

CA Final **AFM** Part 1 **OUTSCANNER**

Comprehensive Question Bank with Video Solutions!

ICAI Suggested
Answers

QR Code
based
Video-Pod

Coverage:
SM, PM, PYQ,
RTP & MTP

Self-notes
for Ambiguities

Adish Jain CA CFA

Table of Contents

Volume 1

- 01.** Equity & Business Valuation **01**
- 02.** Merger & Acquisition **98**
- 03.** Fixed Income Securities **148**
- 04.** Portfolio Management **194**
- 05.** Mutual Fund **268**

Volume 2

- 06.** Advanced Capital Budgeting Decisions **301**
- 07.** Derivatives Analysis & Valuation **341**
- 08.** Interest Rate Risk Management **403**
- 09.** Foreign Exchange Risk Management **429**
- 10.** International Financial Management **505**
- 11.** Financial Policy & Corporate Strategy **533**
- 12.** Risk Management **541**
- 13.** Security Analysis **547**
- 14.** MCQs **555**

Equity & Business Valuation

*“Price is what you pay;
value is what you get!”*

CHAPTER
01

Equity & Business Valuation



A. Dividend based Valuation Models

1. Zero Growth Model &

2. Constant Growth Model



QUESTION 1:

N 20 | N 11 | SM

A company has a book value per share of ₹ 137.80. Its return on equity is 15% and it follows a policy of retaining 60% of its earnings. If the Opportunity Cost of Capital is 18%, what is the price of the share today?

Solution:

$$\text{EPS} = 137.80 \times 15\% = 20.67$$

$$\text{DPS} = 20.67 \times (1 - 0.60) = 8.268$$

$$g = 0.15 \times 0.60 = 9\%$$

$$\begin{aligned} \text{Price of share (P}_0\text{)} &= \frac{D_1}{K_e - g} \\ &= \frac{8.268}{0.18 - 0.09} = 91.87 \end{aligned}$$



QUESTION 2:

SM | M 21 | M 05

A company's beta is 1.40. The market return is 14%. The risk free rate is 10% (i) What is the expected return based on CAPM (ii) If the risk premium on the market goes up by 2.5% points, what would be the revised expected return on this stock?

Solution:

$$\begin{aligned} \text{Expected Return} &= R_f + \beta (R_m - R_f) \\ &= 10 + 1.40 (14 - 10) \\ &= 15.6\% \\ \text{Revised risk premium} &= (14\% - 10\%) + 2.5\% \\ &= 6.5\% \\ \text{Revised expected return} &= 10 + 1.40 (6.5) \\ &= 19.1\% \end{aligned}$$



QUESTION 3:

N 21

Following are the details of X Ltd. and Y Ltd.:

Particulars	X Ltd.	Y Ltd.
Dividend per Share	₹ 4	₹ 4
Growth Rate	10%	10%
Beta	0.9	1.2
Current Market Price per Share	₹ 150	₹ 70

Other Information:

Risk Free Rate of Return 7%

Market Rate of Return 14%

- Calculate the price of shares of both the companies.
- Write the comment on the valuation on the basis of price calculated and current market price.
- As an investor what course of action should be followed?

Solution:

- a) Calculation of Prices of shares of both companies:

	X Ltd.	Y Ltd.
Beta	0.9	1.20
Cost of Equity using CAPM	$= 7\% + 0.9 [14\% - 7\%]$ $= 13.30\%$	$= 7\% + 1.20 [14\% - 7\%]$ $= 15.40\%$
Growth Rate	10%	10%
Price of Share	$= \frac{4.00}{0.133 - 0.10}$ $= ₹ 121.21$	$= \frac{4.00}{0.154 - 0.10}$ $= ₹ 74.07$

- b) and c) Comment on valuation and course of action:

Company	CMP	Value	Valuation	Action of the Investor
X Ltd.	₹ 150.00	₹ 121.21	Overvalued	Sell
Y Ltd.	₹ 70.00	₹ 74.07	Undervalued	Buy



QUESTION 4:

M 15

The following information is collected from the annual reports of BB Ltd:

Profit before tax	₹ 2.50 crore
Tax rate	40 percent
Retention ratio	40 percent
Number of Outstanding shares	50,00,000
Equity capitalization rate	12 percent
Rate of return on investment	15 percent

What should be the market price per share according to Gordon's model of dividend policy?

Solution:

	PBT	2,50,00,000
Less:	Tax @ 40%	(1,00,00,000)
	EAES	1,50,00,000
÷	No. of shares	50,00,000
	EPS	3

$$\text{Calculation of DPS} = 3 \times 0.60 = 1.80$$

$$\text{Calculation of growth} = 0.40 \times 0.15 = 6\%$$

$$\begin{aligned} \text{Price of share (P}_0\text{)} &= \frac{D_1}{K_e - g} \\ &= \frac{1.80}{0.12 - 0.06} = ₹ 30 \end{aligned}$$



Self-note: If we assume only equity in the capital structure of the company, then $R_oI = R_oE$.

**QUESTION 5:**

N 18 | N 13 | M 11 | M 05 | SM | RTP

Shares of Voyage Ltd. are being quoted at a price-earnings ratio of 8 times. The company retains ₹ 5 per share which is 50% of its Earning Per Share.

You are required to determine:

1. the cost of equity to the company if the market expects a growth rate of 15% p.a.
2. the indicative market price with the same cost of capital and if the anticipated growth rate is 16% p.a.
3. the market price per share if the company's cost of capital is 20% p.a. and the anticipated growth rate is 18% p.a.

