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Intra-day Trading Strategy: Opening Range Breakout (ORB)

Authors:
Mallia Corrado
Croci Mattia

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Disclaimer

1 Abstract

This analysis is inspired by the study titled *"Can Day Trading Really Be Profitable? Evidence of Sustainable Long-term Profits from Opening Range Breakout (ORB) Day Trading Strategy vs. Benchmark in the US Stock Market"*, published by Carlo Zarattini and Andrew Aziz on April 24, 2023.

The objective of this work is to update and expand upon the original study's findings by assessing the validity and profitability of the ORB strategy in periods following the article's publication.

The strategy under review is a long/short intra-day approach based on the performance of the first daily candlestick: a long position is taken if the first candlestick is positive, and a short position if it is negative.

While the original article focuses exclusively on the Invesco QQQ Trust ETF (ticker: QQQ), this analysis broadens the scope to include a more diversified basket of financial instruments, encompassing both ETFs and individual equities. Specifically, the study considers three assets, divided between exchange-traded funds and single stocks:

- **ETFs:** SPDR S&P 500 ETF, SPDR Gold Trust

- **Equities:** Nvidia Corporation

2 Introduction

IThe Opening Range Breakout (ORB) strategy was described by Carlo Zarattini and Andrew Aziz in the study titled *"Can Day Trading Really Be Profitable? Evidence of Sustainable Long-term Profits from Opening Range Breakout (ORB) Day Trading Strategy vs. Benchmark in the US Stock Market"*, published on April 24, 2023.

The strategy is based on the observation of a recurring behavior in financial markets during the first minutes of the trading session. The underlying hypothesis is that, within the first 5 to 15 minutes of trading, an initial price range (opening range) is established, and its breakout may serve as a signal to initiate a directional movement exploitable for short-term speculative purposes.

This approach aims to capitalize on the typically high volatility at the beginning of the trading day, which is driven by market participants' reactions to news, macroeconomic data, or corporate events that occurred during market closure. The breach of the initial range is therefore interpreted as a possible indicator of the onset of an intraday trend, which, if properly filtered and managed, could generate positive returns even over the medium to long term.

In their study, Zarattini and Aziz apply the ORB strategy using 5-minute intervals to the Invesco QQQ Trust ETF (ticker: QQQ). The present work, however, seeks to test the validity of the same pattern on a broader and more diversified set of financial instruments, as well as over a time period subsequent to that originally analyzed.

The sample considered includes three assets, divided between ETFs and individual stocks:

- **ETFs:** SPDR S&P 500 ETF, SPDR Gold Trust

- **Stocks:** Nvidia Corporation

The analysis examines the prices of these instruments during the period from January 1, 2023, to June 30, 2025, using a 5-minute time frame. For each trading day, the data record price movements at regular five-minute intervals. This time interval was chosen in order to assess the strategy's validity in a period following the publication of the original study, over a sufficiently extended horizon to reduce the likelihood of results distorted by a limited data sample.

Unlike the original setup, in this analysis the ORB strategy is implemented with a number of modifications aimed at improving its performance. Specifically, variations are introduced regarding position orientation (long-only vs. long/short) and the presence or absence of predefined stop loss and take profit levels. The configurations tested are as follows:

- **ORB Strategy – Long Only**

    ◇ Without stop loss / take profit
    ◇ With stop loss / take profit

- **ORB Strategy – Traditional (Long/Short)**

    ◇ Without stop loss / take profit
    ◇ With stop loss / take profit

To enhance clarity, the results of the analysis are presented from two complementary perspectives:

1. **By instrument:** The various strategy variants are compared for each financial instrument, allowing for the identification of the most profitable configuration for each asset.

2. **By strategy variant:** The performance of each variant is analyzed across the different instruments, in order to determine which assets are best suited to each specific approach.

This dual perspective allows for a cross-evaluation of the strategies' effectiveness and their adaptability to the different instruments considered.

Finally, it should be noted that the results reported in the original study are not replicated in this analysis, as they are not relevant to the comparative assessment conducted here. The differences in the time periods examined, along with the methodological simplifications introduced, make the two sets of results not directly comparable.

3 Strategy Definition

In the paper *"Can Day Trading Really Be Profitable?"* by Carlo Zarattini and Andrew Aziz, published on April 24, 2023, an intraday trading strategy known as the Opening Range Breakout (ORB) is analyzed, with the aim of assessing its effectiveness and sustainability over the long term.

