Expansion Breakouts v.1

Investment Strategy Testing Summary

The Expansion Breakouts strategy is a **swing trading investment technique** that looks for **strong, one-day breakouts of new multi-month highs or lows** and plays for their **short-term continuation.** The key assumption of the strategy is **to open a position only when the breakout is accompanied by the widest daily range from the last few sessions,** which increases the probability of further price movement. In relation to classic breakout setups, **the strategy provides precise criteria for the duration of the transaction** (several days) and the level of stop **loss protection.**

Strategy parameters optimized using **The Grid technique Search.** Although **the strategy results on in-sample data are decent,** <u>the strategy failed the stability test in a wide range of optimized parameters.</u> This means that the strategy loses its profitability and generates a significantly larger drawdown when tests are performed on suboptimal parameters. Therefore, <u>it is not recommended to use it in real transactions.</u>

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

Breakouts Strategy is a short-term investment technique developed by Jeff Cooper, based on **strong, one-day breakouts of several-month highs or lows** and playing for their **short-term continuation.** The key assumption of the strategy is **to open a position only when the breakout is accompanied by the widest daily range from the last few sessions,** which increases the probability of further price movement.

The strategy uses:

- **New multi-month high or low** – defines the impulsive nature of the movement.
- **Widest daily range over the last few sessions** – filters out low-volatility false breakouts.
- **A pre-defined short investment horizon** – forces discipline and minimizes the risk of giving away profits.

The strategy includes both **long (buy) and short (sell) positions,** depending on whether prices reach new highs or lows. An important aspect is the precise choice of the entry point and securing the position through defined stop loss levels.

Characteristics of the strategy and its strengths and weaknesses:

- **Clear entry and exit rules –** the strategy has well-defined rules, which makes it easier for traders to make decisions.
- **Risk management –** thanks to the built-in stop loss, the strategy automatically protects against excessive losses.
- **Exploiting strong breakouts** – strategies based on large daily ranges increase the chance of capturing strong price moves.
- **Potential False Breakouts** – Like any breakout-based strategy, Expansion Breakouts is subject to the risk of false signals that can lead to losses.
- **High psychological demands** – entering a position after a breakout can be psychologically challenging, especially if the market appears unstable.
- **Simplicity** – clearly defined rules make the strategy easy to understand and implement.
- **Requires constant market monitoring –** the strategy requires daily market monitoring, which can be time-consuming.

The Expansion Breakouts strategy uses simple yet effective rules to allow traders to enter a position on a breakout while minimizing risk through the use of stop loss. While it can be effective in the short term, it requires discipline and regular market observation to avoid false signals.

Step 2: Define investment principles

Below is **the pseudocode** for the **Expansion Breakouts strategy** on daily data:

1. **Calculating Indicators:**
    a. **ATR(10)** – average price range from the last 10 sessions.
2. **Long Position:**
    a. **Entry conditions:**
        - Today is a new XX-day high (XX-day high; Donchian channel).
        - Today's range (maximum – minimum) is larger than the largest daily range of the previous YY-days.
        - The last XX-day high was formed at least YY-days ago.
    b. **Entering a position –** the next day set a buy stop order one point above today's high.
    c. **Risk Management –** Set a stop loss at 1 x ATR(10) below today's high (in the original Jeff Cooper suggested a stop loss at 1 point from the closing price, but in the case of futures contracts this approach is pointless).
    d. **Closing a position –** close the position after ZZ-days from opening (close next day to opening).
3. **Short Position:**
    a. **Entry conditions:**
        - Today is a new XX day low (XX day low; Donchian channel).
        - Today's range (maximum – minimum) is larger than the largest daily range of the previous YY-days.
        - The last XX-day low was formed at least YY-days ago.
    b. **Entering a position –** the next day set a sell stop order one point below today's low.
    c. **Risk Management –** Set a stop loss at 1 x ATR(10) above today's low (in the original Jeff Cooper suggested a stop loss at 1 point from the closing price, but in the case of futures contracts this approach is pointless).
    d. **Closing a position –** close the position after ZZ-days from opening (close next day to opening).
4. **Daily Monitoring:**
    a. **Checking entry conditions –** if entry conditions are met (new XX-day high/low, today's range is larger than the largest range over the last YY-days, and the last XX-day high/low was formed at least YY-days ago), set an order for the next day.
    b. **Monitoring an open position –** If a position is open, check the stop loss level daily as well as how many days the position is open.

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.

Testing is performed assuming that **the risk of one position is 1.0% of total capital.**

# 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 sugar futures contract. In mid-September 2024, the quotes formed new **100-day highs** (first candle in the rectangle on the left; Donchian channel), and the last such high was formed at least 10 days ago. **This candle was also the largest in 10 days.** So the next day we set a **buy stop order one tick above the high of this candle.** This order was activated the next day (second candle in the rectangle on the left) and a defensive order (green dot) **was set at a distance of 1 x ATR(10)** below yesterday's high.

The transaction **is maintained for 10 days** or until **the stop loss order is activated.** In the above example, **the defense order was not activated and after a period of 10 days from the moment of opening** (the first candle in the rectangle on the left), **the position was closed the next day at the opening** (the second candle in the rectangle on the left). **The system worked correctly.**
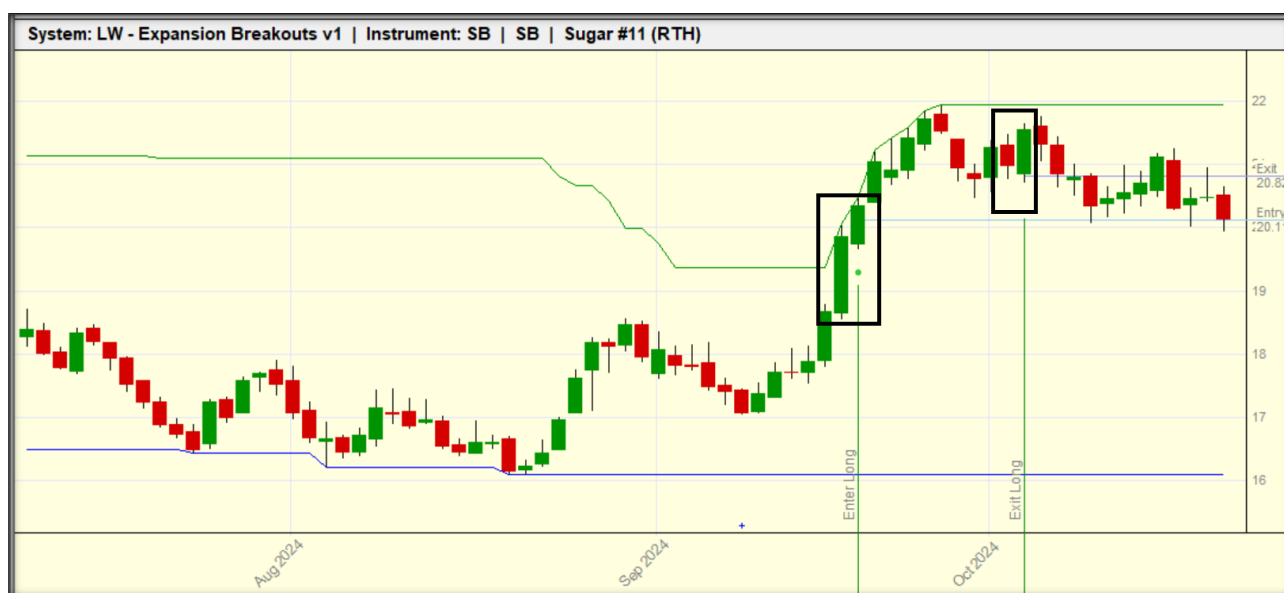

The second transaction was made on a palladium futures contract. In early November 2023, the quotes formed new **100-day lows** (first candle in the rectangle on the left; Donchian channel), and the last such low

was formed at least 10 days ago. **This candle was also the largest in 10 days.** So the next day we set a **sell stop order one tick below the low of this candle.** This order was activated the next day (second candle in the rectangle on the left) and a defensive order (green dot) **was set at a distance of 1 x ATR(10)** above yesterday's low.

The transaction **is held for 10 days** or until **the stop loss order is activated.** In the above example, **the defense order was activated after 9 days from the opening** (candle in the rectangle on the left) and **the position was closed. The system worked correctly.**
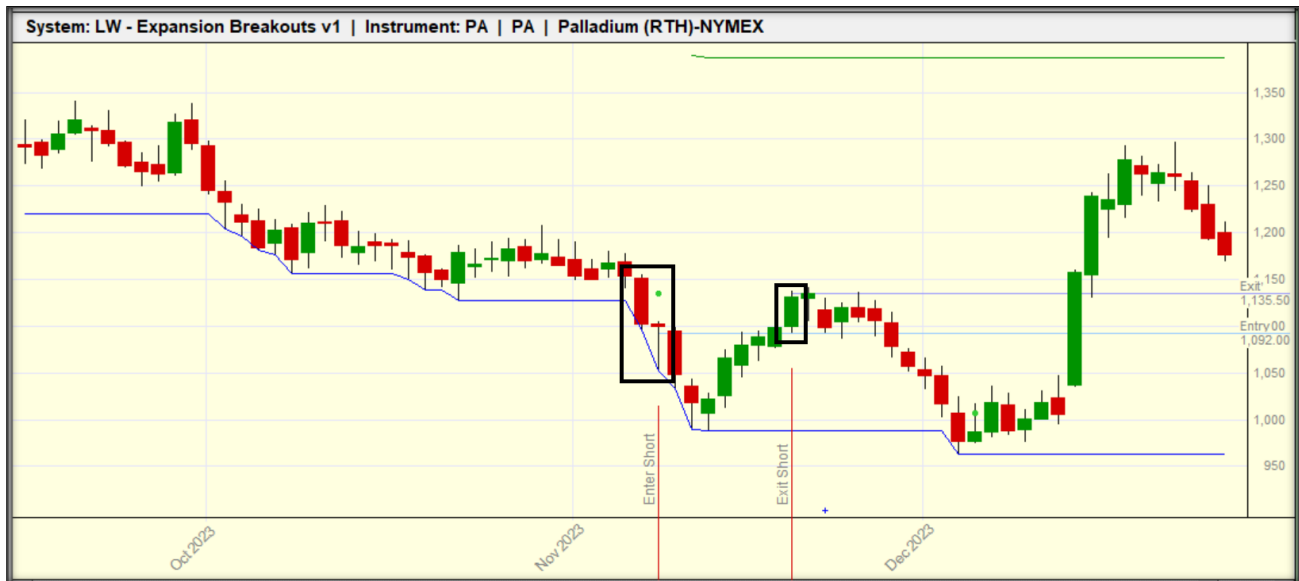
Once we are sure that the transactions are generated correctly, we can proceed to the first test of the strategy on the full **in-sample data set.** These tests are performed on **the basic parameters,** which – according to my assessment – should correspond to the assumed goals of the strategy.

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:

- **Donchian Canal:** 100 days;
- **The largest range (maximum – minimum) of daily price change:** 10 days;
- **How to open a position:** buy/sell stop above/below the high/ low of the previous candle, which was the highest in 10 days and formed a new high/ low of the last 100 days (long/short);
- **Stop loss:** 1 x ATR(10) below/above maximum/minimum (long/short);
- **Closing the position:** 10 days after opening (at the opening price of the next day);
- **Position direction:** long and short;
- **Position sizes:** corresponding to a risk of 1.0% of total capital.

