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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.1

Investment Strategy Testing Summary

Time Price Strategy Scale-In (TPS) is a **swing trading** investment technique that uses the **2-period RSI** (Relative Strength Index) 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.**

The strategy was tested on **parameters suggested by the strategy creator, Larry Connors:**

- **Moving Average Length (SMA):** 200 days;
- **RSI Length:** 2 days;
- **RSI Entry Threshold:** below 25 for two days;
- **RSI Exit Threshold:** above 70;
- **Stop loss (custom):** moving average;
- **Method of opening a position:** at the opening price of the next day;
- **Position size (own):** corresponding to the risk of 2.0% of the total capital, with a hypothetical stop loss order located 2 x ATR (40 days) away from the position opening position;
- **Size of 1 unit:** 10%;
- **Size 2 units:** 20%;
- **Size 3 units:** 30%;
- **Size 4 units:** 40%.

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 conducted 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.



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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 and short positions on stock indices, bonds, gold and the US 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 or overbought.
- **Scale-In:** Scaling a position by gradually adding units as the market becomes more oversold (for long positions) or more overbought (for short positions).

The strategy uses:

- **2-period RSI** to generate entry and exit signals;
- **a 200-day 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 (price drops/rises) increases, traders can take advantage of potential price rebounds when 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. **RSI 2-period** (for short-term oversold market analysis);
 - b. **200-day SMA** (to determine trend).
2. **Generating entry signals – long position:**
 - a. **Entry conditions:**
 - i. Price > SMA200;
 - ii. RSI < 25 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 200-day SMA.
3. **Generating Exit Signals:** Close the entire position the next day on the open when the 2-period RSI closes above 70.
4. **Loss Management:** Close all long positions when price breaches the moving average.
5. **Daily Monitoring:**
 - a. **Calculation of indicators – every day:**
 - i. Calculate 2-period RSI.
 - ii. Calculate 200-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 the RSI closes above 70, close your position for the next day's open.
6. **Generating Entry Signals - Short Position:** all analogous rules also apply to short position.
7. **Additional Notes:**
 - a. **Financial Instruments:** For the purposes of this test, **long and short 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:

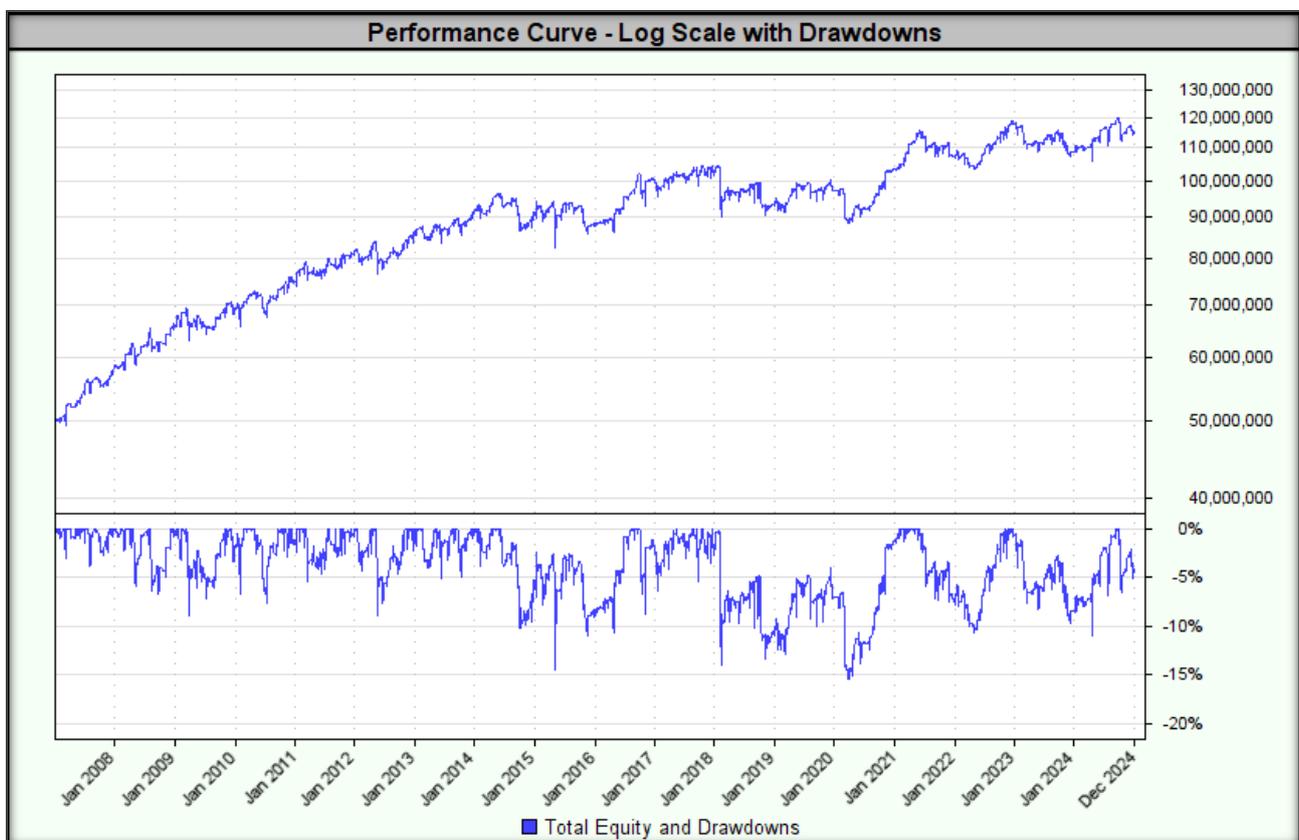
- **Length of the moving average (SMA):** 200 days;
- **RSI length:** 2 days;
- **Number of consecutive days with RSI below Entry Threshold:** 2 days;



- **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 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.



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Indicators/Measures	Concluding a transaction at the opening price
CAGR%	4.7%
MAR Ratio	0.31
RAR%	3.9%
R-Cubed	0.20
Robust Sharpe Ratio	0.47
Max Drawdown	15.3%
Wins	62.4%



Losses	37.6%
Average Win%	0.15%
Average Loss %	0.21%
Win/ Loss Ratio	0.75
Average Trade Duration (days)	5
Percent Profit Factor	1.24
SQN	-
Number of transactions	4734

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.

1. Stability across a wide range of optimized parameters

Time Price Strategy Scale-In v.1 assumes the use of parameters optimized by Larry Connors. This means that **we do not optimize the parameters themselves**, but only examine **whether the strategy behaves stably** on in-sample and out-of-sample data.

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 160-240 days (step: 5);
- **RSI Lengths:** Range 2-3 days (step: 1);
- **Number of consecutive days with RSI below Entry Threshold:** 2 days;
- **RSI Entry Threshold:** range 20-30 (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):** 175;
- **RSI Lengths:** 2 days;
- **Number of consecutive days with RSI below Entry Threshold:** 2 days;



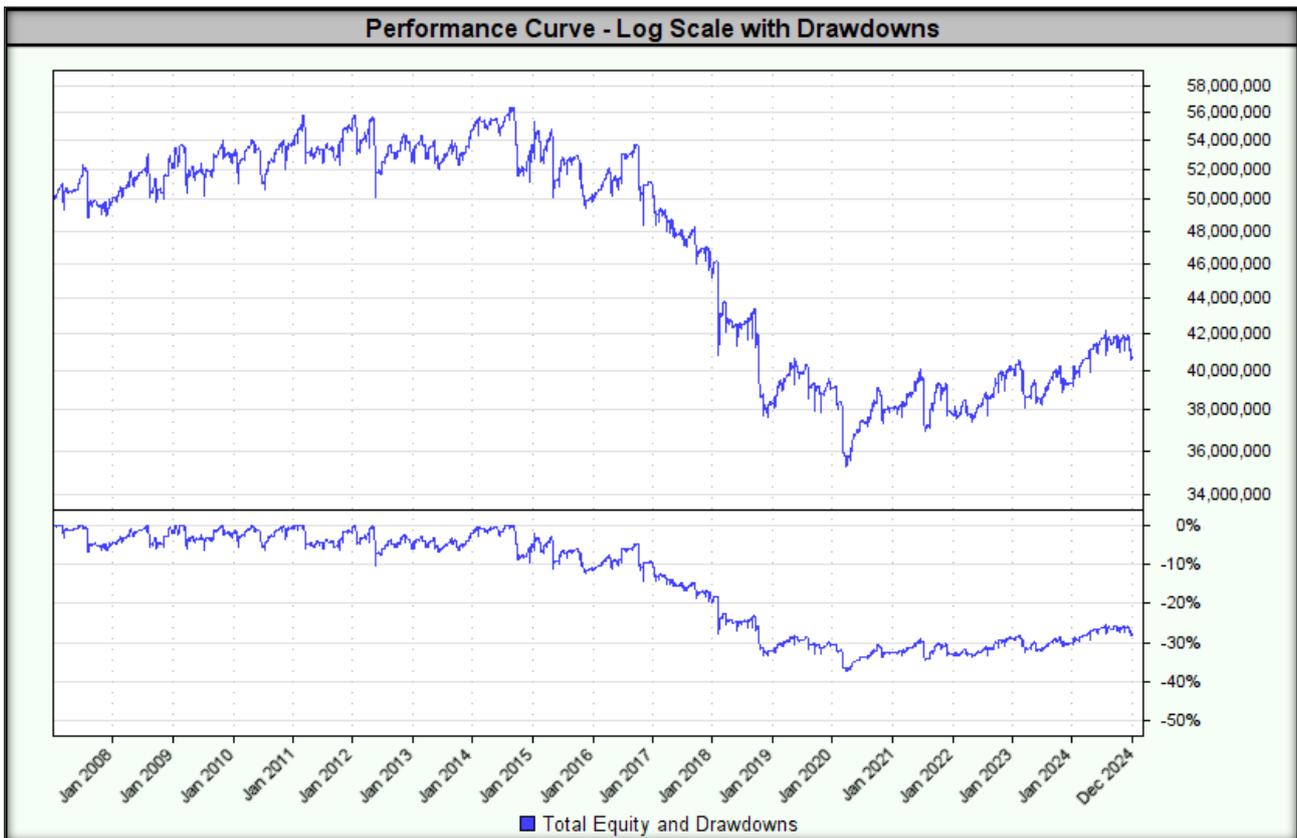
- **RSI Entry Threshold: 27;**
- **RSI Exit Threshold: 55.**

