Capital Asset Pricing Model: Introduction

Plan of Study

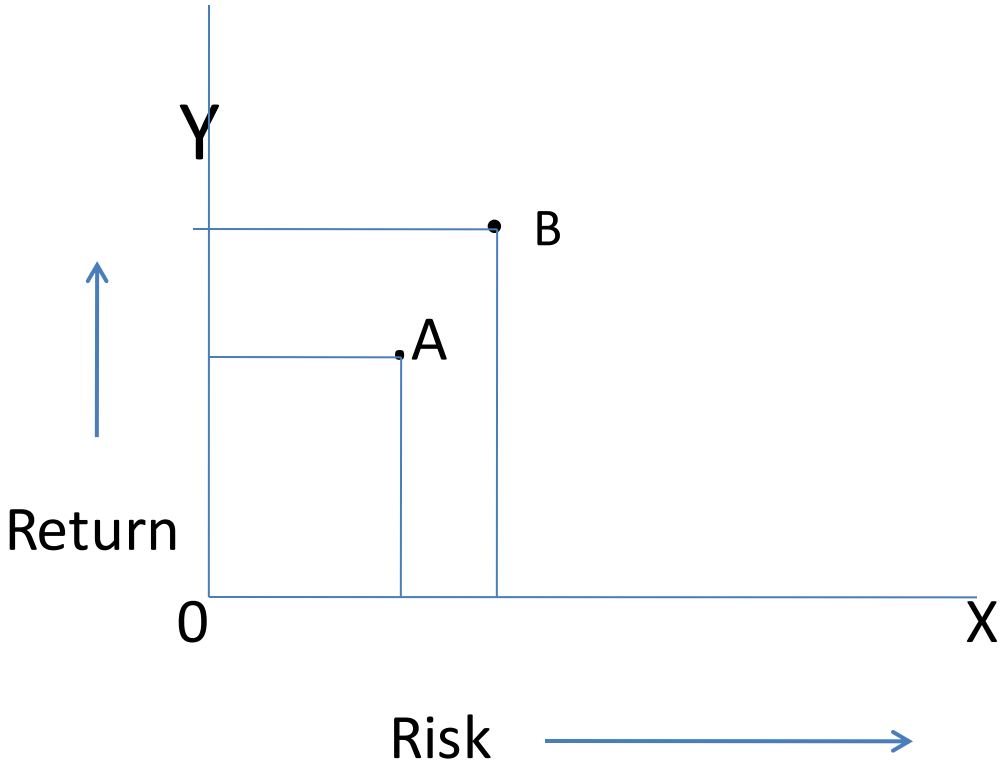
- Concept of Risk & Return
- Concept of efficient frontier
- Concept of Capital Allocation Line
- Concept of Capital Market Line

Concept of Risk & Return

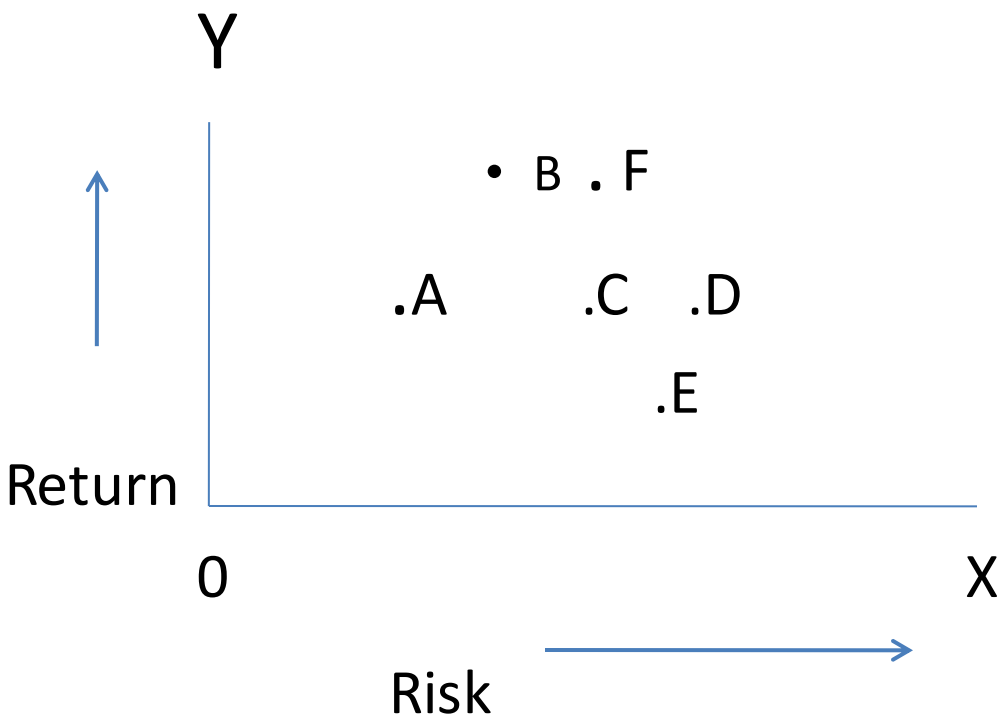
- Rice: Return 18%-22%: Avg: 20%: Range 4%
- Potato: Return -40% to 100%: Avg: 30%: Range 140%