The test result is shown below.
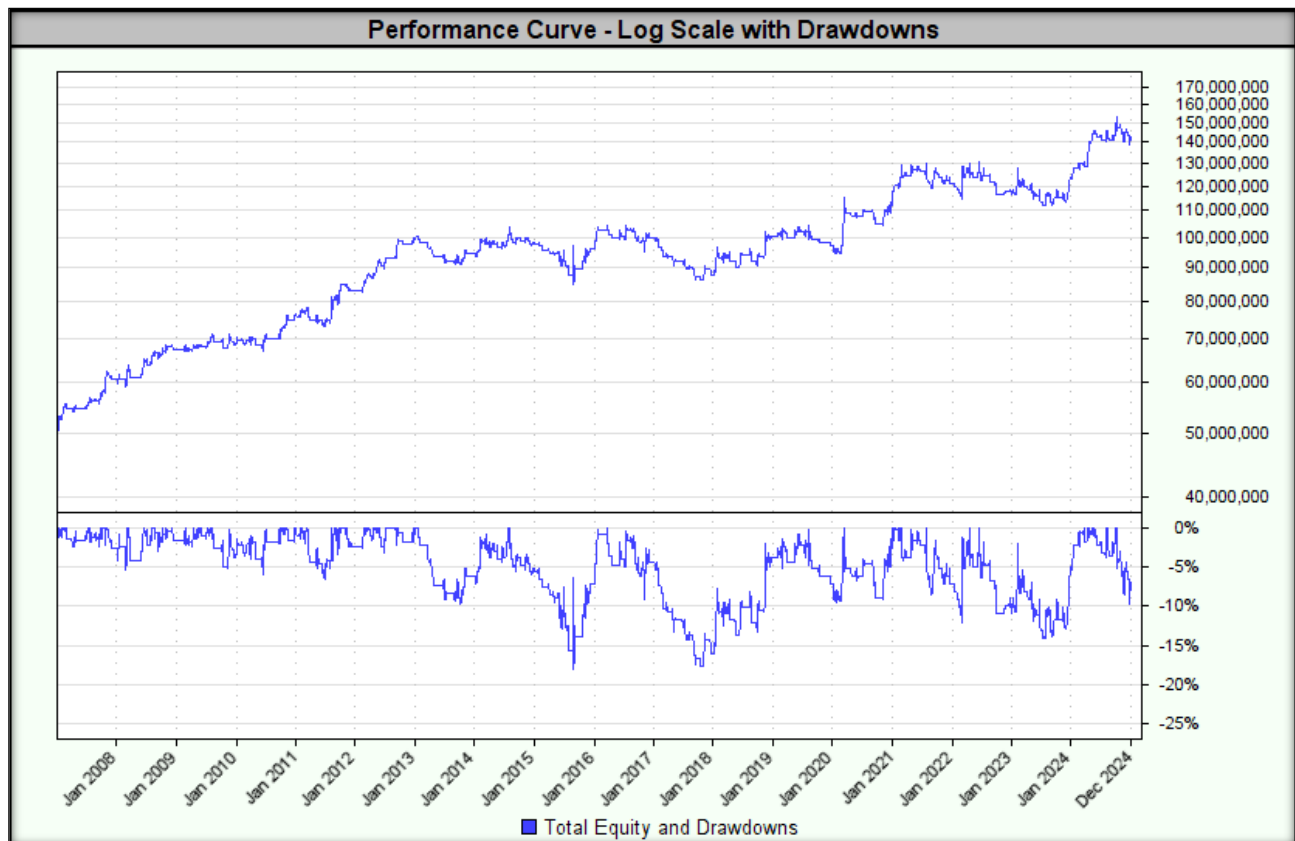
Indicators/Measures	Concluding a transaction at the opening price
CAGR%	6.0%
MAR Ratio	0.33
RAR%	4.3%
R-Cubed	0.15
Robust Sharpe Ratio	0.45
Max Drawdown	18.1%
Wins	41.1%
Losses	58.9%
Average Win%	2.12%
Average Loss %	1.04%
Win/ Loss Ratio	2.04
Average Trade Duration (days)	9
Percent Profit Factor	1.43
SQN	0.67
Number of transactions	433

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**

Expansion Breakouts v.1 in this version it assumes **optimization of parameters proposed by the creator of the strategy - Jeff Cooper.** We will optimize using **The Grid method Search,** which consists in **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 the parameters on **the in-sample data.** For this purpose, we determine the ranges of parameter **values** 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:

- **Donchian Channel:** range **80-140 days (step: 5);**
- **The largest range (maximum – minimum) of daily price change:** range **8-13 days (step: 1);**
- **Closing position:** range **5-10 days (step: 1).**

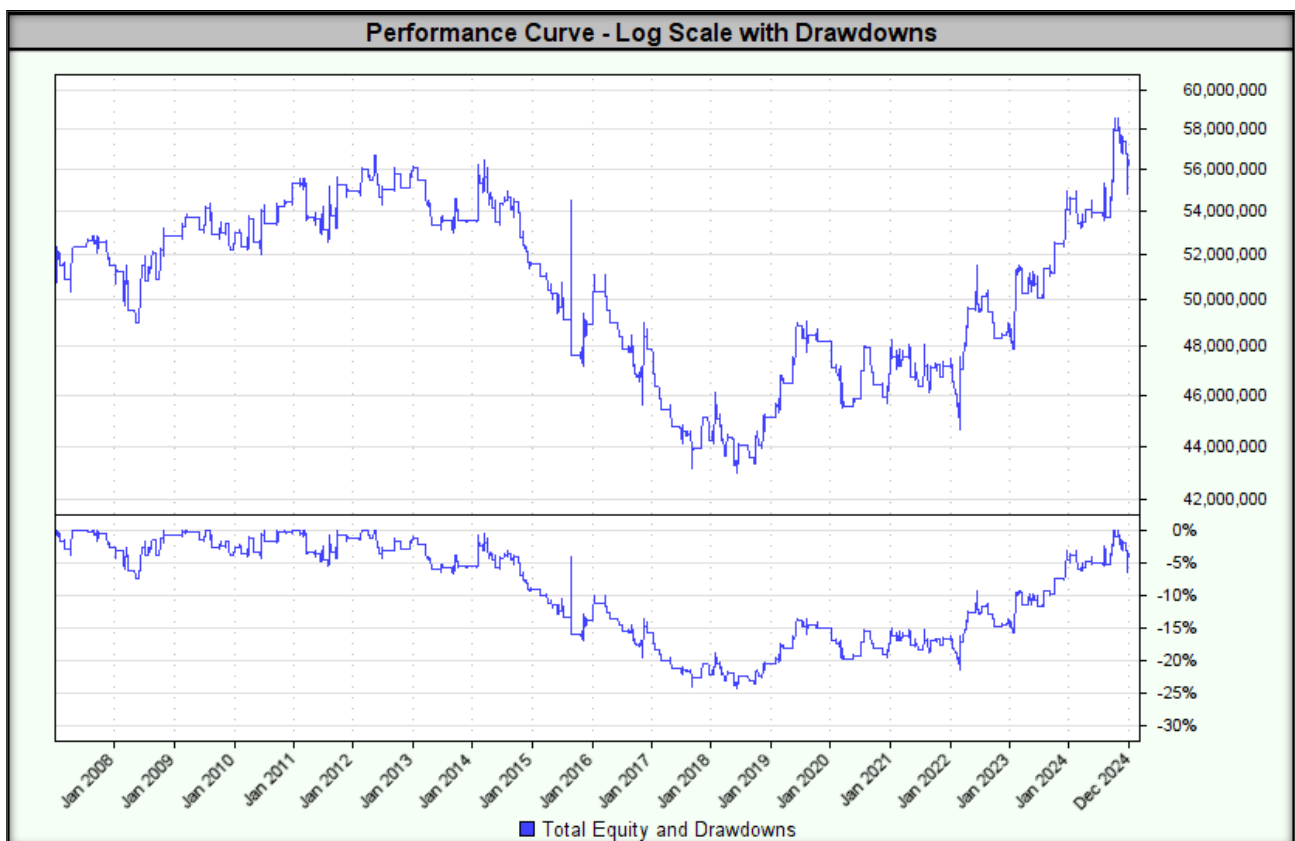**The lowest MAR value of 0.03** was achieved for the following parameters:

- **Donchian Canal:** 95 days;
- **The largest range (maximum – minimum) of daily price change:** 13 days;

- **Closing position:** 5 days.

Test	Highest Lowest (bars)	Prior High/Low Threshold & Largest Range (bar)	Exit (bars)	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades
139	95	13	5	$56,431,907.45	0.67%	0.03	0.14	0.15	24.2%	148.5	331
463	140	13	5	$61,353,019.48	1.14%	0.04	0.23	0.20	29.5%	113.8	270
415	135	11	5	$60,874,221.71	1.10%	0.04	0.21	0.19	27.2%	141.7	332
451	140	11	5	$60,599,051.63	1.07%	0.04	0.21	0.18	26.5%	112.3	319
343	125	11	5	$60,073,802.41	1.03%	0.04	0.20	0.21	24.0%	151.4	343
427	135	13	5	$62,994,729.76	1.29%	0.04	0.26	0.22	29.4%	132.0	281
307	120	11	5	$60,860,206.31	1.10%	0.04	0.21	0.20	24.5%	148.4	343
355	125	13	5	$61,966,875.62	1.20%	0.05	0.25	0.25	26.0%	148.2	293
379	130	11	5	$62,065,792.23	1.21%	0.05	0.23	0.25	24.2%	148.2	337

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

Performance Curve - Log Scale with Drawdowns

The **highest MAR value of 0.39** was achieved for the following parameters:

- **Donchian Canal:** 110 days;
- **The largest range (maximum – minimum) of daily price change:** 10 days;
- **Closing position:** 10 days.

The highest MAR value was accompanied by **a drawdown of 16.4%.**

Test	Highest Lowest (bars)	Prior High/Low Threshold & Largest Range (bar)	Exit (bars)	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades
234	110	10	10	$151,658,183.72	6.36%	0.39	0.69	0.63	16.4%	33.3	421
230	110	10	6	$111,207,976.59	4.54%	0.36	0.61	0.61	12.5%	31.8	421
233	110	10	9	$126,138,153.28	5.28%	0.35	0.62	0.60	15.2%	27.5	421
196	105	10	8	$120,757,661.42	5.02%	0.34	0.58	0.68	14.6%	39.1	426
194	105	10	6	$106,527,215.26	4.29%	0.34	0.58	0.64	12.5%	29.2	426
198	105	10	10	$145,167,173.09	6.10%	0.34	0.67	0.66	18.1%	24.0	426
232	110	10	8	$124,001,714.02	5.18%	0.33	0.60	0.60	15.5%	50.6	421
197	105	10	9	$125,132,417.87	5.23%	0.33	0.62	0.65	15.8%	27.4	426
162	100	10	10	$141,973,907.13	5.97%	0.33	0.65	0.64	18.1%	47.4	433

