MA374 – Financial Engineering Laboratory

Lab – 05

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Ques – 1

I took the two indexes **BSE SENSEX 30** and **NIFTY 50** for the data collection. Firstly, I collected the index prices for these two indexes for the given duration. Then I collected data for 10 stocks included in SENSEX 30, 10 stocks included in NIFTY 50 and 10 stocks which are neither included in SENSEX 30 nor in NIFTY 50. Thus, I formed 2 groups of 20 stocks each by combining each group of 10 stocks from SENSEX 30 and NIFTY 50 respectively with the 10 stocks not included in either two of them.

The closing prices of both groups and the index values are stored in two csv files names 'bsedata1' and 'nsedata1'.

Ques – 2

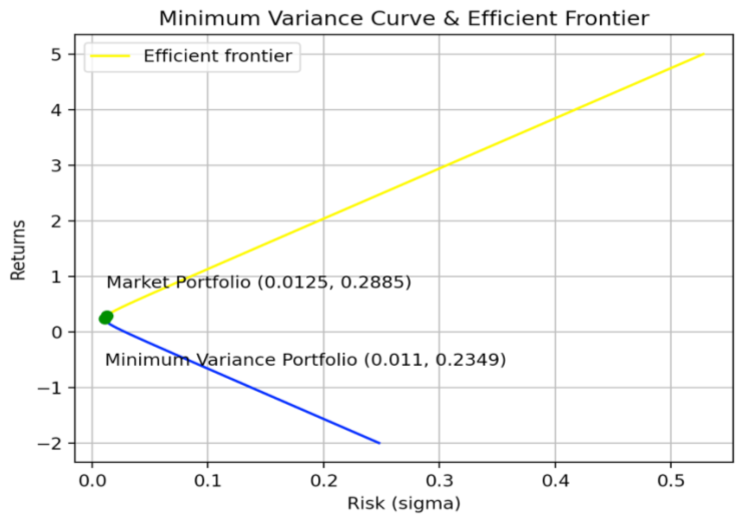
Observations for the collected data

Market portfolio for BSE using Index: -
Market return = 0.21962133416396296
Market risk = 0.9977618198216794 %

Market portfolio for NSE using Index: -
Market return = 0.18385327842255128
Market risk = 0.960812983451128 %

- 10 stocks from the BSE Index: -

i) The plot for Markowitz efficient frontier is:

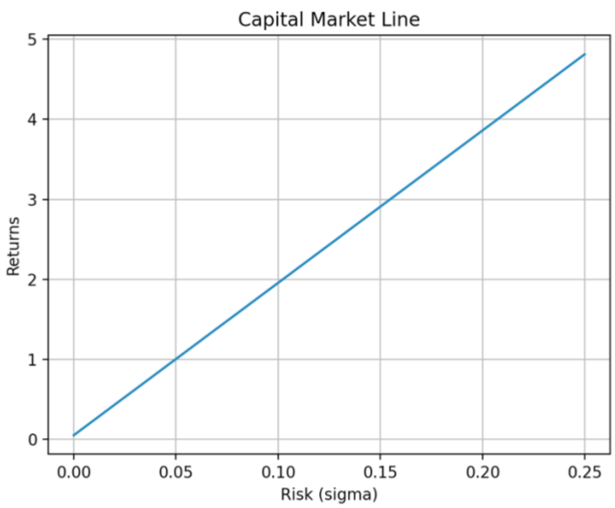


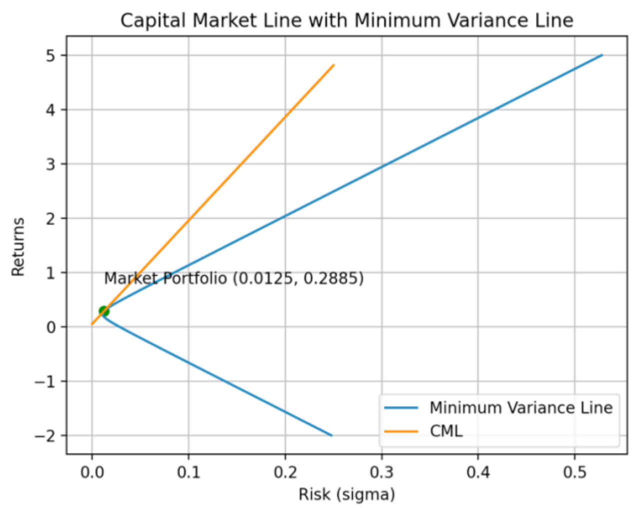
ii) Market Portfolio Weights = [0.07534816, -0.16664, 0.06307248, 0.09007522, 0.24273176, -0.14503317, 0.21779174, 0.09623905, 0.21088248, 0.31553227]

