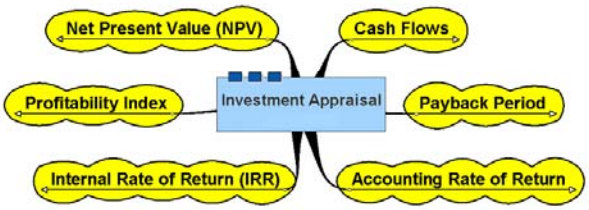
Investment Appraisal

Investment Appraisal



Investment Appraisal

- **A means of assessing whether an investment project is worthwhile or not**
- Investment project could be the purchase of a new PC for a small firm, a new piece of equipment in a manufacturing plant, a whole new factory, etc
- Used in both public and private sector

Investment Appraisal

What factors need to be considered before investing in equipment such as this?

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- **Types of investment appraisal:**
  - Payback Period
  - Accounting Rate of Return (ARR)
  - Internal Rate of Return (IRR)
  - Profitability Index
  - Net Present Value (discounted cash flow)

Investment Appraisal

- **Why do companies invest?**
  - Importance of remembering investment as the purchase of productive capacity NOT buying stocks and shares or investing in a bank!
- Buy equipment/machinery or build new plant to:
  - Increase capacity (amount that can be produced) which means:
    - Demand can be met and this generates sales revenue
    - Increased efficiency and productivity

Investment Appraisal

A fork lift may be an important item but what does it contribute to overall sales? How long and how much work would it have to do to repay its initial cost?

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- Investment therefore assumes that the investment will yield future income streams
- Investment appraisal is all about assessing these income streams against the cost of the investment
- Not a precise science!

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Payback Period

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Payback Method

- **The length of time taken to repay the initial capital cost**
- Requires information on the returns the investment generates
- e.g. A machine costs £600,000
- It produces items that generate a profit of £5 each on a production run of 60,000 units per year
- Payback period will be 2 years

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Payback method

- Payback could occur during a year
- Can take account of this by reducing the cash inflows from the investment to days, weeks or years

$$\text{Payback} = \frac{\text{Days/Weeks/Months x Initial Investment}}{\text{Total Cash Received}}$$

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Payback Method

- e.g.
  - Cost of machine = £600,000
  - Annual income streams from investment = £255,000 per year
- Payback = 36 x 600,000/765,000
  - = 28.23 months
  - (2 yrs, 6¾ months)

	Income
Year 1	255,000
Year 2	255,000
Year 3	255,000

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Accounting Rate of Return

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Accounting Rate of Return

- A comparison of the profit generated by the investment with the cost of the investment

$$\text{ARR} = \frac{\text{Average annual return or annual profit}}{\text{Initial cost of investment}}$$

Accounting Rate of Return

- e.g.
- An investment is expected to yield cash flows of £10,000 annually for the next 5 years
- The initial cost of the investment is £20,000
- Total profit therefore is: £30,000
- Annual profit = £30,000 / 5
  = £6,000

ARR = 6,000/20,000 x 100
= 30%

A worthwhile return?

Investment Appraisal

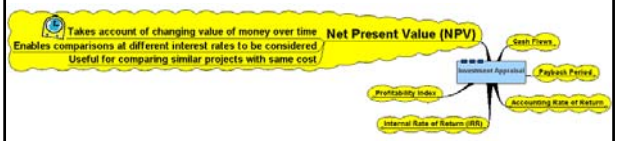
£ now

£ in 5 years time

Which is worth more?

- To make a more informed decision, more sophisticated techniques need to be used.
- Importance of time-value of money

Net Present Value (NPV)



Net Present Value

- Takes into account the fact that money values change with time
- How much would you need to invest today to earn x amount in x years time?
- Value of money is affected by interest rates
- NPV helps to take these factors into consideration
- Shows you what your investment would have earned in an alternative investment regime

Net Present Value

- **e.g.**
- Project A costs £1,000,000
- After 5 years the cash returns = £100,000 (10%)
- If you had invested the £1 million into a bank offering interest at 12% the returns would be greater
- You might be better off re-considering your investment!