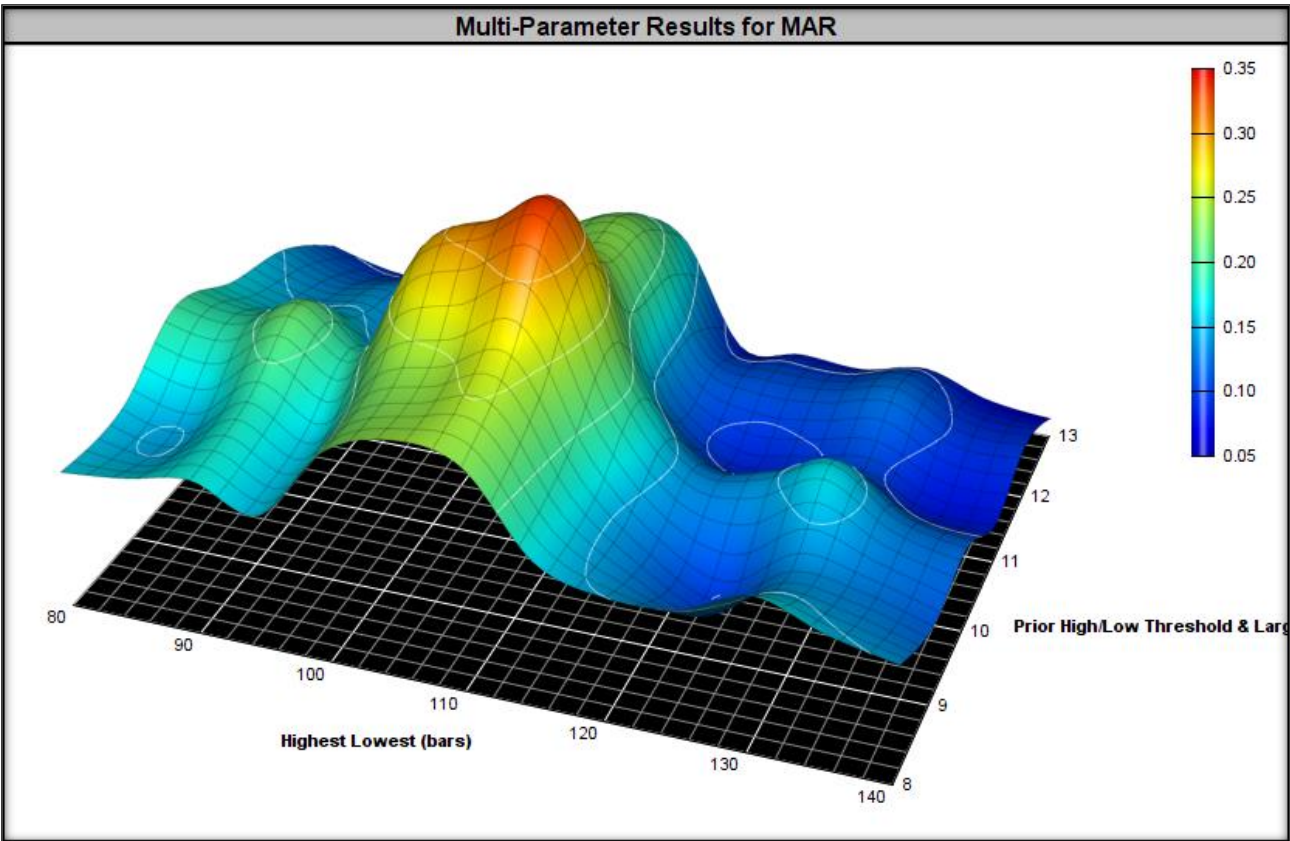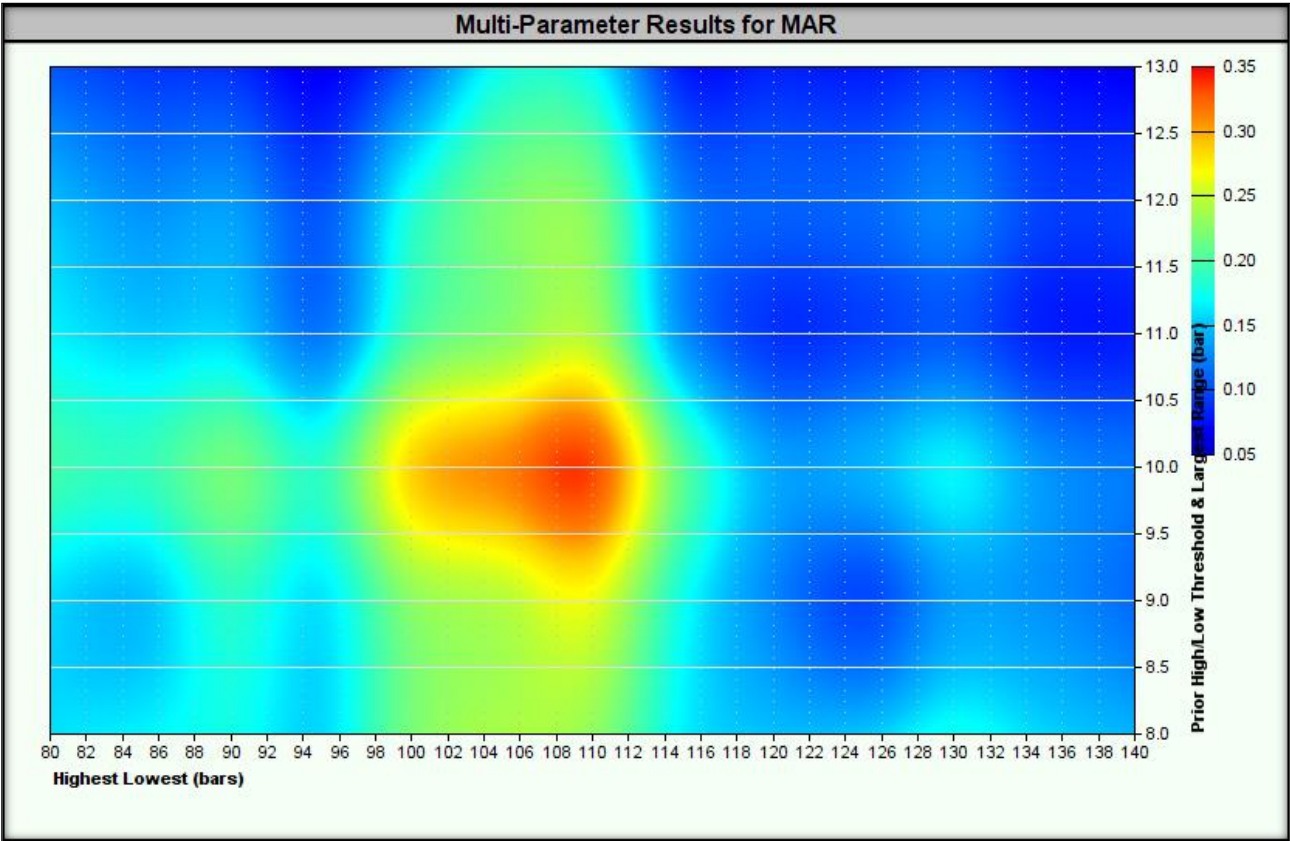Below is a graph of the equity curve for **the strategy with the highest MAR.**
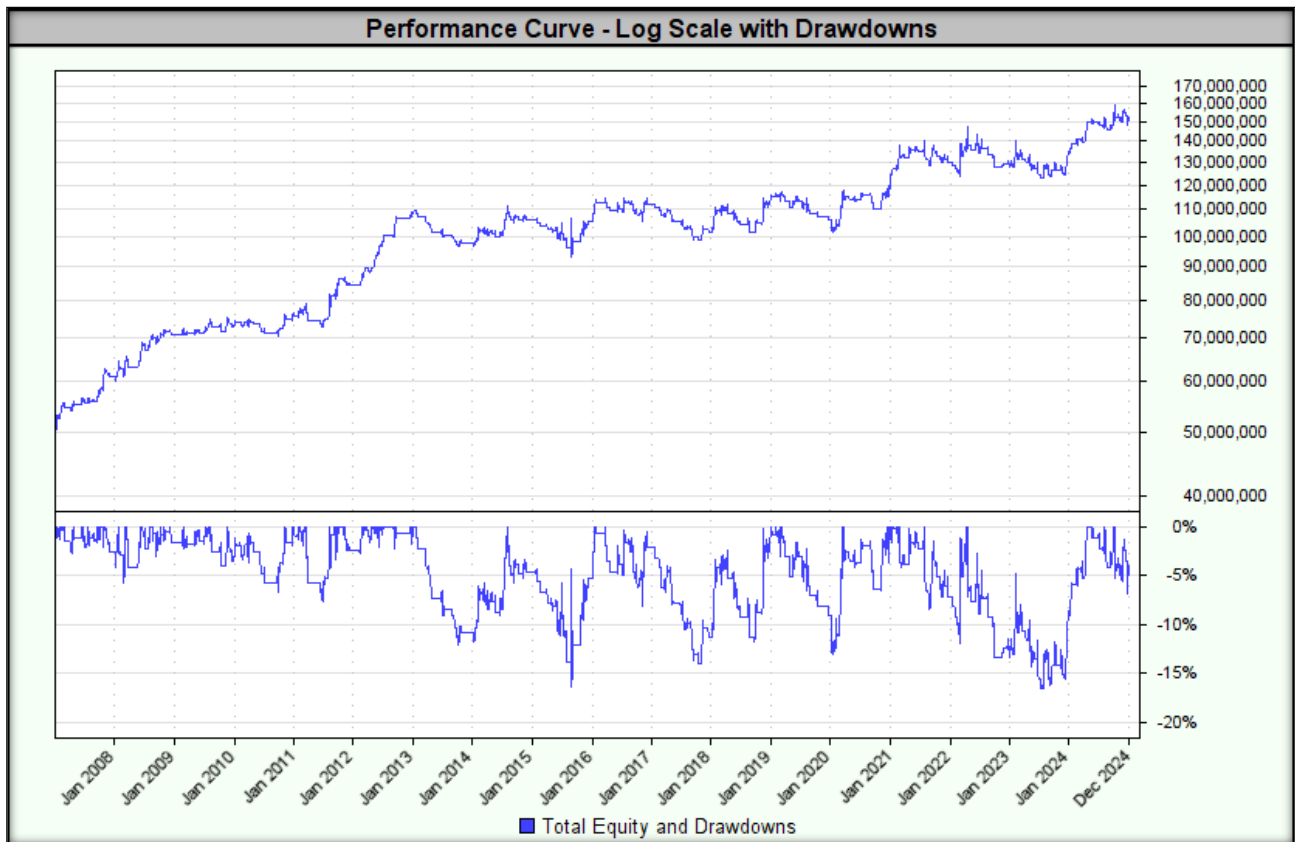
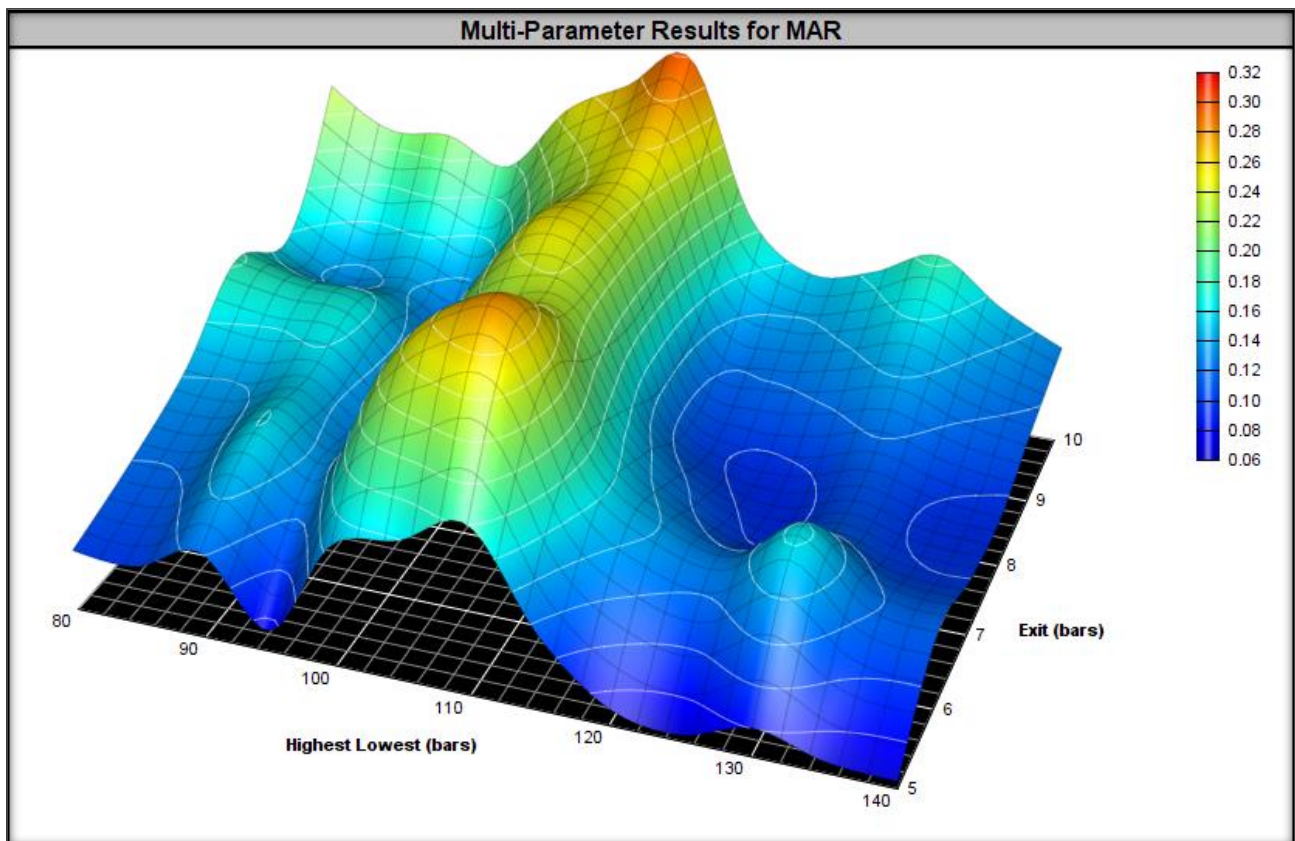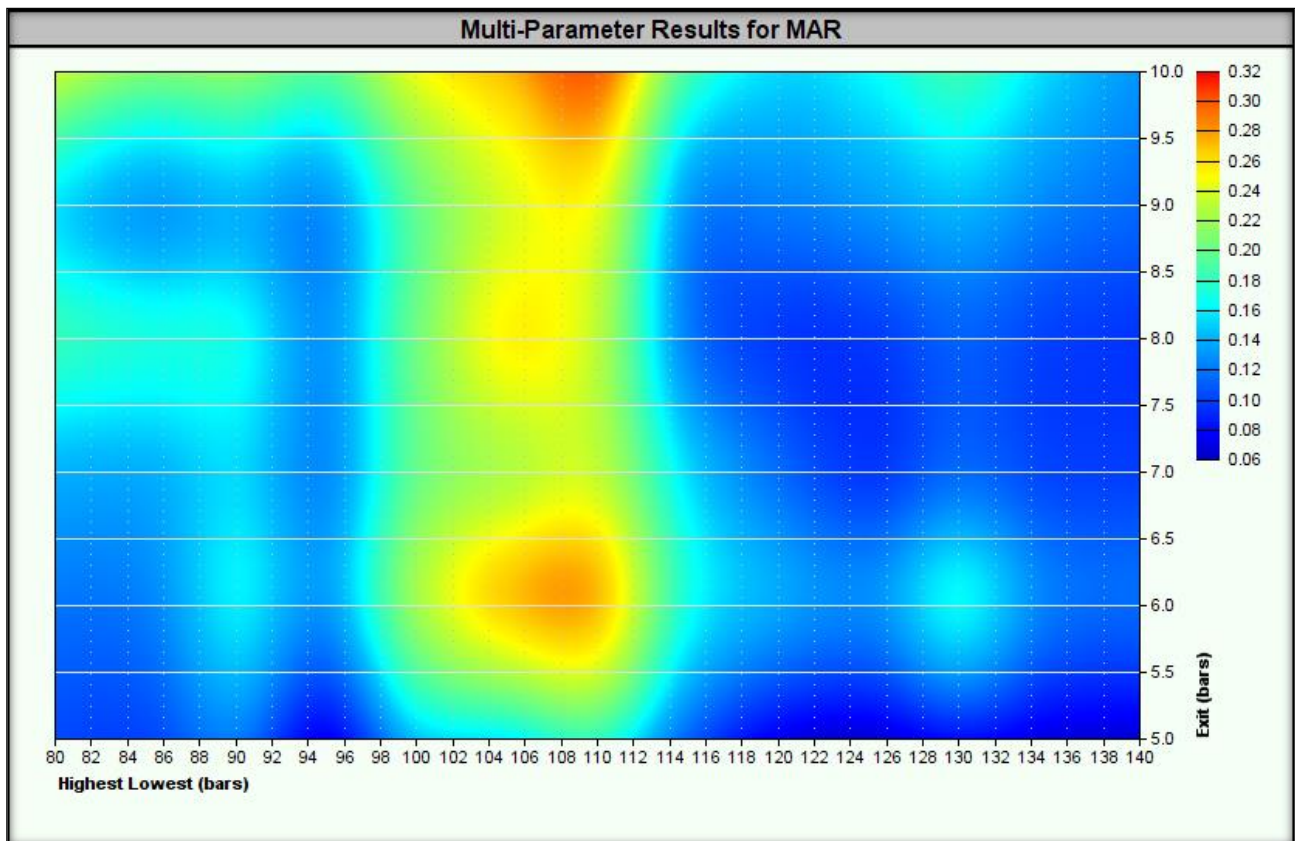For all combinations of tested parameter ranges, **the highest drawdown was 34.1%!**

