

# CAPITAL BUDGETING

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# What is capital budgeting?

- **A STRATEGIC INVESTMENT DECISION.**
- **ANALYSIS OF POTENTIAL PROJECTS.**
- **LONG-TERM DECISIONS; INVOLVE LARGE EXPENDITURES.**
- **VERY IMPORTANT TO FIRM'S FUTURE.**



# Definition

- A capital budgeting decision of a firm may be defined as the firm's decision to invest its current funds most efficiently in **long term assets** in anticipation of an expected flow of benefits over a series of years.
- Long term assets are those that affect firm's operations beyond one year.

# Objectives of Capital Budgeting

- To search for new and most profitable investment proposal.
- To make an economic analysis to determine the profit potential of each investment proposal.

## Features of Investment decision

- Exchange of current funds for future benefits.
- The funds are invested in long term assets
- The future benefits will occur to the firm over a series of years.

# Types of Investment Decisions

- One classification of Investments are
  - 1. Expansion and Diversification
  - 2. Replacement and Modernization
  
- Another way of classify investments are:
  - 1. Mutually Exclusive Investments
  - 2. Independent Investments
  - 3. Contingent Investments

# CAPITAL BUDGETING PROCESS

1. Estimate the cash flows.
2. Assess the riskiness of the cash flows.
3. Determine the appropriate discount rate.
4. Find the PV of the expected cash flows.
5. Accept the project if PV of inflows is more than costs.

# OVERALL AIM

- To maximize shareholders wealth.
- Projects should give a return over & above the weighted average cost of capital.



# Decision-making Criteria in Capital Budgeting



How do we decide  
if a capital  
investment  
project should  
be accepted or  
rejected?



# SELECTION METHODS

## Non-discounted Cash flow Technique

- Pay back period (PBP)
- Accounting Rate of Return (ARR)

## Discounted Cash flow Technique

- Net present value (NPV)
- Internal rate of return (IRR)
- Profitability index (PI)

# Payback period

- It refers to the period of time required for the return on an investment to "repay" the sum of the original investment.
- Means ‘ how long it takes to get our money back.
- For example, a \$1000 investment which returned \$500 per year would have a two year payback period.

## **Payback period-**

Cost of project/ annual cash inflows.

Note: Here calculate cash inflow after tax but before depreciation.

# Question

- If there are two projects for you then which project you will accept by using the payback period method?
- One project costs \$100,000 and is expected to return \$20,000 annually & another project of same cost is expected to return \$ 25,000.

# **PBP Acceptance Criterion**

Conclusion- The better investment is the one with the shorter payback period.

# PBP Strengths and Weaknesses

## Strengths:

- Easy to use and understand
- Can be used as a measure of liquidity

## Weaknesses:

- Does not account for TVM
- does not measure profitability.

# Accounting Rate of Return

- It is also known as Return on Investment (ROI).
- It is based on accounting information from the financial statement rather than cash flows.
- $ARR = \frac{\text{Average Income}}{\text{Average Investment}}$
- Avg. Income = Avg. Profit After Tax
- Avg. Investment = It can be found out by dividing Average investment book value after depreciation by life of the project.

# ARR (Example)

- A project cost is Rs. 40,000. Its streams of earning before depreciation, interest and taxes (EBDIT) during first year through five years is expected to be Rs10,000, Rs 12,000, Rs 14,000, Rs 16,000 and Rs 20,000. Assume a 50% Tax rate and depreciation on straight line basis. Find the projects ARR? (minimum ARR = 15%)



# Solution

Period	(Rs)					
	1	2	3	4	5	Average
Earnings before depreciation, interest and taxes (EBDIT)	10,000	12,000	14,000	16,000	20,000	14,400
Depreciation	8,000	8,000	8,000	8,000	8,000	8,000
Earnings before interest and taxes (EBIT)	2,000	4,000	6,000	8,000	12,000	6,400
Taxes at 50%	1,000	2,000	3,000	4,000	6,000	3,200
Earnings before interest and after taxes [EBIT (1- T)]	1,000	2,000	3,000	4,000	6,000	<u>3,200</u>
Book value of investment:						
Beginning	40,000	32,000	24,000	16,000	8,000	
Ending	32,000	24,000	16,000	8,000	—	
Average	36,000	28,000	20,000	12,000	4,000	<u>20,000</u>

- $ARR = (3,200 / 20,000) \times 100 = 16\%$
- Acceptance Rule
- A minimum rate established by MGT.
  1.  $ARR > \text{minimum rate} = \text{Accept}$
  2.  $ARR < \text{minimum rate} = \text{Reject}$

$16\% > 15\%$  Accept

# ARR Strengths and Weaknesses

## Strengths:

- Easy to use and understand
- It is calculated from the accounting data, so no adjustment is required to arrive at the cash flows of the project.

## Weaknesses:

- Does not account for TVM
- ARR measures the worth of investment and does not take into account the size of investment require for a project.
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# IRR

- IRR as the rate of growth a project is expected to generate
- The IRR is the discount rate at which the NPV for a project equals ZERO.
- This rate means that the present value of the cash inflows for the project would equal the present value of its outflows.
- The IRR is the break-even discount rate.
- The IRR is found by trial & error method.



- As such, IRR can be used to rank several prospective projects a firm is considering.
- The project with the highest IRR would probably be considered the best and undertaken first.
- IRRs can also be compared against prevailing rates of return in the securities market. If a firm can't find any projects with IRRs greater than the returns that can be generated in the financial markets, it may simply choose to invest its retained earnings into the market.
- IRR is sometimes referred to as "economic rate of return (ERR)".

# This concept is simple to understand in case of one period project.

- Ex. Assume that you have deposited Rs. 10,000 with a bank and would get back Rs 10,800 after one year, What is the rate of return on your investment?

- Rate of Return =  $(10,800 - 10,000) / 10,000$

- $= 1.08 - 1 = .08 = 8\%$

- $r = \frac{C_1 - C_0}{C_0}$

- $C_0$

- $C_0 = C_1 / (1 + r)$

- Where,

r - Return on Investment

C<sub>0</sub>- Initial Investment

C<sub>1</sub>- Cash flow after one period

# Internal Rate of Return (IRR)

$$ICO = \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} + \dots + \frac{CF_n}{(1+IRR)^n}$$

# IRR Strengths and Weaknesses

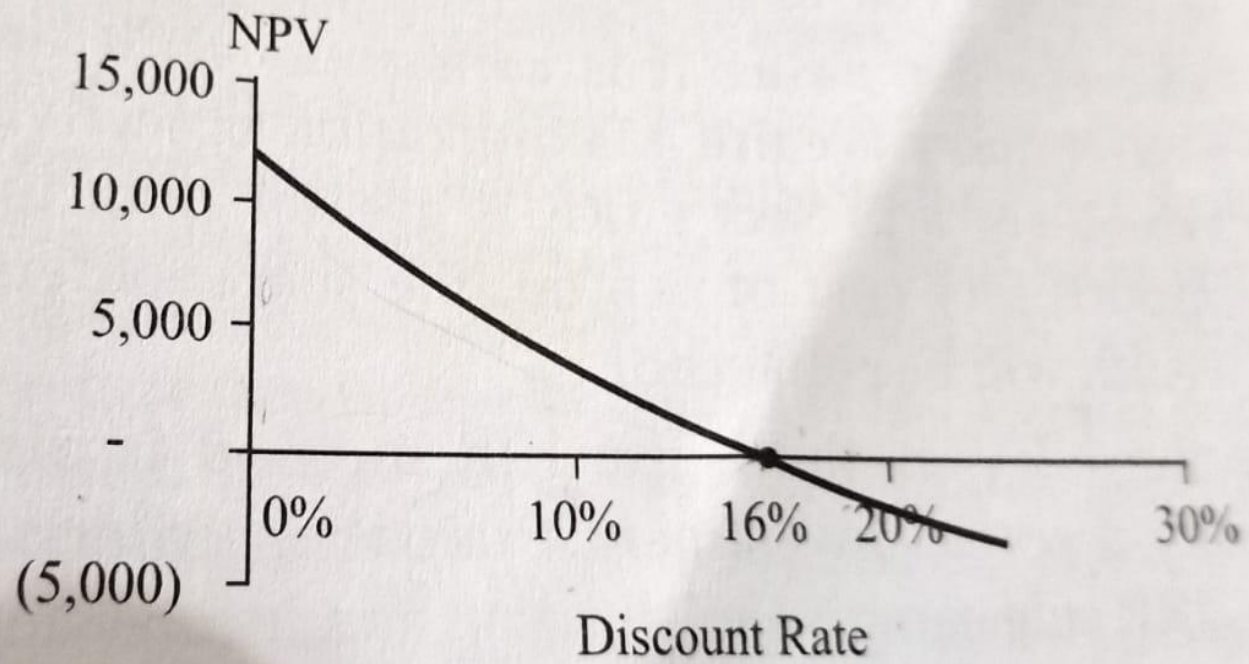
## Strengths:

- Accounts for TVM
- Considers all cash flows
- Less subjectivity

## Weaknesses:

- Assumes all cash flows reinvested at the IRR
- Difficulties with project rankings and Multiple IRRs





# NPV

- Discount cash inflows to their present value & then compare with capital outlay required by the investment it means the difference between the present value of cash inflows and the present value of cash outflows.
- Proposal is acceptable when NPV is greater than or equal to Zero
- The higher the NPV, the more attractive the investment.
- If the NPV of a prospective project is positive, it should be accepted. However, if NPV is negative, the project should probably be rejected because cash flows will also be negative.
- Accounts for TVM & Considers all cash flows.

- $NPV = PVCI - PVCO$
- NPV is difference between Present Value of Cash Inflow and Present Value of Cash Outflow

# Net Present Value (NPV)

*NPV* is the present value of an investment project's net cash flows minus the project's initial cash outflow.

$$NPV = \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \dots + \frac{CF_n}{(1+k)^n} - ICO$$

**NPV:** Sum of the PVs of inflows and outflows.

$$NPV = \sum_{t=0}^n \frac{CF_t}{(1+k)^t}.$$

Cost often is  $CF_0$  and is negative.

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+k)^t} - CF_0.$$

# PROPOSED PROJECT DATA

Julie Miller is evaluating a new project for her firm, *Basket Wonders (BW)*. She has determined that the after-tax cash flows for the project will be \$10,000; \$12,000; \$15,000; \$10,000; and \$7,000, respectively, for each of the Years 1 through 5. The initial cash outlay will be \$40,000.

*Basket Wonders* has determined that the appropriate discount rate ( $k$ ) for this project is 13%.

Find out the NPV of this project?

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# NPV Solution

$$\text{NPV} = \frac{\$10,000}{(1.13)^1} + \frac{\$12,000}{(1.13)^2} + \frac{\$15,000}{(1.13)^3} + \frac{\$10,000}{(1.13)^4} + \frac{\$7,000}{(1.13)^5} - \$40,000$$

# NPV Solution

$$\begin{aligned} \text{NPV} = & \$10,000(\text{PVIF}_{13\%,1}) + \$12,000(\text{PVIF}_{13\%,2}) + \\ & \$15,000(\text{PVIF}_{13\%,3}) + \$10,000(\text{PVIF}_{13\%,4}) + \\ & \$ 7,000(\text{PVIF}_{13\%,5}) - \$40,000 \end{aligned}$$

$$\begin{aligned} \text{NPV} = & \$10,000(.885) + \$12,000(.783) + \\ & \$15,000(.693) + \$10,000(.613) + \\ & \$ 7,000(.543) - \$40,000 \end{aligned}$$

$$\begin{aligned} \text{NPV} = & \$8,850 + \$9,396 + \$10,395 + \\ & \$6,130 + \$3,801 - \$40,000 \\ = & - \$1,428 \end{aligned}$$



# NPV Acceptance Criterion

Should this project be accepted?

No! The **NPV** is negative. This means that the project is reducing shareholder wealth.

[ *Reject* as  $NPV < 0$  ]

# NPV Acceptance Rules are:

- Accept the project when NPV is Positive ( $NPV > 0$ )
- Reject the project when NPV is Negative ( $NPV < 0$ )
- May accept the project when NPV is Zero ( $NPV = 0$ )
  
- A zero NPV implies that project generates cash flows at a rate just equal to the opportunity cost of Capital.
- A positive NPV implies that project generates cash flows at a rate greater than opportunity cost of Capital.
- A negative NPV implies that project generates cash flows at a rate lesser than the opportunity cost of Capital.

# PROFITABILITY INDEX

- The profitability index, or PI, method compares the present value of future cash inflows with the initial investment on a relative basis.
- Therefore, the PI is the ratio of the present value of cash inflows (PVCIF) to the initial investment of the project.
- $PI = PVCIF / \text{initial investment}$
- In this method, a project with a PI greater than 1 is accepted, but a project is rejected when, its PI is less than 1

# Profitability Index (PI)

PI is the ratio of the present value of a project's future net cash flows to the project's initial cash outflow.

Method #1:

$$PI = \left[ \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \dots + \frac{CF_n}{(1+k)^n} \right] \div ICO$$

<< OR >>

Method #2:

$$PI = 1 + [ NPV / ICO ]$$

# PI Acceptance Criterion

$$\begin{aligned} \text{PI} &= \$38,572 / \$40,000 \\ &= .9643 \text{ (Method \#1, 13-34)} \end{aligned}$$

Should this project be accepted?

No! The **PI** is less than 1.00. This means that the project is not profitable. [*Reject* as  $PI < 1.00$  ]

# PI Strengths and Weaknesses

## Strengths:

- Same as NPV
- It is a sound method of capital budgeting as it satisfy all requirement of a sound investment criteria.

## Weaknesses:

- Requires estimation of cash flows which is a tedious task.
- Provides only relative profitability
- Sometimes fails to indicate a correct choice between mutually exclusive projects.