- What about risk?
- How to Measure risk? Expected Return?
  - Historical data

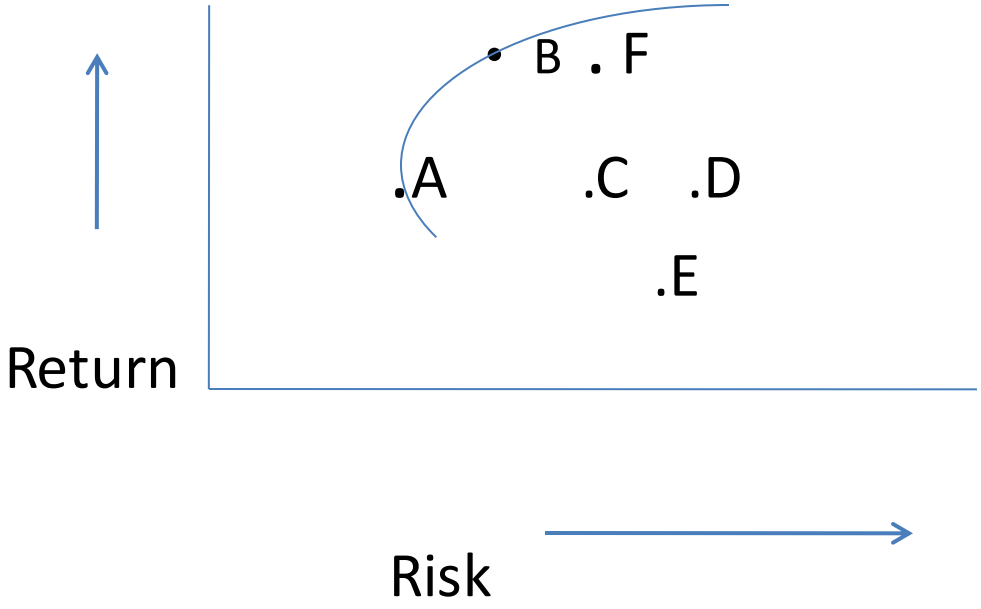
Risk & Return



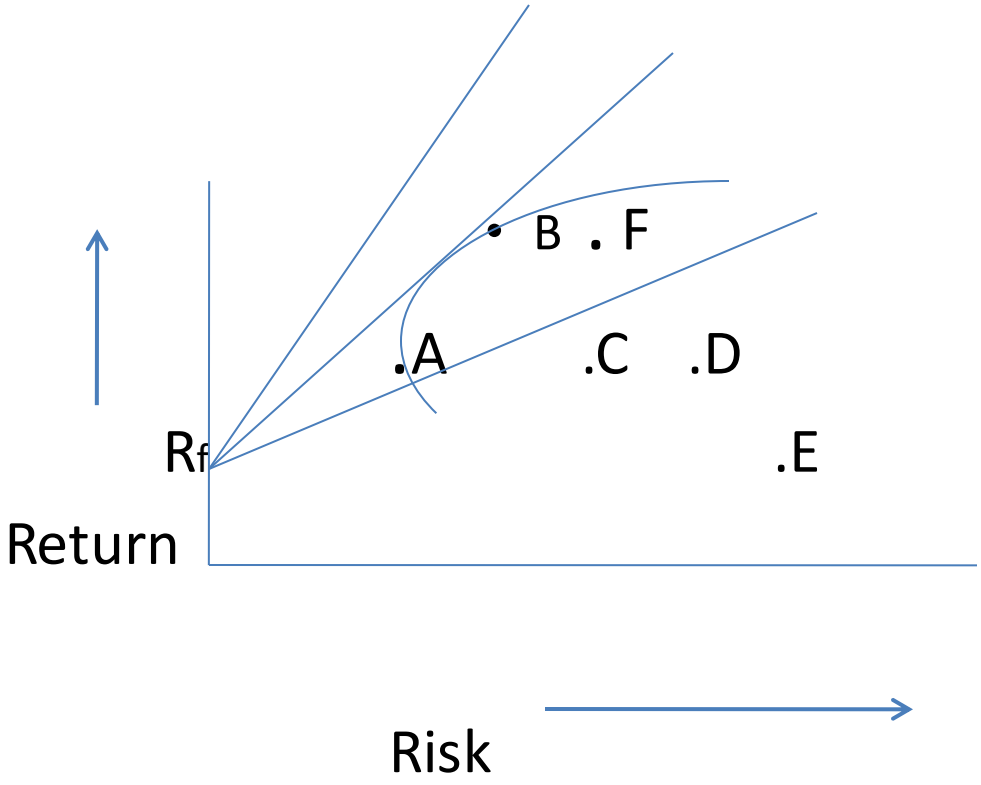