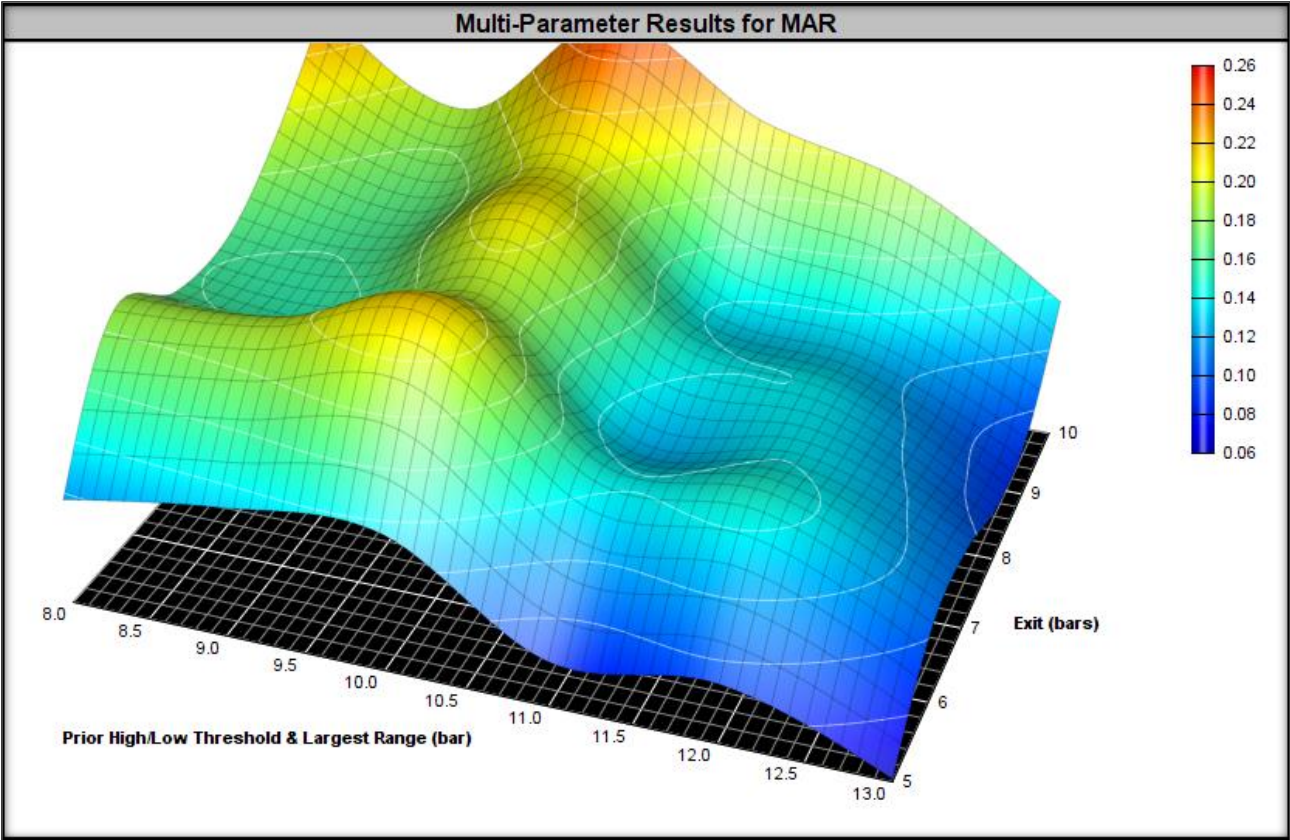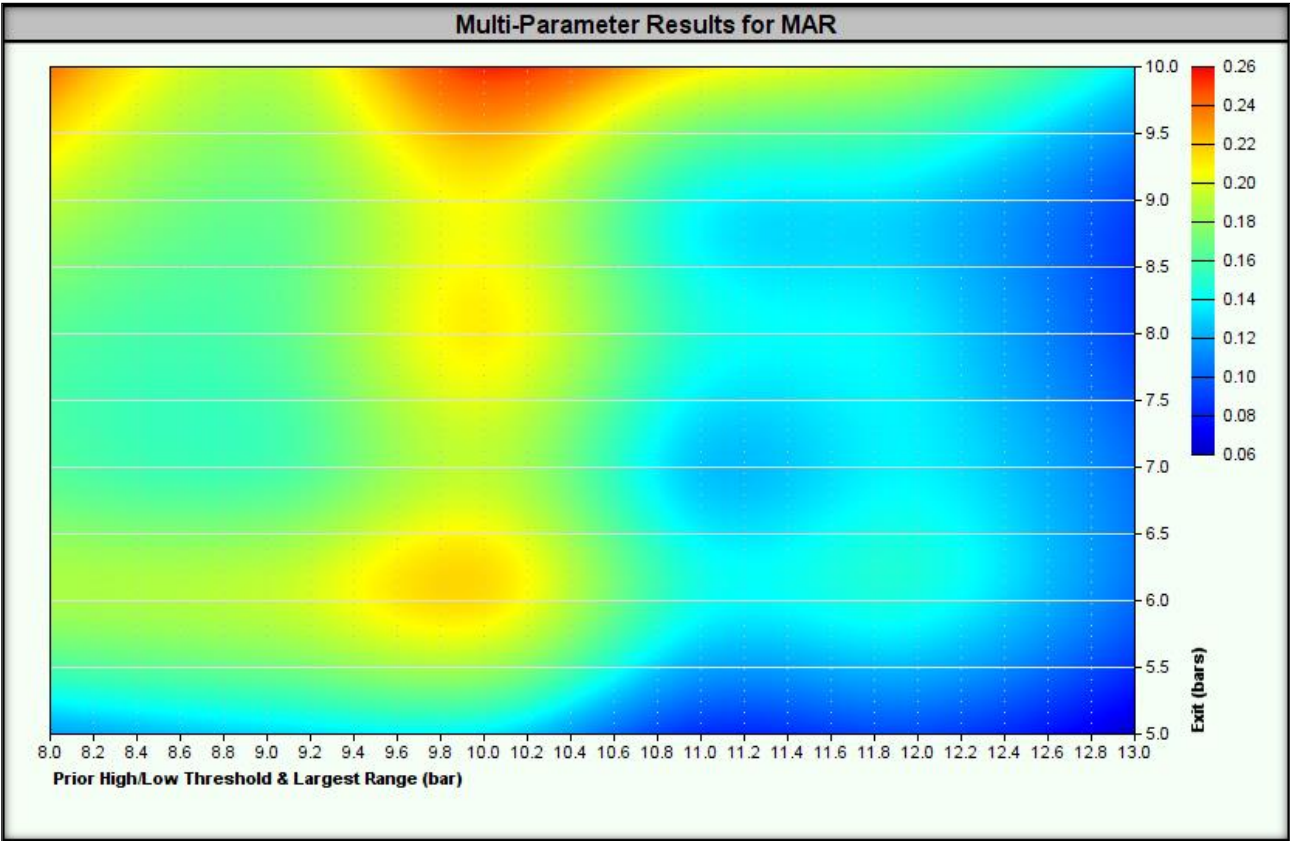| Test	Highest Lowest (bars)	Prior High/Low Threshold & Largest Range (bar)	Exit (bars)	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades
466	140	13	8	$70,743,341.90	1.95%	0.06	0.30	0.27	34.1%	110.9	270
430	135	13	8	$71,443,321.66	2.00%	0.06	0.31	0.28	34.0%	111.8	281
467	140	13	9	$77,077,265.07	2.43%	0.07	0.36	0.34	33.5%	110.4	270
431	135	13	9	$78,994,443.59	2.57%	0.08	0.38	0.36	33.0%	110.4	281
322	120	13	8	$70,301,316.54	1.91%	0.06	0.30	0.27	31.8%	137.1	293
468	140	13	10	$80,299,781.49	2.67%	0.08	0.39	0.37	31.4%	98.2	270
465	140	13	7	$74,764,476.88	2.26%	0.07	0.36	0.34	31.4%	110.4	270
107	90	13	9	$73,524,721.93	2.17%	0.07	0.31	0.34	31.2%	132.7	344
323	120	13	9	$78,841,730.46	2.56%	0.08	0.39	0.36	31.1%	113.7	293