Return = 0.28846446855421337

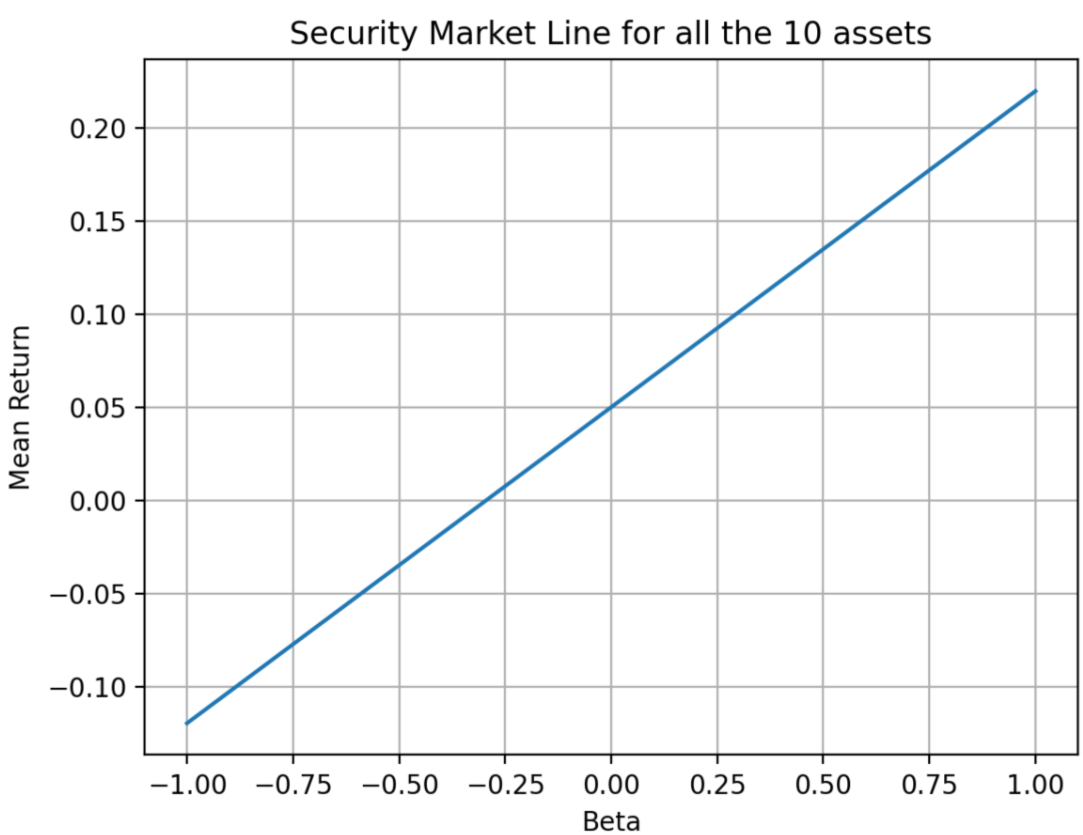
Risk = 1.2517333635070262 %

iii) Equation of CML is: y = 19.0507*x + 0.0500



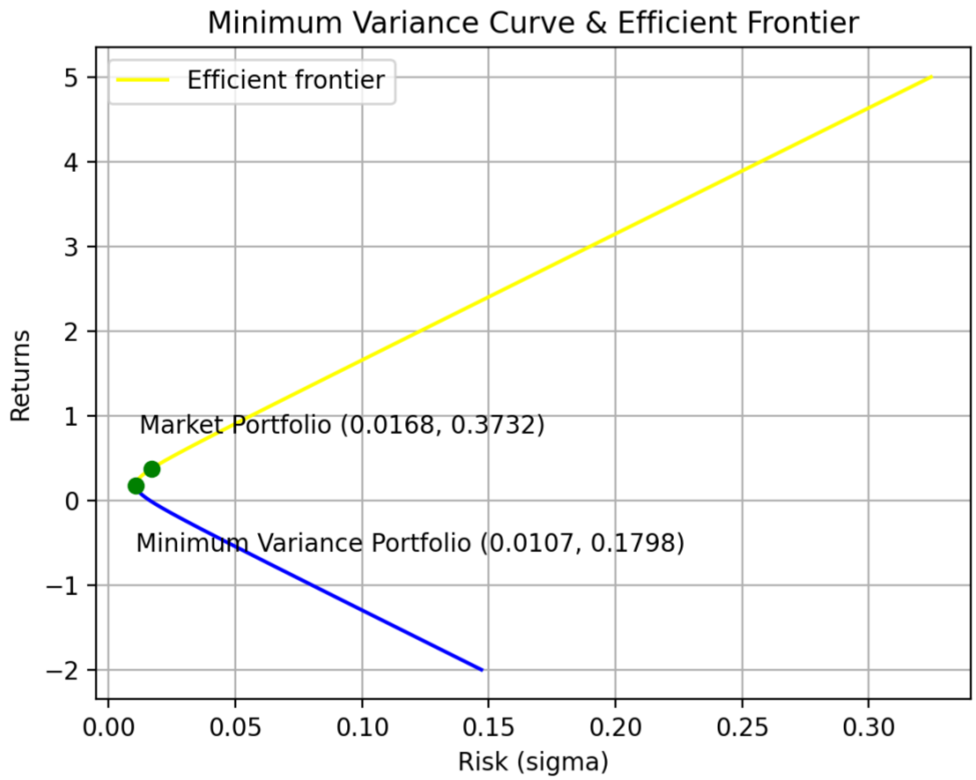


iv) Equation of Security Market Line is: mu = 0.17*beta + 0.05



➢ <u>10 stocks from the NSE Index</u>: -