Solution:

1. Retained Earnings ₹ 5 per share
Retention ratio 50%
EPS $\frac{₹ 5}{50\%} = ₹ 10$
DPS ₹ 5
PF Ratio 8 times
Market Price ₹ 10 × 8 times = ₹ 80
Computation of cost of equity $= \frac{D_1}{P_0} + g$
 $= \frac{5}{80} + 0.15$
 $= 21.25\%$
2. Market Price $= \frac{D_1}{K_e - g} = \frac{5}{0.2125 - 0.16}$
 $= ₹ 95.24$
3. Market Price $= \frac{D_1}{K_e - g} = \frac{5}{0.20 - 0.18}$
 $= ₹ 250$

**QUESTION 6:**

MTP N 23 | M 18 | N 14 | N 10 | N 08

The risk-free rate of return R_f is 9 percent. The expected rate of return on the market portfolio R_m is 13 percent. The expected rate of growth for the dividend of Platinum Ltd. is 7 percent. The last dividend paid on the equity stock of firm A was ₹ 2.00. The beta of Platinum Ltd. equity stock is 1.2.

- a. What is the equilibrium price of the equity stock of Platinum Ltd.?
- b. How would the equilibrium price change when:
 - The inflation premium increases by 2 percent?
 - The expected growth rate increases by 3 percent?
 - The beta of Platinum Ltd. equity rises to 1.3?

Solution:

- a. Calculation of cost of equity by using CAPM

$$\begin{aligned}
 &= R_f + \beta (R_m - R_f) \\
 &= 9 + 1.2 (13 - 9) \\
 &= 13.8\%
 \end{aligned}$$

Calculation of equilibrium price

$$\begin{aligned}
 &= \frac{D_1}{K_e - g} \\
 &= \frac{2(1+0.07)}{0.138 - 0.07} \\
 &= ₹ 31.47
 \end{aligned}$$

- b. Revised price after the change:

$$\begin{aligned}
 R_f &= 11\% \\
 R_m &= 15\% \\
 \text{Growth} &= 10\% \\
 \text{Beta} &= 1.3
 \end{aligned}$$

Calculation of K_e by using CAPM

$$\begin{aligned}
 &= R_f + \beta (R_m - R_f) \\
 &= 11 + 1.3 (15 - 11) \\
 &= 16.2\%
 \end{aligned}$$

Equilibrium price after the change:

$$\begin{aligned}
 &= \frac{D_1}{K_e - g} \\
 &= \frac{2(1 + 0.1)}{0.162 - 0.10} \\
 &= 35.48
 \end{aligned}$$



Self-note: Given rates of R_f and R_m are actual rates of return and therefore are nominal rates and therefore they include inflation premium.

**QUESTION 7:**

M 13 | SM | RTP

X Limited just declared a dividend of ₹ 14.00 per share. Mr. B is planning to purchase the share of X Limited, anticipating increase in growth rate from 8% to 9%, which will continue for three years. He also expects the market price of this share to be ₹ 360.00 after three years.

You are required to determine:

- The maximum amount Mr. B should pay for shares, if he requires a rate of return of 13% per annum.
- The maximum price Mr. B will be willing to pay for share, if he is of the opinion that the 9% growth can be maintained indefinitely and require 13% rate of return per annum.
- The price of share at the end of three years if 9% growth rate is achieved and assuming other conditions remaining same as in (ii) above.

Calculate rupee amount up to two decimal points.

	Year - 1	Year - 2	Year - 3
FVIF @ 9%	1.090	1.188	1.295
FVIF @ 13%	1.130	1.277	1.443
PVIF @ 13%	0.885	0.783	0.693

Solution:

- a) Calculation of Dividends

Year	0	1	2	3
Growth		9%	9%	9%
Dividend	14	15.26	16.63	18.13

The maximum amount Mr. B should pay for share

Year	CF's	PVAF@13%	PV
1	15.26	0.885	13.51
2	16.63	0.783	13.02
3	18.13 + 360 = 378.13	0.693	262.04
Max Amount			288.57

- b. Gordon's formula

If growth rate 9% is achieved for indefinite period, then maximum price of share should Mr. A willing be to pay is

$$\begin{aligned}
 &= \frac{D_1}{K_e - g} \\
 &= \frac{15.26}{0.13 - 0.09} \\
 &= ₹ 381.5
 \end{aligned}$$

- c. Max price paid at the end of 3 years

$$\begin{aligned}
 P_3 &= \frac{D_3 \times (1 + g)}{K_e - g} \\
 &= \frac{18.13 \times 1.09}{0.13 - 0.09} \\
 &= ₹ 494.04
 \end{aligned}$$

**QUESTION 8:**

M 21

NM Ltd. (NML) is aspiring to enter the capital market in a three years' time. The Board wants to attain the target price of ₹ 70 for its shares at the end of three years. The present value of its shares is ₹ 52.03. The dividend is expected to grow at a rate of 15% for the next three years. NML uses dividend growth model for its projections. The required rate of return is 15%.

You are required to calculate the amount of dividend to be declared by the board in the base year so as to achieve the target price.

Period (t)	1	2	3
PVIF (15%, t)	0.8696	0.7561	0.6575

Solution:

Value of Share = PV of Dividend for 3 years + PV of Target price after 3 years

Let Base Dividend be D_0 , then

$$₹ 52.03 = [D_0 (1 + g) \times PVIF_{(15\%, 1)} + D_0 (1 + g)^2 \times PVIF_{(15\%, 2)} + D_0 (1 + g)^3 \times PVIF_{(15\%, 3)}] + 70.00 \times 0.6575$$

$$₹ 52.03 = [D_0 (1.15) \times 0.8696 + D_0 (1.15)^2 \times 0.7561 + D_0 (1.15)^3 \times 0.6575] + 70.00 \times 0.6575$$

$$D_0 = 2$$

Thus, Company should declare a dividend of ₹ 2 in base year.

