CA Final I Paper 2

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Sundar B

CA Inter Dec-21

AIR 49

Ria Gupta

CA Inter May-22

What Our Students have to Say....

Aman Mahajan (CA AIR 19)

I really liked your classes, especially the practical linkages explained with amazing graphics. The full subject test serieshelped a lot in improving my writing speed and presentation skills.

Sundar Sri Renganathan B (AIR 33)

I took Accounting from IndigoLearn and the classes were really good. They emphasized on conceptual clarity over getting things done quickly, which is really vital to score good marks in practical papers. Other resources like Notes, Quizzes and Forum was beneficial too.

Dwarakesh

Thank you IndigoLearn team for the guidance and support throughout the past few months. I had great conceptual clarity in all the subjects and the revision classes by Suraj Sir were very helpful. Study planner and Free resources were very useful. Thank you Team IndigoLearn.

Yug Manoj Kumar Bhattad

I have cleared my CA Foundation examination with the total of 286. And this was not possible without the efforts and support of IndigoLearn. The way of teaching with utmost conceptual clarity is the best thing at Indigolearn.

Prakash Bhatt

Superb, one stop solution for All CA and Accountancy students they serve real Education at very very reasonable price

Naveen Kumar S

Good experience, unlimited views helped a lot in last one month preparation. Looking forward for

Bhagyasree Chougule

It was only because of Indigolearn that my concepts became very clear, and I was able to crack the exam. I wasn't 100% prepared I needed more practice but luckily I got through. I'm definitely choosing IndigoLearn for group 2 preparation. A big thanks!

Mohd Thayyab

Theoretical subjects made easier through story based examples and charts. Concept clarity 100%. Fully exam+practical oriented classes will help not only to retain the concepts during exams but for the longer duration.

Lalit Chetan Sanpal

Indigolearn has been fantastic and brilliant. Helped me alot in my preparations. I cleared both the groups in first attempt with your brilliant classes and notes. Thanks to all the faculties, coordinators, forum admins and everyone at Indigolearn. Really grateful. Will go for CA Finals at Indigolearn For sure. Thank you so much Indigolearn.

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Abishek M

I'd like to thank IndigoLearn for all the support they've provided me with. Modules were great. They were time saving and straight to the point. I extensively used the materials provided before exams, they were so helpful. Also I'd appreciate them for providing unlimited views as I kept looking into the maths modules till the end.

Munnur Nandini Sree

Accounting classes I have taken from IndigoLearn. Now I feel that it's a great choice that I have made (after seeing my result) because only in Accounting I got exemption. Thank you IndigoLearn.

Harshita G

Thank u so much IndigoLearn for your guidance. This is only possible because of u people.... For my finals also my journey will continue with IndigoLearn.

Bharathsha PS

I purchased Economics, IT, FM, EIS and Audit from Indigolearn. All your classes are superb and anyone can easily crack the CA exams. What makes u special is your classes help us to understand the concepts very well.Special thanks to the FM faculty, I studied only 2 chapters in economics,and still managed to score excemption in the 8th paper.

Nayi Mihir kumar

This platform is very helpful in all activity like mcq practise, notes, teaching activities, revisions and the forum interaction with all students which I like the most. If anybody want to clear their exams in first attempt then IndigoLearn is the best platform for them. My all regards to IndigoLearn. Thank you so much.

Rajalaxmi
CA Inter

Can't believe I cleared.Sathya Sir, Suraj Sir, Yogita Mam ... thanks to all my faculties. Basically an Eng student with zero accounts knowledge. Thanks IndigoLearn for making me clear in first attempt.

Priyanka Udeshi

All the faculties have excellent knowledge of the subject and deliver it in very crisp & effective manner. Also, quick response at Forums never let any of my doubts go unresolved no matter how small they were. Thank you once again to all the teachers & staff at IndigoLearn!

Naveen Kumar T

It been a great journey with indigo learn team. Thanks to all the facilities and forum friends who support me a lot.

CA Final – AFM Formula Sheet

❖ Risk Management

Variance : $\frac{\sum(x-\bar{x})^2}{n}$

where x is observation, n is number of observations and $\bar{x}$ is the mean of observations.

