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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.

Time Price Scale-In v.3

Investment Strategy Testing Summary

Time Price Strategy Scale-In (TPS) is a swing trading investment technique that uses the short-term **Relative Strength Index (RSI)** and **correction of the instrument in trend** (quotes above/below the 200-day moving average). The key assumption of the strategy is **to open long positions during a downward correction** and possibly **pyramid it when the price continues to fall,** and then close it after the price increases. **Similarly for short positions.**

Compared to the Time Price Strategy version Scale-In v.1 of this strategy, the parameters were optimized using **The Grid technique Search, and also focused only on long positions in the market. However, it should be noted that while the strategy 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 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

Time Price Strategy Scale-In (TPS) is a short-term investing approach developed by Larry Connors that **is based on market psychology** – primarily **the emotions of fear and greed** that are a natural part of investor behavior.

The strategy involves scaling positions in situations where the market is in a correction within the prevailing trend. Positions are opened gradually as prices continue to fall and the market becomes more oversold, allowing for **entry price averaging** and the potential price rebound to be exploited.

For the purposes of this test, **long positions** on **stock indices, bonds, gold** and **the dollar index were used,** which allows us to assess the strategy's effectiveness across a broad spectrum of asset classes.

Key assumptions of the TPS strategy:

- **Time:** Taking advantage of specific moments in the market when emotions of fear or greed are at a high level.
- **Price:** Identifying price levels that indicate a market is oversold.
- **Scale-In:** Scaling a position by gradually adding units as the market becomes more oversold.

The strategy uses:

- **Short-term RSI** to generate entry and exit signals;
- **Long-term moving average** to determine the direction of the dominant trend;
- **Gradual building of positions in tranches:** 10%, 20%, 30%, 40% of the target position.

Characteristics of the strategy and its strengths and weaknesses:

- **Using market psychology:** The strategy is based on a deep understanding of investor emotions and their impact on price movements.
- **Scaling a position:** Scaling into a position gradually allows for better risk management and entry price averaging.
- **Simple Rules:** Clearly defined rules facilitate implementation and trading discipline.
- **Risk in strong trends:** In the event of strong, prolonged downward or upward trends, the strategy may generate losses because it assumes the market will return to the main trend.
- **Remote Stop Loss Orders:** The strategy closes all positions when the price breaches the moving average. This is an order that is activated only in the event of a dynamic trend change, and our positions may already be generating significant losses by that point.
- **Requires a lot of capital:** Scaling positions and potentially holding losing positions for long periods of time requires adequate capital.
- **Psychological Challenge:** Trading against dominant market emotions can be psychologically challenging and requires a lot of discipline.
- **Flexibility:** Can be used on various markets and financial instruments, especially stock indices.
- **Requires discipline:** The effectiveness of the strategy depends on strict adherence to the rules, which can be difficult in the face of strong market emotions.

- **Not suitable for trendless markets:** The strategy may not work effectively in consolidating markets or markets with no clear trend.

Time Price Strategy Scale-In is an investment approach that exploits **the emotions of fear and greed in the market.** By gradually scaling positions as fear grows (prices fall), traders can take advantage of potential price rebounds as emotions calm down. **The strategy requires discipline and proper risk management,** but has historically proven to be highly effective, especially on stock indices.

Step 2: Define investment principles

Below is **the pseudocode** for the **Time Price Strategy Scale-In** on daily data:

1. **Calculation of indicators**
   a. **X-period RSI** (for short-term oversold market analysis);
   b. **YYY-day SMA** (to determine trend).
2. **Generating entry signals – long position:**
   a. **Entry conditions:**
      i. Price > SMA;
      ii. RSI < ZZ for 2 consecutive days.
   b. **Open 10% of the position at the open of the next day.**
   c. **Scaling a position:** On each subsequent day, if the closing price is lower than the opening price of the previous trade, do the following:
      i. First drop after entry: Buy an additional 20% of the position.
      ii. Second drop after entry: Buy an additional 30% of the position.
      iii. Third drop after entry: Buy an additional 40% of the position.
      After a total of four tranches you have 100% of your target position.
   d. **Additional conditions:** Do not make new transactions if the instrument price closes below the YYY-day SMA.
3. **Generating Exit Signals:** Close the entire position the next day on the open when the X-period RSI closes above WW.
4. **Loss Management:** Close all long positions when price breaches the moving average.
5. **Daily Monitoring:**
   a. **Calculation of indicators** – every day:
      i. Calculate X-period RSI.
      ii. Calculate the YYY-day SMA.
   b. **Checking entry conditions:** If the conditions are met, start the process of scaling the position according to the rules.
   c. **position monitoring** – if position is open:
      i. Watch the 2-period RSI.
      ii. When RSI closes above WW, close the position for the next day's open.
6. **Additional Notes:**
   a. **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.

Tests are conducted assuming that the risk of one position is **2.0% of the total capital,** with **a hypothetical stop loss order** distant from the position opening point by **2 x ATR (40 days). By one position should be understood a maximum of 4 units.** Therefore, **the total risk of all 4 units** is **2.0% of the total capital,** with **a hypothetical stop loss order** distant from the position opening point by **2 x ATR (40 days).**

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 is on a **futures contract for the S&P index.** In January 2010, the index **was in an upward trend** (price above the 200-day moving average). Therefore, we were only interested in **long positions.** To open a long position, **the RSI must be below 25 for two consecutive days.** This situation was created by the first two candles in the marked rectangle. So the next day we open a long position (the third candle in the rectangle). **The system worked correctly.**

In the context of further analysis, it should be noted that **the close of this candle falls below the opening of the position** - this will be important in the next step.

According to the strategy, the position is **increased by another unit when the closing price of the candle falls below the level at which the previous unit was opened.** And so it happened – as we indicated above, **the opening price of the first unit fell above the closing price of the day it was opened** (the first candle in the rectangle below). So **the next day, at the opening price, we buy the second unit** (the second candle in the rectangle). **The system worked correctly.**

Again, in the context of further analysis, note that **the close of this candle falls below the open of the second unit – this will be important in the next step.**

Again, we have the same situation as when opening the second unit - **the opening price of the second unit was above the closing price of the day it was open** (the first candle in the rectangle below). So **the next day, at the opening price, we buy the third unit** (the second candle in the rectangle). **The system worked correctly.**

Let's follow the further development of the situation, presented in the chart below. **The day of the opening of the third unit is the first candle in the rectangle.** We see that **the closing price falls above the opening price of the third unit, so we do nothing the next day.** In addition, **the RSI still has not reached the level of 70,** which signals the closing of the position. **The next day (the second candle in the rectangle) is strongly downward and closes significantly below the opening of the third unit.** So after such a candle **the next day we open the fourth and at the same time the last unit** (the third candle in the rectangle below). **The system worked correctly.**

It should also be noted that since the opening of the first unit, the RSI indicator has never once risen above 70, which would mean closing all positions the next day at the opening. This situation occurred only a few days after the opening of the fourth unit (the first candle in the rectangle below). Therefore, the next day (the second candle in the rectangle below) all four units were closed. **The system worked correctly.**

Once we are sure that the transactions are generated correctly, we can proceed to the first test of the strategy on the full **in-sample data set.** These tests are conducted on **the basic parameters** that were **proposed by the creator, Larry Connors.**

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 length: 2** days;
- **Number of consecutive days with RSI below Entry Threshold:** 2 days;

- **RSI Entry Threshold:** 25;
- **RSI Exit Threshold:** 70;
- **Maximum number of item units:** 4;
- **Size of subsequent units:** 10%/20%/30%/40%;
- **Stop loss:** moving average;
- **Method of opening a position:** at the opening price of the next day;
- **Position direction:** long positions on stock indices, bonds, gold and the dollar index.
- **Position sizes:** corresponding to a risk of 2.0% of total capital, with a hypothetical stop loss order placed 2 x ATR (40 days) away from the position opening position.

The test result is shown below.

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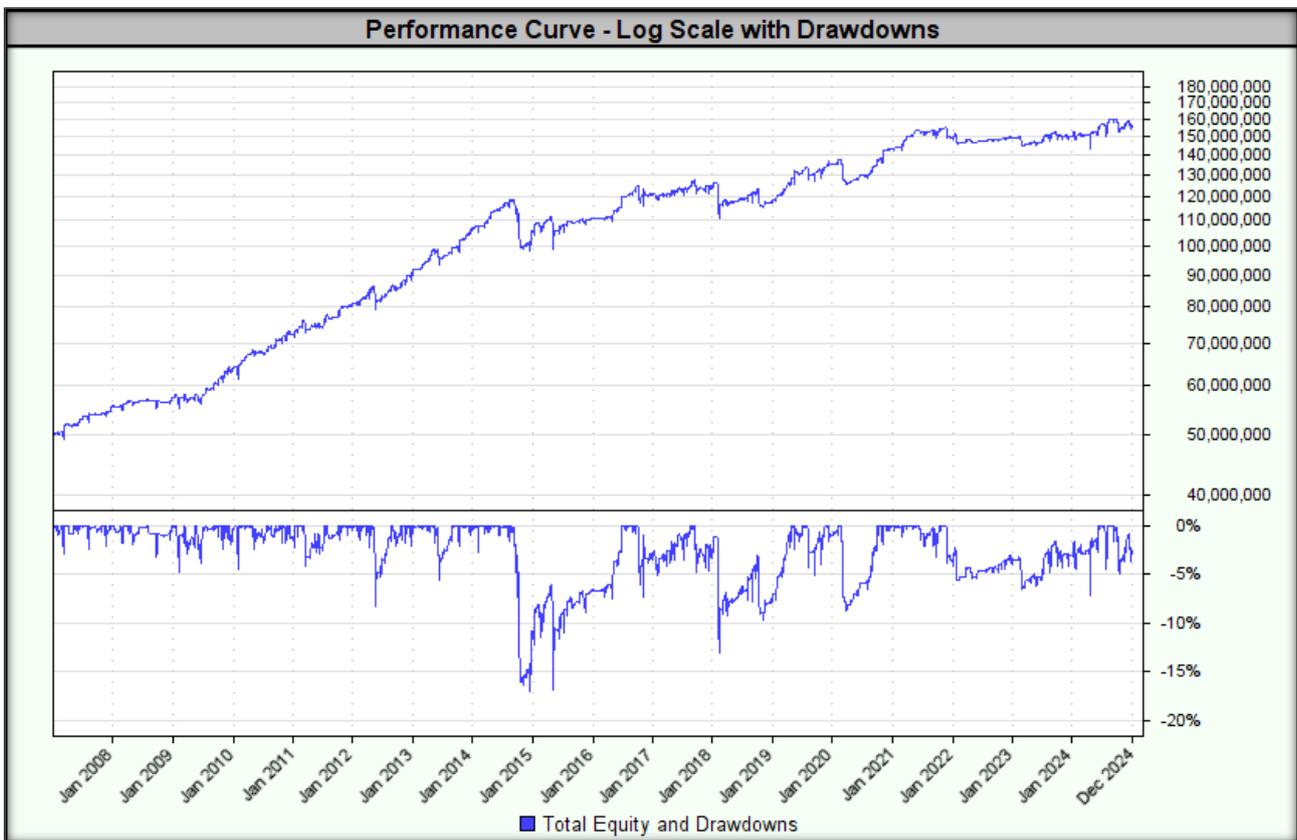
Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.

Indicators/Measures	Concluding a transaction at the opening price
CAGR%	6.5%
MAR Ratio	0.38
RAR%	6.7%
R-Cubed	0.49
Robust Sharpe Ratio	0.95
Max Drawdown	16.9%

Wins	66.6%
Losses	33.4%
Average Win%	0.16%
Average Loss %	0.21%
Win/ Loss Ratio	0.79
Average Trade Duration (days)	6
Percent Profit Factor	1.58
SQN	-
Number of transactions	2934

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.** <u>I cannot</u> emphasize enough that for **a strategy to work** in real conditions, it must also work on <u>**suboptimal parameters** and in **suboptimal conditions.**</u> 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."

<u>**My goal is not**</u> to find **optimal parameter values** – <u>**my goal**</u> is to find <u>**a wide range of parameters** for which the strategy will generate **acceptable results.**</u> **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 considerations 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**

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

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

- **Moving average lengths (SMA):** range **180-270 days (step: 10);**
- **RSI Lengths:** Range **2-3 days (step: 1);**
- **Number of consecutive days with RSI below Entry Threshold:** 2 days;
- **RSI Entry Threshold:** range **13-19 (step: 1);**
- **RSI Exit Threshold:** range **55-80 (step: 2.5).**

The purpose of this test is to check whether **the strategy remains stable (robust)** over a wide range of parameters, which will allow to assess its usefulness in real market conditions. **The key evaluation criterion is that all test results show a positive MAR value, and the maximum drawdown does 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 completely rejected.

