**✅ 1. Prediction Evaluation (Model-level)**

Before you even invest, test your prediction model's ability to **forecast returns or direction** accurately.

**🔹 Common Metrics:**

| **Metric** | **What It Tells You** |
| --- | --- |
| **RMSE / MAE** | Raw error in price prediction (but may be less meaningful due to outliers or price scale) |
| **Accuracy** (Up/Down) | Correctly predicted direction of stock movement |
| **Precision/Recall (for Buy signals)** | Good for evaluating rare buy opportunities |
| **Sharpe Ratio of Predicted Strategy** | Tells you if predicted trades are **worth the risk** |
| **Confusion Matrix** | Helps in directional classification (especially binary models) |

**✅ 2. Backtesting Strategy (Portfolio-level)**

Now test how these predictions **perform in a portfolio** over time.

**🔹 Key Evaluation Metrics:**

| **Metric** | **Description** |
| --- | --- |
| **Cumulative Returns** | How much $ you made overall |
| **Max Drawdown** | Biggest loss from peak to trough — **risk proxy** |
| **Volatility** | Measures uncertainty. Lower is better for stable strategies |
| **Sharpe Ratio** | Return per unit of risk. Risk-adjusted return |
| **Sortino Ratio** | Like Sharpe, but only penalizes downside risk |
| **Calmar Ratio** | Return / Max Drawdown. Good for conservative investors |
| **Beta** | Measures sensitivity to market movements (S&P500 etc.) |
| **Alpha** | Excess return over a benchmark (e.g., index) |

**✅ 3. Risk Control Techniques**

| **Strategy** | **Description** |
| --- | --- |
| **Stop-Loss / Take-Profit** | Exit if price falls/rises by X% |
| **Position Sizing** | Never bet too much on one asset (e.g., 1–5% per stock) |
| **Diversification** | Don't let 1 stock kill your returns |
| **Volatility-Weighted Allocation** | Invest less in volatile assets |
| **Portfolio Rebalancing** | Adjust regularly to maintain target allocations |
| **Monte Carlo Simulations** | Stress test the strategy over many random scenarios |
| **Value at Risk (VaR)** | Worst-case loss in a given time horizon with 95% confidence |

**✅ 4. Live Testing (Paper Trading)**

Once backtesting looks promising:

* Simulate real-time trades without risking money
* Log predicted signals vs actual performance
* Track **slippage**, **commission**, and **execution delay**

**🧠 Final Thoughts:**

If **low risk** is your priority:

* Focus on **high Sharpe / low drawdown** strategies
* Prioritize **capital preservation** over high returns
* Build **robust models** that do well in **uncertain or sideways markets**

Would you like a Python template to backtest such a strategy? I can also show how to log risk metrics like drawdown and Sharpe Ratio.