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 [%]
804	175	2	27	55.0	\$40,608,606.54	-1.15%	-0.03	-0.13	-0.22	37.5%	123.9	4836	-0.06	-2.23
815	175	2	28	55.0	\$40,396,545.85	-1.18%	-0.03	-0.13	-0.20	38.5%	123.9	5002	-0.06	-2.26
562	170	2	27	55.0	\$41,352,118.11	-1.05%	-0.03	-0.12	-0.21	37.3%	123.9	4825	-0.06	-2.09
573	170	2	28	55.0	\$41,362,226.97	-1.05%	-0.03	-0.11	-0.19	38.1%	123.9	4988	-0.06	-2.09
78	160	2	27	55.0	\$41,734,414.16	-1.00%	-0.03	-0.11	-0.18	39.6%	123.9	4780	-0.05	-2.16
89	160	2	28	55.0	\$41,775,426.46	-0.99%	-0.02	-0.11	-0.17	40.4%	123.9	4940	-0.05	-2.15
1046	180	2	27	55.0	\$42,773,825.02	-0.86%	-0.02	-0.09	-0.16	36.0%	155.5	4866	-0.05	-1.92
1057	180	2	28	55.0	\$42,730,417.05	-0.87%	-0.02	-0.09	-0.15	36.3%	124.5	5031	-0.05	-1.91
320	165	2	27	55.0	\$42,624,330.90	-0.88%	-0.02	-0.09	-0.17	38.0%	123.9	4816	-0.05	-1.89
837	175	2	30	55.0	\$42,843,977.40	-0.85%	-0.02	-0.08	-0.14	37.3%	124.5	5356	-0.05	-1.86

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 0.57 was achieved for the following parameters:

- **Length of the moving average (SMA): 215;**
- **RSI Lengths: 3 days;**
- **Number of consecutive days with RSI below Entry Threshold: 2 days;**
- **RSI Entry Threshold: 27;**
- **RSI Exit Threshold: 65.**

The highest MAR value was accompanied by a drawdown of 11.3%.

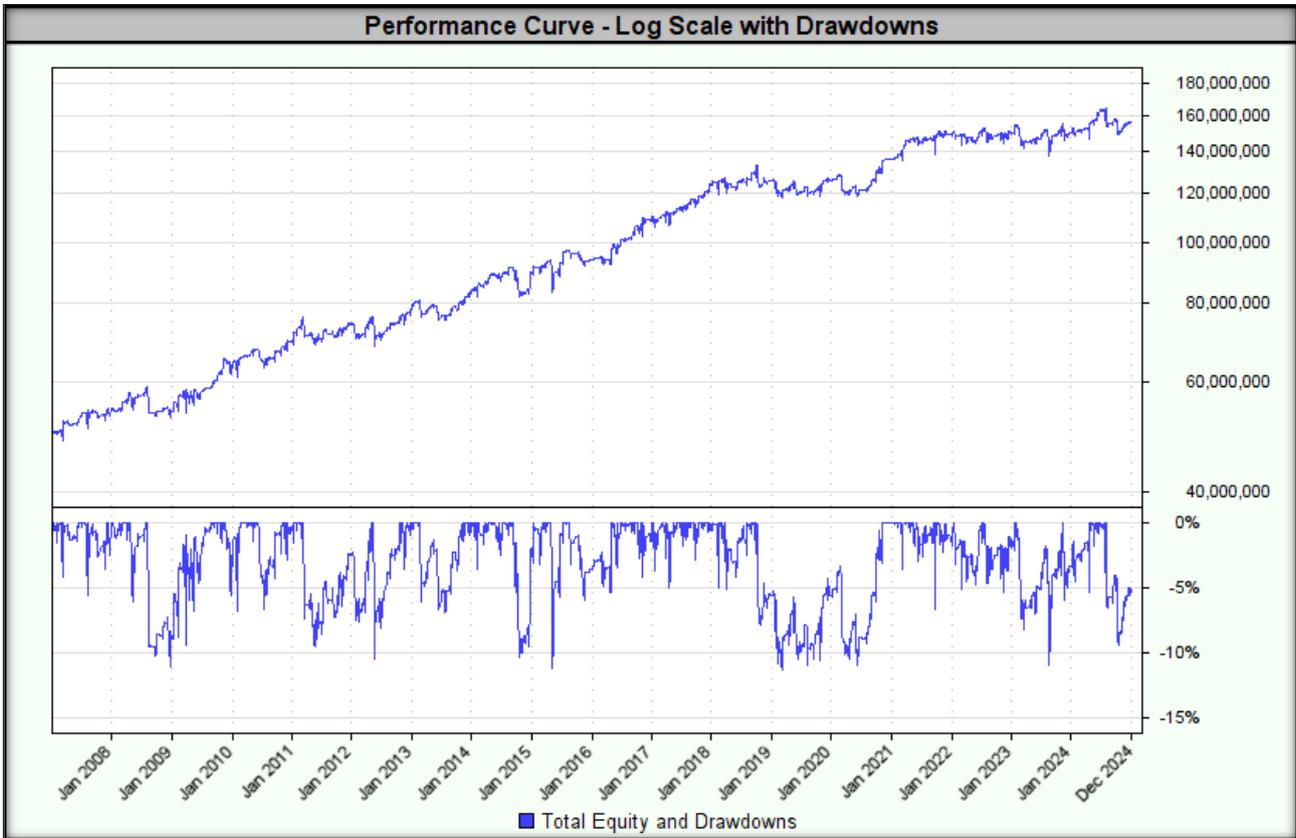


Historical or simulated results do not guarantee that similar outcomes will be achieved in the future.

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	RAI [%]
2865	215	3	27	65.0	\$155,775,116.23	6.52%	0.57	0.81	1.25	11.3%	25.1	3387	0.55	7.02
2149	200	3	28	62.5	\$150,550,460.84	6.32%	0.56	0.84	1.07	11.2%	25.3	3512	0.48	6.67
2160	200	3	29	62.5	\$156,122,276.66	6.53%	0.56	0.85	1.09	11.6%	25.3	3691	0.52	6.91
2161	200	3	29	65.0	\$159,541,934.58	6.66%	0.56	0.81	1.16	12.0%	43.0	3679	0.51	7.27
2150	200	3	28	65.0	\$153,132,051.80	6.42%	0.56	0.80	1.16	11.6%	43.0	3503	0.46	6.97
2171	200	3	30	62.5	\$151,415,288.79	6.35%	0.55	0.81	1.13	11.6%	25.8	3865	0.50	6.69
4074	240	3	27	62.5	\$166,026,991.01	6.90%	0.54	0.88	0.94	12.7%	24.4	3448	0.67	7.03
2623	210	3	27	65.0	\$147,531,823.92	6.20%	0.54	0.77	1.19	11.4%	24.4	3367	0.54	6.47
2403	205	3	29	65.0	\$150,480,600.66	6.31%	0.54	0.76	1.10	11.6%	36.6	3697	0.45	6.91
2381	205	3	27	65.0	\$147,420,506.57	6.19%	0.54	0.78	1.22	11.5%	25.0	3350	0.58	6.50

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

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For all combinations of tested parameter ranges, the highest drawdown was 40.4%.