i) The plot for Markowitz efficient frontier is:

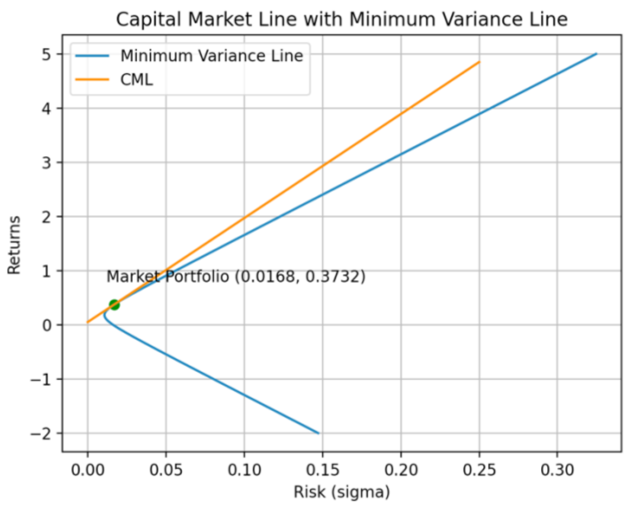


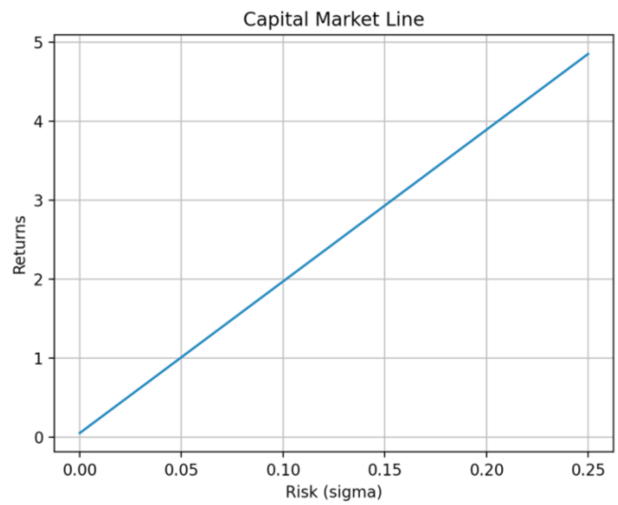
ii) Market Portfolio Weights = [0.45441185, 0.5720041, 0.08399827, -0.34154213, 0.13301761, 0.00649973, 0.34451697, -0.21148159, 0.06273349, -0.10415831]

