DP IB Business Management: HL

Your notes

3.8 Investment Appraisal

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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**
- Two methods **used to appraise the value of an investment**, include:
  - The simple payback period
  - The average rate of return (ARR)

Simple Payback Period

- The payback period is a calculation of the **amount of time** it is expected an investment will **take to pay for itself**
- Where **net cash flows** are expected to be **constant over time,** the payback period can be calculated using the formula

$$\frac{\text{Initial Outlay}}{\text{Net Cash Flow per Period}} = \text{Years / Months}$$

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Worked Example

1. Simple Payback Calculation

Gomez Carpets is considering an investment in a new storage facility at a cost of $200,000. It expects additional net cash flow of $30,000 per year as a result of the investment.

Calculate the Payback period for the investment. [3]

Answer:

Step 1 – Substitute the values into the formula

$$\frac{\$\,200,000}{\$\,30,000} = 6.67 \text{ years}$$ **[1 mark]**

Step 2 – Convert the outcome to years and months

6 years

0.67 years = 8.04 months **[1 mark]**

Payback period = 6 years and 8 months **[3 marks for the correct answer]**

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]

Answer:

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]**

Evaluation of the Payback Method

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

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Average Rate of Return (ARR)

- The Average Rate of Return compares the average **profit** per year generated by an investment with the value of the **initial capital cost**
- The average rate of return is calculated using the formula and is **expressed as a percentage**
  - This makes it easy to **compare different investment options**

$$\frac{(\text{total returns} - \text{capital cost}) \div \text{years of use}}{\text{capital cost}} \times 100$$

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]

Answer:

Step 1 - Deduct the capital cost from the total returns

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

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

$36,000 ÷ 6 years = $6,000 **[1 mark]**

Step 3 - Substitute the values into the formula

$$= \frac{6{,}000}{40{,}000} \text{ x } 100$$

[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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Evaluation of Average Rate of Return (ARR)

Advantages	Disadvantages
▪ ARR considers **all of the net cash flows** generated by an investment over time ▪ ARR is easy to understand and compare the percentage returns with each other	▪ As it depends on an average of cash flows **it ignores the timing of those cash flows** ▪ The **opportunity cost** of the investment is ignored as values are neither expressed in **real terms** nor adjusted for the impact of interest rates and time

Limitations of using Investment Appraisal

- Each of the investment appraisal techniques **relies upon forecasted future cash flows** which may **lack accuracy**
  - Managers compiling cash flow forecasts 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 used to compile the forecast is limited
- **Longer-term forecasts** used to predict **returns on investments** are particularly **prone to inaccuracy** 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**
- Factors other than the cost of investment and the return on investment are not considered
  - Business finances and availability of external finance to fund the investment
  - The overall **corporate objectives**
  - Potential for positive **public relations** or meeting **social responsibilities**

Net Present Value (NPR)

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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 are **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

Table: discount factors at different rates of interest

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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	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	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

Worked Example

Brownsea Sightseeing Tours Ltd is considering purchasing a new pleasure craft at a cost of £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)

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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	(£325 000)	1.00	(£325 000)	
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	£75 000 × 0.75
4	£65 000	0.68	£44 200	£65 000 × 0.68
5	£60 000	0.62	£37 200	£60 000 × 0.62

(2)

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

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

$$= (£\,12,550)$$

(1)

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

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


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Examiner Tips and Tricks

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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