Risk & Return



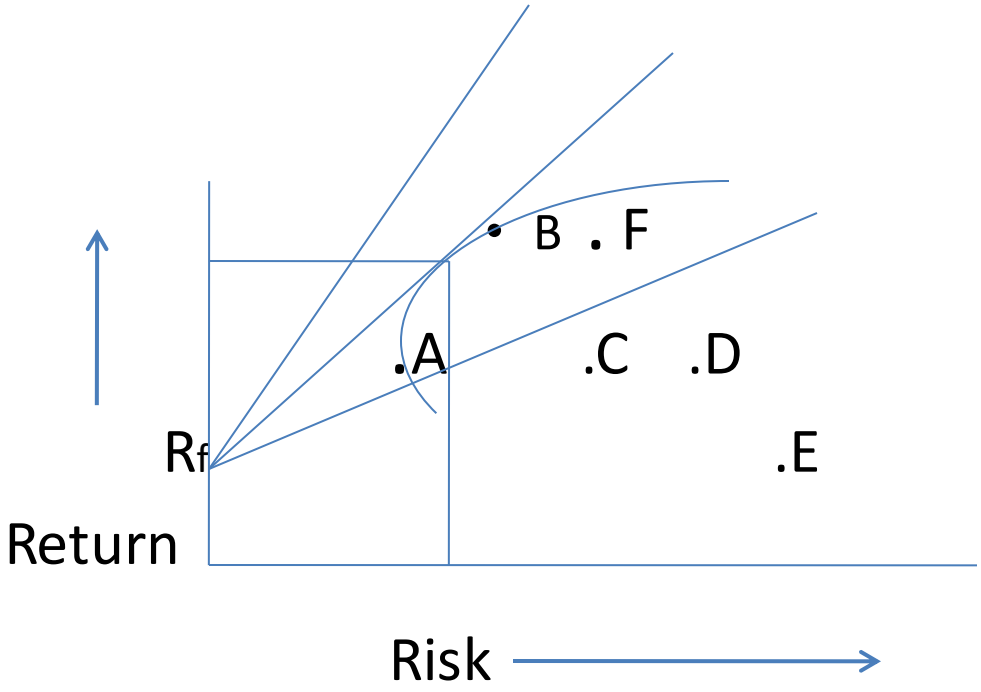
Efficient Frontier



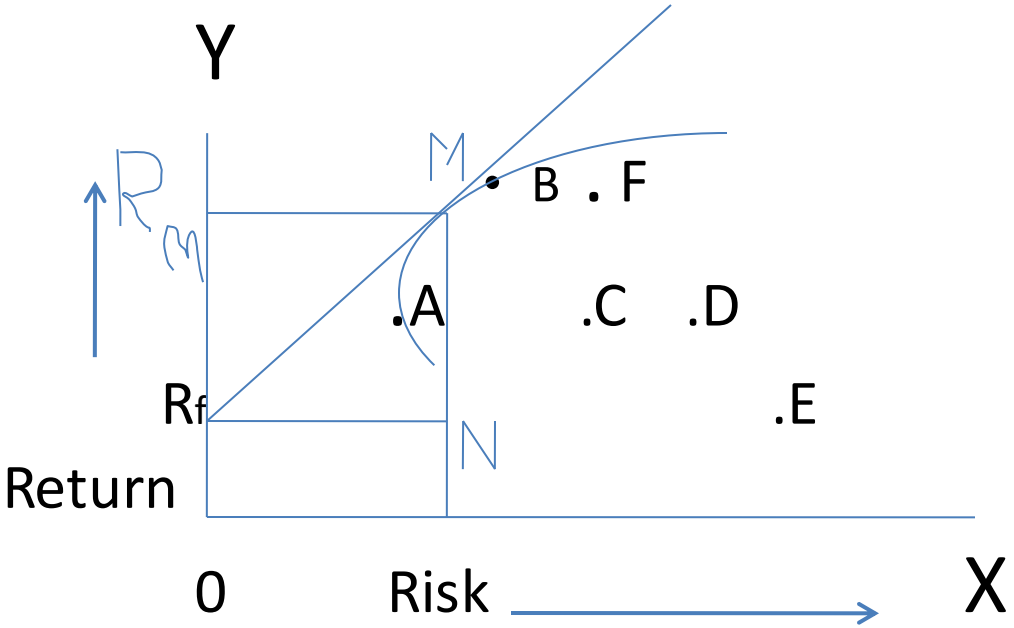
Capital Allocation Line &Efficient Frontier