In summary, the strategy **passed the stability test** in a wide range of optimized parameters on in-sample data because:
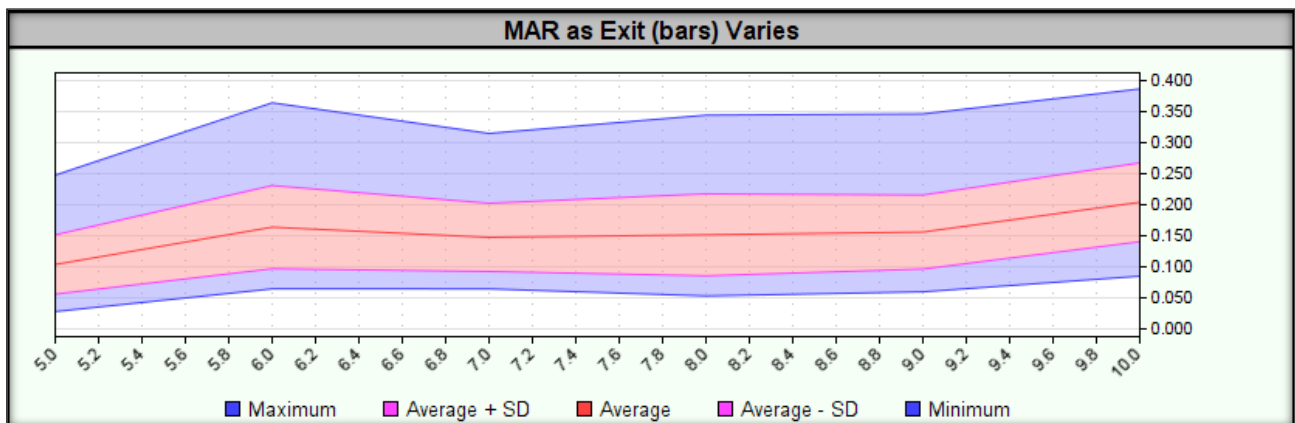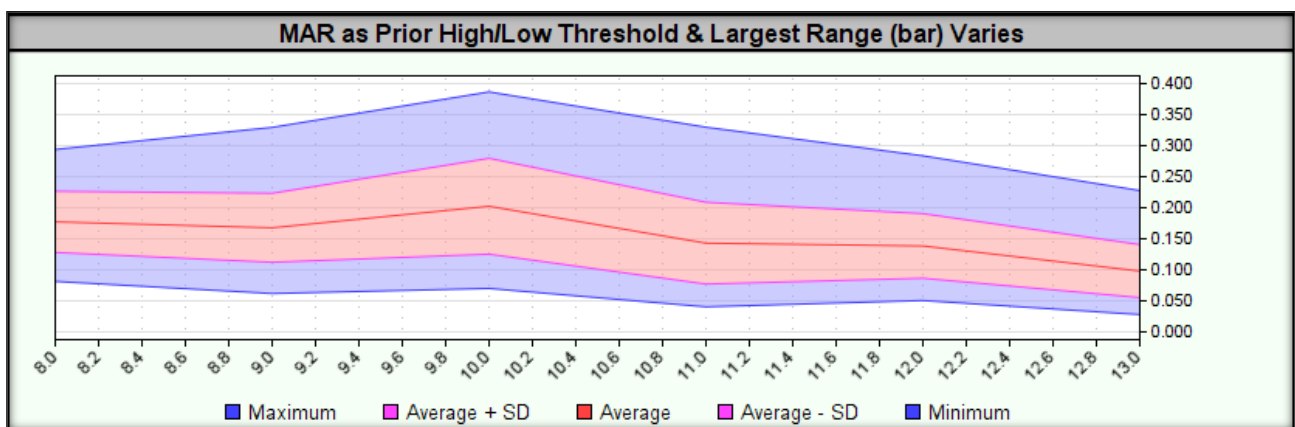
- **MAR value** – which indicates the stability of the strategy in various market conditions.
- **The maximum drawdown did not exceed 250% of the drawdown value** for the result with the highest MAR (**34.1% vs. 16.4%**) – which means an acceptable risk of deep capital drawdowns.

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 Highest Lowest (bars) Varies

MAR as Prior High/Low Threshold & Largest Range (bar) Varies

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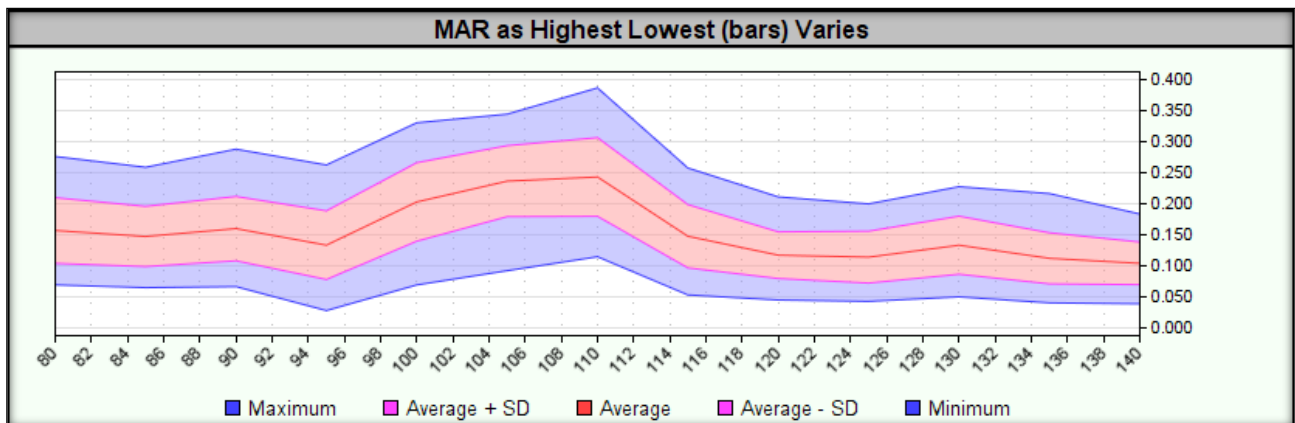
After passing the stability tests on **the in-sample data,** it is time perform the same on **the out-of-sample data.** For this purpose, we use **the same range of parameters** as on the in-sample data:

- **Donchian Channel:** range **80-140 days (step: 5);**
- **The largest range (maximum – minimum) of daily price change:** range **8-13 days (step: 1);**
- **Closing position:** range **5-10 days (step: 1).**

The lowest MAR value of -0.15 was achieved for the following parameters:
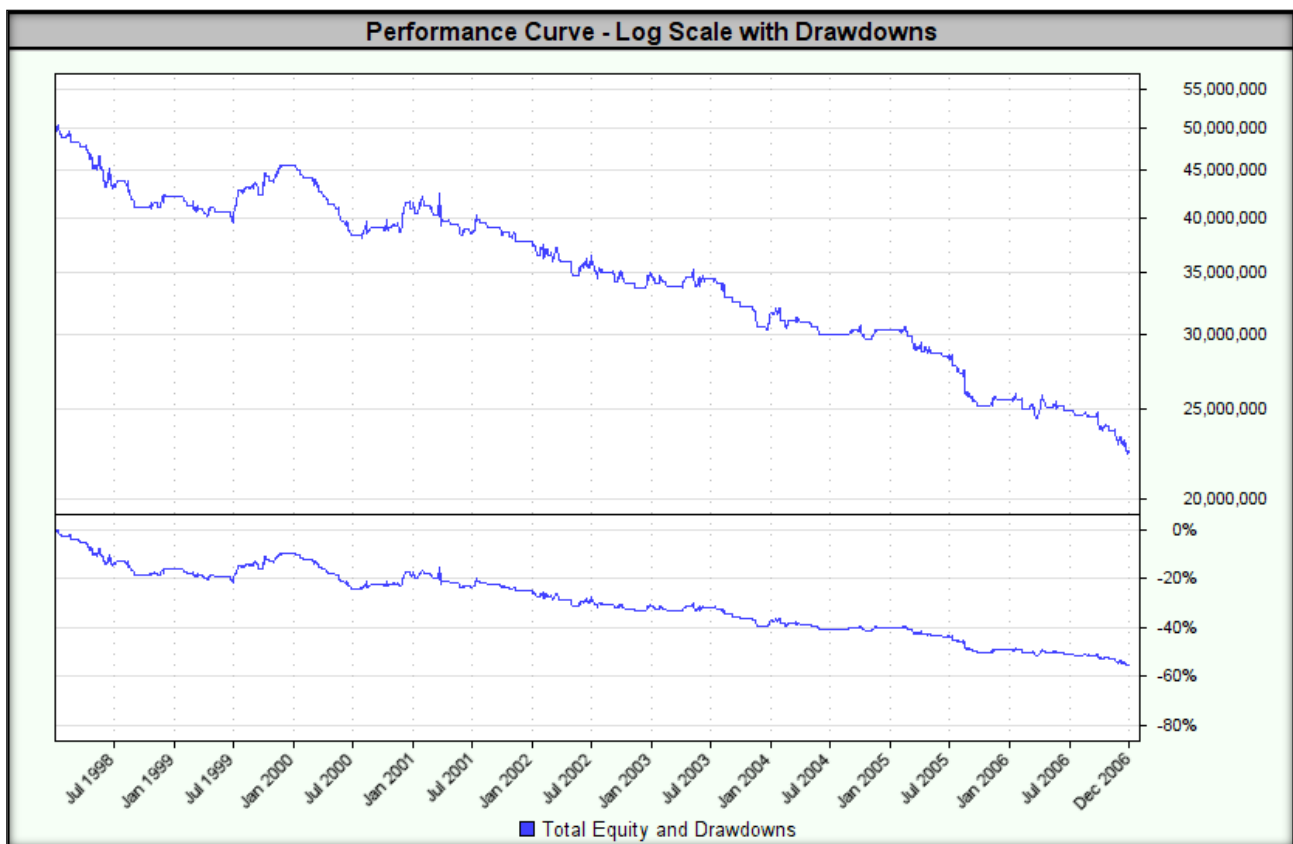
- **Donchian Canal:** 85 days;

- **The largest range (maximum – minimum) of daily price change:** 8 days;
- **Closing position:** 10 days.

Test	Highest Lowest (bars)	Prior High/Low Threshold & Largest Range (bar)	Exit (bars)	End Balance	CAGR%	MAR /	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades
42	85		8	10	$22,502,364.37	-8.50%	-0.15	-1.19	-1.27	55.5%	107.5	227
40	85		8	8	$23,316,142.59	-8.13%	-0.15	-1.25	-1.54	53.9%	107.5	227
6	80		8	10	$23,354,249.89	-8.12%	-0.15	-1.05	-1.14	53.8%	107.5	229
4	80		8	8	$23,931,012.84	-7.87%	-0.15	-1.12	-1.53	52.7%	107.5	229
78	90		8	10	$24,273,989.66	-7.72%	-0.15	-1.07	-1.14	51.8%	107.5	224
114	95		8	10	$25,269,423.43	-7.31%	-0.15	-1.03	-1.10	49.5%	107.9	216
41	85		8	9	$24,544,803.83	-7.61%	-0.15	-1.11	-1.35	51.5%	107.5	227
37	85		8	5	$24,461,605.32	-7.64%	-0.15	-1.52	-2.24	51.8%	107.5	227
150	100		8	10	$25,475,099.07	-7.23%	-0.15	-1.02	-1.16	49.0%	107.9	209
294	120		8	10	$25,943,873.14	-7.04%	-0.15	-1.04	-0.97	48.1%	107.9	191

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

Performance Curve - Log Scale with Drawdowns

The **highest MAR value of -0.06** was achieved for the following parameters:

- **Donchian Canal:** 115 days;
- **The largest range (maximum – minimum) of daily price change:** 12 days;
- **Closing position:** 7 days.