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	RAI [%]
89	160	2	28	55.0	\$41,775,426.46	-0.99%	-0.02	-0.11	-0.17	40.4%	123.9	4840	-0.05	
78	160	2	27	55.0	\$41,734,414.16	-1.00%	-0.03	-0.11	-0.18	39.6%	123.9	4780	-0.05	
331	185	2	28	55.0	\$42,691,009.94	-0.87%	-0.02	-0.09	-0.15	38.8%	123.9	4975	-0.05	
100	160	2	29	55.0	\$44,692,536.55	-0.62%	-0.02	-0.05	-0.10	38.5%	123.9	5117	-0.04	
111	160	2	30	55.0	\$45,101,445.54	-0.57%	-0.01	-0.04	-0.09	38.5%	124.5	5284	-0.04	
815	175	2	28	55.0	\$40,396,545.85	-1.18%	-0.03	-0.13	-0.20	38.5%	123.9	5002	-0.06	
573	170	2	28	55.0	\$41,362,226.97	-1.05%	-0.03	-0.11	-0.19	38.1%	123.9	4988	-0.06	
320	165	2	27	55.0	\$42,624,330.90	-0.88%	-0.02	-0.09	-0.17	38.0%	123.9	4816	-0.05	
1288	185	2	27	55.0	\$43,748,902.23	-0.74%	-0.02	-0.07	-0.13	37.6%	166.0	4876	-0.05	
1299	185	2	28	55.0	\$43,641,515.86	-0.75%	-0.02	-0.07	-0.12	37.6%	166.0	5043	-0.05	

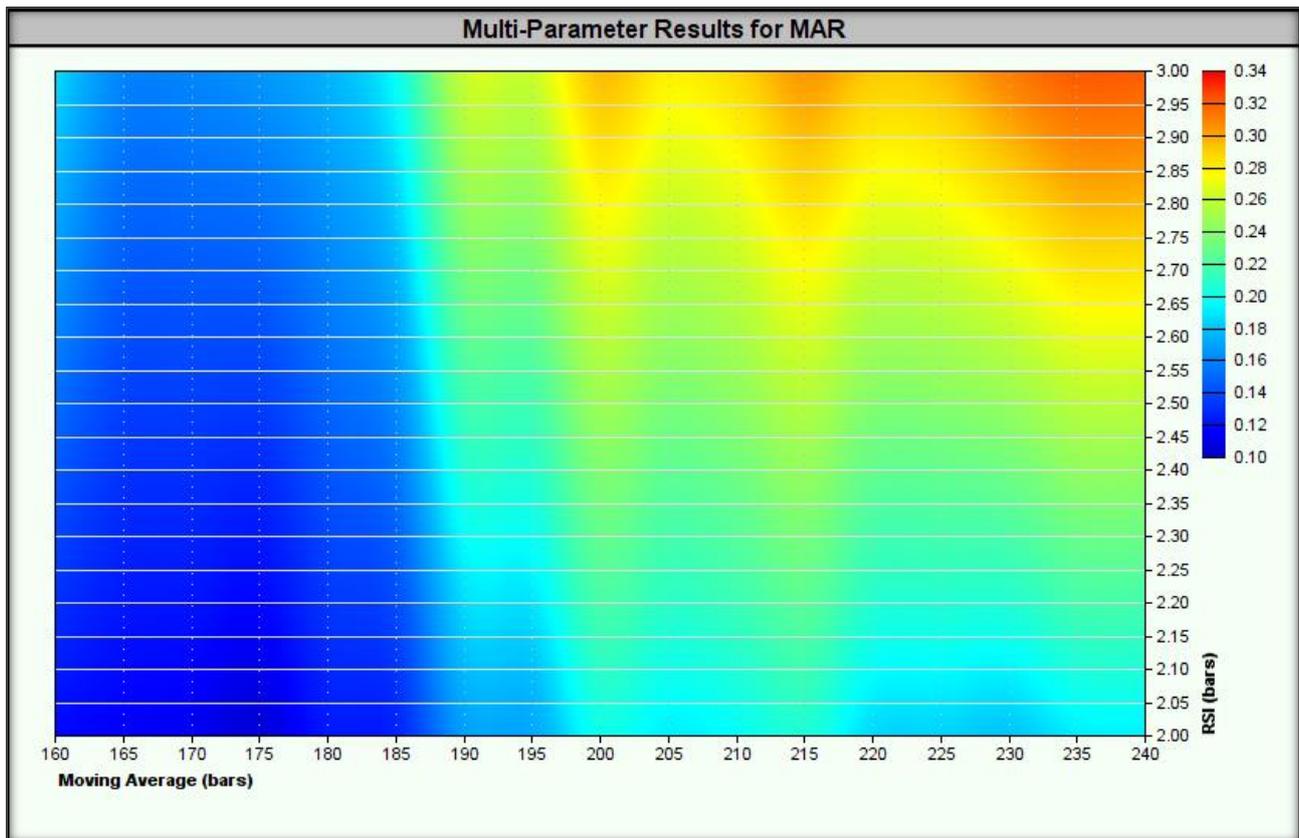
In summary, the strategy failed the stability test over a wide range of optimized parameters because:

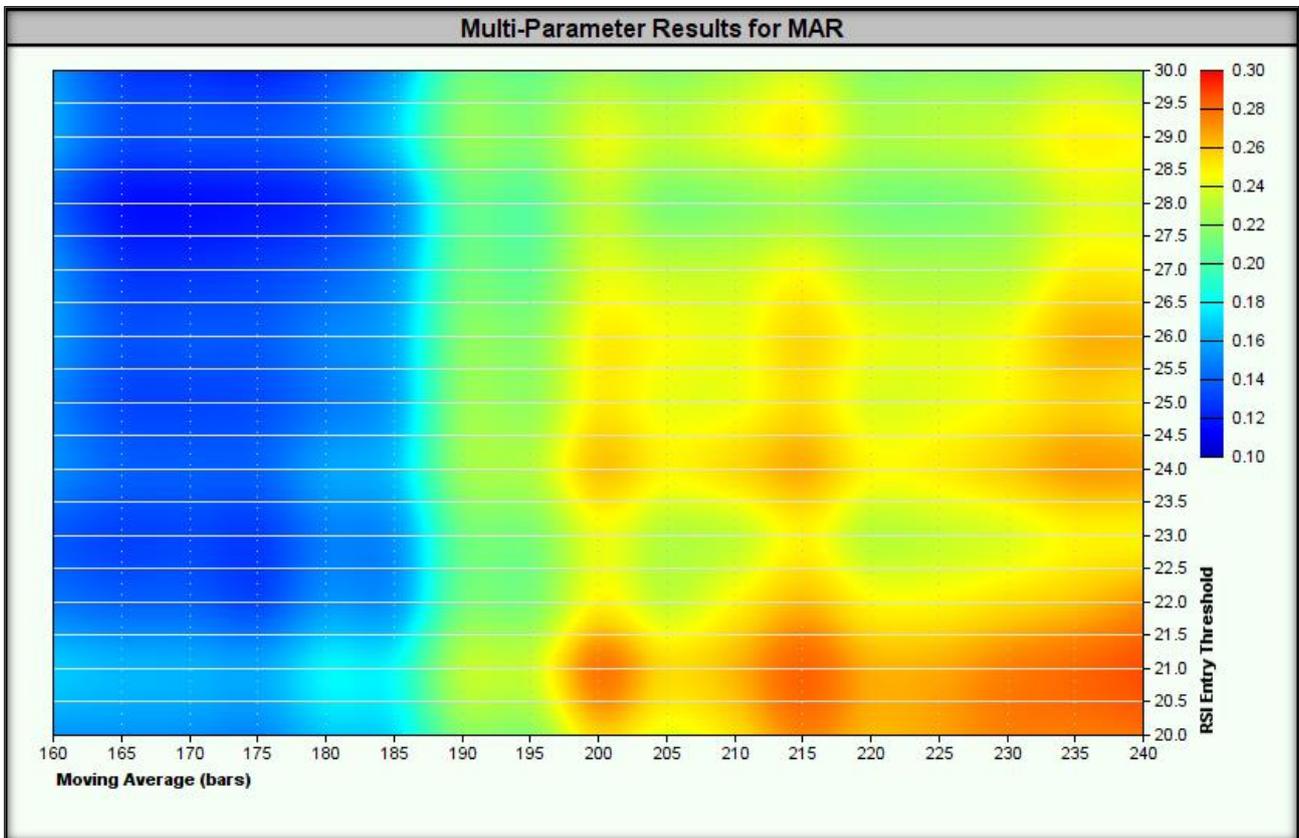
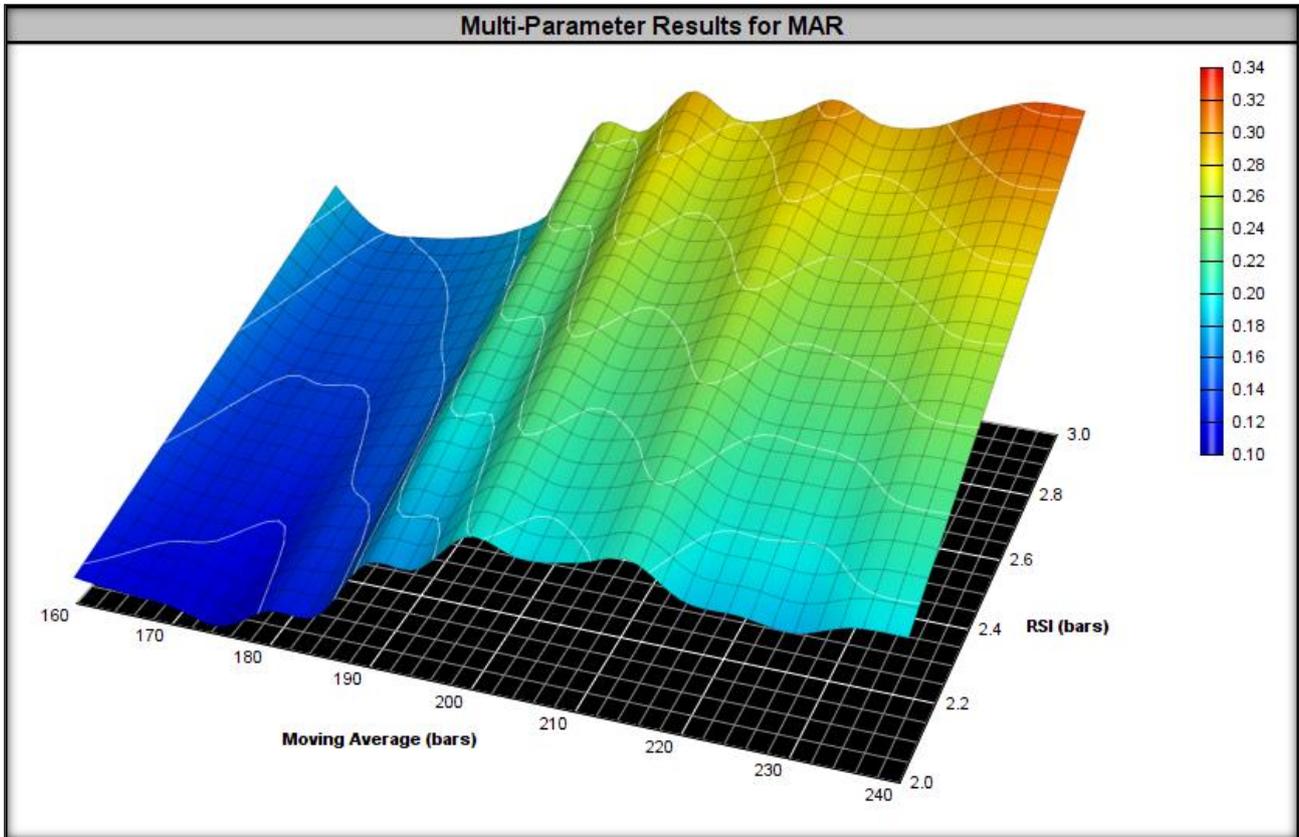


