

ADVANCED CAPITAL BUDGETING DECISIONS

CLASS 6

Topic Adjusted Present Value (APV)

Question 1:

Swati Electronics Limited is evaluating a capital project requiring an outlay of Rs.120 lakhs. It is expected to generate a net cash inflow of Rs.28.5 lakhs for 7 years. The opportunity cost of capital is 15%. Swati Electronics is planning to raise Rs.60 lakhs from term loan. The term loan carries an interest rate of 12% and would be repayable in 12 equal half yearly installments, the first installment falling due at the end of first-half of second year. The balance amount required for the project can be raised by issuing external equity. The issue cost is expected to be 5%. The tax rate for the company is 30%.

You are required to find out

- a. Base case NPV
- b. Adjusted NPV

(Source: FOD)

ANSWER:

a. Base case NPV $= -120 + 28.5 \times \text{PVIFA}(15,7)$
 $= -120 + 28.5 \times 4.160$
 $= -1.44$

∴ Base case NPV of capital project of Swati Electronics is Rs.–1.44 lakhs.

- b. The company raises Rs.60 lakhs from debt @12%. The interest, repayment of loan and present value of tax shield are computed as follows:

Year	Half	Debt outstanding at the beginning	Interest	Tax shield	Present value of Tax shield	Repayment
1	1	60	3.60	1.08	1.02	0
	2	60	3.60	1.08	0.96	0
2	1	60	3.60	1.08	0.91	5
	2	55	3.30	0.99	0.78	5
3	1	50	3.00	0.90	0.67	5
	2	45	2.70	0.81	0.57	5
4	1	40	2.40	0.72	0.48	5
	2	35	2.10	0.63	0.39	5
5	1	30	1.80	0.54	0.32	5
	2	25	1.50	0.45	0.25	5
6	1	20	1.20	0.36	0.19	5
	2	15	0.90	0.27	0.13	5
7	1	10	0.60	0.18	0.08	5
	2	05	0.30	0.09	0.04	5

Total value of the tax shield = Rs.6.79 lakhs.

The company raises Rs.60 lakhs from equity.

As the issue cost is 5%, so to receive Rs.60 lakhs from equity the company has to issue equity of (60/0.95) or, value Rs.63.16 lakhs.

∴ Cost of issue $= 63.16 - 60.00$
 $= \text{Rs.}3.16 \text{ lakhs.}$

∴ Adjusted NPV $= -1.44 - 3.16 + 6.79$
 $= \text{Rs.}2.19 \text{ lakhs}$

ALTERNATIVE ANSWER

Q.1

$$\begin{aligned} 1) \text{ Step 1: Base Case NPV} \\ &= 28.5 \times \text{PVAF}(15\%, 7) - 120 \\ &= -1.428 \text{ lakhs} \end{aligned}$$

[Self note: Iska mtlb project unviable h agar purely equity financed h.....)

$$\therefore \underline{\text{Base Case NPV} = -1.428 \text{ lakhs}}$$

2) Step 2: Adjusted NPV

→ Floatation cost = $\frac{60}{0.95} \times 0.05 = 3.16$ lakhs.

→ Tax Advantage of Debt disc. @ 12%.

6% 6 months ka hai toh saal ka effective int. = $(1.06)^2 - 1 = 12.36\%$

Yrs	Amount ₹	Interest @ 12%	Total Interest	Interest Tax Shield	P.V. @ 12.36%
1: 1 st 1/2	60	3.6	7.2	2.16	1.92
2 nd 1/2	60	3.6		(7.2 × 0.3)	
2: 1 st 1/2	60	3.6	6.9	2.07	1.64
2 nd 1/2	55	3.3		(6.9 × 0.3)	
3: 1 st 1/2	50	3.0	5.7	1.71	1.21
2 nd 1/2	45	2.7		(5.7 × 0.3)	
4: 1 st 1/2	40	2.4	4.5	1.35	0.85
2 nd 1/2	35	2.1		(4.5 × 0.3)	
5: 1 st 1/2	30	1.8	3.3	0.99	0.55
2 nd 1/2	25	1.5		(3.3 × 0.3)	
6: 1 st 1/2	20	1.2	2.1	0.63	0.31
2 nd 1/2	15	0.9		(2.1 × 0.3)	
7: 1 st 1/2	10	0.6	0.9	0.27	0.12
2 nd 1/2	5	0.3		(0.9 × 0.3)	
Tax Advantage of Debt = 6.60					

APV = Base case NPV - Issue cost + Tax advantage of debt
= $-1.428 - 3.16 + 6.6$

∴ APV = 2.012 lakhs

we have calculated ITS assuming we will get it at the end of each year & calculated its PV accordingly

Conclusion: So the project which was not viable with 100% equity financing is now viable given the tax advantage of debt.

Note: We have not considered tax shield on the issue cost. Alternatively, post tax issue cost = $3.16 \times 0.7 = 2.21$

∴ APV = $-1.428 - 2.21 + 6.6 = 2.962$

Question 2:

XYZ Ltd. is presently all equity financed. The directors of the company have been evaluating investment in a project which will require ₹ 270 lakhs capital expenditure on new machinery. They expect the capital investment to provide annual cash flows of ₹ 42 lakhs indefinitely which is net of all tax adjustments. The discount rate which it applies to such investment decisions is 14% net.

