Semester : VIII Subject : AIFB Academic Year: 2024-2025

Model calibration in the context of backtesting refers to the process of tuning a trading or financial model's parameters to fit historical data so it can make effective predictions or decisions.

However, calibration must be done carefully to avoid overfitting — the goal is to improve performance on unseen data, not just optimize it for past conditions.

Why Is Calibration Important in Backtesting?
Ensures your model is using the right parameter values (e.g., moving average length, thresholds).

Improves signal accuracy and risk management.

Helps models adapt to changing market regimes.

Steps to Calibrate a Model in Backtesting

1. Select Calibration Parameters

Identify the inputs you want to tune:

- Length of indicators (e.g., 10-day vs. 20-day moving average)
- Thresholds (e.g., RSI overbought = 70 or 80?)
- Stop-loss and take-profit ratios
- Capital allocation or position sizing rules

2. Choose a Calibration Range

Define reasonable value ranges based on market behavior:

- MA window: 5 to 50 days
- RSI threshold: 60 to 90
- Stop-loss: 1% to 10%

Avoid extreme or unrealistic values.

3. Use a Training Period

Split historical data into:

- **Calibration period (training)** – to find best-performing parameter values.
- **Validation period (testing)** – to verify that these parameters generalize.

This helps **detect overfitting** early.

4. Evaluate Performance Metrics

Compare different parameter settings using:

- Sharpe Ratio
- Net Profit
- Win Rate
- Max Drawdown
- Profit Factor

Choose the set that **balances profitability and risk**, not just the one with the highest profit.

5. Perform Sensitivity Analysis

Ask:

- Do small changes in the parameter values result in large performance changes?
  If so, the model may be too sensitive and prone to instability.

6. Repeat Calibration Regularly

Market dynamics change. Calibrate periodically (e.g., quarterly or annually) using the latest data.

📌 Example (Conceptual)

Let's say you're testing an SMA crossover strategy. You calibrate:

Parameter	Range Tried	Best Performer in Training Set
Short MA	5, 10, 15	10
Long MA	20, 50, 100	50
Stop Loss (%)	2, 5, 8	5
Take Profit (%)	5, 10, 15	10

But before finalizing, you test this combo on unseen data to **validate** it works outside of calibration.