Computer Trading Strategies

Homework 3: Due by the Start of Class on 3/4

Your assignment is to develop a tutorial for back testing a trading strategy using the S&P 500 Industrials Sector of stocks as your stock universe. Use the stock data universe you created for the prior homework, but just the OHLC data and only those stocks listed in the Industrials Sector. Do not worry if you cannot implement a well-performing trading strategy – that is not our goal here. Your back test should meet the following requirements:

a) Make predictions using any time-series forecasting method other than regression and auto-regressive functions (the ones covered in the lectures).

b) Use a back test period from 1/1/2023 to 12/31/2024. Unlike the examples covered in class, use enough data prior to 1/1/2023 so that you can begin trading on the very first trading day of 2023. For example, if you are predicting returns based on a 10 day moving average of prices, you would need the last 10 trading days of 2022 to be included in your back test data.

c) Your strategy should include both long and short positions, trading on a daily basis: entering positions at the open and exiting them at the close.

d) You will need to filter your predictions in terms of a threshold return level, as well as their accuracy or your confidence in them. You can use confidence intervals or other measures of forecast error like mean absolute percentage error. The idea here is you want to invest in stocks that are "more predictable" and avoid those that are "less predictable."

e) Your starting cash on hand to make investments is $100,000. Weight your investments based on "predictability". Employ constraints on investments – number of short/long positions, maximum amount per position and/or total outstanding.

f) Performance measures for the back test should (at minimum) include: # of long trades, % wining long trades, average return of long trades, # of short trades, % winning short trades, and average return of short trades, Sharpe Ratio, cumulative portfolio return, maximum drawdown %, maximum drawdown period, and overall percentage winning trades.