The lowest MAR value of 0.03 was achieved for the following parameters:

- **Length of the moving average (SMA):** 180;
- **RSI Lengths:** 2 days;
- **Number of consecutive days with RSI below Entry Threshold:** 2 days;
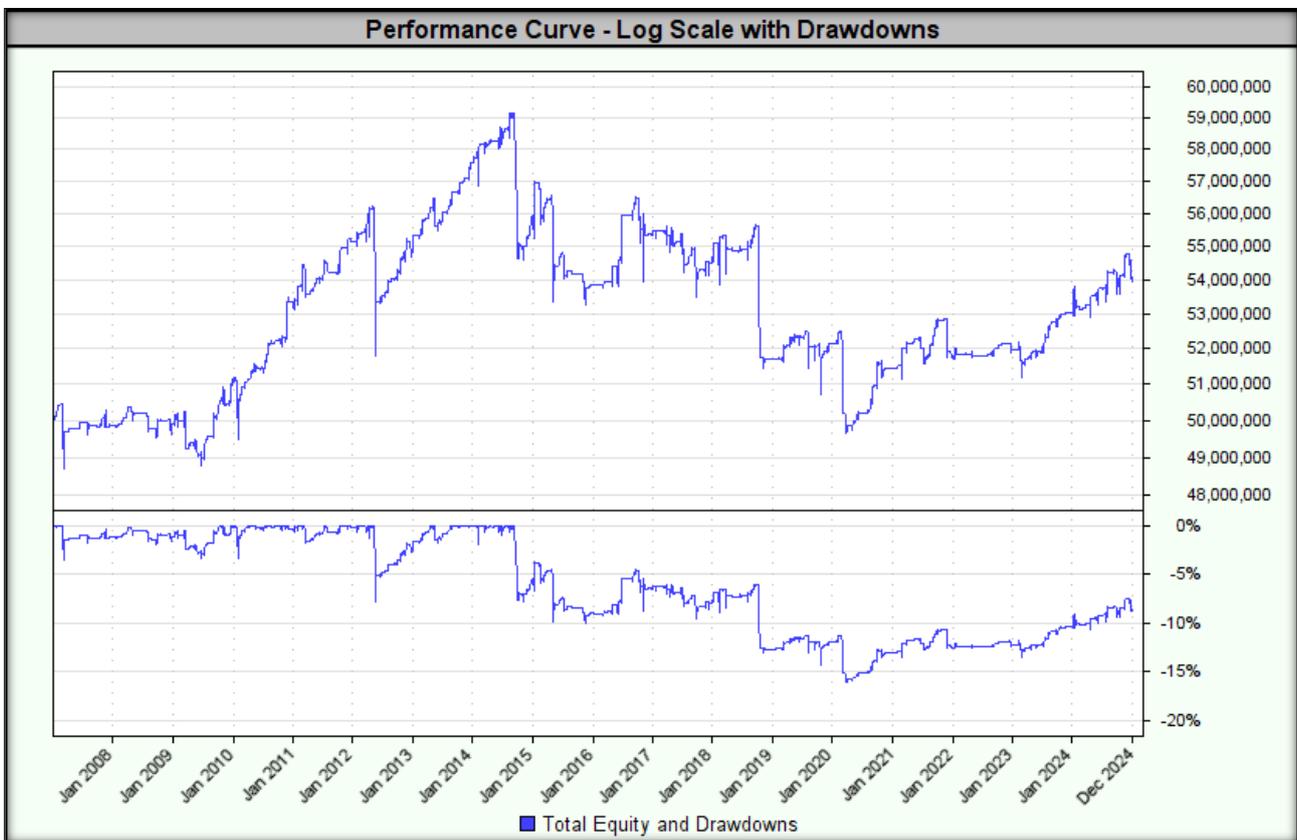- **RSI Entry Threshold:** 13;
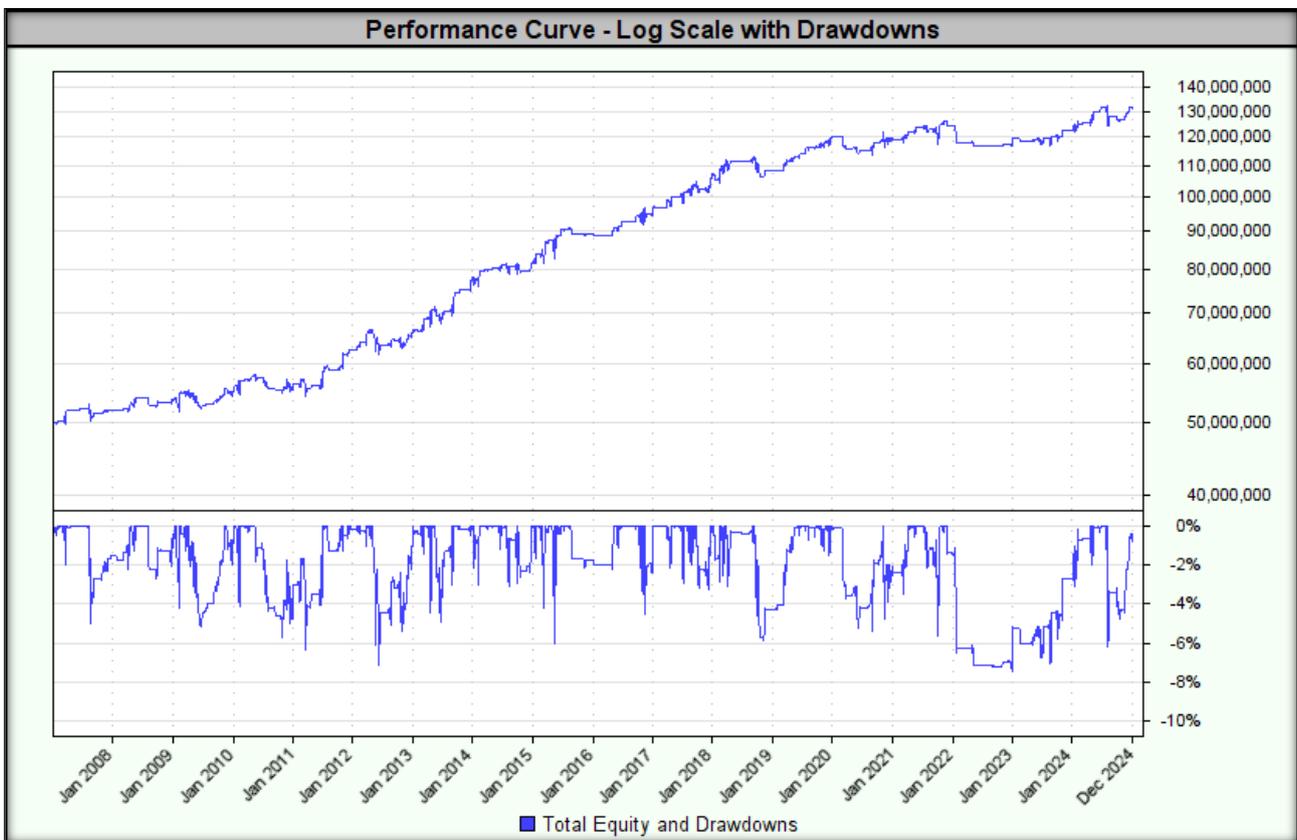
- **RSI Exit Threshold:** 55.

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

Test	Moving Average (bars)	RSI (bars)	RSI Entry Threshold	RSI Exit Threshold	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades	R3	RAR [%]
1	180	2	13	55.0	$53,955,504.73	0.42%	0.03	0.13	0.16	16.1%	123.9	1442	0.01	0.14
12	180	2	14	55.0	$56,613,129.01	0.69%	0.05	0.19	0.25	14.9%	123.9	1568	0.02	0.35
2	180	2	13	57.5	$58,278,238.02	0.85%	0.06	0.23	0.32	14.4%	123.9	1458	0.04	0.56
4	180	2	13	62.5	$59,262,321.56	0.95%	0.06	0.24	0.31	15.7%	123.9	1494	0.04	0.64
3	180	2	13	60.0	$58,264,881.15	0.85%	0.06	0.23	0.32	13.6%	123.9	1478	0.04	0.62
23	180	2	15	55.0	$59,406,288.06	0.96%	0.07	0.25	0.33	13.0%	123.9	1692	0.04	0.66
5	180	2	13	65.0	$63,394,368.97	1.33%	0.08	0.32	0.37	15.6%	123.9	1514	0.07	0.95
15	180	2	14	62.5	$62,247,752.36	1.22%	0.09	0.30	0.37	14.3%	123.9	1619	0.06	0.83
13	180	2	14	57.5	$61,421,741.09	1.15%	0.09	0.30	0.40	13.1%	123.9	1583	0.06	0.80
155	190	2	13	55.0	$59,983,606.86	1.02%	0.09	0.29	0.40	11.4%	124.6	1463	0.07	0.83
14	180	2	14	60.0	$61,614,303.28	1.17%	0.09	0.30	0.41	12.4%	123.9	1603	0.06	0.86

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 0.74 was achieved for the following parameters:

- **Length of the moving average (SMA):** 230;
- **RSI Lengths:** 3 days;
- **Number of consecutive days with RSI below Entry Threshold:** 2 days;
- **RSI Entry Threshold:** 16;
- **RSI Exit Threshold:** 80.

The highest MAR value was accompanied by **a drawdown of 7.4%.**

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

Test	Moving Average (bars)	RSI (bars)	RSI Entry Threshold	RSI Exit Threshold	End Balance	CAGR%	MAR ▽	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades	R3	RAR [%]
891	230	3	16	80.0	$131,248,444.62	5.51%	0.74	1.03	1.04	7.4%	29.3	946	0.82	6.35
258	190	3	15	65.0	$88,312,699.75	3.21%	0.70	1.06	1.12	4.6%	35.1	725	0.69	3.47
1045	240	3	16	80.0	$123,815,099.08	5.17%	0.69	0.96	0.95	7.4%	29.3	964	0.72	6.08
737	220	3	16	80.0	$127,387,214.43	5.33%	0.69	0.98	0.97	7.8%	29.3	928	0.82	6.24
902	230	3	17	80.0	$147,530,778.52	6.20%	0.66	1.07	1.11	9.4%	33.4	1050	0.91	6.92
720	220	3	15	65.0	$88,817,061.64	3.24%	0.65	1.04	1.02	5.0%	36.6	762	0.71	3.74
748	220	3	17	80.0	$145,148,905.13	6.10%	0.64	1.05	1.08	9.5%	31.2	1032	0.94	6.91
890	230	3	16	77.5	$115,897,459.71	4.78%	0.64	0.95	1.01	7.4%	29.4	942	0.76	5.66
1056	240	3	17	80.0	$138,378,211.72	5.82%	0.62	1.00	1.02	9.3%	33.6	1070	0.83	6.62
1044	240	3	16	77.5	$110,256,724.87	4.49%	0.60	0.88	0.94	7.4%	29.4	959	0.71	5.46
736	220	3	16	77.5	$112,558,446.05	4.61%	0.59	0.91	0.99	7.8%	29.4	924	0.69	5.55