Standard Deviation : $\sigma = \sqrt{\text{Variance}}$

Covariance: $\sum \frac{(x-\bar{x})(y-\bar{y})}{n}$

Correlation : $\rho = \frac{Cov(X,Y)}{\sigma_x \, \sigma_y}$

Where, Cov (X,Y) is covariance

σ is Standard Deviation

Standard Deviation of portfolio:

$$\sigma_p = \sqrt{\sigma_1^2 + \sigma_2^2 + (2(\sigma_1\sigma_2\,\rho))}$$

Where σ_1 is standard deviation of 1st security and σ_2 is standard deviation of 2nd security in Rupee terms

Or,

$$\sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + (2(w_1 w_2 \sigma_1 \sigma_2\,\rho))}$$

Where w_1 & w_2 are the weights of respective securities & SDs are in %

Value at Risk (VAR) :

σ_p x Portfolio Value x Cumulative Z score x $\sqrt{\text{N Days}}$

Where, Z score indicates how many standard deviation away from mean

Market Capitalisation: Total number of shares × Market price of share

❖ Advanced Capital Budgeting Decisions

Cash Flow after tax :

(R-C) × (1-T) + D × T

Where,

R is Revenue, C is Cost, T is Tax rate and D is Depreciation.

$\mathbf{Rn = Rr * (1 + P)}$ **[For Absolute]**

R_n is Nominal return,

R_r is Real return,

P is Expected Inflation Rate (%).

$\mathbf{(1+Rn) = (1 + Rr) * (1 + P)}$ **[For Rates]**

R_n is Nominal rate of return (%)

R_r is Real rate of return (%)

P is Expected Inflation Rate (%).

Statistical Methods of Incorporating Risk in Capital Budgeting :

1. **Probability weighted Cashflows:**

Expected Value : $\sum Pi\ NCFi$

Where, Pi is the probability and NCF_i is the Net Cash flows.

2. **Variance :** $\frac{\sum(x-\bar{x})^2}{n}$

$= \sum Pi\,(x - \bar{X})^2$

Where x is Net cash flow, $\bar{x}$ is the expected net cashflow and Pi is the probability.

Variance as per Hillers Model :

$$\sigma^2 = \sum(1 + r)^{-2i}\,\sigma^2{}_i$$

Where,

1+r is the discount rate and i is the time period.

3. **Standard Deviation :** $\sqrt{\sigma^2} = \sqrt{Variance}$

4. **Coefficient of Variation :** $\frac{\text{Standard Deviation}}{\text{Expected Cashflow}}$

Conventional Methods of Incorporating Risk in Capital Budgeting:

1. **Risk Adjusted Discount Rate**

$RADR = R_f + \beta(R_m - R_f)$ or

$RADR = R_f + \text{Risk Premium}$

Where, R_m is Market return R_f is Risk free rate of return and β is beta

2. **Certainty Equivalent**

(α): $\frac{Certain\ Cashflows}{Expected\ Risky\ Cashflows}$

NPV= $\sum \frac{\alpha \times NCF}{(1+k)^n}$ **-** Initial Investment

Where, α is Risk Adjustment factor, NCF is net cash flow without risk adjustment, K is Risk free rate and n is number of periods.

Expected Net Present Value (Multiple Periods):

ENPV = Sum of Present Value of Cashflows calculated Individually – Initial Investment

Replacement Decision :

Step 1: Net Cash flow = Cost of new Machine – (tax saving + market value of old machine)

Step 2: (Change in Sales +/- Change in Operating Cost – Change in Depreciation) × (1- Tax) + Change in Depreciation **Or**

(Change in Sales +/- Change in Operating Cost) ×(1- Tax) + (Change in Depreciation × Tax)

Step 3: Present Value of Cashflows = Present Value of Yearly Cash Flows + Present Value of Salvage

Step 4: NPV = Step 1 + Step 3

Optimum Replacement Cycle :

Equivalent Annual Cost (EAC) = $\frac{\text{Present Value of Cash Outflow (PVCF)}}{\text{Present Value Annuity Factor(PVAF)}}$

Adjusted Present Value :

Base Case NPV (on unlevered cost of capital) + PV of tax benefits on interest

Profitability Index = $\frac{\text{Discount Cash inflow}}{\text{Initial Investment}}$

❖ Security Analysis

Gordon's Dividend Growth Model :

Current Stock Price(P) = $\frac{D1}{k-g}$

Where,

D_1 is value of next year dividend,

k is the minimum rate of return,

g is growth rate of dividend.

PE Multiple : $\frac{\text{Current Market Price}}{\text{Earnings per share}}$

Confidence Index :

$$\frac{\text{Avg yield on high grade bond}}{\text{Avg yield on low grade bond}}$$

Arithmetic Moving Average :

$AMA_{n,t} = 1/n\,[P_t + P_{t-1} + \ldots + P_{t-(n-1)}]$

Where,

N is number of total periods and t is period.

Exponential Moving Average:

$EMA_t = aP_t + (1-a)\,(EMA_{t-1})$

Where, a(exponent) = $\frac{2}{n+1}$

N Is number of days, P_t is price of today and EMA_{t-1} is previous day EMA.

