

Financial Engineering Lab (MA374)

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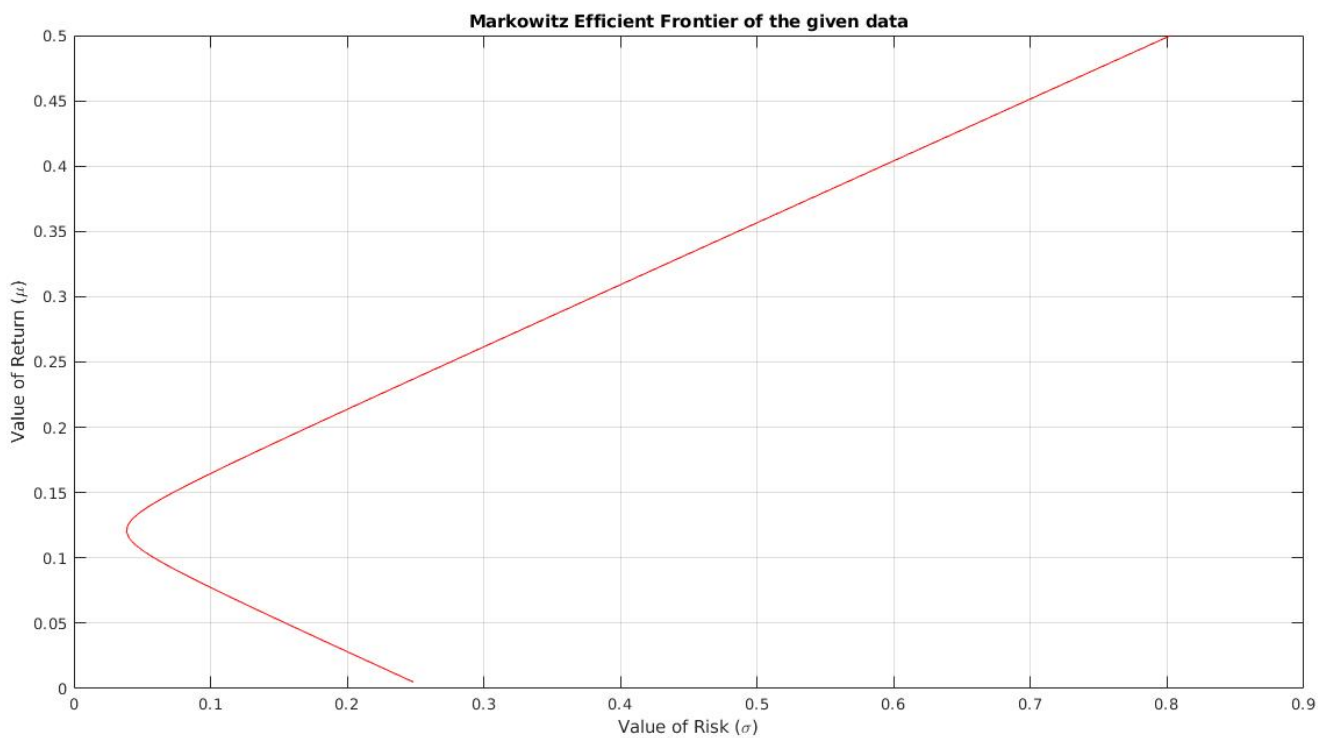
Assignment - 4
(31 January 2019)

◆ Question 1

$$M = \begin{bmatrix} 0.1 & 0.2 & 0.15 \end{bmatrix}$$

$$C = \begin{bmatrix} 0.005 & -0.010 & 0.004 \\ -0.010 & 0.040 & -0.002 \\ 0.004 & -0.002 & 0.023 \end{bmatrix}$$

a) Markowitz Efficient Frontier -



b) Weights, return and risk of the portfolios -

Return	Risk	W1	W2	W3
0.05	0.1550	1.8349	-0.1651	-0.6697
0.10	0.0587	1.1193	0.1193	-0.2385
0.15	0.0724	0.4037	0.4037	0.1927
0.20	0.1714	-0.3119	0.6881	0.6239
0.25	0.2755	-1.0275	0.9725	1.0550
0.30	0.3805	-1.7431	1.2569	1.4862
0.35	0.4859	-2.4587	1.5413	1.9174
0.40	0.5913	-3.1743	1.8257	2.3486
0.45	0.6969	-3.8899	2.1101	2.7798
0.50	0.8025	-4.6055	2.3945	3.2110