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 18.4%.**

Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.
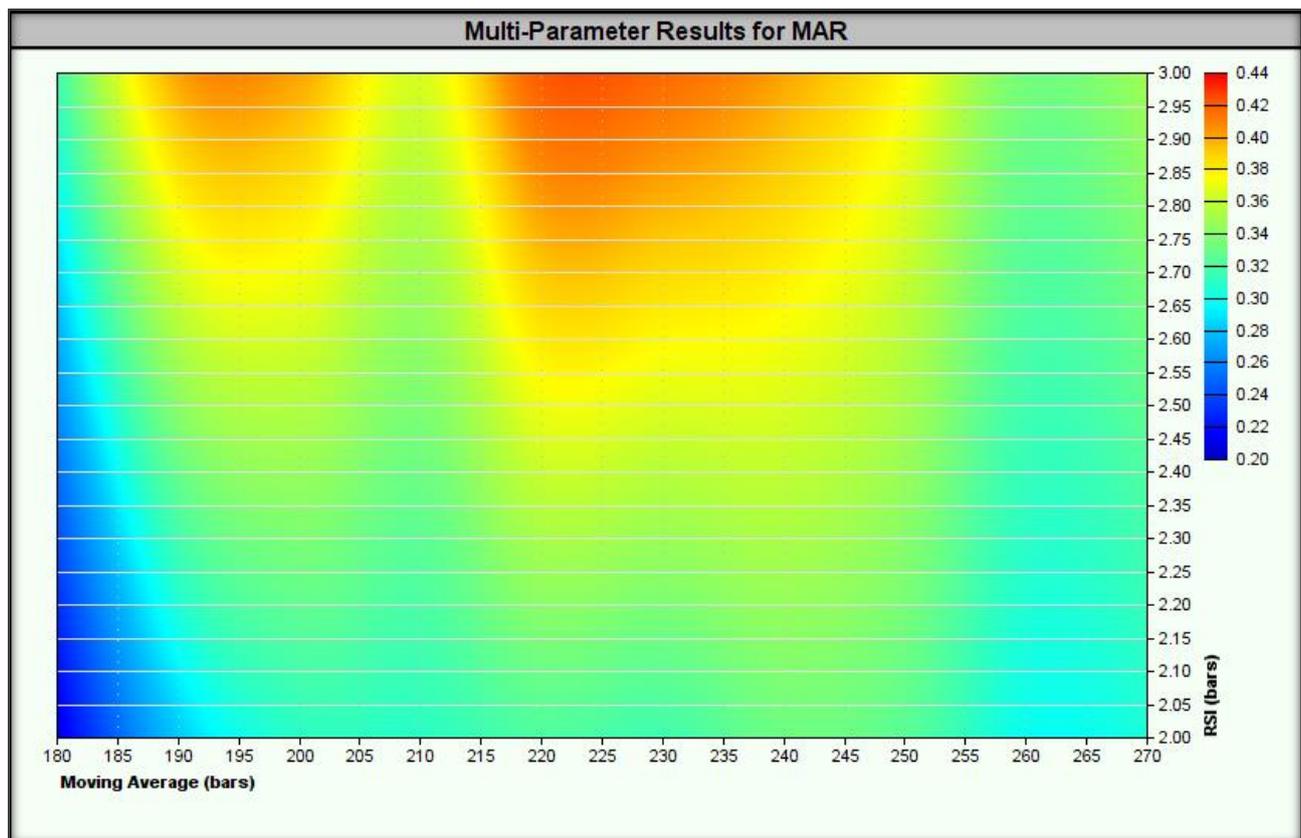
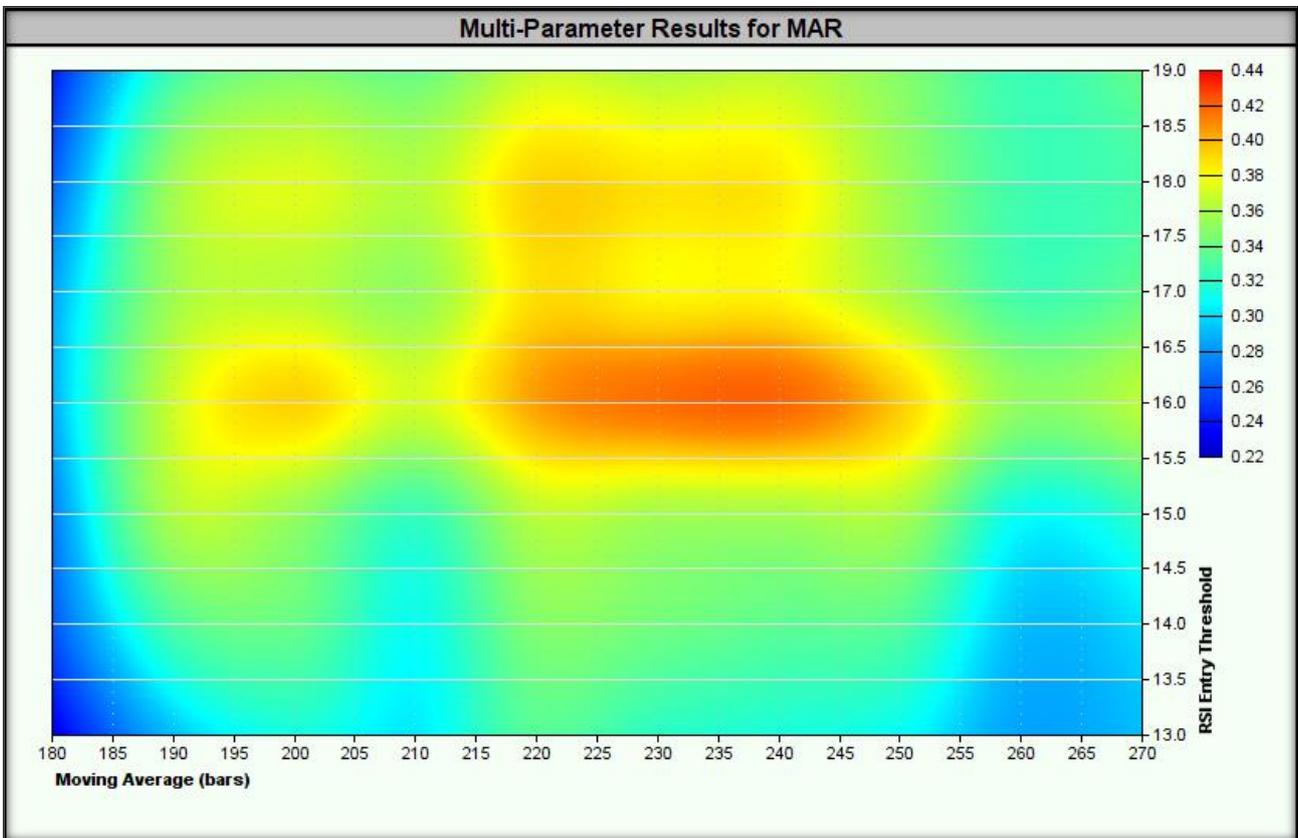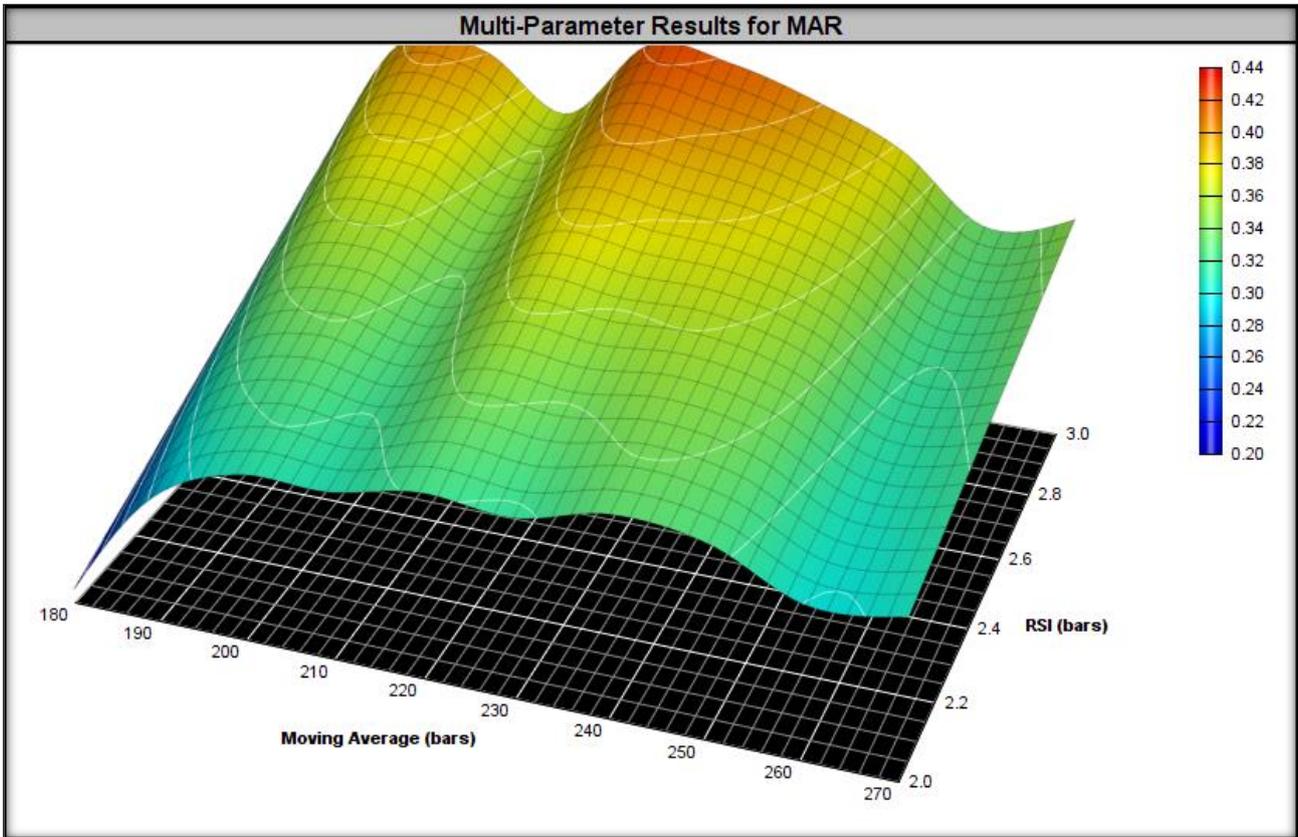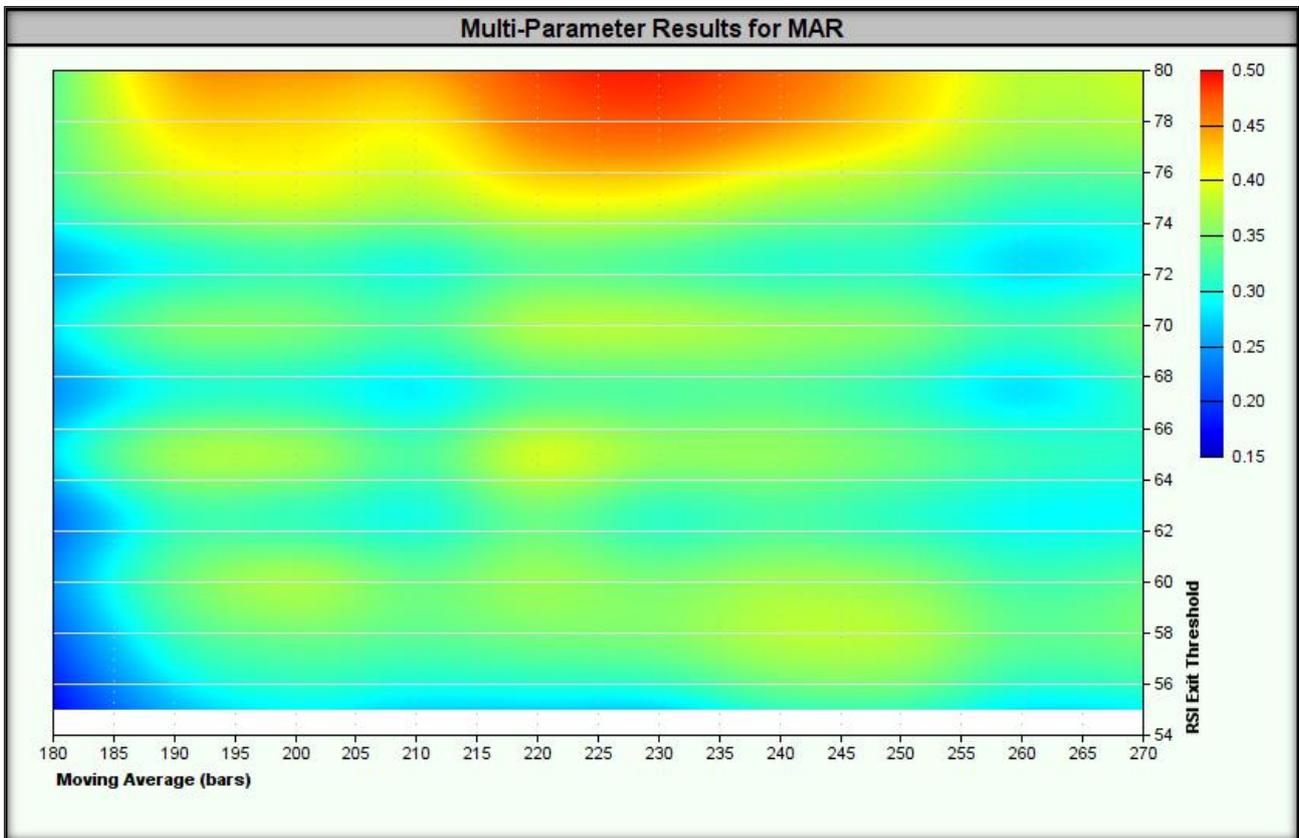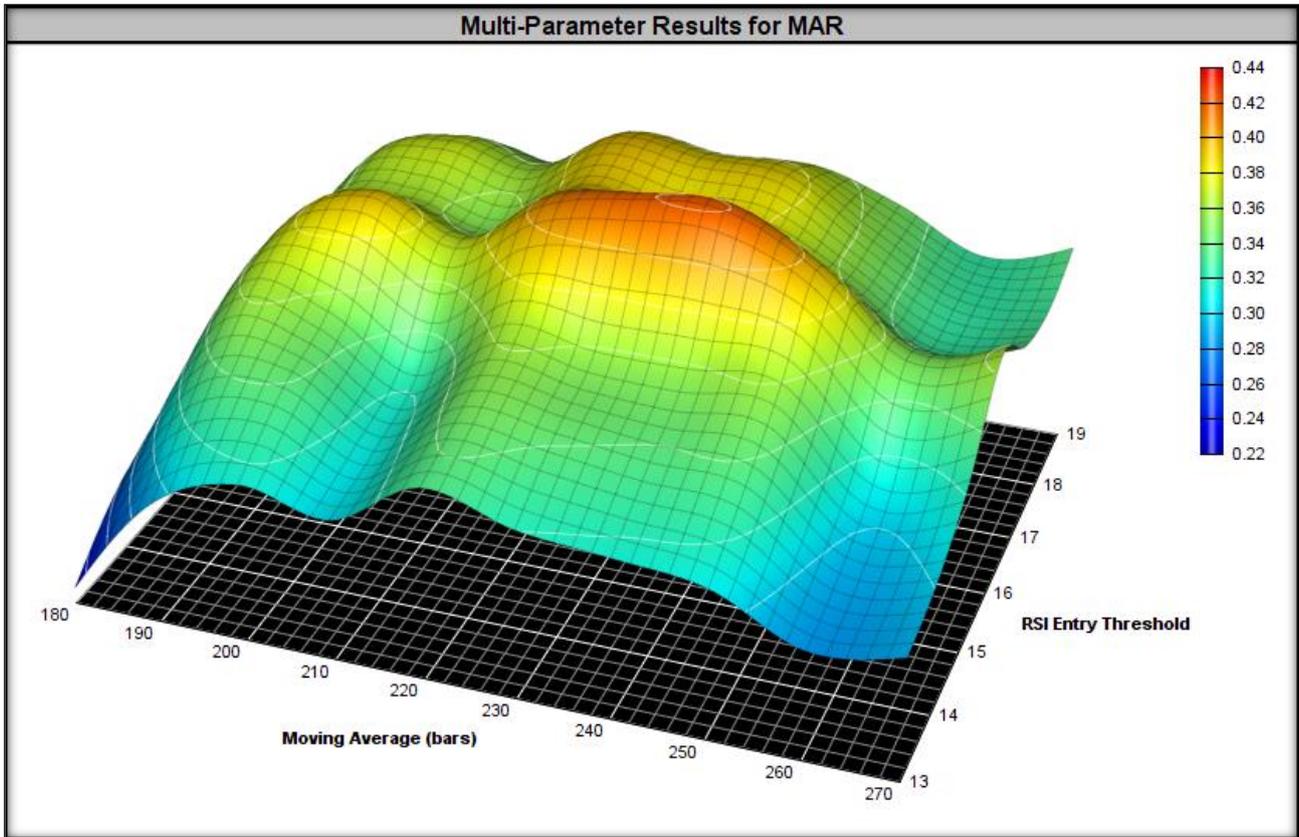| Test	Moving Average (bars)	RSI (bars)	RSI Entry Threshold	RSI Exit Threshold	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD ▽	Longest DD	Trades	R3	RAR [%]
1537	270	3	19	72.5	$102,397,318.57	4.06%	0.22	0.66	0.72	18.4%	42.2	1318	0.30	4.81
1539	270	3	19	77.5	$131,745,840.31	5.53%	0.31	0.78	0.91	18.1%	27.3	1321	0.47	6.70
1540	270	3	19	80.0	$153,568,793.95	6.43%	0.36	0.86	0.97	18.1%	24.0	1315	0.59	7.65
228	190	2	19	72.5	$119,035,018.81	4.94%	0.27	0.90	1.06	18.1%	33.6	2288	0.62	4.90
382	200	2	19	72.5	$124,867,277.34	5.22%	0.29	0.94	1.14	18.0%	26.7	2327	0.71	5.38
1384	260	3	19	75.0	$103,340,217.78	4.12%	0.23	0.65	0.74	17.9%	35.2	1294	0.35	5.22
151	180	3	19	72.5	$80,446,376.58	2.68%	0.15	0.52	0.64	17.9%	46.6	1152	0.17	3.04
305	190	3	19	72.5	$95,332,747.09	3.65%	0.20	0.68	0.76	17.9%	46.5	1178	0.26	4.03
536	210	2	19	72.5	$124,357,557.86	5.19%	0.29	0.92	1.06	17.7%	35.6	2352	0.58	5.31
1230	250	3	19	75.0	$105,245,217.21	4.22%	0.24	0.68	0.78	17.7%	34.7	1290	0.44	5.20
1076	240	3	19	75.0	$109,951,092.87	4.48%	0.25	0.72	0.87	17.7%	33.4	1274	0.48	5.41

