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## IB Business Management HL

YOUR NOTES

### 3.8 Investment Appraisal

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#### Simple Payback Period

#### Introduction to Investment Appraisal

- Investment appraisal involves comparing the expected future cash flows of an investment with the initial expenditure on that investment
- A business may want to analyse
  - How soon the investment will recoup the initial outlay
  - How profitable the investment will be
- Before an investment can be appraised key data will need to be collected, including
  - Sales forecasts
  - Fixed and variable costs data
  - Pricing information
  - Borrowing costs
- The collection and analysis of this data is likely to take some time
  - It requires **significant experience** to interpret the data appropriately **before the investment appraisal can take place**
- Three methods used to appraise the value of an investment, include:
  - The simple payback period
  - The average rate of return (ARR)
  - The net present value (NPR)

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### Worked Example 2. Payback calculation for varying cash flow over time

Hammer and Son provides a household repairs service that has recently employed a new handywoman who requires her own van. The new van will be purchased for \$32,000

The net cash flows are expected to vary over the five years following its purchase and are shown in the table below.

Year	Net cash Flow (\$)	Cumulative Cash Flow (\$)
0	(32,000)	(32,000)
1	14,000	(18,000)
2	10,000	(8,000)
3	6,000	(2,000)
4	3,000	1,000
5	2,000	3,000

Calculate the payback period for the van. [4]

#### Step 1 - Identify the final year where the cumulative cash flow is negative

In this case the cumulative cash flow figure is -\$2,000 at the end of Year 3

This is the remaining amount (outlay) outstanding. [1 mark]

#### Step 2 - Calculate the monthly net cash flow for the next year (year 4)

\$3,000 ÷ 12 (months) = \$250 [1 mark]

#### Step 3 - Divide the remaining amount outstanding by the monthly net cash flow

\$2000 ÷ \$250 = 8 months [1 mark]

#### Step 4 - Identify the payback period

In this case the Payback period is 3 years and 8 months [1 mark]

Advantages & Disadvantages of Using the Payback Method

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Advantages	Disadvantages	YOUR NOTES ↓
<ul> <li>It is a simple method to calculate and understand</li> </ul>	<ul> <li>It provides no insight into the profitability of investments</li> </ul>	
<ul> <li>It is particularly useful for businesses where the cash flow management is vital</li> </ul>	<ul> <li>Payback only considers the total length of time to recover an investment</li> </ul>	
<ul> <li>Businesses can identify the point at which an investment is paid back and contributing positively to cash flow</li> </ul>	<ul> <li>Neither the timing nor the future value of cash inflows is considered</li> </ul>	
<ul> <li>It is also useful where <b>new technology</b> is introduced regularly</li> </ul>	<ul> <li>This method may encourage a short- termism approach</li> </ul>	
• Businesses purchasing equipment can calculate whether an investment 'pays back' <b>before an upgrade is available</b>	<ul> <li>Potentially lucrative investments may be dismissed as they take longer to pay back than alternatives</li> </ul>	

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#### Average Rate of Return (ARR)



• The average rate of return is calculated using the formula and is **expressed as a** percentage which makes it easy to compare different investment options

> (total returns – capital cost)  $\div$  years of use Х capital cost

100

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#### Worked Example

Creative Frames, a small artwork framing business based in Bermuda, is considering an investment of \$40,000 in new machinery. Megan, the business owner, believes that total returns over a 6-year period will be \$76,000

Calculate the Average Rate of Return of the proposed investment. [4 marks]

#### Step 1 - Deduct the capital cost from the total returns

\$76,000 - \$40,000 = \$36,000 [1mark]

#### Step 2 - Divide the outcome by the number of years of use

 $36,000 \div 6 \text{ years} = 6,000 \text{ [1 mark]}$ 

#### Step 3 - Substitute the values into the formula

$$= \frac{6,000}{40,000} \times 100$$
 [1 mark]  
= 0.15

Step 4 - Multiply the outcome by 100 to find the percentage 0.15 x 100 = 15% [1 mark]







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• ARR considers <b>all of the net cash flows</b> generated by an investment over time	• As it depends on an average of cash flows it ignores the timing of those cash flows	YOUR NOTES
• ARR is easy to understand and compare the percentage returns with each other	• The opportunity cost of the investment is ignored as values are nether expressed in real terms nor adjustments made for the impact of interest rates and time	

