

# Systematic Trading Strategies

## Homework 3: Due by the Start of Class on 3/7

Your assignment is to develop a tutorial for backtesting a trading strategy using the S&P 500 energy sector 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 energy 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 an auto-regressive function (the one covered in the lectures).
- b) Use a backtest period from 1/1/2021 to 12/31/2023. Unlike the examples covered in class, use enough data prior to 1/1/2021 so that you can begin trading on the very first trading day of 2021. So if you are predicting returns based on a 10 day moving average of prices, you would need the last 10 trading days of 2020 to be included in your back test data.
- c) Your strategy should include both long and short positions, trading on a daily basis (the video mentions weekly, but I changed my mind).
- 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, % winning 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.