

Walk Forward Analysis of Daily Ranger EAs

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1 Introduction

Walk Forward Analysis is the *gold standard* of trading strategy validation [1]. It is a method used in finance to obtain and determine the robustness of the optimal parameters of a trading strategy. Created by Robert E. Pardo in 1992, it answers the primary question plaguing every algorithmic trader,

Does my strategy actually have an edge?

In other words it validates the premise of the trading algorithm.

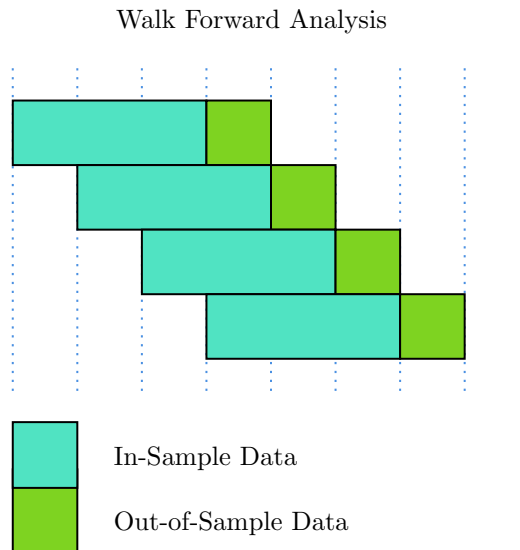


Figure 1: Walk Forward Analysis involves rolling the optimization set forward in a way as to maximise the validation on out-of-sample data

Classical optimisation involves taking one segment called the in-sample data to optimise a system and another segment called the out-of-sample data to validate. This gives a rather small sample of the data for validation, leaving

behind the possibility of over-fitting the optimisation segment. Walk forward testing addresses this issue as it allows us to maintain a reasonable degree of freedom. It carries out-of-sample testing to the next level.

A small portion of the reserved data following the in-sample data is tested and the results are recorded. The in-sample time window is then rolled forward by the period covered by the out-of-sample test as shown in Figure 1 and the process is repeated. This gives us a large out-of-sample period to measure the stability and robustness of our parameters and avoid over-fitting. The culmination of all the recorded results helps validate our trading premise and keeps our trading model a step ahead[1].

There is, however, one caveat: the reduced size of the in-sample period may result in statistically insignificant number of trades. This can easily be mitigated by using well designed performance metrics. Lack of statistical significance materialises as erratic values of the performance metrics for the out-of-sample period indicating the need for re-segmentation of the data.

This paper presents the complete walk forward analysis of the trading premise and strategy behind *Daily Ranger EAs*. The study adheres to industry wide best practices, demonstrating that *Daily Ranger EAs* indeed offer a genuine trading edge.

2 Strategy Premise

Every trading instrument exhibits a unique intraday *price-action* behaviour during its most liquid trading hours ¹. It is possible to numerically parameterise this behaviour and use these parameters in the generation of trading signals.

A common classification is that of *trend following* and *mean-reversion*. According to this classification, certain instruments lend themselves well to trend following strategies and others to mean reverting strategies. Although this classification is widely accepted, it enforces a binary distinction. Moreover, the exact boundary between the two categories is highly debatable. Numerical parameters entirely circumvent this issue by providing each trading symbol with a numeric *behaviour signature*. *Daily Ranger EAs* employ a meticulously designed two-parameter approach and a scheme for generating trading decisions that adapts to the behaviour of the instrument on the basis of these parameters.

3 Walk Forward Analysis

The analysis is carried for the Nasdaq index². The trading hours are taken 13:00 GMT+3 to 23:00 GMT+3 which roughly correspond to the New York trading session³. The starting balance is \$5000 with a leverage ratio of 1:100 at 2% risk per trade.

¹Beyond the liquid trading hours instruments tend to follow each other. E.g. Both German and Japanese indices tend to follow US indices in the respective overnight sessions

²Commonly known as USTEC, NAS100, US100 in the forex traders community

³Including pre-market hours

The optimisation is carried in five stages over a duration of four years with a ratio of 3:1 for the in-sample and out-of-sample segment in each stage.