c) Risk = 15% (given) -

Maximum Return Portfolio for 15 % risk --

Return = 0.1896

Weights : -0.1624, 0.6287, 0.5338

Minimum Return Portfolio for 15 % risk --

Return = 0.0524

Weights : 1.7998, -0.1512, -0.6486

d) Return = 18% (given) -

Risk for 18 % return = 13.0568 % --

Weights : -0.0257, 0.5743, 0.4514

e) $\mu_{rf} = 10\%$ (given) -

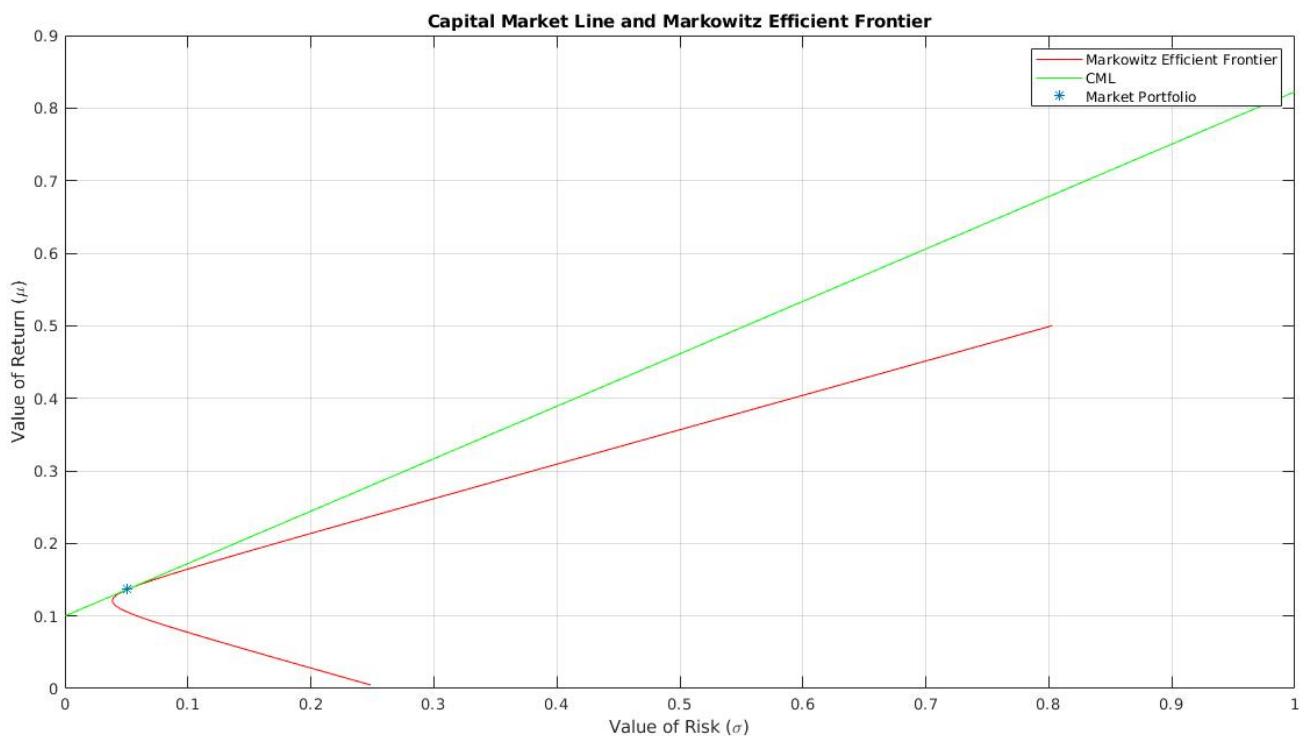
For 10 % risk-free return --