The strategy is based on the observation of a recurring market dynamic at the open: during the initial minutes of trading—due to the accumulation of orders during off-market hours and reactions to recent news or events—prices tend to exhibit heightened volatility and a directional bias. This initial phase, typically limited to the first five minutes of the session, is therefore considered particularly relevant for identifying the beginning of a potential directional move.

The operational mechanism of the ORB approach is simple yet structured. Prices recorded during the first five minutes of trading are observed, identifying the highest and lowest points reached within that interval: these two levels define the so-called opening range. Once this interval has ended, a position is initiated if the price breaks through one of these boundaries: a breakout above the high triggers a long position, while a breakout below the low generates a short signal.

The underlying principle of the strategy is that a breakout of the opening range may serve as a signal of strength (in the case of an upward breakout) or weakness (in the case of a downward breakout), thereby initiating a sustained move—often supported by high trading volumes and driven by institutional investors or algorithmic trading activity. The goal is to capture and profit from an initial impulse with the potential to extend throughout at least part of the trading day.
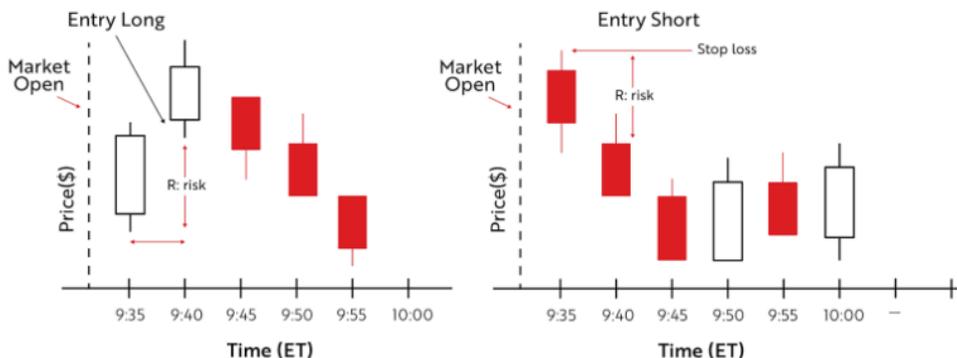
Figure 1: Entry long and short

Since not all breakouts develop into sustained trends, risk management plays a central role in the strategy. Fixed stop losses are generally used to limit losses in case the price re-enters the initial range or reverses direction. In some cases, a dynamic stop loss (trailing stop) is also employed to protect accrued profits during favorable price movements. Exit from the position can occur in several ways: upon reaching a predefined profit target (e.g., two or three times the width of the opening range), or near the close of the trading session, in accordance with the intraday nature of the strategy.

In their study, Zarattini and Aziz apply the ORB strategy to the Invesco QQQ Trust ETF (ticker: QQQ), which tracks the performance of the Nasdaq-100 Index. This instrument is particularly well suited to intraday strategies due to its high trading volume, significant volatility, and well-defined opening moves. As such, QQQ is used as a benchmark representative of a portfolio focused on large-cap technology stocks.

In summary, the ORB strategy aims to exploit the market's initial instability and directional movement, focusing on fast yet meaningful price action. The approach is based on a systematic and disciplined methodology that does not rely on complex forecasts but instead reacts efficiently to price signals generated during the first minutes of the trading day. The operational simplicity and strength of the reported results make this strategy a relevant case study in the field of intraday trading.

3.1 Strategy Variants

The introduction of several strategy variants is intended to enrich the informational content of the analysis by evaluating the effectiveness of different operational configurations, while preserving the underlying logic of the ORB approach. In particular, the decision to test a long-only version addresses the need to reduce transaction costs while also simplifying implementation—especially for individual traders or in contexts where short selling is restricted or costly.

At the same time, the analysis of a variant without stop loss and take profit levels aims to isolate the impact of these position management mechanisms on overall performance. This allows for an assessment of whether the inclusion of predefined exit thresholds enhances or diminishes the strategy's effectiveness, and whether the criteria used to define them contribute meaningfully to improving the risk/return profile.

It should be noted that money management rules commonly associated with the strategy are not considered in this analysis.