For Run tests,

Mean = $\frac{2n1n2}{n1+n2} + 1$,

where n1 and n2 are sign changes,

Variance =

$$\frac{2n1n2\,(2n1n2-n1-n2)}{(n1+n2)(n1+n2)\,(n1+n2-1)}$$

Number of runs : Runs lies between μ ± t(σ) , where

t is distribution with degree of freedom (DoF) & DoF – Number of Runs – 1

❖ Valuation of Debentures and Bonds

Bond Value :

$$P_0 = \sum_{t=1}^{n} \frac{C}{(1+y)^t} + \frac{M}{(1+y)^n}$$

Or,

$$P_0 = C\,(PVIFA_{y,n}) + M\,(PVIF_{y,n})$$

Where,

P_0 = Bond price; n = Maturity period; C = Coupon; y = YTM; M = Maturity value

<u>Alternate Formula :</u>

$$P_o = \frac{C}{y} x \left[1 - \frac{1}{(1+y)^n}\right] + \frac{M}{(1+y)^n}$$

Bond value (when coupon payments are semi-annual) :

$$P_o = \sum_{t=1}^{2n} \frac{\frac{C}{2}}{(1+\frac{y}{2})^t} + \frac{M}{\left(1+\frac{y}{2}\right)^{2n}}$$

Where,

2n = Maturity period expressed in terms of half-yearly periods; C/2 = Semi-annual coupon; y/2 = Discount rate applicable for half-year period

Bond Basic Value (between 2 coupon dates) :

$$\text{Present Value of } (A + \text{ Coupon}) - \text{Accrued Interest}$$

Where,

A = Bond price calculated as on next coupon date after payment of coupon

Present value of (A + Coupon)

$$= \frac{A + \text{Coupon}}{\left(1 + \frac{\text{Req. YTM}}{\text{No. of periods}}\right)^{\frac{\text{Time until next coupon}}{\text{Total coupon period}}}}$$

Accrued Interest

$$= \text{Face Value x } \frac{\text{Coupon rate}}{\text{No. of periods}} \text{ x } \frac{\text{Time elapsed}}{\text{Total coupon period}}$$

Current Yield: $\frac{\text{Coupon}}{\text{Current market price}}$

Yield To Maturity (YTM) :

$$LR + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \text{ x } (HR - LR)$$

Where,

LR = Lower Rate; HR = Higher Rate

YTM (Approximate Formula) :

$$\frac{C \pm \frac{(F-P)}{n}}{\frac{F+P}{2}}$$

Where,

C is coupon, F is face value, P is market price of bond/issue Price, n is years to maturity

Yield To Call :

$$P_o = \sum_{t=1}^{n} \frac{C}{(1+y)^t} + \frac{\text{Call price}}{(1+y)^n}$$

Where y is Yield to Call and n is Call period

Yield To Put :

$$P_o = \sum_{t=1}^{n} \frac{C}{(1+y)^t} + \frac{\text{Put price}}{(1+y)^n}$$

Where y is Yield to Put and n is Put period

Macaulay Duration :

$$\frac{\sum_{t=1}^{n} \frac{t \text{ x } c}{(1+i)^t} + \frac{n \text{ x } M}{(1+i)^n}}{P}$$

Where, t is Time; c is Coupon; I is Interest rate; P is Principal; n is Maturity and M is Maturity value

Or

$$\frac{1+y}{y} - \frac{(1+y)+t(c-y)}{C((1+y)^t-1)+y}$$

Where, Y is yield to maturity

Modified Duration:

$$= -\frac{\text{Macaulay Duration}}{(1+\frac{\text{YTM}}{n})}$$

Where,
YTM is Yield to Maturity; n is Number of compounding periods per year
Or,

$$\frac{\frac{C}{y^2}\left(1-\frac{1}{(1+y)^n}\right)+\frac{n \text{ x } \left(M-\frac{C}{y}\right)}{(1+y)^{n+1}}}{P}$$

Convexity adjustment:

$$C^* \text{ x } \frac{\Delta y^2}{2} \text{ x } 100$$

Where,
C* is Convexity formula; Δy is Change in yield for which calculation is done

Convexity Formula : $\frac{V_+ + V_- - 2V_0}{V_0\,(\Delta y)^2}$

Where, V_+ is Price of Bond if yield increases by Δy
V_- = Price of Bond if yield decreases by Δy
V_0 = Initial Price of bond; Δy = Change in Yield

Alternate Formula:

$$\frac{\sum_{t=1}^{n} \frac{t(t+1)C}{(1+y)^{n+2}} + \frac{n(n+1)M}{(1+y)^{n+2}}}{P}$$

In simple terms,

$$\text{Convexity} = \frac{1}{P\,(1+y)^2} + \sum_{t=1}^{n} \frac{CF_t \text{ x } t \text{ x } (t+1)}{(1+y)^t}$$

Conversion Value of Debenture : Price per equity share x Converted no. of shares per debenture