Return = 0.37317369402107814

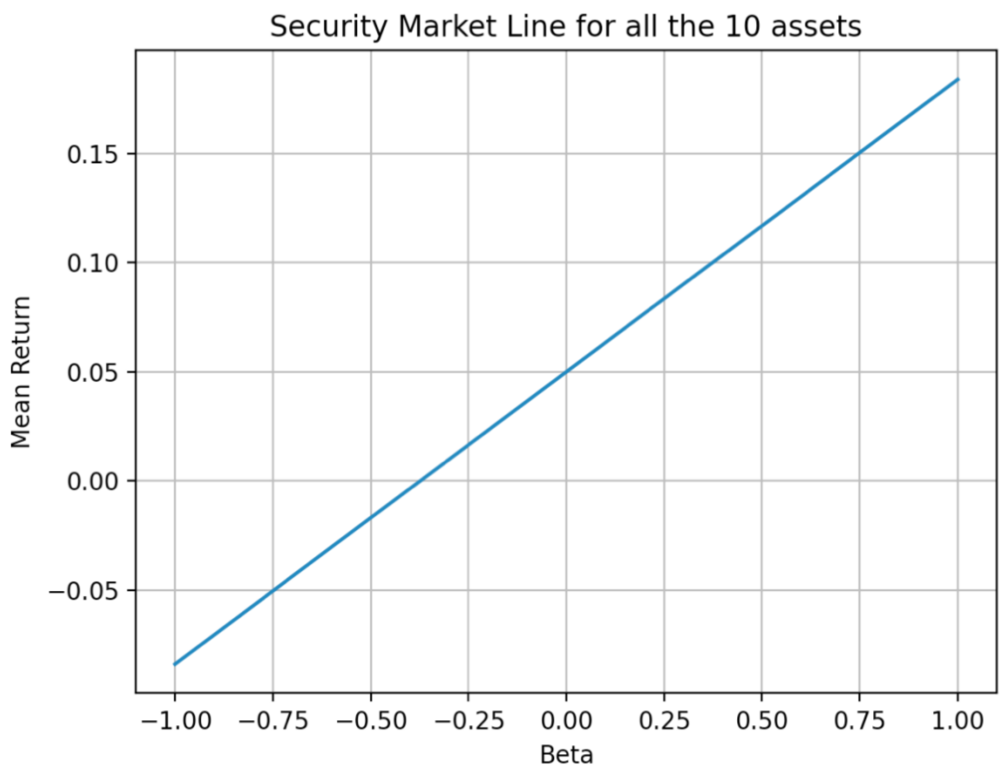
Risk = 1.6827198439086335 %

iii) Equation of CML is: y = 19.2054*x + 0.0500



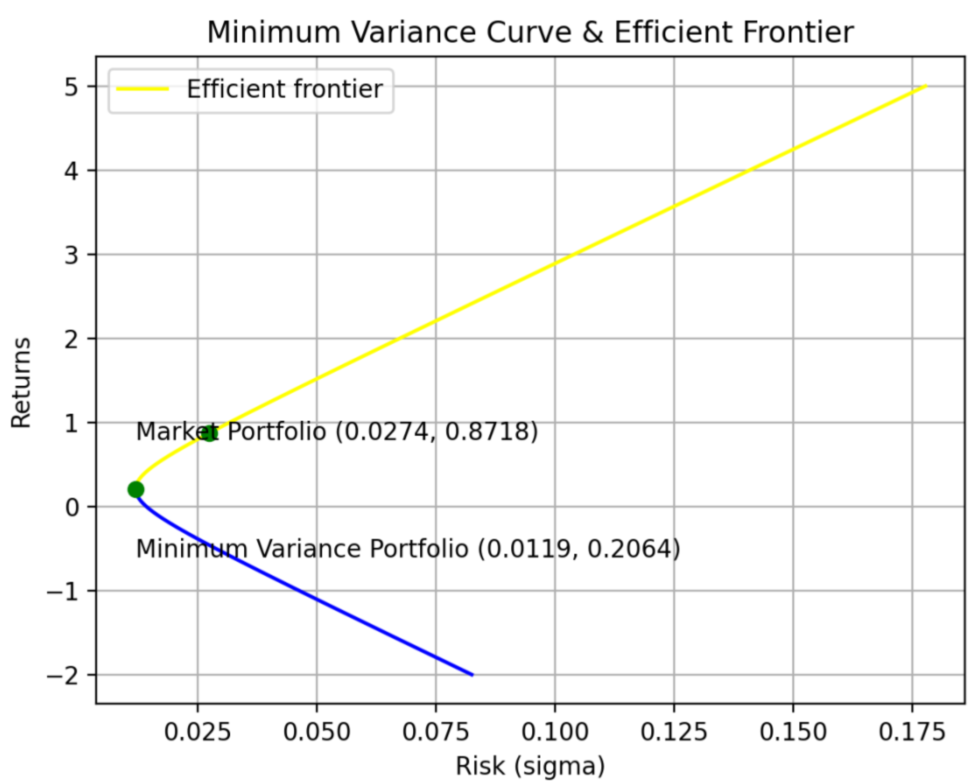


iv) Equation of Security Market Line is: mu = 0.13*beta + 0.05



➢ <u>10 stocks not from any Index</u>: -