**QUESTION 9:**

MTP M 15

SRK Ltd. is a listed company and it has just announced annual dividend for the year ending 2013-14. Earnings Per Share (EPS) and Dividend Per Share (DPS) for 5 years is as follows:

₹	2013-14	2012-13	2011-12	2010-11	2009-10
EPS	14	13.6	13.1	12.7	12.2
DPS	8.2	8.1	7.9	7.8	7.7

In the opinion of MD of SRK Ltd., if current dividend policy is maintained annual growth in Earnings and Dividends will be no better than the annual growth in earnings over the past years.

Since the Board of SRK Ltd. is reluctant to take debt to finance growth it is considering changing its dividend policy by retaining 50% of its earnings for investment in various projects having a post-tax rate of return of 15%. The beta of SRK Ltd. is 1.5, market risk premium is 4% and Risk Free Rate of Return is 6%.

You are required to calculate expected market price of share, if

- SRK Ltd. does not announce a change in its Dividend Policy.
- SRK Ltd. does announce a change in its Dividend Policy by retaining 50% of its earnings.

Note: Growth Rate can be assumed to remain stable.

Solution:

- Calculation of cost of equity using CAPM

$$\begin{aligned} K_e &= R_f + \beta (R_m - R_f) \\ &= 6 + 1.5 (4) \\ &= 12\% \end{aligned}$$

$$\text{Average Growth Rate} \left(\frac{14.00}{12.20} \right)^{1/4} - 1 = 3.5\%$$

Calculation of MP by Gordon's formula

$$\begin{aligned} P_0 &= \frac{D_1}{K_e - g} \\ &= \frac{8.2 \times 1.035}{0.12 - 0.035} \\ &= 99.85 \end{aligned}$$

b) Dividend Payout Ratio: = 50%

$$RR = 1 - 0.5 = 50\%$$

$$ROE = 15\%$$

Calculation of growth rate

$$= RR \times ROE$$

$$= 0.50 \times 0.15$$

$$= 7.5\%$$

$$\begin{aligned} D_1 &= E_0 \times (1 + g) \times \text{Payout ratio} \\ &= 14 \times 1.075 \times 50\% \\ &= ₹ 7.525 \end{aligned}$$

$$\begin{aligned} P_0 &= \frac{D_1}{K_e - g} \\ &= \frac{7.525}{0.12 - 0.075} \\ &= 167.22 \end{aligned}$$



QUESTION 10:

M 12 | RTP N 18

In December, 2011 AB Co.'s share was sold for ₹ 146 per share. A long term earnings growth rate of 7.5% is anticipated. AB Co. is expected to pay dividend of ₹ 3.36 per share.

- What rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 7.5% per year in perpetuity?
- It is expected that AB co. will earn about 10% on book Equity and shall retain 60% of earnings. In this case, whether, there would be any change in growth rate and cost of Equity?

Solution:

$$\begin{aligned} \text{(a)} \quad K_e &= \frac{D_1}{P_0} + g \\ &= \frac{3.36}{146} + 0.075 \\ &= 9.80\% \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad \text{Revised growth} &= RR \times ROE \\ &= 60\% \times 0.10 \end{aligned}$$

- Existing $D_1 = ₹ 3.36$
- Existing RR
 - $g = RR \times ROE$
 - $7.5\% = RR \times 0.10$
 - $RR = 75\%$
- Existing Payout Ratio $= 1 - 0.75 = 25\%$
- Existing $EPS_1 = \frac{3.36}{25\%} = ₹ 13.44$
- Revised $EPS_1 = \frac{13.44}{1.075} \times 1.06 = 13.25$
- Revised $D_1 = 13.25 \times (1 - 0.60) = 5.3$
- $Ke = \frac{D_1}{P_0} + g$

$$= \frac{5.3}{146} + 0.06 = 9.63\%$$



Self-note: In this question, we will have to particularly remember the flow of removing the old growth of and adding the new growth at EPS Level. It is not done in any other question.



QUESTION 11:

N 18

A Company has an EPS of ₹ 2.50 for the last year and DPS of ₹ 1. The Earnings is expected to grow at 2% a year in long run. Currently it is trading at 7 times its Earnings. If the required rate of return is 14%, compute the following:

- An estimate of the P/E Ratio using Gordon Growth Model,
- The Long-Term Growth Rate implied by the Current P/E Ratio.

Solution:

$$\begin{aligned} \text{(a)} \quad P_0 &= \frac{D_1}{Ke - g} \\ &= \frac{1 \times 1.02}{0.14 - 0.02} \\ &= 8.5 \end{aligned}$$

$$\text{PE Ratio} = \frac{MP}{EPS} = \frac{8.5}{2.50} = 3.4 \text{ times}$$

$$\begin{aligned} \text{(b)} \quad \text{PE Ratio (Current)} &= 7 \text{ times} \\ \text{Price per share} &= ₹ 2.50 \times 7 \text{ times} \\ &= ₹ 17.50 \end{aligned}$$

We know that

$$\begin{aligned} P_0 &= \frac{D_1}{Ke - g} \\ 17.50 &= ₹ 1(1+g) / (0.14 - g) \\ g &= 7.84\% \end{aligned}$$

**QUESTION 12:**

N 22 | M 21 | M 19 | N 12 | N 09 | RTP

Following Financial data are available for PQR Ltd. for the year 2008:

	(₹ in lakh)
8% debentures	125
10% bonds (2007)	50
Equity shares (₹ 10 each)	100
Reserves and Surplus	300
Total Assets	600
Assets Turnovers ratio	1.1
Effective interest rate	8%
Effective tax rate	40%
Operating margin	10%
Dividend payout ratio	16.67%
Current market price of Share	₹ 14
Required rate of return of investors	15%

You are required to:

- Draw income statement for the year
- Calculate its sustainable growth rate of earnings
- Calculate the fair price of the Company's share using dividend discount model, and
- What is your opinion on investment in the company's share at current price?

