Return on Investment (ROI) Explained

Introduction

Long-term investment projects by an organisation may be assessed by calculation of its estimated account rate of return (ARR) and, comparing it with a predetermined target ARR – the target being set by management; reflecting their objectives in terms of a satisfactory return. The ARR is also referred to as Return on Investment (ROI).

The purpose of this paper is to explain ROI.

ROI Definitions

Unfortunately, there are several different definitions of ROI. The most popular is:

\[
ROI = \frac{\text{Estimated average profit}}{\text{Estimated average investment}} \times 100\%
\]

Other definitions include;

\[
ROI = \frac{\text{Estimated total profit}}{\text{Estimated initial investment}} \times 100\%
\]

and

\[
ROI = \frac{\text{Estimated average profit}}{\text{Estimated initial investment}} \times 100\%
\]
There are various arguments in favour of using each of the above definitions. However, more importantly, whatever the method adopted it should be used consistently thereby ensuring that *like is compared to like*.

The profit measure is the accounting profit based on accruals accounting principles and is normally taken after depreciation but before taxation. Taxation is ignored as the variations in taxes changes over time and is outside the control of the business.

**ROI Example**

*Example – ACME Internet Inc.*

The business is considering an investment opportunity; data centre servers. The company uses ROI for such purposes. The target ROI for the business is 20%.

Investment for Servers (cost of the assets); £80,000  
Estimated life of Servers; 4 years  
Estimated profit before depreciation:

<table>
<thead>
<tr>
<th>Year</th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>20,000</td>
</tr>
<tr>
<td>Year 2</td>
<td>25,000</td>
</tr>
<tr>
<td>Year 3</td>
<td>35,000</td>
</tr>
<tr>
<td>Year 4</td>
<td>25,000</td>
</tr>
</tbody>
</table>

*(in the above, the servers are to be depreciated using the straight-line method whereby the servers have a nil residual value (in the company accounts) at the end of their `life`; therefore, the charge per year is £80,000/4 years = £20,000 per year)*
The annual profits after depreciation, and the mid year net book value of the asset for each year, would be:-

<table>
<thead>
<tr>
<th>Year</th>
<th>Profit after depreciation</th>
<th>Mid-year net book value</th>
<th>ROI in the year %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>70,000</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>5,000</td>
<td>50,000</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>15,000</td>
<td>30,000</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>5,000</td>
<td>10,000</td>
<td>50</td>
</tr>
</tbody>
</table>

Note:
In the example above, the mid-year book value is the value at the mid-point between the beginning of each year and the end of the year. For example, the value of the asset at the beginning of year 1 was £80,000 and at the end £60,000 (following deduction of depreciation of £20,000); the mid-year net book value therefore is £70,000.

From the example, it can be seen that the ROI from a yearly perspective is low in the early years of the investment. This is due to low profits in year 1 but, in the main, it is due to the net book value of the asset being much higher in the early years. The relatively higher net book value of assets in early years is a characteristic of the straight line depreciation method.

In the example, the investment does not achieve the target ROI of 20% in its first 2 years, but exceeds it in years 3 and 4 at 50%.

Should the investment be made?
When the ROI from a project varies from year to year, it makes sense to take an overall view:

\[
\text{ROI} = \frac{\text{Estimated average profits}}{\text{Estimated average investment}} \times 100
\]

Where,

\[
\text{Estimated average} = \frac{\text{Total profits}}{\text{Number of years}} = \frac{\£25,000}{4} = \£6,250
\]

Estimated average investment over the 4 year period = £80,000 + 0 / 2 = £40,000 (the average investment being the average value of the asset at the beginning of its life, £80,000, and at the end of its life, £0).

Therefore, the ROI = £6250/40,000 x 100 = 15.63%

As the estimated ROI is less than 20% the project should be rejected.

A Microsoft Excel 2002 spreadsheet is available for download from [http://www.itilhelp.com](http://www.itilhelp.com); Return on InvestmentSS.xls

**Critique**

The principle criticism of ARR/ROI is that it does not take into account the timing of profits generated from the investment.

The model assumes that the profits earned in the first year, for example, are equivalent in terms of value to profits earned in later years. In other words, ignoring inflation, £1 today is assumed to be the same as £1 in ten years’ time. Common sense tells us this is not so. The assumption therefore ignores the concept of the time value of money. However Discounted Cash
Flow (DCF) is an investment appraisal which takes into account both the time value of money and also total cash flows over a project’s life. Therefore, it is oft argued that DCF is a superior method to ROI (ARR).

For details and an example of Discounted Cash Flow (DCF) please visit the downloads section of http://www.itilhelp.com.