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The results presented may include historical simulations (backtests) and may not reflect all execution costs and constraints (including commissions, spreads, slippage, taxes, and liquidity limitations). Historical or simulated performance is not a guarantee of achieving similar results in the future.

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The results shown in the reports are indicative only and depend on the adopted methodology, data selection, parameters, assumptions, and the way risk and return measures are calculated. Actual results may differ materially from historical or simulated results.

The author may hold positions in the instruments discussed or may apply a similar approach in practice. The information contained in the reports may change without prior notice.

Methodology

TradingEdge.Pro's methodology describes a multi-step process for building and validating trading strategies, structured into two parts: strategy development and testing, and practical use. In the testing phase, a strategy is defined as a set of objective rules, validated through initial tests, optimised, and assessed for stability (robustness), and then evaluated using Walk-Forward Analysis. The detailed testing assumptions (including the instrument universe, in-sample/out-of-sample periods, data sources, transaction costs, and execution rules) are described in the "Testing Specification" document. The full methodology and metric definitions are available on the TradingEdge.Pro "Methodology" page.

2-RSI v.1

Investment Strategy Testing Summary

The 2-RSI strategy is a swing trading investment technique that uses **a two-day RSI (Relative Strength Index)** and a downward correction of an instrument that is in **an uptrend** (quotes above **the long-term moving average)**. The key assumption of the strategy is **to open long positions during a correction** and then **close after the price increases.**

It should be noted that while the strategy's results on in-sample data are decent, the strategy failed the stability test in a wide range of optimized parameters. This means that the strategy loses its profitability and generates a significantly larger drawdown when tests are performed on suboptimal parameters. Therefore, **it is not recommended to use it in real transactions.**

Our goal is to have a strategy that remains **profitable and effective over a wide range of parameters,** because the market is a changing organism and the optimal parameters can change over different periods. **I cannot** emphasize enough that for **a strategy to work** in real conditions, it must also work on **suboptimal parameters** and in **suboptimal conditions.** In a word - **it must be stable** to changing market conditions.

I don't know who said these words, but they perfectly reflect the problem of many optimizations:

"I've never seen a strategy that didn't work in backtests."

We don't know the future, we don't know future market conditions, but if we know that our strategy **has historically generated acceptable results** in various market conditions and across various parameter ranges, then we are **one step ahead of other** market participants.

Contents

Step 1: Formulate an investment strategy

The 2-RSI v.1 strategy was developed by Larry Connors and Cesar Alvarez as **a short-term mean-reversion system** that uses **extreme readings of the 2-period RSI indicator.** In this approach, the strategy takes **only long positions** in markets that have a **historical tendency to quickly recover,** i.e. major stock indices, Treasury futures, gold, US dollar index.

The aim of the strategy is **to join a pullback after a short-term, sharp price drop** within a dominant uptrend.

The strategy uses:

- **Extreme oversold RSI(2)** – the indicator value below the set threshold signals a potential rebound;
- **SMA Direction Filter** – positions are only taken when the price closes above the long-term moving average;
- **Predetermined exit point** – the trade lasts until the RSI(2) returns to the neutral zone.

Characteristics of the strategy and its strengths and weaknesses:

- **Simple, quantitative logic** – two main conditions (RSI & SMA) simplify testing and automation;
- **Natural mean-reversion environment** – the indicated asset classes historically rebound after short corrections;
- **Small number of transactions** – clear filters reduce commission costs;
- **Risk during violent bear markets** – during heavy sell-offs, the price may fall significantly before recovering (2020);
- **Less activity during periods of low volatility** – extreme RSI(2) values are rare then.

The 2-RSI strategy, while simple to implement, requires caution due to its susceptibility to false signals and **lack of stop losses.** Its application requires careful optimization and risk management, especially in volatile market conditions.

Step 2: Define investment principles

Below is **the pseudocode** for the **2-RSI v.1 strategy** on daily data:

1. **Calculating Indicators:**
    a. **2-Day RSI:** Used to identify short-term oversold market conditions.
    b. **YY-day SMA:** Determines the long-term trend of the market. If the price is above the SMA, it is considered to be in an uptrend.
2. **Generating Entry Signals – Long Position:**
    a. It is opened only when the market is in an uptrend (Price > SMA) and the RSI drops below ZZ, which indicates an oversold condition.
    b. A position is opened at the opening of the next day on which the conditions are met.
3. **Generating Output Signals:**
    a. The position is closed when the RSI rises above WW.
    b. The close occurs at the opening price of the next day, after the signal is generated.
4. **Stop Loss Management:**
    a. The strategy does not use Stop Loss orders, which means that potential losses are not limited by automatic closing of positions.
    b. This is an important consideration for risk management and requires discipline from the trader and the possible introduction of his own capital protection mechanisms.
5. **Daily Monitoring:**
    a. RSI and SMA values are calculated every day.
    b. The system checks whether the entry or exit conditions are met and takes appropriate action the next day upon opening.
6. **Additional Notes:**
    a. **No Short Positions:** The strategy focuses only on long positions in an uptrend.
    b. **Financial Instruments:** For the purposes of this test, **long positions** on **stock indices, bonds, gold** and **the dollar index were used.**

The above rules have been described in a way that allows them to be directly converted into a script in the chosen testing platform, which ensures the accuracy of the historical simulation and the reliability of the test results.

The tests are carried out assuming that the risk of one position is **1.0% of the total capital,** with **a hypothetical stop loss order located 2 x ATR (40 days)** away from the position opening point.

Step 3: Conduct a preliminary test of the investment strategy

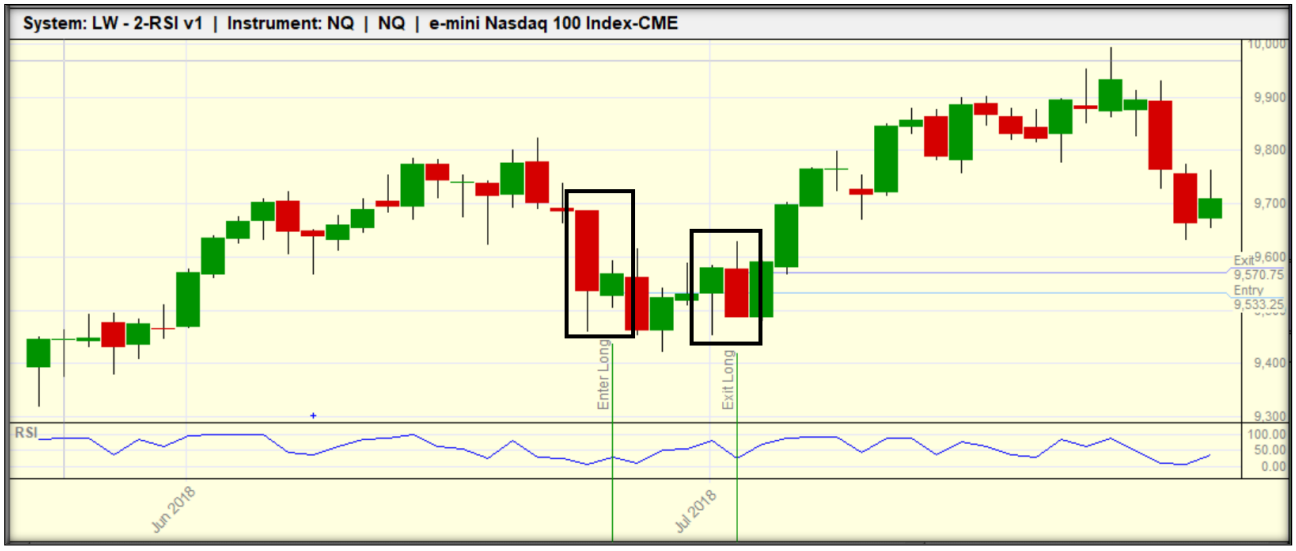
Below are some purchase and sale transactions that allow you to verify the following aspects:

- **Correctness of generated signals;**
- **Direction of opening position;**
- **Moment of opening a position;**
- **Position opening price;**
- **Moment of closing the position;**
- **Closing price of the position;**
- **Compliance of the transaction with the theoretical assumptions of the investment strategy.**

At this stage **it does not matter** whether the transactions are **profitable,** what **instrument was used** or whether they took place **recently** or **in the distant past.** The key is **to check whether the transactions are generated correctly** and in accordance with the assumptions described in the previous step.

