LEARNING SESSIONS

by Ashish Jain

JAIIB

Accounting & Financial Management for Bankers (AFM)

Module C • Chapter 25

CAPITAL INVESTMENT DECISIONS & TERM LOANS

NPV · IRR · Payback · ARR · Term Loans & DPG · Project Appraisal · RBI Project Finance Directions · Infrastructure & Syndication

◆ Updated Edition — with Latest Updates ◆

◆ Introduction

Every long-term decision a bank-financed firm makes — a new plant, capacity expansion, machinery replacement, a fresh product line — is a **capital investment decision**. These decisions tie up funds for years and carry time-value implications, so banks appraising term loans use the same toolkit — **NPV, IRR, Payback, ARR** — that borrowers use.

This chapter covers the four core capital-budgeting techniques, **term loans and Deferred Payment Guarantees (DPGs)**, the pillars of **project appraisal**, the **five top-level infrastructure categories** of the Harmonised Master List, **loan syndication**, and the **RBI Project Finance Directions** that now govern project lending.

◆ 1. Investment Appraisal — The Basics

Investment appraisal determines whether a proposed investment is worth its upfront outflow: is the future stream of cash inflows worth the money invested today?

- **Discounted Cash Flow (DCF) methods** — recognise the time value of money: **NPV** and **IRR**.
- **Non-DCF methods** — ignore the time value of money: **Payback Period** and **ARR**.

> ◉ **Exam Trap —** Discount rate / present value / cost of capital in the question ⇒ **NPV or IRR**. Only recovery speed ⇒ **Payback**. Average profit ÷ average investment ⇒ **ARR**.

◆ 2. Discounted Cash Flow Methods

2.1 Net Present Value (NPV)

NPV measures the rupee surplus a project creates: the present value of future net cash inflows minus the initial outlay.

- **Step 1 —** estimate all future net cash flows over the project's life.
- **Step 2 —** discount each cash flow at the appropriate rate (usually the cost of capital).
- **Step 3 —** sum the present values.
- **Step 4 —** subtract the initial investment: the result is the NPV.

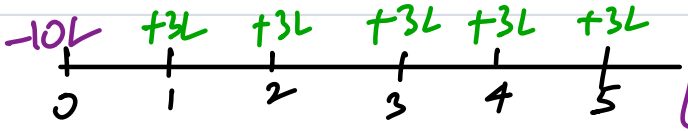
Net Present Value

$$NPV = \Sigma \left[CFt \div (1 + r)^t \right] - CF_0$$

CFt = net cash flow in year t · **r** = discount rate · **n** = project life · **CF_0** = initial outlay

$$NPV = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} - I$$

Discounting Factor $= \frac{1}{(1+r)^n}$



NPV = 0 ⇒ Indifferent decision

- **Decision rule:** NPV positive → **accept**; NPV negative → **reject**; among mutually exclusive projects → **highest positive NPV**.

P1 P2 — NPV higher

> ✓ **Worked Example — NPV — uniform inflows**
>
> **Given:**
>
> - Outlay ₹10,00,000; inflows ₹3,00,000 a year for 5 years; r = 10%
>
> **Formula:** NPV = Σ [CFt/(1+r)^t] − CF_0
>
> **Calculation:**
>
> PVs: 3,00,000 × (0.909 + 0.826 + 0.751 + 0.683 + 0.621)
>
> Total PV of inflows = **₹11,37,000**
>
> NPV = 11,37,000 − 10,00,000
>
> **Answer:** **NPV = ₹1,37,000 (positive → ACCEPT)**

Discounting Rate

$= \frac{300000}{(1.1)^1} + \frac{300000}{(1.1)^2} + \frac{300000}{(1.1)^3} + \frac{300000}{(1.1)^4} + \frac{300000}{(1.1)^5} - 1000000$

Worked illustration — mutually exclusive Projects A and B at 10%:

Year	A: inflow (₹)	PVF @10%	A: PV (₹)	B: inflow (₹)	B: PV (₹)
0	(25,000)	1.000	—	(20,000)	—
1	4,500	0.909	4,090.50	3,000	2,727.00
2	6,000	0.826	4,956.00	4,000	3,304.00
3	7,500	0.751	5,632.50	5,500	4,130.50
4	9,000	0.683	6,147.00	6,500	4,439.50
5	11,000	0.621	6,831.00	7,000	4,347.00
Total PV	—	—	**27,657.00**	—	**18,948.00**
NPV	—	—	**+₹2,657**	—	**(₹1,052)**

Discounting factor

> ✓ **Decision —** Project A's NPV is **+₹2,657**; Project B's is **−₹1,052**. **Accept A, reject B.** Had both been positive, the higher NPV wins for mutually exclusive options.

LIMITATIONS OF NPV

- **Choice of discount rate** — a small change can swing NPV across zero.
- **Unequal-life comparisons** — ordinary NPV may not directly rank repeatable, mutually exclusive projects of different lives performing the same function; use **Equivalent Annual Annuity** or the replacement-chain method there.
- **Estimation risk** — inflow/outflow assumptions are fragile until the project actually runs.

