Project Evolution & Estimation :cash flow forecasting, cost benefit evolution techniques, risk evolution, Cost benefit analysis

EA – Cost-benefit Analysis

- A standard way to assess the economic benefits
- Two steps
  - Identify and estimate all the costs and benefits of carrying out the project
  - Express the costs and benefits in a common unit for easy comparison (e.g. $)

EA – Cost-benefit Analysis (cont'd)

- Costs
  - Development costs
  - Setup costs
  - Operational costs

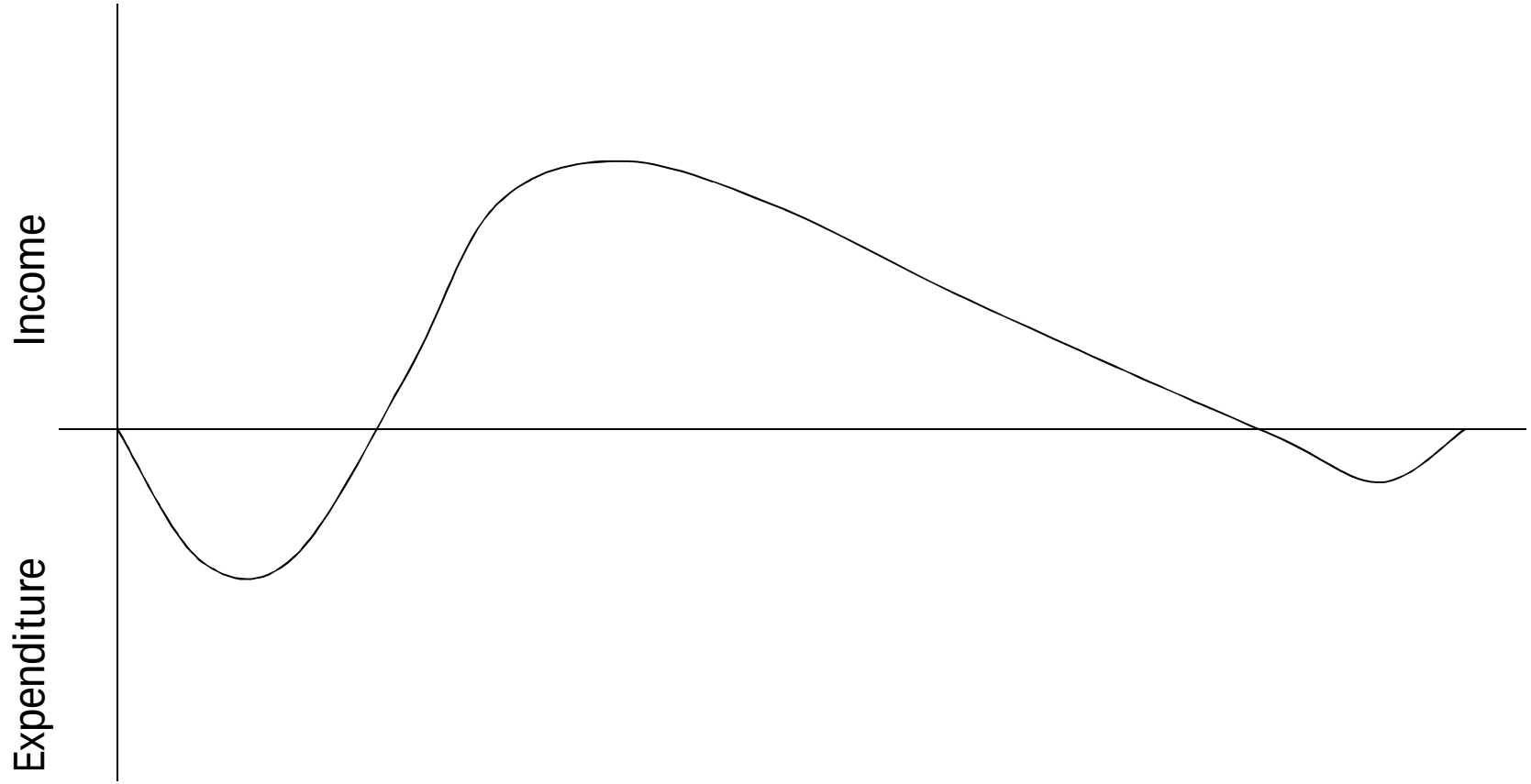
EA – Cost-benefit Analysis (cont'd)