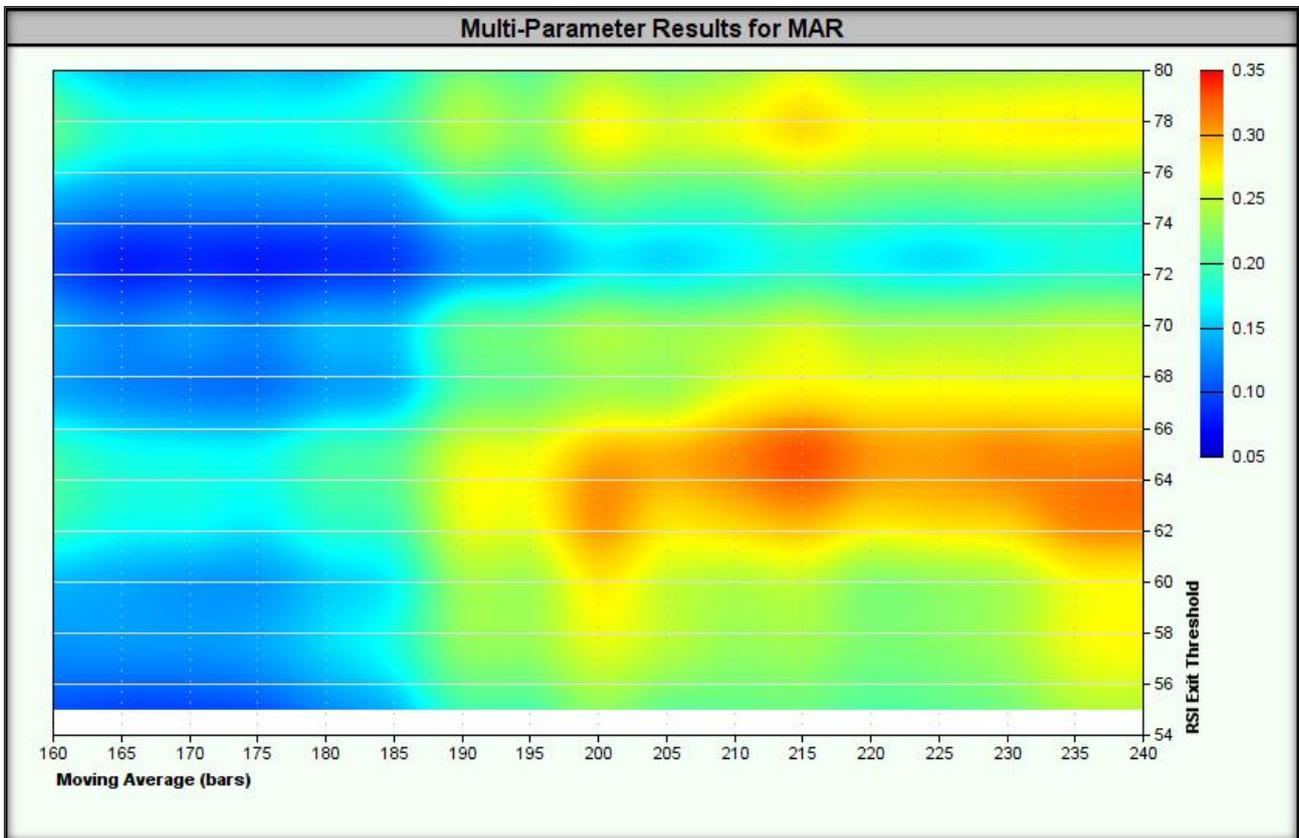
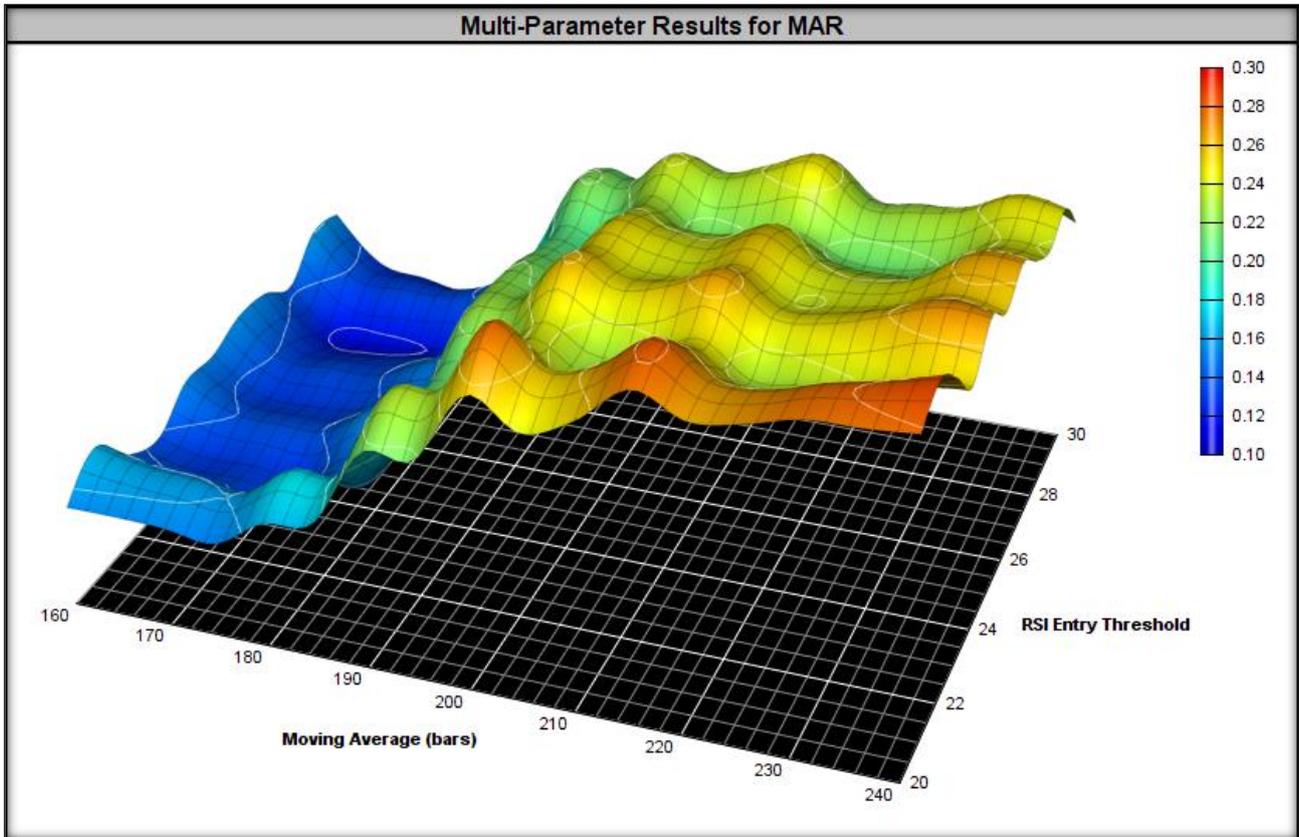
- **MAR value** – which indicates the instability of the strategy in different market conditions.
- **The maximum drawdown exceeded 250% of the drawdown value** for the result with the highest MAR (**40.4% vs. 11.3%**) – which means a high risk of deep capital drawdowns.