Capital Allocation Line &Efficient Frontier



Capital Allocation Line &Efficient Frontier



Return at M= R_m

Risk at M= σ_m

Equation of Capital Allocation Line

- $y = mx + c$
- y= Portfolio Return= R_p
- x= Portfolio Risk= σ_p
- c= R_f

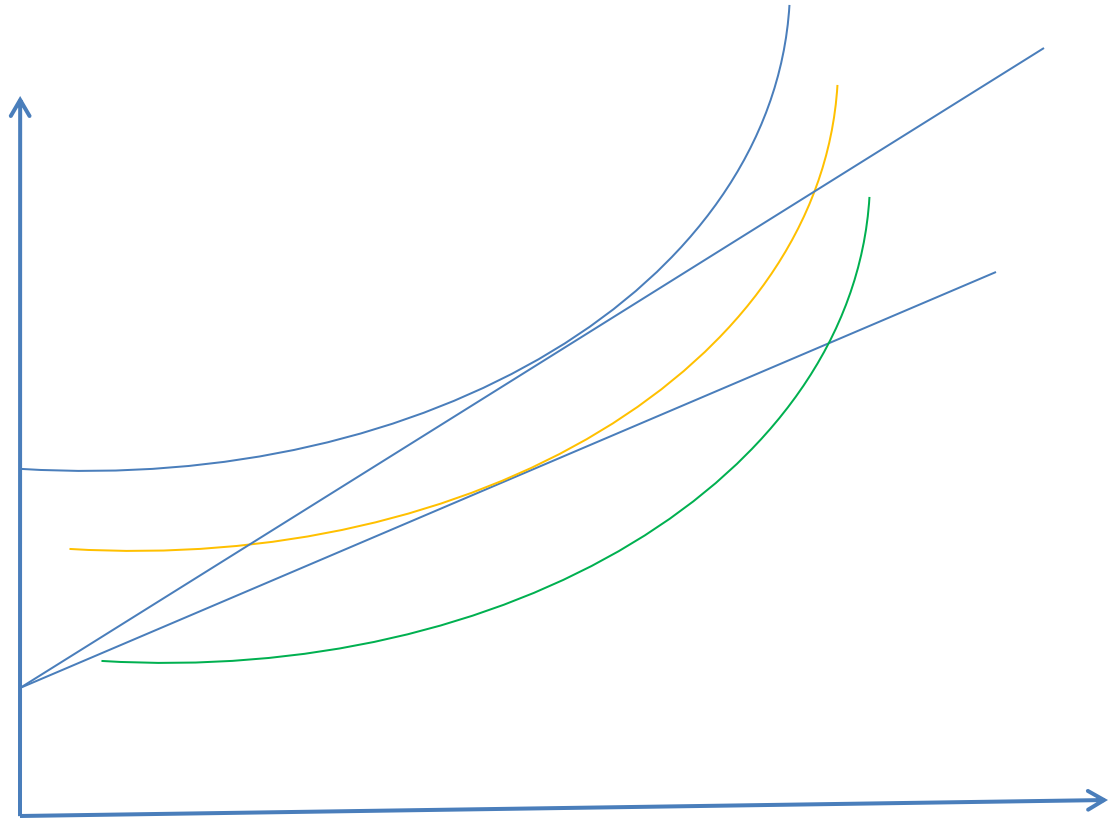
M=slope of CAL=MN/R_fN

$$= (R_m - R_f) / \sigma_m$$

$$R_p = [(R_m - R_f) / \sigma_m] * \sigma_p + R_f$$