The highest MAR value was accompanied by **a drawdown of 12.5%.**

Test	Highest Lowest (bars)	Prior High/Low Threshold & Largest Range (bar)	Exit (bars)	End Balance	CAGR%	MAR ▽	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades
279	115	12	7	$46,677,592.77	-0.76%	-0.06	-0.13	-0.20	12.5%	50.2	125
243	110	12	7	$46,442,142.75	-0.82%	-0.06	-0.14	-0.19	13.0%	50.2	127
278	115	12	6	$46,278,416.70	-0.86%	-0.07	-0.19	-0.26	12.8%	55.0	125
285	115	13	7	$45,229,008.54	-1.11%	-0.07	-0.21	-0.29	16.1%	107.9	112
277	115	12	5	$44,882,850.78	-1.19%	-0.07	-0.31	-0.41	16.7%	100.6	125
241	110	12	5	$45,141,457.74	-1.13%	-0.07	-0.29	-0.36	15.3%	100.6	127
242	110	12	6	$45,351,067.81	-1.08%	-0.08	-0.23	-0.30	13.0%	103.4	127
207	105	12	7	$44,184,953.93	-1.37%	-0.08	-0.27	-0.34	16.4%	100.6	128
244	110	12	8	$43,707,071.74	-1.48%	-0.08	-0.24	-0.33	17.7%	107.9	127
280	115	12	8	$43,755,576.32	-1.47%	-0.08	-0.24	-0.34	17.5%	107.9	125

Below is a graph of the equity curve for **the strategy with the highest MAR.**
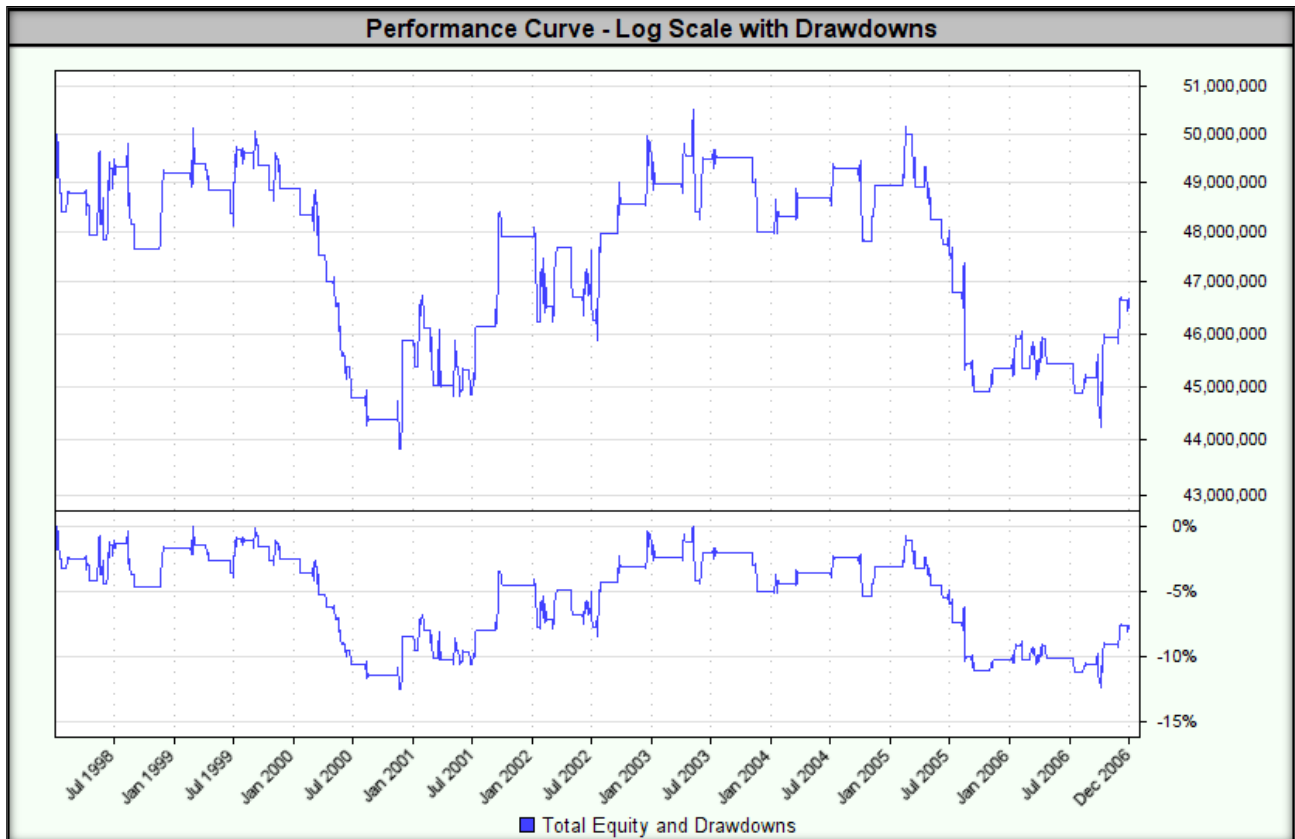
For all combinations of tested parameter ranges, **the highest drawdown was 40.6%.**
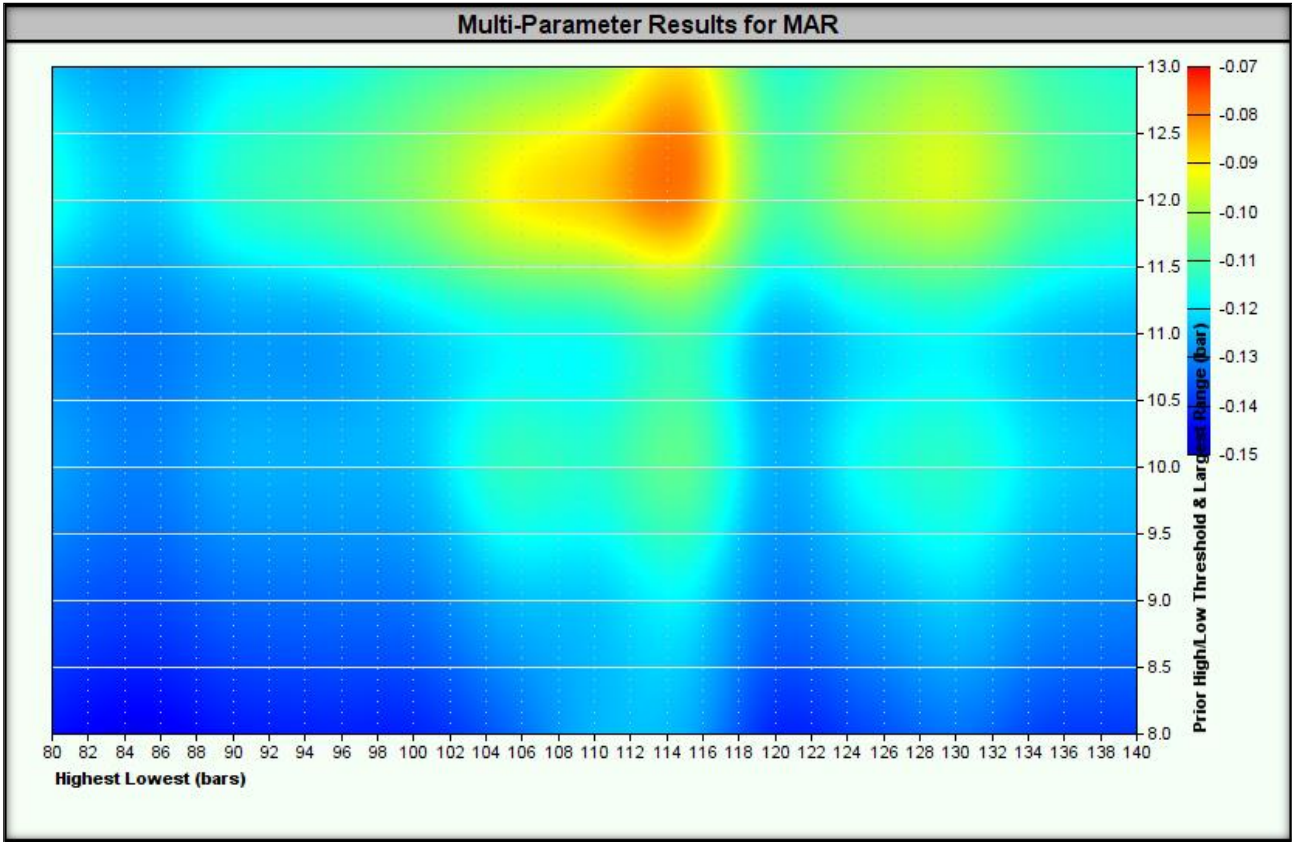
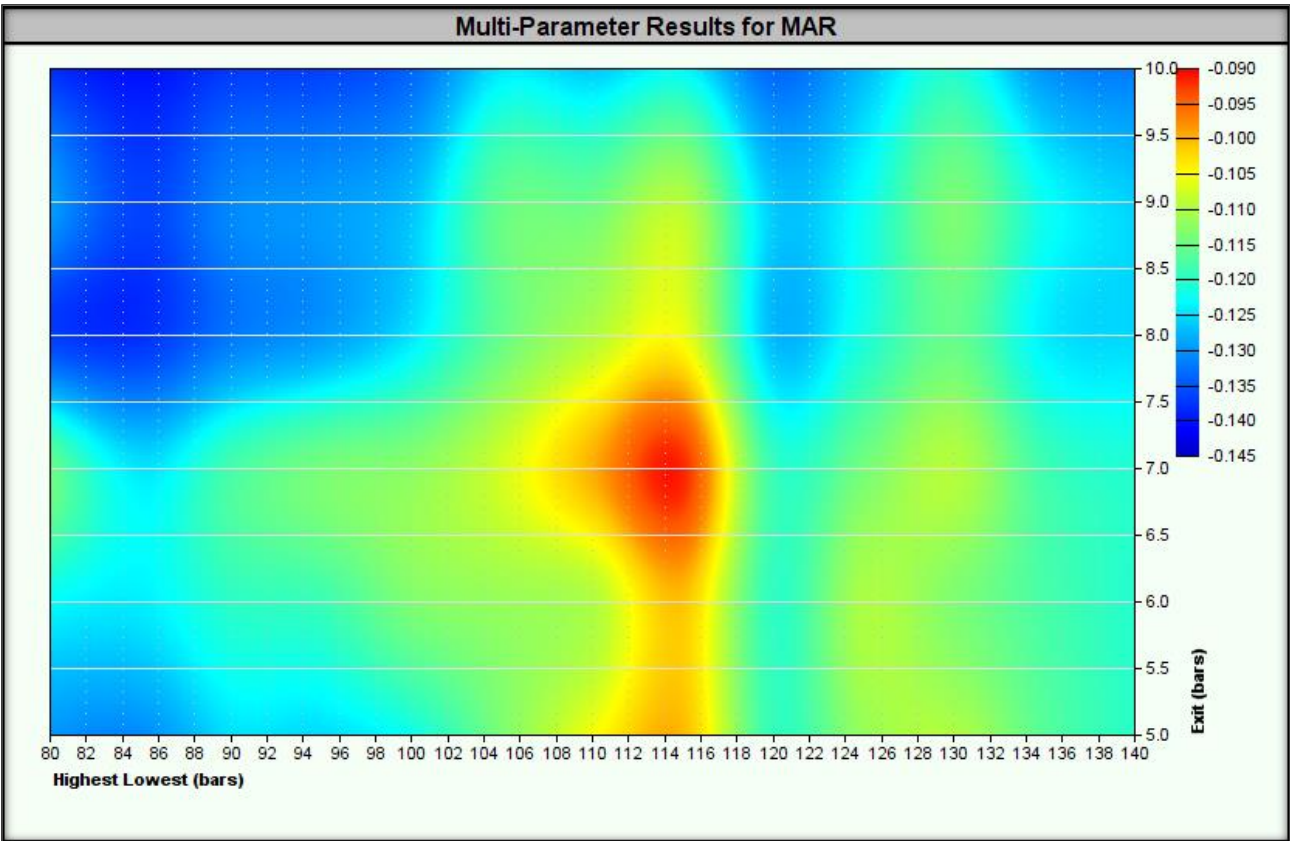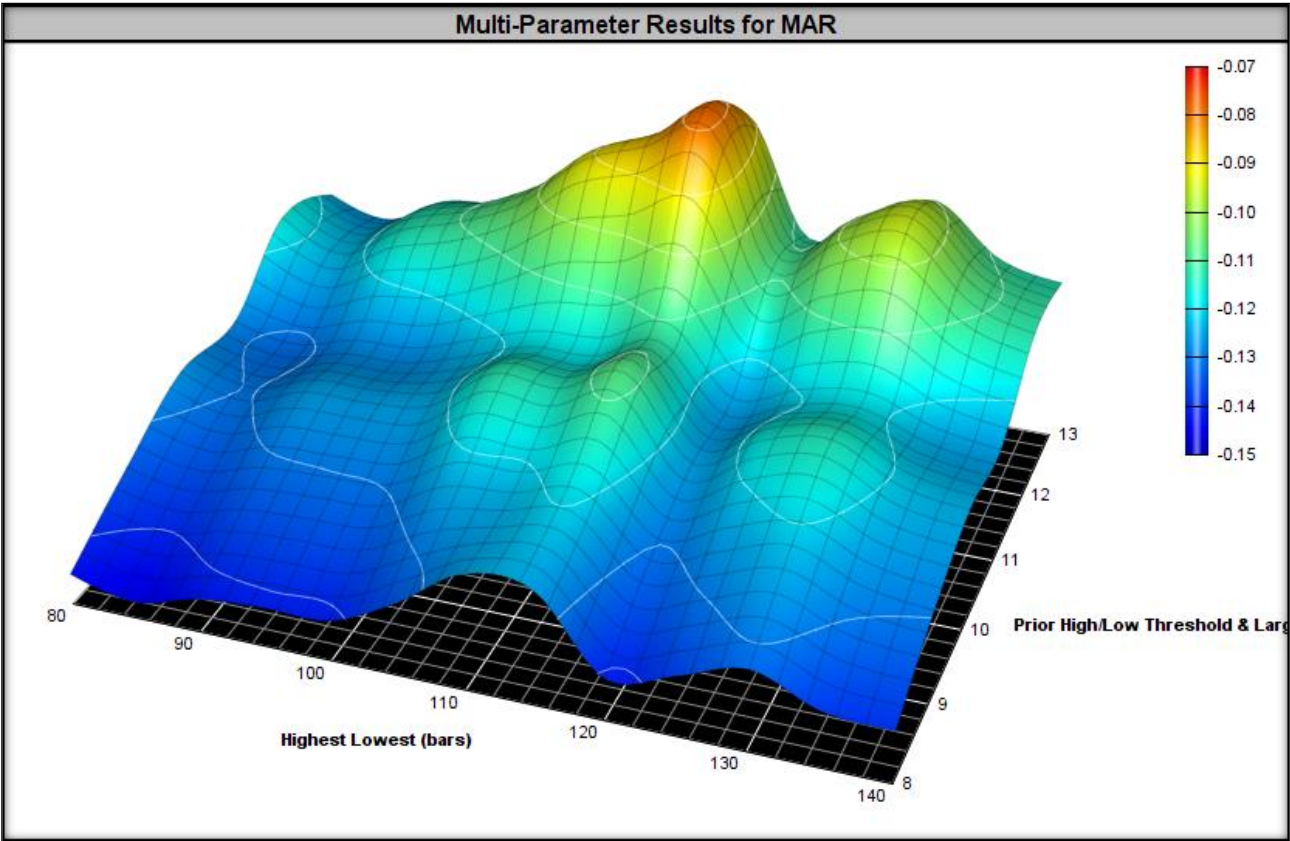| Te...	Moving Average (bars)	RSI (bars)	RSI Entry Threshold	RSI Exit Threshold	End Balance	CAGR%	MAR	Sharpe	Ann. Sharpe	Max TE DD	Longest DD	Trades
5208	280	3	28	80	$118,716,730.78	10.10%	0.25	0.55	0.80	40.6%	43.1	858
5236	280	3	29	80	$127,813,692.25	11.00%	0.27	0.59	0.78	40.6%	38.5	881
5824	290	3	28	80	$123,507,597.43	10.58%	0.26	0.57	0.85	40.6%	44.8	855
6440	300	3	28	80	$135,807,010.40	11.75%	0.29	0.62	0.90	40.6%	45.3	854
5852	290	3	29	80	$133,220,896.96	11.52%	0.28	0.61	0.85	40.6%	44.2	880
5823	290	3	28	79	$118,193,144.67	10.04%	0.25	0.56	0.84	40.6%	44.6	876
5851	290	3	29	79	$127,620,379.33	10.98%	0.27	0.60	0.84	40.6%	44.0	903
6467	300	3	29	79	$142,197,043.99	12.33%	0.30	0.65	0.93	40.6%	44.2	903
5235	280	3	29	79	$122,455,389.27	10.48%	0.26	0.58	0.74	40.6%	38.2	904
6439	300	3	28	79	$131,576,618.98	11.36%	0.28	0.61	0.91	40.6%	45.0	876
6468	300	3	29	80	$146,678,227.20	12.72%	0.31	0.65	0.92	40.6%	44.6	879