Solution:

$$\begin{aligned}
 \text{(a) Assets T/O Ratio} &= \frac{\text{Sales}}{\text{Total Assets T/O}} \\
 1.1 &= \frac{\text{Sales}}{600} \\
 \text{Sales} &= 660
 \end{aligned}$$

Since, operation margin is 10%

Therefore, Operating cost is 90%

Income statement

	(₹ Lakhs)
Sales	660
Less: Operating cost (660 × 90%)	(594)
EBIT	66
Less: Interest (125 + 50) × 8%	(14)
EBT	52
Less: Tax @ 40%	(20.8)
EAT	31.2
Less: Dividend @ 16.67%	(5.20)
Retained Earnings	26

$$(b) \quad ROE = \frac{EAES}{Eq.SHF} = \frac{31.2}{100+300} = 7.8\%$$

$$\begin{aligned} \text{Sustainable growth rate} &= RR \times ROE \\ &= (1 - 0.1667) \\ &= 0.8333 \times 0.078 \\ &= 6.5\% \end{aligned}$$

(c) Using Gordon's formula

$$D_1 = \frac{5.2 \text{ Lakhs}}{10 \text{ lakhs}} = ₹ 0.52$$

$$\begin{aligned} P_0 &= \frac{D_1}{Ke-g} \\ &= \frac{0.52(1.065)}{0.15-0.065} = 6.51 \end{aligned}$$

(d) Current MP = 14, the share is overvalued. Hence investor should not invest in the company.



Self-note: Suggested Answer has assumed the given dividend as D_0 .

3. Variable Growth Model



QUESTION 13:

MTP M 16

A company had paid a dividend of ₹2.50 per share last year and its required rate of return for equity investors is 20%. What will be the market price of the share at the end of the year, if

- there is no growth in dividend?
- dividend grows at constant rate of 5% per annum in perpetuity?
- constant dividend for first five years and then grows at constant rate of 5% per annum in perpetuity?
- constant dividend for first five years and then, share is sold at the price of ₹ 20?

Solution:

$$(a) \quad P_0 = \frac{D_1}{Ke} = \frac{2.50}{0.20} = ₹ 12.50$$

$$\begin{aligned} (b) \quad P_0 &= \frac{D_1}{Ke-g} \\ &= \frac{2.50 \times 1.05}{0.20-0.05} \\ &= 17.5 \end{aligned}$$

(c) Calculation of P_0 :

Year	CF'S	PVAF @ 20%	DCF
D_{1-5}	2.5	2.991	7.48
TV_5	$\frac{2.625}{0.20 - 0.05} = 17.5$	0.402	7.03

Meet Adish

Chartered Accountant (CA) &
Chartered Financial Analyst (CFA)

Ex-Morgan Staley & ICICI Securities with
2+ years work-ex in Equity Research

Teaches CA Final - AFM, CMA Final - SFM, CFA
and Financial Modelling

His 3 core mantra for students:

- Conceptual Clarity
- Comprehensive Coverage
- Diversified Application

Scan QR
to connect
Across Platforms



with one Scan



Adish Jain CA CFA



 www.fast.edu.in



9584510000,
9522564050



Scan to Download
FAST APP
from  Play Store



Want to Buy
CA Inter & Video Lectures
scan this QR Code
Visit: www.fast.edu.in

CA Final **AFM** Part 2 **OUTSCANNER**

Comprehensive Question Bank with Video Solutions!

ICAI Suggested
Answers

QR Code
based
Video-Pod

Coverage:
SM, PM, PYQ,
RTP & MTP

Self-notes
for Ambiguities

Adish Jain CA CFA

Table of Contents

Volume 1

- 01.** Equity & Business Valuation **01**
- 02.** Merger & Acquisition **98**
- 03.** Fixed Income Securities **148**
- 04.** Portfolio Management **194**
- 05.** Mutual Fund **268**

Volume 2

- 06.** Advanced Capital Budgeting Decisions **301**
- 07.** Derivatives Analysis & Valuation **341**
- 08.** Interest Rate Risk Management **403**
- 09.** Foreign Exchange Risk Management **429**
- 10.** International Financial Management **505**
- 11.** Financial Policy & Corporate Strategy **533**
- 12.** Risk Management **541**
- 13.** Security Analysis **547**
- 14.** MCQs **555**

Advanced Capital Budgeting Decisions

*“Invest today with wisdom, and let tomorrow
reward your vision.”*

CHAPTER
06

Advanced Capital Budgeting



A. Capital Budgeting Techniques



QUESTION 1:

MTP M 26

D and Co. is a company which installs pipes for supply of oxygen in the hospitals as per their specifications. It is planning to invest ₹ 40 crore in a new facility to convert vans and trucks into ambulance. Each ambulance will be designed and built according to customer requirements. D and Co. expect ambulance production and sales in the first four years of operation to be as follows:

Year	1	2	3	4
Ambulances produced and sold	250	300	450	450

The selling price for an ambulance depends on the van or truck which is converted, the quality of the units installed and the extent of conversion work required. D and Co. has undertaken research into likely sales and costs of different kinds of ambulances which could be selected by customers, as follows:

Ambulance type	Basic	Standard	Deluxe
Probability of selection	20%	45%	35%
Selling price (₹/unit)	30,00,000	42,00,000	72,00,000
Conversion cost (₹/unit)	23,00,000	29,00,000	40,00,000

Fixed costs of the production facility are expected to depend on the volume of ambulance production as follows:

Production volume (units/year)	200 - 299	300 - 399	400 - 499
Fixed costs (₹ crore/year)	40	50	55

The applicable tax rate for D and Co. is 28% per year, being settled in the year in which it arises. The company can claim tax allowable depreciation on the cost of the investment on a straight-line basis over ten years.

D and Co. evaluates investment projects using an after-tax discount rate of 11%.

Required:

- Advise the company on the financial viability of the planned investment for the first four years of operation if tax benefit on unabsorbed depreciation for the remaining period will not be available.
- Advise the company on the financial viability of the planned investment continuing to produce and sell ambulances beyond the first four years if after the fourth year of operation, D and Co. expects to continue to produce and sell 450 ambulances per year for the foreseeable future.

Note: (1) Use PV Factors rounded off upto three decimal points.
(2) Present all calculation in ₹ Crore rounded off upto three decimal points.

Solution:

$$\begin{aligned} \text{a. Average selling price} &= (30,00,000 \times 0.20) + (42,00,000 \times 0.45) + (72,00,000 \times 0.35) \\ &= ₹ 50,10,000 \text{ per unit} \end{aligned}$$

$$\text{Average conversion cost} = (23,00,000 \times 0.20) + (29,00,000 \times 0.45) + (40,00,000 \times 0.35)$$

$$\begin{aligned} &= ₹ 31,65,000 \text{ per unit} \\ \text{Average Contribution per unit} &= ₹ 50,10,000 - ₹ 31,65,000 \\ &= ₹ 18,45,000 \end{aligned}$$

Tax allowable depreciation = ₹ 40 crore/10 = ₹ 4 crore per year

Benefit of tax allowable depreciation = ₹ 4 crore x 0.28 = ₹ 1.12 crore per year

Calculation of NPV over four years (₹ Crores)

Year	1	2	3	4
Contribution per unit	0.1845	0.1845	0.1845	0.1845
x Number of units sold	250	300	450	450
Total Contribution	46.125	55.35	83.025	83.025
Less: Fixed costs	(40)	(50)	(55)	(55)
Before-tax cash flow	6.125	5.35	28.025	28.025
Less: Tax @ 28%	(1.715)	(1.498)	(7.847)	(7.847)
Add: Tax benefit on Depreciation	1.120	1.120	1.120	1.120
CFAT	5.53	4.972	21.298	21.298
PVF @ 11%	0.901	0.812	0.731	0.659
DCFs	4.983	4.037	15.569	14.035
Total PV of Cash Inflows				38.624
Less: Initial investment				40.000
NPV				(1.376)

Advice: If only the first four years of operation are considered, the NPV of the planned investment is negative and so it would not be financially acceptable.

b. Ignoring tax allowable depreciation, after-tax cash flow from year five onwards will be:

$$= ₹ 28.025 \text{ crore} - ₹ 7.847 \text{ crore} = ₹ 20.178 \text{ crore per year}$$

Present value of this cash flow in perpetuity

$$= (₹ 20.178 \text{ crore} / 0.11) \times 0.659 = ₹ 120.885 \text{ crore}$$

There would be a further six years of tax benefits from tax allowable depreciation. The present value of these cash flows would be

$$= ₹ 1.12 \text{ crore} \times 2.787 = ₹ 3.121 \text{ crore}$$

Increase in NPV of production and sales continuing beyond the first four years would be:

$$= ₹ 120.885 \text{ crore} + ₹ 3.121 \text{ crore} = ₹ 124.006 \text{ crore}$$

In other words, NPV of the planned investment would be ₹ 122.632 crore (₹ 124.006 crore – ₹ 1.376 crore)

Advise: If production and sales beyond the first four years are considered, the NPV is strongly positive and so the planned investment is financially acceptable.



QUESTION 2:

N 24

PQ Ltd. expects sales of ₹ 100 lakhs in year 1. The same will increase by ₹ 20 lakhs per year over the next four years. At the end of 5 years the project would be wound up. The Depreciation will be charged at 20% p.a. on straight line method.

The expenses excluding the depreciation will be 40% of the sales. There will be no salvage value of the plant. PQ Ltd. proposes to invest in the plant an amount where the Net Present Value will be Zero.

Corporate Tax rate is 30%.

You are required to calculate the investment which can be made in the plant.

Solution:



Self-note: The question is missing the data of discounting rate. That is why suggested answer has solved the question without calculating PV of future cash inflows. Alternatively, the question can also be solved assuming any other discounting rate.