Risk & Return in Capital Allocation Line

Optimum Investor Portfolio



Capital Market Line

Different Investors

- Different efficient frontier
- Different Capital Allocation Line

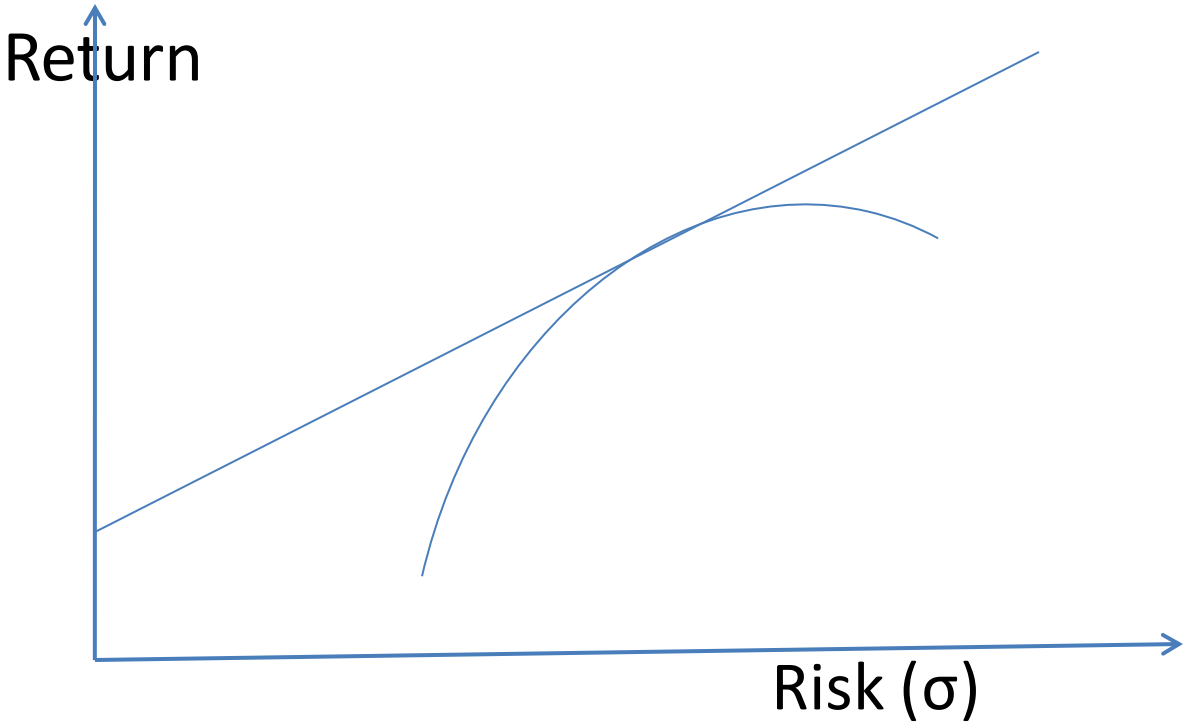
Homogeneous Expectation → Market Expectation

Capital Allocation Line on average market expectation is called Capital Market Line

