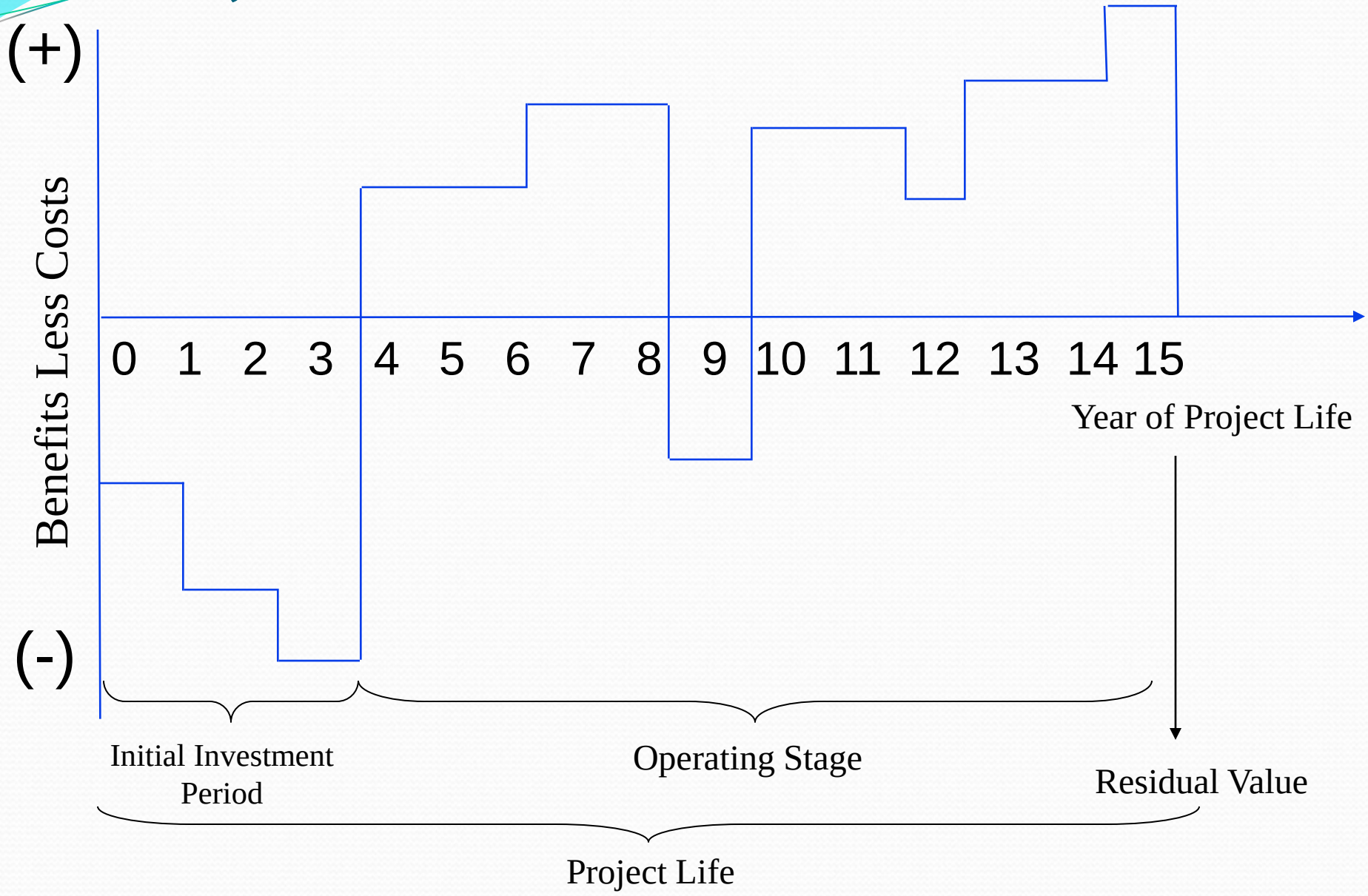
Cash Analysis: Principles, Concepts & Conventions

