

MIE1622 Assignment 1 Report
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1. Produce the following output for the 12 periods (years 2015 and 2016):

Period 1: start date 1/2/2015, end date 2/27/2015

Strategy "Buy and Hold", value begin = \$ 1000002.12, value end = \$ 1043785.08
Strategy "Equally Weighted Portfolio", value begin = \$ 992871.44, value end = \$ 1020334.04
Strategy "Minimum Variance Portfolio", value begin = \$ 991454.17, value end = \$ 1016180.61
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 990052.61, value end = \$ 1007859.90
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 992871.44, value end = \$ 1020334.04

Period 2: start date 3/2/2015, end date 4/30/2015

Strategy "Buy and Hold", value begin = \$ 1045234.09, value end = \$ 1069877.19
Strategy "Equally Weighted Portfolio", value begin = \$ 1031067.89, value end = \$ 1011525.43
Strategy "Minimum Variance Portfolio", value begin = \$ 1023412.52, value end = \$ 1014243.81
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1017313.49, value end = \$ 1056100.26
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 1031603.90, value end = \$ 1011998.49

Period 3: start date 5/1/2015, end date 6/30/2015

Strategy "Buy and Hold", value begin = \$ 1085647.24, value end = \$ 1027659.63
Strategy "Equally Weighted Portfolio", value begin = \$ 1021518.10, value end = \$ 987742.27
Strategy "Minimum Variance Portfolio", value begin = \$ 1009289.81, value end = \$ 970162.87
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1057412.04, value end = \$ 1015548.08
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 1022672.07, value end = \$ 987241.79

Period 4: start date 7/1/2015, end date 8/31/2015

Strategy "Buy and Hold", value begin = \$ 1035245.91, value end = \$ 947793.98
Strategy "Equally Weighted Portfolio", value begin = \$ 991618.31, value end = \$ 934542.95
Strategy "Minimum Variance Portfolio", value begin = \$ 972734.74, value end = \$ 932825.67
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1011289.18, value end = \$ 925499.96
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 991686.46, value end = \$ 941435.44

Period 5: start date 9/1/2015, end date 10/30/2015

Strategy "Buy and Hold", value begin = \$ 912055.56, value end = \$ 1027307.87
Strategy "Equally Weighted Portfolio", value begin = \$ 904735.62, value end = \$ 1022936.74
Strategy "Minimum Variance Portfolio", value begin = \$ 900886.58, value end = \$ 941137.54
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 880517.38, value end = \$ 1099098.65
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 911263.28, value end = \$ 1033364.38

Period 6: start date 11/2/2015, end date 12/31/2015

Strategy "Buy and Hold", value begin = \$ 1039856.20, value end = \$ 1003328.46
Strategy "Equally Weighted Portfolio", value begin = \$ 1039893.88, value end = \$ 1035339.80
Strategy "Minimum Variance Portfolio", value begin = \$ 945637.98, value end = \$ 960129.18
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1102151.74, value end = \$ 1216470.72
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 1048377.17, value end = \$ 1049708.22

Period 7: start date 1/4/2016, end date 2/29/2016

Strategy "Buy and Hold", value begin = \$ 994608.85, value end = \$ 970570.87
Strategy "Equally Weighted Portfolio", value begin = \$ 1014986.39, value end = \$ 954593.97
Strategy "Minimum Variance Portfolio", value begin = \$ 949291.10, value end = \$ 944795.17
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1175381.51, value end = \$ 1007400.01
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 1028135.34, value end = \$ 962912.02

Period 8: start date 3/1/2016, end date 4/29/2016

Strategy "Buy and Hold", value begin = \$ 999683.25, value end = \$ 975547.52
Strategy "Equally Weighted Portfolio", value begin = \$ 982585.52, value end = \$ 1052713.07
Strategy "Minimum Variance Portfolio", value begin = \$ 956400.31, value end = \$ 989141.91
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1030825.34, value end = \$ 1002665.85
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 992775.86, value end = \$ 1055484.48