The first transaction was made on a futures contract for the Nasdaq100 index. At the end of June 2018, the quotes were above **the 200-day moving average** (not visible on the chart), and the value of the **2-day indicator RSI fell below the level of 10,** which generated a signal to open a long position (**the first candle in the rectangle on the left)**. The position was opened the next day at the opening price (**the second candle in the rectangle on the left)**.

After several days of sideways movement, in early July 2018 the market rose slightly, raising the **RSI value to 70,** which signaled the closing of the position (**the first candle in the rectangle on the right)**. The position was closed the next day at the opening price (**the second candle in the rectangle on the right)**. **The system worked correctly.**



Once we are sure that the trades are generated correctly, we can proceed to the first test of the strategy on the full **in-sample data set.** These tests are performed on **the basic parameters,** which – according to my assessment – should correspond to the assumed goals of the strategy.

First of all, **we reject strategies that linearly lose capital.** If a strategy exhibits such a pattern, it is a clear signal that any parameter optimization does not make sense.

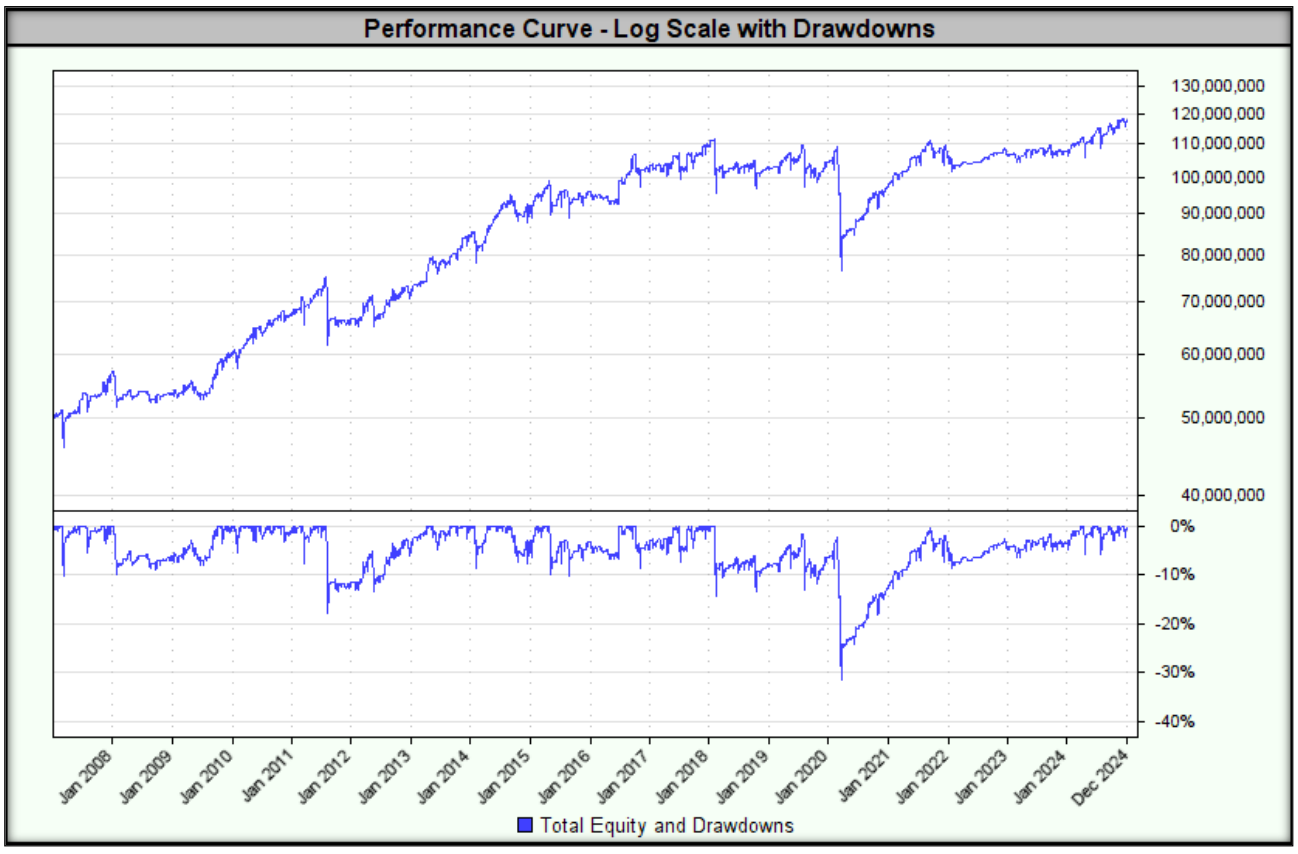
Our basic expectation is that the strategy generates **positive results,** even if they are at a low level.

Tested base parameters:

- **Length of the moving average (SMA):** 200 days;
- **RSI Lengths:** 2 days;
- **RSI Entry Threshold:** 10;
- **RSI Exit Threshold (take profit):** 70;
- **Stop loss:** none;
- **Method of opening a position:** at the opening price of the next day;
- **Position size:** corresponding to the risk of 1.0% of the total capital, with a hypothetical stop loss order located 2 x ATR (40 days) away from the position opening position;
- **Position direction:** long positions (buy) only.

The test result is shown below.

Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.



Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.

Indicators/Measures	Concluding a transaction at the opening price
CAGR%	4.9%
MAR Ratio	0.15
RAR%	4.7%
R-Cubed	0.17
Robust Sharpe Ratio	0.54
Max Drawdown	31.4%
Wins	68.7%
Losses	31.3%
Average Win%	0.45%
Average Loss%	0.74%
Win/Loss Ratio	0.61
Average Trade Duration (days)	8
Percent Profit Factor	1.35
SQN	-
Number of transactions	1154

In summary, the system works properly and generates signals as expected. Additionally, tests on basic parameters have yielded satisfactory results. We can now move on to the most interesting stage of creating an investment strategy – **optimization.**

Step 4: Optimization and assessment of investment strategy stability

This stage of strategy creation and testing is **crucial,** as it determines how **effective** the strategy will be in **real conditions. I cannot** emphasize enough that for **a strategy to work** in real conditions, it must also work on **suboptimal parameters** and in **suboptimal conditions.** In a word – **it must be stable** to changing market conditions.

I don't know who said these words, but they perfectly reflect the problem of many optimizations:

"I've never seen a strategy that didn't work in backtests."

My goal is not to find **optimal parameter values** – **my goal** is to find **a wide range of parameters** for which the strategy will generate **acceptable results. We don't know the future,** we don't know future market conditions, but if we know that our strategy **has historically generated acceptable results** in various market conditions and across various parameter ranges, then we are **one step ahead of other** market participants.

What **parameters to choose** for the next period is the subject of consideration in **Step 5 of the "Walk-Forward Analysis,**" but before we get to that, **we need to know whether our strategy is stable** at all.

1. Stability across a wide range of optimized parameters

The 2-RSI v.1 strategy in this version assumes **the optimization of parameters using The Grid Search** method. It consists in **the full optimization of all indicated parameters by creating a wide range of possible combinations.** Our goal is to find such **parameter ranges** that **the strategy remains stable (robust),** which will allow us to assess its usefulness in real market conditions.

The key criterion for assessing stability is that all test results must show a positive MAR value and the maximum drawdown must not exceed 250% of the drawdown value for the result with the highest MAR. If any test generates a negative MAR value or if the drawdown exceeds 250% of the drawdown value for the result with the highest MAR, the strategy is rejected completely.

In the first step, we test the stability of parameters on **in-sample data.** For this purpose, we determine **the ranges of parameter values** so that **the quotient of the highest and lowest value of the range is at least 150%.**

In the tested strategy, the ranges defined in this way are:

- **Moving average lengths (SMA):** range **90-150 days (step: 5);**
- **RSI Lengths:** 2 days;
- **RSI Entry Threshold:** range **10-15 (step: 0.5);**
- **RSI Exit Threshold (take profit):** range **52.5-80.0 (step: 2.5).**

The lowest MAR value of 0.06 was achieved for the following parameters:

- **Length of the moving average (SMA):** 145;
- **RSI lengths:** 2;

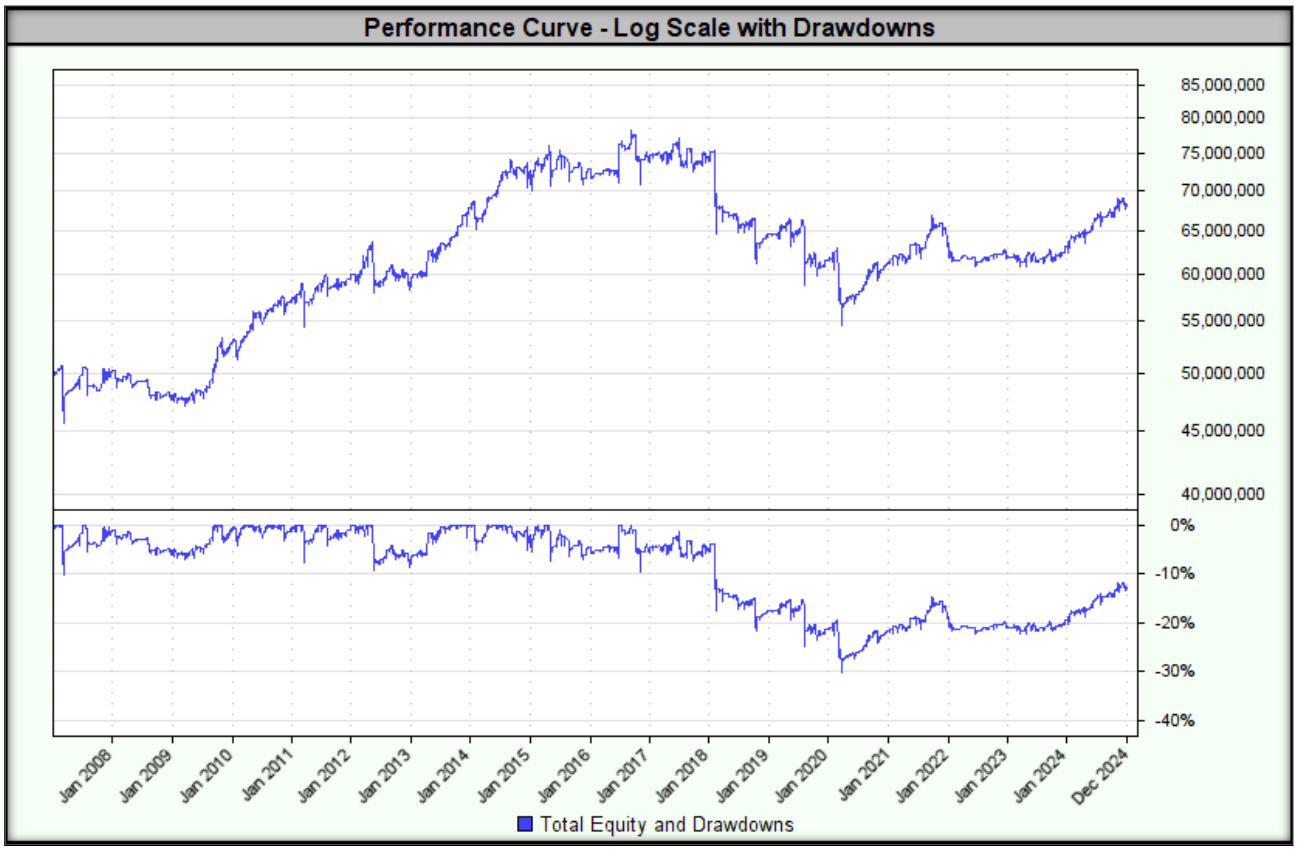
- **RSI Entry Threshold:** 10;
- **RSI Exit Threshold (take profit):** 52.5.

Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.

Test	Moving Average Long (bars)	RSI Threshold Entry	RSI Threshold Exit	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades	R3
1453	145	10.0	52.5	$68,181,917.27	1.74%	0.06	0.30	0.28	30.2%	99.6	1146	0.05
1405	140	13.5	52.5	$70,833,985.84	1.95%	0.06	0.30	0.27	33.9%	99.6	1558	0.05
1585	150	10.0	52.5	$68,225,873.34	1.74%	0.06	0.30	0.28	30.0%	99.6	1149	0.05
1321	140	10.0	52.5	$68,799,762.43	1.79%	0.06	0.31	0.29	30.5%	99.6	1133	0.05
1537	145	13.5	52.5	$71,172,318.44	1.98%	0.06	0.30	0.26	33.2%	99.6	1567	0.05
1273	135	13.5	52.5	$71,201,787.95	1.98%	0.06	0.30	0.27	32.9%	99.6	1547	0.05
1669	150	13.5	52.5	$71,456,454.26	2.00%	0.06	0.30	0.26	32.9%	99.6	1569	0.06
1189	135	10.0	52.5	$68,615,718.53	1.77%	0.06	0.31	0.30	29.1%	99.6	1124	0.05

Below is a graph of the equity curve for **the strategy with the lowest MAR.**

Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.



The highest MAR value of 0.48 was achieved for the following parameters:

- **Length of the moving average (SMA):** 90;
- **RSI lengths:** 2;
- **RSI Entry Threshold:** 10;
- **RSI Exit Threshold (take profit):** 75.