To summarize, the strategy **failed the stability test** over a wide range of optimized parameters on out-of-sample data, as **none of the test results showed a positive MAR value** – which indicates the lack of stability of the strategy under various market conditions.
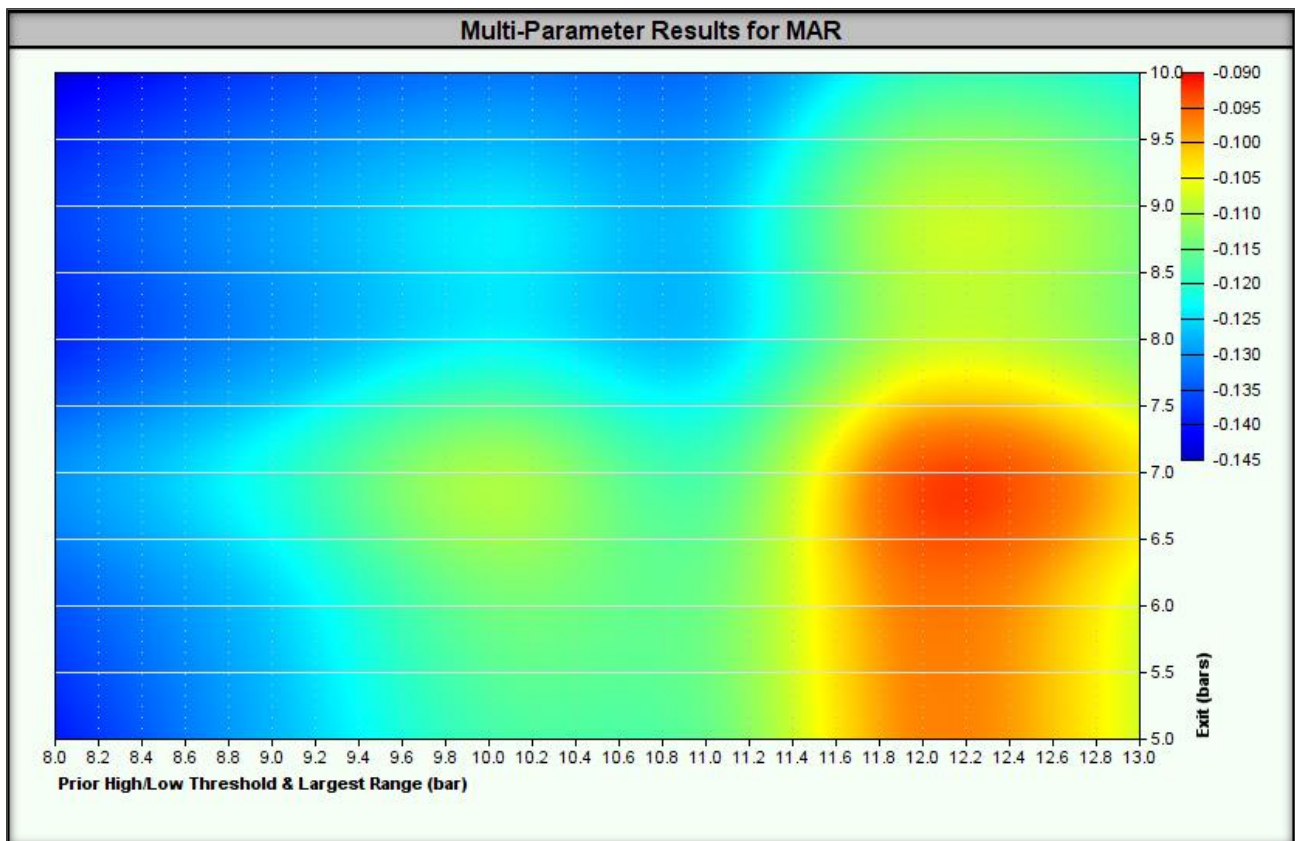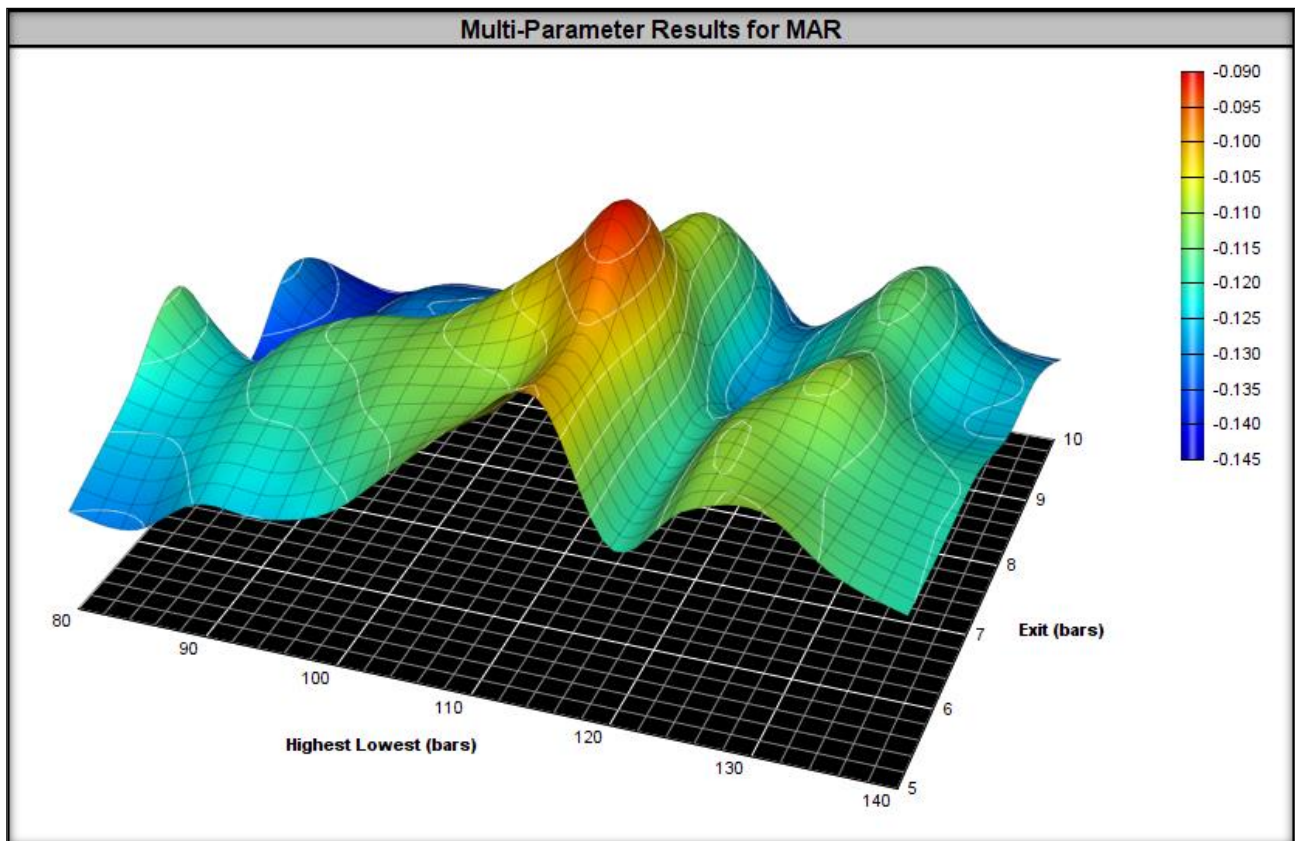
Therefore, **further testing of the strategy is not justified,** as its use in real transactions **is highly questionable.**
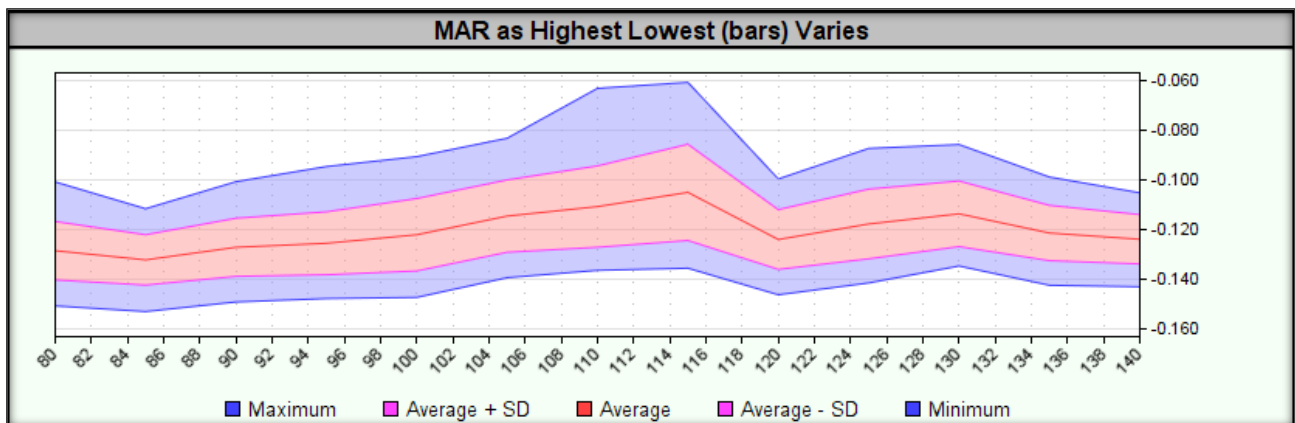
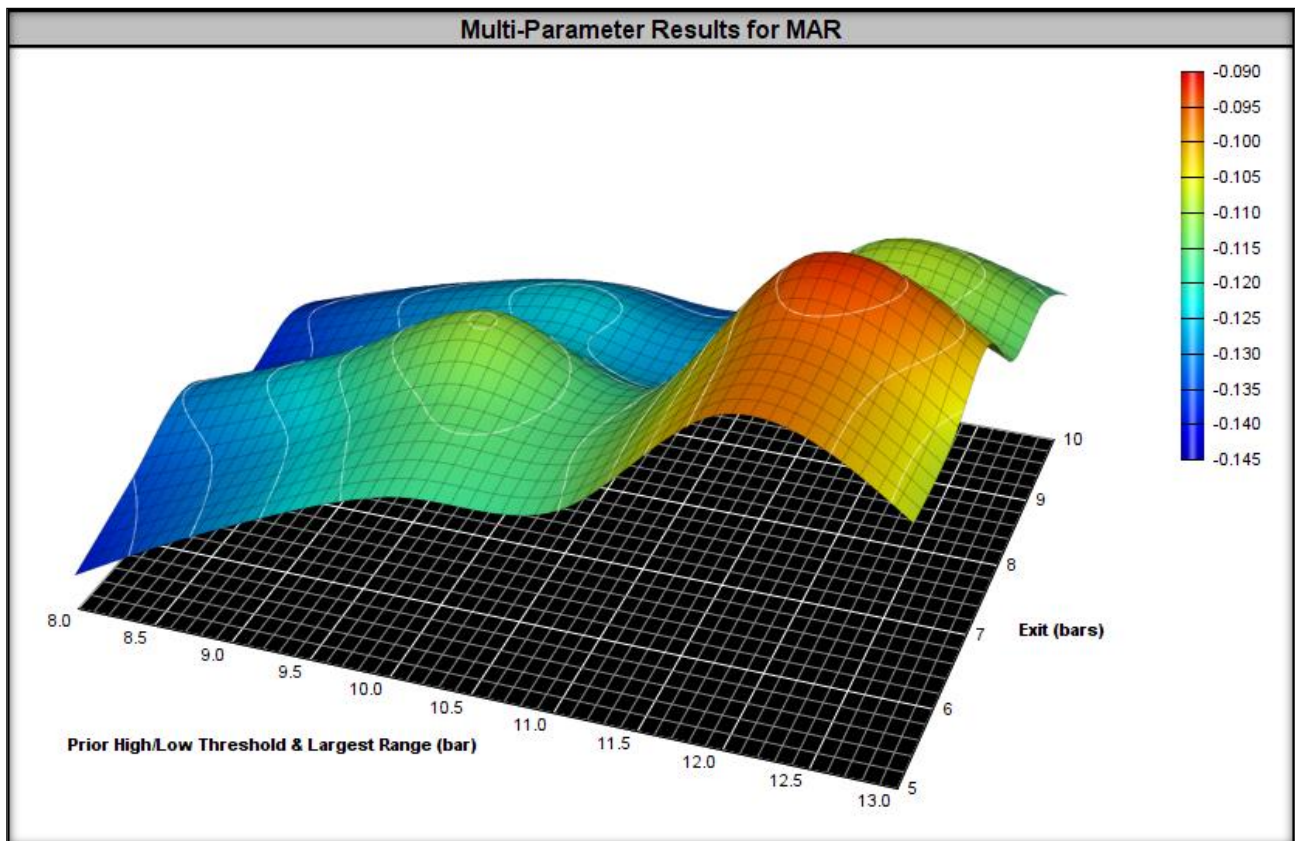**Heatmaps for the tested ranges** are presented below.

