MA – 374 – Financial Engineering Lab Assignment – 5

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Question 1:

The considered 10 stocks in BSE are ['RELIANCE.BO', 'TCS.BO', 'HDFCBANK.BO', 'HINDUNILVR.BO', 'INFY.BO','KOTAKBANK.BO', 'ICICIBANK.BO', 'LT.BO', 'HDFC.BO', 'SBIN.BO'] and 10 stocks that are not in BSE are ['GOOGL', 'AAPL', 'AMZN', 'MSFT', 'NVDA', 'GOOG', 'NFLX', 'TSLA', 'INTC', 'CSCO'].

The considered 10 stocks in NSE are ['RELIANCE.NS', 'TCS.NS', 'HINDUNILVR.NS', 'INFY.NS','KOTAKBANK.NS', 'ICICIBANK.NS', 'LT.NS', 'SBIN.NS', 'ITC.NS', 'ONGC.NS'] and 10 stocks that are not in NSE are ['BABA', 'BIDU', 'NVDA', 'JD', 'PYPL', 'SNAP', 'MCD', 'UBER', 'LYFT', 'SQ'].

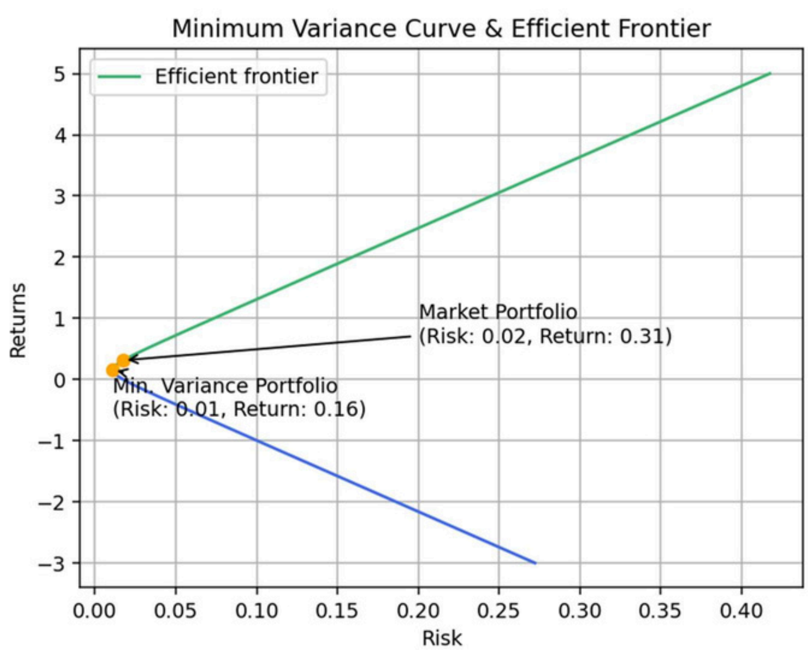
From the historical data, I have considered "Adj Close" as the column to work with and have taken daily returns corresponding to this column as "Adj Close" adjusts the closing price to account for dividends as well.

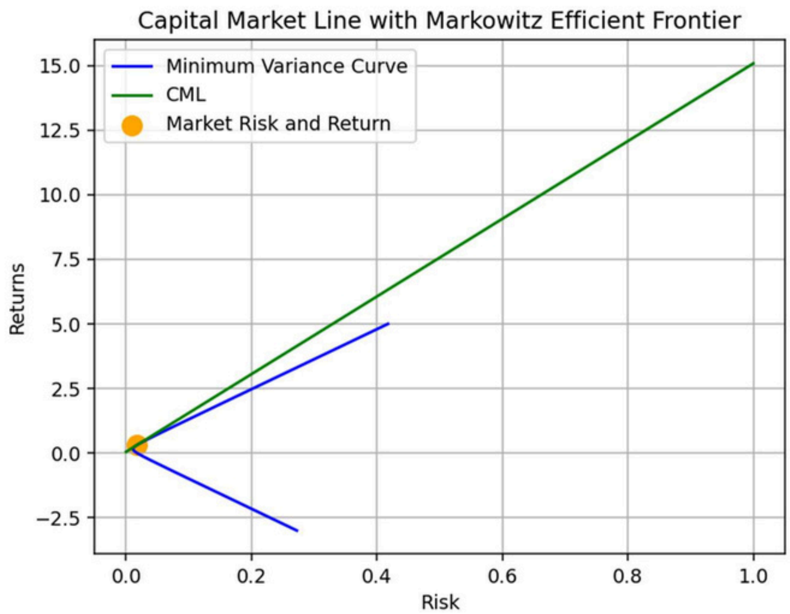
Question 2:

Annualized Market return for BSE turns out to be 15.863185384708489 %
Market risk for BSE turns out to be 1.2230637558275375 %

Annualized Market return for NSE turns out to be 15.817266614593944 %

Market risk for NSE turns out to be 1.203951638998675 %
Various Plots for BSE 10 stocks data

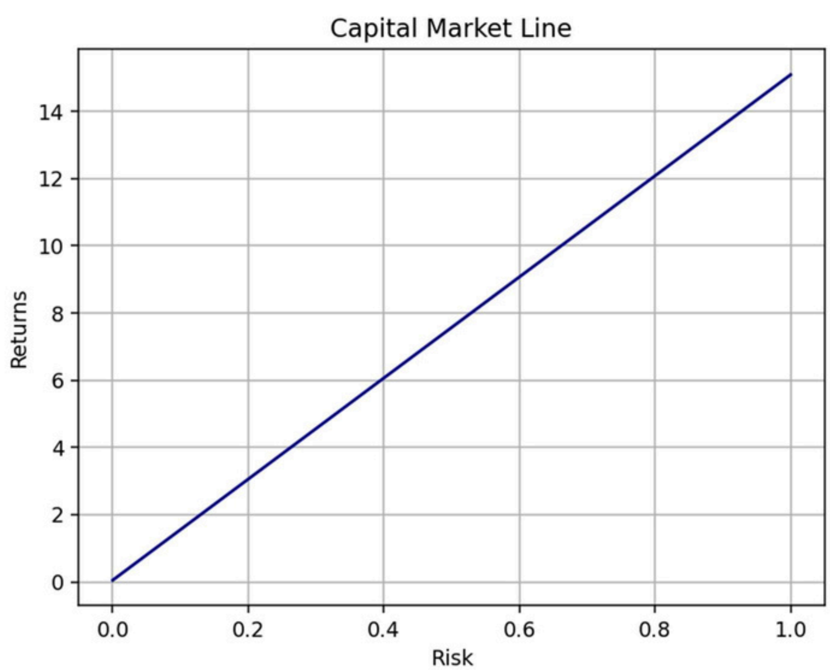




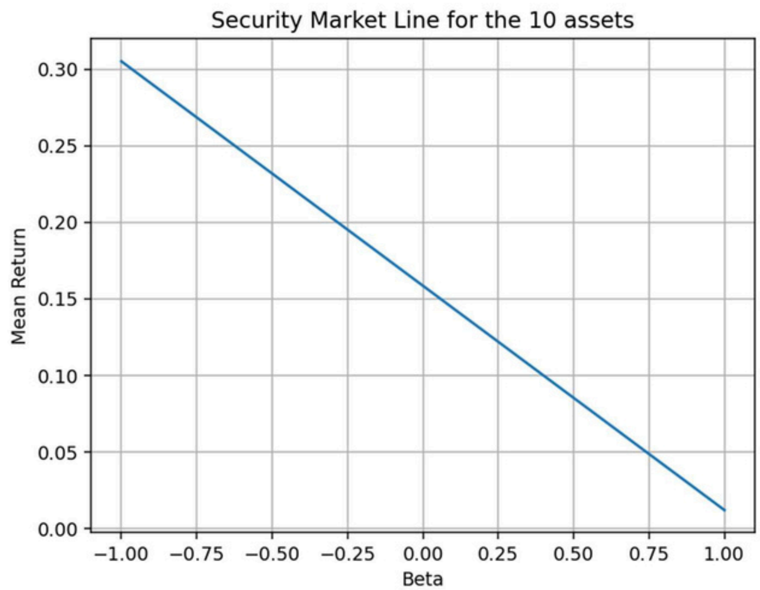
Market Portfolio Weights = [0.25613992 0.17347742 -0.05773937 -0.07607163 0.33980232 -0.15967616 0.55496632 0.45965836 -0.51629392 0.02573674]