Project Cash Flow Profile



Statement of Cash Flows

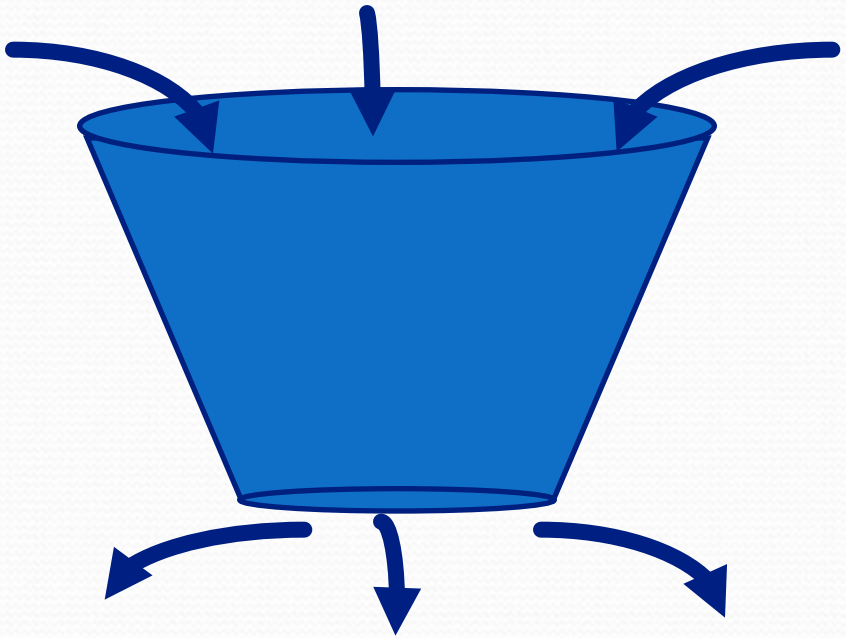
CASH INFLOWS

(Benefits)

Operating Activities

Investing Activities

Financing Activities



CASH OUTFLOWS

(Costs)

Operating Activities

Investing Activities

Financing Activities

Classification of Cash Flows

1. Operations -- cash flows related to selling goods and services; that is, the principal business of the firm.
2. Investing -- cash flows related to the acquisition or sale of capital assets.
3. Financing -- long term and short term cash flows related to liabilities and owners' equity.

Classification of Cash Flows

- **Operating activities:**
  - Inflows: Collection of Revenues
  - Outflows: Payment of Expenses, including ***interest***
- **Investing activities:**
  - Inflows: Disposal of Land, Building, Equipment
    Collections of loans made to others
  - Outflows: Purchases of Land, Building, Equipment
    Lending money to others
- **Financing activities:**
  - Inflows: Borrowing money from others
    Contributions (investments into the company) by owners
  - Outflows: Distributions to owners
    Repayment of *loans* to creditors

Basic principle of cash analysis

- **This methodology follows "Cash Flow" approach**
  - ✓ An item enters Cash flow statement only when actual cash is received or paid, only exception is opportunity costs.
  - ✓ Hence different from Profit and Loss statement
- ***The issue of opportunity cost***
  - ➢ All resources used as result of investment decision have to be charged to the project as investors are forgoing value that could be earned from alternative use of resources – concept of **"opportunity cost"**
  - ➢ Not all "cash flows" are actual flows of cash through an account. Where existing resources are used, opportunity cost or the forgone "cash flows" are charged to the investment for using these resources
    - ✓ Existing land, building and machinery
    - ✓ Time of owner-manager of business

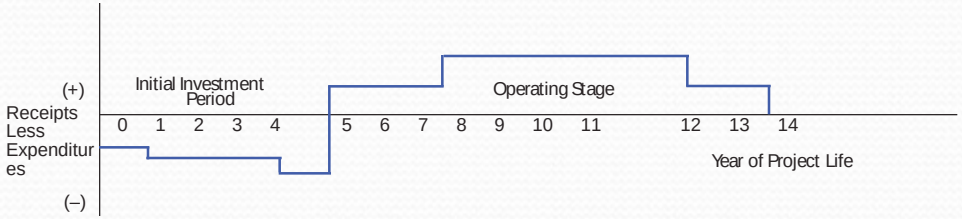
- ***Ignore Sunk Costs***
- ***Depreciation***