In summary, the strategy **passed the stability test** in a wide range of optimized parameters because:
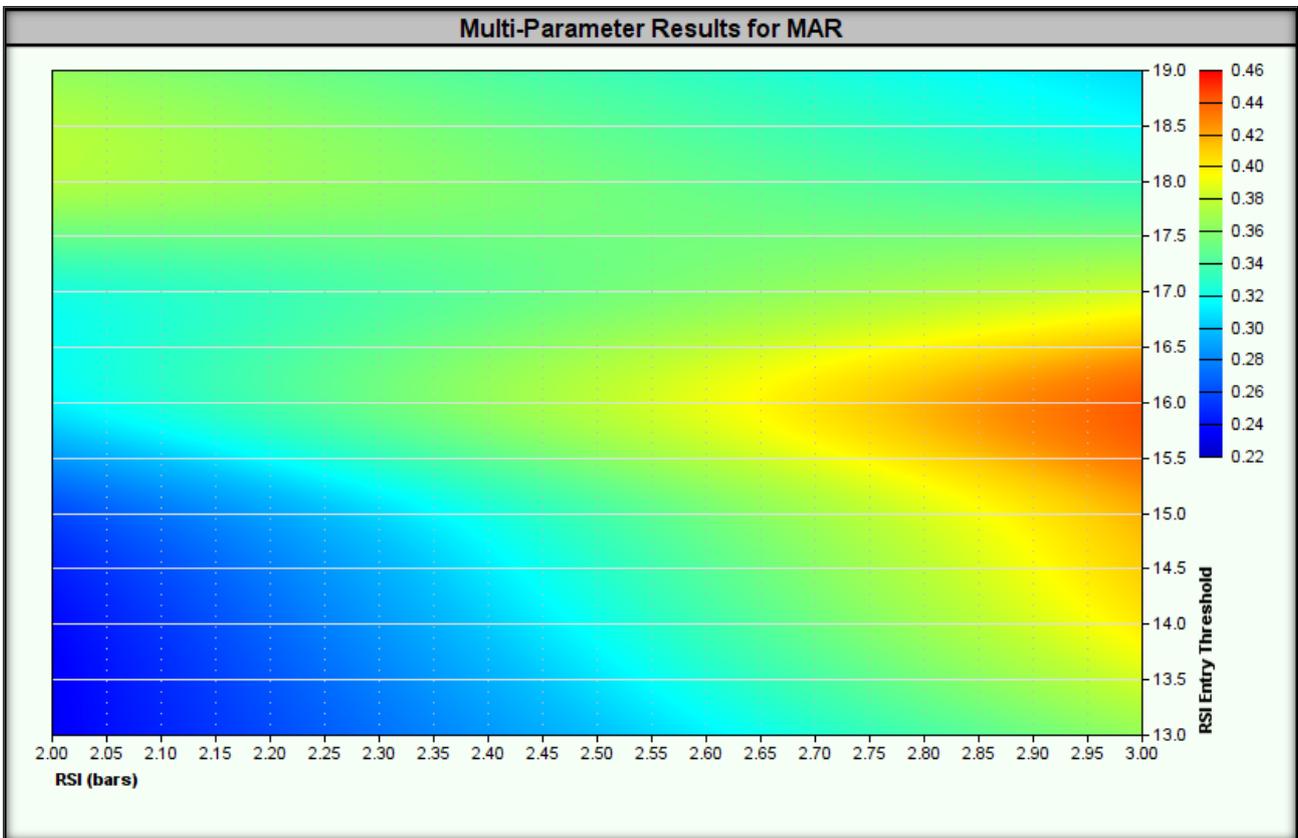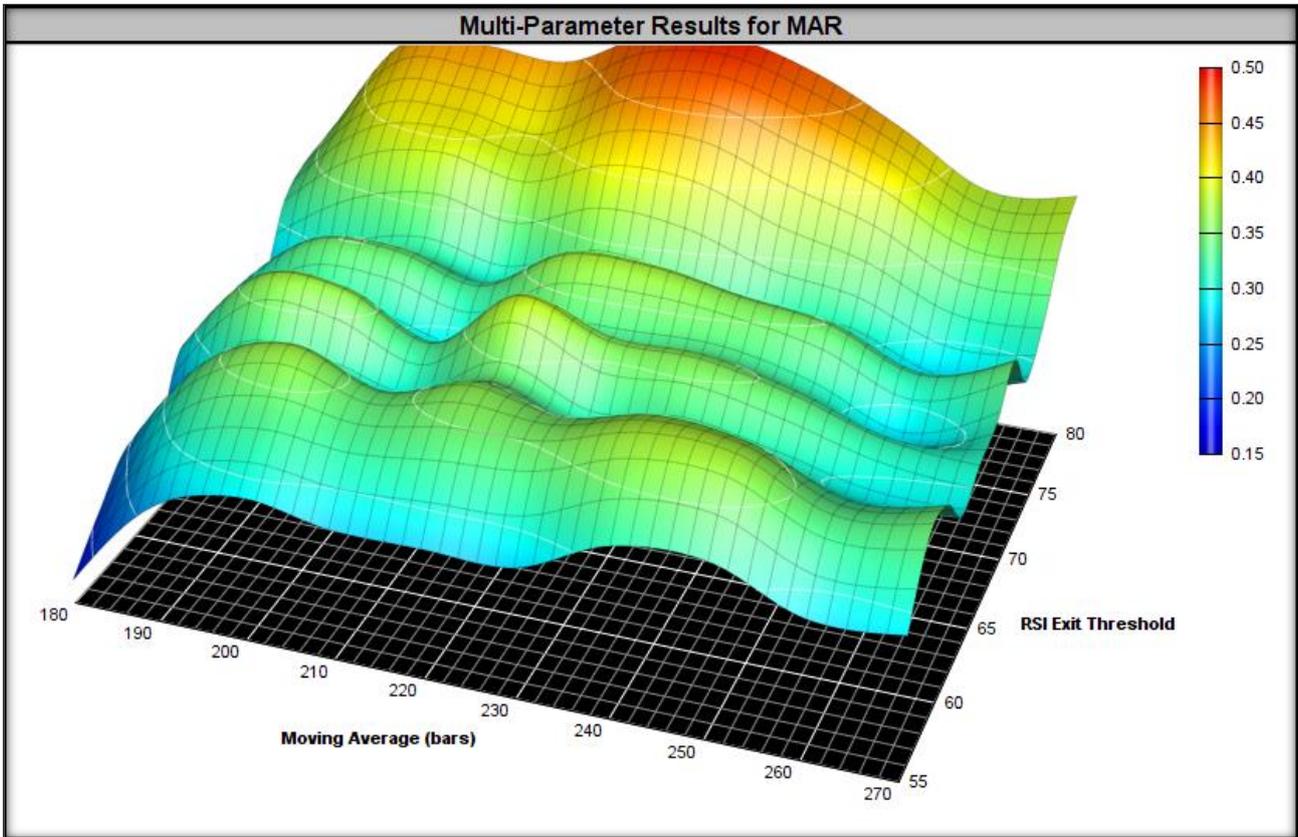
- **MAR value** – which indicates the stability of the strategy in various market conditions.
- **The maximum drawdown did not exceed 250% of the drawdown value** for the result with the highest MAR (**18.4% vs. 7.4%**) – which means an acceptable risk of deep capital drawdowns.
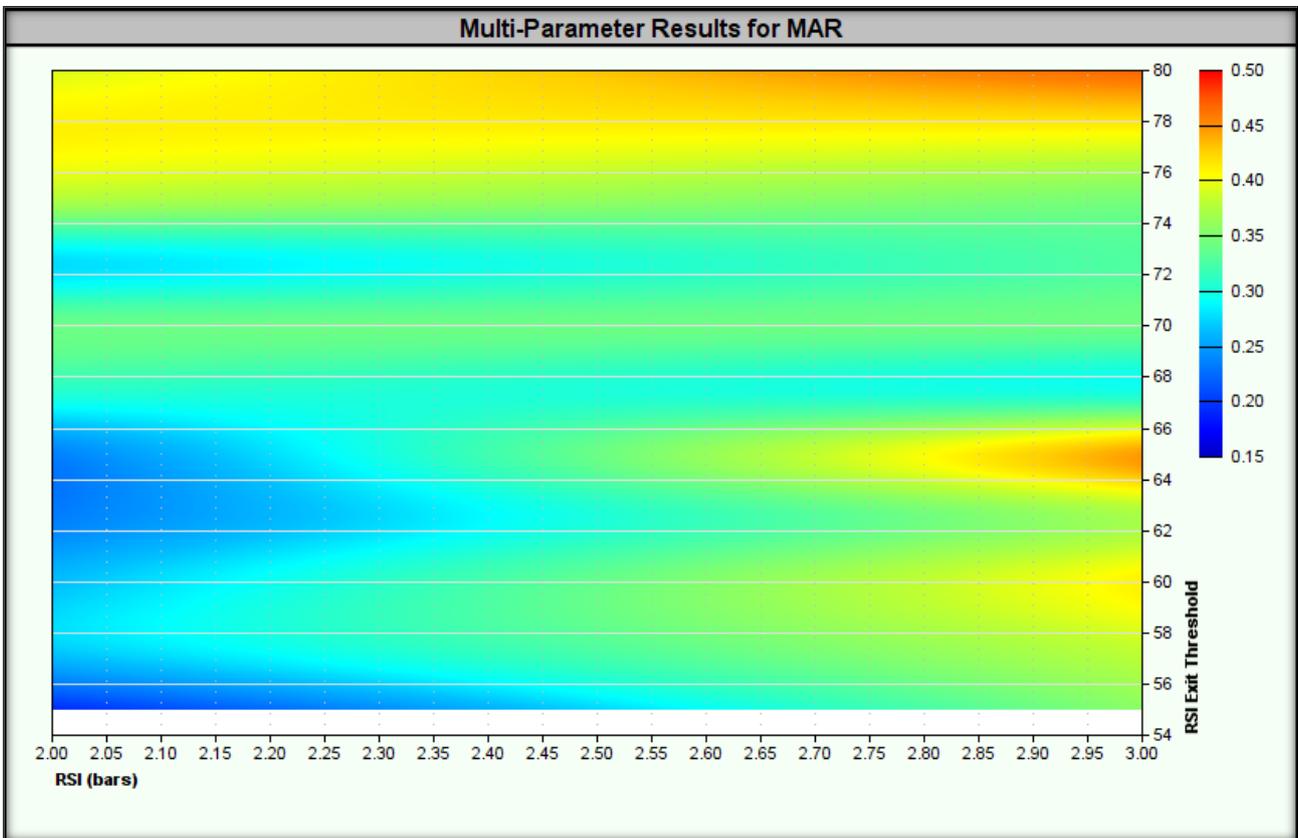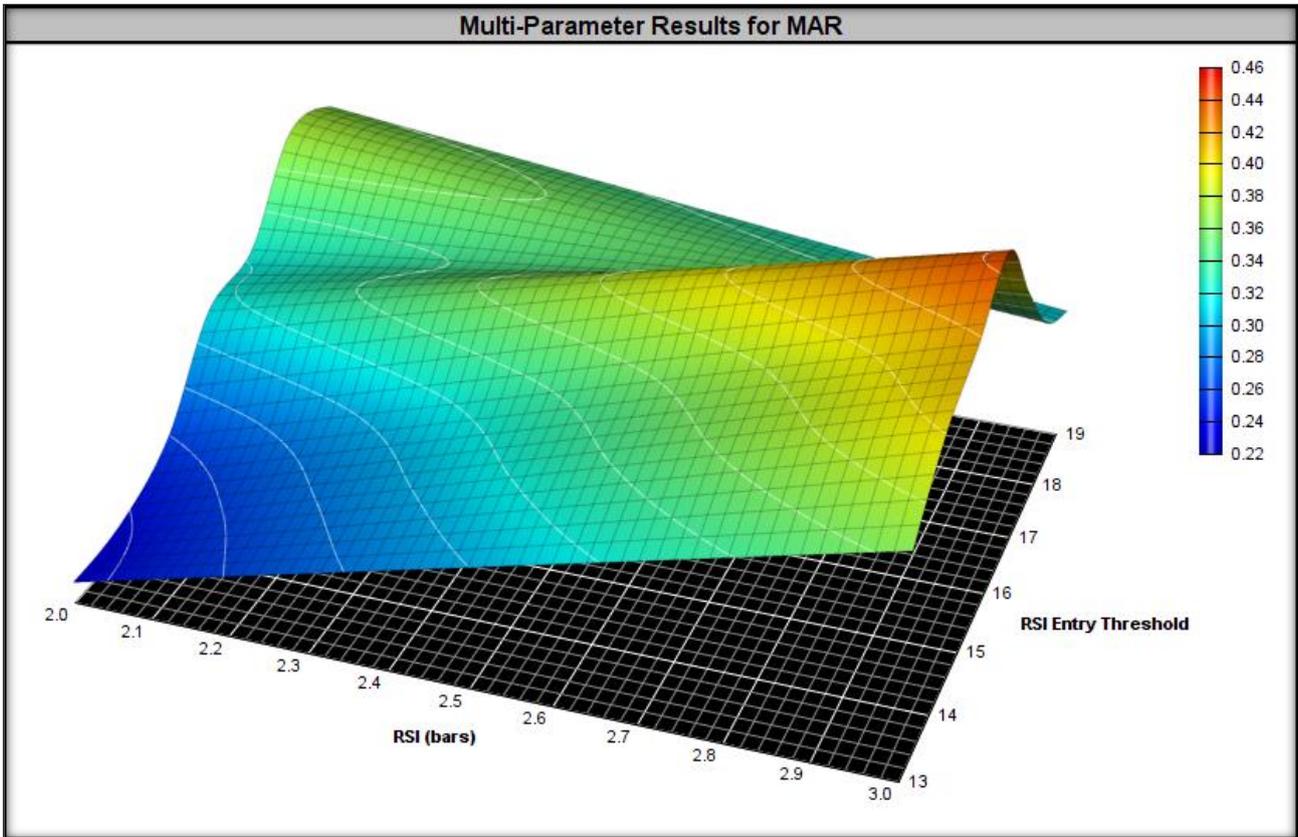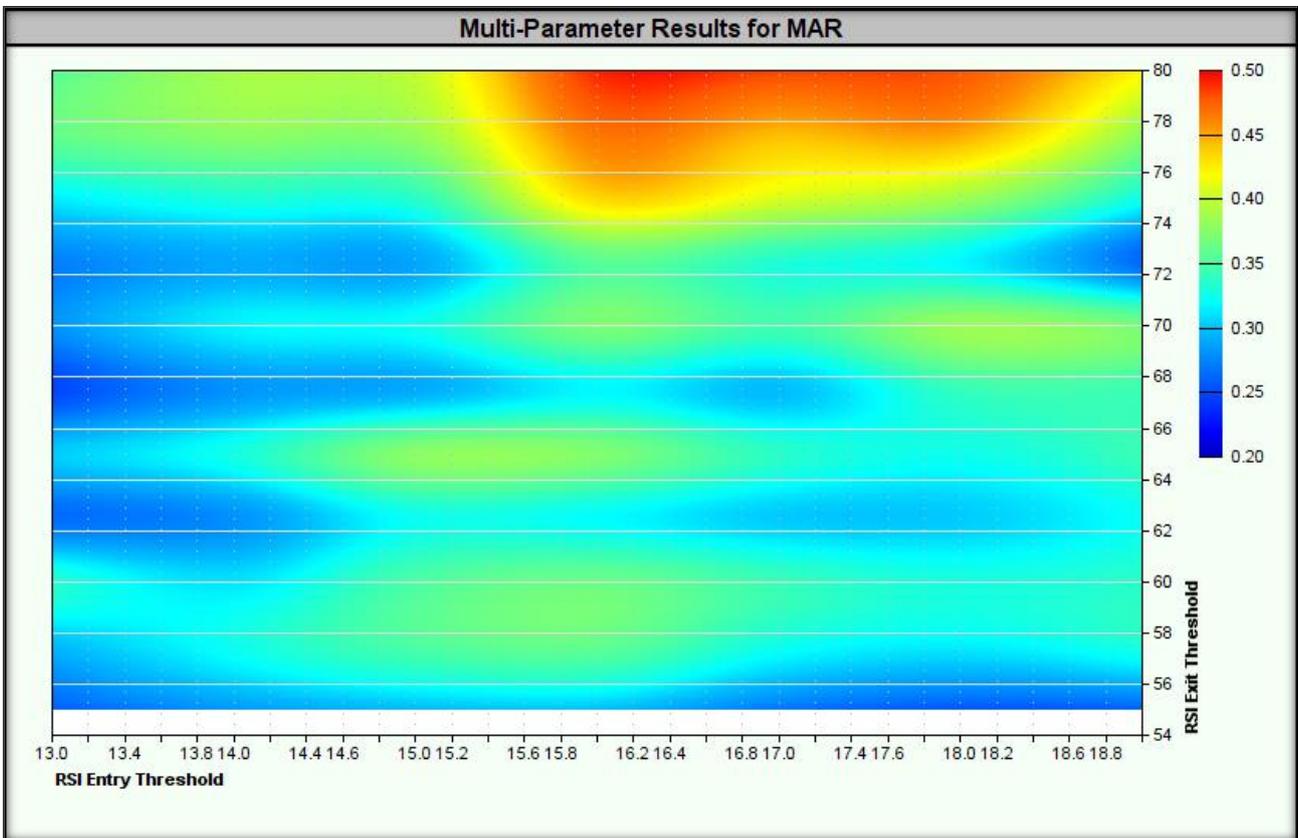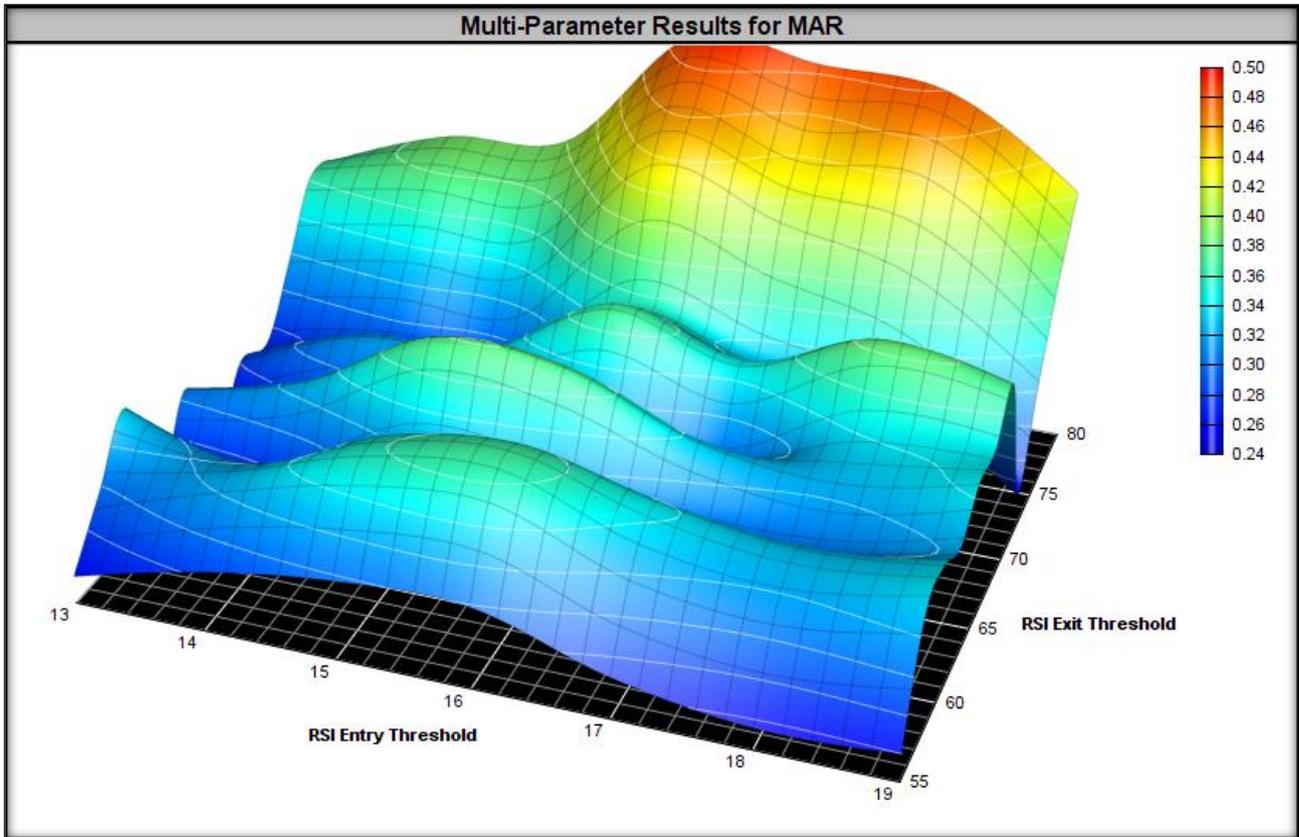
Heatmaps for the tested ranges are presented below.