Return = 0.3124718458205692

Risk = 1.7454793120572787 %

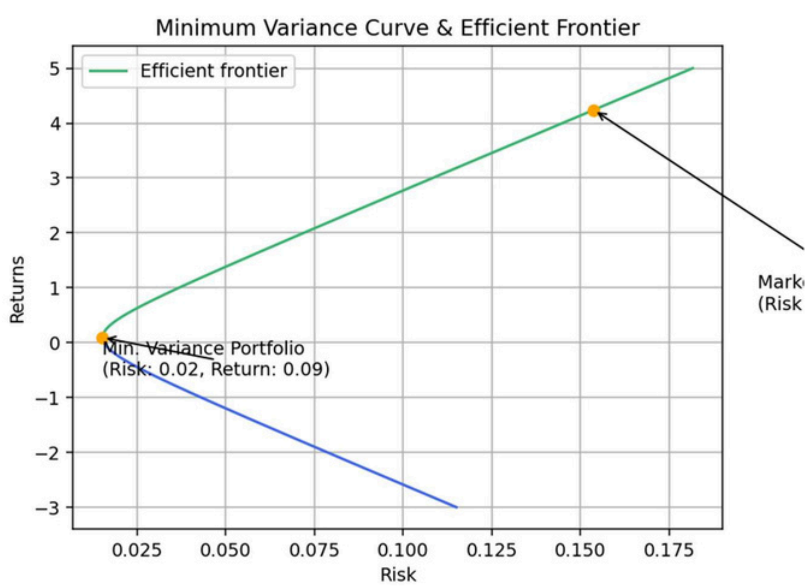


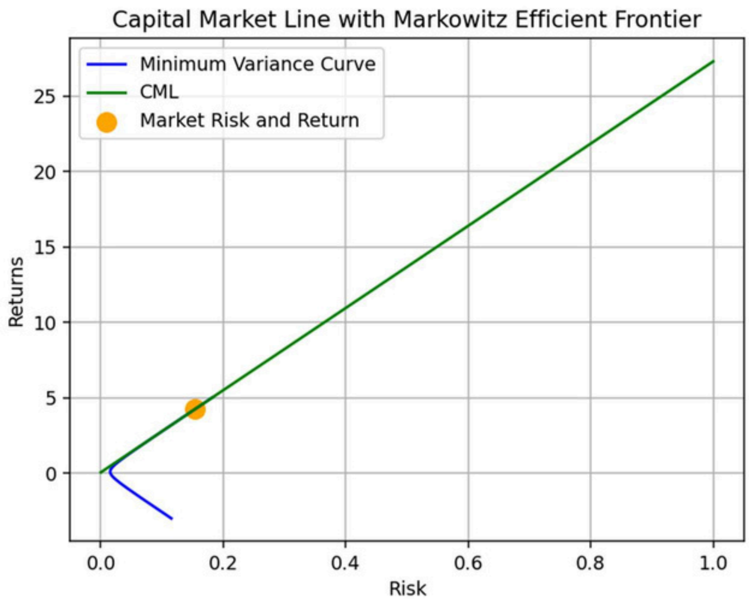
Equation of Capital Market Line is:
y = 15.04 x + 0.05