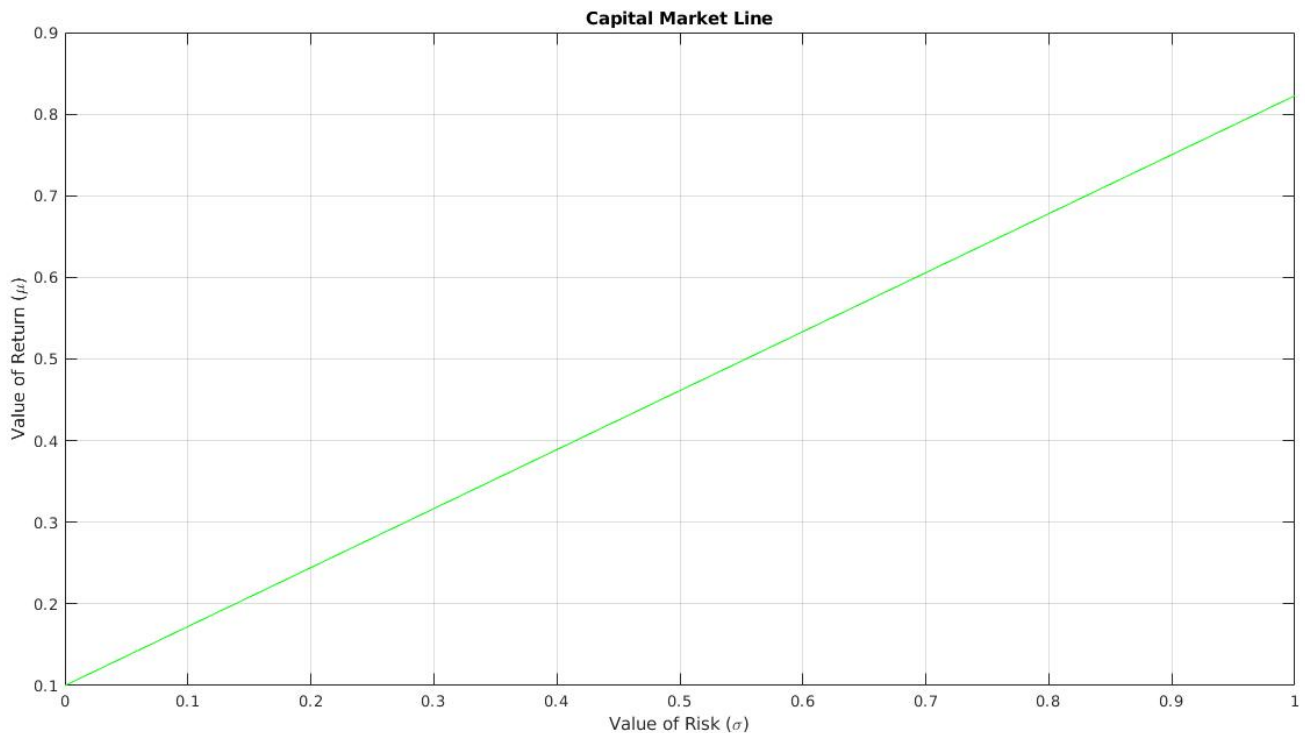
Weights : 0.5938, 0.3281, 0.07811

Return on market portfolio = 0.1367

Risk on market portfolio = 5.0811% (0.0508)

Capital Market Line (CML) -





f) Portfolios (consisting of both risky and risk free assets) with the risk at 10% and 25% -

Portfolio for 10 % risk -- (Weights)

Risk-Free Asset : -0.9681

Risky Assets Weights : 1.1685, 0.6458, 0.1538

Portfolio for 25 % risk -- (Weights)