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

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Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

MAR as Moving Average (bars) Varies

MAR as RSI (bars) Varies

■ Maximum ■ Average + SD ■ Average ■ Average - SD ■ Minimum

MAR as RSI Entry Threshold Varies

■ Maximum ■ Average + SD ■ Average ■ Average - SD ■ Minimum

MAR as RSI Exit Threshold Varies

■ Maximum ■ Average + SD ■ Average ■ Average - SD ■ Minimum

After passing the stability tests on **the in-sample data,** it is time perform the same on **the out-of-sample data.** For this purpose, we use **the same range of parameters** as on the in-sample data:

- **Moving average lengths (SMA):** range **180-270 days (step: 10);**
- **RSI Lengths:** Range **2-3 days (step: 1);**
- **Number of consecutive days with RSI below Entry Threshold:** 2 days;
- **RSI Entry Threshold:** range **13-19 (step: 1);**
- **RSI Exit Threshold:** range **55-80 (step: 2.5).**

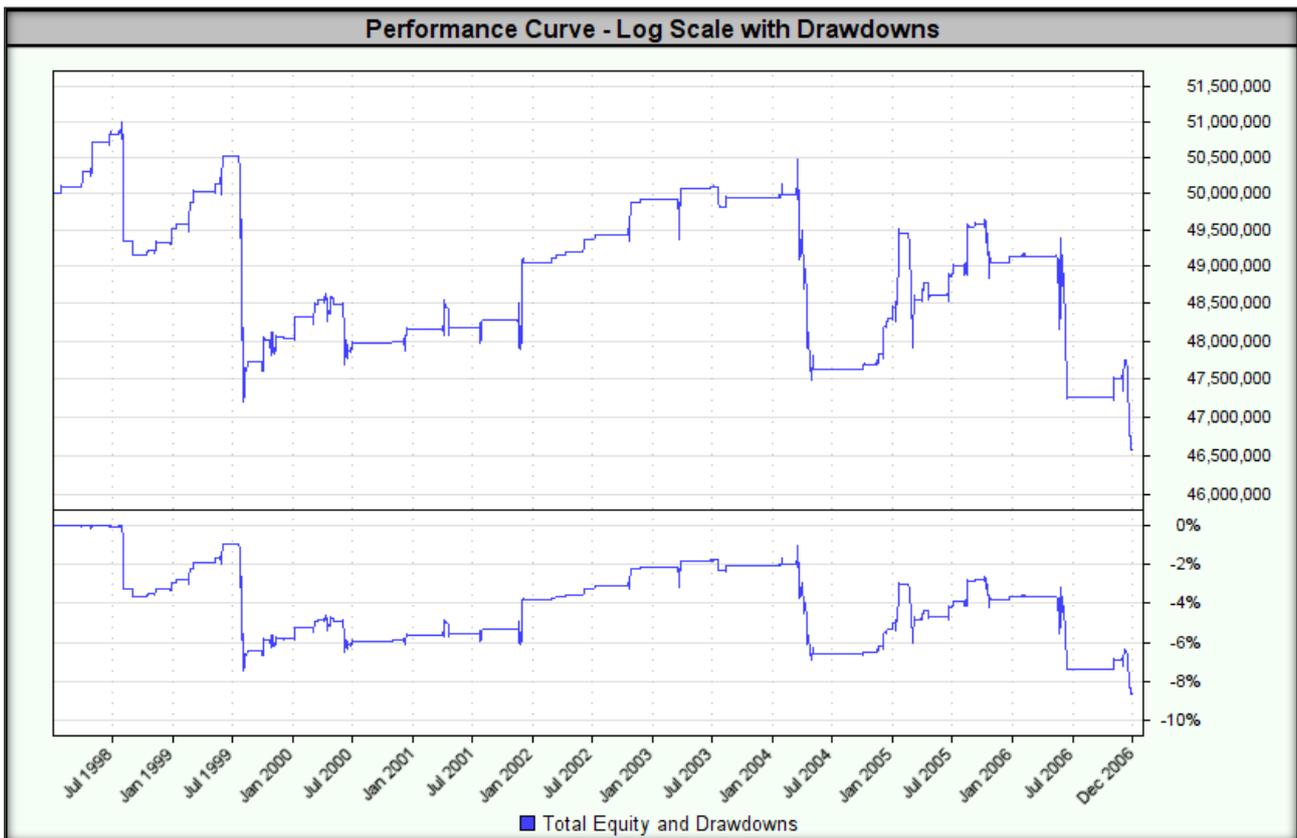**The lowest MAR value of -0.09** was achieved for the following parameters:

- **Length of the moving average (SMA):** 180;
- **RSI Lengths:** 3 days;
- **Number of consecutive days with RSI below Entry Threshold:** 2 days;
- **RSI Entry Threshold:** 13;
- RSI **Exit Threshold:** 57.5.

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

Test	Moving Average (bars)	RSI (bars)	RSI Entry Threshold	RSI Exit Threshold	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades	R3	RAR [%]
79	180	3	13	57.5	$46,577,745.30	-0.79%	-0.09	-0.24	-0.33	8.7%	101.0	261	-0.07	-0.21
1485	270	3	14	80.0	$41,214,231.65	-2.13%	-0.09	-0.33	-0.38	24.3%	101.0	357	-0.19	-1.54
242	190	3	13	80.0	$43,518,411.30	-1.53%	-0.09	-0.27	-0.40	17.7%	90.7	296	-0.12	-0.88
253	190	3	14	80.0	$43,592,842.89	-1.51%	-0.09	-0.27	-0.47	17.6%	90.7	322	-0.14	-1.02
90	180	3	14	57.5	$47,085,483.69	-0.67%	-0.09	-0.20	-0.31	7.8%	101.0	288	-0.07	-0.20
715	220	3	14	80.0	$42,551,710.19	-1.78%	-0.08	-0.29	-0.35	21.1%	90.7	334	-0.12	-1.01
704	220	3	13	80.0	$42,496,584.61	-1.79%	-0.08	-0.29	-0.33	21.5%	90.7	310	-0.11	-0.99
1474	270	3	13	80.0	$42,292,797.16	-1.84%	-0.08	-0.28	-0.33	22.6%	90.7	336	-0.14	-1.20
713	220	3	14	75.0	$43,816,951.37	-1.46%	-0.08	-0.25	-0.35	18.4%	90.7	334	-0.04	-0.46
1331	260	3	14	80.0	$43,441,736.43	-1.55%	-0.08	-0.25	-0.29	19.7%	101.0	348	-0.15	-0.99
251	190	3	14	75.0	$44,427,720.14	-1.31%	-0.08	-0.26	-0.43	16.6%	90.7	320	-0.10	-0.68
1177	250	3	14	80.0	$43,539,673.18	-1.53%	-0.08	-0.24	-0.30	19.5%	101.0	343	-0.14	-0.97

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 0.69 was achieved for the following parameters:

- **Length of the moving average (SMA):** 230;
- **RSI Lengths:** 2 days;

- **Number of consecutive days with RSI below Entry Threshold:** 2 days;
- **RSI Entry Threshold:** 19;
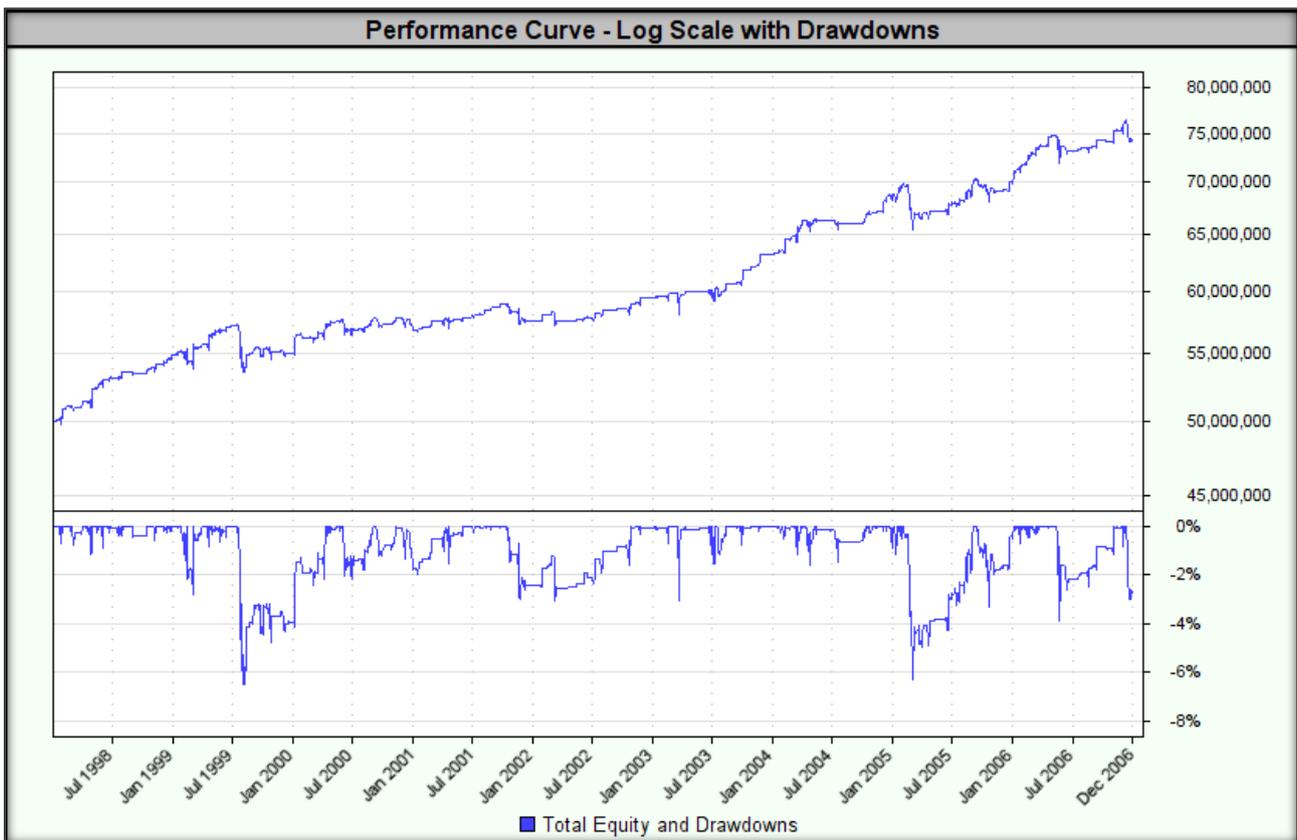- **RSI Exit Threshold:** 65.

