1 CAPITAL BUDGETING

LO 1: TIME VALUE OF MONEY

Definition	
Time Value of Money [TVM]	TVM is the reward for postponement of consumption of money.
Principle	Rs.100 received today is greater than Rs. 100 receivable a year later because money has a time value (TVM).
	If Rs.100 today is equal to Rs.115 one year later, the TVM is Rs 15 for one year.
Formula	TVM = [Inflation Rate + Real Rate of Return on Riskfree Investments + Risk Premium].
Ideas	TVM is the rate of return expected from a comparable investment alternative.
	TVM differs from person to person.
	For the same person, it differs from investment to investment.
	Higher the risk, higher will be the TVM.
Value of an asset	The present value of the future cash flows to be received across the life of the asset discounted at the appropriate TVM.

FORMULAE IN TVM

Basic Abbreviations

1. PV   - Present Value
2. FV   - Future Value
3. CF   - Cash Flow
4. PVF - Present Value Factor
5. FVF - Future Value Factor

6. PVAF - PV Annuity Factor
7. FVAF - FV Annuity Factor
8. PVA   - PV of Annuity Regular
9. FVA   - FV of Annuity Regular
10. IR   - Inflation Rate

Formulae

Type	FV	PV
Single Cash Flow	FV = PV x FVF	PV = FV x PVF
Uneven Cash Flows	1. Decide Future Date. 2. Compute the FV of each cash flow 3. Aggregate the above.	1. Multiply each cash flow with the respective PVF. 2. Aggregate the above.
Annuity Regular	Applies when cash flows happen at year end. FVA = Annuity x FVAF	PVA = Annuity x PVAF
Annuity Due/ Immediate	FVA x (1+R)	Annuity x [PVAF (one year short) + 1]
Perpetuity	Not applicable because perpetuity does not have an end date.	Perpetuity / TVM
Growing Perpetuity		Perpetuity / (TVM- G)
Perpetuity Immediate		[Perpetuity / TVM] + [Perpetuity]
Growing Perpetuity Immediate		[Perpetuity / (TVM - IR)] + [Perpetuity]

CONCEPT OF COMPOUNDING AND DISCOUNTING

Compounding	Discounting
Computes future value.	Computes present value.
Computes what will be the value after N years of a sum invested today.	Computes what will be the value today of a sum that will be received after N years.

Compounding at a faster frequency

When we compound at a frequency greater than 1, the effective annual rate (EAR) is higher.

$$\text{Effective Annual Rate (EAR)} = \{[1 + (\text{Stated Rate} / n)]^n - 1\}$$

Ex: Rs.1000 is invested at 8% per annum, By year-end it grows to Rs 1000 x (1.08) = Rs.1080. If the same amount is invested at 4% half yearly, then at the year end it becomes 1000 x $(1.04)^2$ = Rs. 1081.6.

$$EAR = 8.16\%.$$

In other words 8% per annum with half yearly rests is the same as 8.16% per annum with annual rests.

LO 2: INVESTMENT DECISION

Basic Principles of Capital Budgeting

1. **Cash Flow Principle:** It is cash flows, not profits, that count. This is because (a) we can spend cash, not profits. (b) cash, unlike profits, cannot be fudged.

2. **After Tax Principle:** All cash flows must be expressed after tax, because tax is an outflow of money.

3. **Incremental Principle:** It is incremental Cash flow, not total cash flow, that matters.

   Rules of relevance: (a) Sunk cost is irrelevant. (b) Opportunity cost is relevant (c) Future cash flows that change with alternatives matter. (d) Beware of fixed overheads per unit. (e) Remember working capital

4. **Inflation Adjustment Principle**: Cash flows must be considered either with inflation or without inflation, consistently.

5. **Long Term Fund (LT) Principle:** Evaluation could be done either from the stand point of (a) shareholders or (b) shareholders and term lenders. The latter is called long term fund evaluation. It's preferable to evaluate from LT fund angle because investing and financing should not be mixed up.

6. **Reward Exclusion Principle**: The cash flow relevant for evaluation would exclude any payment, of whatever form, to be made to those for whom evaluation is being done.

