Methodology:

For both approaches, the correlation analysis, linear regression and moving average. The correlation helps to identify the relationship between the two variables and find any possible trend, moving to the same direction.

Linear Regression will help to have a better understand how they stocks, and the target benchmark are related

Why this methodology:

If a variable A and B has a strong correlation, the stocks return moves together with the target. The linear regression shows the trend of returns between the two variables.

Using the moving average analysis, we'll identify how strong are the basket of stocks being below or above the moving average. Based on the daily percent of stocks being above the moving average, we can compare the impact in the target benchmark. It could also become a trading model.

Any potential drawbacks/caveat

When we use correlation, we'll not be able to see which variable have the most influence.

In case a model is built based on the analysis, correlation could be a time-consuming process due the calculation and volume of data to be processed.

Using linear regression, it's quite sensitive to outliers

Do returns to gold or gold stocks predict US CPI with a lag (e.g., 12-24 months out)?

The tickers used for analysis

GLD: SPDR Gold Shares

ASM : Avino Silver & Gold Mines Ltd.

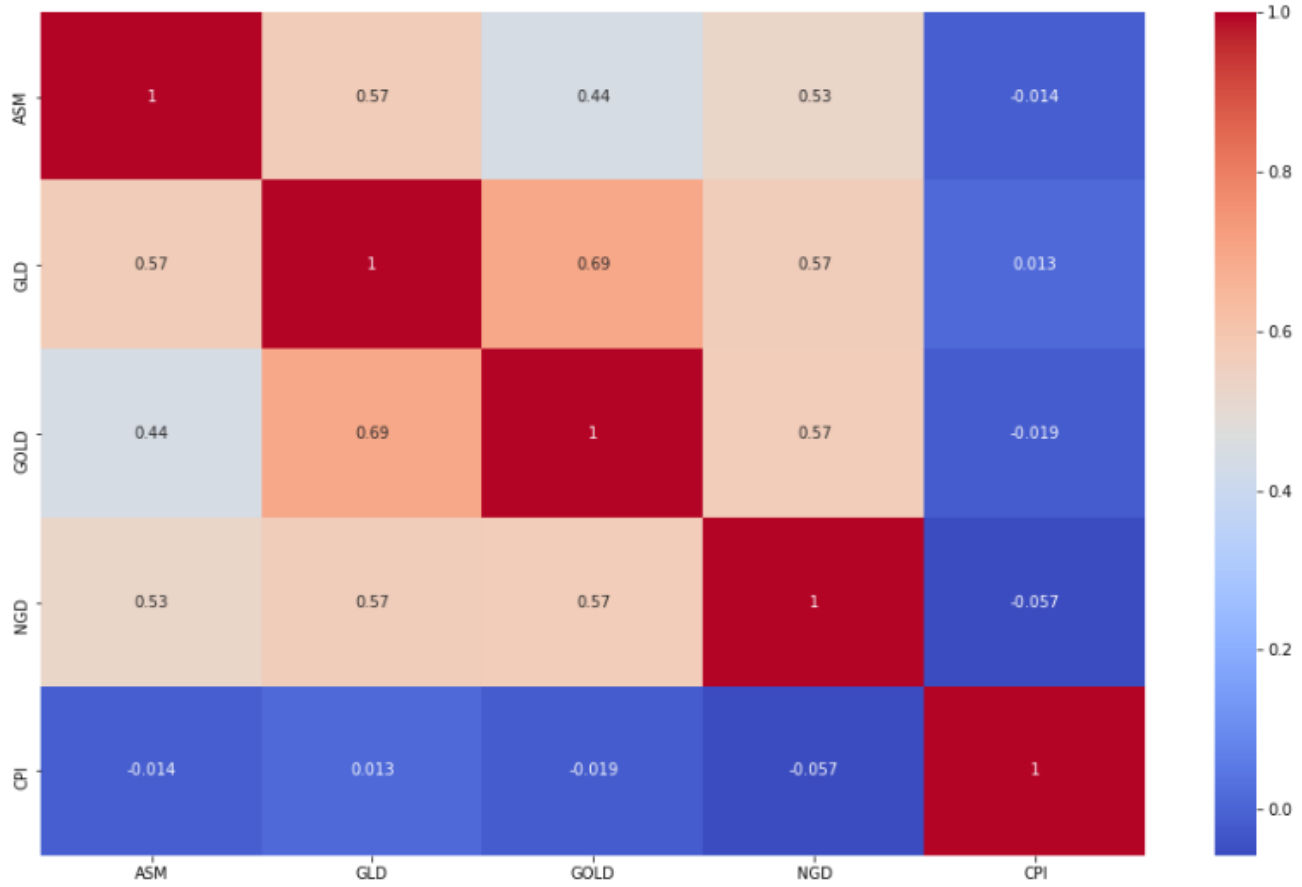
NGD: New Gold Inc.