Value of Warrant : (MP – E) x n
Where,
MP is Current Market Price of Share
E is Exercise Price of Warrant
n is No. of equity shares convertible with one warrant

Yield on Treasury Bills:

$$\frac{\text{FV} - \text{Issue Price}}{\text{Issue Price}} \text{ x } \frac{365}{\text{Maturity}}$$

Yield on Commercial Bills/ Certificate of Deposit/ Commercial Paper:

$$\frac{\text{FV} - \text{Sale Value}}{\text{Sale Value}} \text{ x } \frac{365}{\text{Maturity}}$$

Dirty Price = Clean Price + Accrued Interest

Start Proceeds in Repo

$$\text{Nominal Value x } \frac{\text{Dirty Price}}{100} \text{ x } \frac{100 - \text{Initial Margin}}{100}$$

Repayment at Maturity in Repo

$$\text{Start Proceeds x } \left(1 + \text{Repo Rate x } \frac{\text{No, of days}}{360}\right)$$

❖ Valuation Equities

Expected Return :

(R_x) = $R_f + \beta_x (R_m - R_f)$

Where,
R_x is expected return on equity
R_f is risk-free rate of return
β_x is beta of "x"
R_m is expected return of market

Equity Risk Premium :

$(R_x - R_f) = \beta_x (R_m - R_f)$

Equity Valuation for a holding period of one year

$$P_0 = \frac{D_1 + P_1}{1 + K_e}$$

Where,
D_1 – Dividend at the end of year 1, P_1- Price at the end of Year 1 & K_e – Cost of Equity.

Valuation of Equity – Zero Growth

$$P_0 = \frac{D}{K_e}$$

Where, D is Dividend at the end of year 1.

Valuation of Equity – Constant Growth

$$P_0 = \frac{D_1}{K_e - g}$$

Where, $D_1 = D_0\,(1+g)$, g is growth rate

Valuation of Equity – Two Stage Growth

$$P_0 = \left[\frac{D_0(1+g_1)}{(1+K_e)} + \frac{D_0(1+g_1)^2}{(1+k_e)^2} + \ldots\ldots + \frac{D_0(1+g_1)^n}{(1+k_e)^n}\right] + \frac{P_n}{(1+k_e)^n}$$

$$P_n = \frac{D_0\,(1+g_1)^n(1+g_2)}{(K_e - g_2\,)}$$

Where,
D_0 is Dividend Just Paid,
g_1 is Finite or Super Growth Rate
g_2 is Normal Growth Rate
K_e is Req. Rate of Return on Equity
P_n is Price of share at the end of Super Growth.

H Model

$$P_0 = \frac{D_0\, X \frac{t}{2} X\, (g_S - g_L)}{(K_e - g_L\,)} + \frac{D_0(1+g_L)}{(K_e - g_L\,)}$$

Where,
g_s is super normal growth rate
g_L is normal growth
t is time period

Gordon's Model (Earnings Approach)

$$P_0 = \frac{EPS_1\,(1-b)}{(K_e - br\,)}$$

Where,
P_0 is Price per share
b is Retention ratio
r is Return on Equity
br is Growth Rate (g)

Gordon's Model (Dividend Approach)

$$P_0 = \frac{D_1}{(K_e - br\,)}$$

Where,
D1 is dividend at the end of yr 1

Walter's Model

$$P_0 = \frac{D_0 + (E-D)\frac{r}{K_e}}{(K_e)}$$

Where, E is earning per share and D is dividend per share for the just concluded year

PE or Multiple Approach

Value of an Equity Share = EPS X PE Ratio

Enterprise Value (EV)

$$EV = \frac{FCFF}{K-g}$$

Where,
FCFF is Free cash flow to firm
k is Weighted Average cost of Capital
g is Growth rate

Theoretical Ex-Right Price (TERP)

$$TERP = \frac{nP_0+S}{n + n_1}$$

Where,
n is Number of existing equity shares,
P_0 is Price of Share Pre-Right Issue,
S is Subscription amount raised from Right Issue &
n_1 is No. of new shares offered

Value of Right

$$Value = \frac{TERP - S}{n}$$

Value of Preference Share :

$$\frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \ldots\ldots + \frac{D_n + \text{Maturity Value}}{(1+r)^n}$$

Where,
D_1 is Dividend at the end of Year 1
D_2 is Dividend at the end of Year 2
D_n is Dividend at the end of Year n
r – Cost of Preference Shares

❖ Portfolio Management

Expected Return :

$$(\overline{X}) = \sum_{i=1}^{n} X_i p(X_i)$$

Where,
X_i is Possible Returns of a security,
P (X_i) is Related probability &
$\overline{X}$ is Expected Return