3.2 Interpretation of Results

The results obtained from the simulation of the various ORB strategy variants are compared against those generated by a baseline strategy, which serves as the reference benchmark. The baseline strategy consists of purchasing a share of the underlying asset at the market open and selling it at the end of the same trading session. This approach eliminates the impact of news released during non-trading hours, focusing solely on intraday price dynamics.

The systematic application of this strategy to each of the selected instruments provides a neutral point of comparison, useful for assessing the relative effectiveness of the different ORB configurations. In this way, it becomes possible to determine whether, and to what extent, the proposed variants offer added value compared to a simple daily exposure to the underlying asset.

4   Evaluation Metrics For The Instruments)

4.1   SPDR S&P 500 ETF - Long only

The first ETF analyzed is the SPDR S&P 500 ETF (ticker: SPY), examined under the long-only configuration, with a particular focus on the impact of introducing a stop loss. Overall, the application of the ORB strategy in its long-only version proves to be inefficient, as it tends to underperform the baseline strategy over the majority of the observed period. This result appears to stem from the strategy's limited predictive power with respect to the directional movements of the underlying asset, which are better captured by the baseline approach.

With the introduction of a stop loss, greater capital protection is observed; however, this also reveals a strong dependency on the stop loss mechanism. Specifically, approximately 72% of the trades (245 out of 338) are closed due to the activation of the stop loss, resulting in a win rate of 26%. The resulting improvement in certain aggregate metrics—such as average return and profit factor—may be misleading, as it reflects a high frequency of small losing trades rather than a genuine ability of the strategy to generate substantial profits.

In summary, the analysis shows that despite the protective role of the stop loss, the ORB long-only strategy does not prove to be profitable, at least in the specific context of the SPY ETF and the time period under examination.

Figure 2: Results SPDR S&P 500 ETF - Long only

4.2   SPDR S&P 500 ETF - Long / Short

The ORB strategy was originally conceived as a long/short approach, and it is therefore methodologically appropriate to evaluate its performance in line with this original framework. In this configuration, the analysis reveals that the baseline strategy—defined as buying at market open and selling at close—delivers higher returns compared to all tested variants, including the ORB long/short version.

The return patterns, as shown in the graphical comparison, highlight an inverse relationship between the ORB long/short strategy without stop loss and the baseline strategy: periods in which the baseline records negative returns correspond to phases where the ORB strategy shows positive performance, and vice versa. This phenomenon suggests

that the ORB strategy, in this variant, captures short-term movements contrary to the broader daily trend, albeit with overall inferior results.

The long/short configuration with stop loss, consistent with the original formulation of the strategy, shows solid returns and more effective risk management, with relatively contained drawdowns compared to the other variants. Nevertheless, even in this case, the strategy fails to outperform the benchmark represented by the baseline approach. In fact, out of a total of 623 trades analyzed, the stop loss is triggered in 471 cases, representing approximately 75% of all open positions. This high incidence of losing trades raises concerns about the effectiveness of the parameters used for defining stop loss levels, suggesting that further optimization could significantly improve the strategy's performance.

Lastly, it is worth noting that from November 2024 onward, the ORB long/short strategy enters a particularly effective phase in capturing market movements, achieving significant returns. However, this improvement proves to be temporary, as the strategy begins to show negative results again starting in May 2025.

Figure 3: Results SPDR S&P 500 ETF - Long / Short

4.3 SPDR Gold Trust - Long only

In the next part of the analysis, the SPDR Gold Trust ETF (ticker: GLD) is examined, with the aim of evaluating the effectiveness of the ORB strategy when applied to a typically defensive asset that is uncorrelated with equity markets, such as gold.

The results show that the long-only variant of the ORB strategy is able to adapt effectively to the behavior of the underlying asset, generating a return trajectory that is broadly consistent with that of the baseline strategy. This suggests a good capacity of the strategy to capture the prevailing market direction during the early stages of the trading day. However, the restriction to long positions limits the ability to fully exploit directional dynamics, particularly during downward phases.

In this case as well, the introduction of a stop loss proves to be an effective tool for capital protection, helping to preserve early gains. Nevertheless, the return curve exhibits significant drawdowns, highlighting the strategy's volatility and the impact of unprofitable trades.

Specifically, out of a total of 623 trading days analyzed, the ORB strategy with stop loss excluded 242 trades due to failure to meet the operational entry criteria. Of the remaining

381 trades, 215 were closed due to the activation of the stop loss, while 166 were closed at the end of the trading day (accounting for 43% of the executed trades).