GOLD: Barrick Gold Corporation

CPI : Consumer Price Index

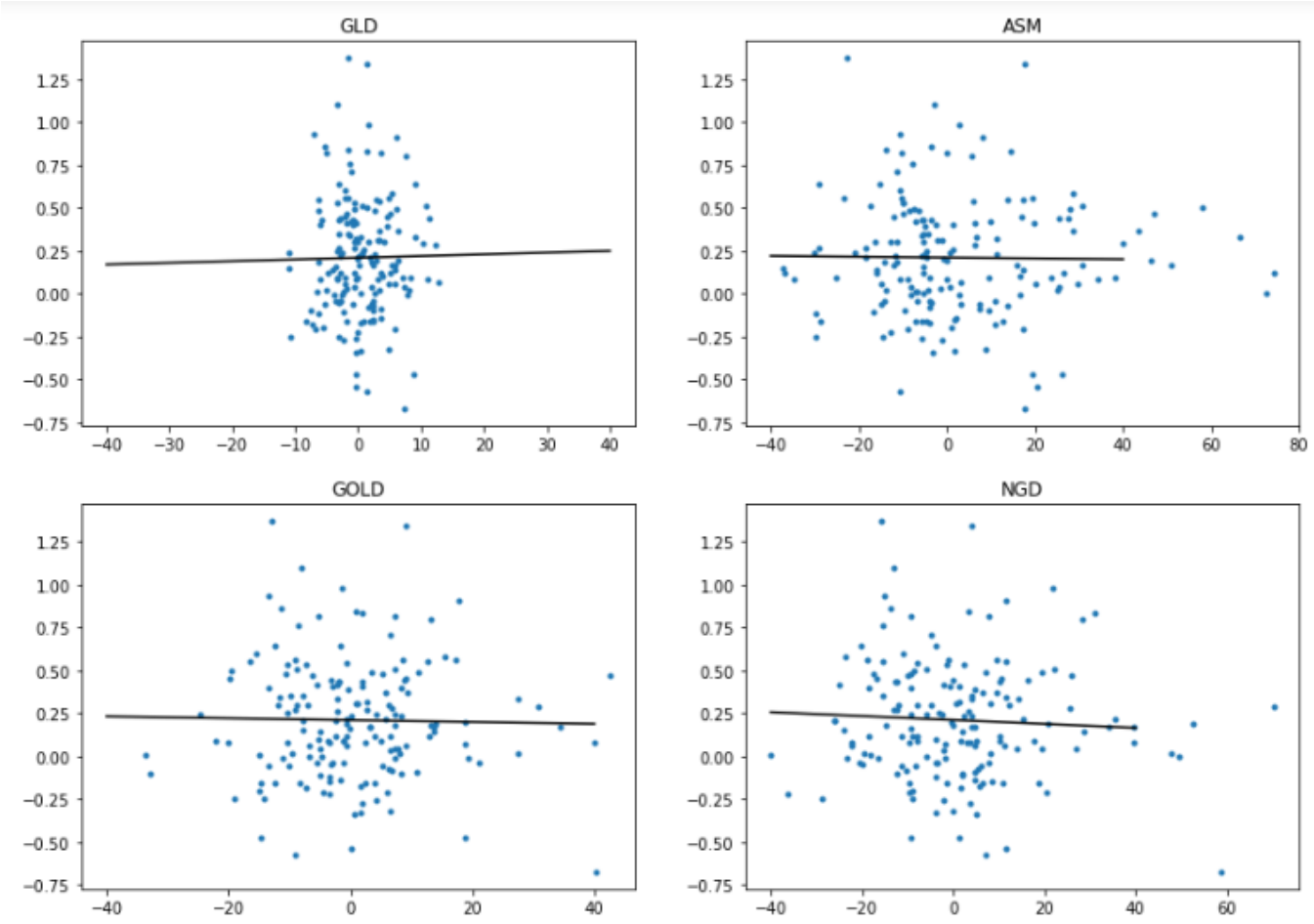
The stocks prices are grouped by month, which matches with the frequency of CPI data and also helps to have a fair analysis.