Period 9: start date 5/2/2016, end date 6/30/2016

Strategy "Buy and Hold", value begin = \$ 982170.01, value end = \$ 1000838.49
Strategy "Equally Weighted Portfolio", value begin = \$ 1066039.38, value end = \$ 1107801.14
Strategy "Minimum Variance Portfolio", value begin = \$ 993643.75, value end = \$ 1062960.40
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1006517.88, value end = \$ 1094312.21
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 1071391.58, value end = \$ 1134162.24

Period 10: start date 7/1/2016, end date 8/31/2016

Strategy "Buy and Hold", value begin = \$ 1003605.67, value end = \$ 1067751.34
Strategy "Equally Weighted Portfolio", value begin = \$ 1118897.99, value end = \$ 1224937.26
Strategy "Minimum Variance Portfolio", value begin = \$ 1063264.62, value end = \$ 1049359.77
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1093737.04, value end = \$ 1115233.23
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 1142584.00, value end = \$ 1274001.21

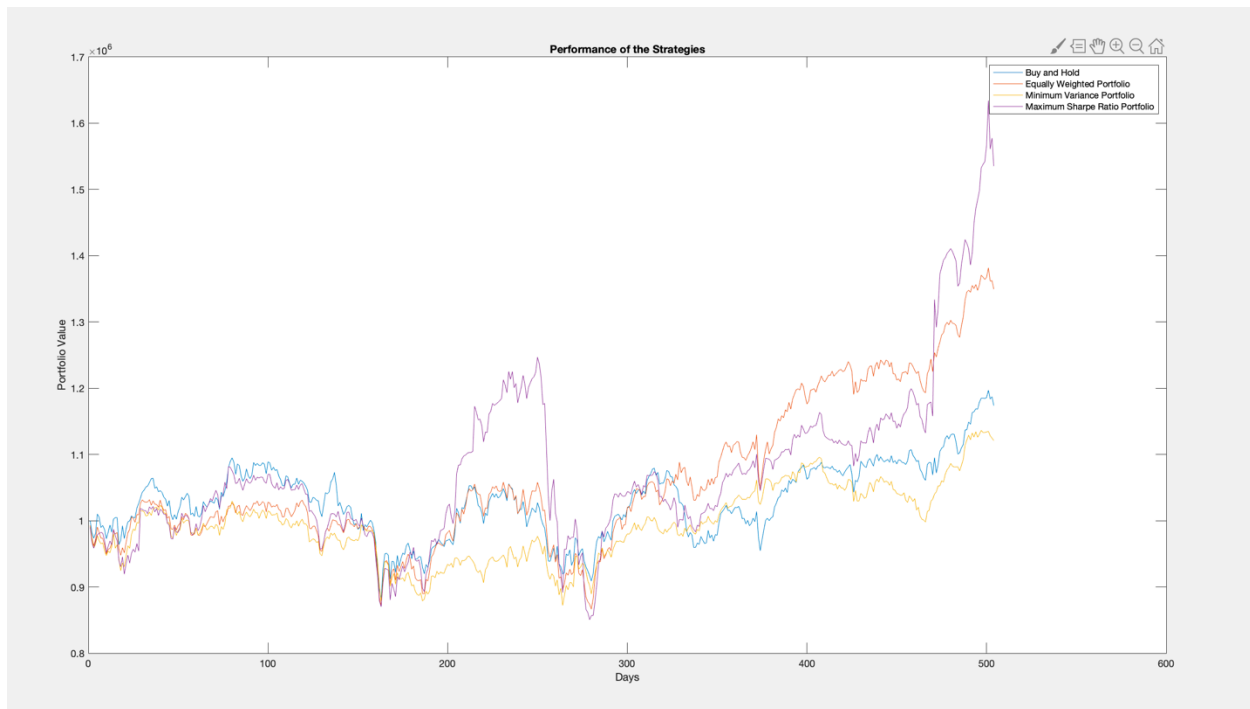
Period 11: start date 9/1/2016, end date 10/31/2016

