A firm is faced with the choice of buying a large machine or a small one. The return or pay off will vary depending on the choice of machine and the state of demand in the economy.

<table>
<thead>
<tr>
<th>State of Demand</th>
<th>Probability</th>
<th>Pay off from small machine</th>
<th>Pay off from large machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>0.2</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>Medium</td>
<td>0.6</td>
<td>36</td>
<td>24</td>
</tr>
<tr>
<td>Low</td>
<td>0.2</td>
<td>16</td>
<td>-10</td>
</tr>
</tbody>
</table>

Expected return

- **Small Machine**
  - Expected return £32800
  - (High) 0.2 £40,000
  - (Med) 0.6 £36,000
  - (Low) 0.2 £16,000

- **Large Machine**
  - Expected return £28400
  - (High) 0.2 £80,000
  - (Med) 0.6 £24,000
  - (Low) 0.2 (£10,000)

Profit from small machine

\[
\text{Profit from small machine} \equiv (40,000)(0.2) + 36,000(0.6) + 16,000(0.2) \\
= 8000 + 21600 + 3200 \\
= 32800
\]

Profit from large machine

\[
\text{Profit from large machine} \equiv 80,000(0.2) + 24,000(0.6) + (-10,000)(0.2) \\
= 16,000 + 14,400 - 2000 \\
= 28400
\]

Hence small – large (32800 – 28400) = 4400
So small machine should be bought.

**DECISION TREES**

Exercise Bruce Jewells

Q.1. \[800 \times 6000 \times 0.1 = 480000\]
810 \times 6000 \times 0.4 = 1944000
820 \times 6000 \times 0.3 = 1476000
830 \times 6000 \times 0.2 = 996000
\text{Total annual sales} = 48496000

Q.2.
1100 \times 5000 \times 0.2 = 1100000
1110 \times 5000 \times 0.3 = 1665000
1120 \times 5000 \times 0.4 = 2240000
1130 \times 5000 \times 0.1 = 565000
\text{Total annual sales} = 5570000

Q.3.
<table>
<thead>
<tr>
<th>£ (000)</th>
<th>£ (000)</th>
<th>£ (000)</th>
<th>£ (000)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option A</strong></td>
<td><strong>Option B</strong></td>
<td><strong>Option C</strong></td>
<td><strong>Option D</strong></td>
</tr>
<tr>
<td>0.4 \times 50 = 20</td>
<td>0.3 \times (-30) = -9</td>
<td>0.4 \times 30 = 12</td>
<td>0.3 \times 50 = 15</td>
</tr>
<tr>
<td>0.6 \times 80 = 48</td>
<td>0.5 \times (50) = 25</td>
<td>0.5 \times 60 = 30</td>
<td>0.3 \times 60 = 18</td>
</tr>
<tr>
<td>0.2 \times 80 = 16</td>
<td>0.2 \times 80 = 16</td>
<td>0.1 \times 100 = 10</td>
<td>0.4 \times 90 = 36</td>
</tr>
</tbody>
</table>

\sum_{\text{Option A}} 68 \quad \sum_{\text{Option B}} 32 \quad \sum_{\text{Option C}} 52 \quad \sum_{\text{Option D}} 69

Option D should be accepted because it has the highest expected return.

Q.4. Large investment (£000) Small investment (£(000))

\[
\begin{align*}
500 \times 0.4 &= 200 \\
50 \times 0.6 &= 30 \\
\frac{230}{(400)} &= \text{less cost} \\
250 \times 0.3 &= 75 \\
50 \times 0.7 &= 35 \\
\frac{110}{(50)} &= \text{less cost} \\
\end{align*}
\]

\[
\begin{align*}
\text{less cost} \quad \frac{170}{(60)} \\
\end{align*}
\]

The owner should take the smaller scale investment because
Test Market
600 000 (0.25) = £ 150 000
200 000 (0.50) = £ 100 000
(-100 000) (0.25) = £ (250 000)
£ 225 000

50 000 (0.3) = £ 15 000
22 5000 (0.7) = £ 157 500
£ 172 500

The firm should test market its new product because the expected value of its outcome is higher than that of abandoning it by £ 22 500.
1. **LIQUIDITY RATIOS**
   
   (i) **current ratio** = \( \frac{\text{current assets}}{\text{current liabilities}} \) 
   
   \( (1.5 - 2) \)
   
   (ii) **Acid test or Quick ratio** = \( \frac{\text{current assets} - \text{stock}}{\text{current liabilities}} \) 
   
   \( (1 - 1.5) \)

2. **PROFITABILITY RATIOS**

   (i) **Gross Profit margin** = \( \frac{\text{gross profit}}{\text{sales}} \times 100 \)

   (ii) **Net Profit Margin** = \( \frac{\text{net profit}}{\text{sales}} \times 100 \)

   (iii) **Return on capital employed** = \( \frac{\text{net profit}}{\text{capital employed}} \times 100 \)

   (iv) **Mark – up** = \( \frac{\text{Gross Profit}}{\text{cost of goods soled}} \times 100 \)

**NOTE:**

We can compare ratios in two ways: one is to compare trend analysis one firm’s ratio over the years → intra – firm analysis. The other is to compare one firm’s ratio with that of other firms in the industry → inter firm analysis.