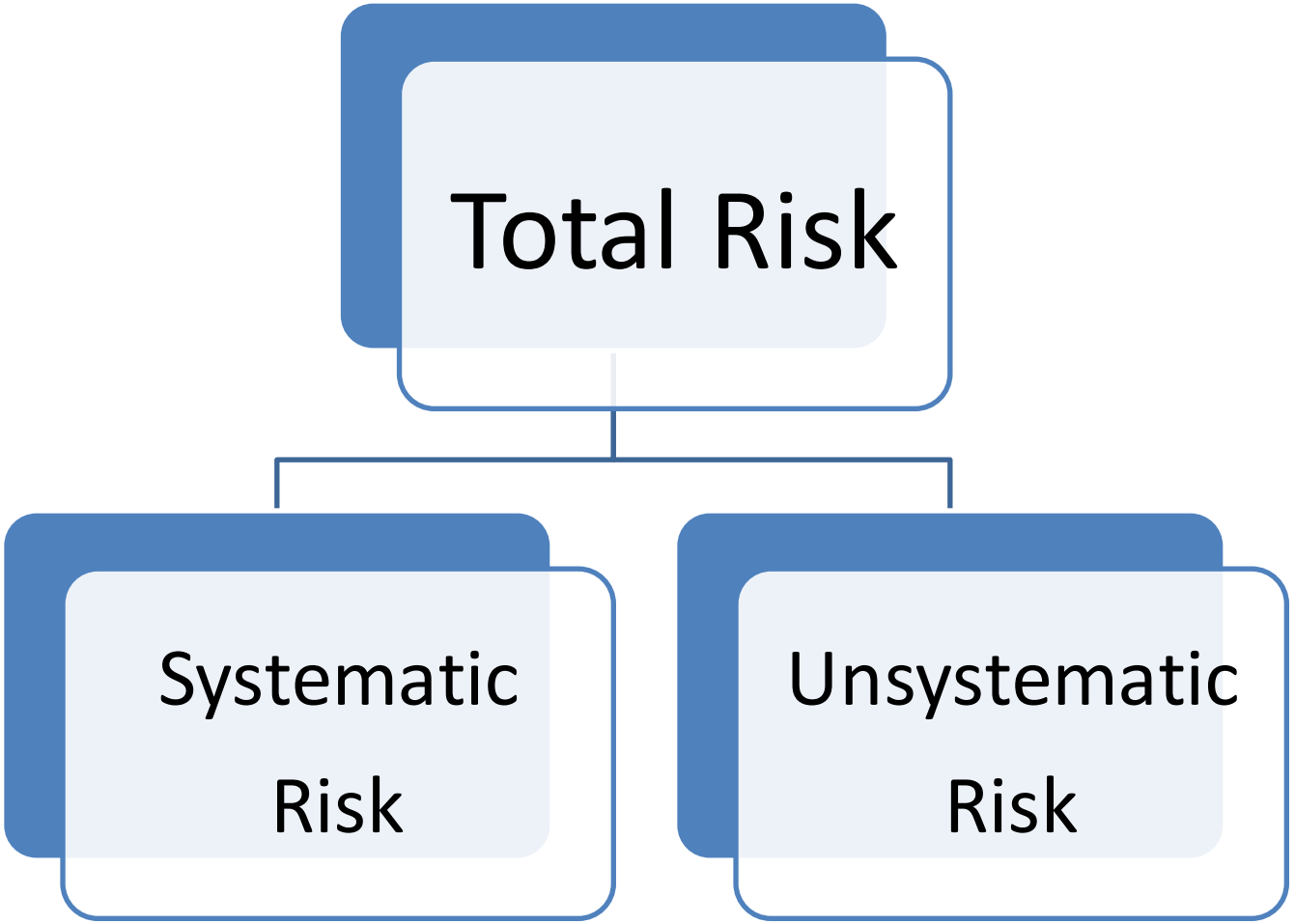
Market CAL: CML

- Market Capital Allocation Line is called Capital Market Line

Capital Market Line (CML)