Risk-Free Asset : -3.9202

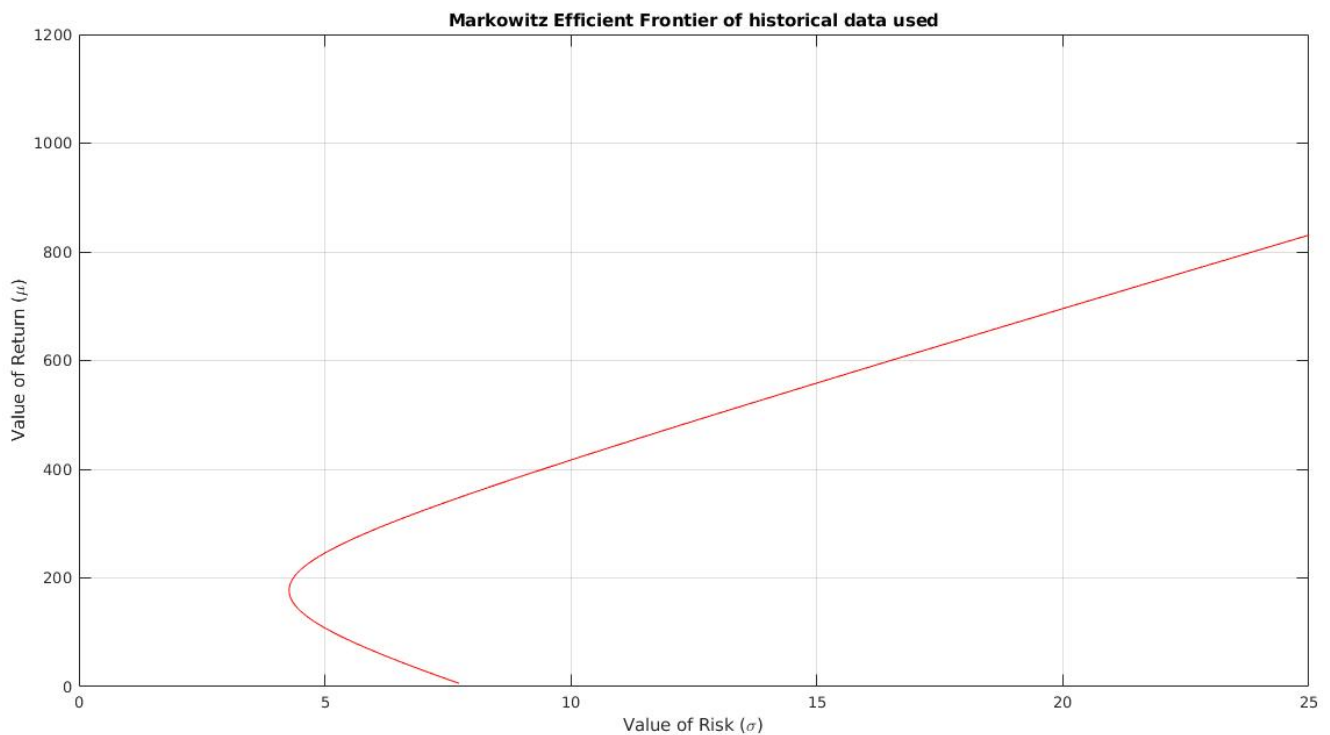
Risky Assets Weights : 2.9213, 1.6144, 0.3844

◆ Question 2

10 stocks were chosen having 247 data points. These stocks are listed on NSE. Data is taken from NSE official website for the dates 02-02-2018 to 01-02-2019 (247 working days). Data Can be found in the file '**data.csv**'. Stocks chosen are as following -

Asian Paints, Bharti Airtel, Cipla, IOC, JSW Steel, Maruti Udyog Ltd., NTPC, ONGC, SBI and Wipro

a) Markowitz Efficient Frontier -



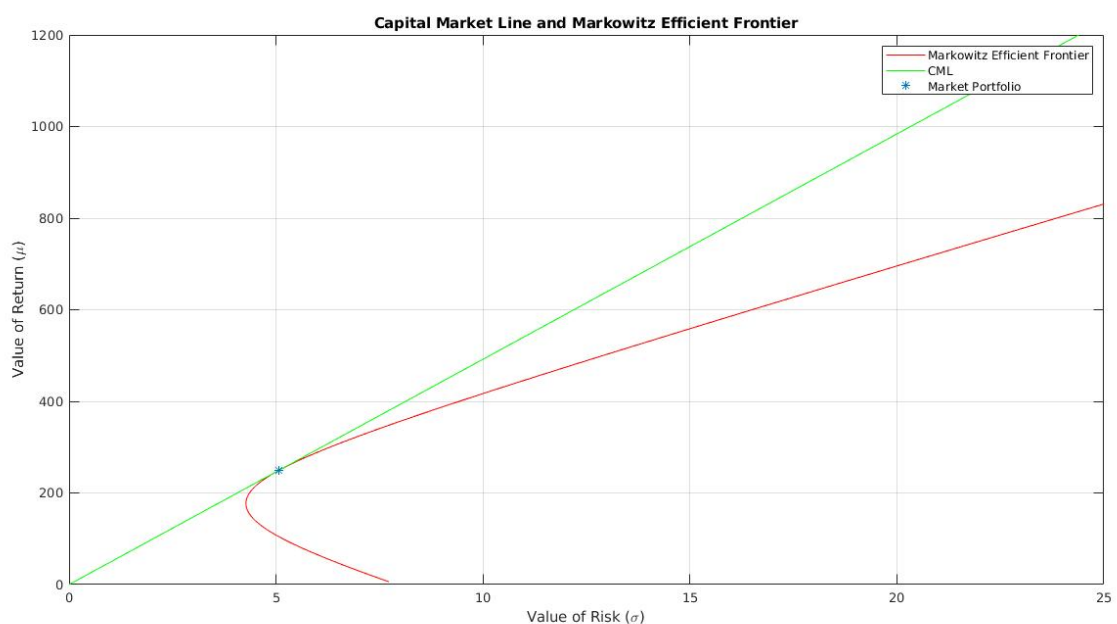
b) $\mu_{rf} = 7\%$ (given)