The highest MAR value was accompanied by **a drawdown of 6.5%.**

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

Test	Moving Average (bars)	RSI (bars)	RSI Entry Threshold	RSI Exit Threshold	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades	R3	RAR [%]
841	230	2	19	65.0	$74,306,400.40	4.50%	0.69	1.12	1.43	6.5%	12.8	1007	1.40	3.93
687	220	2	19	65.0	$73,668,536.30	4.40%	0.68	1.12	1.29	6.5%	20.7	994	1.06	3.74
819	230	2	17	65.0	$73,015,742.18	4.30%	0.68	1.09	1.38	6.4%	12.4	902	1.47	3.79
995	240	2	19	65.0	$73,532,588.09	4.38%	0.67	1.06	1.38	6.5%	12.4	1022	1.22	3.79
840	230	2	19	62.5	$72,217,674.06	4.17%	0.66	1.11	1.38	6.3%	12.8	999	1.34	3.74
665	220	2	17	65.0	$72,445,804.98	4.21%	0.66	1.09	1.28	6.4%	13.4	892	1.29	3.64
830	230	2	18	65.0	$72,678,663.82	4.25%	0.66	1.09	1.32	6.5%	13.4	948	1.32	3.71
533	210	2	19	65.0	$72,732,800.26	4.26%	0.66	1.09	1.35	6.5%	20.7	982	0.96	3.50
973	240	2	17	65.0	$72,119,146.20	4.16%	0.65	1.04	1.35	6.4%	12.3	913	1.25	3.64
511	210	2	17	65.0	$72,111,446.89	4.16%	0.65	1.08	1.34	6.4%	13.4	879	1.24	3.50
1457	270	2	19	65.0	$71,571,181.48	4.07%	0.65	0.97	1.58	6.3%	26.8	1077	0.87	3.35
686	220	2	19	62.5	$71,629,322.15	4.08%	0.64	1.12	1.28	6.3%	20.7	987	1.08	3.56

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 24.3%.**

Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.
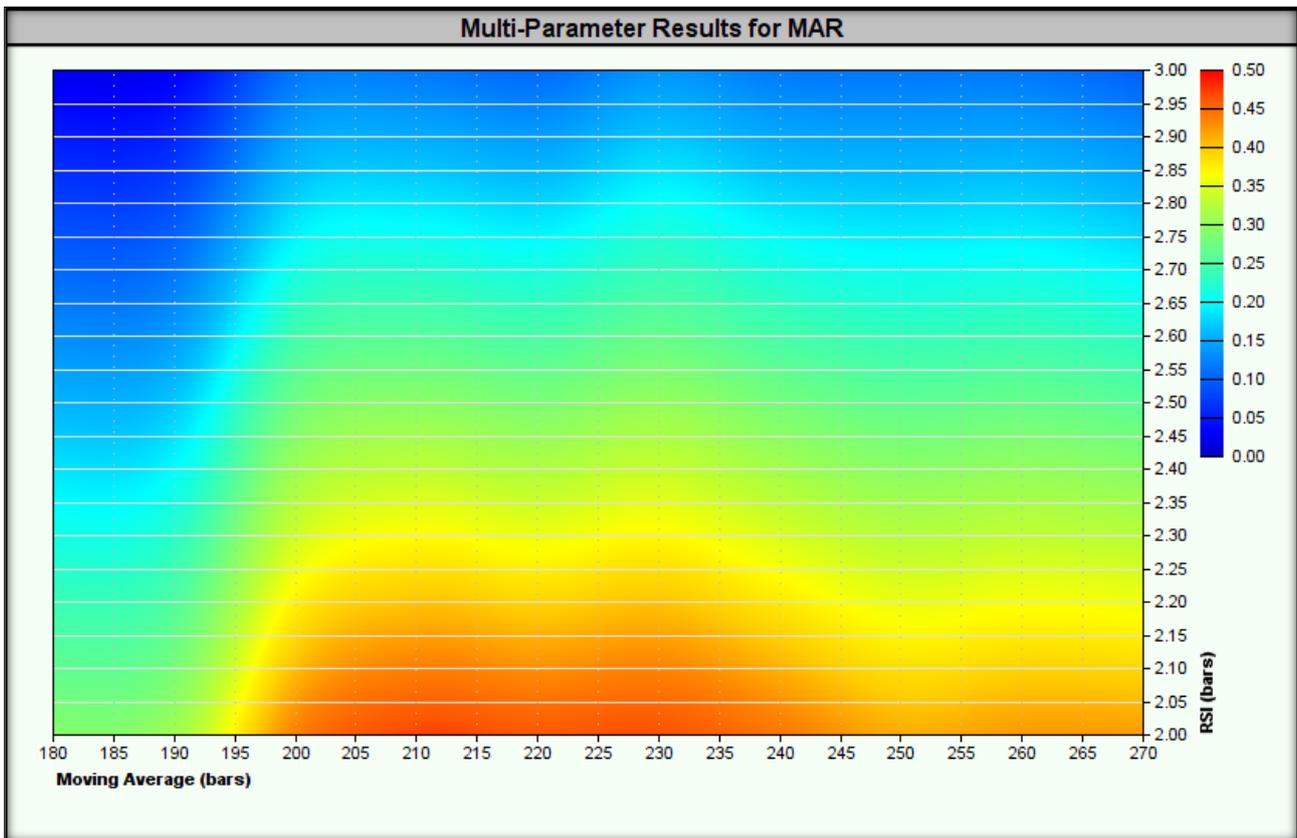
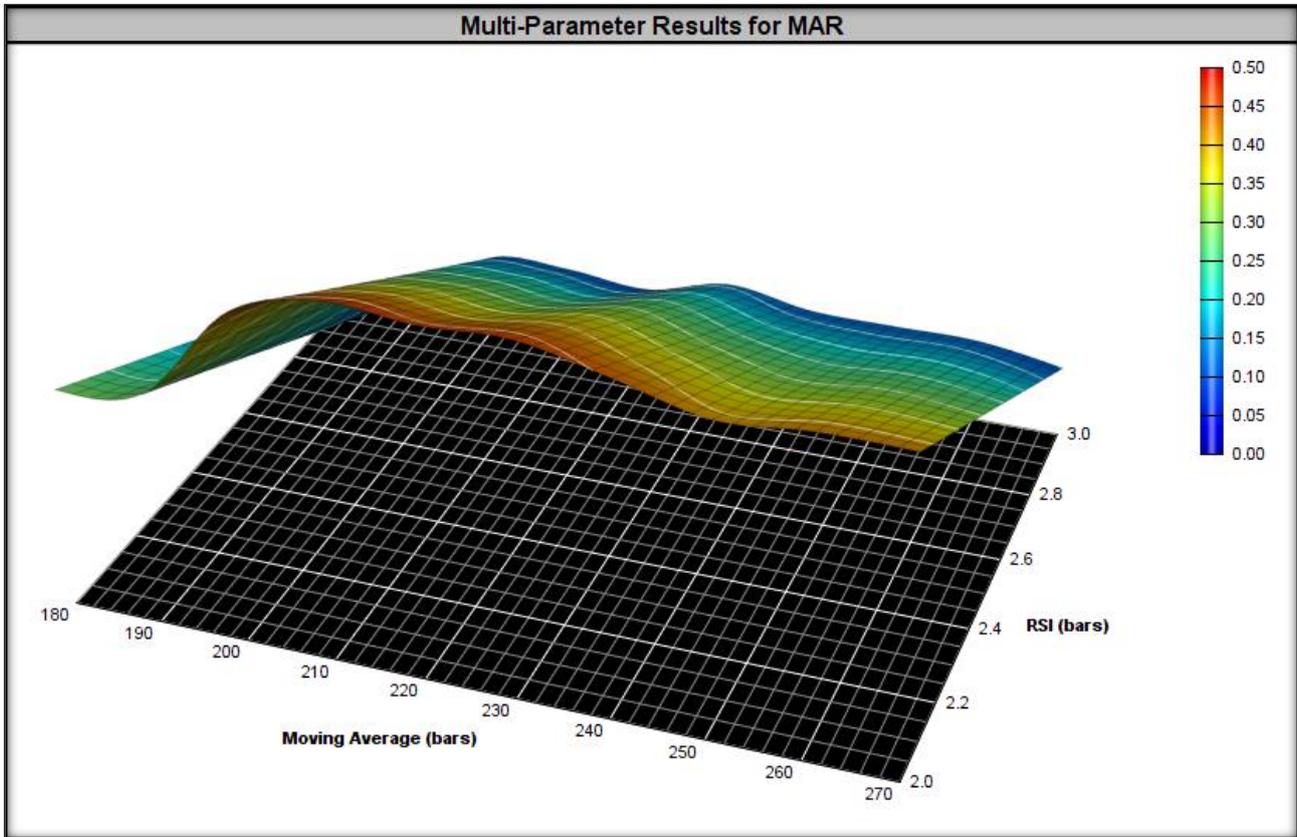| Test	Moving Average (bars)	RSI (bars)	RSI Entry Threshold	RSI Exit Threshold	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD ▽	Longest DD	Trades	R3	RAR [%]
1485	270	3	14	80.0	$41,214,231.65	-2.13%	-0.09	-0.33	-0.38	24.3%	101.0	357	-0.19	-1.54
1474	270	3	13	80.0	$42,292,797.16	-1.84%	-0.08	-0.28	-0.33	22.6%	90.7	336	-0.14	-1.20
704	220	3	13	80.0	$42,496,584.61	-1.79%	-0.08	-0.29	-0.33	21.5%	90.7	310	-0.11	-0.99
715	220	3	14	80.0	$42,551,710.19	-1.78%	-0.08	-0.29	-0.35	21.1%	90.7	334	-0.12	-1.01
1496	270	3	15	80.0	$44,450,775.76	-1.30%	-0.06	-0.18	-0.22	20.7%	68.0	410	-0.07	-0.82
1331	260	3	14	80.0	$43,441,736.43	-1.55%	-0.08	-0.25	-0.29	19.7%	101.0	348	-0.15	-0.99
1177	250	3	14	80.0	$43,539,673.18	-1.53%	-0.08	-0.24	-0.30	19.5%	101.0	343	-0.14	-0.97
726	220	3	15	80.0	$45,271,269.98	-1.10%	-0.06	-0.16	-0.19	19.4%	57.1	380	-0.03	-0.35
1166	250	3	13	80.0	$43,764,102.88	-1.47%	-0.08	-0.23	-0.28	19.4%	90.7	318	-0.12	-0.93
713	220	3	14	75.0	$43,816,951.37	-1.46%	-0.08	-0.25	-0.35	18.4%	90.7	334	-0.04	-0.46
724	220	3	15	75.0	$46,141,559.47	-0.89%	-0.05	-0.13	-0.18	18.2%	49.1	377	0.01	0.07
1320	260	3	13	80.0	$44,495,053.05	-1.29%	-0.07	-0.20	-0.24	18.1%	90.7	324	-0.06	-0.68