IRR is higher it is better

$$0 = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} - I$$

IRR > CoC ⇒ Accept

2.2 Internal Rate of Return (IRR)

IRR is the discount rate at which NPV = 0 — discounted inflows exactly equal discounted outflows.

- **Independent projects:** IRR > cost of capital → accept.
- **Mutually exclusive projects:** the primary rule is the **highest positive NPV at the appropriate cost of capital** — a higher-IRR project can carry a **lower NPV** because of differences in size, timing, life or reinvestment; **incremental IRR** may supplement the analysis.

IRR by Linear Interpolation

$$IRR \approx L + [\, NPV(L) \div (NPV(L) - NPV(H)) \,] \times (H - L)$$

L, H = lower and higher trial rates · bracket the sign change, then interpolate

✓ **Worked Example — IRR by interpolation**

Cost of capital ⇒ 16%

Given:

- NPV at 15% = +₹2,400; NPV at 20% = −₹1,600

Formula: IRR ≈ L + [NPV(L) ÷ (NPV(L) − NPV(H))] × (H − L)

Calculation:

IRR ≈ 15 + [2,400 ÷ (2,400 + 1,600)] × 5

IRR ≈ 15 + 0.60 × 5 = 15 + 3.0

Answer: IRR ≈ 18.00% p.a.

15% — 0 — 20%

$$= L + \left[\frac{NPV_L}{NPV_L - NPV_H}\right] \times (H - L)$$

$$= 15 + \frac{2400}{(2400 + 1600)} (20 - 15)$$

IRR > CoC ⇒ Accept

For Projects A and B above: NPV positive at 15% and negative at 20% for both — so both IRRs sit in the 15–20% band; narrowing gives **≈18.1% (A)** and **≈16.8% (B)**. Both clear the 10% cost of capital, and here the IRR and NPV rankings happen to agree — but where they conflict, **NPV rules**.

Small / large

	NPV	IRR
	20000	30%
	15L	20%

LIMITATIONS OF IRR

- **Scale, timing and life differences** can make IRR rank projects incorrectly — it is a percentage, blind to rupee scale; committing funds longer at a high IRR may not suit liquidity needs. *(It is computed from all dated cash flows, so it does not literally 'ignore duration' — the defect is in ranking, not arithmetic.)*
- **Reinvestment convention** — under the textbook interpretation IRR assumes intermediate cash flows are reinvested **at the IRR itself**, often overstating true profitability.
- **Multiple IRRs** — with **n sign changes in the cash-flow sequence there can be up to n positive IRRs** (the actual number may be lower). NPV always produces a single figure — one reason it is academically preferred.

2.3 NPV vs IRR — Side by Side

Basis	NPV	IRR
Meaning	Algebraic sum of PVs of all cash flows	Discount rate at which NPV = 0
Expressed in	Absolute rupees	Percentage
Represents	Surplus generated	Break-even discount rate
Reinvestment (textbook convention)	At the cost of capital	At the IRR
Decision	NPV > 0 → accept	IRR > cost of capital → accept; for mutually exclusive projects defer to the **NPV ranking**

■ **Precision — Reinvestment is a textbook convention:** strictly, NPV is a present-value rule and needs no separate reinvestment assumption to establish value — quote the convention when the exam compares the two, not as a property of the mathematics.

◆ 3. Non-Discounted Cash Flow Methods

3.1 Payback Period

Payback Period = the time required for **cumulative net cash inflows** to recover the **initial cash investment** — a cash-flow measure, never accounting earnings.

Payback (uniform inflows)

$$\text{Payback} = \text{Initial investment} \div \text{Annual net cash inflow}$$

For uneven inflows, accumulate year by year until the outlay is recovered

✓ **Worked Example — Payback — uneven inflows (cumulative method)**

Given:

- Outlay ₹50,000 each. A: 10,000 / 12,500 / 15,000 / 12,500 / 3,000. B: 10,000 × 5 years

Formula: Accumulate until the outlay is recovered

Calculation:

A cumulative: 10,000 → 22,500 → 37,500 → **50,000 at end-Year 4**

B cumulative: 40,000 by Year 4 → **50,000 at end-Year 5**

Answer: **Payback: A = 4 years, B = 5 years → choose A** (shorter recovery)

- **Limitations:** ignores the time value of money; ignores cash flows after payback (and hence total profitability); judges only recovery speed; identical paybacks can hide very different lifetime returns.

3.2 Accounting Rate of Return (ARR)

ARR measures profitability using **accounting profits after tax** — not cash flows — as a percentage of average (or initial) investment.