Equation of Security Market Line is: mu = -0.15 beta + 0.16

Various Plots for 10 stocks data that are not in BSE

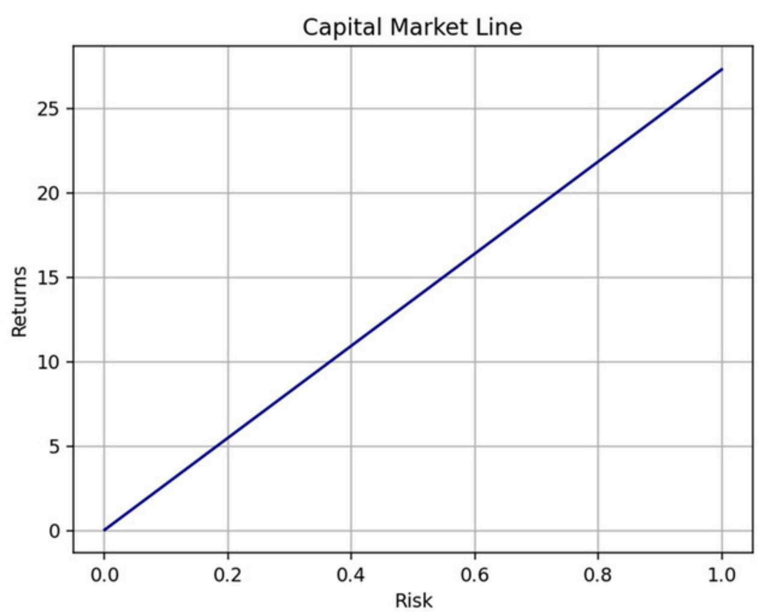




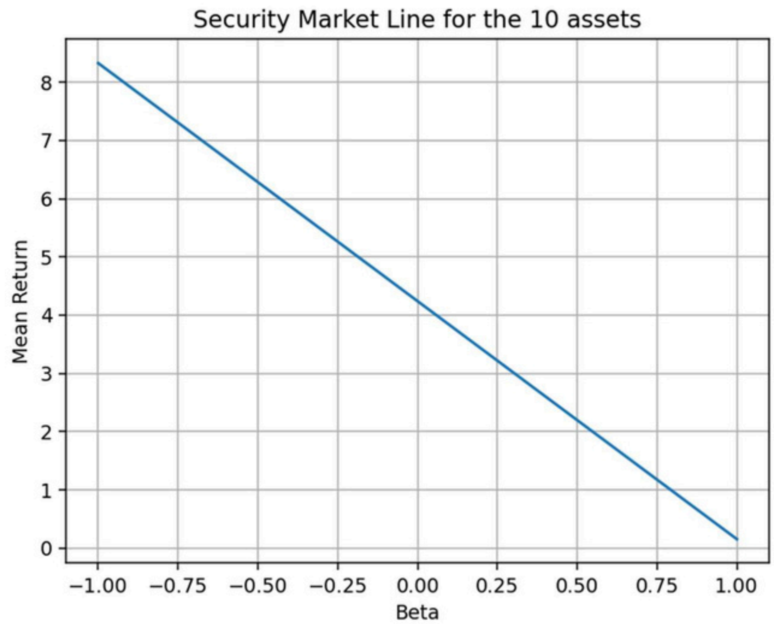
Market Portfolio Weights = [-9.84746259 4.12589087 -3.17620017 2.82495529 3.56481782 9.12847895 -0.61528102 1.21587431 -3.1943083 -3.02676515]

