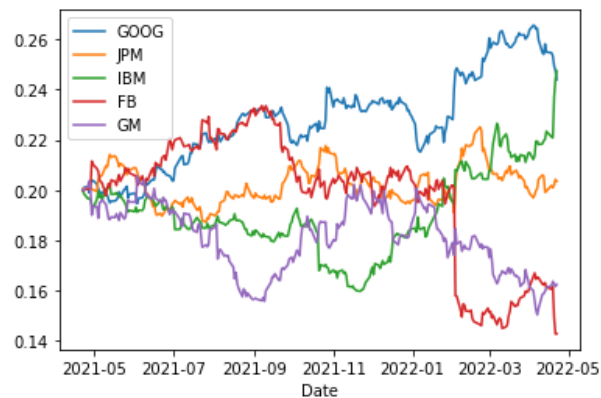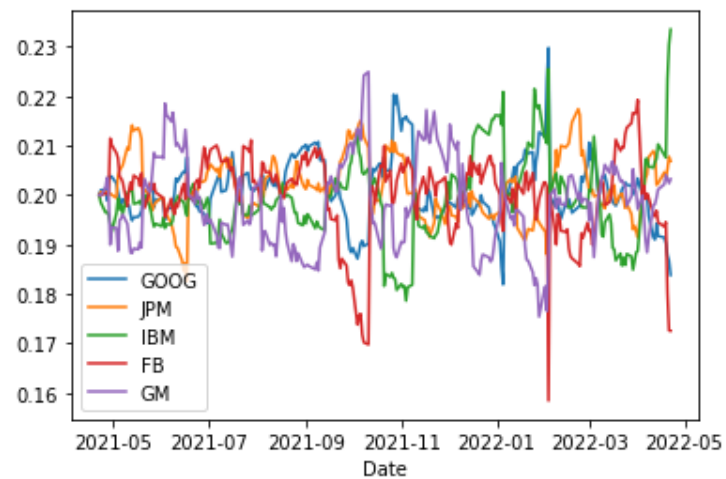Evelyn Baranski

Stocks chosen: JPM, GOOG, IBM, FB, and GM

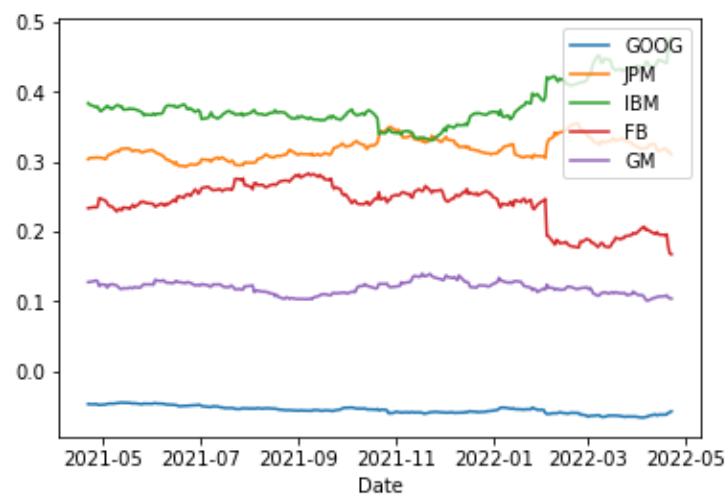Equally-weighted portfolio without rebalancing:
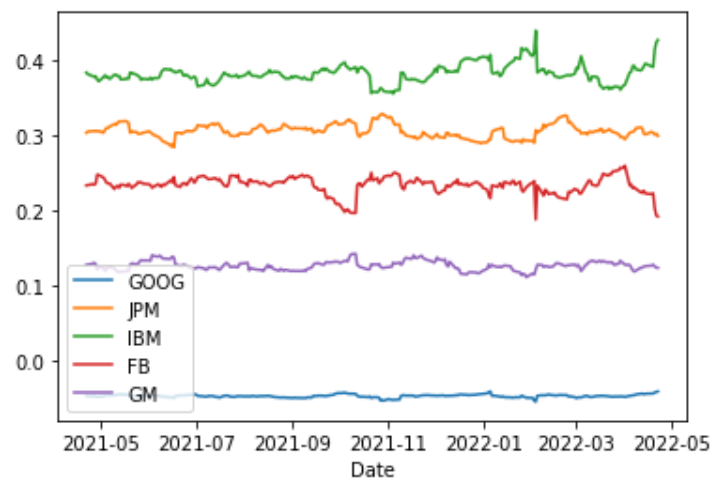
Plotted relative weights:



Equally weighted portfolio, rebalanced:

Efficient portfolio, no rebalance:



Efficient portfolio rebalanced



Descriptive stats of all:

```
Equally weighted portfolio without rebalancing:
            GOOG          JPM          IBM           FB           GM     portfolio
count  253.000000   253.000000   253.000000   253.000000   253.000000   253.000000
mean     0.000384    -0.000349     0.000398    -0.001467    -0.001069    -0.000449
std      0.016180     0.015211     0.013232     0.027223     0.024038     0.012892
min     -0.046830    -0.061463    -0.095631    -0.263901    -0.089150    -0.063809
25%     -0.008163    -0.008527    -0.006216    -0.012081    -0.015141    -0.008004
50%      0.001860    -0.000505     0.000070    -0.000397    -0.001418    -0.000042
75%      0.008682     0.009908     0.007094     0.013867     0.013058     0.007922
max      0.073674     0.044686     0.071003     0.072973     0.074710     0.037406

Equally weighted portfolio with rebalancing:
            GOOG          JPM          IBM           FB           GM     portfolio
count  253.000000   253.000000   253.000000   253.000000   253.000000   253.000000
mean    -0.000599    -0.000217     0.000296    -0.000496    -0.000083    -0.000410
std      0.021296     0.017094     0.018831     0.034021     0.026439     0.013096
min     -0.131449    -0.061463    -0.115201    -0.263901    -0.115080    -0.063363
25%     -0.008845    -0.008892    -0.006038    -0.012667    -0.014058    -0.008212
50%      0.001483    -0.000504     0.000656    -0.000648    -0.001182    -0.000071
75%      0.008723     0.009931     0.007404     0.013867     0.015107     0.007829
max      0.102282     0.075360     0.088724     0.259521     0.074710     0.038276

Mean variance portfolio without rebalancing:
            GOOG          JPM          IBM           FB           GM     portfolio
count  253.000000   253.000000   253.000000   253.000000   253.000000   253.000000
mean     0.000384    -0.000349     0.000398    -0.001467    -0.001069    -0.000475
std      0.016180     0.015211     0.013232     0.027223     0.024038     0.012377
min     -0.046830    -0.061463    -0.095631    -0.263901    -0.089150    -0.064715
25%     -0.008163    -0.008527    -0.006216    -0.012081    -0.015141    -0.007644
50%      0.001860    -0.000505     0.000070    -0.000397    -0.001418     0.000182
75%      0.008682     0.009908     0.007094     0.013867     0.013058     0.007007
max      0.073674     0.044686     0.071003     0.072973     0.074710     0.033059

Mean variance portfolio with rebalancing:
            GOOG          JPM          IBM           FB           GM     portfolio
count  253.000000   253.000000   253.000000   253.000000   253.000000   253.000000
mean    -0.000763    -0.000437     0.000059    -0.000687    -0.000289    -0.000445
std      0.023506     0.016676     0.017505     0.034599     0.026699     0.012499
min     -0.142586    -0.061463    -0.126546    -0.263901    -0.109022    -0.062772
25%     -0.009061    -0.009108    -0.006216    -0.012485    -0.014969    -0.007548
50%      0.001483    -0.000504     0.000416    -0.000648    -0.001014     0.000382
75%      0.008723     0.010098     0.007494     0.013867     0.015107     0.006917
max      0.143674     0.045023     0.071003     0.243371     0.074710     0.035921
```

```
Equally weighted portfolio without rebalance VaR: -0.08822270373381564 max drawdown: 0.2522745427473634

Equally weighted portfolio with rebalance VaR: -0.08915348741914425 max drawdown: 0.2579226391973651

Min variance portfolio without rebalance VaR: -0.08513144234413744 max drawdown: 0.254697425061858

Min variance portfolio with rebalance VaR: -0.08562026695427627 max drawdown: 0.2544014354072842
```

Summary of findings:

I was really surprised that the equally weighted portfolio with rebalancing ended up having the highest mean value out of all of the portfolios. I thought that the minimum variance portfolio using the mean rate of returns (with or without rebalancing) would surely have better returns. I actually initially did the problem wrong for the minimum variance portfolios and had it based on global minimum variance, which I later changed. Those obviously had the highest out of all of them until I used the mean rate of return from the other portfolios. Even more surprising, the mean variance portfolio without rebalancing actually had the lowest mean value. In terms of standard deviation, the mean variance portfolio with rebalancing

did best and the mean variance portfolio without rebalancing did the worst. The equally weighted portfolio with rebalancing had the highest VaR and drawdown out of the three. At the end of the assignment, all portfolio's lost money. I think that if I used the same stocks at a different time to would be interesting to see how these figures would change.