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#### Net Present Value (NPR)

#### Using the Net Present Value (NPV)

- The Net Present Value (NPV) takes into account the effects of interest rates and time
- It recognises
  - The fact that that **money received in the future is often worth less** than money received today (inflation)
  - The **opportunity cost** of not having the money available for other uses
- To calculate the Net Present Value of an investment **the value of all future net cash flows in today's terms** need to be calculated first and then **discounted using a table**
- The cost of the initial investment is deducted from the total of the discounted net cash flows
  - If future net cash flows minus the initial investment is **positive**, then the investment is **likely to be worthwhile**
  - If the sum of future net cash flows minus the initial investment is **negative**, then the investment is **unlikely to be worthwhile**
- Discounted cash flows are calculated using **discount tables** which allow future cash flows to be expressed in today's terms

#### A table illustrating discount factors at different rates of interest

Interest Rate										
Year	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0·917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.202	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.200	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386

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#### Worked Example

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Brownsea Sightseeing Tours Ltd is considering purchasing a new pleasure craft at a cost of  $\pm 325,000$ . It expects the investment to achieve the following net cash flows over five years of operation

Year	Net cash Flow (£)	10% Discount Factor (2dp)
0	(325,000)	1.00
1	110,000	0.91
2	90,000	0.83
3	75,000	0.75
4	65,000	0.68
5	60,000	0.62

Using the 10% discount factor calculate the NPV of the leisure craft investment. (4 marks)

## Step 1 – Calculate the discounted cash flow for each year by multiplying the net cash flow by the discount factor

Year	Net cash Flow	10% Discount Factor	Discounter cash flow	
0	(£325000)	1.00	(£325000)	
1	£110 000	0.91	£100 100	£110 000 × 0.91
2	£90 000	0.83	£74 700	£90 000 × 0.83
3	£75 000	0.75	£56 250	£75000×0.75
4	£65 000	0.68	£44 200	£65000×0.68
5	£60 000	0.62	£37 200	£60 000 × 0.62

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(2)

Step 2: Add together the discounted cash flow values for each year, including Year 0

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 $(\pounds 325,000) + \pounds 100,100 + \pounds 74,400 \pounds 56,250 + \pounds 44,200 + \pounds 37,200$ 

$$= (\pounds 12,550)$$

(1)

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The Net present Value of the investment is -£12,550

This **negative outcome** suggests that the investment in the new pleasure craft is **not financially worthwhile** 

(1)

#### Advantages and Disadvantages of the Net Present Value Method

Advantages	Disadvantages
<ul> <li>Considers the opportunity cost of money</li> <li>Discount tables are used to calculate forecast future values of net cashflows</li> <li>Businesses may choose different discount tables (20%, 10%, 5% etc) to adjust the level of risk involved in a project <ul> <li>Can consider a range of scenarios</li> </ul> </li> </ul>	<ul> <li>More complicated to calculate and interpret than other methods</li> <li>Accurately forecasting future cash flows is complex</li> <li>Choosing an appropriate discount rate can be 'hit and miss'</li> <li>Ignores non-financial benefits or costs e.g environmental damage</li> </ul>



#### Exam Tip

Being able to calculate the payback period, ARR or NPV of an investment is a key quantitative skill

More important, though, is interpreting the outcome of your calculation and using it to make a judgement

- Is an investment worthwhile?
- Which investment is the most profitable?
- The costs of which investment will be recouped first?

Qualitative factors should be considered alongside calculations - review case study material carefully to select relevant information

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#### Limitations of using Investment Appraisal

- Each techniques relies upon forecasted future cash flows which may lack accuracy
  - Managers may lack experience or may be biased towards a particular investment
  - Incomplete past data may make forecasting imprecise or mean that confidence in the data is limited
- Longer-term forecasts used to predict returns on investments may be inaccurate for a variety of reasons
  - Unexpected increases in **costs**
  - The arrival of **new competitors**
  - Changes in consumer tastes
  - Uncertainties arising as a result of economic growth or recession
- Non-financial factors are ignored
  - Business finances and availability of external finance to fund the investment
  - Overall corporate objectives
  - Potential for positive public relations or meeting social responsibilities

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