Correlation:



- We don’t see any correlation between the equities against CPI, which doesn’t tell us if the gold returns move in the same or opposite direction of CPI

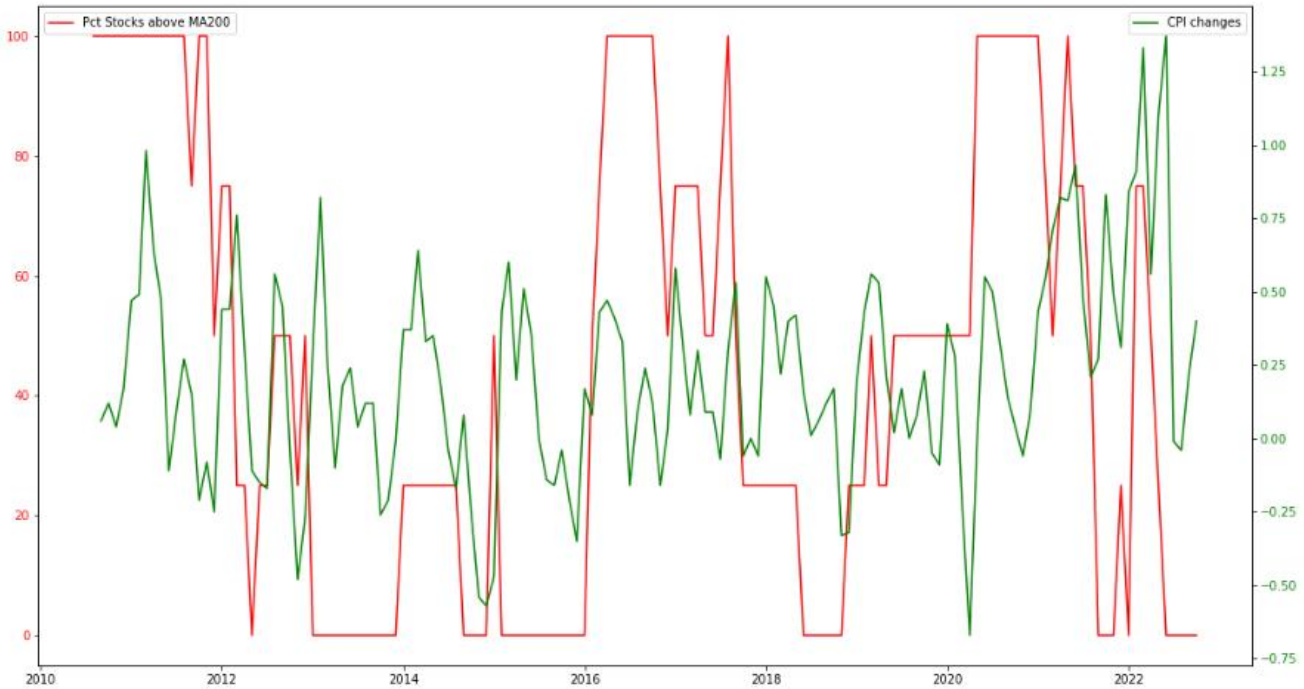
Analyzing the Linear Regression, we can clearly see all the stocks without any trends on returns against CPI