i) The plot for Markowitz efficient frontier is:

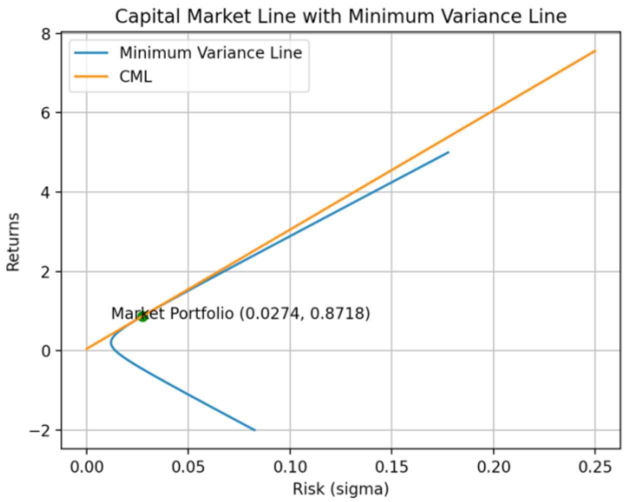


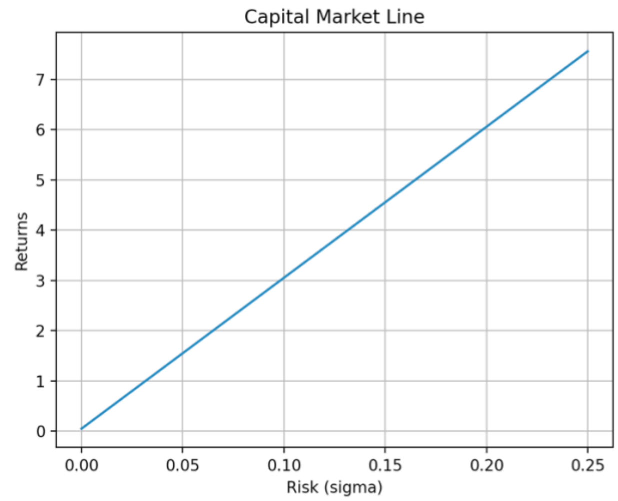
ii) Market Portfolio Weights = [-0.08662322, -0.58931445, 0.64624583, -0.01729321, 0.17933864, 0.11507626, -0.36724272, 0.06639928, 0.57524466, 0.47816893]