- Benefits
  - Direct benefits
  - Assessable indirect benefits
  - Intangible benefits

EA – Cash Flow Forecasting

- What?
  - Estimation of the cash flow over time
- Why?
  - An excess of estimated benefits over the estimated costs is not sufficient
  - Need detailed estimation of benefits and costs versus time

EA – Cash Flow Forecasting (Cont'd)



EA – Cash Flow Forecasting (Cont'd)

- Need to forecast the expenditure and the income
- Accurate forecast is not easy
- Need to revise the forecast from time to time

Cost-benefit Evaluation Techniques Example

Year	*Project 1*	*Project 2*	*Project 3*	*Project 4*
0	-100,000	-1,000,000	-100,000	-120,000
1	10,000	200,000	30,000	30,000
2	10,000	200,000	30,000	30,000
3	20,000	200,000	30,000	30,000
4	20,000	200,000	20,000	25,000
5	100,000	350,000	20,000	50,000
Net Profit	60,000	150,000	30,000	45,000
Payback	5	5	4	4
ROI	12%	4%	10%	11%

Cost-benefit Evaluation Techniques

- Net profit
  = Total income – Total costs
- Payback period
  = Time taken to break even
- Return on Investment (ROI)

$$= \frac{\text{average annual profit}}{\text{total investment}} \times 100\%$$

Cost-benefit Evaluation Techniques – NPV

Net present value (NPV)

- It is the sum of the present values of all future amounts.
- *Present value* is the value which a future amount is worth at present
- It takes into account the profitability of a project and the timing of the cash flows

Cost-benefit Evaluation Techniques – NPV (cont'd)

- *Discount rate* is the annual rate by which we discount future earning
  - e.g. If discount rate is 10% and the return of an investment in a year is $110, the present value of the investment is $100.

Cost-benefit Evaluation Techniques – NPV (cont'd)

- Let *n* be the number of year and *r* be the discount rate, the present value (PV) is given by

$$\mathrm{PV} = \frac{\text{value in year } n}{(1+r)^n}$$

Cost-benefit Evaluation Techniques – NPV (cont'd)

- Issues in NPV
  - Choosing an appropriate discount rate is difficult
  - Ensuring that the rankings of projects are not sensitive to small changes in discount rate

Cost-benefit Evaluation Techniques – NPV (cont'd)

- Guidelines:
  - Use the standard rate prescribed by the organization
  - Use interest rate + premium rate
  - Use a target rate of return
  - Rank the projects using various discount rates

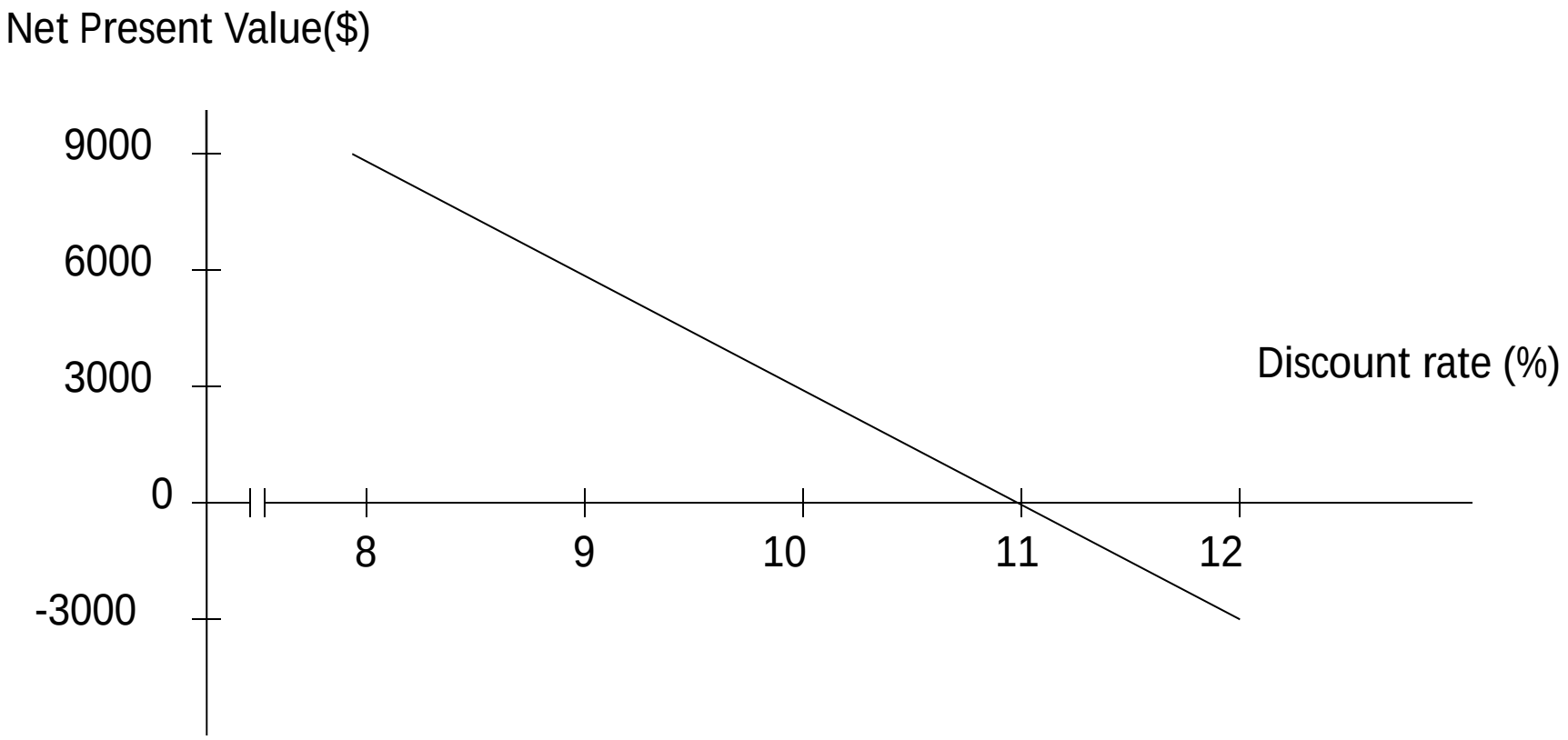
Cost-benefit Evaluation Techniques – NPV (cont'd)

- Disadvantage
  - May not be directly comparable with earnings from other investments or the costs of borrowing capital

Cost-benefit Evaluation Techniques – IRR

- Internal Rate of Return (IRR)
  - The percentage discount rate that would produce a NPV of zero
  - A relative measure

Cost-benefit Evaluation Techniques – IRR (cont'd)



Cost-benefit Evaluation Techniques – IRR (cont'd)

- Advantages
  - Convenient
    - Directly comparable with rate of return on other projects and with interest rates
  - Useful
    - Dismiss a project due to its small IRR value
    - Indicate further precise evaluation of a project
  - Supported by MS Excel and Lotus 1-2-3

Estimation

- Why? – to define the project budget and to ‘refine’ the product to realize the budget
- Who? – the manager
- What? – size and cost
- When? – always
- How? – techniques and models

Issues related to Estimation

- Difficult to make accurate estimation
- Better to have previous data and analyze the actual values against their estimates so that you know how accurate you are
- Even better to have previous data of the whole organization so that you know how accurate the estimation method, if any, used within the organization is

Positive Attitude Towards Estimation

- Use your estimation as a guide to manage your project
- From time to time, you need to revise your estimation based on the current status of the project

Estimation Approaches

- Expert judgement
  - Ask the knowledgeable experts
- Estimation by analogy
  - Use the data of a similar and completed project
- Pricing to win
  - Use the price that is low enough to win the contract

Estimation Approaches (cont'd)

- Top-down
  - An overall estimate is determined and then broken down into each component task
- Bottom-up
  - The estimates of each component task are aggregated to form the overall estimate
- Algorithmic model
  - Estimation is based on the characteristics of the product and the development environment.

Size Estimation

- Problems related to size estimation
- Size Estimation Model
  - Function Point Analysis (FPA)

Problems related to size estimation

- Nature of software
- Novel application of software
- Fast changing technology
- Lack of homogeneity of project experience
- Subjective nature of estimation
- Political implications within the organization

Application & Scope of research Project estimation

Application :

- Sizing Estimation Techniques for Business Critical Software Project Management
- Evolutionary fuzzy hybrid network
- CEOS

Scope of research :

- Dynamic bridge substructure evolution