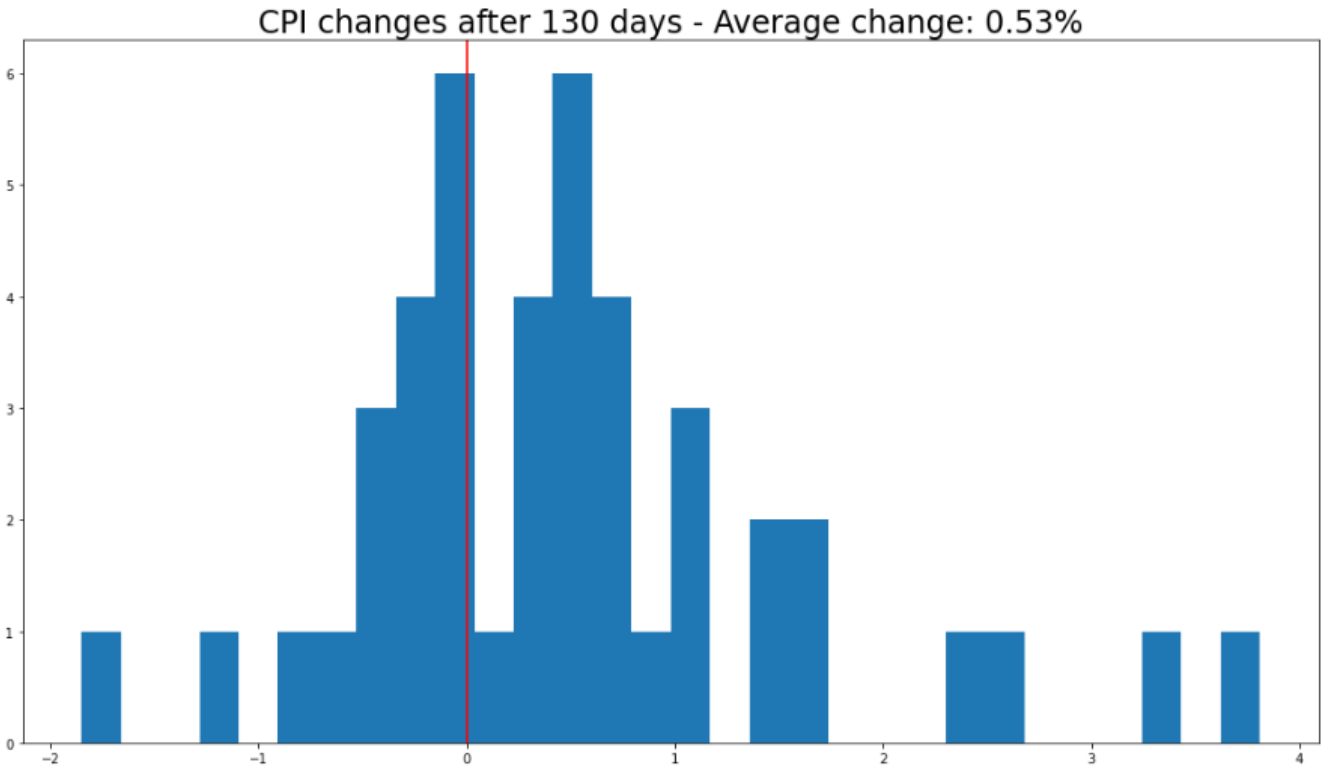
When we analyze the moving average, there's some good insights.

The steps are:

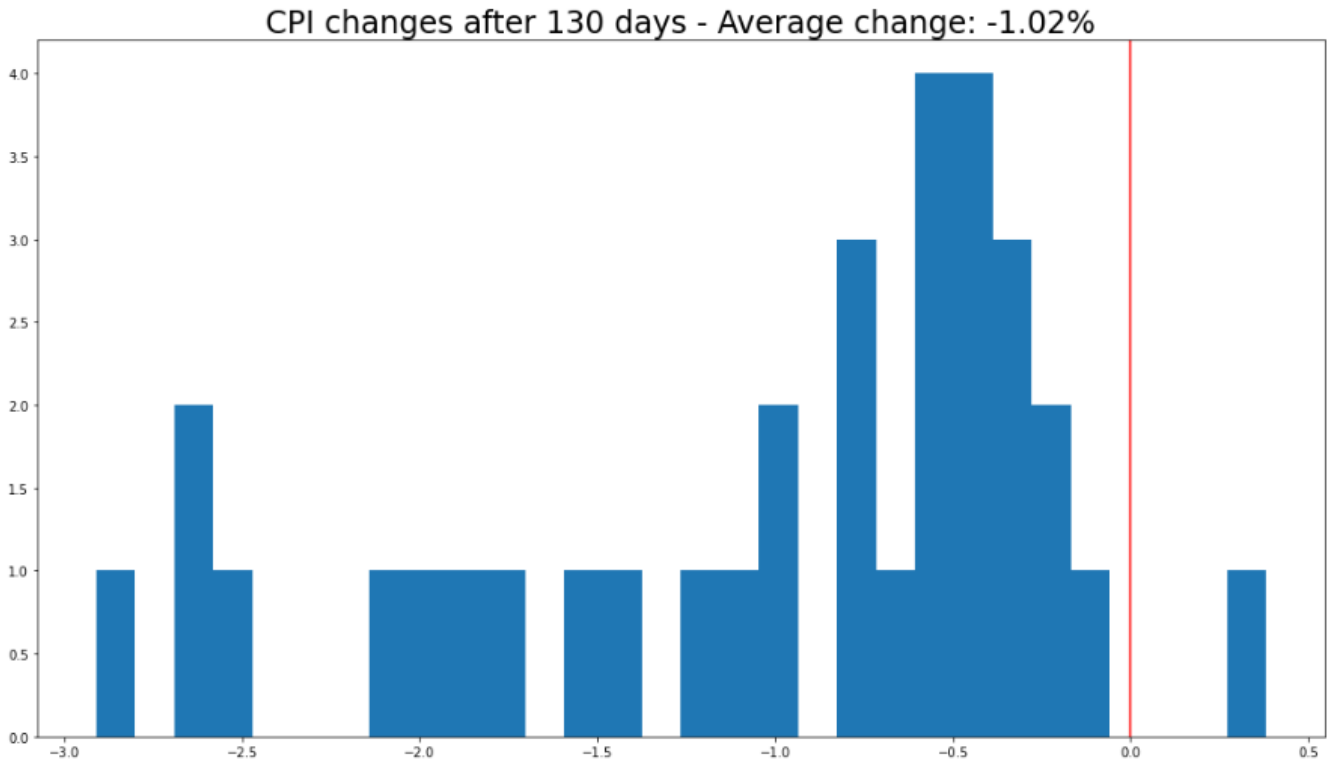
1) Calculate the 20 days moving average for all gold stocks
2) Check by date how many stocks are above the moving average
3) Build a dataframe with date, number of stocks result and percent of stocks
4) identify if the percent of stocks for each date has any impact on the index price movements
5) Simulate how is the CPI performance for the next 130 days every time the percent of stocks below of moving average



