Assignment - 2 Report

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- Google colab link:
  https://colab.research.google.com/drive/1iQIhmON9_lJV-13O9pSXpGpxtiZRCfIR?usp=sharing
- Dataset link:
  https://drive.google.com/file/d/1cXRkL_LDG8TB2q6HiMjF5dgT112p7jUU/view?usp=sharing

Q1. Pick any 10 risky assets from the market. Use their 3 months closing price to obtain simple returns.

S.No	Name of the asset
1	BandhanBank
2	Burgerking
3	Glenmark
4	ITC
5	CIL
6	Canara Bank
7	Castrol
8	Exide Ind
9	CUB
10	Rsys

- The above table contains the ten asserts selected as risky assets dated from 6th january 2021 to 6th april 2021

Q2. Use the mean-variance theory and build the Markowitz efficient frontier.

Equations used for calculating markowitz efficient frontier,

$$w = \frac{uC^{-1}}{uC^{-1}u^T}, \quad \sigma_V = \sqrt{wCw^T}, \quad \mu_V = mw^T$$
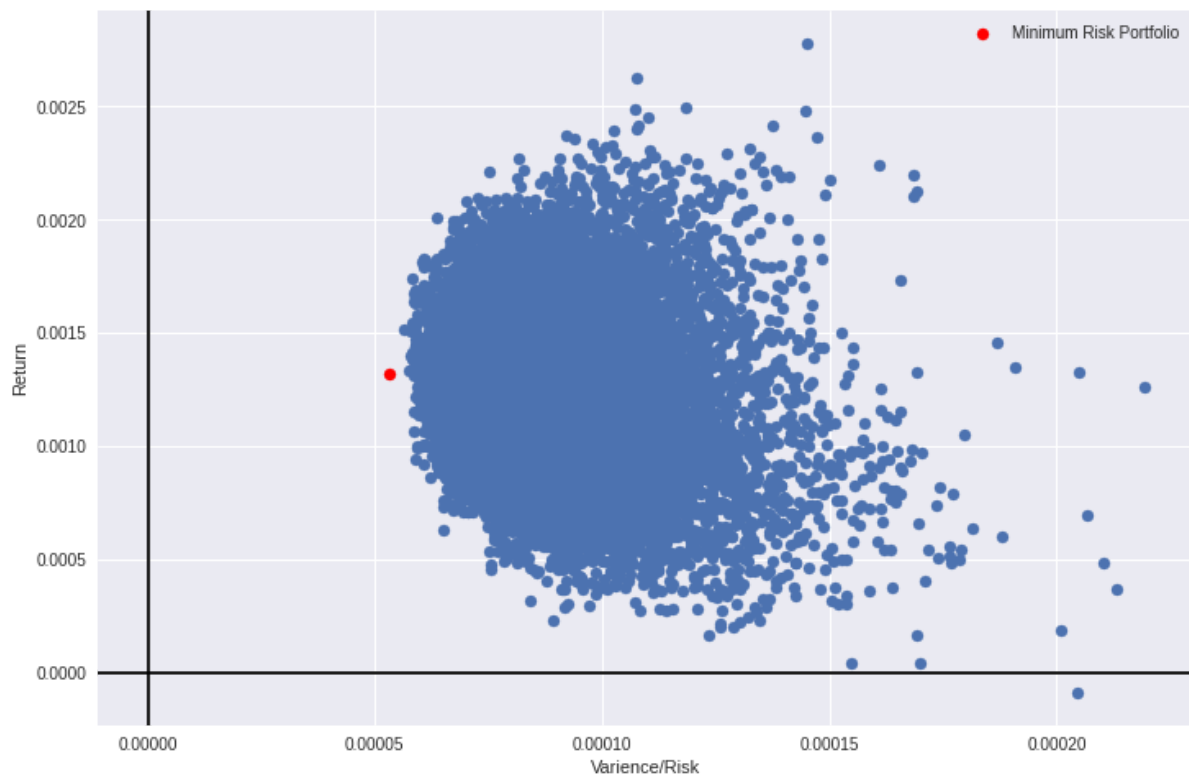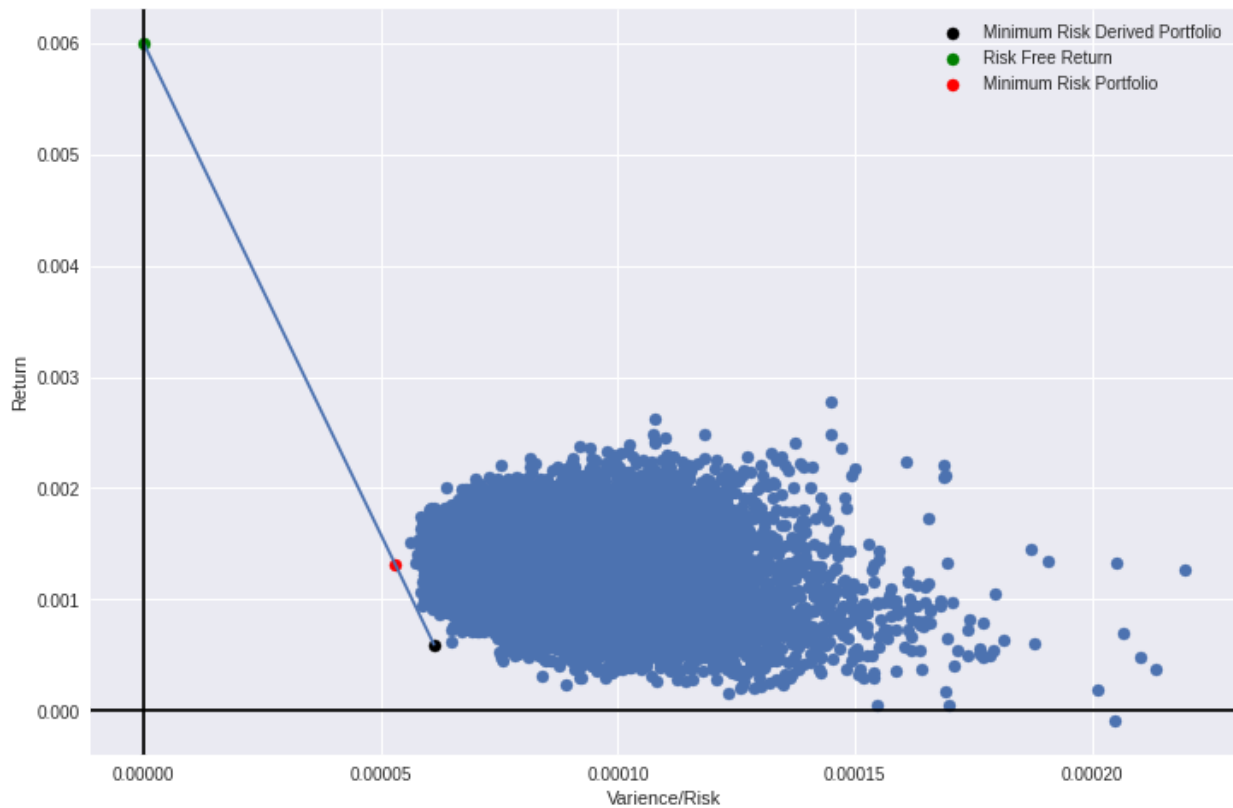