Return = 4.240194348816732

Risk = 15.37881815367812 %

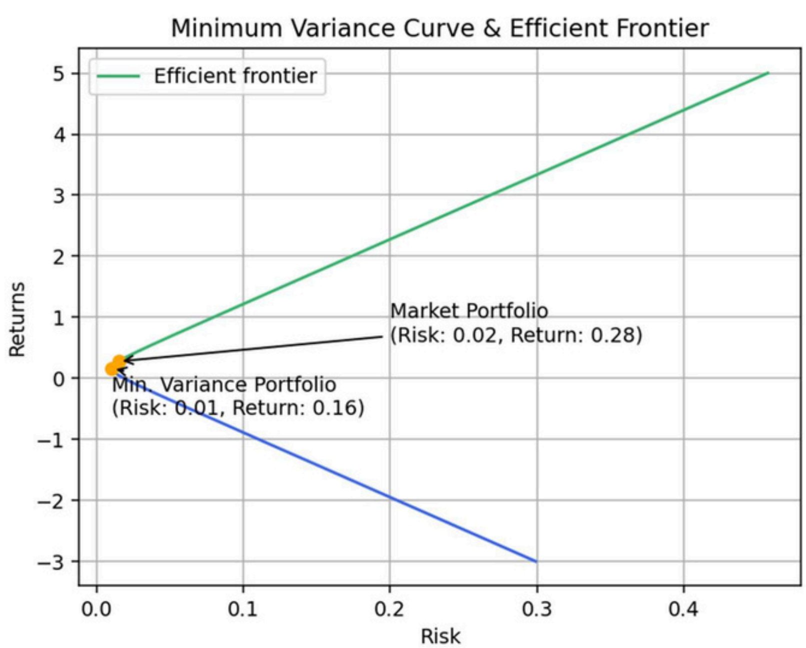


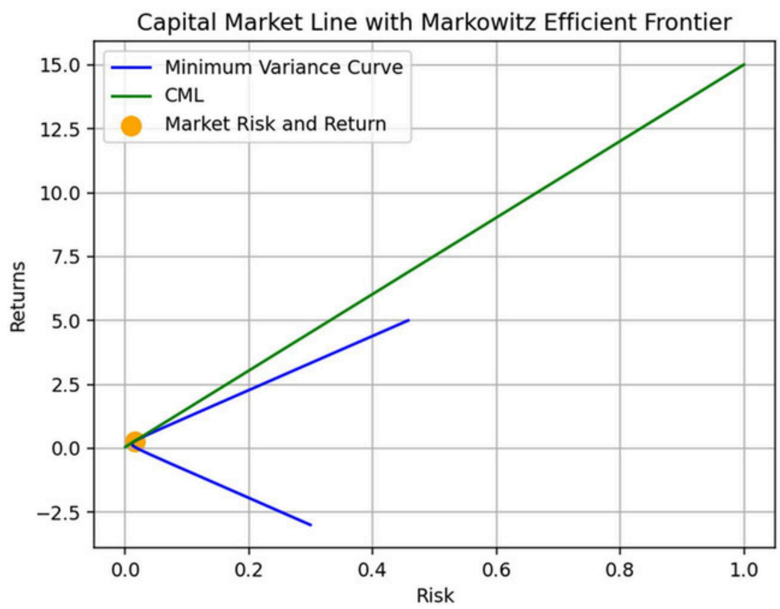
Equation of Capital Market Line is:
y = 27.25 x + 0.05



Equation of Security Market Line is: mu = -4.09 beta + 4.24

Various Plots for NSE 10 stocks data

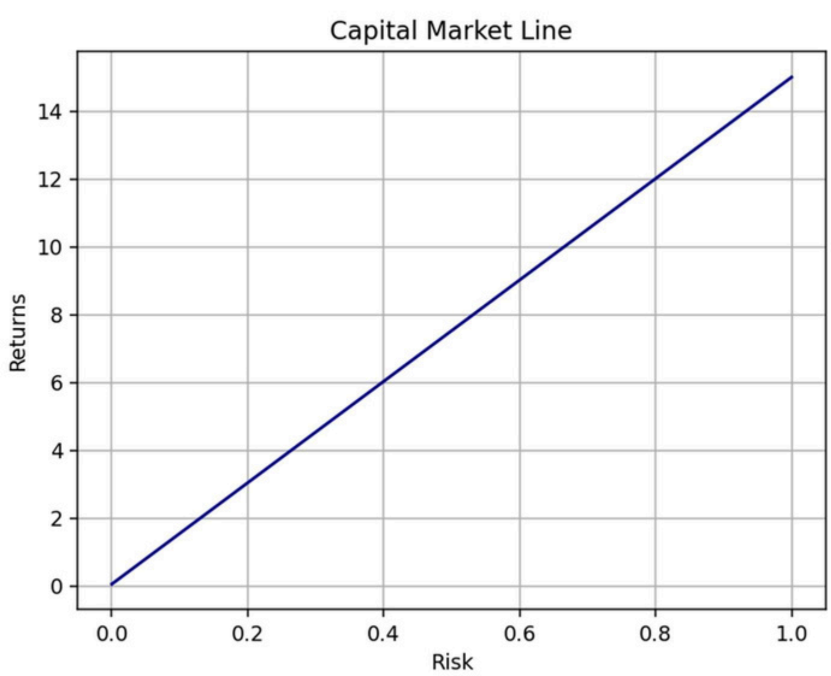




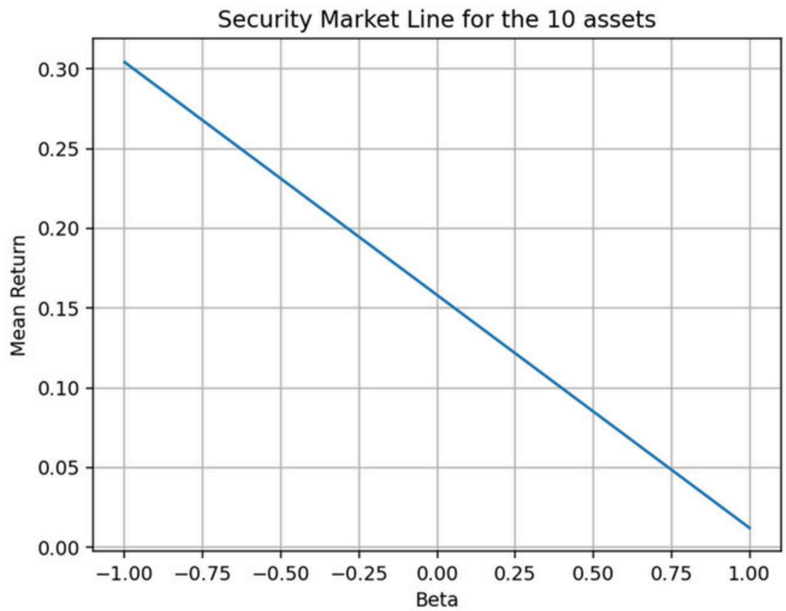
Market Portfolio Weights = [0.26152237 0.119224 -0.09982123 0.31910708 -0.34060085 0.33040169 0.31321515 -0.07521215 0.16266639 0.00949756]

