Moving average cross-over strategy

Z. Kakushadze and J.A. Serur. 151 Trading Strategies. Cham, Switzerland: Palgrave Macmillan, an imprint of Springer Nature, 1st Edition (2018), XX, 480 pp; ISBN 978-3-030-02791-9

3.12 Strategy: Two moving averages

The simplest variant of this strategy replaces the stock price P in Eq. (321) by another moving average. That is, we have 2 moving averages with lengths T' and T, where $T' < T$ (e.g., $T' = 10$ and $T = 30$), and the signal is given by:

$$\text{Signal} = \begin{cases} \text{Establish long/liquidate short position if } \text{MA}(T') > \text{MA}(T) \\ \text{Establish short/liquidate long position if } \text{MA}(T') < \text{MA}(T) \end{cases} \tag{322}$$

This signal can be augmented with additional "stop-loss" rules to protect realized profits. E.g., if a long position has been established, the trader can define a threshold

to liquidate the long position if the stock begins to fall (even if the shorter moving average has not crossed the longer moving average yet):

$$\text{Signal} = \begin{cases} \text{Establish long position if } \text{MA}(T') > \text{MA}(T) \\ \text{Liquidate long position if } P < (1-\Delta) \times P_1 \\ \text{Establish short position if } \text{MA}(T') < \text{MA}(T) \\ \text{Liquidate short position if } P > (1+\Delta) \times P_1 \end{cases} \tag{323}$$

Here Δ is some predefined percentage, e.g., $\Delta = 2\%$. So, a long position is liquidated if the current price P falls over 2% below the previous day's price P_1; and a short position is liquidated if P rises over 2% above P_1. Other variations can be used.

Notes I:

- T and T' are measured in trading days.
- You are free to choose the moving average (e.g. simple moving average, exponential moving average, ML-based moving average, etc…) and any other parameters.
- You will need to mark-to-market your position at the close (or adjusted close depending on your setup) of each day in order to determine the position's daily PnL (profits and losses).

Deliverables:

- Python code (commented)
- Point form write-up of your strategy and parameters.
- daily PnL in .csv or .xlsx (two columns: Column 1 = date, column 2 = daily PnL).
- Plot of the cumulative PnL curve of your strategy.