Return = 0.8718489845030102

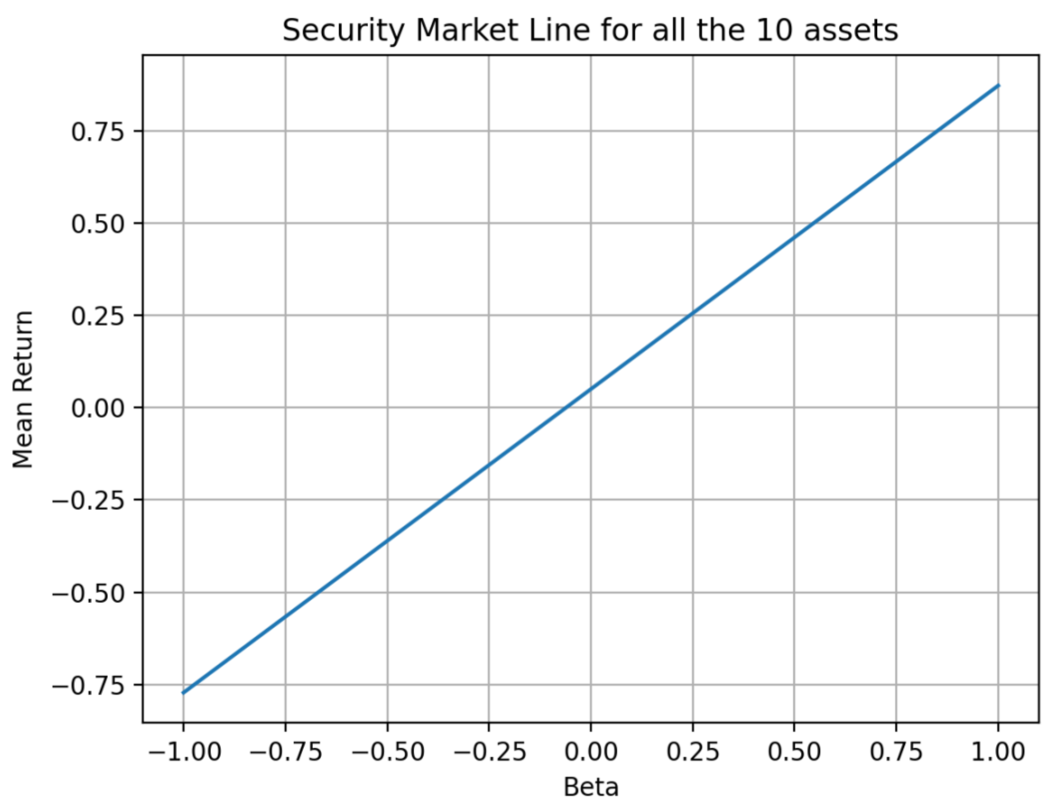
Risk = 2.7357253672079644 %

iii) Equation of CML is: y = 30.0414*x + 0.0500





iv) Eqn of Security Market Line is: mu = 0.82*beta + 0.05



➢ Following tables compares the expected and actual return value of each stock, where expected value is computed by making use of the security market line (SML) equation:

********** Inference about stocks taken from BSE **********

Stocks Name	Actual Return	Expected Return
Asian_Paints	0.21822377774907026	0.1712721321621859
Axis_Bank	0.18013177388872859	0.26646105550674964
Bajaj_Finance	0.28570780330531587	0.30825299165008463
DRL	0.20025107945274506	0.1298260313953044
ICICI_Bank	0.25862548098889826	0.27191166189189353
Induslnd_Bank	0.14702298618469023	0.3319063631927062
Nestle_India	0.2025905415467973	0.13675611318076003
Reliance_Industries	0.233052568948459	0.23779427556899974
Sun_Pharma	0.2615340137364315	0.1555228270584396
Titan_Company	0.3258723780540198	0.20129593631445325

********** Inference about stocks taken from NSE **********

Stocks Name	Actual Return	Expected Return
Apollo_Hospitals	0.36904930170886585	0.15607085434748158
Bajaj_Auto	0.2156890542297843	0.15472732334303224
Britannia_Industries	0.13713275612220366	0.1289977814105649
Hero_MotoCorp	0.10860747325112323	0.1821678997798491
Infosys	0.2111892577316002	0.14586126603287003
ITC	0.13568021380949993	0.13925771172799092
LTIMindTree	0.3174309627624144	0.13879060503487095
Maruti_Suzuki	0.11385866674925896	0.19517629693193161
TCS	0.17199235599792786	0.13439604670060307
Wipro	0.16677873747514577	0.13434625261910593