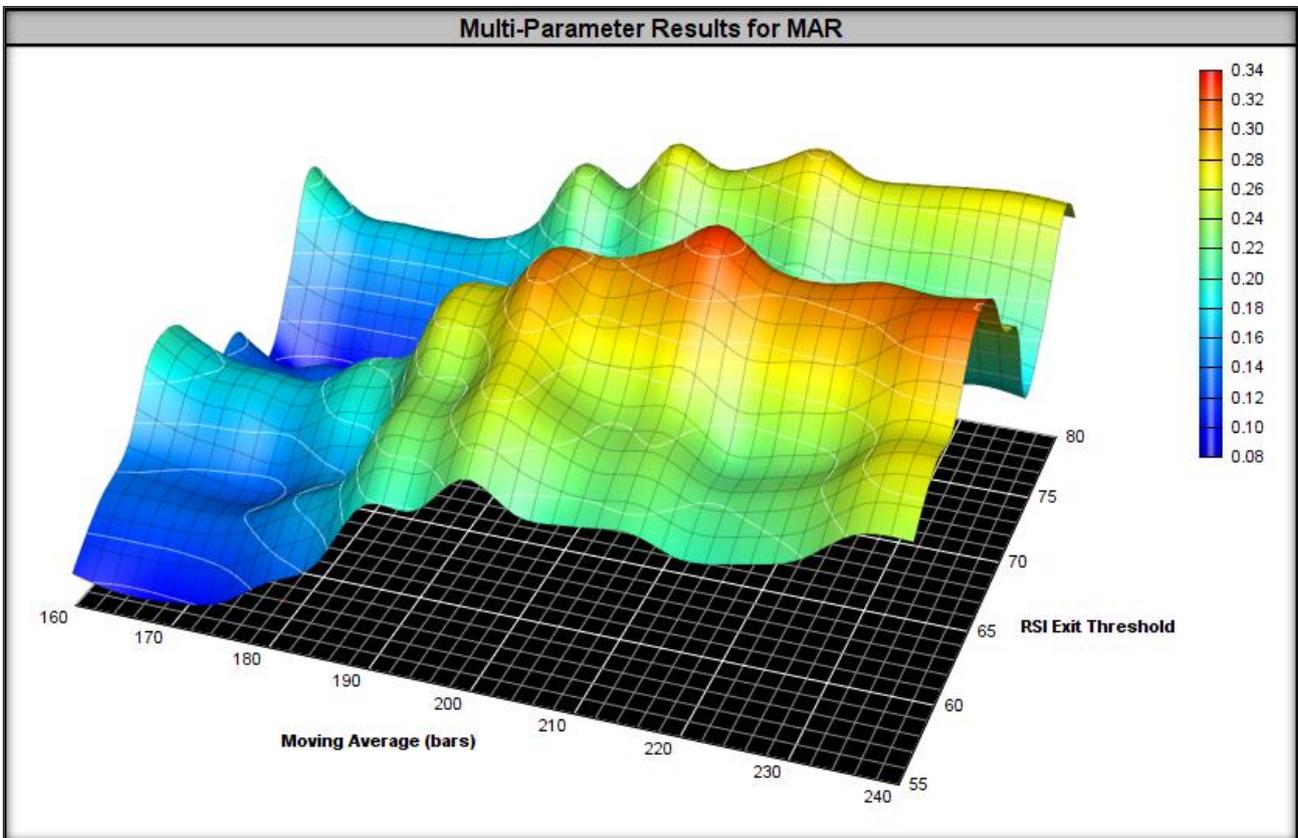
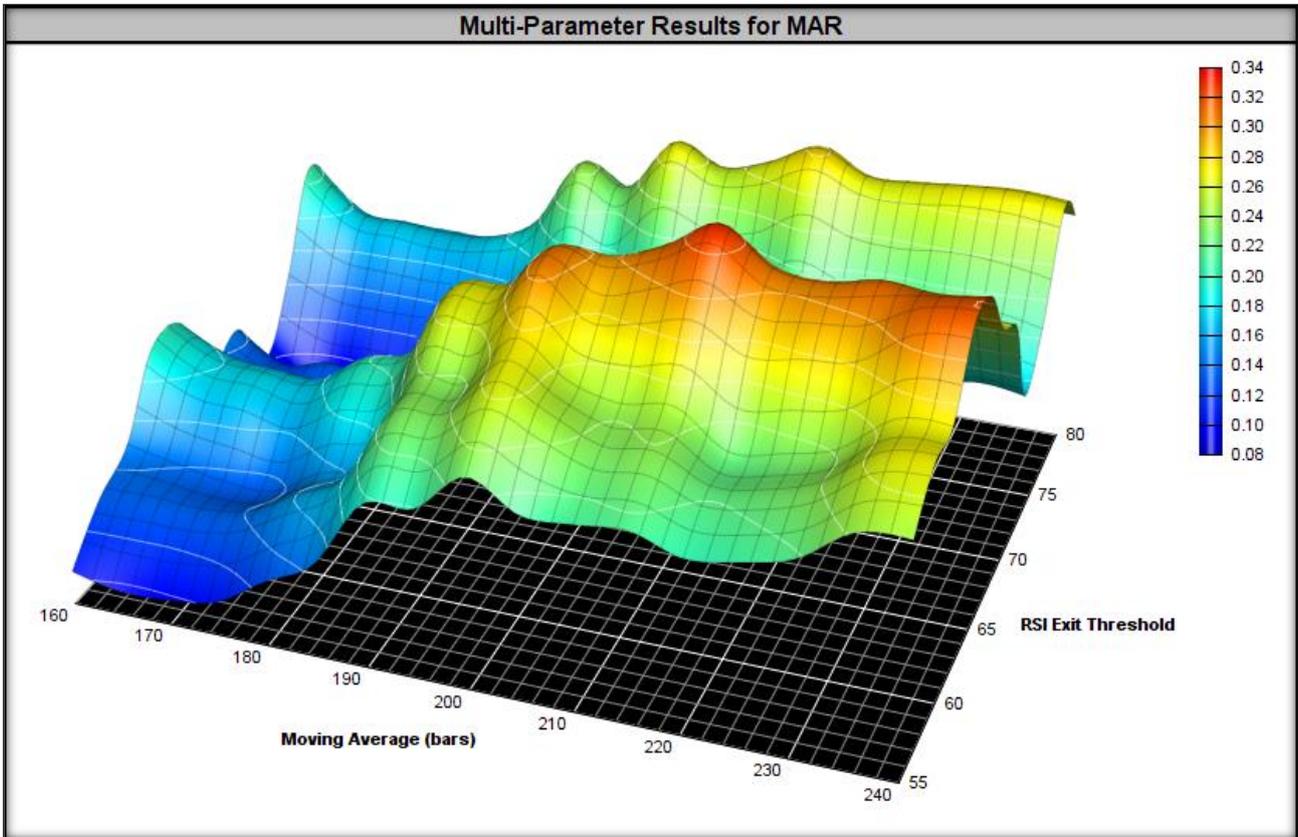
Therefore, further testing of the strategy is not justified, as its use in real transactions is **highly questionable**.