Net Present Value

- **The principle:**
- How much would you have to invest now to earn £100 in one year's time if the interest rate was 5%?
- The amount invested would need to be: £95.24
- Allows comparison of an investment by valuing cash payments on the project and cash receipts expected to be earned over the lifetime of the investment at the same point in time, i.e the present.

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Net Present Value

$$PV = \frac{\text{Future Value}}{(1 + i)^n}$$

Where i = interest rate
n = number of years

- The PV of £1 @ 10% in 1 years time is 0.9090
- If you invested 0.9090p today and the interest rate was 10% you would have £1 in a year's time
- Process referred to as:

'Discounting Cash Flow'

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Net Present Value

- Cash flow x discount factor = present value
- e.g. PV of £500 in 10 years time at a rate of interest of 4.25% = 500 x .6595373 = £329.77
- £329.77 is what you would have to invest today at a rate of interest of 4.25% to earn £500 in 10 years time
- PVs can be found through valuation tables (e.g. Parry's Valuation Tables)

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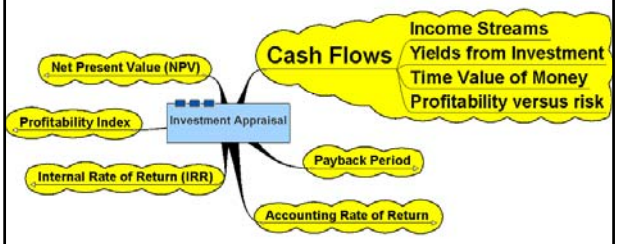
Cash Flows



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Discounted Cash Flow

- **An example:**
- A firm is deciding on investing in an energy efficiency system. Two possible systems are under investigation
- One yields quicker results in terms of energy savings than the other but the second may be more efficient later
- Which should the firm invest in?

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Discounted Cash Flow – System A

Year	Cash Flow (£)	Discount Factor (4.75%)	Present Value (£) (CF x DF)
0	- 600,000	1.00	-600,000
1	+75,000	0.9546539	71,599.04
2	+100,000	0.9113641	91,136.41
3	+150,000	0.8700374	130,505.61
4	+200,000	0.8305846	166,116.92
5	+210,000	0.7929209	166,513.39
6	+150,000	0.7569650	113,544.75
Total	**285,000**		**NPV =139,416**

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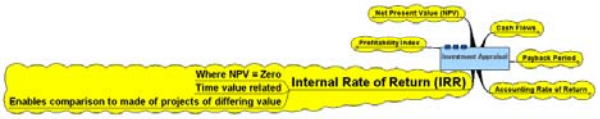
Discounted Cash Flow – System B

Year	Cash Flow (£)	Discount Factor (4.75%)	Present Value (£) (CF x DF)
0	- 600,000	1.00	-600,000
1	+25,000	0.9546539	23,866.35
2	+75,000	0.9113641	68,352.31
3	+85,000	0.8700374	73,953.18
4	+100,000	0.8305846	83,058.46
5	+150,000	0.7929209	118,938.10
6	+450,000	0.7569650	340,634.30
Total	**285,000**		**NPV** =108,802.70

Discounted Cash Flow

- **System A represents the better investment**
- System B yields the same return after six years but the returns of System A occur faster and are worth more to the firm than returns occurring in future years even though those returns are greater

Internal Rate of Return (IRR)



Internal Rate of Return

- Allows the risk associated with an investment project to be assessed
- **The IRR is the rate of interest (or discount rate) that makes the net present value = to zero**
  - Helps measure the worth of an investment
  - Allows the firm to assess whether an investment in the machine, etc. would yield a better return based on internal standards of return
  - Allows comparison of projects with different initial outlays
  - Set the cash flows to different discount rates
  - Software or simple graphing allows the IRR to be found

Profitability Index

Profitability Index

- Allows a comparison of the costs and benefits of different projects to be assessed and thus allow decision making to be carried out

$$\text{Profitability Index} = \frac{\text{Net Present Value}}{\text{Initial Capital Cost}}$$

Investment Appraisal

- **Key considerations for firms in considering use:**
  - Ease of use/degree of simplicity required
  - Degree of accuracy required
  - Extent to which future cash flows can be measured accurately
  - Extent to which future interest rate movements can be factored in and predicted
  - Necessity of factoring in effects of inflation