Treatment of Land

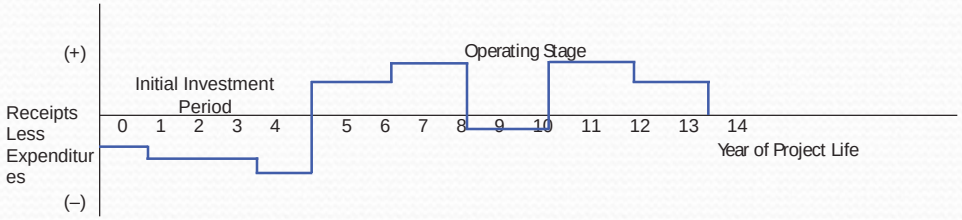
We usually list the value of the land IN and OUT at the same price IF the increase in the land value is NOT DIRECTLY attributable to the project. This avoids distorting the project selection process.

Figure: Different Financial Project Profiles

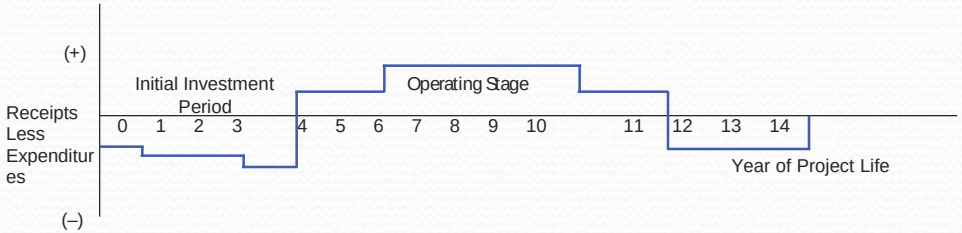
Panel A



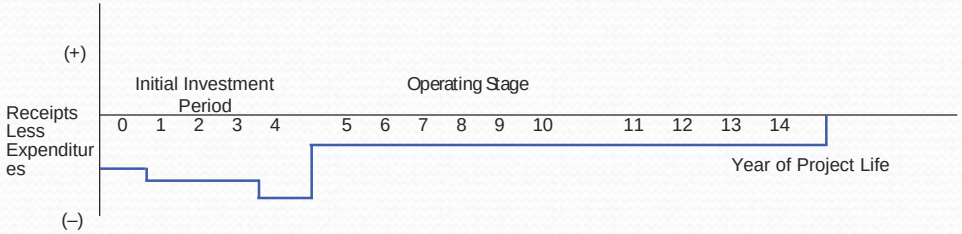
Panel B



Panel C

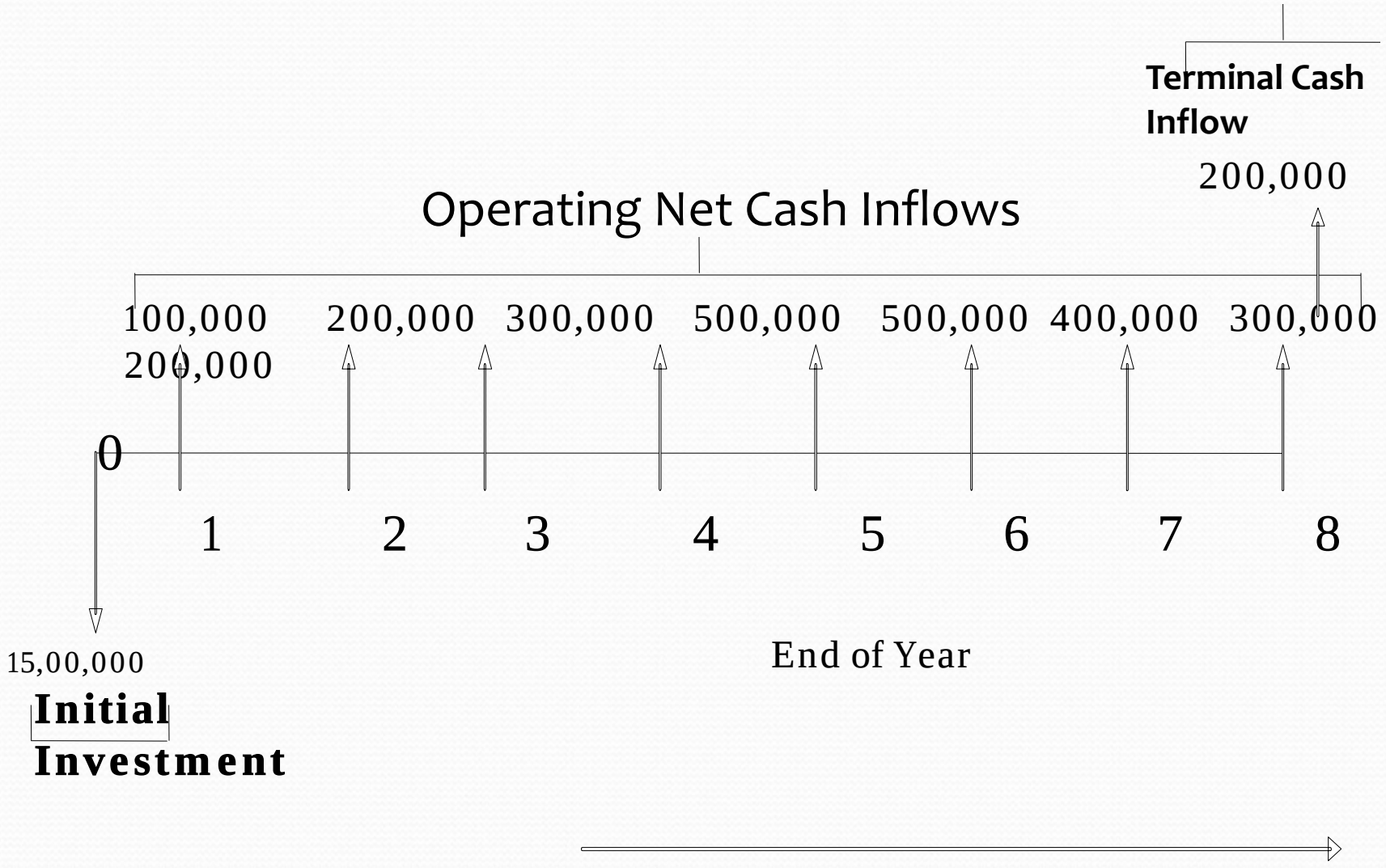


Panel D



Comments / Questions

Cash Flow Components of Ms. X's housing project



Time Value of Money

- **Principle of Compounding**

  Original amount = a

  Interest rate = i

  After one year, it becomes = $a(1+i)$

  After two years, it becomes = $a(1+i)^2$

- **Discounting - reverse of compounding**

  Amount a received after one year is worth $a/(1+i)$ today

  Amount a received after two years is worth $a/(1+i)^2$ today

Net Present Value Criterion (contd)

a. When to accept or reject projects?

Rule: ***"Do not accept any project unless it generates a positive net present value when discounted by the opportunity cost of funds"***

Examples:

Project A: Present Value Costs Rs 1 million, NPV + 70,000

Project B: Present Value Costs Rs 5 million, NPV - 50,000

Project C: Present Value Costs Rs 2 million, NPV + 100,000

Project D: Present Value Costs Rs 3 million, NPV - 25,000

Result:

Only projects A and C are acceptable. The country is made worse off if projects B and D are undertaken.

Net Present Value Criterion (contd)

b. When you have a budget constraint?

Rule: ***"Within the limit of a fixed budget, choose that subset of the available projects which maximizes net present value"***

Example: If budget constraint is Rs 4 million and 4 projects with positive NPV:

Project E:	Costs Rs 1.5 million, NPV + 60,000
Project F:	Costs Rs 2.5 million, NPV + 400,000
Project G:	Costs Rs 2.0 million, NPV + 150,000
Project H:	Costs Rs 2.0 million, NPV + 225,000

Result:

Combinations FG and FH are impossible, as they cost too much. EG and EH are within the budget, but are dominated by the combination EF, which has a total NPV of 460,000. GH is also possible, but its NPV of 375,000 is not as high as EF.

Net Present Value Criterion (contd)

c. When you need to compare mutually exclusive projects?