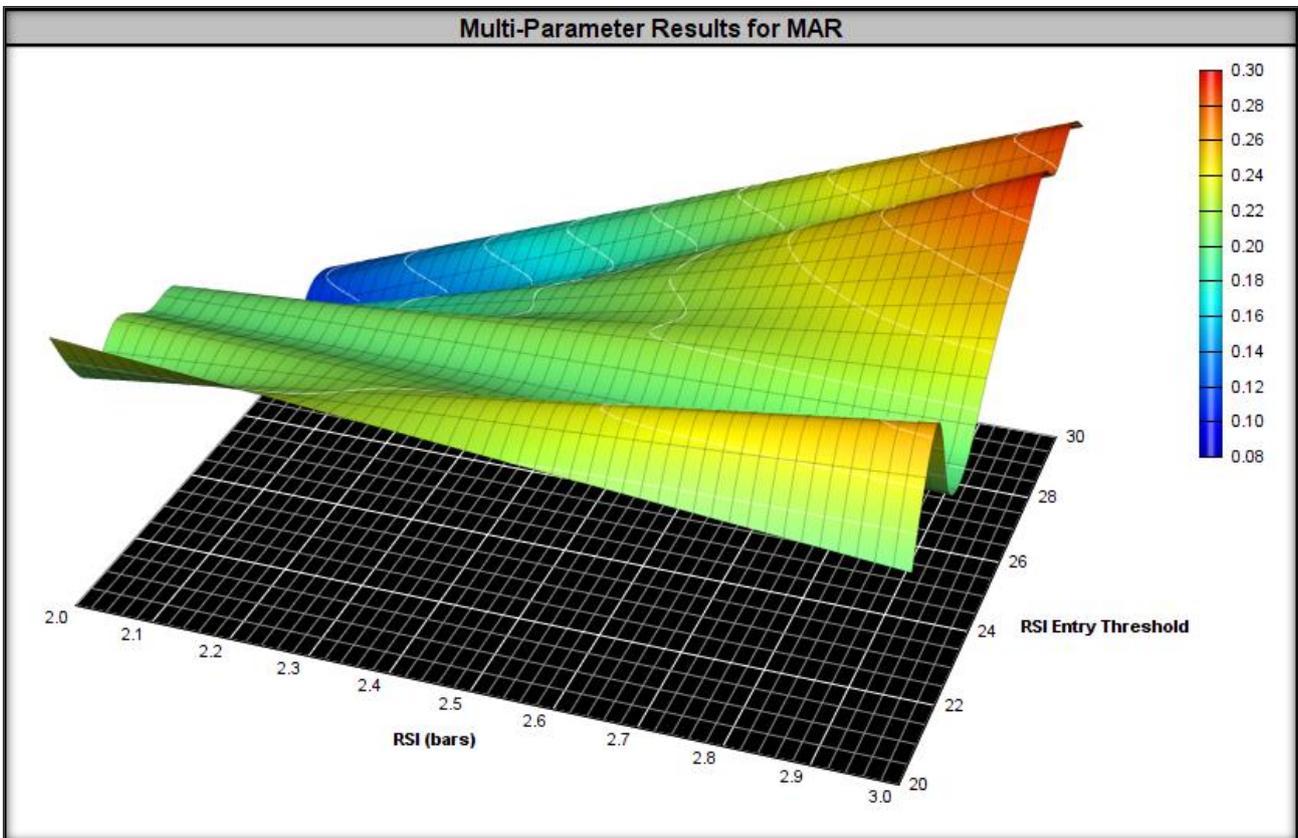
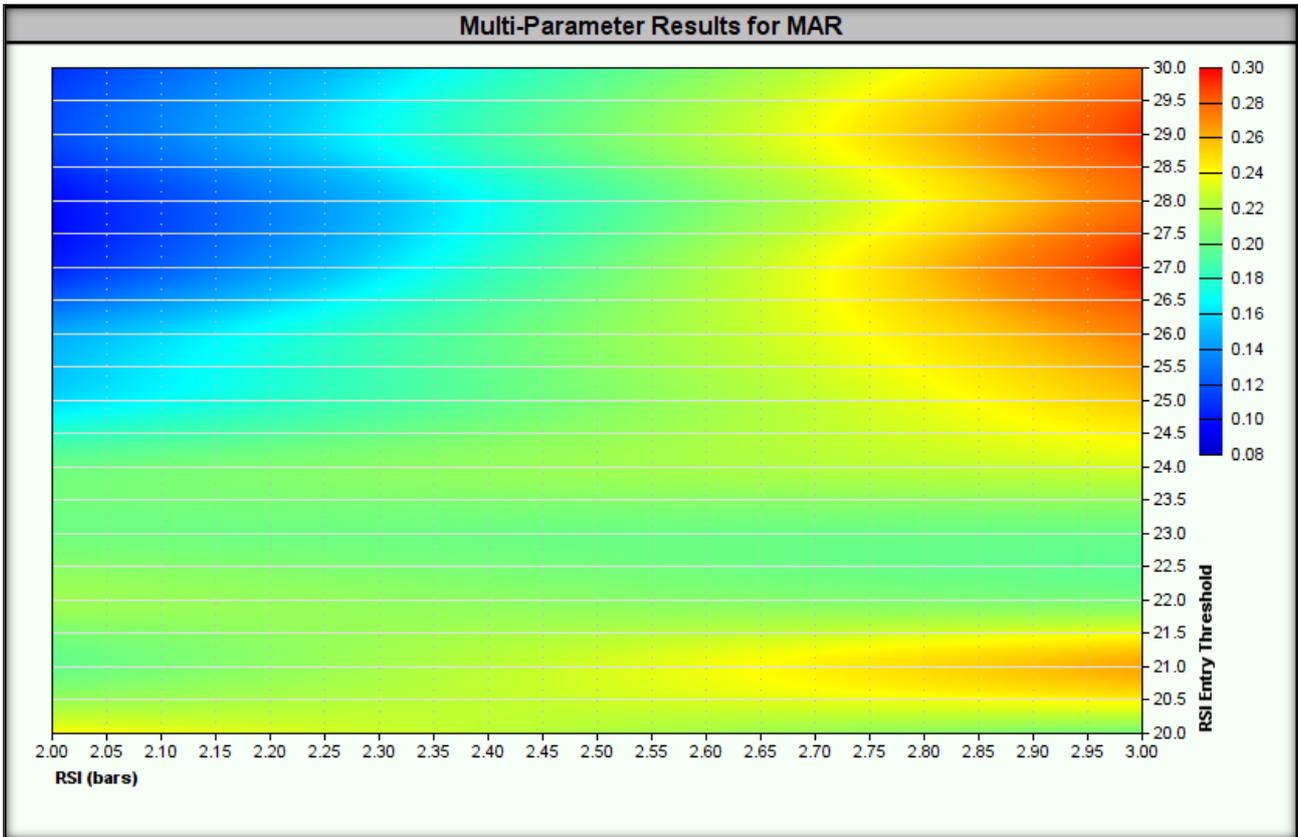
Heatmaps for the tested ranges are presented below.

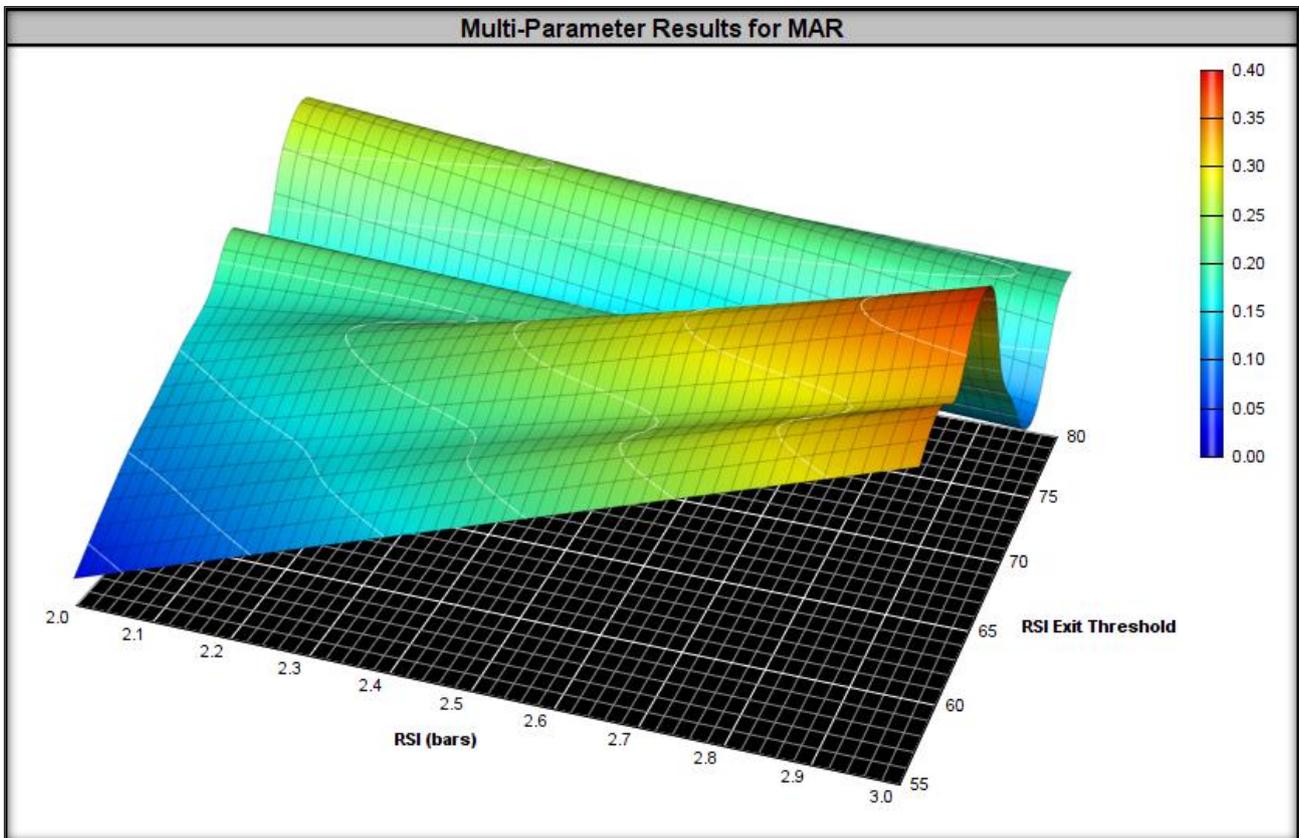
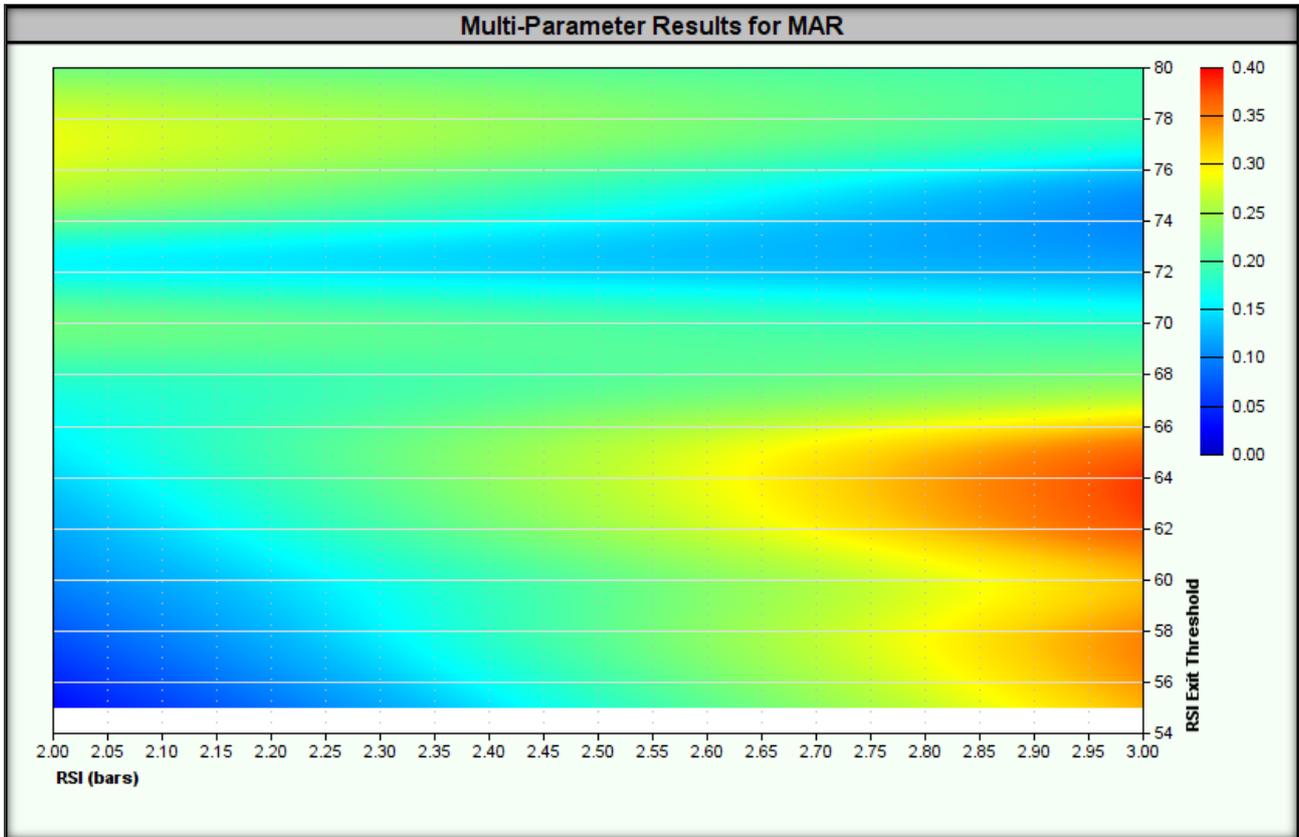