In conclusion, the strategy **is not passed the stability test** over a wide range of optimized parameters on out-of-sample data because:
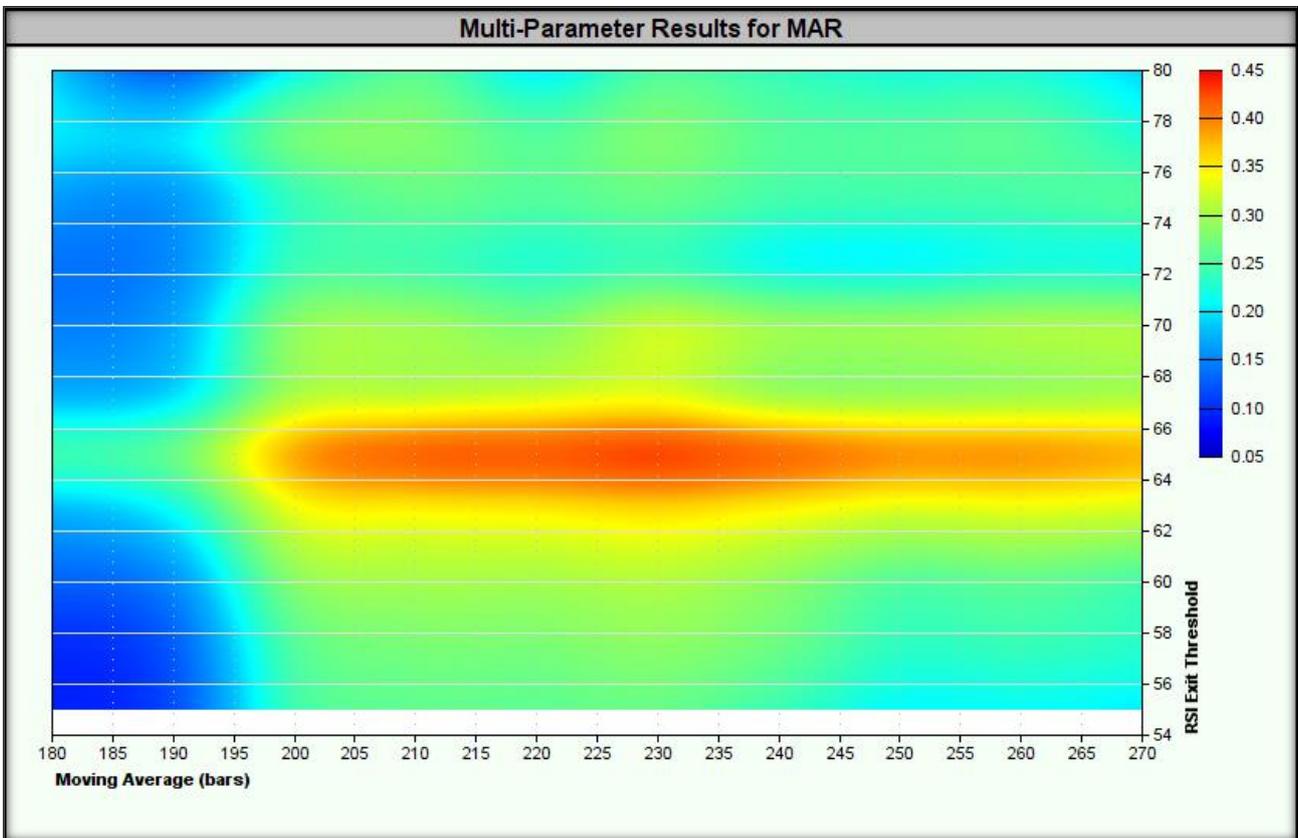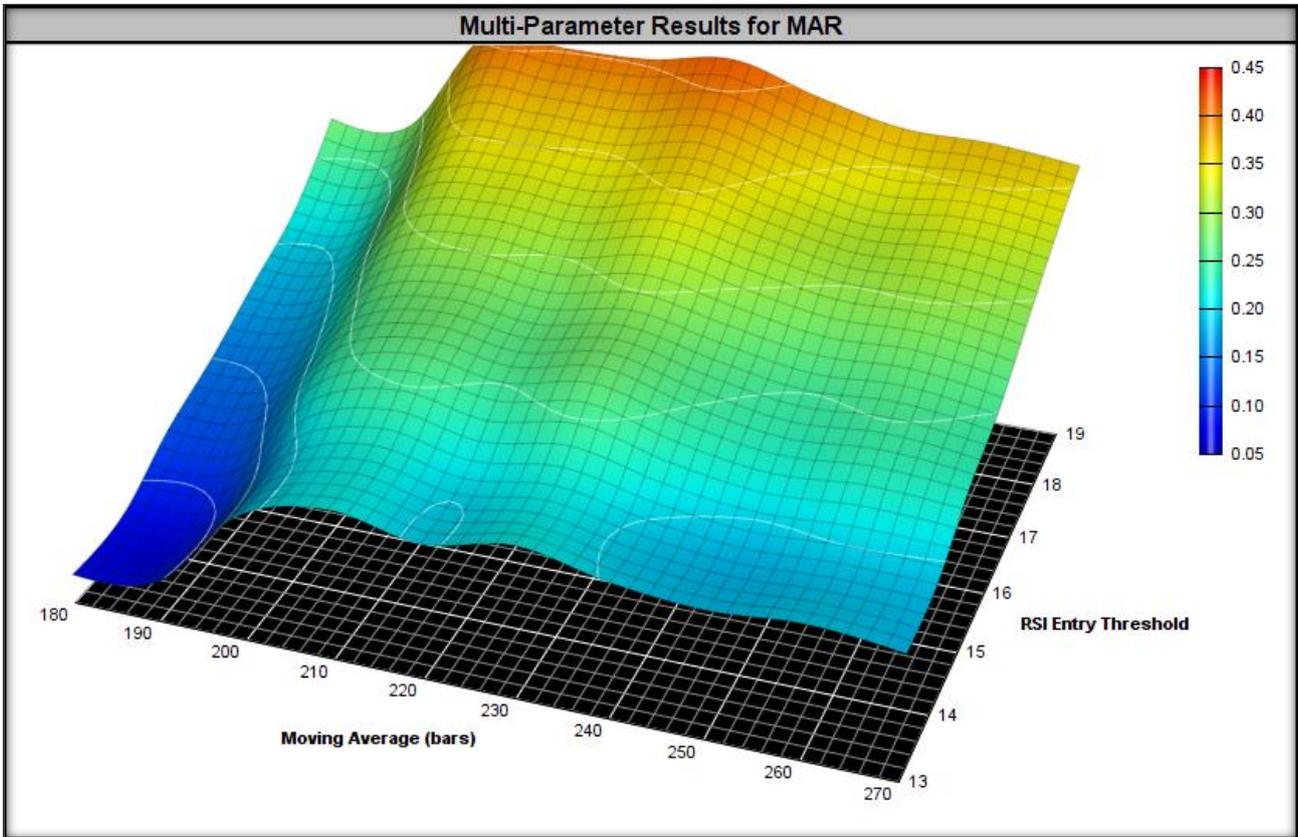
- **Not all test results showed a positive MAR value –** which indicates the instability of the strategy in different market conditions.
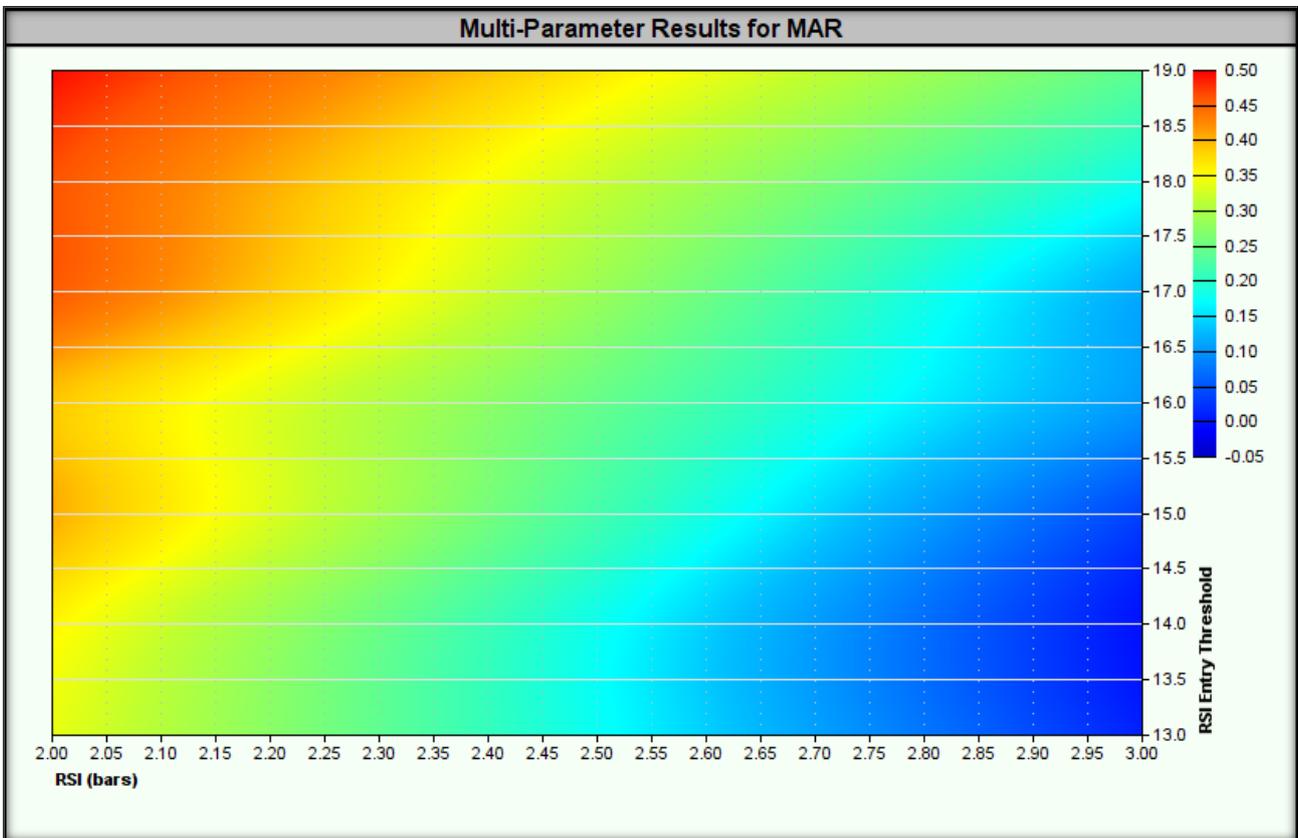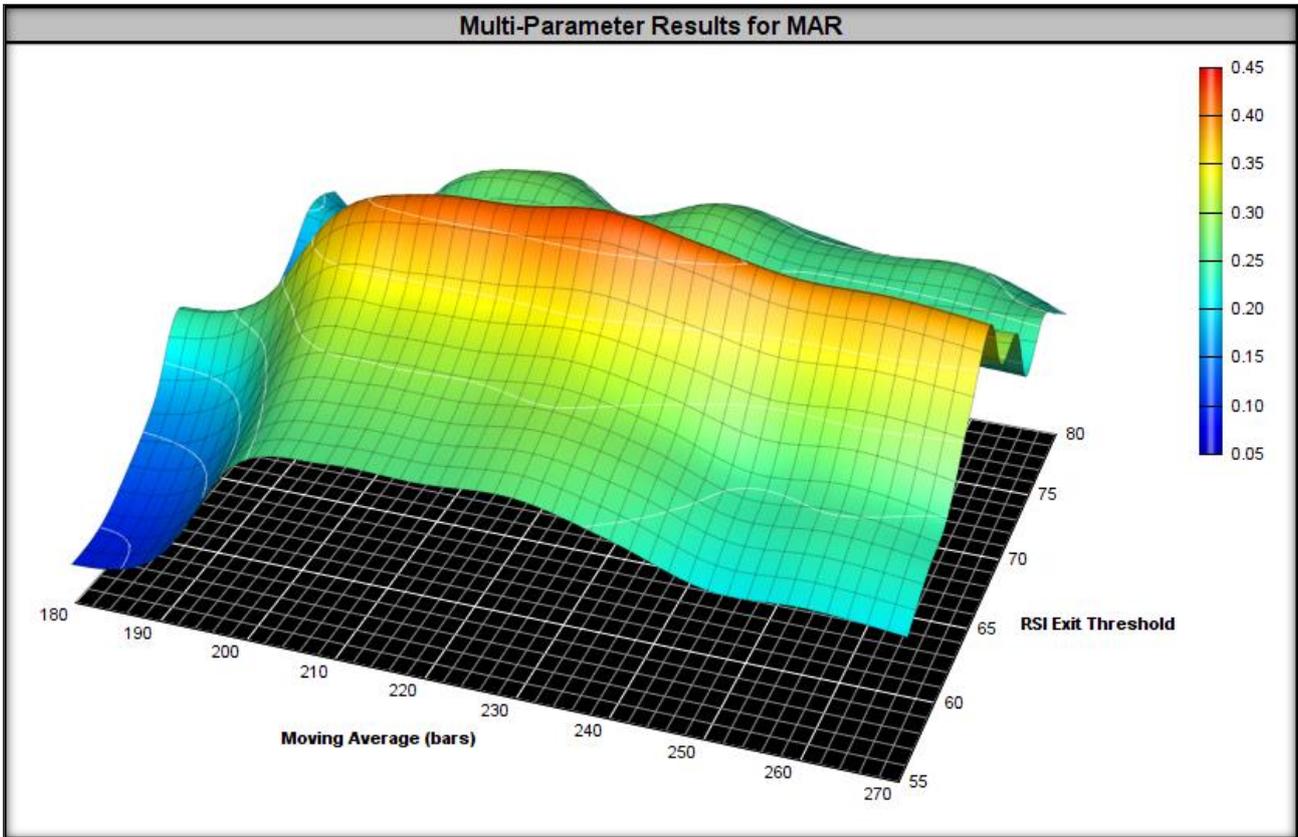
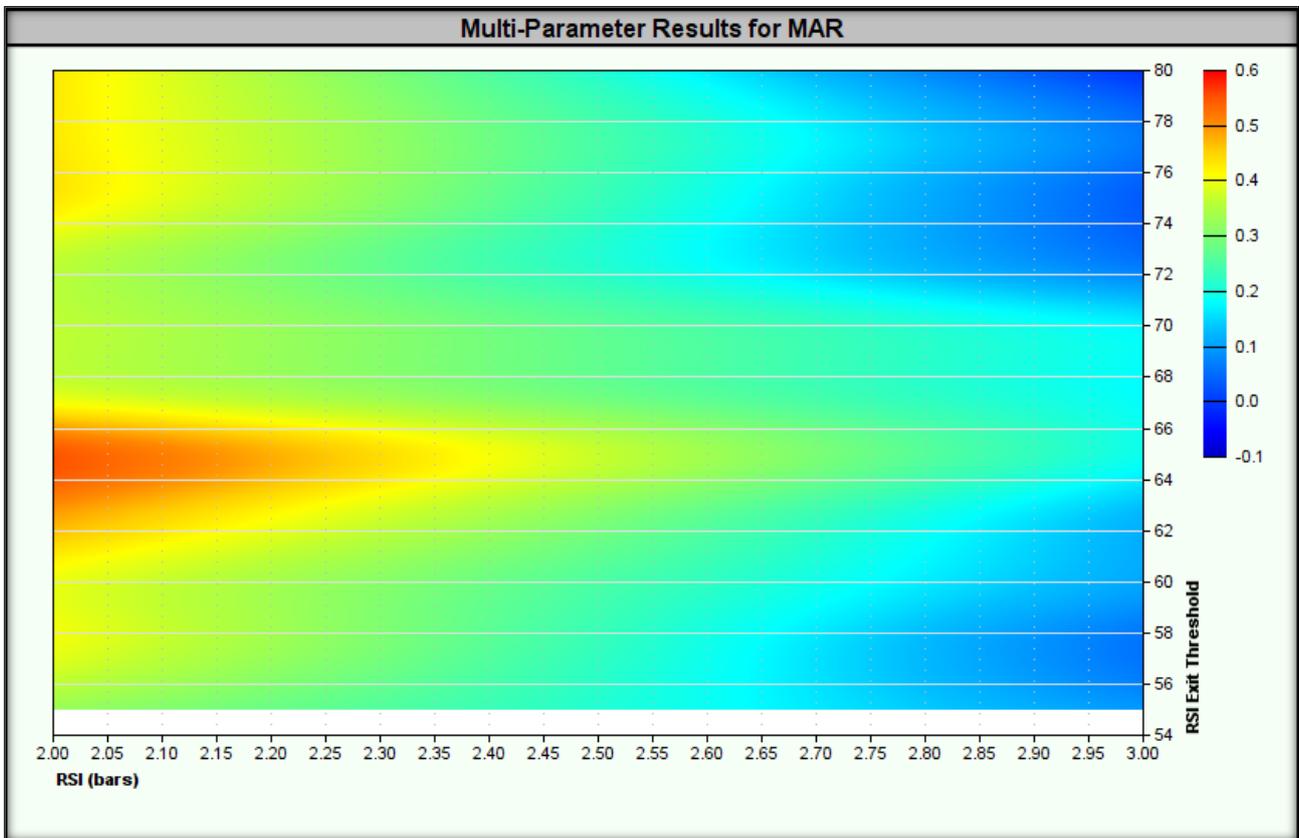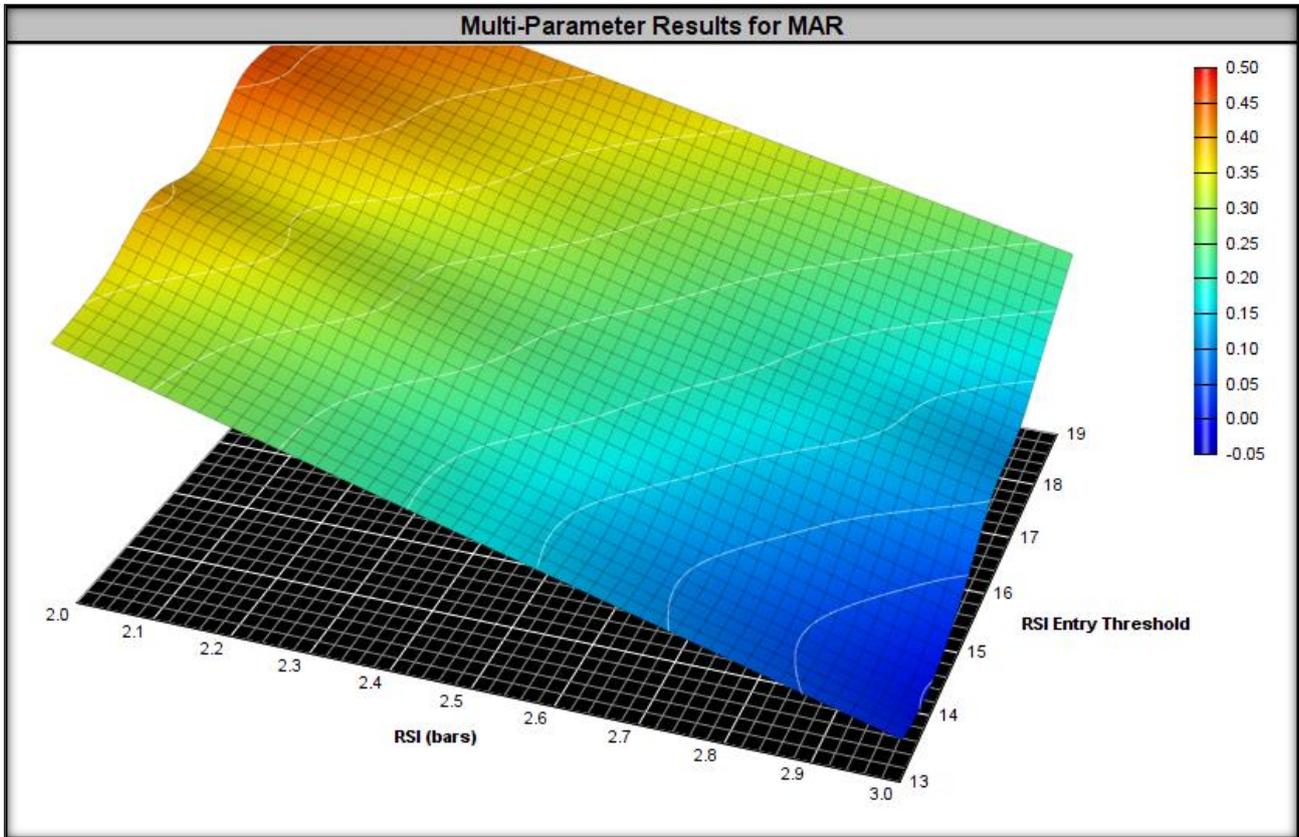Therefore, **further testing of the strategy is not justified,** as its use in real transactions **is highly questionable.**

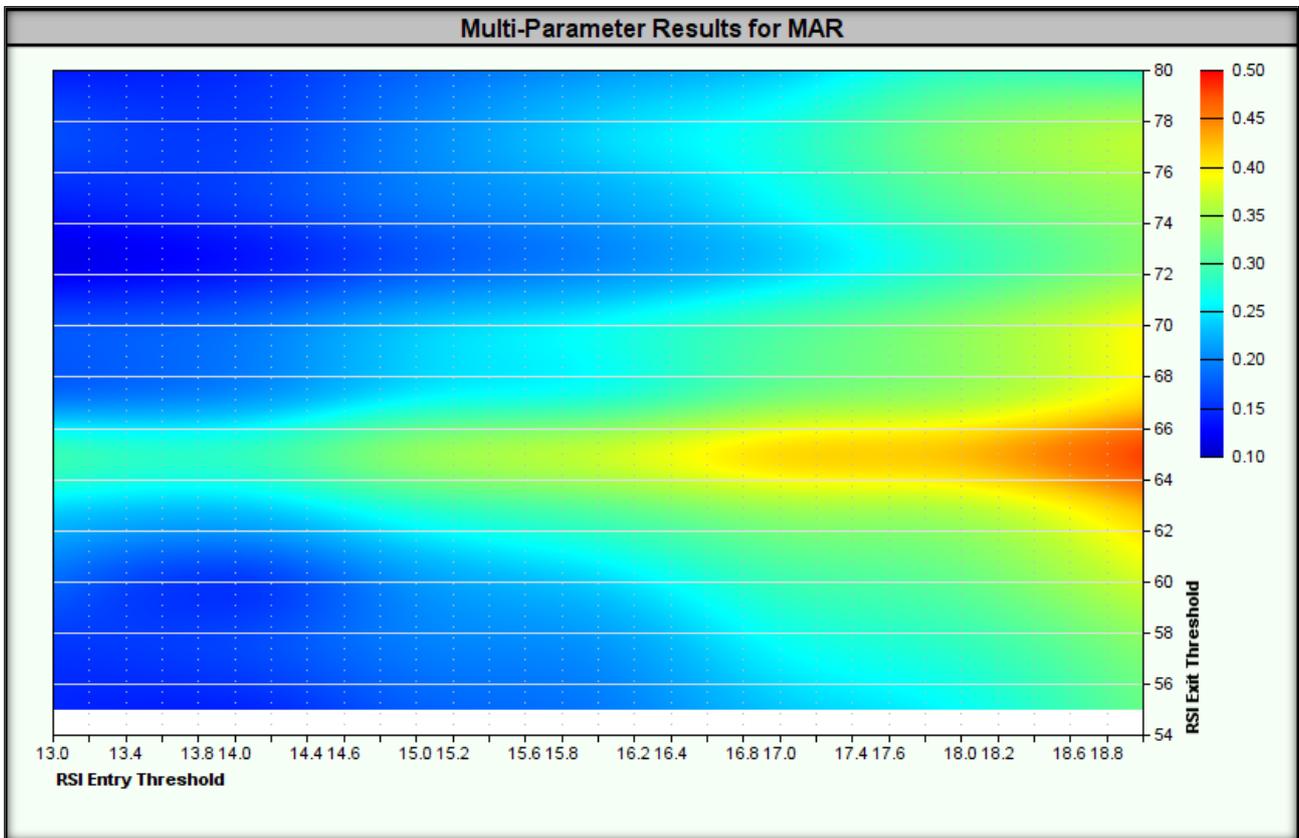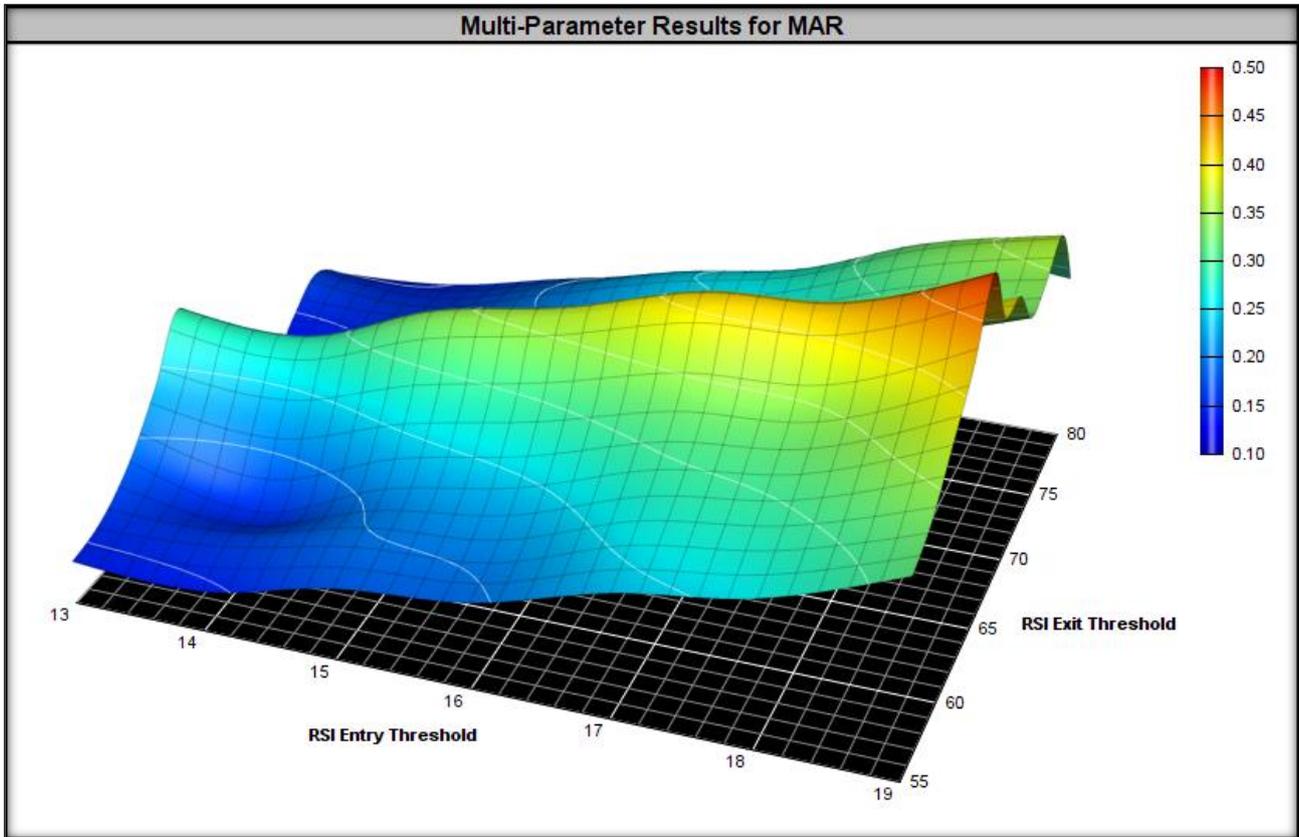**Heatmaps for the tested ranges** are presented below.

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

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Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

MAR as Moving Average (bars) Varies

■ Maximum ■ Average + SD ■ Average ■ Average - SD ■ Minimum

MAR as RSI (bars) Varies

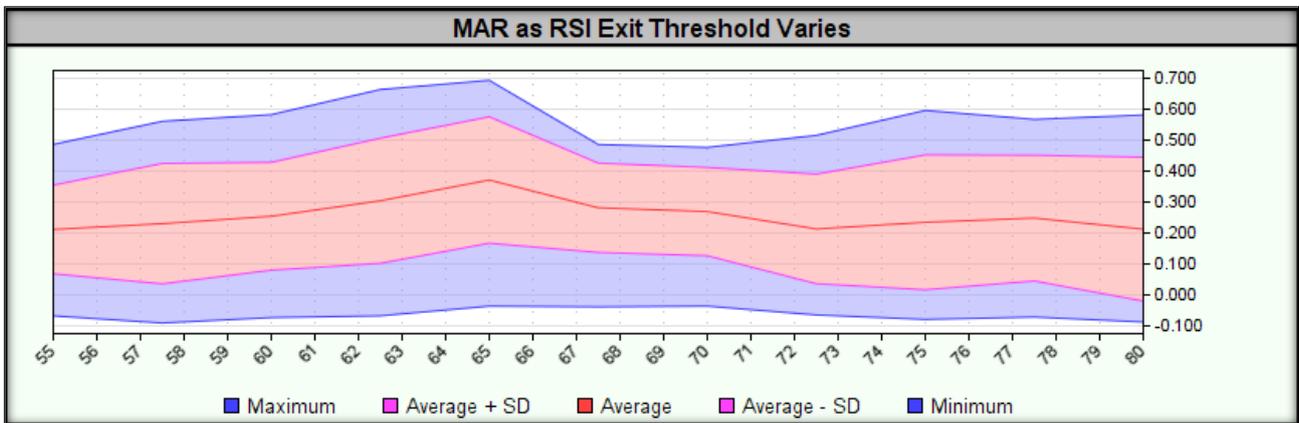**MAR as RSI Entry Threshold Varies**

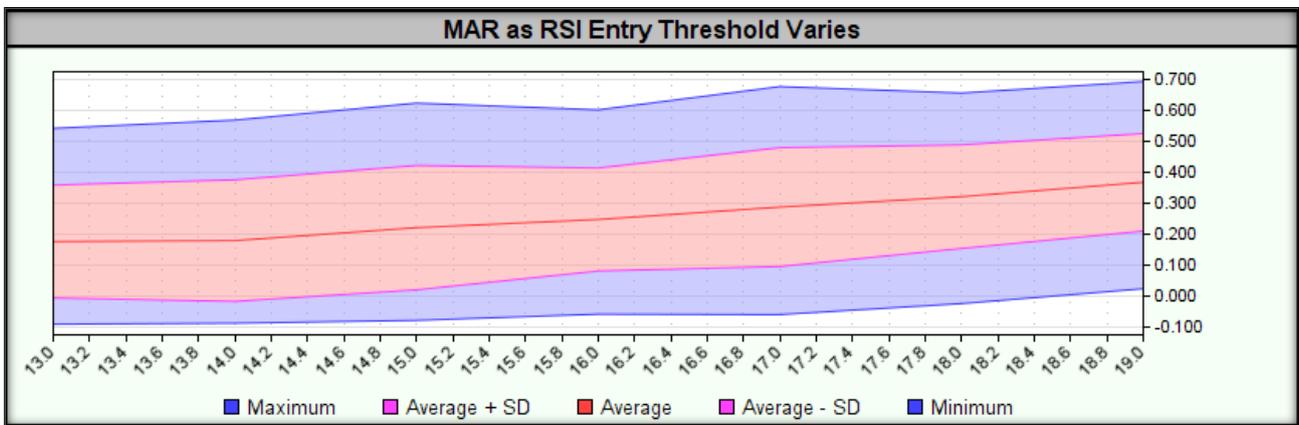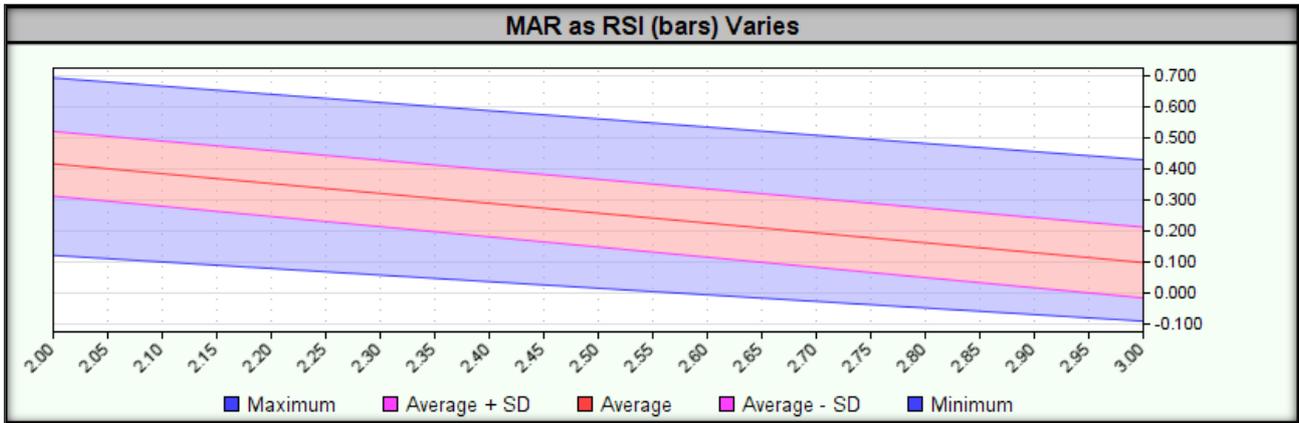**MAR as RSI Exit Threshold Varies**

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. **Stability long/short**

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.**