MA 374 Lab 03

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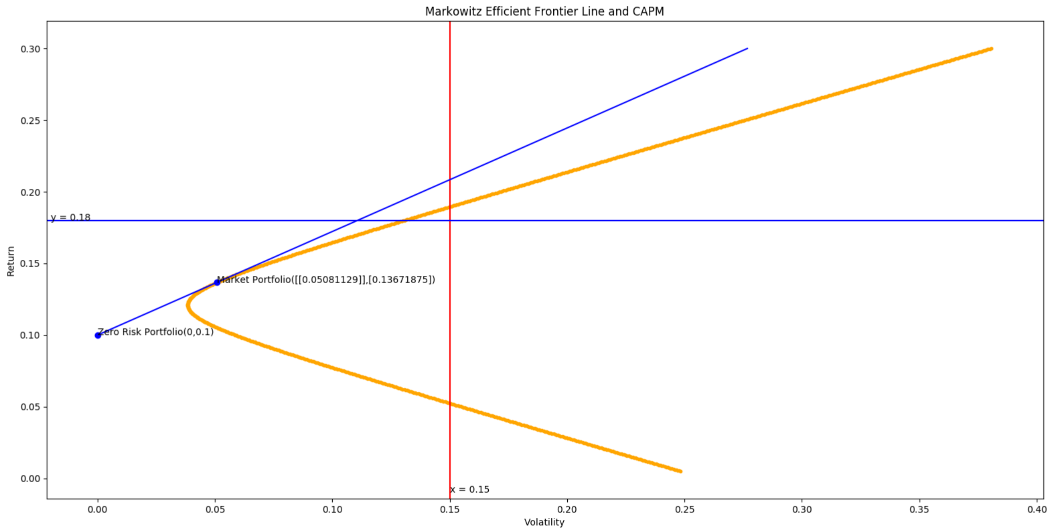
1.



Plot of Markowitz efficient frontier, Capital Market Line, Zero risk and Market Portfolio

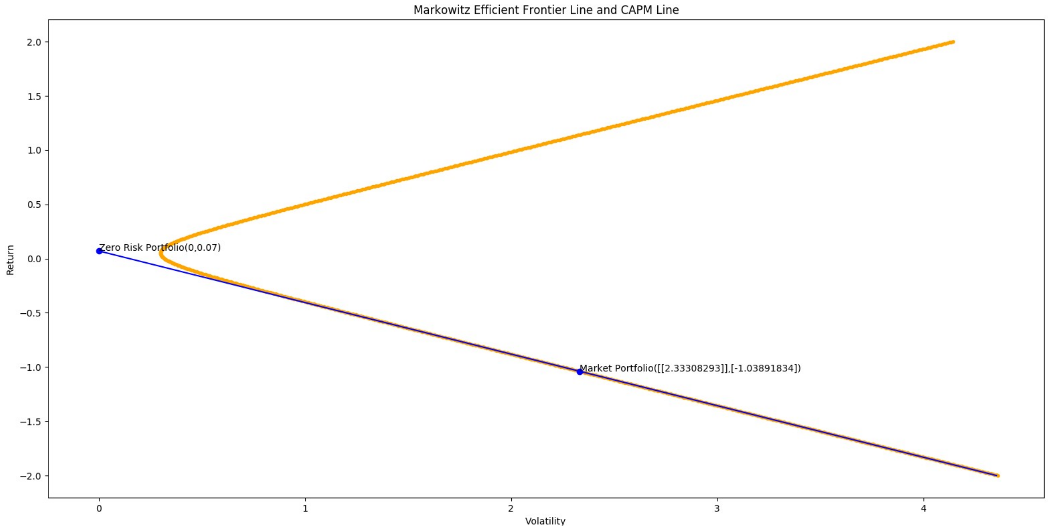
Index	Weight	Return	Risk
0	[2.47889908 -0.42110092 -1.05779817]	0.0050	0.24833741
111	[2.00978593 -0.23465851 -0.77512742]	0.0377	0.18016572
222	[1.54067278 -0.04821611 -0.49245668]	0.0705	0.11340272
333	[1.07155963 0.1382263 -0.20978593]	0.1033	0.05359987
444	[0.60244648 0.32466871 0.07288481]	0.1361	0.04997989
555	[0.13333333 0.51111111 0.35555556]	0.1688	0.10832963
666	[-0.33577982 0.69755352 0.6382263]	0.2016	0.1748854
777	[-0.80489297 0.88399592 0.92089704]	0.2344	0.24299542
888	[-1.27400612 1.07043833 1.20356779]	0.2672	0.31164229
999	[-1.74311927 1.25688073 1.48623853]	0.3000	0.3805356

For 15% risk, the maximum return is **0.1895** and corresponding portfolio is **[-0.16250379 0.6286874 0.53381639]** and the minimum return is **0.0525** and corresponding portfolio is **[1.7984737 -0.15067545 -0.64779826].**

For 18% return, the risk is **0.13079086** and the corresponding portfolio is **[-0.02726396 0.57493824 0.45232572].**

Portfolio(with risky and riskfree assets) at 0.10% risk = **[1.16853953 0.64577185 0.1537552 -0.96806658]**
Portfolio(with risky and riskfree assets) at 0.25% risk = **[2.92134883 1.61442961 0.384388   -3.92016644]**

2.



Plot of Markowitz efficient frontier, Capital Market Line, Zero risk and Market Portfolio

Details of the data taken:
The data is taken from **S&P500 dataset** from **NYSE**. The companies considered are **Apple, Adidas, Amazon, DE Shaw, Facebook, Google, IBM, Microsoft, Nike** and **Nvidia.**

The data was taken from 2012-02-08 to 2017-01-27 at an interval of 20 days. The return was obtained for each record by calculating the difference between closing and opening price.

The Zero risk portfolio is at **(0, 0.07)** and the Market Portfolio isat **(2.333, -1.038)**.

The Security Market Lines obtained are as follows: