

# *Edexcel*

## *A Level*

### *Accounts*

*CODE: (4AC1)*

*Unit 02 - Section 06*

*Project appraisal*



## Chapter 08 – Project appraisal

### INTRODUCTION

Companies need to grow to satisfy increasing demand for their products. This means that they need new property, new machinery and other non-current assets. Non-current assets will lose their effectiveness for a number of reasons, and when this happens they will need to be replaced.

One of the most important aspects of the initial assessment is to decide what, and when, to buy. For any new idea, we need to:

- fund the original capital costs
- ensure a positive contribution towards any additional fixed costs
- be certain that any interest due on borrowed money can be met
- determine the profit remaining.

### PROJECT APPRAISAL

Project appraisal describes how decisions are made regarding when and how to spend money on capital projects. More importantly, it asks whether or not a project should be taken on. The benefits are compared with the costs. If the return is not reasonable then investors will stay away from that company in the future. Whichever appraisal method is used, the yearly cash flows must be estimated for the project being considered.

### METHODS OF CALCULATION

There are two main groups of method. They are:

- non-discounted methods
- discounted methods.

The most important distinction between the various methods is whether they take account of the fact that money now is worth more than money received in the future. Discounted methods take this fact into account, whereas non-discounted methods do not. Although non-discounted cash flow methods are easier to calculate manually, even the most complicated discounted cash flow calculations can be performed relatively easily on a computer spreadsheet.

### NON-DISCOUNTED METHODS

There are two non-discounted methods of investment appraisal:

- payback period
- average rate of return

#### Payback period method

The payback period is the length of time taken for the project to recover the initial cost of the investment.

In this method, the positive cash flows are deducted from the initial cost of the project. We are then able to calculate, from the net cash inflow, how long it takes to pay back the full cost of the project. By using this method, which emphasises liquidity, calculations are both quick and easy.

### Advantages of the payback method

- Simple calculation and easy to understand, so highly favoured by managers and non-accountants.
- Considers the cash inflows and outflows and so reflects liquidity.
- Recognises that cash received earlier in the project is
- probably preferable to cash received later.
- Indicates the project that is at risk for the shortest amount of time.

### Disadvantages of the payback method

- Does not measure total profitability over the life of the investment but merely tells how long it will take to recover the initial investment.
- Does not consider the time value of money - see discounted methods.
- Does not recognise the net cash inflows after the payback period.
- Life of the non-current asset not considered in the calculation.

### Average rate of return method

The average rate of return (ARR) is the profit as a percentage of the cost of the investment over the life of the investment.

The ARR method takes the average profit that the investment will generate and expresses it as a percentage of the average investment in the project. For a positive decision to invest, a firm must achieve a predetermined minimum ARR. When a choice of projects is being considered, the project with the higher ARR would be chosen.

$$\text{Average rate of return \%} = \frac{\text{average annual profit}}{\text{average investment}} \times 100$$

Where:

$$\begin{aligned} \text{Average annual profit} &= \frac{\text{total profit}}{\text{number of years}} \\ \text{Average investment} &= \frac{\text{opening value of investment} + \text{closing value of investment}}{2} \end{aligned}$$

An alternative method of calculating the ARR is to use the value of the initial investment rather than the average investment when there is insufficient information given to calculate the average investment. Therefore:

$$\text{Average rate of return \%} = \frac{\text{average annual profit}}{\text{initial investment}} \times 100$$

One important thing to note is that profit, rather than cash flow, is used in these calculations.

#### Advantages of the average rate of return method

- Simple calculation and easy to understand, so highly favoured by managers and non-accountants.
- Focus on profit, often a company's primary objective.
- Accounts for all revenues and costs of a capital project.

#### Disadvantages of the average rate of return method

- Does not consider the time value of money.
- Does not consider the timing of the cash flows, which might be important if the company has liquidity problems.
- Does not show how long the project takes to recover the initial outlay.
- Does not consider the duration of the project. Profit figures are only estimates.

#### DISCOUNTED METHODS

There are two discounted methods of investment appraisal:

- net present value
- internal rate of return

#### Net present value

Net present value (NPV) is found by calculating the discounted value of an investment's cash inflows less the discounted cash outflows of the investment. The following information is needed to calculate NPV:

- initial cost
- cost of capital
- annual cash flows
- expected life of the project and amount of any residual value.

The NPV method applies the time value of money to cash flows. It recognises that the value of £1 received in the future will be less than the value of £1 now. The value of money tends to fall over time with the effects of inflation. The spending power of £1 now is greater than the spending power of £1 a company might receive in five years. Investment projects are the exchange of money at today's values in exchange for future cash inflows.

From here we can deduce that the present value of £105 received after one year, at 5 per cent interest, is £100 and that the present value of £100, at 5 per cent, would be £95.24, a discount factor of 0.952.

With each year that passes, the spending power of today's £100 decreases by a further 5 per cent. A discount table to show the reduction is given below.

Year	5% Discount factor
1	0.952
2	0.907
3	0.864
4	0.823
5	0.784

▲ Table 8.1 Present values at 5 per cent

### Advantages of net present value

- Considers the time value of money, recognising that £1 received in the future has less value than £1 at the present time.
- All cash flows used in the calculation of NPV.
- Considers the timings of the cash inflows and outflows with greater importance being placed on early net cash flows.

### Disadvantages of net present value

- Cost of capital used to determine the NPV values may be difficult to set.
- Estimates of cash flow may be wrong - this applies to all methods, especially in later years.
- Cost of capital may change over the life of the project.

### Internal rate of return (IRR)

While the NPV method of investment appraisal considers the discounted future cash flows, it does not give directors of companies the expected rate of return on an investment. The investment must cover the cost of the capital employed by a business - if it does not, the project will not return a profit for the company.

The aim of this method is to determine the rate of interest that will give a net present value of zero for a project.

The method for calculating the IRR is:

1 Calculate two discount rates - one that provides a positive net present value and one that gives a negative net present value.

2 Apply the results of the calculations to the following formula:

$$\text{IRR} = \text{lower discount rate} + \frac{\text{(difference between the rates} \times \text{NPV of lower rate)}}{\text{difference between the NPVs}}$$

### Advantages of internal rate of return

- Considers the time value of money.
- Provides the business with the exact discounted cash flow rate of return that the project is expected to make, allowing comparisons.

### Disadvantages of internal rate of return

- Complicated to use and will not be easily understood by non-accountants.
- Time-consuming, as choosing the discount rates for the cost of capital is a matter of guesswork.

### ANALYSIS OF DISCOUNTED METHODS

So far this chapter has discussed four methods. To illustrate further, this section will now look at three different projects and apply each method to each project.

Year	Project A	Project B	Project C
	£	£	£
0	(200 000)	(200 000)	(200 000)
1	20 000	80 000	60 000
2	40 000	60 000	60 000
3	50 000	60 000	60 000
4	60 000	40 000	60 000
5	60 000		40 000
6	68 000		20 000
<b>Total profit</b>	<b>108 000</b>	<b>40 000</b>	<b>100 000</b>
<b>Payback period</b>	4 years 6 months	3 years	3 years 4 months
<b>ARR</b>	18%	10%	16.7%
<b>NPV at 12%</b>	(£884)	(£12 580)	£15 100
<b>IRR</b>	12%	8.5%	15%

## WEIGHTED AVERAGE COST OF CAPITAL

The **weighted average** cost of capital is based on the capital structure of the company. It includes the equity finance (ordinary share capital and preference shares) and the debt finance (debentures and bank loans).

The formula for the weighted average cost of capital (WACC) is:

$$\text{WACC} = \frac{\text{cost of interest and returns}}{\text{total cost of project}} \times 100$$

## PROFITABILITY INDEX

The profitability index is a measure of the acceptability of a capital project. It compares the initial investment of a project with the present value of the future cash flows (NPV). The formula for calculating this is:

$$\text{Profitability index \% (PI\%)} = \frac{\text{net present value}}{\text{initial investment}} \times 100$$

### SUBJECT VOCABULARY

**average rate of return (Accounting rate of return, ARR)** the percentage return expected from a capital investment project compared to the initial investment

**cost of capital** the return from a capital project required to make a project worthwhile

**discount factor** a number (factor) that, when multiplied by a future cash flow, gives its present value

**internal rate of return (IRR)** the discount rate that results in a net present value of zero

**net cash flow** the difference between the cash inflows and the cash outflows

**net present value (NPV)** a method of capital investment appraisal that considers the time value of money

**payback period** the length of time a capital project takes to return the initial cost of the investment

**profitability index** a measure of the acceptability of a capital project. It compares the initial investment of a project with the present value of the future cash flows (NPV)

**project appraisal** the evaluation of investment projects

**time value of money** the concept that money received in the future does not have the same value as the same amount paid today

**weighted average cost of capital (WACC)** the average amount a company pays for its capital from all funding sources