In relative terms, the trades closed at the end of the session represent approximately 26% of the total observed days—roughly one in every four sessions—with a cumulative return of $28.32.

In summary, the application of the ORB strategy to GLD in its long-only configuration demonstrates a good ability to interpret intraday market movements in the gold market, although it fails to generate returns superior to the baseline strategy. The final outcome is therefore not positive, even though the approach remains consistent with the characteristics of the underlying asset under analysis.
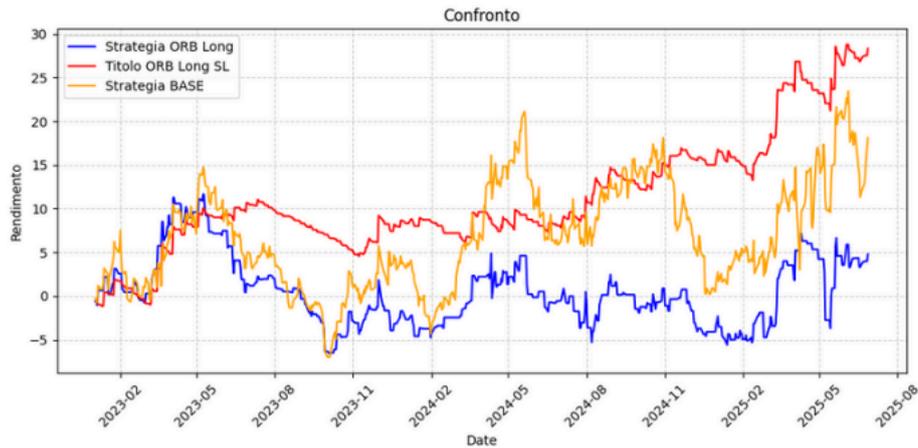

Figure 4: Results SPDR Gold Trust - Long only

4.4   SPDR Gold Trust - Long / Short

The application of the ORB strategy in its traditional long/short configuration on the SPDR Gold Trust ETF (ticker: GLD) yields results that are generally consistent with those observed in the previously analyzed variants. In particular, the baseline strategy continues to show superior performance compared to the ORB long/short version, which, however, improves significantly with the introduction of a stop loss—becoming, in this context, the most profitable configuration.

Once again, the adoption of a loss-limiting mechanism proves to be a key element in protecting and stabilizing returns. The pure long/short strategy shows difficulty in correctly interpreting the intraday price movements of gold, recording a negative trend in returns. Although the introduction of a stop loss helps mitigate this divergence, the graphical performance curve reveals marked and frequent drawdowns—an indication of limited effectiveness over the observation period. In certain phases, the strategy even proves inefficient, although it remains overall profitable due to the mitigating role of the stop losses, which are triggered in approximately 73% of executed trades.

A comparative analysis of the ORB strategy variants highlights that the number of losing trades in the version without stop loss is 324. With the introduction of this mechanism, the number of trades closed at a loss increases to 471—about 75% of the total—despite the stop loss being technically triggered in 457 cases.

In summary, the results suggest that the inclusion of short positions in the ORB strategy applied to GLD does not lead to a meaningful improvement in performance. On the

contrary, the addition of this component and the systematic application of the stop loss according to the strategy's parameters appear to reduce overall efficiency, making the strategy less profitable than the long-only configuration.

Figure 5: Results SPDR Gold Trust - Long / Short

4.5 NVIDIA Corporation - Long only

This section focuses on an individual equity security, NVIDIA Corporation (ticker: NVDA), with the objective of testing the effectiveness of different ORB strategy variants on a large-cap stock with a strong technological component.

In this case, the ORB strategy configuration without stop loss proves to be the least effective among those analyzed, while the long-only variant with risk management through stop loss delivers the highest overall return. Similar to what was observed with the SPDR Gold Trust, the ORB strategy shows a strong ability to adapt to the underlying asset's market dynamics: the performance trends of the strategy and the benchmark are closely aligned and, at times, even overlap. The introduction of a stop loss further allows for the consolidation of profits and protection of capital during periods of heightened volatility.

Specifically, the ORB long-only strategy with stop loss excludes 194 trades out of a total of 623 trading days, activating 429 positions. Of these, 176 are closed due to the stop loss being triggered, while the remaining 253 are exited at the end of the trading day.

