* PPT 7*

Investment Decision Rule

→ NPV = - cost + $\frac{C}{r}$

Q. NPER = 3 = n

PV = 1000,000

PMT = -500,000

(C)

r = 10%.

According to IRR,

IRR = 23.38%.

we should accept the project,

According to NPV,

$$NPV = -\text{cost} + \frac{C}{R}$$

$$= 1000,000 - \frac{500,000}{1.1} - \frac{500,000}{(1.1)^2} - \frac{500,000}{(1.1)^2}$$

= Rs -243,426

NPV is negative, so we should reject the Project.

→ Profitability Index,

PI = Value created (NPV) / Resource consumed (Initial Investment)

Q 180 enigneers.

Project	PI
Router	15/50 = 0.300
Project A	22.7/47 = 0.482
Project B	8.1/44 = 0.184
Project C	14/40 = 0.350
Project D	11.5/61 = 0.188
Project E	20.6/58 = 0.355
Project F	12.9/32 = 0.403

→ Increasing order.

Project A
Project F
Project E
Project C
Router
Project D
Project B

Sd 47
50+32 ≠ 82 < 180 47+32 = 79 < 180
50+32+58 = 140 < 180 79+58 = 137 < 180
137 + 40 = 177 < 180

So we can Accept A, F, C, E project.

* Bond Valuation *

Q (a) Coupon rate = 8%, C = 8% of 1000
Yield to maturity = 8% = $\frac{8}{100} \times 1000$ = 80 Rs
face value = 1000
n = 10 years,

Bond value = PV(coupon payments) + PV(face amount)

→ $PV(\text{coupon payments}) = \frac{C}{r}\left(1 - \frac{1}{(1+r)^n}\right)$

$= \frac{80}{0.08}\left(1 - \frac{1}{(1.08)^{10}}\right)$

= Rs 536.81

→ $PV(\text{face amount}) = \frac{FV}{(1+r)^n}$

$= \frac{1000}{(1+0.08)^{10}}$

= Rs 463.19

∴ Bond value = 536.81 + 463.19 = 1000

∴ Here Bond value = face value
because coupon rate = Yield to maturity

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Pg 12 :- A year has gone
Yield to maturity = 10%
n = 9 years,
Coupon rate = 8%

→ Bond value = PV(coupon payment) + PV(face amount)

$$= \frac{80}{0.10}\left(1 - \frac{1}{(1.10)^9}\right) + \frac{1000}{(1.10)^9}$$

$$= 460.72 + 424.10$$
$$= 884.82 \text{ RS}$$

discount Bond Because,
Bond value < Face value.
This is because yield to maturity is greater than coupon rate.

Pg 14 A year has gone,
Yield to maturity = 6%.
n = 9 years
coupon rate = 8%.

→ Bond value = PV(coupon payment) + PV(face amount)

$$= \frac{80}{0.06}\left(1 - \frac{1}{(1.06)^9}\right) + \frac{1000}{(1.06)^9}$$

$$= 544.14 + 591.90$$
$$= \text{Rs } 1136.03$$

Premium Bond

Because Yield to Maturity is less than coupon rate.

Bond value > face value.

⇒ Yield to maturity for Zero-coupon Bond ⇒

$$PV = \frac{FV}{(1+YTM)^n}$$

$$\therefore YTM = \left(\frac{FV}{P}\right)^{\frac{1}{n}} - 1$$

⇒ Yield to maturity for coupon Bond

$$P = \frac{CPN}{Y}\left(1 - \frac{1}{(1+Y)^n}\right) + \frac{FV}{(1+Y)^n}$$

where Y is Yield to maturity.

Pg 20 n = 6

Coupon rate = 8%, CPN = $\frac{8}{100} \times 1000 = 80$

FV = 1000

P = 955.14

Yield = ?

Bond value = $\frac{CPN}{Y}\left(1 - \frac{1}{(1+Y)^n}\right) + \frac{FV}{(1+Y)^n}$

(P)

$\therefore 955.14 = \frac{80}{Y}\left(1 - \frac{1}{(1+Y)^6}\right) + \frac{1000}{(1+Y)^6}$

→ By trial And error,

$Y = 9\%$

We can also observe that as,

Bond value < FV,

Yield must be > Coupon rate

$\therefore Y = 9\%$

→ Current Yield = $\frac{80}{955.14} = 8.38$ percent.