- X-axis in the above graph represents Risk (Variance)
- Y-axis in the above graph represents Return
- Red dot in the graph represents the minimum risk portfolio

Q3. Use a risk-free asset along with the 10 risky assets to obtain CAP"M".
Draw the straight line and show that it is tangent to the efficient frontier.
Obtain the market portfolio.

$$\text{CAP'M': } w = \frac{(u - u_{rf}U)C^{-1}}{(u - u_{rf}U)C^{-1}u^T}$$

From the w, We calculate the μ_{der} and σ^2_{der} and that constitutes our point of tangency $(\sigma^2_{der}, \mu_{der})$ and the other point lies on the Y-axis as it constitutes no risk because μ_{rf} is the return of the risk free assets. So, the other point is $(0, \mu_{rf})$. The green line shown below is the line drawn from these two points and that is the CAP'M' line.

- X-axis in the above graph represents Risk (Variance)
- Y-axis in the above graph represents Return
- Red dot in the graph represents the minimum risk portfolio
- Black dot represents the minimum risk for derived portfolio
- Green dot represents the risk free return of the government bond
- Rate of return is 0.6%

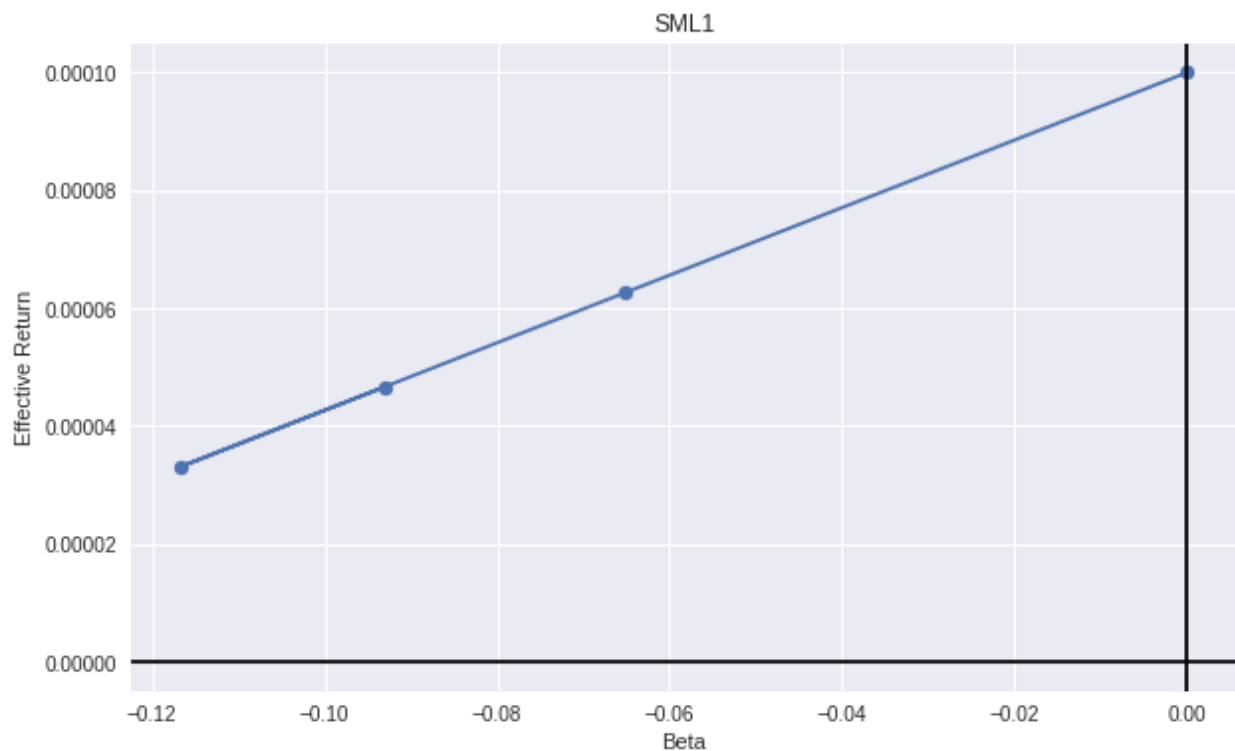## Q4. Use any three assets out of the 10 risky assets to get three different SMLs.

The equation of the SML is given by the

$$\mu_V = r_F + \left(\mu_M - r_F\right)\beta_V$$

$$\beta_V = \frac{\left(K_V, K_M\right)}{\sigma_M^2}$$

- Beta (β_V) signifies how the stock return is related to overall market return
- The market index considered is NIFTY 50 and r_F risk free return of the asset is chosen as 1%

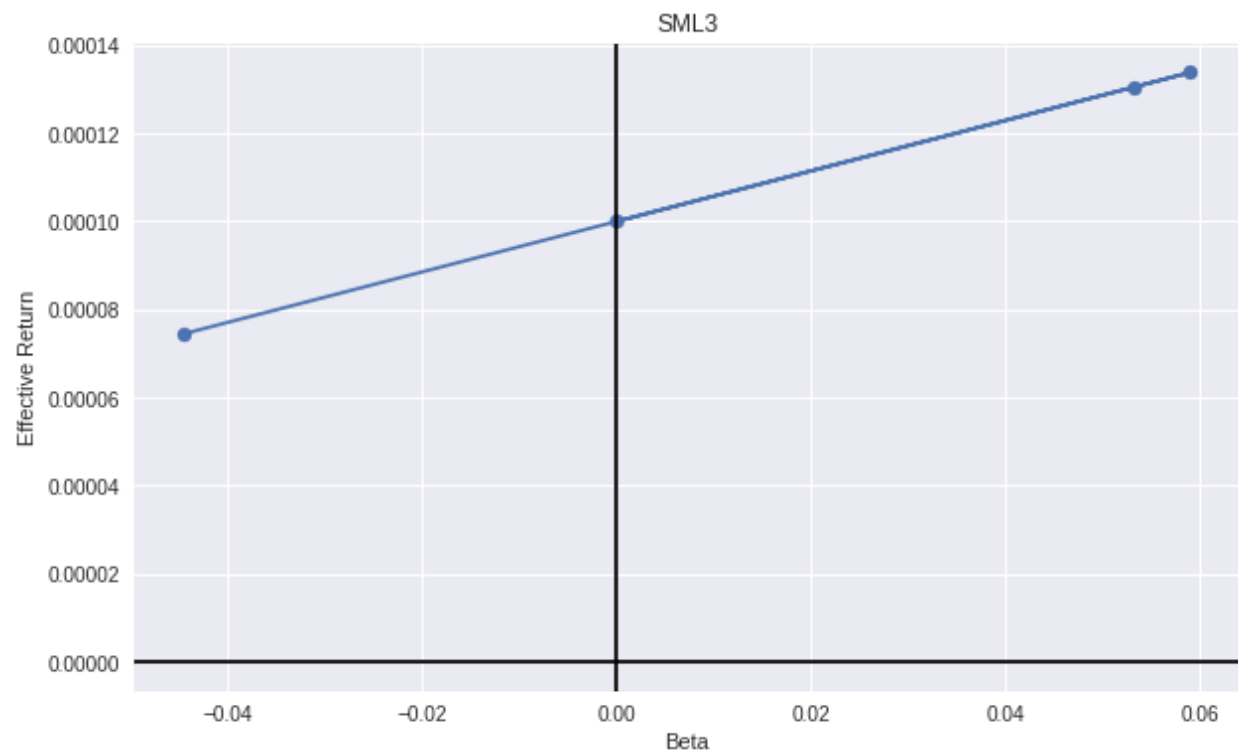**The SML for the stocks Bandhan Bank, Burger King, Glenmark is**