Accounting Rate of Return

$$\text{ARR} = (\text{Average annual PAT} \div \text{Average investment}) \times 100$$

Average investment = (Initial investment + Scrap value) ÷ 2 — an approximation that assumes **straight-line depreciation and even carrying-value decline**; where recoverable **working capital** exists, add it: (Fixed cost + Scrap)/2 + WC. **Follow the method the question specifies.**

✓ **Worked Example — ARR**

Given:

- Initial investment ₹8,00,000; scrap ₹2,00,000; PAT over 4 years: 1.2 / 1.4 / 1.6 / 1.8 lakh

Formula: ARR = (Avg PAT ÷ Avg investment) × 100

Calculation:

Avg PAT = 6,00,000 ÷ 4 = **₹1,50,000**

Avg investment = (8,00,000 + 2,00,000) ÷ 2 = **₹5,00,000**

ARR = 1,50,000 ÷ 5,00,000 × 100

Answer: **ARR = 30% p.a.** — accept if above the management hurdle rate

- **Decision rule:** accept if ARR exceeds the hurdle rate; among mutually exclusive projects prefer the highest ARR — remembering ARR **ignores the time value of money**.

4. Term Loans

A **term loan** is a **funded credit facility with a specified maturity and an agreed repayment schedule**. Repayment may be through equal instalments, unequal instalments, **balloon payments, bullet repayment, step-up instalments** or another cash-flow-linked structure — there is no uniform schedule across a bank's portfolio.

- Term loans finance **fixed assets** — land, building, plant & machinery, infrastructure.

- Repayment follows the **sanction terms**, matched to the borrower's cash-surplus profile; moratoriums are common.
- **Working-capital facilities:** cash-credit/overdraft limits are commonly **reviewed annually**, though their repayment character and renewal terms flow from the sanction documents; working capital may also be financed by demand loans, short-term loans, bills, packing credit — and by **Working Capital Term Loans**.
- **WCTL is not only a stressed-account product** — it may fund the **permanent/core component of working capital**, structure a working-capital gap, convert an irregular portion during restructuring, or implement a cash-flow-based arrangement under the bank's policy.

◆ 5. Deferred Payment Guarantees (DPG)

Where a buyer of a fixed asset pays the supplier by an agreed **deferred schedule** and the bank **guarantees** those deferred payments, the guarantee is a **DPG**. The bank carries **term-loan-like credit risk on the buyer — but the instrument is a non-fund-based, off-balance-sheet exposure until invocation.**

- Buyer contracts a deferred-payment purchase (plant, machinery, equipment); the bank issues the DPG in the supplier's favour for the instalments.
- The buyer pays per schedule; the bank steps in **only on default** — on invocation/devolvement the exposure **becomes funded**.
- **Capital treatment:** the guarantee converts to a credit-equivalent by the prescribed **Credit Conversion Factor** — as a **direct credit substitute, a 100% CCF** generally applies, then the counterparty risk weight.
- The bank charges **commission**, and the DPG should ordinarily be backed by **adequate tangible security or counter-guarantees** per policy.

> ◉ **Exam Trap —** Write it precisely: **a DPG exposes the bank to term-loan-like credit risk but remains an off-balance-sheet contingent exposure until invocation** — it is *not* a term loan in the bank's books from the date of issuance.

◆ 6. Project Appraisal

Project appraisal structures the case for a project — its viability — before a term loan is sanctioned. The classical syllabus pillars, in sequence:

6.1 Managerial Appraisal #1

- **Credentials of the promoters** — track record, competence, integrity.
- **Financial stake** — the higher the promoters' margin, the greater the commitment.
- **Form of organisation** — proprietorship / partnership / LLP / company, each with governance and liability implications.
- **Key persons** — depth of the second line, succession, operational expertise.

6.2 Technical Appraisal #2

- **Location** — proximity to raw material, markets, labour, power, transport.
- **Products and process** — technology choice, plant capacity, layout.
- **Infrastructure availability** — power, water, communication, roads, effluent disposal.
- **Technology provider** — supplier track record, royalties, know-how transfer.
- **Construction details** — civil works, installation timelines, implementation schedule.
- **EPC contractor** — credentials, delivery record, financial strength.
- **Waste disposal & pollution control** — environmental clearances, treatment design.
- **Raw-material availability** — supply tie-ups, price risk, alternatives.
- **Marketing arrangements** — demand, off-take agreements, distribution.

6.3 Economic Appraisal #3

- **Return on investment** — NPV, IRR, Payback, cost–benefit ratio, ARR applied to project numbers.
- **Break-even analysis** — a high break-even point means more risk before profitability.
- **Sensitivity analysis** — viability under moves in key variables (raw-material +10%, sale price −5%, utilisation −8%).

■ **Modern practice —** Lender appraisal today runs wider than the three pillars: **promoter/managerial → market & commercial → technical → legal & regulatory → environmental → financial & economic → risk, sensitivity and security assessment** — covering legal due diligence, approvals, E&S and climate risk, group exposure, security enforceability, DSCR and scenario analysis. Banks conduct **scenario and sensitivity testing under their Board-approved policies** — the number and severity of scenarios follow project size and risk, not a universal RBI-mandated minimum.