Variance :

$$(\sigma^2) = \sum_{i=1}^{n} (X_i - \overline{X})^2 . p(X_i)$$

Where, σ^2 is Variance

Standard Deviation :

$$SD = \sqrt{\text{variance}} = \sqrt{\sigma^2} = \sqrt{\frac{\sum_{i=1}^{n}(X_i - \overline{X})^2}{n}}$$

Covariance :

$$\text{Cov}\,(X, Y) = \sum_{I=1}^{n} (X_i - \overline{X})\,(Y_i - \overline{Y})\,/n$$

Where,
X is security 1
$\overline{X}$ is Mean of security 1
Y is security 2
$\overline{Y}$ is Mean of security 2
n is no. of observations

Correlation Coefficient

$$r_{XY} = \frac{Cov(X, Y)}{\sigma_X . \sigma_Y}$$

Where,
σ_X is standard deviation of X
σ_Y is standard deviation of Y

Beta Under Correlation Method

$$\beta = \frac{r_{im}\sigma_i}{\sigma_m} \text{ Or } \frac{Cov(i,m)}{(\sigma_m)^2}$$

Where,
β is Beta (degree of dependency of returns / ri
σi – standard deviation of Individual security return
σm is standard deviation of market return
r is correlation of individual security return (i) and market return (m)

Beta Under Regression Method

$$\beta = \frac{(n\sum xy - \sum x \sum y)}{n\sum x^2 - (\sum x)^2}$$

Or,

$$\beta = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2}$$

where,
x is independent market return
y is dependent stock return

Beta (Slope of line) :

$$y = \alpha + \beta x$$

Where,
α – alpha, intercept value
β –Beta, Slope of the line

Portfolio Return :

$$E(R)_p = \sum R_i w_i$$

Where,
$E(R)_p$ is Portfolio Return
R_i is Return on Stock
w_i is Weightage of stock in the portfolio

Portfolio Risk:

$$(\sigma p)^2 = w_i^2.(\sigma_i)^2 + w_j^2.(\sigma_j)^2 + 2\sigma_i\sigma_j r_{ij} w_i w_j$$

$$= w_i^2.(\sigma_i)^2 + w_j^2.(\sigma_j)^2 + 2\text{Cov}(i,j) w_i w_j$$

Where,
i is security 1 & j is security 2
σp is Portfolio risk
$(\sigma p)^2$ is Portfolio variance
σ_i is Standard deviation of security 1
σ_j is Standard deviation of security 2
w_i is Weight of security 1 in portfolio
w_j is Weight of security 2 in portfolio
r_{ij} is correlation between security 1 and 2

Portfolio Risk with different correlation coefficient :

when r is 0, (σ_p)

$$= \sqrt{w_1^2.(\sigma_1)^2 + w_2^2(\sigma_2)^2}$$

when r is + 1, $(\sigma_p) = (w_1\sigma_1 + w_2\sigma_2)$

when r is − 1, $(\sigma_p) = (w_1\sigma_1 - w_2\sigma_2)$

Covariance :

$$\text{Cov}(x,y) = r_{xy} . \sigma_x \sigma_y$$

Where,

r_{xy} – correlation between x and y

Standard Deviation of portfolio :

$$\sigma_p{}^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} x_i x_j . r_{ij} . \sigma_i . \sigma_j$$

Or,

$$\sigma_p{}^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} x_i x_j . \sigma_{ij}$$

Where,
x_i: weightage of security 1 in portfolio
x_j: weightage of security 2 in portfolio
r_{ij} is correlation between security 1 and 2

Variance of portfolio for 3 Securities :

$$\sigma^2 = [2\sigma_y\sigma_z w_y w_z r_{yz}] + [2\sigma_x\sigma_y w_x w_y r_{xy}] + [2\sigma_x\sigma_z w_x w_z r_{xz}] + [(\sigma_x)^2(w_x)^2 + (\sigma_y)^2(w_y)^2 + (\sigma_z)^2(w_z)^2]$$

Where, x, y & z are Security 1, 2 & 3 respectively

Slope of Capital Market Line (CML):

$$\frac{R_m - R_f}{\sigma_m}$$

Where,
R_m is Market return
R_f is Risk free rate of return
σ_m is Market risk (SD of market)
Slope is reward per unit of risk borne

Expected return of the portfolio (using CML):

$$E(R_p) = R_f + \left(\frac{R_m - R_f}{\sigma_m}\right).\sigma_p$$

Where, σ_p is Portfolio risk

Expected return of the portfolio (using CAPM):

$$E(R) = R_f + \beta(R_m - R_f)$$

Expected return of the stock – Sharpe Model :

$$R_i = \alpha_i + \beta_i R_m + \epsilon_i$$

Where,
R_i is Expected return on a security i
α_i is intercept of the straight line or alpha co-efficient
β_i is slope of straight line or beta co-efficient
R_m is rate of return on market index
ϵ_i is error term

