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# Unit 4 – Investment Appraisal

◆ Investment appraisal is how a business decides if a capital investment project is worthwhile

It involves both

- numerical techniques
- qualitative factors

# Capital investment

- ◆ a firm will have to make a range of capital investment decisions:
  - Premises
  - Fixtures and fittings
  - Computer hardware
  - Company cars
  
- ◆ these decisions may be based upon:
  - The firm's objectives
  - Opportunities it faces
  - The constraints it works within

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# Qualitative issues

- ◆ The objectives of the firm
- ◆ External costs and benefits
- ◆ The current and expected state of the economy
- ◆ Past experience

# Cash Flows

- ◆ To make a financial assessment of a capital investment decision;
  - A firm must estimate the expected cash flows associated with it, set against the expected rates of return.
  - This shows the profit over the lifetime of the investment.
- See example in Marcouse 26.3 page 185.

# Uncertain factors – in making investment predictions

- ◆ The performance of the asset
- ◆ The reaction of competitors
- ◆ The taste of consumers
- ◆ The economy
- ◆ Technological developments

# Quantitative techniques

- ◆ These are techniques used to analyse a potential investment.
- ◆ They are based upon expected cash flows
- ◆ It is usual for several techniques to be used in making a decision.

## Which techniques you need to know:

- ◆ Payback
- ◆ Average Rate of Return
- ◆ Net present value
- ◆ Internal rate of return

# Exam specification

## ◆ **Purpose of investment appraisal**

A critical understanding of qualitative and quantitative factors involved in investment appraisal.

A critical understanding of forecasting cash flow from investments.

## ◆ **Investment appraisal techniques**

The application of the investment appraisal techniques of average rate of return, payback, net present value and internal rate of return. (Calculations will be required.)

A critical understanding of the advantages and limitations of each technique. A critical understanding and application of the techniques of forecasting cash flows and the problem of investment decision-making against a background of risk and uncertainty.

## ◆ **Uses and limitations of investment appraisal methods**

A critical understanding of their uses and limitations in business decision-making.



# Payback

- ◆ This refers to the amount of time it takes an investment to repay the initial outlay

# Payback example

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Year	Net Cash Flow	Cumulative Cash Flow
0	(£100 000)	(£100 000)
1	+ £30 000	(£70 000)
2	+ £40 000	(£30 000)
3	+ £60 000	+£30 000
4	+ £35 000	+£65 000

With an initial investment of £100 000, when to the nearest month would the payback period be?

# Payback

- ◆ In some examples it may be hard to calculate the exact payback month
- ◆ It can be calculated by:

$$\text{Month of payback} = \frac{\text{income required}}{\text{contribution per month}}$$

# Payback

◆ Using the previous example; the income needed in the third year was £30 000. The total income, or contribution for year 3 was £60 000. Therefore, the monthly contribution is  $£60\ 000 / 12 = £5\ 000$ .

◆ Using the formula:

$$\frac{30\ 000}{5\ 000} = 6 \text{ months}$$

# Advantages and Disadvantages of Payback

Advantages	Disadvantages
<ul style="list-style-type: none"><li>◆ Easy to calculate – simple to use</li></ul>	<ul style="list-style-type: none"><li>◆ Doesn't consider the overall profitability of the project, as it ignores cash flows after the payback period</li></ul>
<ul style="list-style-type: none"><li>◆ Gives some indication of level of risk involved (the longer the payback period the longer the money is at risk)</li></ul>	<ul style="list-style-type: none"><li>◆ May encourage a short termist attitude</li></ul>
<ul style="list-style-type: none"><li>◆ useful in times of rapidly changing technology – need to recover the costs of investment before a new machine is designed</li></ul>	<ul style="list-style-type: none"><li>◆ Ignores what happens after the payback period</li></ul>
<ul style="list-style-type: none"><li>◆ Takes into account the timing of cash flows</li></ul>	

## Average Rate of Return (ARR)

- ◆ This method compares the average annual profit generated by an investment with the amount of money invested in it.
- ◆ It measures the net return each year as a % of the initial cost of investment
- ◆ This allows 2 or more potential projects to be compared for the better rate of return.