Pg 22

$n = 5$ year $= 10$ (5×2) ← semiannual

$fV = 1000$

coupon rate $= 5\%$ (semiannual)

Yield to maturity $= 6.30\%$ (APR)

$= 3.15\% \left(\frac{6.30}{2}\right)$

Bond value = PV(coupon payment) + PV(face value) → ①

→ ~~PV(coupon payment)~~

→ Coupon payments $= \frac{5\%}{2} \times 1000 = 25$ RS

$$\text{Bond value} = \frac{25}{0.0315}\left(1 - \frac{1}{(1.0315)^{10}}\right) + \frac{1000}{(1.0315)^{10}}$$

$= 944.98$

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Pg 4 Coupon rate = 14% semiannually

$= \frac{14}{2} = 7\%$

Yield to maturity = 16 (semiannually)

$= \frac{16}{2} = 8\%$

n = 7 years = 7×2 = 14 payments.

Bond price = ? , EAR = ? Face value = 1000

CPN = $\frac{7}{100} \times 1000 = 70$ Rs

Sol^n We can see that, YTM > coupon rate so Bond price will be less than face value.

Bond Price = $\frac{70}{0.08}\left(1 - \frac{1}{(1.08)^{14}}\right) + \frac{1000}{(1.08)^{14}}$

= 917.56 Rs.

→ Effective Annual Rate = $\left(1 + \frac{YTM}{k}\right)^2 - 1$

$= (1 + 0.08)^2 - 1$

$= (1.08)^2 - 1$

$= 16.64\%$.

Pg 25 Coupon rate = 10% (semiannually)
= 5%

FV = 1000

n = 20 years = 20×2 = 40

YTM = 12% (semiannualy)
= $\frac{12}{2}$ = 6%

CPN = $\frac{5 \times 1000}{100}$ = 50 Rs.

Bond Price = ?, EAR = ?

Soln

Bond Price = $\frac{50}{0.05}\left(1 - \frac{1}{(1.06)^{40}}\right) + \frac{1000}{(1.06)^{40}}$

= $\frac{50}{0.05}\left(1 - \frac{1}{10.29}\right) + \frac{1000}{10.29}$

= $\frac{50}{0.05}(1 - 0.142) + 142.04$

= 858 + 142.04

= 1000.04

= $\frac{50}{0.06}(1 - 0.097) + 97.08$

= 903 + 97.08 752.5 + 97.08

= 1000.08 = 849.58

→ EAR = $(1+0.06)^2 - 1$ = 12.36%

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pg 28 n = 30 years.

$C_1 = 10\%$ $YTM_1 = 5\%$ CPN = 10

$C_2 = 5\%$ $YTM_2 = 5\%$ CPN = 5

$C_3 = 3\%$ $YTM_3 = 5\%$ CPN = 3

FV = 100 for All.

Bond 1:-

→ Bond Price $= \frac{10}{0.05}\left(1 - \frac{1}{(1.05)^{30}}\right) + \frac{100}{(1.05)^{30}}$

$= 176.86$ (premium)

Bond 2:-

Bond Price $= \frac{5}{0.05}\left(1 - \frac{1}{(1.05)^{30}}\right) + \frac{100}{(1.05)^{30}}$

$= 100$ (Par)

Bond 3:

Bond Price $= \frac{3}{0.05}\left(1 - \frac{1}{(1.05)^{30}}\right) + \frac{100}{(1.05)^{30}}$

$= 69.26$ (discount)