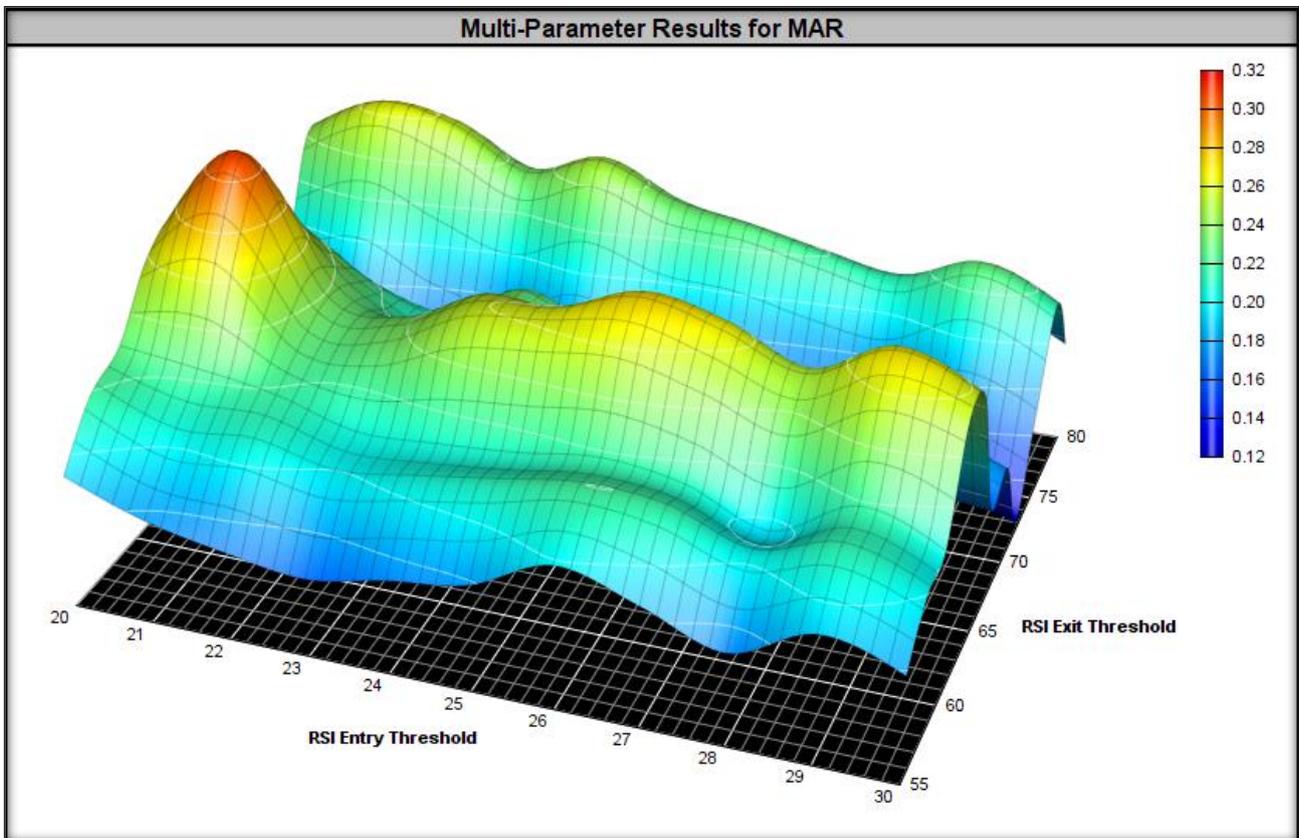
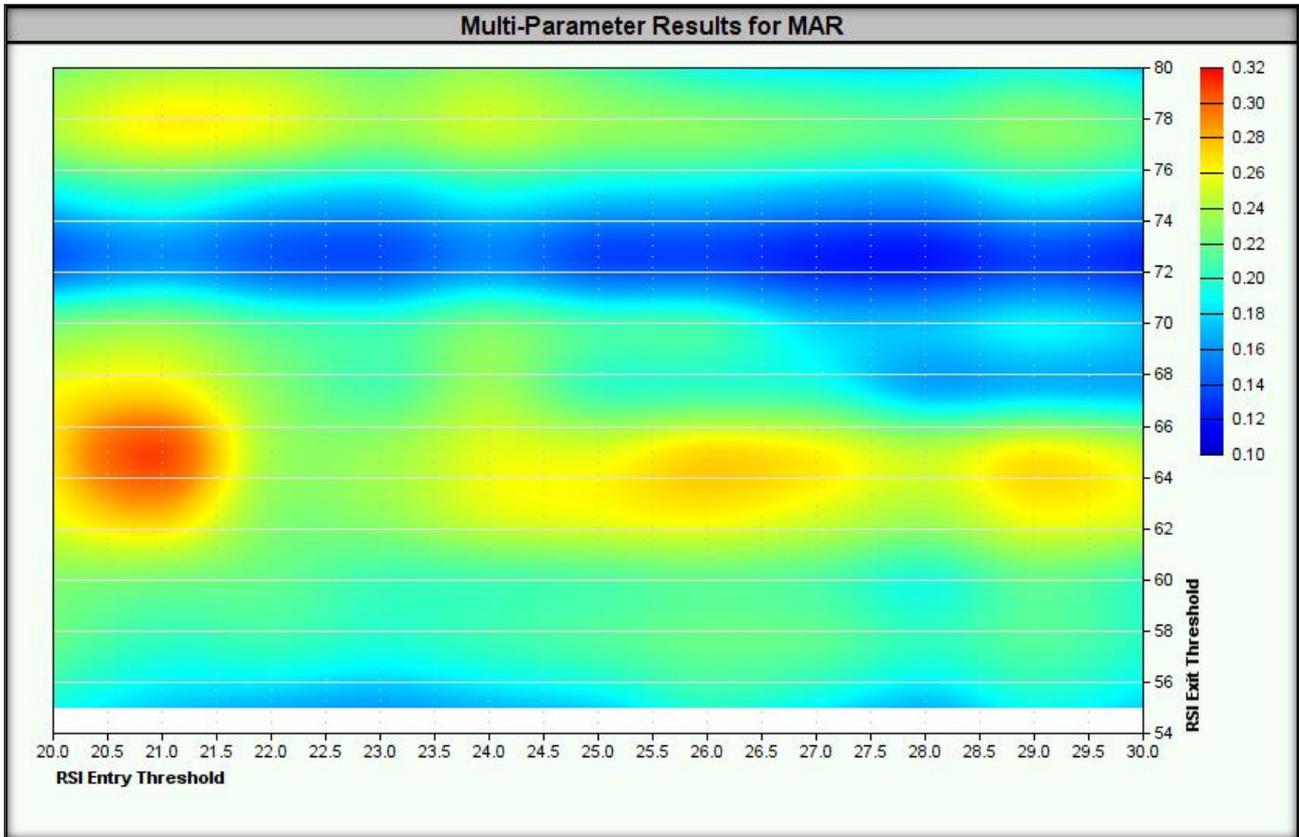