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## Average Rate of Return %

- ◆ Calculated by:
  - ◆ 
$$\frac{\text{Average annual return (profit)}}{\text{initial outlay}} \times 100 = \text{ARR \%}$$

# ARR for 3 projects:

	Project X	Project Y	Project Z
Cost	50 000	40 000	90 000
Return: Yr 1	10 000	10 000	20 000
Yr 2	10 000	10 000	20 000
Yr 3	15 000	10 000	30 000
Yr 4	15 000	15 000	30 000
Yr 5	20 000	15 000	30 000
Total	70 000	60 000	130 000
Total net profit (return – cost)	20 000	20 000	40 000
Net profit p.a (profit / 5)	4 000	4 000	8 000
ARR	8%	10	9.1



# Advantages and Disadvantages of Average Rate of Return (ARR)

Advantages	Disadvantages
<ul style="list-style-type: none"><li>◆ Focuses upon profitability</li></ul>	<ul style="list-style-type: none"><li>◆ Because later years are included, the results will not prove as accurate as payback</li></ul>
<ul style="list-style-type: none"><li>◆ Easy to compare % returns on different investments, to help make a decision.</li></ul>	<ul style="list-style-type: none"><li>◆ It ignores time value of the money invested</li></ul>
<ul style="list-style-type: none"><li>◆ Easier to identify the opportunity cost of investment</li></ul>	<ul style="list-style-type: none"><li>◆ Some allowance must be made for the time span over which the income from an investment project is received.</li></ul>

# Net Present Value

- ◆ This method calculates the present values of all the money coming in from the project in the future. Then sets these against the money being spent on the project.
- ◆ The result is the net present value of the project.

# Net Present Value

- ◆ Projects can be compared with other projects to find out which has the highest return and therefore should be chosen.

# Net Present Value

- ◆ If a project has a negative net present value – what would this mean?

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# Net Present Value

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◆ Would you accept this investment?

If you buy a piece of machinery today which costs £100,000 knowing it will return £30,000 in year 1. £40,000 in year 2, £50,000 in Year 3.

# Net Present Value

- ◆ Interest rates are 10%
- ◆ So to work out a more realistic return figure you should bear these in mind.
- ◆ How can we work out what your return really is?

# Net Present Value

Year	Cash Flow	D Factor	Present Value
0		1.00	
1		0.91	
2		0.83	
3		0.75	

# Net Present Value

- ◆ When you add the present values from years 1-3 What is the actual return from your investment of £100,000?
- ◆ Would this be a worthwhile investment?



# How to calculate the Discount Factors

◆ Present Value =  $\frac{A}{(1+r)^n}$

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- ◆ A = amount of money (investment)
- ◆ r = rate of interest
- ◆ n = number of years

# Net Present Value

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- ◆ How would you work out how much £100 would be worth in three years with an interest rate of 10%?

# Advantages and Disadvantages of Net Present Value

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Advantages	Disadvantages
Takes opportunity cost of money into account	Complex to calculate and communicate
A single measure which takes the amount and timing of cash flows into account	Meaning of the result is often misunderstood
Can consider different scenarios	Only comparable between projects if the initial investment is the same

# Internal Rate of Return (IRR)

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- ◆ Can compare project with different initial values.
- ◆ Involves the calculation of the Net Present Value
- ◆ To decide on the IRR a firm must find the rate of return( $x$ ) where the NPV is zero.

# Internal Rate of Return (IRR)

- ◆ The IRR is then compared with the market rate of interest to determine whether the investment should take place

# Internal Rate of Return (IRR)

- ◆ Trial and error is used
- ◆ This means choosing discount rate, calculating the NPV and seeing whether it equals zero
- ◆ See Rafto p441 - table 64.10 for example.

# Factors which influence investment decisions

- ◆ Human relations
- ◆ Ethical considerations
- ◆ Corporate strategy
- ◆ Availability of funding
- ◆ Current cash flow

# Investment Appraisal

## Issues for analysis

- ◆ Making decisions based on uncertain factors e.g. predicting cash flow or future levels of interest rates
- ◆ Balancing risks against potential rewards
- ◆ Questioning the reliability of data
- ◆ Basing decisions on a mixture of quantitative and qualitative data



# Investment Appraisal

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## Issues for evaluation

- ◆ Investment appraisal methods can give conflicting advice to managers
- ◆ Must consider objectives and size of the firm
- ◆ Managers often rely on past experience
- ◆ Due to accountability projected figures will be relied upon heavily by managers
- ◆ Concern for the environment and other social responsibilities now play a greater role in a firm's considerations of potential investments