Expected Sales & Cost excluding depreciation (₹ Lakhs)

Year	Expected Sales	Expected expenses @ 40%
1	100	40
2	120	48
3	140	56
4	160	64
5	180	72

Cash Inflow from the Project

Let the cost of the plant = P

The, Depreciation per year = $0.20P$

Accordingly, annual CFAT will be (₹ Lakhs):

Year	Sales	Expenses	Depn	PBT	Tax @ 30%	PAT	Depn	CFAT
1	100	40	$0.20P$	$60 - 0.20P$	$18 - 0.06P$	$42 - 0.14P$	$0.20P$	$42 + 0.06P$
2	120	48	$0.20P$	$72 - 0.20P$	$21.6 - 0.06P$	$50.4 - 0.14P$	$0.20P$	$50.40 + 0.06P$
3	140	56	$0.20P$	$84 - 0.20P$	$25.2 - 0.06P$	$58.8 - 0.14P$	$0.20P$	$58.80 + 0.06P$
4	160	64	$0.20P$	$96 - 0.20P$	$28.8 - 0.06P$	$67.2 - 0.14P$	$0.20P$	$67.20 + 0.06P$
5	180	72	$0.20P$	$108 - 0.20P$	$32.4 - 0.06P$	$75.6 - 0.14P$	$0.20P$	$75.60 + 0.06P$
PV of Net Cash Inflows								$294 + 0.30P$

For NPV to be zero, PV of Cash OF (i.e., investment in plant) = PV of Cash Inflows

Accordingly, $P = 294 + 0.30P$

$P = 420$

Thus, the required investment to be made in plant shall be ₹420 lakhs.



QUESTION 3:

SM | N 10 | PM | N 16

A firm has projected the following cash flows from a project under evaluation:

Year	₹ lakhs
0	(70)
1	30
2	40
3	30

The above cash flows have been made at expected prices after recognizing inflation. The firm's cost of capital is 10%. The expected annual rate of inflation is 5%.

Show how the viability of the project is to be evaluated.

Solution:

Nominal rate = $(1 + 0.1) \times (1 + 0.1) - 1 = 0.155$ i.e., 15.5%

Year	Nominal cash flows	PVF @ 15.50%	PV of cash flows
1	30	0.866	25.98
2	40	0.749	29.96
3	30	0.649	19.47
Total Present Value of Inflows			75.41
Less: Cash out flow			70.00
NPV			5.41



Advise: With positive NPV, the project is financially viable.

Self-note: In the absence of information, assume cost of capital to be nominal.



QUESTION 4:

N 20 | N 19 | SM | PM

KLM Ltd. requires ₹ 15,00,000 for a new project.

Useful life of project is 3 years.

Salvage value - NIL.

Depreciation is ₹ 5,00,000 p.a.

Given below are projected revenues and costs (excluding depreciation) ignoring inflation:

Year	1	2	3
Revenues in ₹	10,00,000	13,00,000	14,00,000
Costs in ₹	5,00,000	6,00,000	6,50,000

Applicable tax rate is 35%. Assume nominal cost of capital to be 14% (after tax). The inflation rates for revenues and costs are as under:

Year	Revenues %	Costs %
1	9	10
2	8	9
3	6	7

PVF at 14%, for 3 years = 0.877, 0.769 and 0.675

Show amount to the nearest rupee in calculations.

You are required to calculate net present value of the project.

Solution:

a. Inflation adjusted Revenues

Year	Nominal Revenues (₹)
1	10,00,000(1.09) = 10,90,000
2	13,00,000(1.09) (1.08) = 15,30,360
3	14,00,000(1.09) (1.08) (1.06) = 17,46,965

b. Inflation adjusted Costs

Year	Nominal Costs (₹)
1	5,00,000(1.10) = 5,50,000
2	6,00,000(1.10) (1.09) = 7,19,400
3	6,50,000(1.10) (1.09) (1.07) = 8,33,905

c. Calculation of DCF:

Particulars	Year1	Year2	Year3
Revenue	10,90,000	15,30,360	17,46,965
Less: Cost	5,50,000	7,19,400	8,33,905
Less: Depreciation	5,00,000	5,00,000	5,00,000
PBT	40,000	3,10,960	4,13,060
Less: Tax	14,000	1,08,836	1,44,571
PAT	26,000	2,02,124	2,68,489
Add: Depreciation	5,00,000	5,00,000	5,00,000
CFAT	5,26,000	7,02,124	7,68,489
X PVF	0.877	0.769	0.675
DCF	4,61,302	5,39,933	5,18,730

$$\begin{aligned}\text{NPV} &= -15,00,000 + 4,61,302 + 5,39,933 + 5,18,730 \\ &= ₹ 19,965\end{aligned}$$

**QUESTION 5:**

M 25

BC Ltd. is contemplating on buying a new machine at ₹ 70,00,000 with an additional working capital requirement of ₹ 10,00,000. The machine is expected to have an economic useful life of 5 years, with no salvage value. The company follows the straight line method of depreciation and same is accepted for tax purposes. The machine is expected to generate an incremental increase in the before tax cash operating income of ₹ 25,00,000 (in real terms) per year for a period of 5 years.

The relevant tax rate is 35%. Inflation is expected to be 6% per year and the firms cost of capital in real term is 10% per year. Assuming that the working capital requirement will remain unchanged throughout the period, in spite of inflation.

Advise the company whether the machine should be purchased or not.

Show your NPV calculation in real term.

Calculation upto two decimal places.