Expected risk of the stock – Sharpe Model :

$$(\sigma_i)^2 = (\beta_i)^2.(\sigma_m)^2 + (\sigma_{\epsilon_i})^2$$

Where,

$(\sigma_i)^2$ is variance of the security
β_i is slope of straight line or beta co-efficient
$(\sigma_m)^2$ is market variance
$(\sigma_{\epsilon_i})^2$ is Variance of errors

Covariance between securities – Sharpe Model :

$$(\sigma_{ij}) = (\beta_i).(\beta_j)(\sigma_m)^2$$

Risk (SD) of portfolio – Sharpe Model:

$$(\sigma_p)^2 = \left[\sum_{i-1}^{n} x_i\beta_i\right]^2.(\sigma_m)^2$$

$$+ \left[\sum_{i-1}^{n}(x_i)^2(\sigma_{\epsilon_i})^2\right]$$

Return of the portfolio – Sharpe Model:

$$E = \sum_{i-1}^{n} x_i(\alpha_i + \beta_i R_m)$$

Alpha of the portfolio :

$$\alpha_p = \sum_{i=1}^{n} x_i \alpha_i$$

Where,

x_i is weightage of 'x' security in portfolio

α_i is intercept of the straight line or alpha co-efficient

Beta of the portfolio:

$$\beta_p = \sum_{i=1}^{n} w_i \beta_i$$

Expected return using SML :

$$E_R = R_f + \sigma_{im}\left[\frac{R_m - R_f}{(\sigma_m)^2}\right]$$

Expected return – Arbitrage Pricing theory : $E_R = R_f + \lambda_1\beta_1 + \lambda_2\beta_2 \ldots \lambda_n\beta_n$ **Or,**

$$E_R = R_f + (EV_1 - AV_1)\beta_1 + (EV_2 - AV_2)\,\beta_2 \ldots\ldots (EV_n - AV_n)\beta_n$$

Where, λ *is* Risk premium for the factors like GDP, inflation, interest rate, etc

$(EV_n - AV_n)$ – Surprise Factor due to change in Value of Factor

Weight to achieve Minimum Variance Portfolio :

$$W_A = \frac{[\sigma_B{}^2 - r_{AB}\sigma_A\sigma_B]}{\sigma_A{}^2 + \sigma_B{}^2 - 2r_{AB}\sigma_A\sigma_B}$$

Relationship of weight of securities in Minimum Variance Portfolio :

$WB = 1 - WA$

Sharpe 's Optimal Portfolio :

Calculation of cutoff point (C*):

$$\frac{\sigma_m{}^2 . \sum_{i=1}^{n} \frac{(R_i - R_f)\beta_i}{\sigma_{ei}{}^2}}{1 + \sigma_m{}^2 \sum_{i=1}^{n} \frac{\beta_i{}^2}{\sigma_{ei}{}^2}}$$

Highest C value is taken as cut off point (C*)

Calculation of weights :

$$\frac{Z_i}{\sum_{i=1}^{n} Z_i}$$

Where, $Z_i = \frac{\beta}{\sigma_{ei}^2}\left[\frac{R_i - R0}{\beta_i} \times C^*\right]$

σ_m^2 *is* Variance of the market

$\Sigma_{ei}{}^2$is Stock's unsystematic risk

Sharpe Ratio: $S = \frac{R_p - R_f}{\sigma_i}$

Treynor Ratio: $T = \frac{R_p - R_f}{\beta_i}$

Jensen Alpha : $Alpha(\alpha) = A(R) - E(R) = R_p - (R_f - \beta(R_m - R_f))$

Where, Jensen's Alpha is α

A(R) is Actual return

E(R) is Expected Return as per CAPM

❖ Mutual Funds

NAV per unit :
Net Assets of the Scheme)/(No. of units outstanding) Where,
net assets of the scheme = Market value of Investments + Receivables + Other accrued income + Other assets – Accrued expenses – Other payables – Other liabilities

Tracking Error (TE) :

$$\sqrt{\frac{\sum(d - \bar{d})^2}{n-1}}$$

Where,
d is Differential return
d' or $\bar{d}$ is Average differential return
n = No. of observation

❖ Derivative Analysis and Valuation – Futures

Basis : Spot Price – Futures Price

Annual Compounding :
A = P(1+r/100)^t
Where,
A is Compounded amount,P is Principal amount,r is Rate of interest & t is Time period

Interval Compounding :
A = P(1+r/n)^{nt}
Where, n is no of intervals

Continous Compounding :
P x e^{rt} = X
Where,
e is Epsilon and X is Future Value

Futures Price :
F = S x e$^{(r-y)t}$
Where,
F is Future Value ,S is Spot Value & y is Dividend Yield

