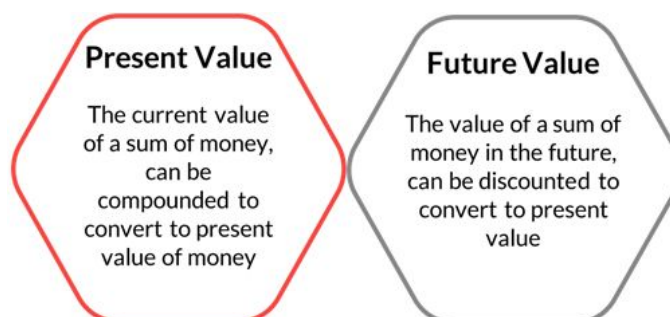# Summary

Getting Started with Corporate Finance

Any Business entity or firm wants to maximise its value, this can be done using the three key decisions of the corporate finance, identifying investment opportunities (investment decision), deciding how to fund the project (financing decision) and returning money to the stakeholders, in case there is no investment opportunity (dividend decision).
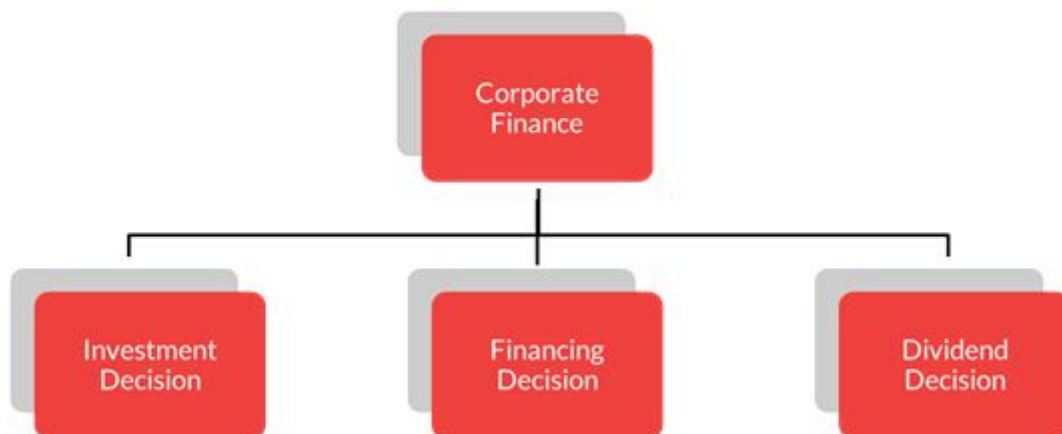
Time Value of Money

Money earns interest over time and grows, this is known as time value of money, the two terminologies related to the time value of money are

Present Value

The current value of a sum of money, can be compounded to convert to present value of money

Future Value

The value of a sum of money in the future, can be discounted to convert to present value

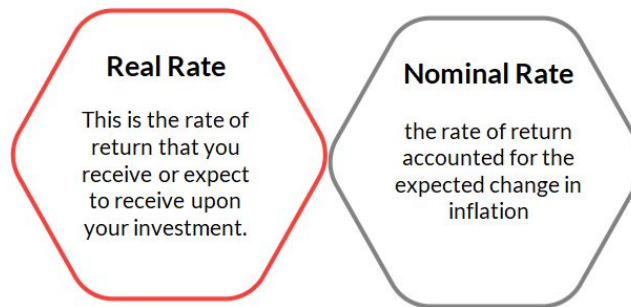The relationship between present value and future value is given by:

$$\text{Future Value} = \text{Present Value} * (1 + (R/N))^{(T*N)}$$

Compounding - Converting present value to future value
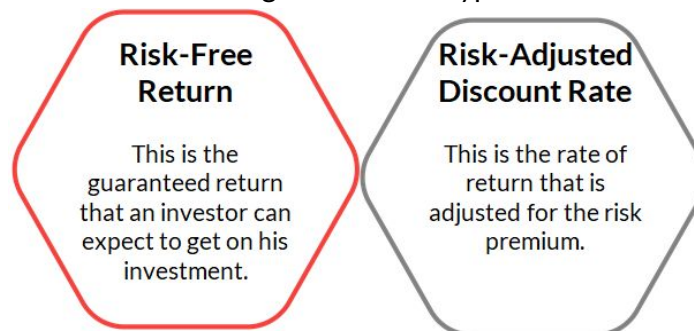**Discounting -** Converting future value to present value

Rate of Return

Rate of Return is the net gain or loss of an investment over a specified period of time, expressed as a percentage of investments initial cost. They can be classified as :

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Real Rate

This is the rate of return that you receive or expect to receive upon your investment.

Nominal Rate

the rate of return accounted for the expected change in inflation

The relationship between the two is given by the following equation:

Nominal rate = Real rate + Expected inflation

Based on risk, rate of return can further be categorized in two types:

Risk-Free Return

This is the guaranteed return that an investor can expect to get on his investment.

Risk-Adjusted Discount Rate

This is the rate of return that is adjusted for the risk premium.

The relation between the two is given by the following equation:

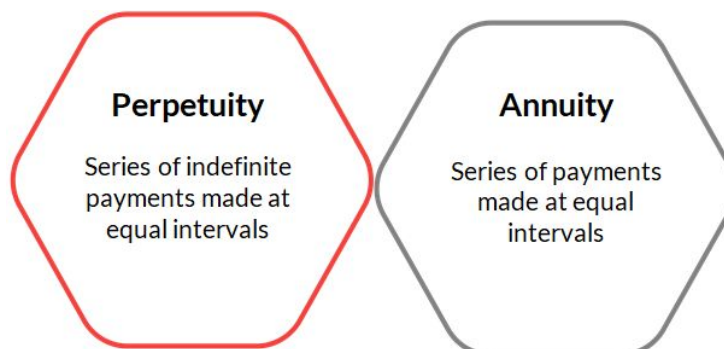**Risk-adjusted discount rate = Risk-free rate + Risk premium**

Summary

Project Evaluation Techniques - I

Multiple Cash Flows

This revenue from a investment can be in the form of either interest or profits and will be recurring throughout the life of the investment. In corporate finance, this recurring income from your investments is termed multiple cash flows. There are two specific types of multiple cash flows, that are:
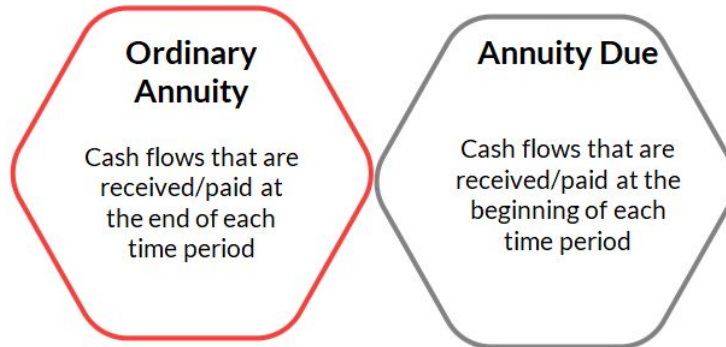

Perpetuity

Series of indefinite payments made at equal intervals

Annuity

Series of payments made at equal intervals

The present value of perpetuity can be given by:

$$Present\ Value\ of\ Perpetuity\ =\ \frac{C}{R}$$

Similarly, the present value of annuity can be given by:

$$Present\ Value\ of\ Annuity\ =\ C*\left(\frac{1}{R}-\frac{1}{R*(1+R)^N}\right)$$

The annuity further has two types based on the time period of payment:

Ordinary Annuity

Cash flows that are received/paid at the end of each time period

Annuity Due

Cash flows that are received/paid at the beginning of each time period

The present value if ordinary annuity can be given by the above formula, while for annuity due, you can use the below mentioned formula:

$$Present\ Value\ of\ Annuity\ Due = C * \left(\frac{1}{R} - \frac{1}{R*(1+R)^N} \right) * (1+R)$$

Also, to calculate the future value of annuity, you can compound its present value:

$$Future\ Value\ of\ Annuity = C * \left(\frac{(1+R)^N - 1}{R} \right)$$
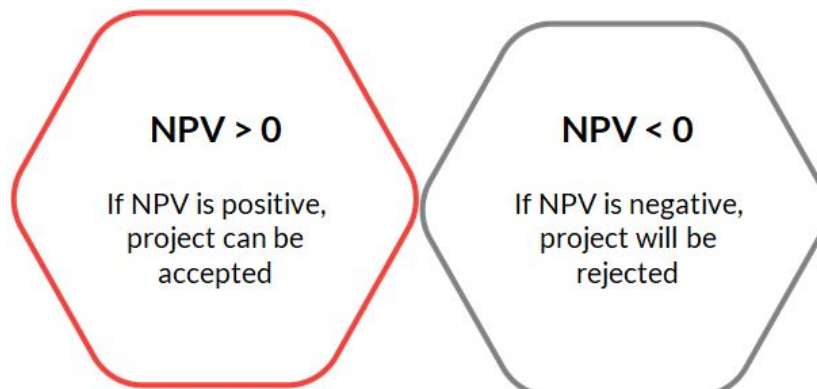
Net Present Value

Net present value method gives the value of net gain/loss by comparing the present value of cash outlflows and cash inflows. It is one of the most reliable techniques and generally used by the firms, since it gives the absolute value of gain/loss. The net present value for a project can be given by:

Net Present Value = Present value of all cash outflows + Present value of all cash inflows

To calculating the present value you can use the pv factor table, the table gives you a particular value for a return rate and time period, which can be used as below to calculate the present value of cash flows:
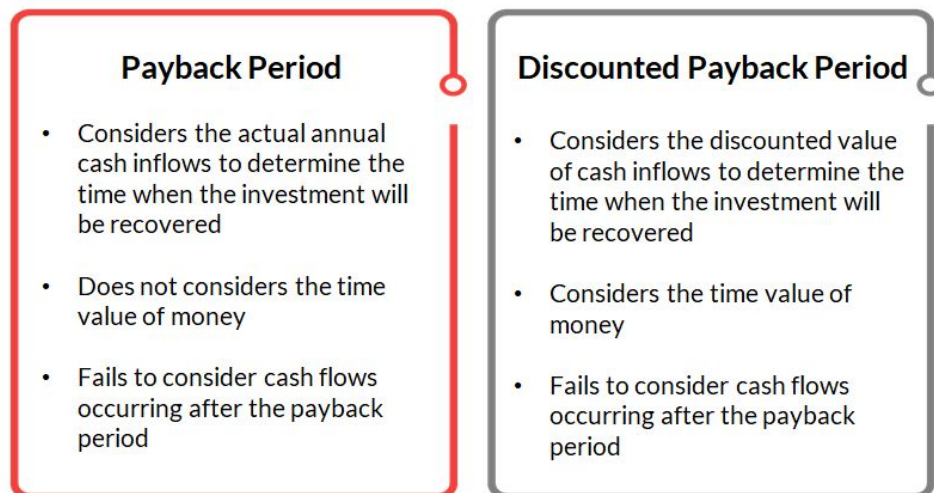
*Present value = Future value * PV factor*

An investment opportunity can be evaluated based on the NPV as following

NPV > 0

If NPV is positive, project can be accepted

NPV < 0

If NPV is negative, project will be rejected

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Payback Period

Payback period is the time required to recover the initial investment made on the project. This technique is used by firms as it is simple to calculate and also gives an estimate of how quick the firm can recover the money, more the time, higher the risk.

Discounted payback method is a modification of the payback period, instead of cash flows it considers the discounted value of cash flows.
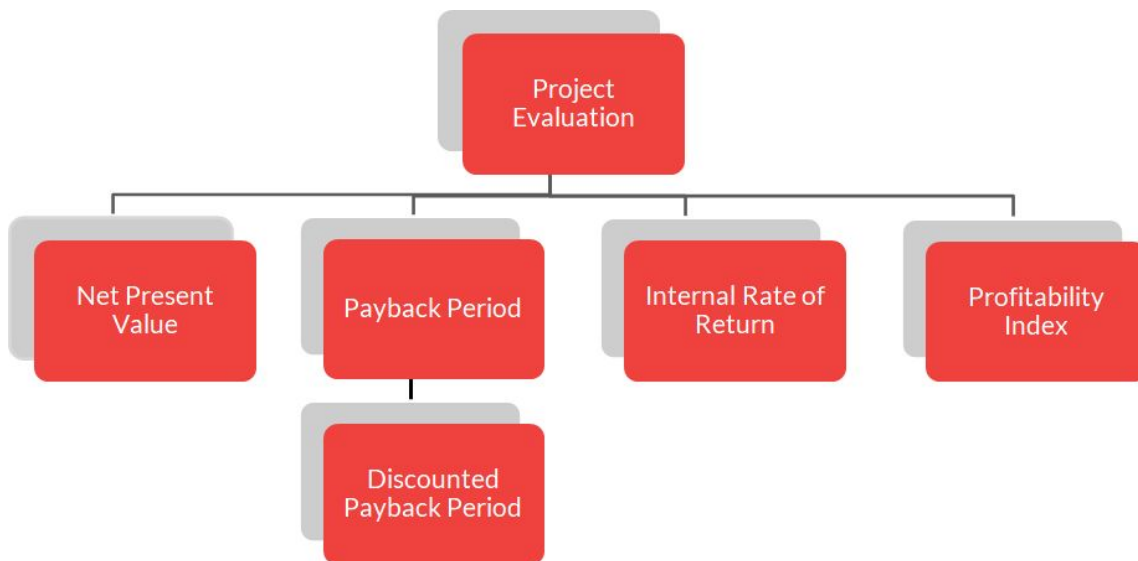
Payback Period

- Considers the actual annual cash inflows to determine the time when the investment will be recovered

- Does not considers the time value of money

- Fails to consider cash flows occurring after the payback period

Discounted Payback Period

- Considers the discounted value of cash inflows to determine the time when the investment will be recovered

- Considers the time value of money

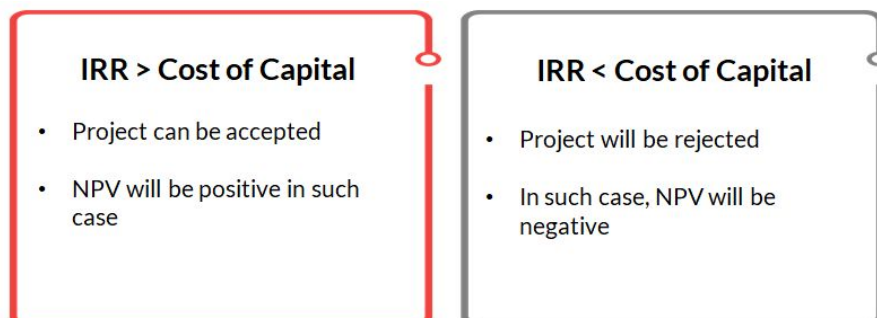- Fails to consider cash flows occurring after the payback period

Summary

Project Evaluation Techniques - II

Internal Rate of Return

IRR is the rate of return at which NPV is zero, the project will be selected or rejected based on the following scenario:

IRR > Cost of Capital
- Project can be accepted
- NPV will be positive in such case

IRR < Cost of Capital
- Project will be rejected
- In such case, NPV will be negative

The relationship between IRR and NPV is given by the **NPV - Profile.**

Pitfalls of IRR

NPV and IRR are two major techniques used by business entities for project evaluation. While NPV is an absolute measure (it is the value added in terms of money), IRR is a relative measure (it is the rate of return of the project). Following are the pitfalls of IRR:

1 Lending or borrowing – IRR cannot identify the pattern of cash flows, giving same result in both case

2 Multiple rate of return - if the sign of a cash flow changes more than once, there can be two values of the IRR

3 Mutually exclusive projects - IRR could give contradictory results while choosing between mutually exclusive projects

4 Multiple opportunity cost of capital – in such cases, you will have a single IRR, which can be greater than the hurdle rate for one year but less than the others

Profitability Index

Profitability index is a tool to measure the attractiveness of any investment opportunity, higher the profitability index more attractive the investment. It can be expressed as rupee gained per unit of investment. The formula to calculate the profitability index is:

Profitability index = (Present value of all the cash inflows) / (Present value of all the cash outflows)

This method is also use to rank the projects, the project giving highest return on the investment will be ranked first. This ranking is used for **capital rationing** - allocating resources to maximise the returns. Capital rationing is done in case of **independent projects**.

There are 4 rules of cash flow which needs to be kept in mind while estimating the cash flows for a project. These cash flows are then discounted to arrive at the NPV of a project. The 4 rules are:

1. • Only **Cash flow** is relevant

2. • Consider only **incremental** cash flow

3. • **Consistent** treatment of inflation

4. • Only **operating cash flow** is relevant

These rules ensure that the cash flow is estimated correctly to ensure correct evaluation of the feasibility of the project.

Rule #1 and Rule # 2

Rule # 1 : Only cash flows are relevant

- There are 2 elements which generally accounts for the difference between accounting income and cash flow

- Depreciation is the first element. It is a non-cash expense and should not be taken as an expenditure while estimating Cash flow. It must be added back to profit after tax to arrive at cash flow

- Working capital is the other element
  - If there is any increase in Assets/ decrease in liability , then cash flow is negative
  - Decrease in Assets/ increase in liability , then cash flow is positive

Rule # 2 : Consider only incremental cash flow

- All types of collateral costs and collateral benefits related to the project must be considered
- All types of opportunity cost must be considered

- All types of sunk cost must be ignored

- The salvage value or retirement cost must be considered

Rule # 3 and Rule # 4

Rule # 3 : Consistent treatment of Inflation

- Cash flows which account for inflation are called nominal cash flows
- Cash flows which do no account for inflation are called real cash flows

- Discount rate which incorporates the impact of inflation are called nominal rate and which do no incorporate the impact of inflation are called real discount rate
- Real cash flows must be discounted by real discount rates
- Nominal cash flows must be discounted by nominal discount rates

Rule # 4 : Only operating cash flow is relevant

- Cash inflows and outflows occuring due to financing activities must not be considered while estimating the cash flows for a project

- Only cash inflows and outflows due to operating activity must be considered as cash flows for a project.

The relationship between real and Nominal cash flow can be obtained from the following formula:

(1+ Nominal Rate) = (1+ Real Rate) x (1+ Inflation Rate)

Summary

Application of Cash Flow and Sensitivity Analysis

The steps to arrive at NPV for a project whose cash flows are not given explicitly are:
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1	Estimate the profit after tax from the given data of sales, variable cost, fixed cost, depreciation and taxes
2	Adjust the profit after tax for working capital changes and depreciation
3	Add the salvage value as a cash inflow in the year it is sold
4	Calculate the discount factor
5	Discount the cash flow at the appropriate rate to arrive at the present value of cash inflows
6	Subtracted from the initial cash outflow from the sum of present values of cash inflows to arrive at the NPV

Sensitivity Analysis

- It means observing changes in NPV by changing one input variable at one time

- There is a base case situation, best case situation and a worst case situation.

- Sensitivity analysis helps in understanding how your outcomes can change when your input variables change in different situations

- Sensitivity analysis helps in stress testing the model.

Probability Analysis

- Probability analysis gives you what would happen most likely and what is the expected value.

- Expected return is calculated as the sum of the (Probability A*Factor A) + (Probability B * Factor B)

Summary

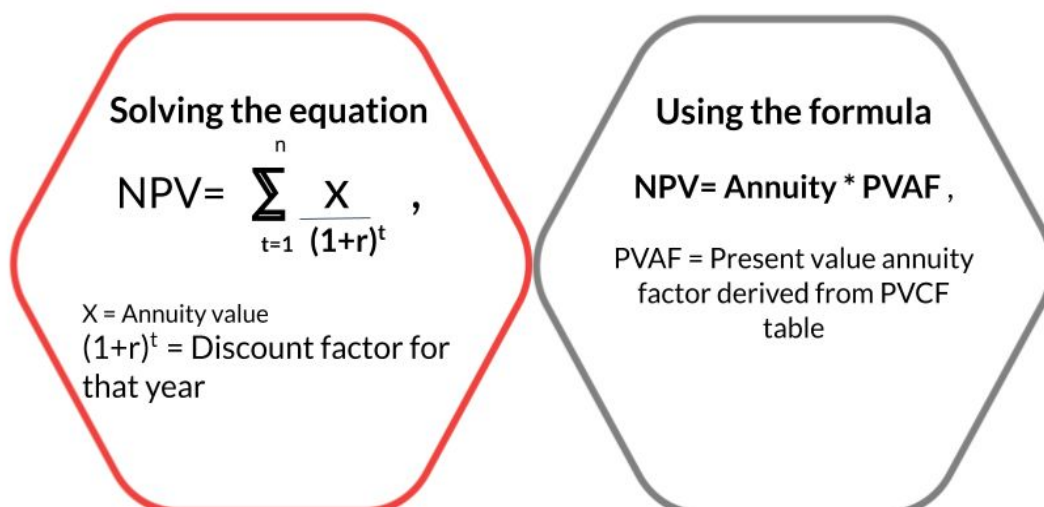## Projects with constraints, risk and cost of capital

Projects With Unequal Lives

When the projects under comparison are of unequal duration, choosing the project with the higher NPV does not give a fair answer.This is because the project with the highest duration will receive cash inflows for more years than the project with lower duration and this will definitely increase it's NPV and should be the chosen project always. One way of comparing such projects is by using the method Equivalent Annual Annuity (EAA) approach.

EAA approach uses the NPV of a project and tries to find the annuity value of this NPV for the life of the project. This annuity value of two projects are comparable and hence this comparison helps in making investment decisions

The two step process for using EAA approach is:

1 ▶ Find the NPV of the project.

2 ▶ Find the annuity value equivalent to the NPV of the project.
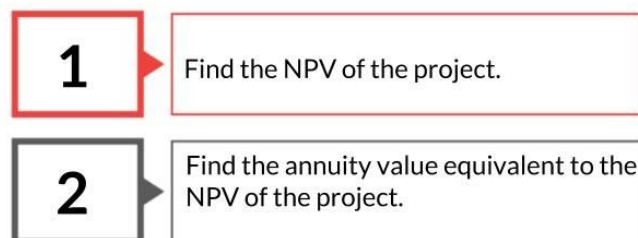
The formula for calculating the Equivalent Annual Annuity value of a project is

Solving the equation

$$NPV = \sum_{t=1}^{n} \frac{X}{(1+r)^t},$$

X = Annuity value
$(1+r)^t$ = Discount factor for that year

Using the formula

$$NPV = Annuity * PVAF,$$

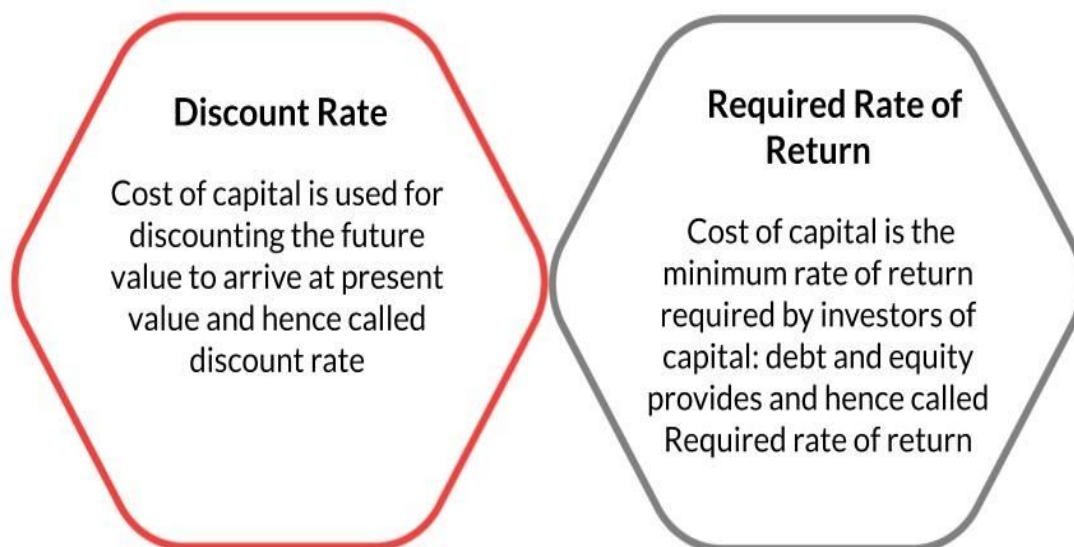PVAF = Present value annuity factor derived from PVCF table

Whenever there are options in a project, calculating NPV straight away without accounting for options may give you false results which might lead you to ignore a positive NPV project. Hence, you must account for options in projects.
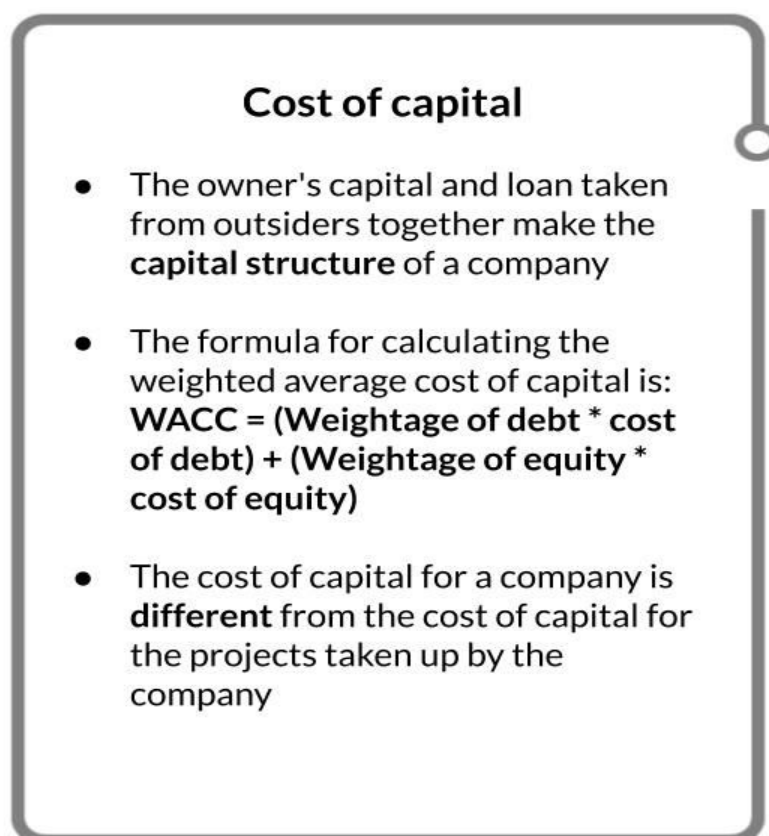
Project with embedded options:

- Option in a project gives power to managers to take decisions in future. But such options alter the present value of the project

- The option present in the project can be exercised only if the value from exercising option> value from not exercising option

- Calculate the NPV with and without option. And then assign the respective probabilities to get the NPV of the project with option

- Value of option = difference between the NPV of a project without option and NPV of a project with Option.

Cost of Capital

This cost of capital is a very crucial element in the field of investment decision making and valuation of firms.

Discount Rate

Cost of capital is used for discounting the future value to arrive at present value and hence called discount rate

Required Rate of Return

Cost of capital is the minimum rate of return required by investors of capital: debt and equity provides and hence called Required rate of return

Certain important points to remember regarding the cost of capital are:

Cost of capital

- The owner's capital and loan taken from outsiders together make the **capital structure** of a company

- The formula for calculating the weighted average cost of capital is: **WACC = (Weightage of debt * cost of debt) + (Weightage of equity * cost of equity)**

- The cost of capital for a company is **different** from the cost of capital for the projects taken up by the company

Determinants of Project Risk

Two most important factors which can pull up the project risk are:

Cyclicality

- Revenues and cash flows are highly related to up-cycles and down-cycles of the economy

- When the economy faces downturn, the demand for unnecessary items fall down. This fall in demand and cash flow increases the risk in the projects and hence a higher discount rate is used to discount such projects to incorporate the increased risk in them

- If the project is related to commodities which are affected by the up-cycles or down-cycles in the economy, then the cash flows become highly uncertain. This high uncertainty brings in high risk in the project

Operating leverage

- Operating leverage means leveraging the presence of fixed cost in the business

- Fixed cost is a cost which does not vary directly with the change in output or revenue

- If a company has a high fixed cost and high demand for output/ high revenue, then the company will benefit from operating leverage

- If the fixed cost component is high but the revenues are low, then the company will suffer from operating leverage