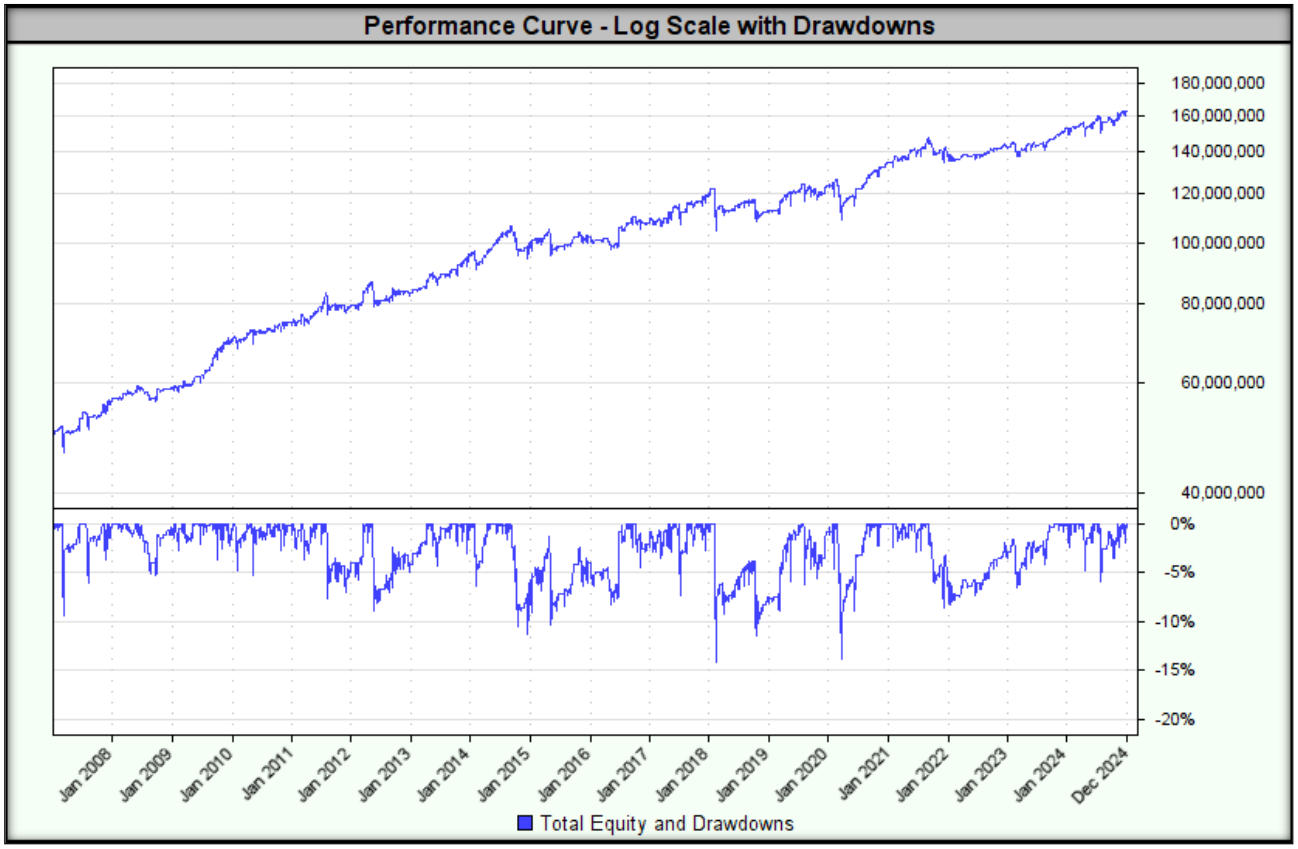
The highest MAR value was accompanied by **a drawdown of 14.2%.**

Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.

Test	Moving Average Long (bars)	RSI Threshold Entry	RSI Threshold Exit	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades	R3
10	90	10.0	75.0	$162,612,341.65	6.77%	0.48	0.97	1.25	14.2%	25.4	949	0.52
33	90	11.0	72.5	$161,174,036.65	6.72%	0.47	0.92	1.14	14.2%	28.6	1067	0.57
34	90	11.0	75.0	$179,258,565.28	7.35%	0.47	0.98	1.25	15.7%	26.5	1054	0.64
22	90	10.5	75.0	$170,887,311.47	7.07%	0.46	0.98	1.23	15.2%	23.1	1003	0.62
69	90	12.5	72.5	$170,727,546.98	7.06%	0.46	0.90	1.11	15.3%	28.9	1230	0.45
57	90	12.0	72.5	$171,163,881.43	7.08%	0.46	0.92	1.16	15.5%	29.1	1174	0.48
45	90	11.5	72.5	$162,861,308.07	6.78%	0.46	0.90	1.14	14.9%	29.1	1113	0.49
21	90	10.5	72.5	$151,729,765.58	6.36%	0.45	0.90	1.12	14.2%	25.4	1014	0.48

Below is a graph of the equity curve for **the strategy with the highest MAR.**

Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.



For all combinations of tested parameter ranges, **the highest drawdown was 53.1%.**

Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.