3. **EFFICIENCY / ACTIVITY RATIOS**

   (i) **Stock turnover** = \( \frac{\text{Cost of Goods Sold}}{\text{Average Stock}} \)

   (ii) **Debtors days ratio** = \( \frac{\text{Debtors}}{\text{Audit Sales}} \times 365 \text{ days} \)

   or Total Debtors

   Collection Period

   (iii) **Creditor’s days ratio** = \( \frac{\text{Creditors}}{\text{Credit Purchases}} \times 365 \text{ days} \)

   or Total Creditors

   Payment Period
4. **GEARING RATIOS**

(i) Gearing ratio = \( \frac{\text{long-term loan}}{\text{total capital employed}} \times 100 \)

should not be more than 50%

Gearing ratio = \( \frac{\text{long-term loans}}{\text{share capital}} \times 100 \)

should not be more than 100%

NOTE: High GR may mean that management has guts enough to take the risk of expanding.

Gearing ratio = \( \frac{\text{long-term debt}}{\text{total capital}} \times 100 \)

(for sole traders)

Interest cover ratio = \( \frac{\text{operating profit}}{\text{interest paid}} \)

how many times you are able to pay the interest from the operating profit.

5. **INVESTORS/EQUITY RATIOS**

(i) Dividend yield ratio = \( \frac{\text{minimal value per share} \times \text{dividend rate}}{\text{Market price per share}} \times 100 \)

OR

\[ \text{Dividend yield ratio} = \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100 \]

(ii) Dividend cover ratio = \( \frac{\text{profit after tax & interest}}{\text{paid and proposed dividends}} \)

• value in times
• how many times dividends can be paid from profits

(iii) Earnings per share = \( \frac{\text{Net profit available for distribution}}{\text{Number of ordinary shares}} \)

• EPS ↑ investors should invest

(iv) Price earning ratio = \( \frac{\text{Market price per share}}{\text{Earnings per share}} \)

(P/E ratio)

• PE ↑ also attracts investors
Q.5. The following figures relate to two similar businesses.

<table>
<thead>
<tr>
<th></th>
<th>Business A</th>
<th>Business B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average stock carried at S.P.</td>
<td>£40000</td>
<td>£50000</td>
</tr>
<tr>
<td>Rate of stock turnover</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>GP as a % of sales revenue</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>NP as a % of sales revenue</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Capital Employed</td>
<td>£400000</td>
<td>£150000</td>
</tr>
</tbody>
</table>

(a) For each business calculate:
(i) Sales revenue
(ii) Net Profit
(iii) Return on Capital Employed
(iv) Total expenses as a % of sales

(b) Comment on the expenses involved in running the two business.

(c) Assuming that 10% is the general level of interest rates, what can be concluded about the profitability of the two businesses.

**Ans.**

\[
\text{Rate of stock turn} = \frac{\text{cost of sales}}{\text{average stock}}
\]

\[
\text{COS} = 40000 \times 12 = £480000
\]
\[
\text{COS} = 80\% \text{ of sale revenue}
\]
\[
\text{Sales revenue} = \frac{100}{80} \times 480000
\]
\[
\text{BUSINESS A} = £600000
\]

**BUSINESS B**
\[
\text{COS} = 50000 \times 6 = £300000
\]
\[
\text{COS} = 90\% \text{ of Sales Revenue}
\]
\[
\text{Sales Revenue} = \frac{100}{90} \times 300000
\]
\[
= £333333
\]

(ii) **NET PROFIT**

**BUSINESS A**
NPM = \frac{NP}{SR} \\
5 \times \frac{NP}{100} = 600000 \\
NP = \£30000

BUSINESS B \\
5 \times \frac{NP}{100} = 333333 \\
NP = \£16667

(iii) RETURN ON CAPITAL EMPLOYED
BUSINESS A
ROCE = \frac{NP}{C\ Employee} \times 100 \\
= \frac{30000}{400000} \times 100 = 7.5\%

BUSINESS B
ROCE = \frac{16667}{150000} \times 199 = 11.1\%

(iv) TOTAL EXPENSES AS A % OF SALES
BUSINESS A
Exp as % of sales = \frac{GP - NP}{Sales\ R} \times 100 \\
= \frac{120000 - 30000}{600000} \times 100 \\
= 15\%

BUSINESS B
Exp as % of sales = \frac{33333 - 16667}{33333} \times 100 \\
= 5\%

(b) The operating expenses of Business A are proportionately greater than that of Business B. This means that despite a higher Gross Profit margin of 20% of ‘A’ as compared to 10% of ‘B’. Business A has a Net Profit margin equal to that of B. This may be because of higher salaries higher electric or power costs or several other costs. Unable to control expenses so net return will go down.