- When the pct of stocks reach zero, we see a slightly increase of CPI returns, representing an average of **0.53%** after 130 trading days



- If the percent reaches 100%, CPI has a decrease in the CPI returns, representing -1.02% after 130 trading days**,** which means the CPI usually drops after the percent of gold stocks reaches 100%



Conclusion: We don't see any correlation and trend between the stocks and CPI, however we can have an idea of CPI based on the price movements of gold stocks. The current level is 0%, which we can assume for the next 130 trading days, we can expect an increase of 0.53% .

Do banks act as a lead indicator of broader markets? So, if they start outperforming, is it a bullish signal?

The tickers used for analysis

Banks Stocks:

JPM - JPMorgan Chase & Co
BAC - Bank of America Corp
WFC - Wells Fargo & Co
MS - Morgan Stanley
HSBC - HSBC Holdings plc
SCHW - Charles Schwab Corporation
GS - Goldman Sachs Group
C - Citigroup Inc

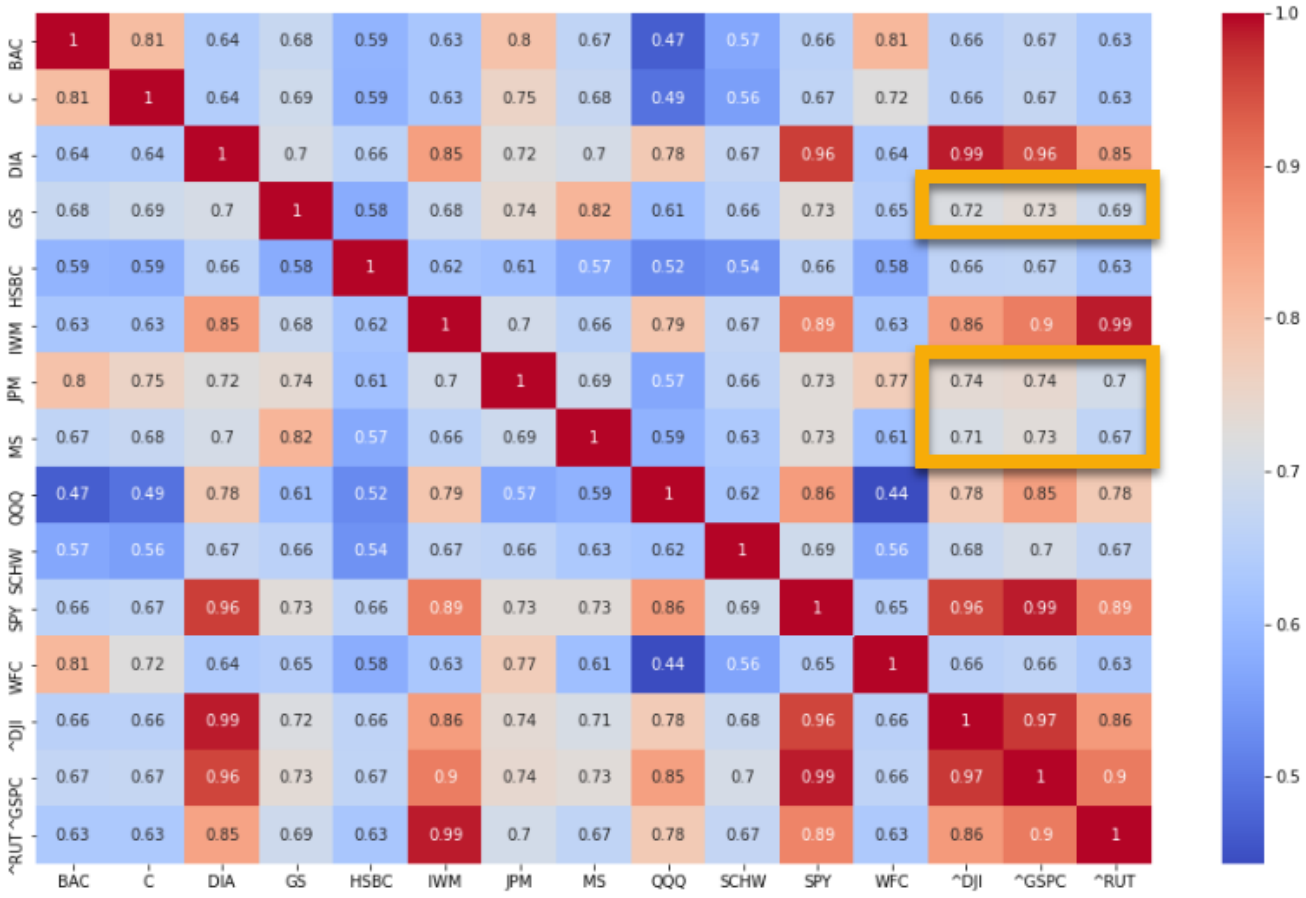
Indexes ETF:

SPY
DIA
IWM
QQQ

Indexes:

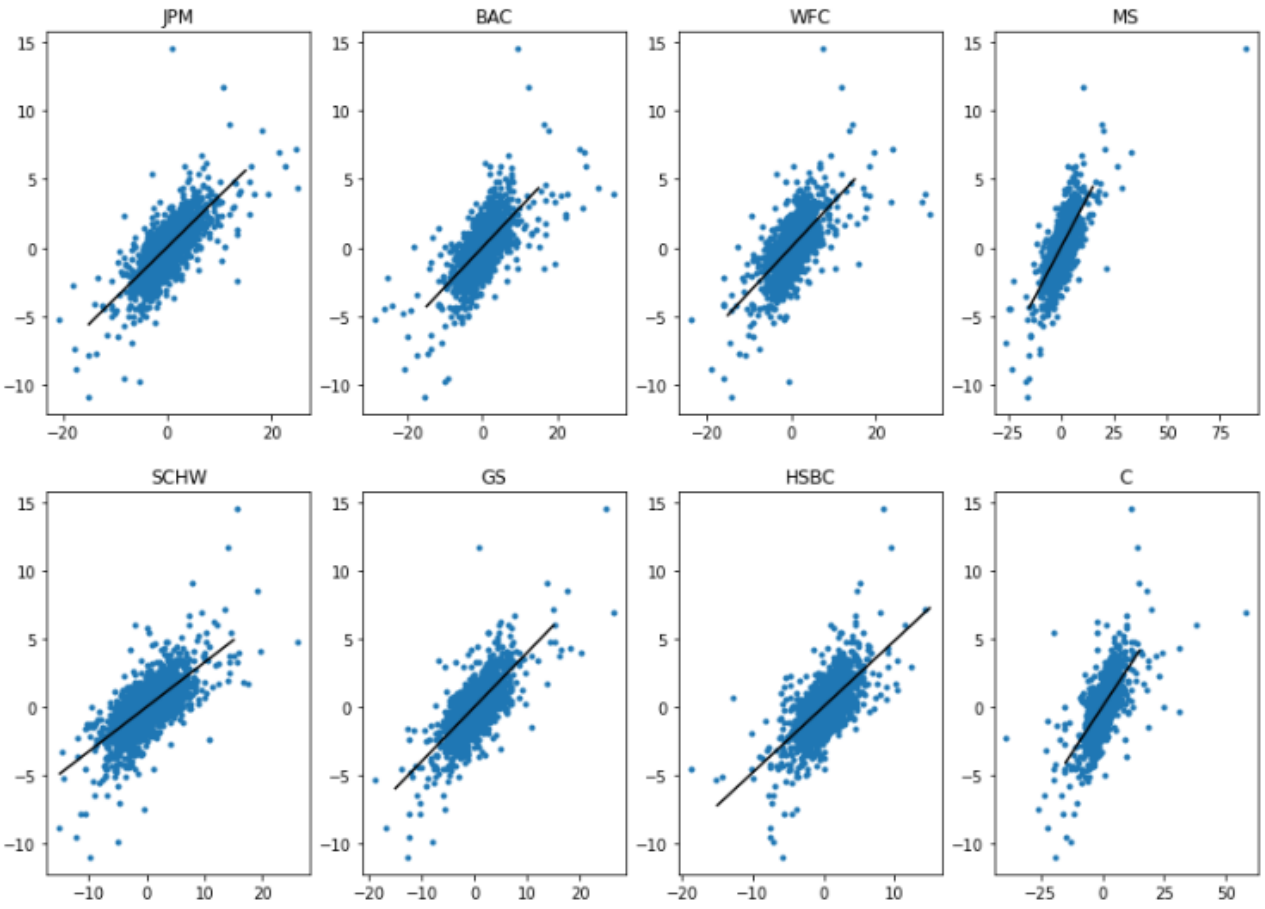
DJI
GSPC
RUT

Correlation



We can see a good correlation in some Banks stocks, which are **GS, JPM and MS.**

When we check the linear regression, we see a trend on the stocks and index return. The index used for this analysis is **SPY**, it has almost the same result as GSPC

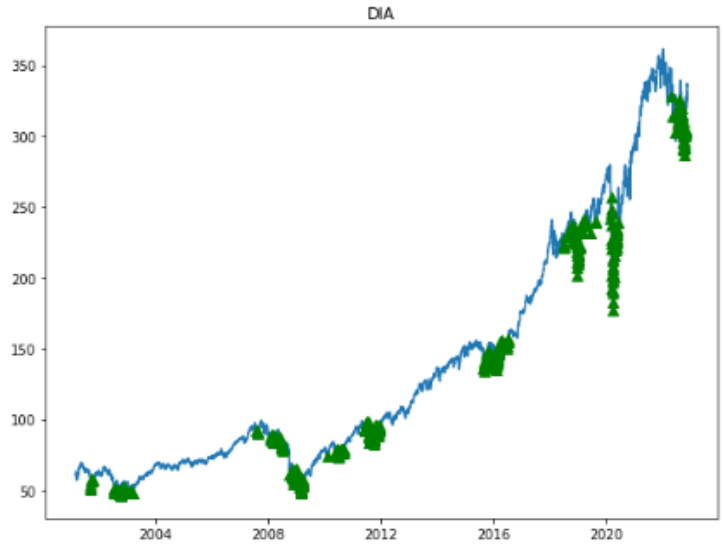


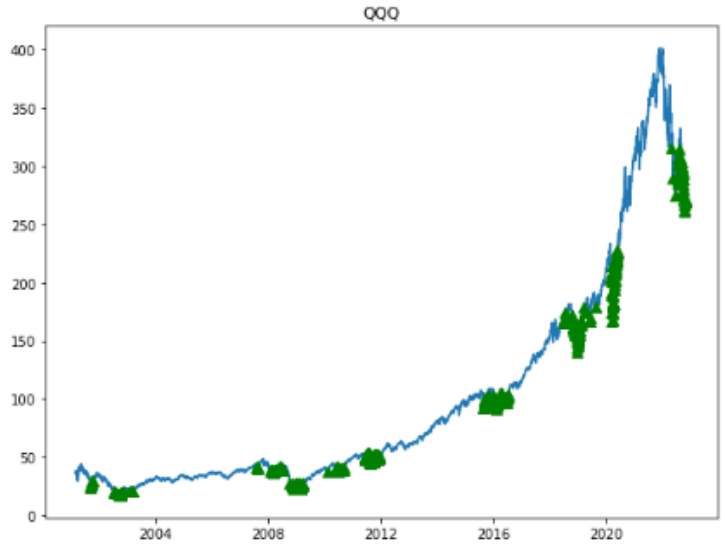
Until here, we can conclude the banks moves together with the GSPC/SPY. In order to confirm a bullish signal when they start outperforming, we'll check the 200 moving average performance.