Pg 33 $n_1 = 15$ year

$n_2 = 30$ year $\quad C_2 = 10\% \Rightarrow CPN = 10$

YTM = 5%

$YTM_{new} = 6\%$

FV = 100

⇒ Zero Coupon Bond :-

YTM = 5 %

$$\text{Bond Price} = \frac{100}{(1.05)^{15}} = 48.10$$

YTM = 6 %

$$\text{Bond Price} = \frac{100}{(1.06)^{15}} = 41.73$$

⇒ Coupon Bond :-

YTM = 5 %

$$\text{Bond Price} = \frac{10}{0.05}\left(1 - \frac{1}{1.05^{30}}\right) + \frac{100}{1.05^{30}}$$

$$= 176.86$$

YTM = 6 %

$$\text{Bond Price} = \frac{10}{0.06}\left(1 - \frac{1}{1.06^{30}}\right) + \frac{100}{1.06^{30}}$$

$$= 155.06$$

→ zero coupon bond :-

$$\frac{41.73 - 48.10}{48.10} = -13.2\%$$

→ coupon bond :-

$$\frac{155.06 - 176.86}{176.86} = -12.3\%$$

Pg 46 :-

zero coupon bond	Face Value	Cost
1 year	1000	96.62
2 year	100	92.45
3 year	1100	11 * 87.63 = 963.93

= 1153 Rs

3-year

So ^ Coupon Bond must be trade at 1153

⇒ PV = PV (Bond cash flow)

$$= \frac{CPN}{1+YTm_1} + \frac{CPN}{1+YTm_2^2} + \cdots \frac{CPN+FV}{(1+YTm)^2}$$

* Interest rate *

→ Equivalent n-Period Discount rate
$= (1+r)^n - 1$

Pg6 :- EAR = 6·1.
Each Month so $n = \frac{1}{12}$
FV = 1,00,000 , C = ?
n = 10 year = 10×12 = 120 (each month)

Equivalent $\frac{1}{12}$ Period Discount rate

$r = (1+0.6)^{\frac{1}{12}} - 1$
$= 0.48681$

$$FV = \frac{C}{r}\left((1+r)^n - 1\right)$$

$$100,000 = \frac{C}{0.004868}\left((1.004868)^{120} - 1\right)$$

$$\therefore \boxed{C = 615.47}$$

→ $EAR = \left(1 + \frac{APR}{k}\right)^{k} - 1$

Pg 10 :- C = 4000, each month. | n = 4 years = 4 × 12 = 48

APR = 5% semiannual

semiannual so :-

$r = \frac{5}{2} = 2.5\%$

So 1 month discount rate

$r = (1.025)^{\frac{1}{6}} - 1 = 0.4124\%$ per month

PV for 4000 Rs :-

$PV = \frac{C}{r}\left(1 - \frac{1}{(1+r)^{n}}\right)$

$= \frac{4000}{0.004124}\left(1 - \frac{1}{1.004124^{48}}\right)$

$= 173,867$

So $173867 > 150000$

So Better to Pay 1,50,000

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Pg16 APR = 4.8% with monthly payments,
So $r = \frac{4.8\%}{12} = 0.4\%$ per month

→ loan today = £ 484,391.98

interest paid in last 2 years
= 47291.28

→ Real interest rate :-

Growth in Purchasing Power $= 1 + r_r = \frac{1+r}{1+i}$

$$r_r = \frac{r-i}{1+i} \approx r-i$$

Pg 19 * Nominal rate with nominal cash flow :-

25000, $i = 4\%$, $r = 10\%$

$C_1 = 25,000\ (1.04) = 26,000$
$C_2 = 25,000\ (1.04)^2 = 27040$
$C_3 = 25,000\ (1.04)^3 = 28121.60$

So $PV = \frac{26,000}{1.10} + \frac{27040}{1.10^2} + \frac{28,121.60}{1.10^3}$

$= 67,111.65$ Rs

Pg 20 * Real rate with real cash flow

$$PV = \frac{25000}{0.5777}\left(1 - \frac{1}{1.05773}\right)$$

$= 67,111.65$ Rs

→ Equivalent after-tax interest rate

$r(1-t)$

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$\Rightarrow PV = \frac{C_1}{(1+r_1)} + \frac{C_2}{(1+r_2)^2} + \dots + \frac{C_n}{(1+r_n)^n}$