Return = 0.2763653829942804

Risk = 1.5130294158770248 %

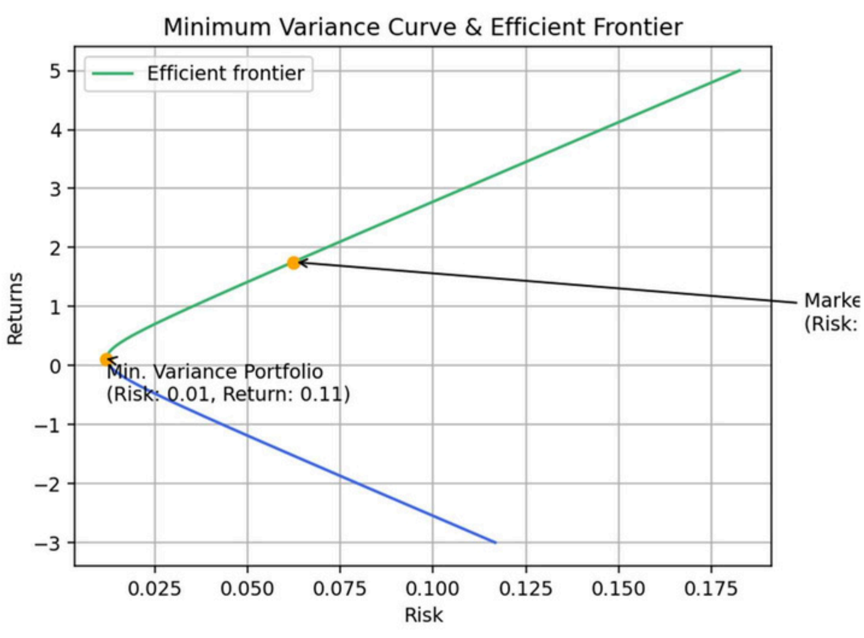


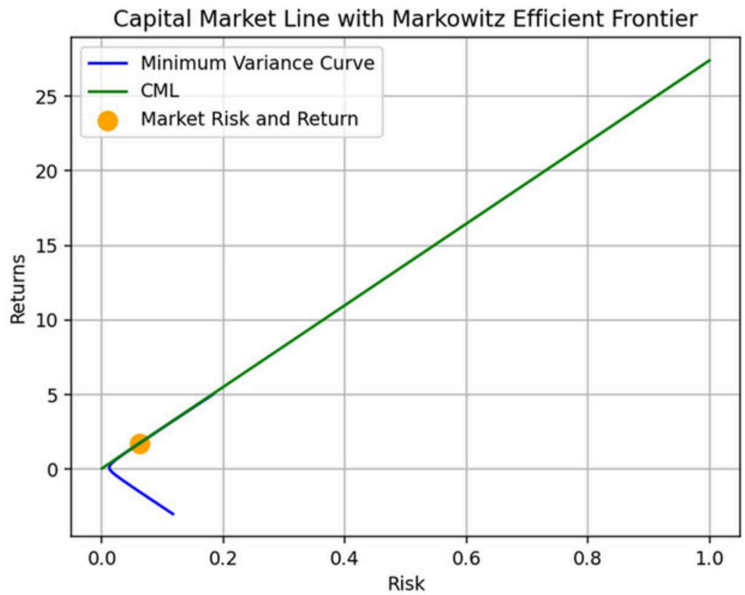
Equation of Capital Market Line is:
y = 14.96 x + 0.05



