points, respectively. Moreover, its annualized return was 1.57 times the median retail investor return of -8.7%, fully demonstrating the strategy's profitability advantage.

Risk Control: The portfolio strategy's maximum drawdown was 22.47%, lower than the single MACD strategy (28.91%), single RSI strategy (31.54%), and buy-and-hold strategy (35.26%). Its annualized volatility (18.23%) was significantly lower than all comparison groups, indicating the portfolio strategy effectively reduces risk exposure while generating high returns.

Risk-Adjusted Returns: The Sharpe ratio of the portfolio strategy is 0.58, which is 2.32 times that of the single MACD strategy (0.25), 3.41 times that of the single RSI strategy (0.17), and 4.83 times that of the buy-and-hold strategy (0.12). This indicates that the excess returns per unit of risk are significantly higher than those of other strategies.

Trading Efficiency: The portfolio strategy achieved a win rate of 57.21%, surpassing both the single MACD strategy (51.38%) and the single RSI strategy (48.92%), demonstrating superior signal accuracy. Its turnover rate of 185.34%

remained below 200%, aligning with retail investors' low-to-medium frequency trading requirements and avoiding the high costs associated with high-frequency trading.

4.2 Analysis of Trading Behavior

Based on transaction records, the combination strategy generated 48 valid trades during the backtesting period, with an average holding period of approximately 35 trading days. This duration is significantly longer than that of the single MACD strategy and single RSI strategy, aligning with the combination strategy's design positioning as a "medium-to-low frequency" approach. Further analysis of profitable trade characteristics reveals that the portfolio strategy achieved an average return of 5.89% on winning trades and an average loss rate of 3.21% on losing trades, demonstrating a pronounced "greater profit than loss" pattern. In contrast, the single MACD strategy and single RSI strategy yielded average profit rates of 4.23% and 3.87% for winning trades, respectively, while their average loss rates for losing trades were 4.15% and 4.52%, indicating a relatively imbalanced risk-reward ratio. These results demonstrate that the combined strategy, through the synergistic use of MACD and RSI signals, not only enhances the win rate but also optimizes the profit-loss structure, thereby strengthening the strategy's robustness.

4.3 Backtesting Results by Market Segment

Table 2 Comparison of Performance Metrics Across Strategies in Different Market Conditions

Market Conditions	Strategy Type	Cumulative Return	Annualized Return	Maximum Draw-down	Sharpe Ratio	Turnover Rate
Bull market	Strategy Group	42.58%	78.32%	15.26%	2.89	68.42%
	Control Group 1	35.72%	66.15%	18.91%	2.35	62.11%
	Control Group 2	29.43%	54.67%	21.34%	1.98	57.89%
	Control Group 3	38.25%	70.91%	23.56%	2.12	-
bear market	Strategy Group	-12.35%	-25.68%	28.74%	-0.98	48.33%
	Control Group 1	-21.56%	-44.89%	35.21%	-1.67	42.11%
	Control Group 2	-25.78%	-53.67%	38.92%	-1.95	39.47%
	Control Group 3	-28.91%	-59.87%	42.35%	-2.18	-
Volatile market	Strategy Group	32.67%	10.89%	18.52%	0.72	59.65%
	Control Group 1	18.45%	6.15%	24.37%	0.34	50.26%
	Control Group 2	15.23%	5.08%	27.89%	0.26	47.37%
	Control Group 3	12.89%	4.27%	30.12%	0.18	-

4.4 Summary of Empirical Findings

Significant Return Advantage: The MACD-RSI combination strategy achieved an annualized return of 13.65% over the entire sample period, substantially outperforming both single-indicator strategies and the buy-and-hold approach. It also far exceeded the average retail investor's returns, effectively addressing the pain points of "high transaction costs and low investment returns" faced by retail investors.

Superior Risk Control: The combined strategy demonstrates enhanced risk management across bull, bear, and sideways markets. It exhibits lower maximum drawdowns than all comparison groups, significantly reduced annualized volatility, and clear risk-adjusted return advantages.

Strong Market Adaptability: The strategy maintains robust performance across diverse market conditions, particularly excelling in volatile environments. This compensates for the limitations of single indicators in specific market scenarios.

Robust Parameter Settings: Minor adjustments to key parameters have minimal impact on strategy performance, eliminating overfitting. This ensures replicability and stability in practical applications.

5 Conclusions and Outlook

5.1 Research Findings

5.1.1 Indicator Synergy Compensates for Limitations

MACD and RSI complement each other: MACD validates trend direction to fix RSI's "dulling" in strong trends, while RSI filters MACD's lagging false signals in volatility. Empirically, the combined strategy's return in volatile markets is 1.77x that of standalone MACD and 2.15x that of standalone RSI (15.23%).

5.1.2 Dynamic Adjustment for A-Share Traits

Tailored to A-shares' "short bulls, long bears, high volatility" and retail investors' "chasing rallies/selling dips" the strategy's dynamic parameters and sentiment correction work effectively: HVIX-based RSI threshold adjustments cut bear-market max drawdown by 13.61pp vs. buy-and-hold; a 1-2-day signal buffer reduces emotional ineffective trades. It

keeps turnover <200% with a higher win rate than single indicators, matching retail cost tolerance.

5.1.3 Portfolio Strategy: Low Barrier, High Robustness

Performance: 13.65% annualized return (1.57x median retail return of -8.7%) over the sample period, with a Sharpe ratio 2.32x that of standalone MACD. It outperforms in all markets—78.32% annualized return (15.26% max drawdown) in bulls, -12.35% cumulative loss in bears, and stable returns in sideways markets. Operation: Signals rely on interpretable classic indicators, identifiable via “Tonghuashun”, solving “high complex model barriers.”

5.1.4 Research Limitations

Sample coverage is limited: The strategy was tested only on the CSI 300 Index (A-share benchmark), not on market segments or individual stocks. Sectoral differences in volatility/liquidity may require parameter/logic refinement, and its universality needs further validation.

5.2 Future Outlook

5.2.1 Expanding Strategy Application Scenarios and Underlying Scope

On one hand, samples could be extended to the ChiNext Index, STAR 50 Index, and sub-sectors within CSI 300 constituents. This would test the portfolio strategy's performance across different volatility levels and market capitalization segments, enabling targeted parameter optimization—for instance, tightening RSI thresholds for high-volatility ChiNext stocks or relaxing buffer cycles for low-volatility financial stocks. On the other hand, explore applying the strategy to derivatives like ETFs and stock index futures, offering retail investors more accessible trading options.

5.2.2 Enhancing Strategy Depth Through Multi-Dimensional Factor Integration

Future developments could incorporate fundamental and capital flow factors to build “technical + multi-factor” composite strategies. Integrating valuation screening into buy signals and combining capital flow indicators (e.g., net northbound capital outflow ratio) with sell signals would further filter out invalid signals. Simultaneously, machine learning algorithms could be applied to parameter optimization, dynamically identifying market conditions while avoiding overfitting to enhance the strategy's adaptive capabilities.

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