MONTE CARLO SIMULATION ON MARKOWITZ'S ESSENTIAL FRONTIER THEORY

- 2 ASSETS TAKEN (SP500 & NVIDIA) FOR A PERIOD OF 25 YEARS AND 1 MONTH INTERVALS
- A MINIMUM CONSTRAINT OF w=20% WAS PLACED FOR THE SIMULATION

FUNCTIONS

def portfolio_returns : calculates portfolio returns, volatility and sharpe ratio

def neg_sharpe: finds the highest sharpe ratio using the scipy optimization tool (which only finds the smallest one so we reverse it with the -)

def minimize_vol: minimizes volatility and finds the safest one

PLOT RESULTS

Although we don't see the "normal" Markowitz bullet it is completely normal. First of all the reason it seems like a continuous line has to be because of the high amount of portfolios simulated(10.000). Secondly there is an extremely high correlation between Nvidia and the SP500 meaning that when one moves to a certain direction the other one moves to the same (NVIDIA a lot more). Also the combination of the weight constraint of a minimum 20% with a high volatility/very high returns (NVIDIA) stock with a low volatility/ok returns (10% compared to 4000%) proves the result.