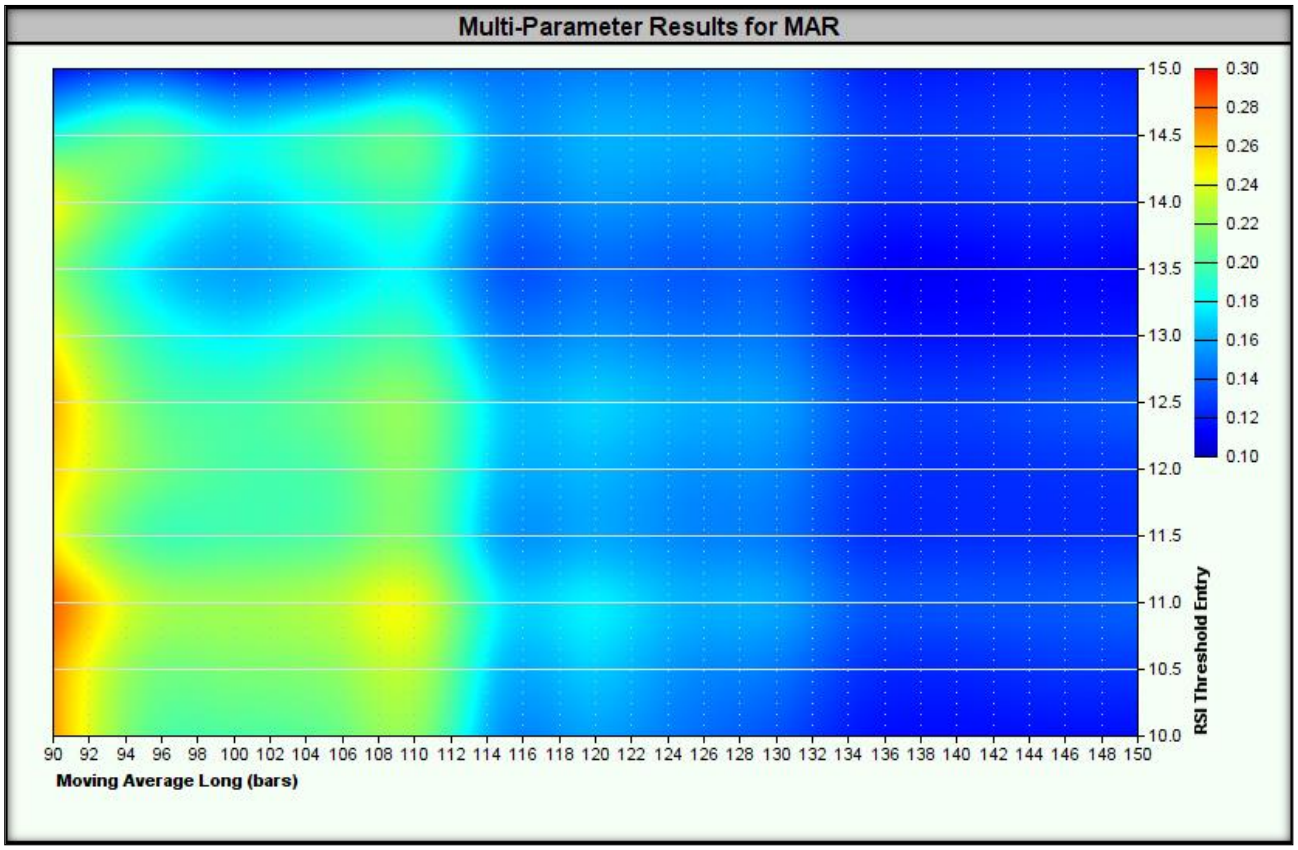
Test	Moving Average Long (bars)	RSI Threshold Entry	RSI Threshold Exit	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades	R3
1319	135	15.0	77.5	$139,694,955.14	5.87%	0.11	0.53	0.54	53.1%	65.1	1447	0.18
1451	140	15.0	77.5	$138,902,909.26	5.84%	0.11	0.52	0.54	53.1%	65.1	1456	0.18
1583	145	15.0	77.5	$142,549,120.50	5.99%	0.11	0.54	0.54	52.7%	65.1	1461	0.20
923	120	15.0	77.5	$162,240,367.47	6.76%	0.13	0.60	0.58	52.6%	58.7	1431	0.23
1187	130	15.0	77.5	$152,528,418.64	6.39%	0.12	0.57	0.56	52.6%	58.7	1441	0.22
1715	150	15.0	77.5	$135,828,737.72	5.71%	0.11	0.52	0.51	52.6%	58.7	1459	0.19
1055	125	15.0	77.5	$151,457,750.41	6.35%	0.12	0.56	0.55	52.6%	58.7	1438	0.22
1320	135	15.0	80.0	$143,091,299.59	6.02%	0.11	0.54	0.55	52.6%	58.7	1398	0.20
924	120	15.0	80.0	$163,676,118.50	6.81%	0.13	0.60	0.58	52.5%	58.7	1383	0.24
1056	125	15.0	80.0	$151,400,706.81	6.35%	0.12	0.56	0.55	52.5%	58.7	1389	0.22
1716	150	15.0	80.0	$139,724,437.28	5.88%	0.11	0.53	0.52	52.5%	58.7	1409	0.21

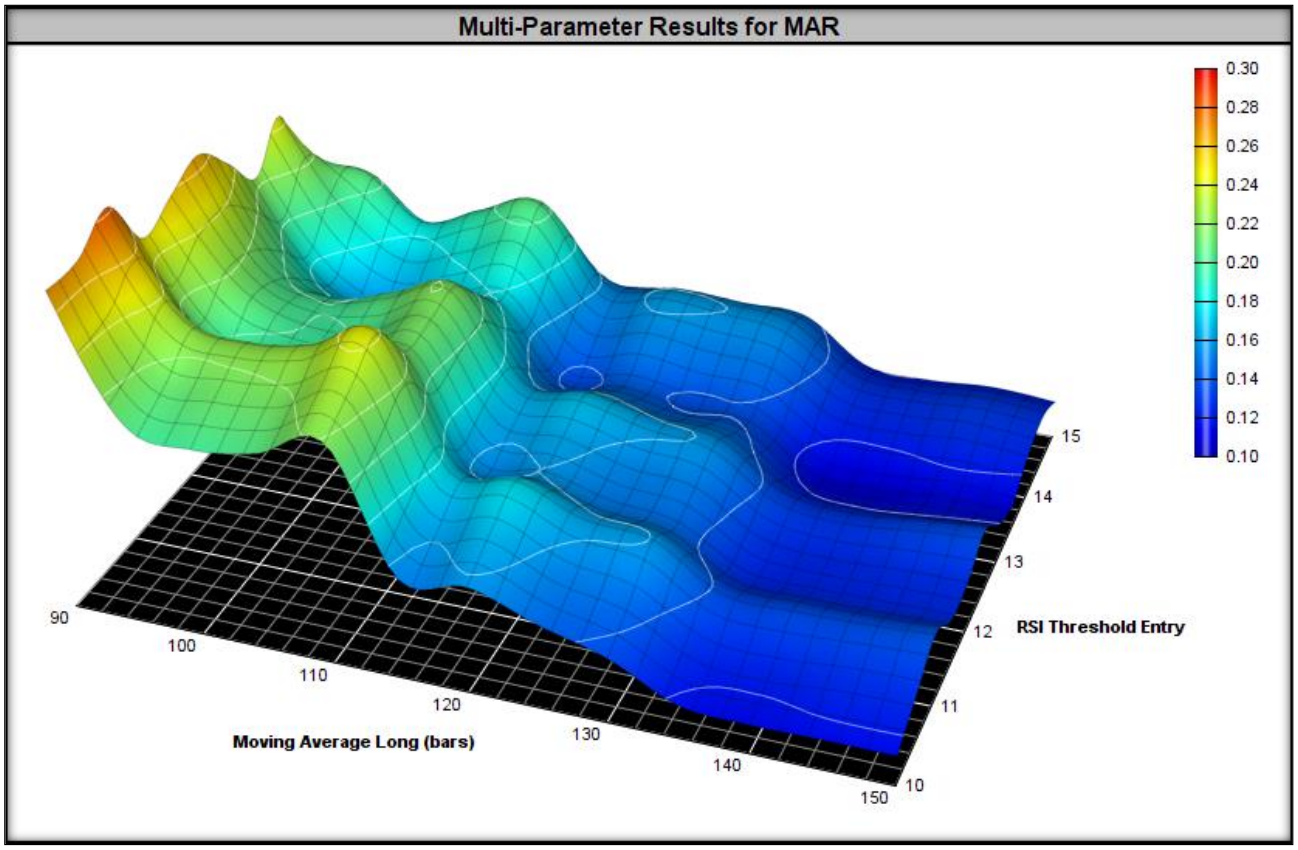
In summary, the strategy **failed the stability test** over a wide range of optimized parameters because:

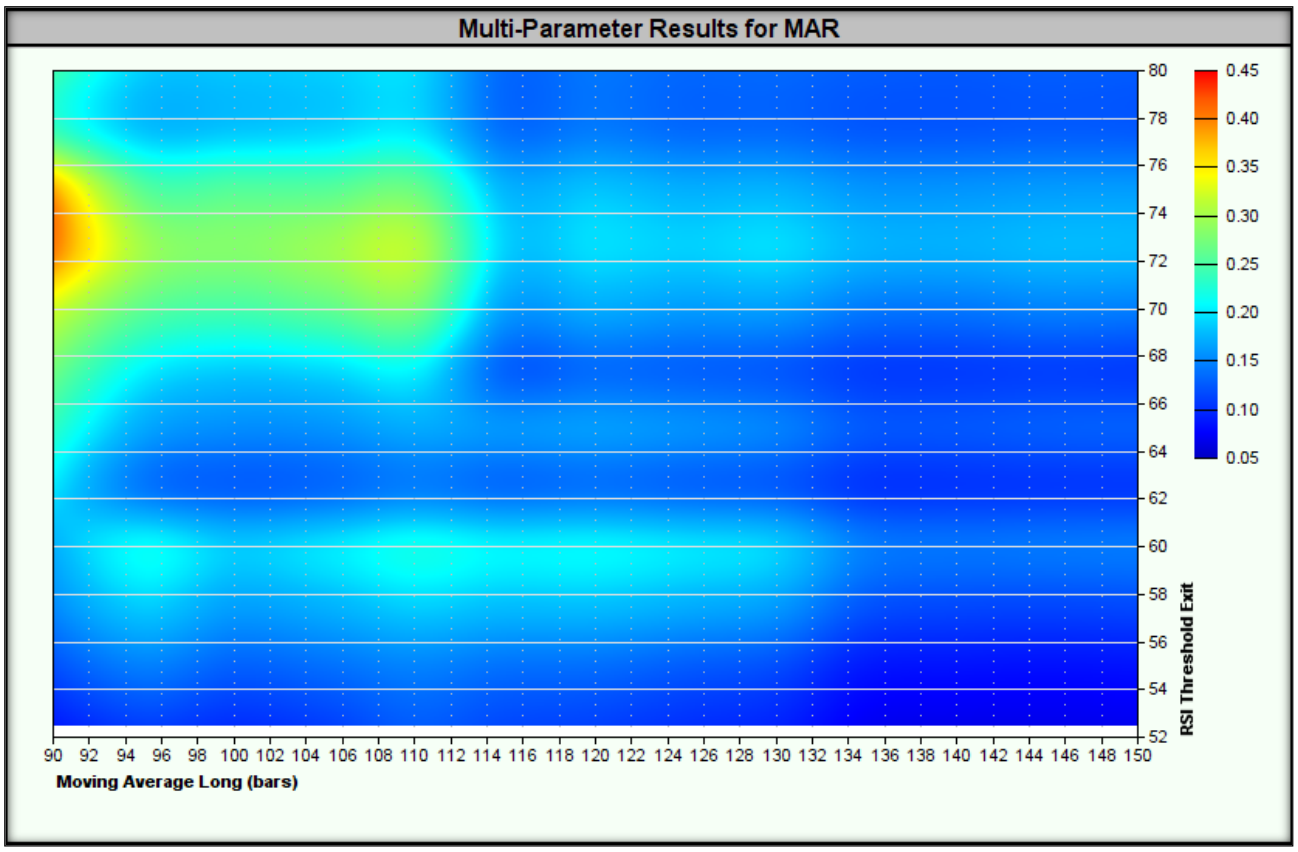
- **The maximum drawdown exceeded 250% of the drawdown value** for the result with the highest MAR (**53.1% vs. 14.2%)** – which means a high risk of deep capital drawdowns.

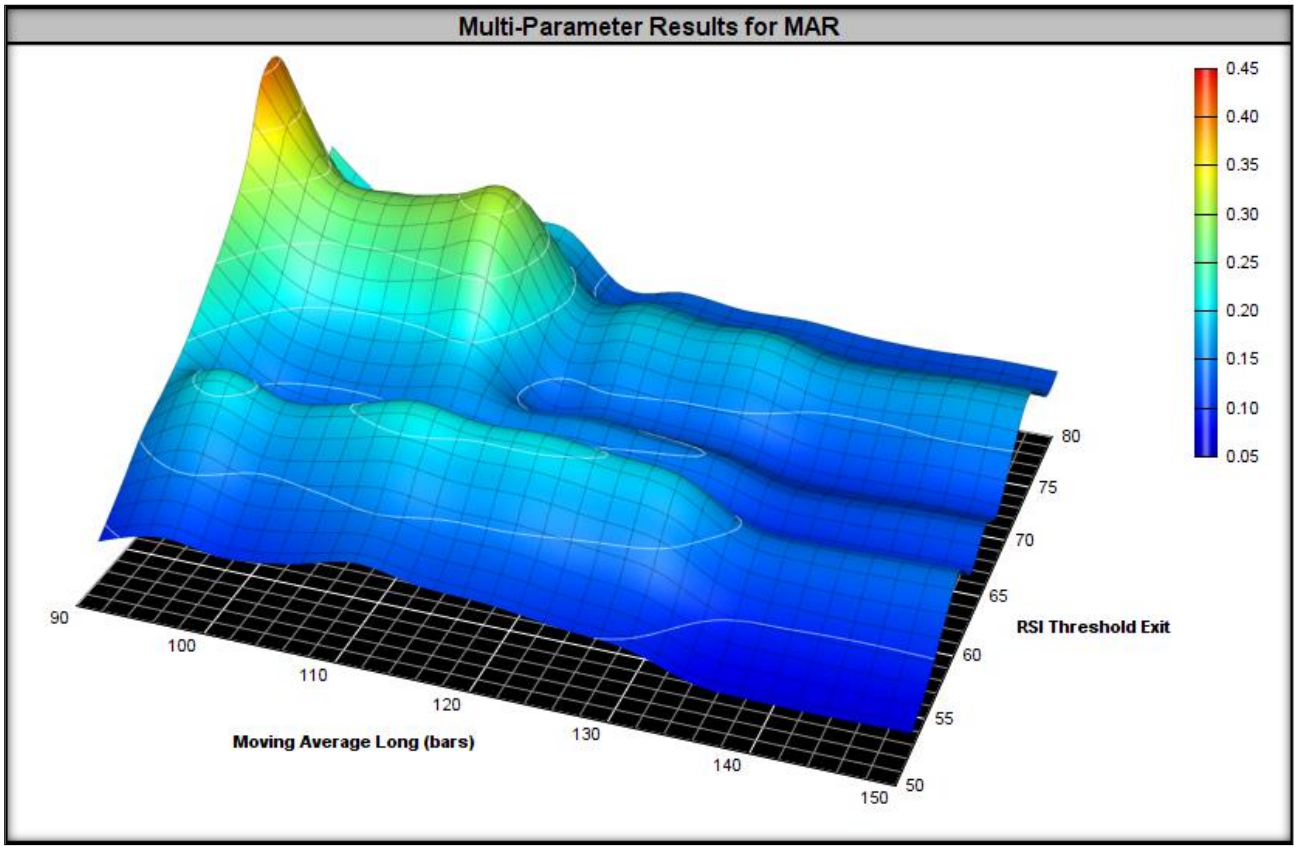
Therefore, **<u>further testing of the strategy is not justified,</u>** as its use in real transactions **is highly questionable.**

Heatmaps for the tested ranges are presented below.