(c) If 10% is the general interest level, then only the profitability of Business B is satisfactory. Business A gives a return on capital employed (capital invested in the business) of just 7.5%. This means that the owner would be better off if they
had left their capital in the bank to earn interest. However ROCE of Business B is 11.1% which is higher than 10% so they have a better position in doing business rather than leaving their capital idle in bank. The owners run a business to get profit higher than the rate of interest which in this case is 10%.

Q.4.
(a) INTEREST PAYMENTS
   X LTD
   Int = £ 0

   Y LTD
   Int = 20 m × 12%
   = £ 2.4 m

   Z LTD
   Int = 50 m × 12%
   = £ 6 m

(b) TAX LIABILITY
   X LTD
   Tax = 10 m × 30%
   = £ 3.3 m

   Y LTD
   Tax = (10m – 2.4m) × 33%
   = £ 2.508 m

   Z LTD
   Tax = (10m – 6m) × 33%
   = £ 1.32 m

(c) EARNING AVAILABLE FOR DIVIDEND PAYMENTS
   BUSINESS X LTD
   Earnings = Profit – Tax – Interest
   = £ 10 m - £ 3.3 m
   = £ 6.7 m

   Y LTD
   Earnings = £ 10 m - £ 6 m - £ 1.32
   = £ 2.68 m

(d) Earnings per share
   X LTD
   EPS = \( \frac{\text{Net profit available for distribution}}{\text{No. of ordinary shares}} \)
   = \( \frac{£ 6.7 + 35}{35} \)
Y LTD
EPS = \( \frac{\mathbf{\pounds} 5.092 + 20}{30} \)
= \( \mathbf{\pounds} 0.84 \)

Z LTD
EPS = \( \frac{\mathbf{\pounds} 2.68 + 10}{10} \)
= \( \mathbf{\pounds} 1.27 \)

Q.1
(a) Market price of a share = price earning ratio \times earnings per share
= 14 \times 35 p
= 490 p - \( \mathbf{\pounds} 4.9 \)

(b) Dividend yield = \( \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100 \)
= \( \frac{11 p}{490 p} \times 100 \)
= 2.2%

(c) Profit margin = \( \frac{\text{Operating profit}}{\text{Sales Revenue}} \times 100 \)
= \( \frac{\mathbf{\pounds} 80m}{\mathbf{\pounds} 700m} \times 100 \)
= 11.4%

(d) Interest payable by the firm = \( \frac{\text{operating profit}}{\text{interest cover}} \)
= \( \frac{\mathbf{\pounds} 80m}{3.2} \)
= \( \mathbf{\pounds} 21.08 \text{ m} \)
Q.5. (b) Business A has a gross profit margin of 20% in comparison with the 10% of Business B. It means that Business A has more control over the cost of production. But if we look at the net profit margin the situation turns in an opposite direction. Here we see that Business B is in a far better position as compared to Business A. Then net profit margins are equal which clearly shows that a lot of Business A gross profit goes in paying off its huge expenses. It is evident from its 15% value of the expenses as a %age of sales. Only if Business A would be able to control its expenses it can improve its profitability position. Business Bon the other hand would have to work on its cost of production or to increase its stock turnover rate to improve the next profit.

(c) The profitability of Business A is unsatisfactory because its return on capital employed is just 7.5%. This is below the interest rates of 10% that banks offer on idle investment. Owners run a business to earn a return greater than the curve interest rate. Therefore, Business B has a better profitability situation as its return is 11.1% which is greater than interest rate. This means that owners atleast have the incentive continue running the business. Even though business A is bigger, its profitability is poor. This is mainly because it has been unable to maintain its operating expenses due to which despite a good gross profit margin, the net profit may has fallen equal to that of Business B of 5%. Therefore Business A should control its administrative expenses and

LIMITATIONS OF RATIO ANALYSIS

1. Ratio Analysis doesn’t provide a complete means of assessing a company’s financial problems. When making comparisons we have to take into account any changes in the accounting procedures, in the business activities of the firm, in general business and economic condition (e.g. changes in inflation rates over the years).

2. It is also important that firms in comparison are from the same industry. The financial year and should also be considered.

3. Ratio analysis (Trend analysis) is based on historic information and might not be applied very correctly to the future time periods.

4. Ratio analysis does not include some very important but non – numerical aspects of the business. (e.g. efficient and loyal staff, location of the business and environmental and ethical policies of the business).

5. Different companies can value their assets in many different ways and can use various depreciation methods. This may lead to different capital employed values which will definitely affect certain important ratio results.