The directors of the company believe that the current capital structure fails to take advantage of tax benefits of debt, and propose to finance the new project with undated perpetual debt secured on the company's assets. The company intends to issue sufficient debt to cover the cost of capital expenditure and the after tax cost of issue.

The current annual gross rate of interest required by the market on corporate undated debt of similar risk is 10%. The after tax costs of issue are expected to be ₹ 10 lakhs. Company's tax rate is 30%.

You are required to calculate:

The adjusted present value of the investment

(Source: ICAI)

ANSWER:

Calculation of Adjusted Present Value of Investment (APV)

Adjusted PV = Base Case PV + PV of financing decisions associated with the project

Base Case NPV for the project:

(-) ₹ 270 lakhs + (₹ 42 lakhs / 0.14)	= (-) ₹ 270 lakhs + ₹ 300 lakhs
	= ₹ 30
Issue costs	= ₹ 10 lakhs
Thus, the amount to be raised	= ₹ 270 lakhs + ₹ 10 lakhs
	= ₹ 280 lakhs
Annual tax relief on interest payment	= ₹ 280 X 0.1 X 0.3
	= ₹ 8.4 lakhs in perpetuity
The value of tax relief in perpetuity	= ₹ 8.4 lakhs / 0.1
	= ₹ 84 lakhs
Therefore, APV = Base case PV – Issue Costs + PV of Tax Relief on debt interest	
	= ₹ 30 lakhs – ₹ 10 lakhs + 84 lakhs
	= ₹ 104 lakhs

Question 3:

A manufacturing company, ABC Industries, is considering a capital investment project to expand its production capacity. The project involves purchasing new machinery and equipment costing 2,500,000, which will be depreciated over a 5-year period using the straight-line method. The company expects to generate additional revenue of 12,00,000 per year and additional operating expenses (excluding depreciation) of 4,00,000 for the next 5 years from the project. The tax rate is 30%, and unlevered beta of the project is 1.5. Treasury securities are yielding 5% and market risk premium is 6%. Additionally, the company is planning to finance the project with 40% equity and 60% debt. The company's cost of equity is estimated to be 15%, and the cost of debt is 8%. Floatation cost of equity is 2%.

As a financial analyst, you have been tasked with using the Adjusted Present Value (APV) technique to analyze the capital investment project. Determine whether the project should be accepted based on the APV analysis, and provide a detailed solution explaining each step of the APV calculation.

(Source: FOD)

Q.3

W.N.] Cash Flow

Revenue	1200000
(-) Op. Exp.	<u>400000</u>
EBDIT	800000
(-) Depr ⁿ	<u>500000</u>
EBIT	300000
NOPAT @ 70%	210000
(+) Depr ⁿ	<u>500000</u>
CFAT	<u>710000</u>
∴ Cash Flow for firm = 710000	

$$k_c^* = R_f + (R_m - R_f) B_u = 5 + 6 \times 1.5 = 14\% \text{ (unlevered } k_c)$$

* k_c^* : Unlevered k_c .

$$R_e = R_f + (R_m - R_f) \beta \rightarrow \text{CAPM}$$

where, β = systematic risk.↓
Market Risk.If market Δ by 1%, Stk Δ by $\beta\%$

β $\begin{cases} B_u: \text{only business risk.} \\ B_L: \text{Business + Financial risk.} \end{cases}$

 $k_c^* = \text{Unlevered } k_c$

$$= R_f + (R_m - R_f) \beta_u$$

↑
(unlevered β)

$$1) \text{ Base Case NPV} = 710000 \times \text{PVAF}(14\%, 5) - 2500000$$

$$= -62512.5$$

$$2) \text{ Issue cost of NPV} = \frac{40\% \text{ of } 2500000}{98\%} \times 2\% \approx 20408$$

3) Tax Advantage of Debt -

$$\text{Debt} = 60\% \text{ of } 2500000 = 1500000$$

$$\text{Interest rate} = 8\%$$

$$\text{tax rate} = 30\%$$

Assuming that debt is repayable one-shot i.e. lumpsum at the end of 5 years.

$$\text{Annual ITS} = 30\% \text{ of } 8\% \text{ of } 1500000 =$$

$$= 36000 \text{ p.a. for 5 years.}$$

$$\text{Tax advantage of Debt} = \text{PV of ITS @ } 8\%$$

If question states, interest tax shield is certain, then we should use $R_f = 5\%$ as discount rate for tax advantage of debt.

$$= 36000 \times \text{PVAF}(8\%, 5)$$

$$= 143738$$

$$4) \text{ APV} = \text{Base Case NPV} - \text{Floatation cost} + \text{tax advantage of debt}$$

$$= -62512.5 - 20408 + 143738$$

$$= 60817.5 \therefore \text{Project is viable}$$

If a company has losses $\rightarrow$ no tax shield.
To get Tax shield, Co. got to have profits.

Note :-

$$1) \text{ Alternatively, after tax floatation cost}$$

$$= 20408 \times 0.7$$

$$= 14286$$

$$\text{This gives APV} = -62512.5 - 14286 + 143738 = 66939$$

2) Problem remaining silent, we have assumed that loan is repayable lumpsum on maturity.

3) If the firm is definitely going to make positive profits in future, ITS becomes certain & disc. rate for TAD should be $R_f = 5\%$.

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i.e. $TAD = 36000 \times PVAF(5\%, 5) = 155861.16$