- X-axis in the above graph represents Beta
- Y-axis in the above graph represents Effective Return

The SML for the stocks ITC, CIL, Canara Bank is
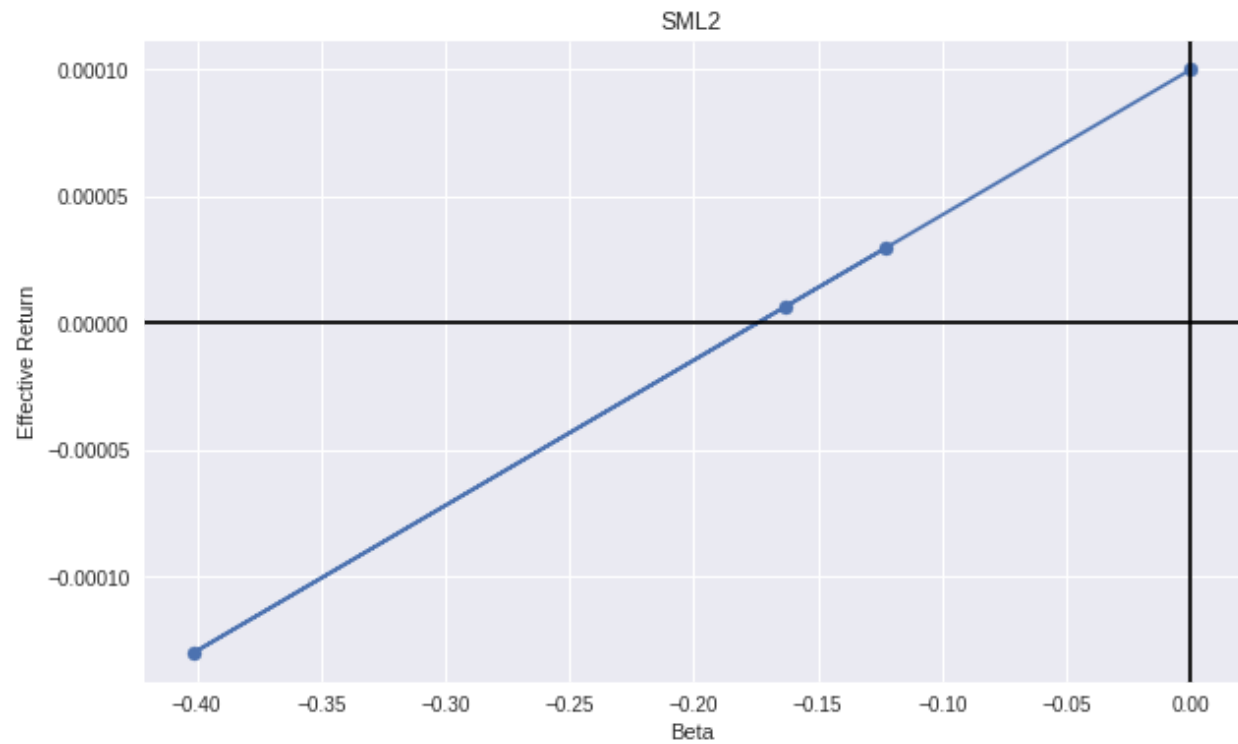
SML2

- X-axis in the above graph represents Beta
- Y-axis in the above graph represents Effective Return

The SML for the stocks Exide Ind, CUB, Castrol is

- X-axis in the above graph represents Beta
- Y-axis in the above graph represents Effective Return