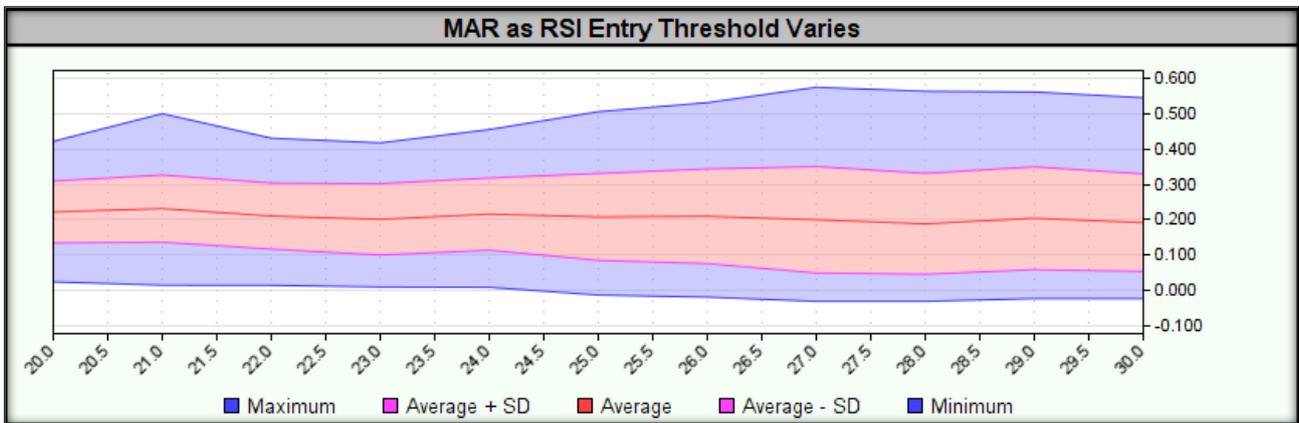
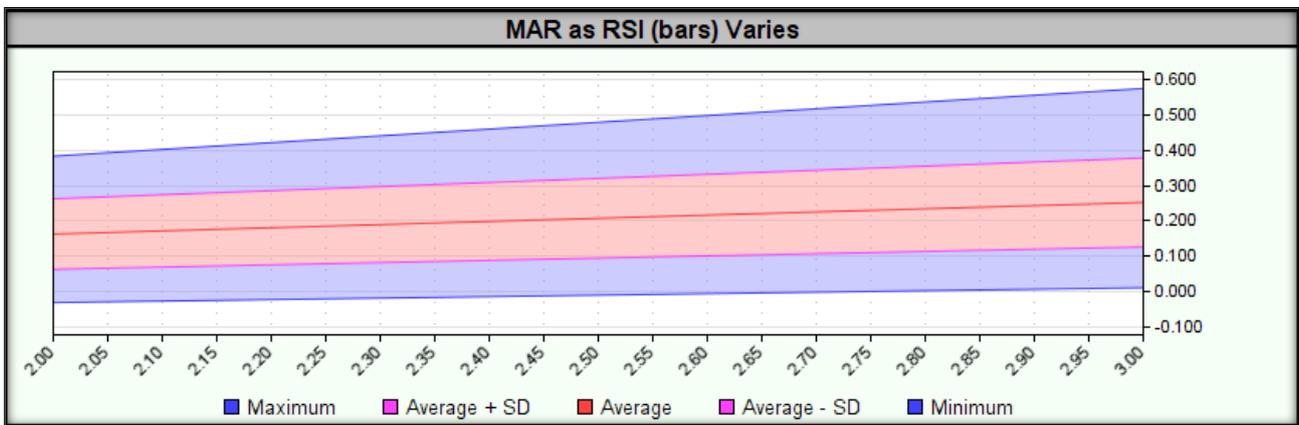
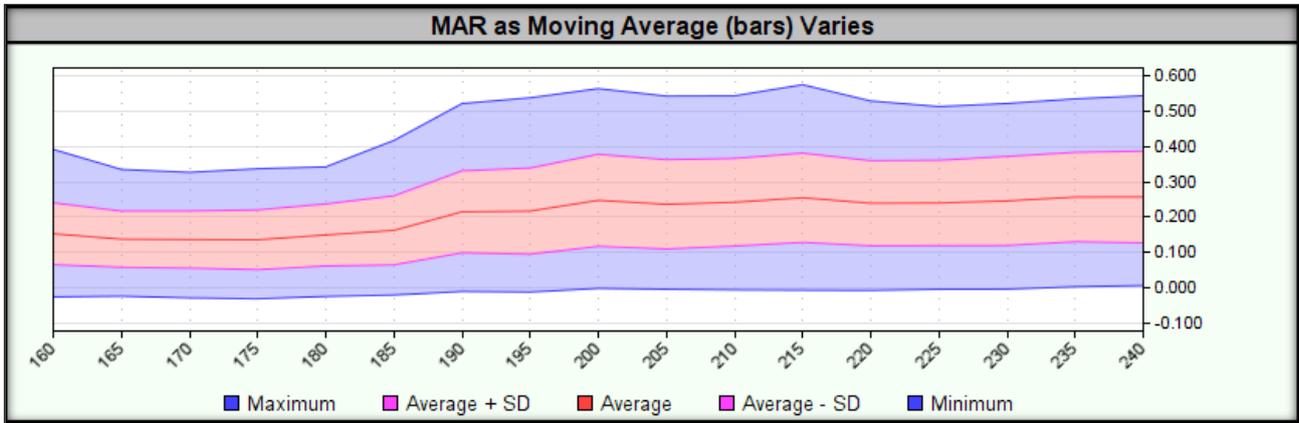


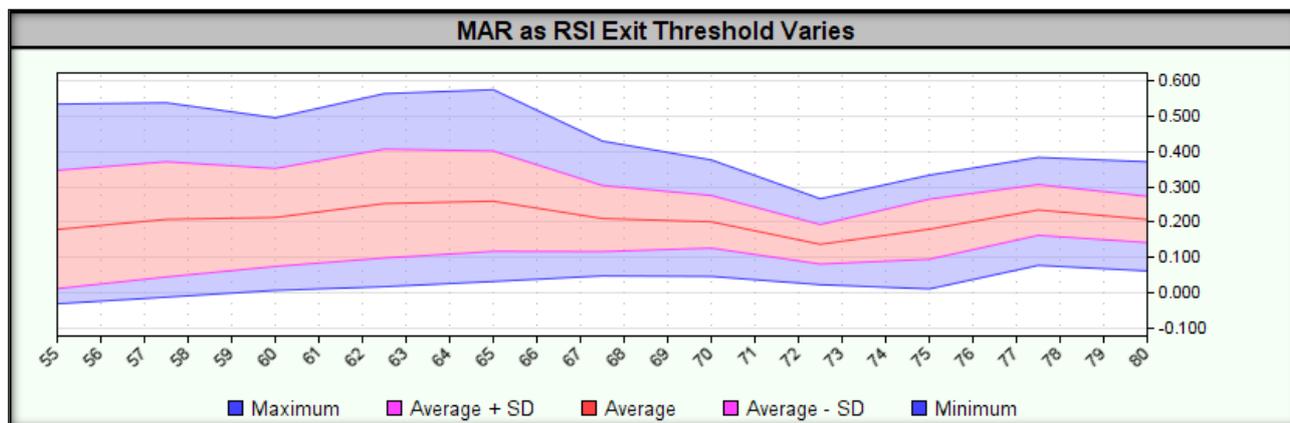












Observations for potential inclusion in future versions of the strategy, resulting from the analysis of stability test results and heatmap:

- **Sensitivity to RSI Exit Threshold** – the strategy shows high volatility depending on the RSI level used to close the position. An increase in RSI Exit Threshold causes a decrease in MAR due to the increasing movement needed to close the position – mainly when we already have 4 units open. **It is possible to move the lower range of RSI Exit to the level of 50.**
- **Moving Average (SMA) Length Optimization** – Heatmap analysis shows that strategies with shorter SMA (closer to 160 days) have lower MAR compared to longer periods. **It is possible to extend the SMA.**

One of the challenges associated with the TPS strategy is its construction based on **pyramiding positions on an increasingly large scale**. In combination with **different values of the RSI Entry Threshold**, this significantly affects the profile of the maximum drawdown. **When the RSI Entry Threshold level is low (e.g. 10–13), the probability of opening all four tranches of the position is relatively small.** On the other hand, at **higher values of this parameter (e.g. 20–25), the chance of fully building the position increases significantly.** This means that the strategy – despite a **comparable MAR value** – can generate very different **drawdown levels**, which was observed in the tests conducted. For this reason, it is worth considering **narrowing the RSI Entry Threshold range to stabilize the risk profile and limit the volatility of results.**

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.**