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

Multi-Parameter Results for MAR

MAR as Highest Lowest (bars) Varies

■ Maximum ■ Average + SD ■ Average ■ Average - SD ■ Minimum
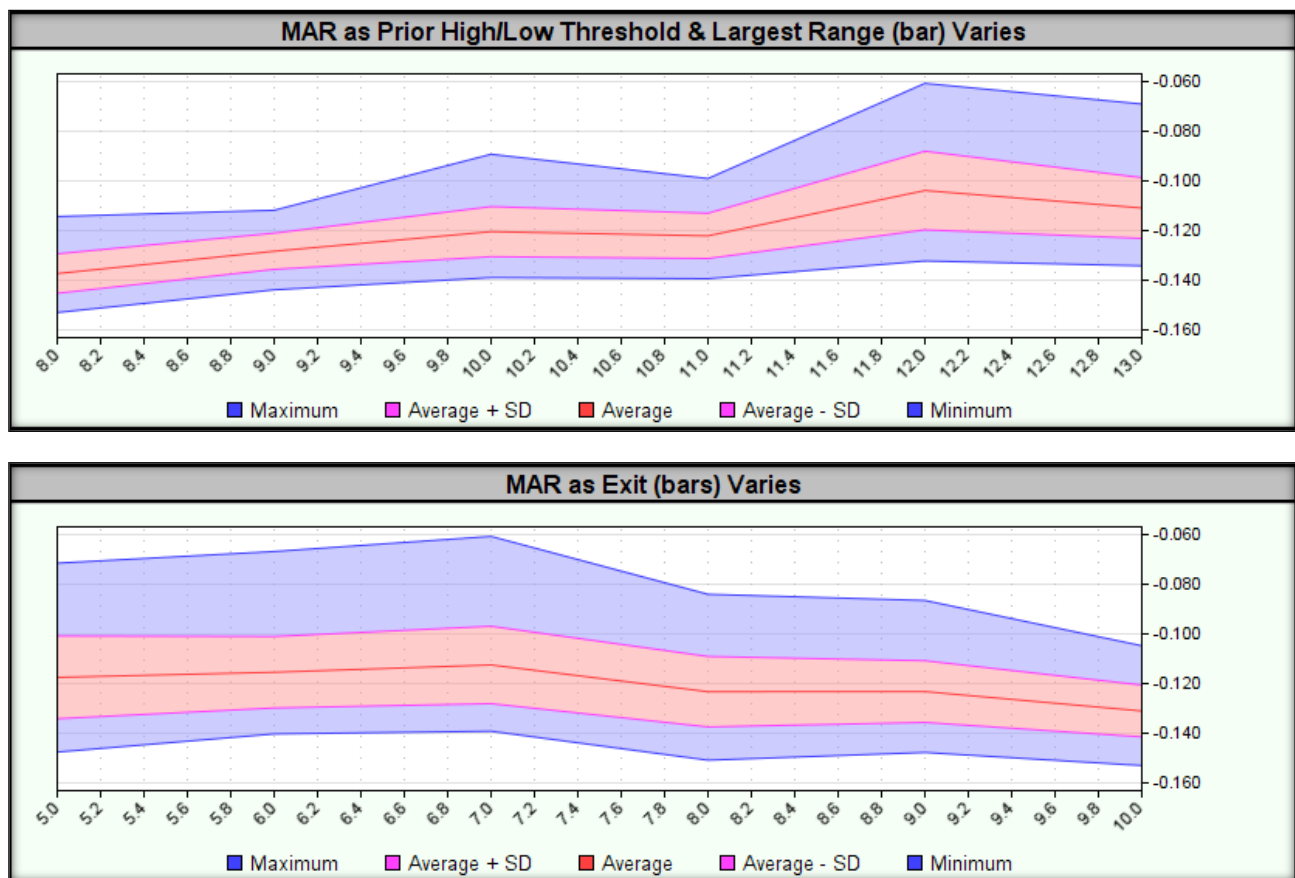
2. **Monte Carlo simulation**

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. **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

Walk-Forward Analysis (WFA) is a key tool for assessing **a strategy's ability to perform under real market conditions.** It provides **reliable measures of profit and risk** after the optimization process and allows for answering several key questions:

1. **What rate of return can you expect from the strategy?**
   - The optimization result often overestimates the expected rate of return, which can lead to unrealistic forecasts.
   - WFA provides a more **reliable and realistic measure of return** by minimizing the impact of overfitting to historical data.
2. **What set of parameters should be used in the next period?**
   - Thanks to **WFA,** it is possible **to dynamically adjust the strategy parameters** to **the latest market changes,** increasing its adaptability.

WFA tests the strategy over multiple time periods, which helps **minimize the risk of overfitting** (overfitting the strategy to historical data). The WFA process consists of **two repeated steps:**

1. **Optimization (In-Sample):**
   - The strategy is optimized over a specific **training period** (**in-sample**).
   - In this step, parameters are adjusted to obtain **the best results.**
2. **Testing (Out-of-Sample):**
   - The strategy, using **the parameters optimized in Step 1,** is tested on **a test period** (**out-of-sample**).
   - This stage verifies the effectiveness of the strategy in new market conditions that **were not used** during optimization.

Walk-Forward Efficiency (WFE) is a key measure that assesses whether a strategy has the potential to perform under real market conditions. WFE compares:

- **The rate of return achieved in the in-sample window** (where parameters were optimized)
- **The rate of return in the out-of-sample window** (where the strategy was operating on unknown data)

Similarly, **for the drawdown value,** WFE checks whether the strategy does not lose significant stability outside the optimization period.

A strategy considered **stable (robust) should meet the following conditions:**

- **WFE ≥ 50% for the rate of return** – means that the strategy retains at least half of its effectiveness outside the optimization period.
- **WFE ≤ 150% for drawdown** – means that the drawdown outside the optimization period is not significantly higher than during the optimization period.

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

Step 6: Using the strategy in real time

After **extensive testing, implementing a real-time** trading strategy becomes **relatively easy. Buy/sell signals and stop loss orders are generated automatically** by the computer based on previously established rules and formulas.

The most important element of **strategy implementation** is **consistent enforcement of all signals, without exceptions. How Larry Williams noted:** *"Trading strategies work. Traders do not."*

Before making **a final decision to implement a strategy,** it is necessary to check **whether it really adds value** to the results of the entire portfolio. It does not make sense to implement a strategy that **generates similar signals** or **is characterized by a similar course of the equity curve.**

Key criteria for evaluating the strategy before implementation:

1. **Daily Return Correlation**
    - The **lower the correlation** with other strategies, the better.
    - **Optimal values:** Correlation **close to zero or negative.**
2. **Reducing maximum drawdown**
    - If adding a strategy to a portfolio results in **a lower maximum drawdown,** this is **a strong positive signal.**
3. **Objective Function Improvement (MAR)**
    - If adding a strategy causes **the MAR to increase,** this indicates that **it has added value** to the portfolio.
4. **Better results in Monte Carlo simulation**
    - Monte Carlo simulation determines the potential **maximum drawdown.**
    - If Monte Carlo results **improve** after adding a strategy, this is **a strong positive signal.**

The above elements are often interrelated – usually **all of them are met** or **none of them are met.**

Once you decide to add a strategy to your portfolio, **the question arises:** *Should you implement your strategy right away or is it better to wait?*

Some studies suggest **an incubation period** of **3-6 months,** during which:

- The strategy is **monitored** but **does not execute real transactions.**
- **Generated signals, positions and results** are observed to detect **potential anomalies.**

In our case, **the incubation period** lasts from the moment **the strategy is launched in a live environment** until **a drawdown occurs at a level of about half of the maximum drawdown** observed in historical data. **Only after reaching this threshold does the strategy begin to be used with real funds.**

Thanks to this:

- **We avoid investing real money in an untested environment.**

- **We wait for a drawdown to occur** before launching the strategy, which **reduces the risk of starting at an unfavorable moment.**

The final decision to fully implement it should be based on **thorough testing and analysis of the value added to the portfolio,** so that the strategy actually supports long-term investment goals and does not increase unnecessary risk.