Multi-Parameter Results for MAR
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
90
100
110
120
130
140
150
Moving Average Long (bars)
10
11
12
13
14
15
RSI Threshold Entry


Multi-Parameter Results for MAR
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
80
78
76
74
72
70
68
66
64
62
60
58
56
54
52
RSI Threshold Exit
90 92 94 96 98 100 102 104 106 108 110 112 114 116 118 120 122 124 126 128 130 132 134 136 138 140 142 144 146 148 150
Moving Average Long (bars)


Multi-Parameter Results for MAR
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
90
100
110
120
130
140
150
Moving Average Long (bars)
80
75
70
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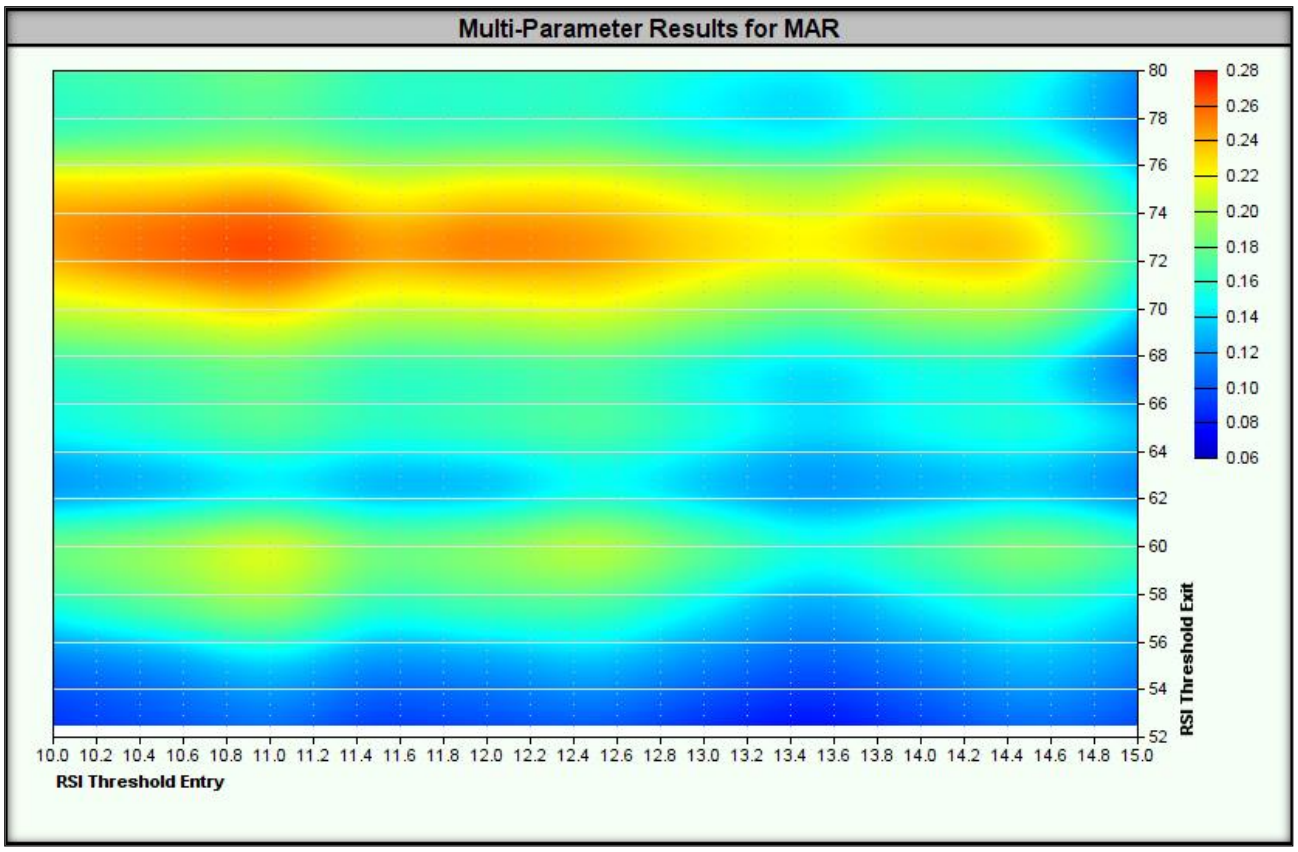
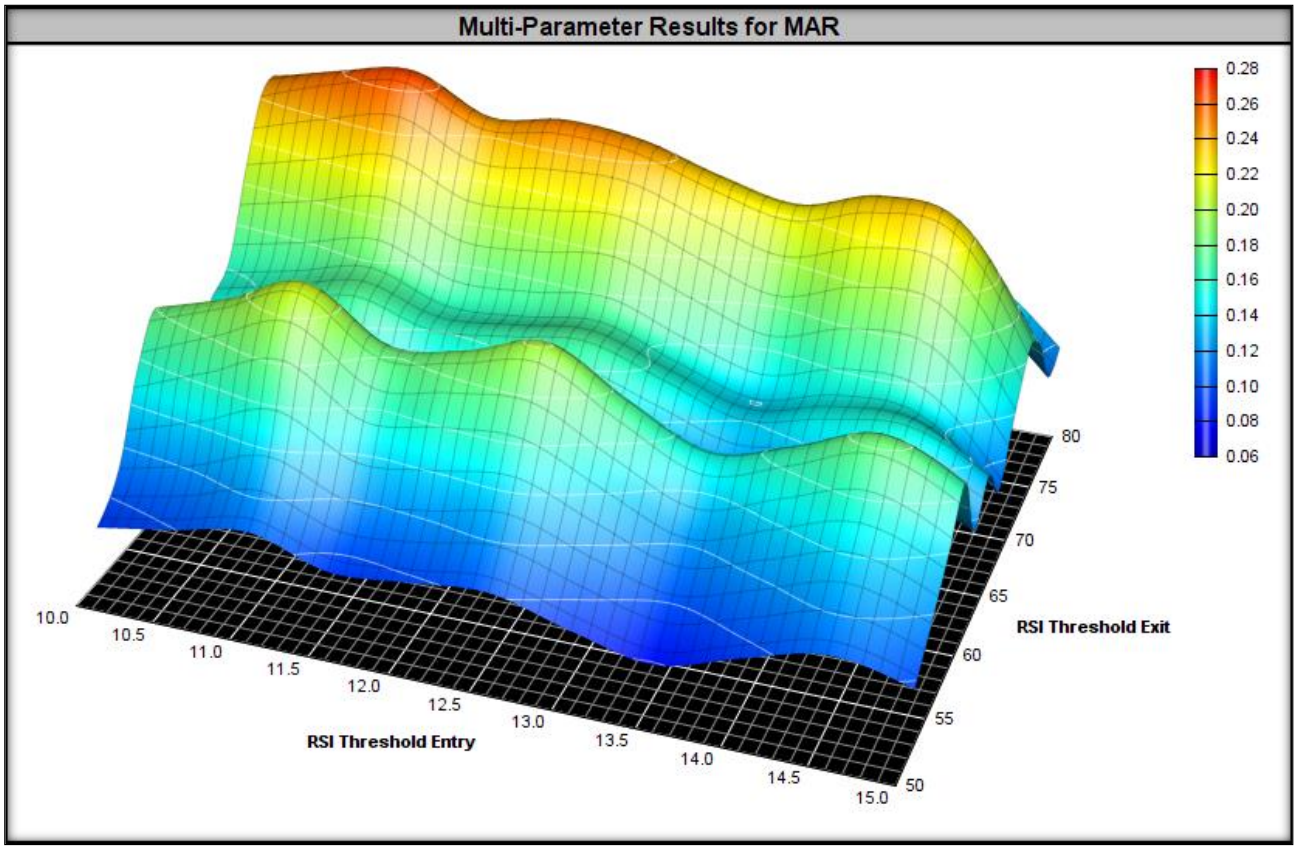
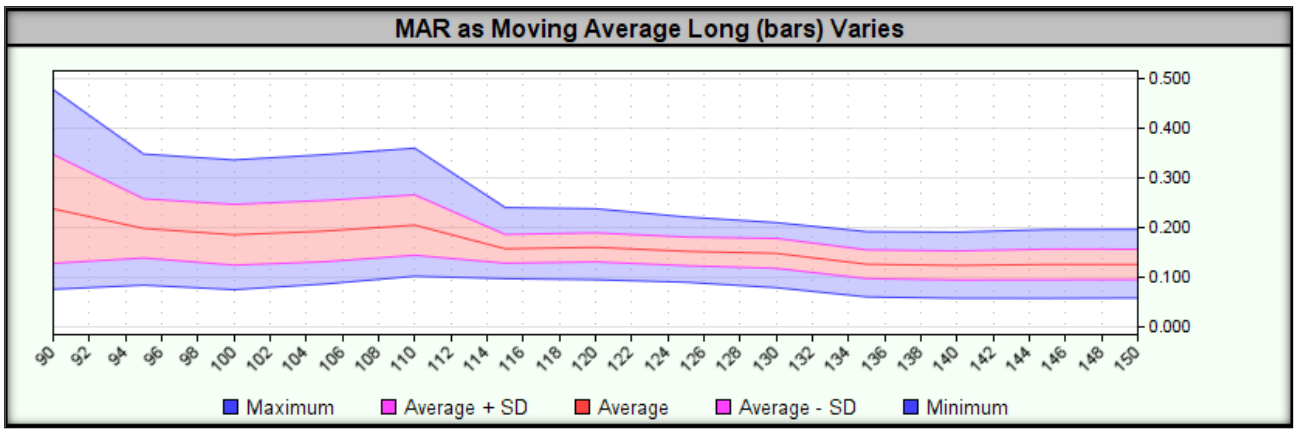
60
55
50
RSI Threshold Exit