Contract Value : Lots size × Futures Price

Beta : $\frac{\Delta \text{ in value of stock}}{\Delta \text{ in value of INDEX}}$

Value of futures contracts to be hedged : Portfolio Value x Beta of the portfolio

❖ Derivative Analysis and Valuation - Options

Long call payoff : Max (0, (S_T – X))
Where,
S_T – Spot price at Maturity Date
X – Strike Price

Short call payoff : Min((X – S_T), 0)

Long put payoff : Max(0, (X - S_T))

Short put payoff : Min((S_T - X), 0))

Delta (Δ):

$$\frac{\text{Change in the price of the option}}{\text{Change in the price of the stock}}$$

Gamma (ɣ):

$$\frac{\text{Change in the price of the option}}{\text{Change in delta}}$$

Theta (θ) :

$$\frac{\text{Change in the price of the option}}{\text{Change in time period}}$$

Vega (V) :

$$\frac{\text{Change in the price of the option}}{\text{Change in Volatility}}$$

Rho (ρ):

$$\frac{\text{Change in the price of the option}}{\text{Change in Interest rate}}$$

Put Call Parity :
C + (K x e^{-rt}) = P + S_0
Where,
C is Value of call
K is Strike price
e^{-rt} is Present Value
P is Value of Put
S_0 is Spot price

Binomial Model :

Probability : $p = \frac{e^{rt} - d}{u - d}$

Where,

$u = \frac{Su}{S0}$

S_u is spot going up & S_0 is current spot

$d = \frac{Sd}{S0}$

S_d is spot going down

Present Value :

$$\frac{(P) \text{ x } (u) + (1-P) \text{ x } (d)}{e^{rt}}$$

Black Scholes Merton Method:

C = S_0 N(d_1) – K e^{-rt} N(d_2)

$$d1 = \frac{\ln\left(\frac{S0}{K}\right) + \left(r + \frac{\sigma 2}{2}\right)T}{\sigma\sqrt{T}}$$

d_2 = d1 – $\sigma\sqrt{T}$

where, C is Call Value , S_0 is Spot

N(d1) - hedge ratio of shares of stock to Options.

K e^{-rt} N(d2) – borrowing equivalent to PV of the exercise price times an adjustment factor of N(d2)

Futures price of Commodity :

(S_0) x $e^{(r+s-c)t}$

Where,
S_0 is Spot price
r is Rate of interest
s is Storage cost
c is convenience yield
t is time.

❖ Foreign Exposure and Risk Management

Relationship between direct and indirect quote:
Direct Quote = 1/(Indirect Quote)

% Spread $= \frac{\text{Ask} - \text{Bid}}{\text{Bid}}$ x 100

Forward Rate = Spot Rate ± Premium/Discount

Forward Premium % =

$$\frac{\text{Forward Premium}}{\text{Spot Rate}} \text{ x } 100$$

Forward Premium (Annualised) :

$$\frac{\text{Forward Premia}}{\text{Spot Rate}} \text{ x } \frac{12}{\text{Given Period}} \text{ x } 100$$

Forward Rate as per Covered Interest Parity :

$$= \text{Current spot rate (Direct Q) x } \frac{1 + \text{Current domestic interest rate}}{1 + \text{Interest rate of foreign market}}$$

Expected Future Spot Rate as per Uncovered Interest Parity:

$$= \text{Current spot rate (Direct Q) x } \frac{1 + \text{Current domestic interest rate}}{1 + \text{Interest rate of foreign market}}$$

Purchasing Power Parity (Absolute Form) :

Spot Rate

$$= \alpha \text{ x } \frac{\text{Price level in domestic market}}{\text{Price level in foreign market}}$$

Where,
α = Sectoral constant for adjustment

Purchasing Power Parity (Relative Form) :

$$\text{Expected Spot Rate} = \text{Current Spot Rate (Direct Q) x } \frac{1 + \text{Domestic Inflation Rate}}{1 + \text{Foreign Inflation Rate}}$$

International Fisher Effect :

$$\frac{\text{Expected Spot Rate}}{\text{Current Spot Rate}} = \frac{1 + \text{Domestic interest rate}}{1 + \text{Interest rate in Foreign market}}$$

❖ Intl. Financial Management

Modified IRR i.e MIRR =

$$\sqrt[n]{\frac{\text{FV (Positive Cash Flows, Reinvestment rate)}}{-\text{PV (Negative cash Flows, Finance rate)}}} - 1$$

Where, n is project life in years.

$$\mathbf{APV} = -I_0 + \sum_{t=1}^{n} \frac{X_t}{(1+K)^t} + \sum_{t=1}^{n} \frac{T_t}{(1+i_d)^t} + \sum_{t=1}^{n} \frac{S_t}{(1+i_d)^t}$$