$= ?$

Pg25

$n = 5$ years, $C = 1000$,

$r_1 = 0.91\%$, $r_2 = 0.98\%$, $r_3 = 1.26\%$

$r_4 = 1.69\%$, $r_5 = 2.01\%$

$$PV = \frac{1000}{1.0091} + \frac{1000}{(1.0098)^2} + \frac{1000}{(1.01263)^3} + \frac{1000}{(1.0169)^4} + \frac{1000}{(1.0201)^5}$$

$PV = ?$

Pg29

$r_1 = 1\%$ $\quad r_2 = ?$

$r_{12} = 2\%$ $\quad r_3 = ?$

$r_{13} = 4\%$

$\rightarrow (1+r_2)^2 = (1.01) * (1.02) *$

$= 1.0302$

$\therefore r_2 = (1.0302)^{\frac{1}{2}} - 1 = 1.499\%$

$\rightarrow (1+r_3)^3 = (1.01) * (1.02) * (1.04)$

$= 1.0714$

$\therefore r_3 = (1.0714)^{\frac{1}{3}} - 1$

$r_3 = 2.326\%$

$\therefore$ Yield curve increase

PdF 7

* financial statement *

→ Assets = liabilities + Stockholder's Equity

* Double - declining Balance method *

→ Periodic Depreciation Expense = Begining book value × Rate of depreciation

* straight line method *

depreciation = (cost − salvage value) / life span

→ Market Value of Equity = Share outstanding * Market price per share

→ Market to Book Ratio (price to book ratio)

= Market Value of Equity / Book value of Equity

→ enterprise value = Market value of Equity + Debt - cash

→ EPS (Earning Per share)
= Net income / No of share outstanding

→ Retained Earning = Net income - Dividend.

* Profitability ratio *

→ operating Margin = operating Income / Sales

→ gross margin = gross profit / Sales

→ EBIT Margin = EBIT / Sales

→ Net Profit margin = Net income / Sales

* Liquidity ratio *

- current ratio = current assets / current liability

- quick ratio = (Account & receivable + Short term investment + cash) / current liabilities

- cash ratio = Cash / current liabilities

* Working Capital ratio *

→ Account Receivable days =

$$\frac{\text{Accounts Receivable}}{\text{Average Daily Sales}}$$

→ Account Payable days =

$$\frac{\text{Account Payable}}{\text{Average Daily cost of sales}}$$

→ Inventory days = $\frac{\text{Inventory}}{\text{average daily cost of sales}}$

* Turnover ratio *

→ Inventory turnover = $\frac{\text{Annual cost of sales}}{\text{Inventory}}$

→ Account receivable turnover = $\frac{\text{Annual sales}}{\text{account receivable}}$

→ Account Payable turnover = $\frac{\text{annual cost of sales}}{\text{account payable}}$

* interest coverage ratio *

→ EBITDA = EBIT + depreciation And Amortization

* leverage ratio *

→ Debt to Equity ratio = Total Debt / Total Equity

→ Debt to Capital ratio = Total Debt / Total Equity + Total Debt

→ Net debt = Total debt - Excess Cash & short term investments.

→ Debt to Enterprise value ratio = Net Debt / Enterprise value

or

Net Debt / Market Value of Equity + Net Debt.

* Valuation Ratio *

P/E ratio = $\frac{\text{Market capitalization}}{\text{Net income}}$

$= \frac{\text{share price}}{\text{Earning per share}}$

* operating Return *

→ Return on Equity = $\frac{\text{Net income}}{\text{Book value of Equity.}}$

→ Return on Assets = $\frac{(\text{Net income} + \text{Interest Expense})}{\text{Book value of Assets}}$

→ Return on Invested Capital (ROIC) = $\frac{EBIT(1 - \text{tax rate})}{(\text{Book Value of Equity} + \text{Net Debt})}$

* The DuPont identity *

$ROE = \left(\frac{\text{Net Income}}{\text{Sales}}\right) * \left(\frac{\text{Sales}}{\text{Total Assets}}\right) \left(\frac{\text{Total Asset}}{\text{Book value of Equity}}\right)$

Net Profit margin — Asset Turnover — Equity multiplier