The steps are:

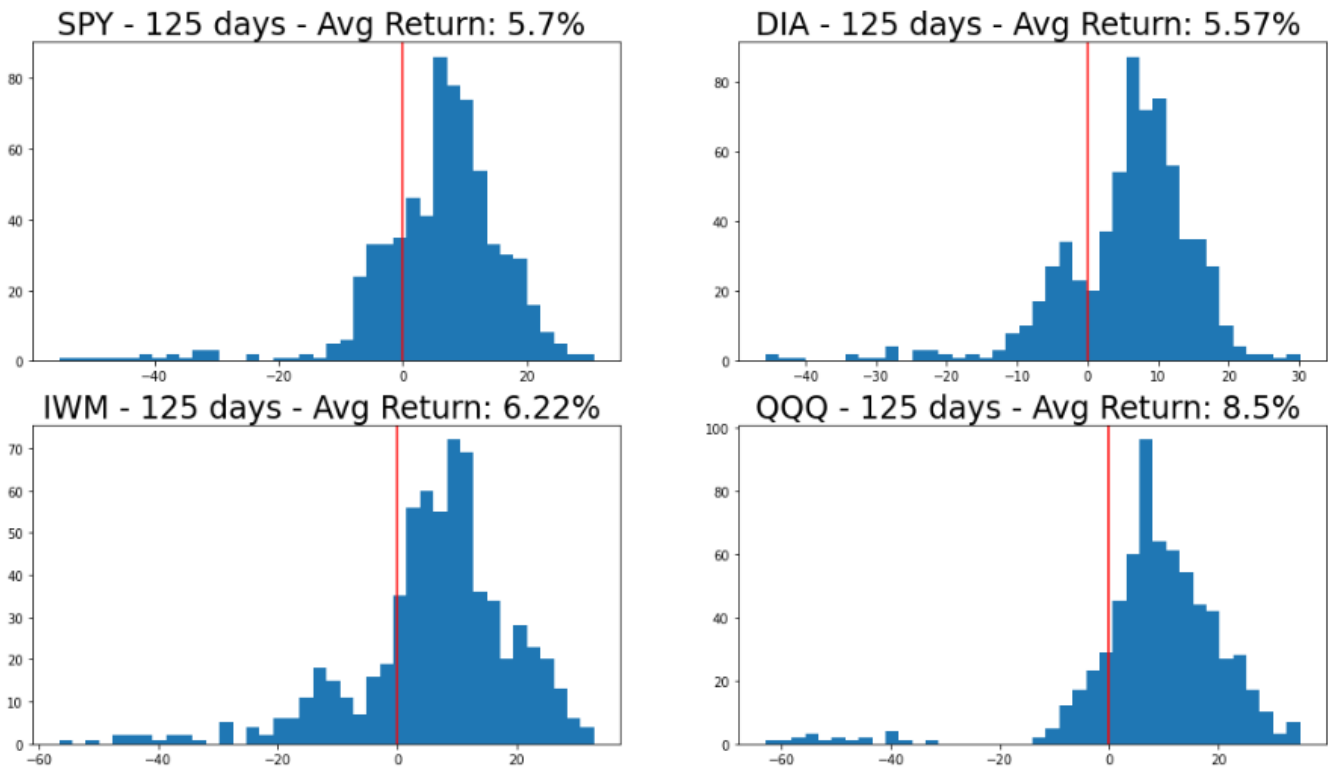
1) Calculate the 200 days moving average for all the stocks
2) Check by date how many stocks are above the moving average
3) Build a dataframe with date, number of stocks result, percent of stocks
4) identify if the percent of stocks for each date has any impact on the index price movements
5) The idea would be simulating a "buy" on different indexes when the percent of stock reach **below zero** and sell after 6 months. It will give an idea about the impact of banks performance on indexes.

These are the buy signal every time the percent of stocks reaches zero percent.
Based on the results below, since 2003, we see when banks is performing, the 4 ETFs representing the indexes, also goes up.





We're going to **BUY** with the signal and selling after **125 trading days**



When a buy signal appears and we buy and hold the ETFs for 125 trading day, we are most likely to have a gain.

Conclusion: Banks are a very good indicator when they start outperforming, we can see a directly impact on the 4 indexes (DJI, S&P500, RUSSELL and Nasdaq 100).