Where,

I_0 is Present Value of Investment Outlay

$\frac{X_t}{(1+K)^t}$ is present value of operating cash flow

$\frac{T_t}{(1+i_d)^t}$ is present value of Interest Tax shields

$\frac{S_t}{(1+i_d)^t}$ is present value of Interest subsidies

❖ Int. Rate Risk Management

Settlement amount on FRA

$$\frac{N(RR-FR)\left(\frac{dtm}{DY}\right)}{\left[1+RR\left(\frac{dtm}{DY}\right)\right]}$$

Where,

N is notional principal amount

RR is Reference Rate prevailing on the contract settlement date

FR is Agreed-upon Forward Rate

dtm is days of loan (FRA Specified period)

DY is Total number of days (360 or 365 days)

Interest Rate Cap =

$$(N)\max(0, R_A - R_C) . \frac{dt}{\text{Days in year}}$$

Where,

N is notional principal amount of the agreement,

R_A is actual spot rate on the reset date

R_C is cap rate (expressed as a decimal)

dt is the number of days from the interest rate reset date to the payment date

Interest Rate Floor

$$=(N)\max(0, R_F - R_A) . \frac{dt}{\text{Days in year}}$$

Interest Rate Collar :

$$\text{Payment} = (N)[\max(0, R_A - R_C) - \max(0, R_F - R_A)]. \frac{dt}{\text{Days in year}}$$

Interest Rate Swaps :

$$\text{Rate Payment} = N.(AIC). \frac{d_t}{360}$$

Where,

N is notional principal amount of the agreement,

AIC is All In Cost (Interest rate – fixed or floating)

dt is number of days from the interest rate to the settlement date

❖ Business Valuation

Beta of Assets : $\beta_a = \beta_e \left[\frac{E}{E+D(1-t)}\right] + \beta_d \left[\frac{D}{E+D(1-t)}\right]$

Where,

β_a – Ungeared or Asset Beta

β_e – Geared or Equity Beta

β_d – Debt Beta

E – Equity

D is Debt

t is Tax rate

P/E to Growth Ratio:

$$\text{PEG Ratio} = \frac{\text{PE Ratio}}{\text{g x 100}}$$

Where,

P is Market Price per share

E is Earnings per share

g is Growth rate of EPS

Enterprise Value:

$$EV = MC + D - C$$

Where,

MC is Market capitalization,

D is debt and C is Total Cash Equivalents.

Economic Value Added: EVA = $\text{NOPAT} - \text{Capital Charge} = \text{EBIT}\ (1 - \text{tax rate}) - \text{Invested Capital} * \text{WACC}$

Where,

NOPAT = Net Operating Profit After Taxes

EBIT = Earnings before Interest and Tax

WACC = Weighted Average Cost of Capital

Invested Capital = Total Assets minus Non-Interest-Bearing Liabilities

Note: Adjust. EBIT and Invested Capital for non-cash charges (other than depreciation) like provisions for doubtful debts, P&L adjustments.

Market Value Added (MVA):

MVA = MV of E & D – Invested Capital

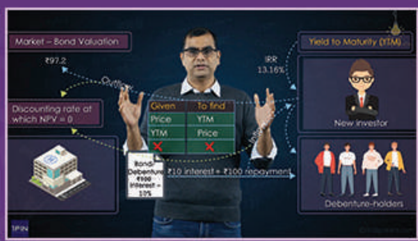
FINANCE IS AS MUCH A SCIENCE AS IT IS AN ART. THE KEY TO MASTERING THIS SUBJECT LIES NOT IN JUST REMEMBERING A FEW FORMULAE BUT THE ABILITY TO UNDERSTAND THE CONCEPTUAL 'RATIONALE' & THE HUMAN PSYCHE THAT DRIVES SUCH 'BEHAVIOUR'.

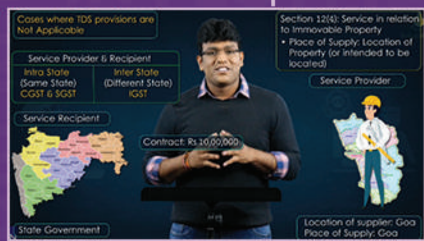
Sriram Somayajula, CFA, PGP (ISB)
AFM Faculty & Director, 1FIN

Our Approach

We go to great lengths to ensure that we deliver a quality learning experience to our students. Right from pedagogy design to faculty selection, video recording and animation, at evaery stage our goal is to ensure that the final output is the BEST and it meets the requirements of the learners. It is our laser sharp focus on maintaining HIGH QUALITY and setting new benchmarks in the CA education domain, that make our efforts stand out and help our students to succeed in their examinations.

A Glimpse of our e-learning modules





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