Equation of Security Market Line is: mu = -0.15 beta + 0.16

<u>Various Plots for 10 stocks not in NSE</u>

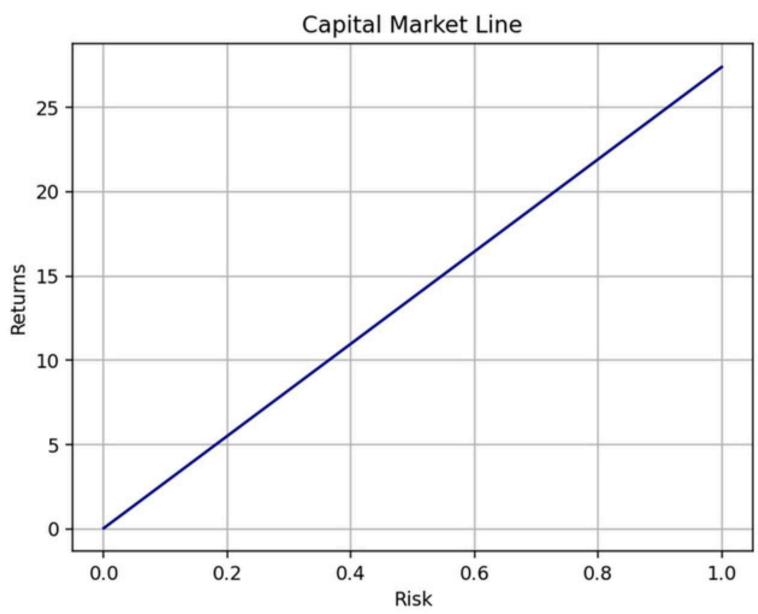




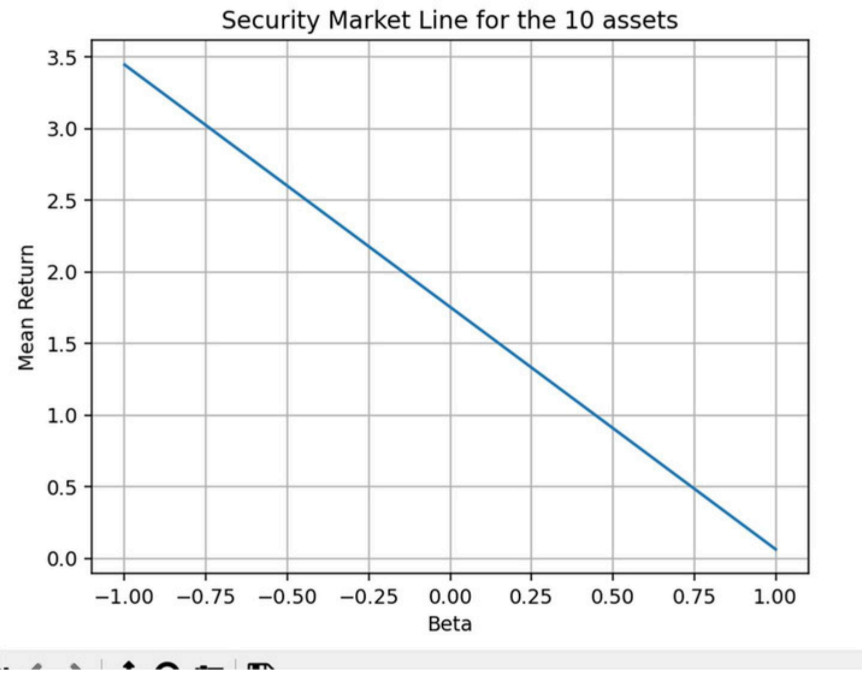
Market Portfolio Weights = [-0.75810016 -0.37697602 2.04531626 0.68377326 -1.56139217 0.30462237 0.46860488 0.42955696 -0.10133917 -0.13406621]