Types of Risk

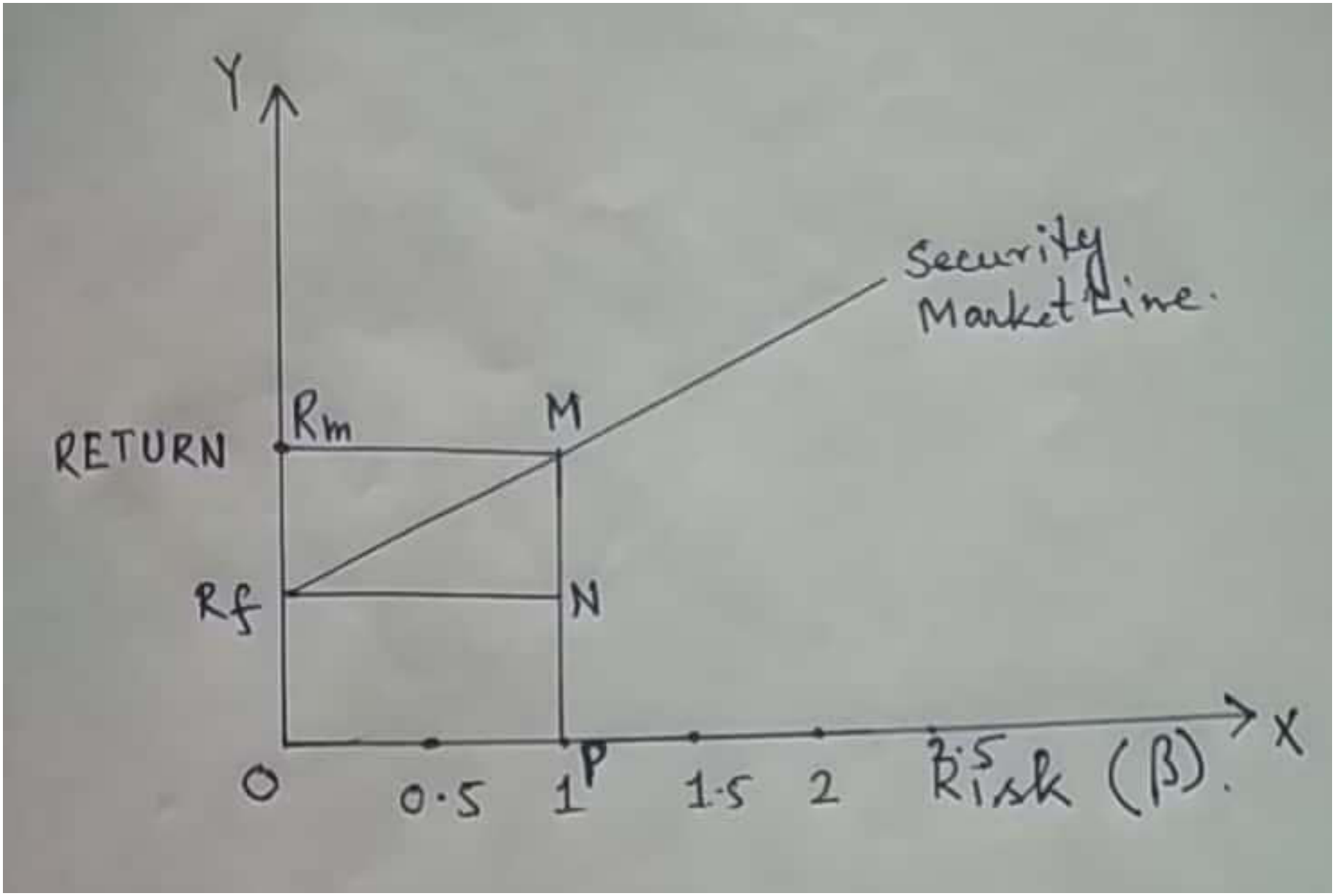


About Risk

- Risk is probability of incurring loss
- It is represented by fluctuation in past return
- It is assumed that past fluctuation would continue in future to represent same level of risk
- Total Risk is represented by σ
- Systematic risk is represented by β
- Only systemic risk is diversifiable

Security Market Line

- Security Market Line (SML) represent different combination of return and systematic risk
- SML is a line that displays expected rate of return of an security (individual share/bond/portfolio) as a function of systematic (market) risk


Y
Security Market Line.
RETURN
Rm
M
Rf
N
X
O
0·5
1
P
1·5
2
2·5
Risk (β).