********** Inference about stocks not taken from any index with index taken from BSE values**********

Stocks Name	Actual Return	Expected Return
Ambuja_Cements	0.23169015438995397	0.21389522661431282
Bosch	0.07635444381411294	0.22053881687940918
Dixon_Tech	0.64154686494002	0.1778188851523641
Havells_India	0.18364118541447488	0.17585484923482858
InfoEdge_India	0.3427669538356274	0.19647606689156383
InterGlobe_Aviation	0.26847699251205304	0.1789193849870092
Oracle	0.07606684058254434	0.14617942065930145
Procter_and_Gamble	0.14442194047743137	0.09353741482305192
Siemens_Ltd	0.31337877640778855	0.1982915343108264
Tube_Invest_India	0.5671710914109043	0.13727625557307566

```
**********  Inference about stocks not taken from any index  with index taken from NSE values**********


Stocks Name                         Actual Return                   Expected Return

Ambuja_Cements                      0.23169015438995397             0.19558686935059527
Bosch                               0.07635444381411294             0.19166071159296133
Dixon_Tech                          0.64154686494002                0.1607895130114697
Havells_India                       0.18364118541447488             0.1546300657029136
InfoEdge_India                      0.3427669538356274              0.17417305970780936
InterGlobe_Aviation                 0.26847699251205304             0.1638107837819961
Oracle                              0.07606684058254434             0.1328953424124244
Procter_and_Gamble                  0.14442194047743137             0.08771172382689237
Siemens_Ltd                         0.31337877640778855             0.17689029903035347
Tube_Invest_India                   0.5671710914109043              0.12371424151689109
```

- The betas of the securities for the stocks from BSE index are: -

```
**********  Beta for securities in BSE  **********
Asian_Paints          = 0.7149580137423
Axis_Bank             = 1.2761428659528729
Bajaj_Finance         = 1.5225265909089398
DRL                   = 0.4706131559968822
ICICI_Bank            = 1.3082768331334111
Induslnd_Bank         = 1.6619746836810276
Nestle_India          = 0.5114693479353134
Reliance_Industries = 1.1071383001118837
Sun_Pharma            = 0.6221082246437047
Titan_Company         = 0.8919628952346548
```

- The betas of the securities for the stocks from NSE index are: -

```
**********  Beta for securities in NSE  **********
Apollo_Hospitals      = 0.7924412132262799
Bajaj_Auto            = 0.7824038721892673
Britannia_Industries= 0.5901818942467942
Hero_MotoCorp         = 0.987408760827047
Infosys               = 0.7161667399004816
ITC                   = 0.6668324659648605
LTIMindTree           = 0.6633427741274636
Maruti_Suzuki         = 1.0845927618869038
TCS                   = 0.6305116146216423
Wipro                 = 0.6301396096764967
```

- The betas of the securities for the stocks from non-index using market portfolio from BSE index are: -

```
**********  Beta for securities in non-index using BSE Index  **********
Ambuja_Cements      = 0.966241819887379
Bosch               = 1.0054090054176754
Dixon_Tech          = 0.7535542965887126
Havells_India       = 0.7419753526591891
InfoEdge_India      = 0.8635474282378538
InterGlobe_Aviation = 0.7600422766536574
Oracle              = 0.5670243140897032
Procter_and_Gamble  = 0.2566741680086472
Siemens_Ltd         = 0.8742504888417025
Tube_Invest_India   = 0.5145358395112658
```

- The betas of the securities for the stocks from non-index using market portfolio from NSE index are: -

```
**********  Beta for securities in non-index using NSE Index  **********
Ambuja_Cements      = 1.0876600936960477
Bosch               = 1.0583282924588768
Dixon_Tech          = 0.8276936830917707
Havells_India       = 0.7816772733247134
InfoEdge_India      = 0.9276803763880689
InterGlobe_Aviation = 0.8502651942727576
Oracle              = 0.6193000529336185
Procter_and_Gamble  = 0.2817392616103363
Siemens_Ltd         = 0.947980509149601
Tube_Invest_India   = 0.550709272014901
```