The overall performance of the strategy is therefore positive, also supported by the significant growth recorded by NVDA during the observation period. This structurally bullish trend makes the long-only strategy particularly suitable, as it fully benefits from the market's directional bias.

In summary, the high volatility and strong momentum of NVDA provide a favorable environment for the ORB strategy, which—when supported by effective risk management—proves capable of generating significant intraday returns.

Figure 6: Results NVIDIA Corporation - Long only

4.6 NVIDIA Corporation - Long / Short

Continuing the analysis, the effectiveness of the ORB strategy in its traditional long/short configuration is evaluated on an individual equity—specifically NVIDIA Corporation (ticker: NVDA)—to assess whether the inclusion of short positions contributes to an improvement in overall performance.

The return graph clearly shows that the introduction of short trades does not provide any significant benefit compared to the previously tested variants. On the contrary, opening short positions results in increased losses due both to stop loss activations and misinterpretation of market movements, leading to a halving of returns relative to the long-only version.

Quantitatively, in the long/short variant, stop losses are triggered in 370 trades out of a total of 623, approximately 60% of the trades. This figure is significantly higher than that observed in the long-only configuration, where stop losses occur in 176 out of 429 trades. This data highlights a marked difficulty of the strategy in correctly positioning short trades, resulting in an increased number of losing operations.

Direct comparison between the two variants confirms the ineffectiveness of the original stop loss management criteria when applied to short positions. The win rate of the long/short strategy stands at approximately 36%, indicating a low probability of trade success. Nevertheless, the systematic use of stop losses helps to contain losses, safeguard capital, and maintain a certain level of profitability.

In summary, applying the ORB strategy in its original form to a high-growth stock like NVDA reveals structural limitations in managing short positions. The high number of losing trades and low success rate make this configuration less efficient, although the implementation of rigorous risk control rules contributes to sustaining an acceptable level of performance.
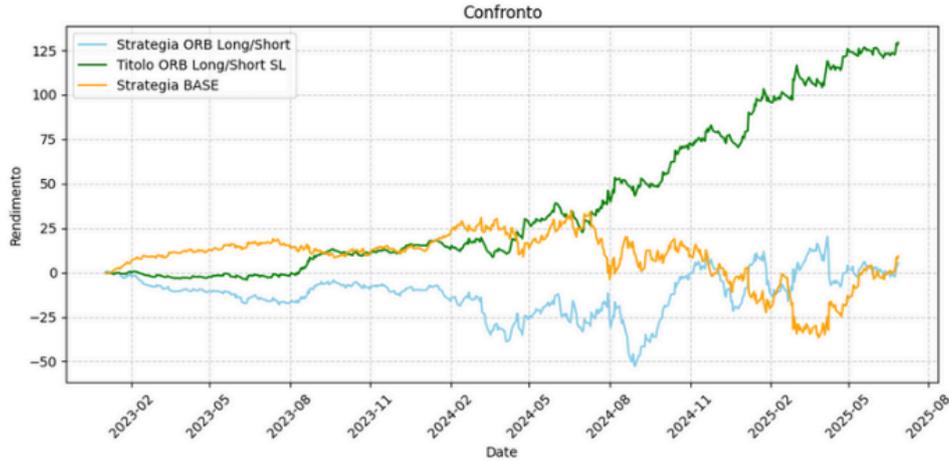
Figure 7: Results NVIDIA Corporation - Long / Short

5 Evaluation Metrics for the Variants

5.1 Strategy ORB - Long

Title	Return	Average Return	Variance	Sharpe Ratio	Win Rate	Profit Factor
SPY	72,43 $	0,21 $	18,62	0,05	51,18%	-1,17
GLD	4,79 $	0,01 $	1,57	-0,03	47,79%	-1,04
NVDA	6,34 $	0,02 $	5,01	0,01	54,19%	-1,02

Table 1: Performance metrics: Strategy ORB - Long

5.2 Strategy ORB - Long (with Stop Loss)

Title	Return	Average Return	Variance	Sharpe Ratio	Win Rate	Profit Factor
SPY	86,51 $	0,26 $	3,43	0,12	26,03%	-1,52
GLD	28,32 $	0,09 $	0,66	0,09	24,41%	-1,48
NVDA	59,18 $	0,19 $	2,29	0,11	38,71%	-1,46

Table 2: Performance metrics: Strategy ORB - Long (with Stop Loss)

SPY closed 245 trades out of 338 due to stop loss activation, accounting for approximately 72% of all trades.
GLD closed 215 trades out of 295 due to stop loss activation, representing approximately 73% of all trades.
NVDA closed 176 trades out of 310 due to stop loss activation, corresponding to approximately 56% of all trades.