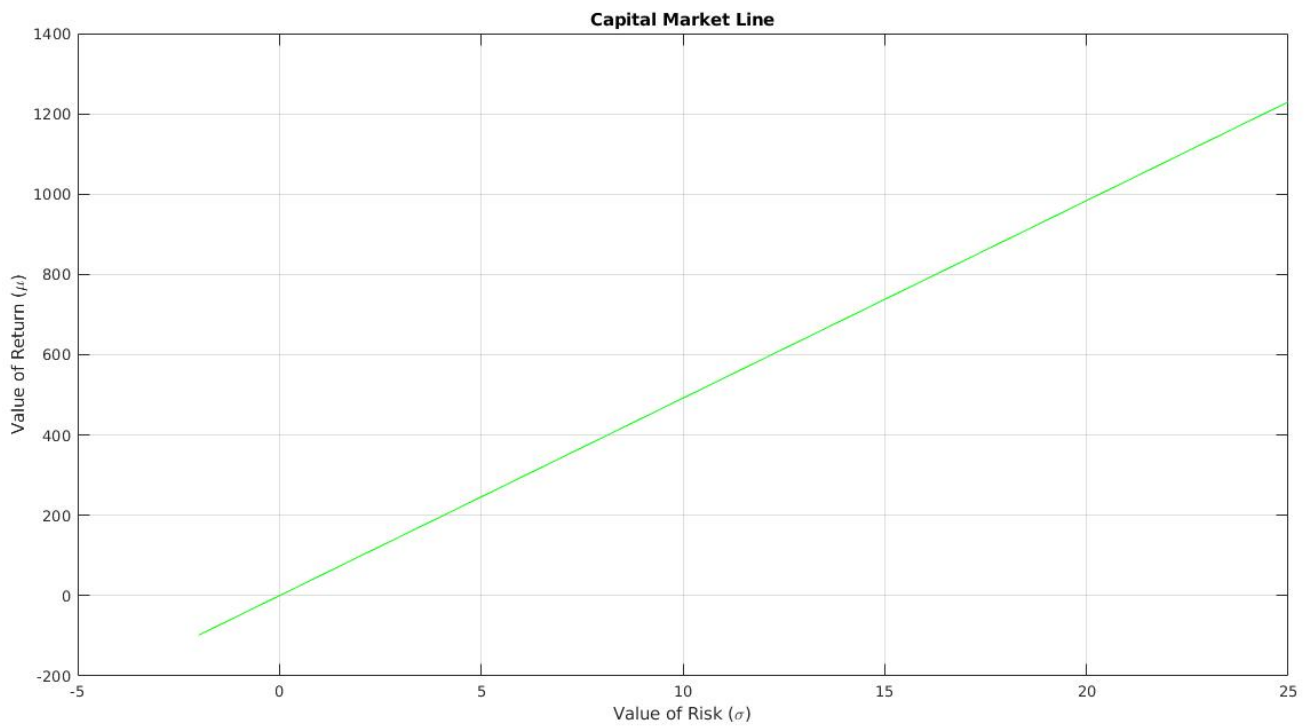
Weights : 0.0585, 0.0043, -0.0107, 0.0393, -0.0736, 0.0019, 1.0588,
-0.2668, 0.0286, 0.1596

Return on market portfolio = 249.6149

Risk on market portfolio = 507.3437% (5.0734)

c) Capital Market Line (CML) -





d) Security Market Line (SML) -