Strategy "Buy and Hold", value begin = \$ 1073361.15, value end = \$ 1090939.15
Strategy "Equally Weighted Portfolio", value begin = \$ 1226779.94, value end = \$ 1225360.36
Strategy "Minimum Variance Portfolio", value begin = \$ 1045777.93, value end = \$ 1020358.92
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1114010.73, value end = \$ 1177006.94
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 1278542.29, value end = \$ 1290549.63

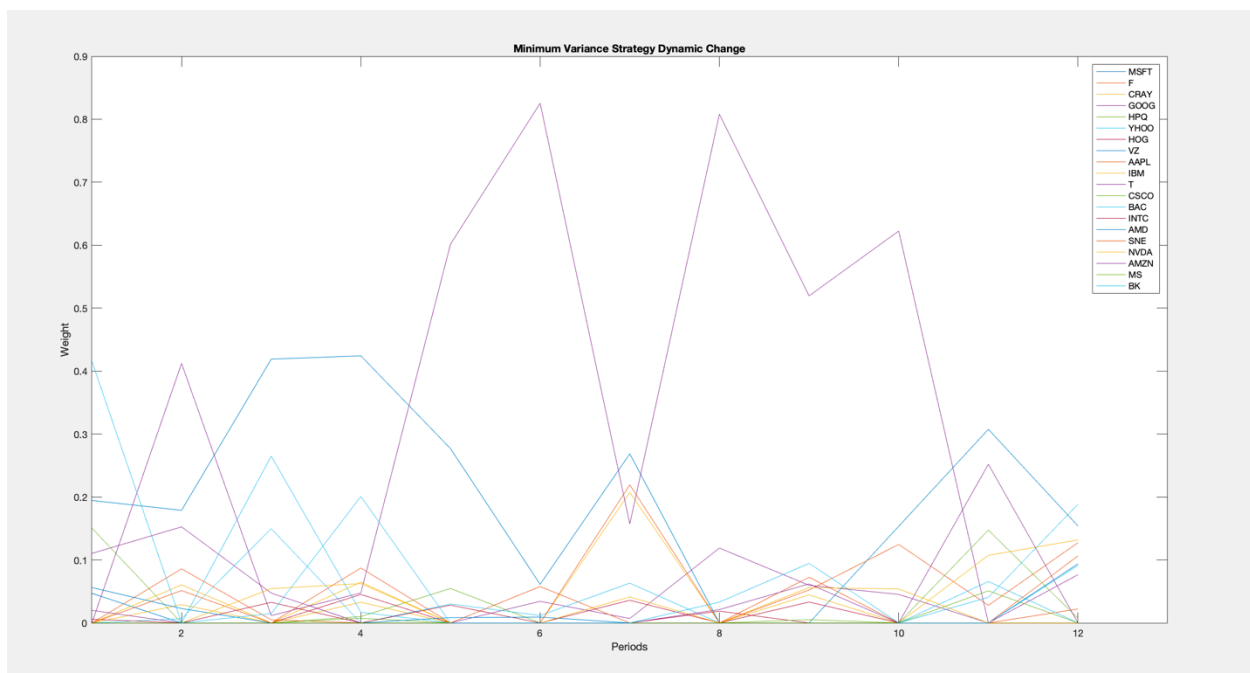
Period 12: start date 11/1/2016, end date 12/30/2016