3.1 Data Segmentation

The entire study is conducted over a four year time period from⁴ 2020-10-01 → 2024-09-30. Each in-sample segment is 1.5 years in length with the out-of-sample segment of 0.5 years in the ratio 3:1. The duration is divided into five stages as follows:

- Stage 1: 2020-10-01 → 2022-03-31 WF: 2022-04-01 → 2022-09-30
- Stage 2: 2021-04-01 → 2022-09-30 WF: 2022-10-01 → 2023-03-31
- Stage 3: 2021-10-01 → 2023-03-31 WF: 2023-04-01 → 2023-09-30
- Stage 4: 2022-04-01 → 2023-09-30 WF: 2023-10-01 → 2024-03-31
- Stage 5: 2022-10-01 → 2024-03-31 WF: 2024-04-01 → 2024-09-30

The combined walk forward out-of-sample period spans a duration 2.5 years from 2022-04-01 → 2024-09-30. We utilise more than 50% of the data to validate the robustness of our trading premise, which is quite remarkable!

3.2 Performance Metrics

Standard performance metrics such as profit factor, expected payoff, percent drawdown and Sharpe ratio are useful in assessing the performance of the out-of-sample validation. However there is a minor modification that needs to be done before we can use them. As our model uses a percent risk per trade system, these metrics get biased due to the increasing (decreasing in case of loss) position sizing, rendering the comparison ineffective. Adjusting for this we get a modified version of the standard metrics which can now be used to determine the optimal set of parameters.

It is tempting to jump to the parameter set that maximised profit in the in-sample as our optimal parameters. However, this is not best practice, as the maximum profit result often tends to be an outlier, skewed by some event that is not likely to repeat. Instead we want to opt for the most stable set of parameters. By combining our modified standard metrics in different ratios we can choose our optimal set. We get two sets of optimal parameters. The first set is aimed at consistent returns with lower drawdowns in a balanced way, this forms our *Daily Ranger Balanced* series of EAs. The other set is aimed for the ultimate returns, maximising the potential of the strategy, this is our *Daily Ranger Ultimate* series of EAs.

⁴All dates in yyyy/mm/dd format unless mentioned otherwise

3.3 Results

3.3.1 Balanced Series

Figure 2 shows the combined validation of the out-of-sample data for the balanced set of parameters. The ending balance of each validation stage is the starting balance of the next. The following results were obtained:

- Starting Balance: \$5,000
- Ending Balance: \$14,756.35
- Net Profit: \$9,756.35
- Profit Factor: 1.16
- Drawdown Percent: 20.01%
- No of trades: 578
- Average No of trades per in-sample stage: 353

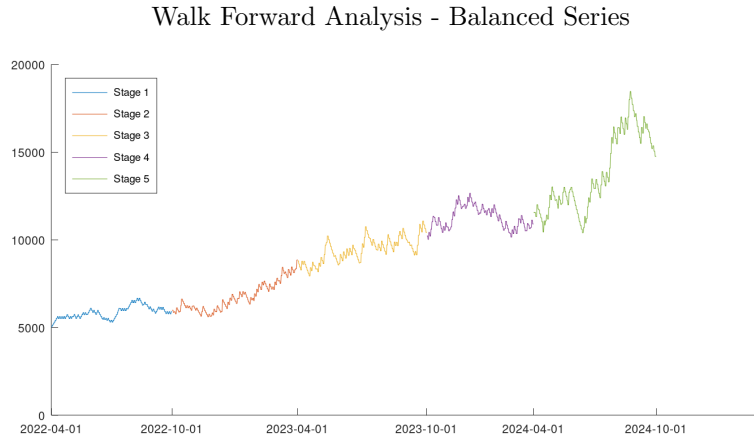


Figure 2: The results show that the balanced series gives consistent performance and does indeed have a genuine predictive edge

It is clear from Figure 2 that the strategy does have a predictive edge and performs well even over data it has not seen before. More importantly from the consistent performance of the strategy over multiple out-of-sample periods, we can be certain that our in-sample test generates a significant number of trades and has not overfit the data. These results validate our premise and the robustness of our parameters to achieve consistent returns.