PV Factor at 10% & 6% are as under:

	1	2	3	4	5
10%	0.909	0.826	0.751	0.683	0.621
6%	0.943	0.89	0.84	0.792	0.747

Solution:

Cash Outflow (Initial Outlay) = ₹ 70,00,000 + ₹ 10,00,000 = ₹ 80,00,000

Calculation of CFAT = EBITDA × (1-t) + Depreciation × (t)

$$\begin{aligned}\text{a) Real EBITDA} \times (1-t) &= 25,00,000 \times (1 - 0.35) \\ &= 16,25,000\end{aligned}$$

b) Real Depreciation:

Year	Nominal Depreciation	Inflation Factor @ 6%	Real Depreciation
1	14,00,000	0.943	13,20,200
2	14,00,000	0.890	12,46,000
3	14,00,000	0.840	11,76,000

Advanced Capital Budgeting

4	14,00,000	0.792	11,08,800
5	14,00,000	0.747	10,45,800

c) PV of CFAT:

Year	Real EBITDA $\times (1 - t)$	Depreciation $\times (t)$	Real CFAT	PVF @ 10%	DCF
1	16,25,000	4,62,070	20,87,070	0.909	18,97,147
2	16,25,000	4,36,100	20,61,100	0.826	17,02,469
3	16,25,000	4,11,600	20,36,600	0.751	15,29,487
4	16,25,000	3,88,080	20,13,080	0.683	13,74,934
5	16,25,000	3,66,030	19,91,030	0.621	12,36,430
					77,40,465

d) PV of Release of Working Capital

	(₹)
Release of Nominal Working Capital at of 5 th year end	10,00,000
Inflation Factor at 6% for 5 years	0.747
Cash Inflow in real terms at 5 th Year end	7,47,000
PVF @ 10% for 5 years	0.621
Present Value of Inflow	4,63,887

e) Calculation of NPV

Particulars	Present Value (₹)
Initial Outlay	(80,00,000)
Present Value of CFAT	77,40,465
Present Value Release of Working	4,63,887
NPV	2,04,352

Recommendation: The Company should purchase the machine as the NPV of real cash flow is positive.



Self-note: The depreciation is charged in the income statement every year is the actual amount of expense shown in IS. Therefore, it is already a nominal amount of expense.

B. Incorporating Risk in Capital Budgeting

1) Statistical Techniques



QUESTION 6:

SM | PM

Cyber Company is considering two mutually exclusive projects. Investment outlay of both the projects is ₹ 5,00,000 and each is expected to have a life of 5 years. Under three possible situations their annual cash flows and probabilities are as under

Situation	Probabilities	Cash Flow (₹)	
		Project A	Project B
Good	0.3	6,00,000	5,00,000
Normal	0.4	4,00,000	4,00,000
Worse	0.3	2,00,000	3,00,000

The cost of capital is 7 per cent, which project should be accepted? Explain with workings

Solution:

Project A

$$E(CF_A) = 0.3 (6,00,000) + 0.4 (4,00,000) + 0.3 (2,00,000) \\ = 4,00,000$$

$$PV \text{ of } E(CF_A) = 4,00,000 \times 4.100 \\ = 16,40,000$$

$$E(NPV_A) = 16,40,000 - 5,00,000 = 11,40,000$$

$$\sigma \text{ of } E(CF_A) = \sqrt{0.3 \times (6,00,000 - 4,00,000)^2 + 0.4 \times (4,00,000 - 4,00,000)^2 + 0.3 \times (2,00,000 - 4,00,000)^2} \\ = 1,54,919.33$$

Project B

$$E(CF_B) = 0.3 (5,00,000) + 0.4 (4,00,000) + 0.3 (3,00,000) \\ = 4,00,000$$

$$PV \text{ of } E(CF_B) = 4,00,000 \times 4.100 \\ = 16,40,000$$

$$E(NPV_B) = 16,40,000 - 5,00,000 = 11,40,000$$

$$\sigma \text{ of } E(CF_B) = \sqrt{0.3 \times (5,00,000 - 4,00,000)^2 + 0.4 \times (4,00,000 - 4,00,000)^2 + 0.3 \times (3,00,000 - 4,00,000)^2} \\ = 77,459.66$$

Recommendation: NPV in both projects being the same, the project should be decided on the basis of standard deviation and hence project 'B' should be accepted having lower standard deviation, means less risky.



QUESTION 7:

SM | M 13 | PM

Skylark Airways is planning to acquire a light commercial aircraft for flying class clients at an investment of ₹ 50,00,000. The expected cash flow after tax for the next three years is as follows:

Year 1		Year 2		Year 3	
CFAT	Probability	CFAT	Probability	CFAT	Probability
14,00,000	0.1	15,00,000	0.1	18,00,000	0.2
18,00,000	0.2	20,00,000	0.3	25,00,000	0.5
25,00,000	0.4	32,00,000	0.4	35,00,000	0.2
40,00,000	0.3	45,00,000	0.2	48,00,000	0.1

The Company wishes to take into consideration all possible risk factors relating to airline operations. The company wants to know:

- The expected NPV of this venture assuming independent probability distribution with 6 percent risk free rate of interest.
- The possible deviation in the expected value.
- How would standard deviation of the present value distribution help in Capital Budgeting decisions?

Solution:

$$\begin{aligned} \text{a)} \quad E(CF_1) &= 14 \times 0.1 + 18 \times 0.2 + 25 \times 0.4 + 40 \times 0.3 \\ &= 27 \text{ lacs} \end{aligned}$$

$$\begin{aligned} E(CF_2) &= 15 \times 0.1 + 20 \times 0.3 + 32 \times 0.4 + 45 \times 0.2 \\ &= 29.3 \text{ lacs} \end{aligned}$$

$$\begin{aligned} E(CF_3) &= 18 \times 0.2 + 25 \times 0.5 + 35 \times 0.2 + 48 \times 0.1 \\ &= 27.9 \text{ lacs} \end{aligned}$$

E(NPV):

Expected CFs	PVF @ 6%	Total PV
27.0	0.943	25.461
29.3	0.890	26.077
27.9	0.840	23.436
PV of E(CFs)		74.974
Less: Cash outflow		50.000
E(NPV)		24.974