Rule: ***"In a situation where there is no budget constraint but a project must be chosen from mutually exclusive alternatives, we should always choose the alternative that generates the largest net present value"***

Example:

Assume that we must make a choice between the following three mutually exclusive projects:

Project I: PV costs Rs 1.0 million, NPV 300,000

Project J: PV costs Rs 4.0 million, NPV 700,000

Project K: PV costs Rs 1.5 million, NPV 600,000

Result:

Projects J should be chosen because it has the largest NPV.

Net Present Value (NPV)

- What does net present value mean?
- Measures change in wealth or net worth or value of equity: ***NPV > 0 means increase in value of firm***
  - **Basic target of increasing shareholder value**
- Use as a decision criterion to answer following:

a. When to accept or reject projects?

b. When you have a budget constraint?

c. When you need to compare mutually exclusive projects?

Alternative Investment Criteria

Internal Rate of Return (IRR)

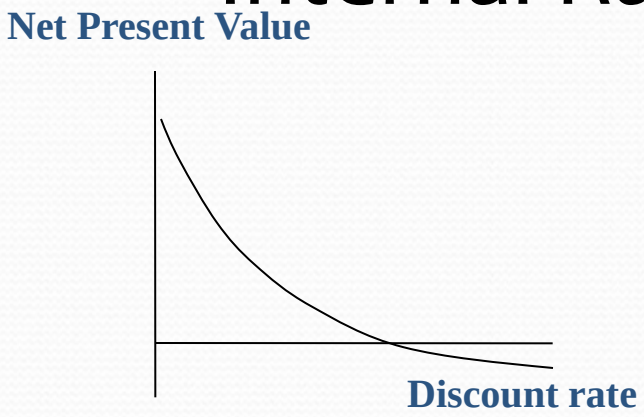
IRR is the discount rate at which the present value of benefits are just equal to the present value of costs for the particular project

Common uses of IRR:

(a) If the IRR is larger than the cost of funds then the project should be undertaken

(b) Often the IRR is used to rank mutually exclusive projects. The highest IRR project should be chosen

Internal Rate of Return



The internal rate of return (IRR) of a project is the discount rate that makes its NPV equal to zero. It is represented by the point of intersection in the above diagram . In the NPV calculation we assume that the discount rate (cost of capital) is known and determine the NPV. In the IRR calculation, we set the NPV equal to zero and determine the discount rate that satisfies this condition. Accept the project if IRR is more than cost of capital

Net Present Value

- **Assumes that the discount rate (cost of capital) is known**
- **Calculates the net present value, given the discount rate**

Internal Rate of Return

- **Figures out the discount rate that makes net present value zero**
- **Assumes that the net present value is zero**

Internal Rate of Return (Scale)

Time Period	T_0	T_1	IRR	NPV (at 10 %)
Net Cash Flows of M	-1000	+1500	50%	363
Net Cash Flows of N	-9000	12000	20%	909

NPV vs IRR ?

NPV

- Assumes that the discount rate (cost of capital) is known
- Calculates the net present value, given the discount rate
- NPV of the components of a project can be added .

IRR

- Figures out the discount rate that makes the NPV zero.
- Assumes that the NPV is zero
- Ignores the differences in scales of investment
- IRRs are not additive

Benefit Cost Ratio

$$\text{Benefit-cost Ratio : } BCR = \frac{PVB}{I}$$

PVB = present value of benefits

I = initial investment

To illustrate the calculation of these measures, let us consider a project which is being evaluated by a firm that has a cost of capital of 12 percent.

Initial investment :		Rs 100,000
Benefits:	Year 1	25,000
	Year 2	40,000
	Year 3	40,000
	Year 4	50,000

The benefit cost ratio measures for this project are:

$$BCR = \frac{\frac{25,000}{(1.12)} + \frac{40,000}{(1.12)^2} + \frac{40,000}{(1.12)^3} + \frac{50,000}{(1.12)^4}}{100,000} = 1.145$$

BCR measures NPV per rupee of outlay. When capital budget is limited, the BCR may rank Projects correctly in order of decreasingly efficient use of capital.

The following decision rules are associated with **Benefit Cost Ratio**

When BCR	*Rule is*
>1	Accept
=1	Indifferent
<1	Reject

Comments / Questions