Type	Shareholders	Term Lenders
PAT	YES	YES
Add:		
Int on LTL (1–T)	NO	YES
Int on STL (1–T)	NO	NO
Dividend	NO	NO
Less:		
Repayment of LTL	YES	NO
Repayment of STL	YES	YES

7. **Consistency Principle:** If cash flows are after tax, the discount rate should also be expressed after tax.

Steps in Capital Budgeting

1. **Identify Initial Investment**
   a. Initial capital expenditure.
   b. Initial investment in working capital.

2. **Identify in-between Cash Flows**
   a. Profit after tax.
   b. Add Depreciation.
   c. Add: Decrease in working capital.
   d. Deduct: Increase in working capital.
   e. Deduct additional investment in capital assets.

   Principle: In computing profits, if there is a loss, the loss multiplied with the tax rate will be considered as tax shelter. This is an inflow.

3. **Identify Terminal Cash Flow**
   a. Net sale value of the asset (Sale Price less Tax on sale)
   b. Recapture of working capital

Principle: Net Salvage Value will be as follows:

Profit on Sale of Asset		Loss on Sale of Asset	
a. Sale Price	xxx	a. WDV	xxx
b. Less WDV	(xxx)	b. Less Sale Price	(xxx)
c. Profit on sale (a - b)	xxx	c. Loss on sale (a - b)	xxx
d. Less Tax Payable (Tax Rate x c)	(xxx)	d. Add Tax Shelter (Tax Rate x c)	xxx
e. Net Salvage Value (c – d)	xxx	e. Net Salvage Value (c + d)	xxx

4. **Prepare Analysis Statement**
   a. Consolidate cash flows from Step 1 to Step 3.
   b. Choose the appropriate discount rate.
   c. Compute Net Present Value (NPV).
   d. If NPV is +ve, accept the project.
      If NPV is –ve, reject the project.

LO 3: REPLACEMENT ANALYSIS

Decision	Steps	Decision
Abandon-ment (Giving up an existing asset)	At the end of each year, a company takes a decision on whether it would like to continue with the asset. For Steps, see "A" below.	If the resulting NPV is positive, **retain the asset.** If the resulting NPV is negative, **abandon the asset**.
Purchase (Should we buy a new asset?)	For Steps, see "Steps in Capital Budgeting" above.	If the resulting NPV is positive, **purchase the asset.** If the resulting NPV is negative, **reject the asset.**
Replace-ment (Buying a new asset and giving up the old asset)	**Method 1- Comparison Method** • Compute NPV of continuation option. • Compute NPV of purchase option .	If NPV of the purchase option > NPV of abandonment option, **replace the existing asset with the new one. Otherwise, retain the old asset.**

Method 2 – Incremental Cash Flow Method • Compute Incremental Initial Outflow • Compute Incremental Operational flow • Compute Incremental Terminal Outflow • Prepare Analysis Statement	If NPV is +ve, **replace the existing asset with the new asset.**

A. Steps for Abandonment Decision

These are cashflows associated with retaining the asset:

1. **Initial Investment**
   a. Net salvage value of asset, if sold today.
   b. Recapture of working capital foregone.

2. **In between Cash Flows**
   List the cash flows for the balance life of the asset.

3. **Terminal Cash Flow**
   a. Compute net salvage value of asset after its useful life.
   b. Recapture of working capital.

4. **Prepare Analysis Statement**
   a. Consolidate cash flows from Step 1 to Step 3.
   b. Choose the appropriate discount rate.
   c. Compute Net Present Value (NPV).
   d. If NPV is +ve, retain the Asset.
      If NPV is –ve, abandon the Asset.

Note:

1. If the life of the new machine and the balance life of the old machine are UNEQUAL we must decide by using Equated Annual Benefit (EAB). The option with the higher EAB should be selected.

   EAB = NPV / PVAF.

2. If the evaluation is not based on NPV but on present value of outflows, then the asset with lower Equated Annual Cost (EAC) should be selected.

   EAC = PVO / PVAF

NPV : Net Present Value, PVO : Present Value of Inflows,
PVAF : Present Value Annuity Factor.