- Possible deviation in the expected value

SD of $E(CF_1)$:

X	P	$D_x = X - \bar{X}$	$P \times D_x^2$
14	0.1	-13	16.9
18	0.2	-9	16.2
25	0.4	-2	1.6
40	0.3	13	50.7
			85.4

$$SD_1 = \sqrt{85.4} = 9.2412 \text{ lacs}$$

SD of E(CF₂):

X	P	D _X = X - $\bar{X}$	P × D _X ²
15	0.1	-14.3	20.45
20	0.3	-9.3	25.95
32	0.4	2.7	2.92
45	0.2	15.7	49.30
			98.60

$$SD_2 = \sqrt{98.61} = 9.9303 \text{ lacs}$$

SD of E(CF₃):

X	P	D _X = X - $\bar{X}$	P × D _X ²
18	0.2	-9.9	19.60
25	0.5	-2.9	4.21
35	0.2	7.1	10.08
48	0.1	20.1	40.40
			74.29

$$SD_2 = \sqrt{74.29} = 8.6192 \text{ lacs}$$

Standard deviation of E(NPV):

$$\sigma_{NPV} = \sqrt{\left(\frac{9.2412}{1.06^1}\right)^2 + \left(\frac{9.9303}{1.06^2}\right)^2 + \left(\frac{8.6192}{1.06^3}\right)^2}$$

$$= ₹ 14.3696 \text{ lacs}$$

- c) Standard deviation is a statistical measure of dispersion; it measures the deviation from a central number i.e. the mean.

In the context of capital budgeting decisions especially where we take up two or more projects giving somewhat similar mean cash flows, by calculating standard deviation in such cases, we can measure in each case the extent of variation. It can then be used to identify which of the projects is least risky in terms of variability of cash flows.

A project, which has a lower coefficient of variation will be preferred if sizes are heterogeneous.

Besides this, if we assume that probability distribution is approximately normal, we are able to calculate the probability of a capital budgeting project generating a net present value less than or more than a specified amount.

**QUESTION 8:**

SM | PM

A company is considering Projects X and Y with following information:

Project	Expected NPV (₹)	Standard deviation
X	1,22,000	90,000
Y	2,25,000	1,20,000

- Which project will you recommend based on the above data?
- Explain whether your opinion will change, if you use coefficient of variation as a measure of risk.
- Which measure is more appropriate in this situation and why?

Solution:

a) On the basis of standard deviation, Project X be chosen because it is less risky than Project Y and on the basis of return (i.e., NPV), Project Y should be chosen because it has higher return than project X.

$$b) CV_x = \frac{SD}{ENPV} = \frac{90,000}{122,000} = 0.738$$

$$CV_y = \frac{120,000}{225,000} = 0.533$$

On the basis of Co-efficient of Variation (C.V.) Project X appears to be riskier and hence Y should be accepted.

c) However, the NPV method in such conflicting situation is best because the NPV method is in compatibility of the objective of wealth maximisation in terms of time value



QUESTION 9:

SM | M 18 | PM

KLM Ltd. is considering taking up one of the two projects-Project-K and Project-S. Both the projects having same life require equal investment of ₹ 80 lakhs each. Both are estimated to have almost the same yield. As the company is new to this type of business, the cash flow arising from the projects cannot be estimated with certainty. An attempt was therefore, made to use probability to analyse the pattern of cash flow from other projects during the first year of operations. This pattern is likely to continue during the life of these projects. The results of the analysis are as follows

Project K		Project S	
Cash Flow (in ₹)	Probability	Cash Flow (in ₹)	Probability
11	0.10	09	0.10
13	0.20	13	0.25
15	0.40	17	0.30
17	0.20	21	0.25
19	0.10	25	0.10

Required:

- Calculate variance, standard deviation and co-efficient of variance for both the projects.
- Which of the two projects is riskier?

Solution:

Project K

$$\text{Expected Net Cash Flow} = (0.10 \times 11) + (0.20 \times 13) + (0.40 \times 15) + (0.20 \times 17) + (0.10 \times 19) = 15$$

$$\sigma^2 = 0.10(11 - 15)^2 + 0.20(13 - 15)^2 + 0.40(15 - 15)^2 + 0.20(17 - 15)^2 + 0.10(19 - 15)^2$$

$$= 4.8$$

$$\sigma = \sqrt{4.8} = 2.19$$

Project S

$$\text{Expected Net Cash Flow} = (0.10 \times 9) + (0.25 \times 13) + (0.30 \times 17) + (0.25 \times 21) + (0.10 \times 25) = 17$$

$$\sigma^2 = 0.1(9 - 17)^2 + 0.25(13 - 17)^2 + 0.30(17 - 17)^2 + 0.25(21 - 17)^2 + 0.10(25 - 17)^2$$

$$= 20.8$$

$$\sigma = \sqrt{20.8} = 4.56$$

Meet Adish

Chartered Accountant (CA) &
Chartered Financial Analyst (CFA)

Ex-Morgan Staley & ICICI Securities with
2+ years work-ex in Equity Research

Teaches CA Final - AFM, CMA Final - SFM, CFA
and Financial Modelling

His 3 core mantra for students:

- Conceptual Clarity
- Comprehensive Coverage
- Diversified Application

Scan QR
to connect
Across Platforms



with one Scan



Adish Jain CA CFA



 www.fast.edu.in



9584510000,
9522564050



Scan to Download
FAST APP
from  Play Store



Want to Buy
CA Inter & Video Lectures
scan this QR Code
Visit: www.fast.edu.in