5.3 Strategy ORB - Long / Short

Title	Return	Average Return	Variance	Sharpe Ratio	Win Rate	Profit Factor
SPY	45,57 $	0,07 $	17,58	0,01	48,15%	-1,05
GLD	-13,66 $	0,02 $	1,64	-0,03	47,99%	-0,97
NVDA	5,27 $	0,01 $	5,83	-0,04	50,72%	-1,01

Table 3: Performance metrics: Strategy ORB - Long / Short

For SPY, short trades numbered 285, representing approximately 45% of all trades.
For GLD, short trades totaled 328, accounting for approximately 52% of all trades.
For NVDA, short trades amounted to 313, corresponding to approximately 50% of all trades.

5.4 Strategy ORB - Long / Short (with Stop Loss)

Title	Return	Average Return	Variance	Sharpe Ratio	Win Rate	Profit Factor
SPY	117,81 $	0,18 $	3,75	0,08	23,11%	-1,35
GLD	55,24 $	0,08 $	0,66	0,08	24,39%	-1,44
NVDA	129,33 $	0,20 $	2,9	0,11	36,11%	-1,49

Table 4: Performance metrics: Strategy ORB - Long / Short (with Stop Loss)

SPY closed 471 trades out of 623 due to stop loss activation, accounting for approximately 75% of all trades.
GLD closed 457 trades out of 623 due to stop loss activation, representing approximately 73% of all trades.
NVDA closed 370 trades out of 623 due to stop loss activation, corresponding to approximately 59% of all trades.

6 Conclusions

The conducted analysis shows that the Opening Range Breakout (ORB) strategy, in its various configurations, does not systematically generate profits across the analyzed securities. In many instances, the baseline intraday buy-and-hold strategy outperforms or matches the returns achieved by the ORB strategy, despite having a simpler operational structure.

6.1 Performance of Short Positions

The introduction of short positions proves counterproductive: it significantly lowers the overall win rate without providing a meaningful increase in returns. In some cases, such as with NVDA, the effect is even negative, resulting in a net reduction in returns compared to the long-only component.

6.2   Effect of Stop Loss

Variants without stop loss were tested to evaluate whether removing a rigid constraint could improve performance. However, results indicate that the absence of stop loss leads to greater losses, as many trades continue in an unfavorable direction. Conversely, the introduction of stop loss improves the average return but at the expense of the win rate, which in some cases is halved. In extreme situations, such as with SPY, 75% of trades are closed due to stop loss activation, leaving profits in only one out of four trades—a result unsustainable for an intraday strategy.

A critical issue is that the high or low of the first candle does not represent a technically robust level to serve as an effective stop; the stop loss is often triggered already in the second candle after entry, drastically limiting profit potential.

6.3   Differences Among Underlyings

- SPY confirms itself as a versatile asset, often capable of generating good performance but also characterized by high volatility. Its returns are particularly penalized in long-only variants.

- GLD (gold) proves unsuitable for the ORB strategy: its defensive nature and low volatility do not allow for effective exploitation of initial breakouts. Returns are low or negative across all variants.

- NVDA, as a highly volatile and growth-oriented stock, is the underlying on which the ORB strategy achieves the best performance. The variants applied to NVDA also show stable parameters and fewer trades closed by stop loss, although still at a relatively high rate.

6.4   Identified Structural Limitations

The analysis highlights two main weaknesses in the ORB strategy:

- The static definition of the stop loss, based on the first candle, proves to be inefficient and overly restrictive.

- The conditions for initiating short positions are ineffective and increase the likelihood of unsuccessful trades.

6.5   Suggestions for Improvement

To make the ORB strategy more robust and sustainable, the following interventions are proposed:

- Redefine the stop loss by using dynamic indicators (e.g., ATR, intraday support/resistance levels, realized volatility).

- Filter short trades by introducing additional confirmation conditions (e.g., reversal patterns, volume-confirmed breakouts).

- Consider multiple initial candles to define the opening range, thereby increasing the robustness of the signal.