Module 2 : Chap 2

Risk

Concepts of Risks & Returns.

Historical returns - return on asset of single security portfolio.

We earn returns in two forms:
- income from asset in form of interest or dividend
- change in price of assets (capital gain or capital loss)

So the total return is sum total of interest / dividend + capital gain or loss.

Rate of return:

$$R = \frac{Div_1}{P_0} + \frac{P_1 - P_0}{P_0} \Big/ R = \frac{Div_1 + (P_1 - P_0)}{P_0}$$

dividend yield (%) — capital gain/loss yield (%)

Average rate of return

$$\bar{R} = \frac{1}{n} \sum_{i=1}^{n} R_i$$ SM.

Holding Period return
- calculated by multiplying notional amount of 1 with returns on for each period + subtracting 1 from total value.

Measures of Risk for 1 security.
1. Variance (σ^2)
2. Std (σ)

$$\sigma^2 = \frac{1}{(n-1)} \sum_{i=1}^{n} (R_i - \bar{R})^2$$

$$\sigma = \sqrt{\sum_{i=1}^{n} \frac{(R_i - \bar{R})^2}{n-1}}$$

Expected Return of single security.

$$E(R) = \sum_{i=1}^{n} R_i P_i$$

P_i = probability of outcome

Expected Risk of single security

$$\sigma^2 = \sum_{i=1}^{n} P_i (R_i - E(R))^2$$

$$\sigma = \sqrt{\sigma^2}$$

Normal distribution

$$S = \frac{R - E(R)}{\sigma}$$

S: ≠ btw actual R & mean R expressed as multiple of std.

Two Security Portfolio. - Historical Return.

$$R_p = W_1 R_1 + W_2 R_2$$

W_1 = weightage of sy 1
W_2 = — " — sy 2

Expected return of 2 security portfolio

$$E(R_p) = W \times E(R_1) + (1 - W) E(R_2)$$

Measuring Portfolio Risk for 2 security P.

$$\sigma^2 = W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2 W_A W_B (Cov_{AB})$$

W = weightage of sy A & B
$\sigma_A \sigma_B$ = std of sy A & B
Cov_{AB} = covariance of AB
$= (\sigma_A)(\sigma_B)(Cor_{AB})$

$$Cor_{AB} = \frac{Cov_{AB}}{(\sigma_A)(\sigma_B)}$$

Risks of portfolio:
1- corr of 2 sys
2- Proportion of investment in each security
3 - std of each sy.

Min σ^2 portfolio

$$W_A = \frac{(\sigma_B^2 - Cov_{AB})}{(\sigma_A^2 + \sigma_B^2 - Cov_{AB})}$$

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Time Value of money

Concept of time value

Future Value

Simple Interest

$$A = P(1 + RT)$$

A = final amt

P = principal amt

T = time in yrs

R = Annual rate of interest

Compound Interest

$$A = P\left(1 + \frac{R}{N}\right)^{NT}$$

N = number of times interest applied per time period.

T = Nb of time period elapsed

One time Investment / Lump sum

Future Value

$$FV_n = P \times (1 + i)^n$$

n = nb of periods

i = ror / period

FV_n = future value at end of period n

P = principal amt

FVIF - Future Value Interest Factor

CVIF - Compound Value Interest Factor

$(1 + i)^n$

- Future Value of Rps 1 for period of n at the rate of i

Future Value of Annuity

Annuity - fixed amt paid or received at annual freq.

- fixed amt of cashflow is received or paid at end of year or period

⇒ ordinary annuity.

- cash flows are received or paid at beginning of year or period is annuity due.

Sinking fund $= \frac{1}{(1+i)^n}$