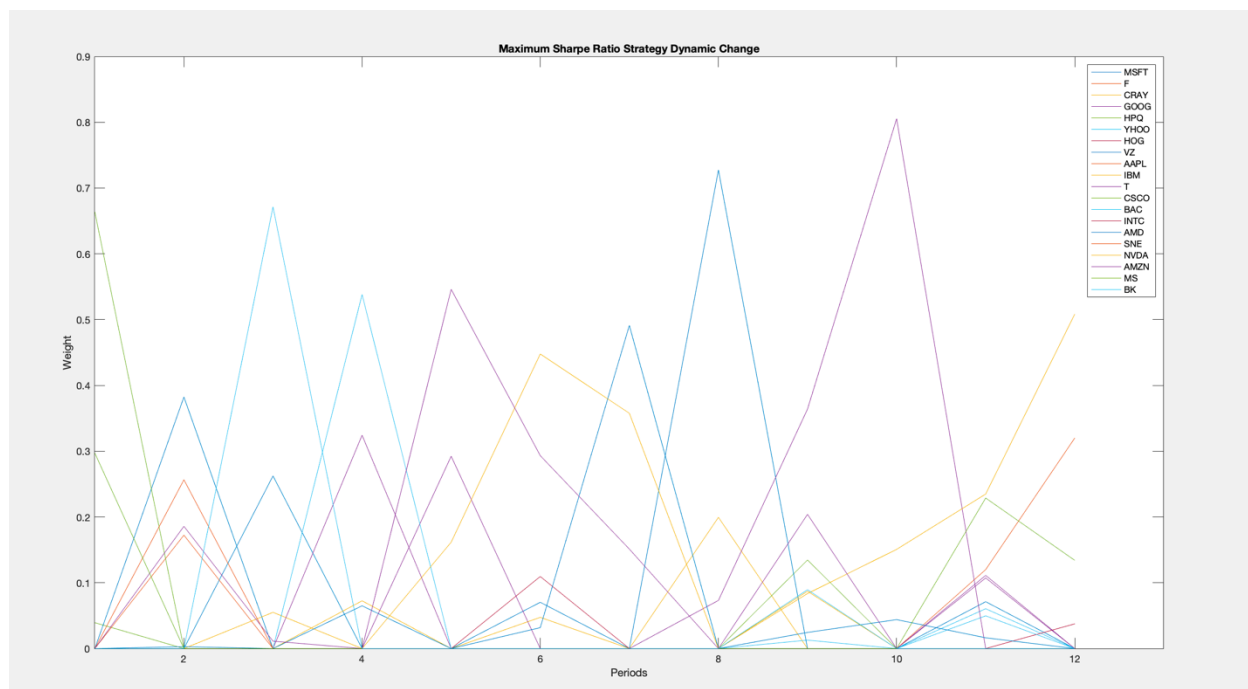
Strategy "Buy and Hold", value begin = \$ 1077523.53, value end = \$ 1173675.24
Strategy "Equally Weighted Portfolio", value begin = \$ 1211690.01, value end = \$ 1349610.80
Strategy "Minimum Variance Portfolio", value begin = \$ 1006922.65, value end = \$ 1120982.74
Strategy "Maximum Sharpe Ratio Portfolio", value begin = \$ 1156930.40, value end = \$ 1535186.44
Strategy "Buy and Hold Equally Portfolio", value begin = \$ 1274550.67, value end = \$ 1493213.56

- Plot one chart in MATLAB that illustrates the daily value of your portfolio (for each trading strategy) over the years 2015 and 2016 using daily prices provided.



- Plot two charts in MATLAB for strategy 3 and 4 to show dynamic changes in portfolio allocations. In each chart, x-axis represents the rolling up time horizon, y-axis denotes portfolio weights between 0 and 1, and distinct lines display the position of selected assets over time periods.