Return = 1.7547357773763197

Risk = 6.2344473420882975 %



Equation of Capital Market Line is:
y = 27.34 x + 0.05



Equation of Security Market Line is: mu = -1.69 beta + 1.75

Comparing the actual and expected returns, we have

Stock Name	Actual Return	Expected Return
RELIANCE_BO	0.21661325332436138	0.0490998775646343
TCS_BO	0.1776391299559106	0.04922676484876396
HDFCBANK_BO	0.13202031385930396	0.05475833018093281
HINDUNILVR_BO	0.10904009334520448	0.0620619828437701
INFY_BO	0.21730917727728838	0.054205588710129926
KOTAKBANK_BO	0.12757133643253243	0.056828660933932545
ICICIBANK_BO	0.2609466644205526	0.042324675981744775
LT_BO	0.22292266340067796	0.04853001885597762
HDFC_BO	0.12438222679850379	0.051653931261618095
SBIN_BO	0.21567005471613818	0.04687126952044692
GOOGL	0.23862927442080503	0.042191551114724495
AAPL	0.37428445737295196	0.041298542096535884
AMZN	0.18858623702178365	0.04555618961758751
MSFT	0.31621347822217843	0.04439979147508143
NVDA	0.6690006226974606	0.043124418483726 67
GOOG	0.24271365661811511	0.041912257541966084
NFLX	0.2207880542490225	0.0437355460672714
TSLA	0.6940243138406434	0.05737297617476386
INTC	0.08749868344267703	0.04323463947339252
CSCO	0.09166374524866731	0.04300422437277621

Stock Name	Actual Return	Expected Return
RELIANCE_NS	0.2338409542178818	0.06270039840724322
TCS_NS	0.1900636387899069	0.05338139143576062
HINDUNILVR_NS	0.1158476575808759	0.0562270737887706
INFY_NS	0.23679936420994213	0.05310452977757257
KOTAKBANK_NS	0.12459507640647771	0.04137214139859755
ICICIBANK_NS	0.25869352778117827	0.055716234935458075
LT_NS	0.2322204262831175	0.04929727118481129
SBIN_NS	0.21701286025030053	0.05660241539802686
ITC_NS	0.16715041215744783	0.04385857979434565
ONGC_NS	0.20131522706110552	0.07349917327473375
BABA	0.004377600271200079	0.05598693279923662
BIDU	0.06382459189622078	0.0628941013754326
NVDA	0.6716643349176304	0.06152008750513872
JD	0.20083018890812618	0.050572767105281614
PYPL	0.00795433914622028	0.05874234219304057
SNAP	0.4457052778787956	0.07920145660749513
MCD	0.1414610476764471	0.05845381468203832
UBER	0.23342312113428712	0.040973458904647236
LYFT	-0.08623429909652655	0.07227394803347863
SQ	0.20603441379673743	0.06974553558756512

We see that the Actual returns vs the expected returns vary by some amounts and this can be attributed to the fact that we have used "Adj Close" prices for our returns and hence the values vary.

Beta values for the stocks are

---------------------------------- Beta values for BSE ----------------------------------		
RELIANCE_BO	=	-0.008285989822402914
TCS_BO	=	-0.007117941228587382
HDFCBANK_BO	=	0.043802347216046304
HINDUNILVR_BO	=	0.11103541379998068
INFY_BO	=	0.03871413918839957
KOTAKBANK_BO	=	0.06286057626840166
ICICIBANK_BO	=	-0.07065445121703769
LT_BO	=	-0.013531768923796445
HDFC_BO	=	0.015225103899508523
SBIN_BO	=	-0.02880122513565151

---------------------------------- Beta values for Non-BSE ----------------------------------		
GOOGL	=	-0.07187991927549199
AAPL	=	-0.08010042722563387
AMZN	=	-0.040907065699788185
MSFT	=	-0.051552176701335516
NVDA	=	-0.06329249914073741
GOOG	=	-0.07445092918527
NFLX	=	-0.057666823412097286
TSLA	=	0.06787121745286968
INTC	=	-0.062277870505005946
CSCO	=	-0.06439893437767676

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---------------------------------- Beta values for NSE ------------------------------------
RELIANCE_NS              =               0.11740857334614152
TCS_NS           =               0.03125920397671137
HINDUNILVR_NS            =               0.05756605629345808
INFY_NS          =               0.028699762039553905
KOTAKBANK_NS             =               -0.07976006239656064
ICICIBANK_NS             =               0.052843616960925266
LT_NS            =               -0.006496362160849789
SBIN_NS          =               0.06103589412430043
ITC_NS           =               -0.05677423349599931
ONGC_NS          =               0.2172376267682097
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---------------------------------- Beta values for Non-NSE ------------------------------------
BABA             =               0.05534607782671677
BIDU             =               0.1191992564742439
NVDA             =               0.10649721334959582
JD               =               0.005294933791396711
PYPL             =               0.08081840361821141
SNAP             =               0.2699522684233228
MCD              =               0.07815111694328576
UBER             =               -0.08344567455862419
LYFT             =               0.20591105708190716
SQ               =               0.18253719993298248
```