3.3.2 Ultimate Series

Figure 3 shows the combined validation of the out-of-sample data for the ultimate set of parameters. As above, the ending balance of each validation stage is taken as the starting balance of the next. With this validation we get the following results:

- Starting Balance: \$5,000
- Ending Balance: \$48,104.27
- Net Profit: \$43,104.27
- Profit Factor: 1.22
- Drawdown Percent: 29.81%
- No of trades: 628
- Average No of trades per in-sample stage: 380

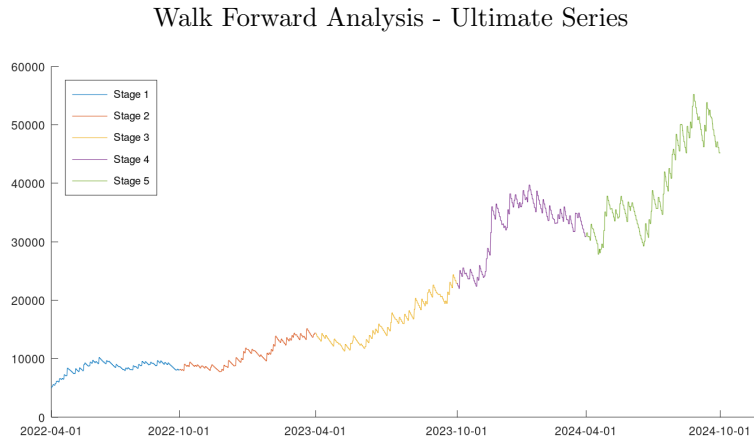


Figure 3: The results obtained show a profitable growth over the out-of-sample periods, maximising the validity of our trading premise for ultimate returns

Once again we see that the strategy performs consistently well over the entire out-of-sample validation period. The parameters here are chosen with the intention to maximise the potential of the strategy, which is in fact what is achieved further cementing the effectiveness of the walk-forward process. With the percent risk per trade system, we can see the exponential growth nature of our validated trading edge take over, giving ultimate returns.

The results demonstrate that our strategies are practically viable and offer traders a powerful tool for achieving their financial goals, paving the way for exponential growth and sustainable long-term profitability with *Daily Ranger EAs*.

4 Conclusion

The study shows that *Daily Ranger EAs* are based on a sound trading premise that can be validated with the *gold standard* of trading strategy optimisation. The edge that our products offer is genuine and can be compounded for exponential returns. Regardless of the type of trader you are, there is always an EA that can meet your requirements. Looking for consistent returns with minimal drawdowns? Try out our *Daily Ranger Balanced* series. Aiming to maximise the trading potential for ultimate returns? Check out our *Daily Ranger Ultimate* series.

Our EAs are created by informed traders who understand the intricacies of trading, not savvy programmers automating a failed premise such as martingale, grid trading, DCA, loss recovery. We also do not indulge in deceptive ChatGPT and AI marketing fluff, promising astronomical returns which all informed traders know is not attainable.

This study presents a complete walkthrough of the walk forward analysis undertaken to validate our trading premise and the behaviour of our parameters. From the results obtained for both the *Balanced* and *Ultimate* series, we see profitable trading over the entire combined out-of-sample period, in line with expectations, validating the robustness of the backtesting and parameter selection process. The consistent balance growth over multiple out-of-sample periods proves the existence of a valid trading edge with a long term reliable and compoundable advantage. This comprehensive analysis and validation process demonstrates that our approach is not only statistically sound but also practical and effective in real-world trading scenarios.

References

- [1] Walk forward optimisation, March 2024. URL: https://en.wikipedia.org/wiki/Walk_forward_optimization.