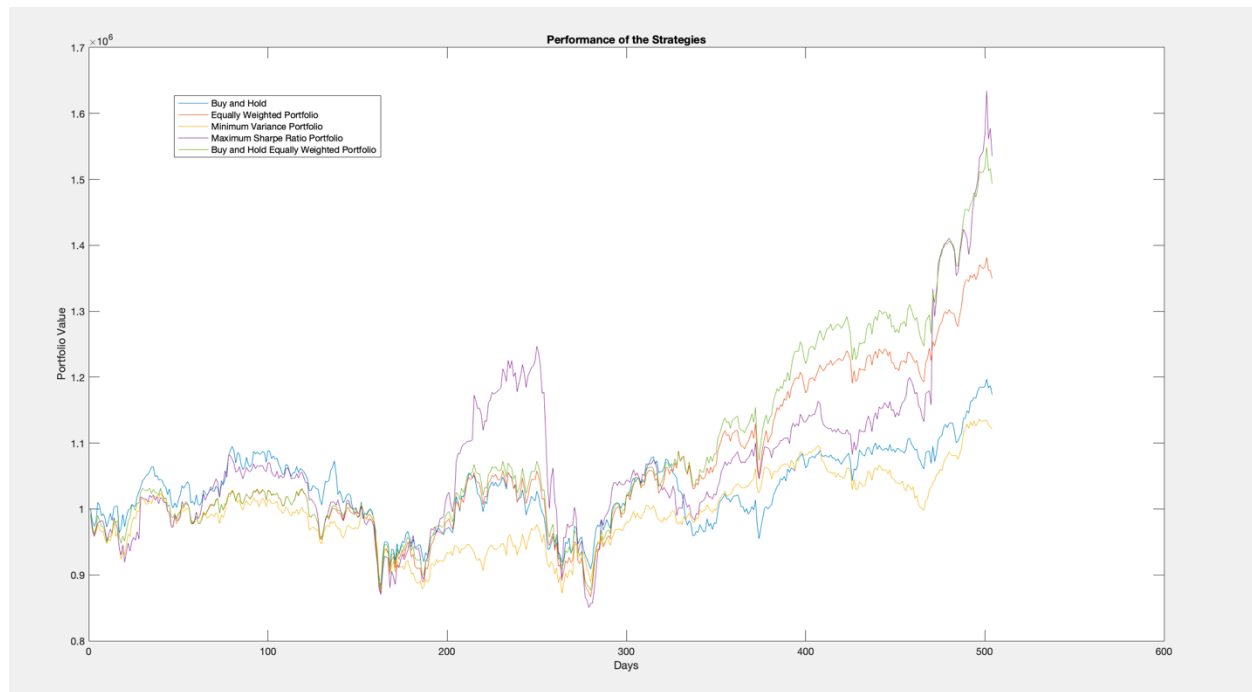
- Compare your trading strategies and discuss their performance relative to each other. Which strategy would you select for managing your own portfolio and why?

For the Buy and Hold strategy, we hold the initial portfolio and cash account for two years and no transaction cost. For the Equally weighted portfolio, we invest money in each stock equally and we should re-balance our portfolio in each period after paying the transaction cost. For the Minimum Variance Portfolio, we minimize risk of portfolio for each period and re-balance accordingly. For the Maximum Sharpe Ratio Portfolio, we find the best portfolio on the efficient frontier for each period and re-balance accordingly.

Based on the output and the Performance of the Strategies plot, after 12 periods (2 years), the Maximum Sharpe Ratio Strategy would product the highest portfolio value and the Minimum Variance Strategy would product the lowest portfolio value. The reason might be that there is negative relation between risk and return. So when we choose to minimize the risk, we should expect a lower return. In between, the final portfolio value introduced by Equally Weighted Strategy is higher than the value introduced by Buy and Hold Strategy. Although different strategies would create portfolio with different values, the general pattern of each portfolio over 12 periods are similar, which means all the portfolio values move in the same direction but different magnitudes. According to the Dynamic Change plots, we can figure out that the weight of each stock varies in each period.

For managing my own portfolio, I would choose Maximum Sharpe Ratio Strategy. Since it select the portfolio with the best combination of risk and return in each period, therefore, it would come out with the highest portfolio value.

- Test your MATLAB program for different variations of your strategies, e.g., select “1/n” portfolio at the beginning of period 1 and hold it till the end of period 12 (as if the re-balancing strategy required large transaction costs). Discuss if you are able to achieve better results. Can you suggest any improvements of the trading strategies that you have implemented?



The Buy and Hold Equally Weighted Strategy selects “1/n” portfolio at the beginning of period 1 and hold it till the end of period 12. It can produce a portfolio value just lower than the Maximum Sharpe Ratio Portfolio after 12 periods, which is better than both Buy and Hold Portfolio and Equally Weighted Portfolio. This may because it only has transaction cost for the first period and select the portfolio based on equally weighted strategy in the first period. Therefore, we will achieve better results.