Security Market Line: Systematic Risk vs. Return

- y= mx+c

y= Portfolio Return= R_p

M= Slope = MN/ R_f N = (oR_m - oR_f)/ β

x= Systematic Risk

c= intercept = R_f

$R_p = (R_m - R_f)\,\beta_m + R_f$

Capital Asset Pricing Model

Security Market Line is graphical depiction of Capital Asset Pricing Model

$Rp = (Rm-Rf)\ \beta m + Rf$

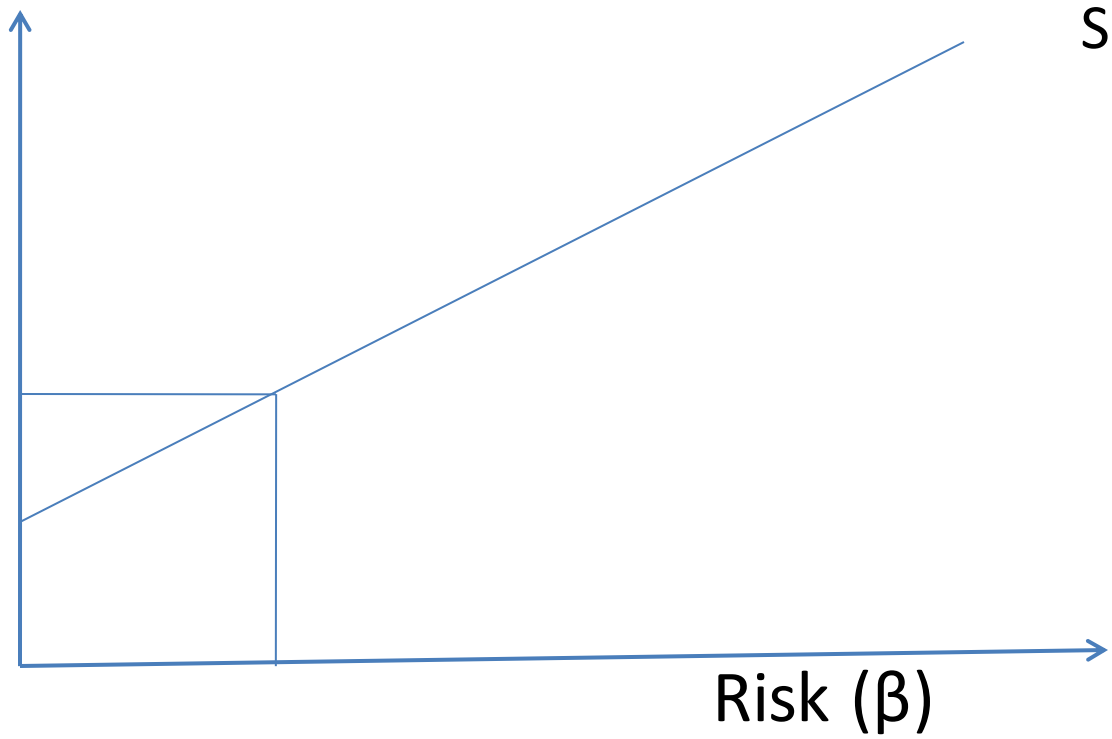
Rp=…

Rm=…

β m=…

Capital Asset Pricing Model

Return



Terms: Not to be confused

- Efficient Frontier: Combination of risk-return of different investment including portfolios
- Capital Allocation: Different options a investor has
- Indifference curve/Utility Curve: The points of risk-return combination where investor derive similar satisfaction i.e. amount of return desires at a given risk or amount of risk willing to accept for a particular return.
- Capital Market Line: Capital Allocation Line for the market as a whole

Assumptions of CAPM

- Investors are risk averse, rational
- No Transaction Cost, No Tax
- Single Holding Period
- Homogeneous expectation
- Investments are infinitely divisible
- Investors are price takes

Application of CAPM

- Cost of capital

- Portfolio decision
  - Trenor ratio: $(Rp- Rf)/ \beta p$

Questions for preparation

1. What is Efficient Frontier?
2. What is Capital Allocation Line?
3. Discuss the difference between Capital Market Line and Security Market Line?
4. What are the assumptions of CAPM?
5. Discuss the CAPM model and its application.

References

- Investment Management by V.K Valla. Sultan Chand
- Investment Analysis and Portfolio Management by Prasanna Chanda. McGrawhill India
- Security Analysis & Portfolio Management, S.Kevin. Prentice Hall of India