Multi-Parameter Results for MAR
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
80
78
76
74
72
70
68
66
64
62
60
58
56
54
52
RSI Threshold Exit
10.0 10.2 10.4 10.6 10.8 11.0 11.2 11.4 11.6 11.8 12.0 12.2 12.4 12.6 12.8 13.0 13.2 13.4 13.6 13.8 14.0 14.2 14.4 14.6 14.8 15.0
RSI Threshold Entry


Multi-Parameter Results for MAR
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
14.5
15.0
RSI Threshold Entry
80
75
70
65
60
55
50
RSI Threshold Exit


MAR as Moving Average Long (bars) Varies
0.500
0.400
0.300
0.200
0.100
0.000
90
92
94
96
98
100
102
104
106
108
110
112
114
116
118
120
122
124
126
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134
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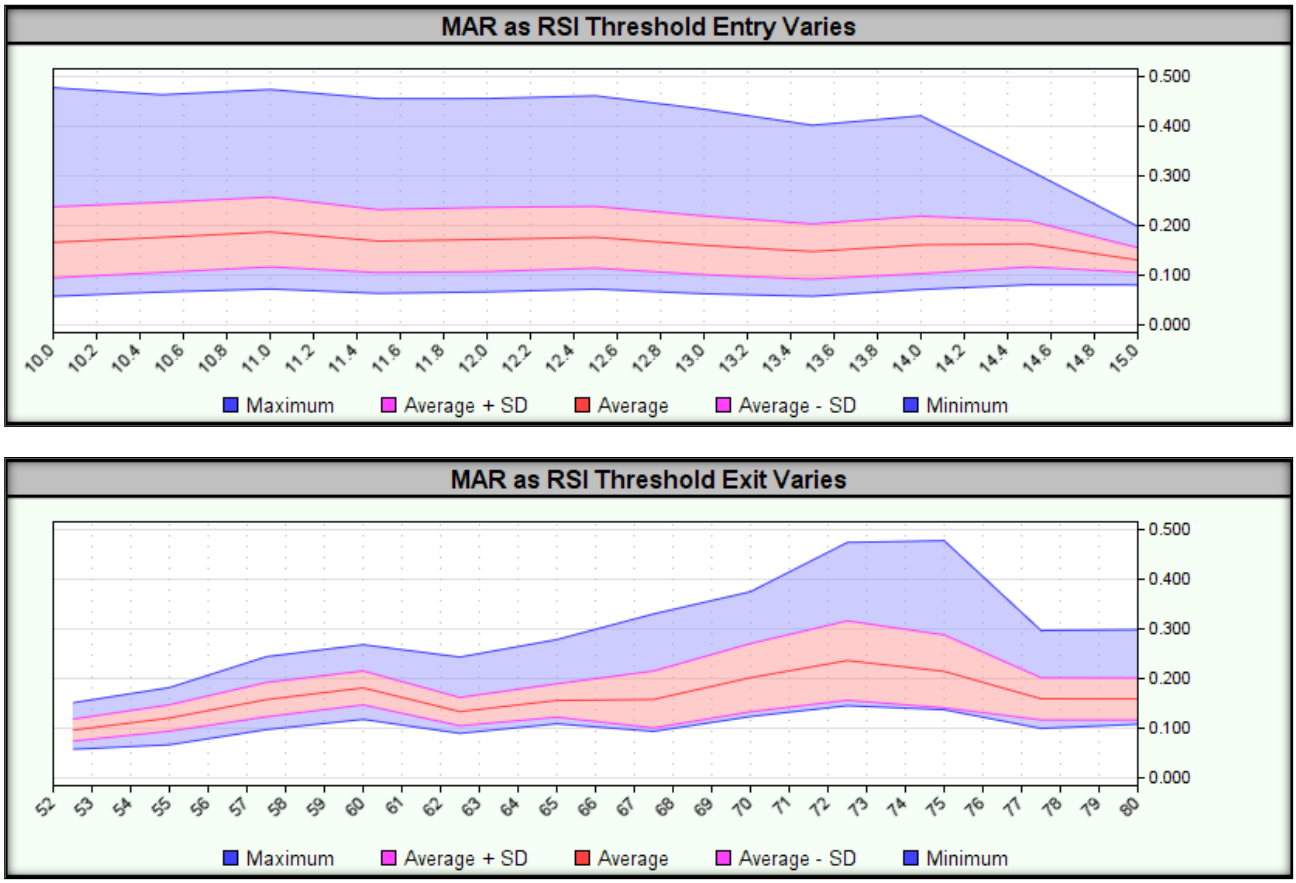
138
140
142
144
146
148
150
Maximum
Average + SD
Average
Average - SD
Minimum



2. **Monte Carlo simulation**

This step was skipped due to **failure of previous stability tests.**

3. **Stability over a moving time window**

This step was skipped due to **failure of previous stability tests.**

4. **Long/short stability**

This step was skipped due to **failure of previous stability tests.**

5. **Stability in the portfolio of financial instruments**

This step was skipped due to **failure of previous stability tests.**

6. **Money Management (Position Sizing)**

This step was skipped due to **failure of previous stability tests.**

7. **Strategy Risk Management**

This step was skipped due to **failure of previous stability tests.**

Step 5: Walk-Forward Analysis

This step was skipped due to **failure of previous stability tests.**

Step 6: Using the strategy in real time

This step was skipped due to **failure of previous stability tests.**