Deflation not only has an effect on investment appraisal mathematics; it also has a psychological impact on investors.

For the past 60 years any discussion about the impact of general price changes on management accounting has been synonymous with a discussion on inflation. This is so because between 1940 and the late 1990s price inflation was an endemic feature of most western economies. The UK experienced rates of inflation exceeding 10 per cent a year for protracted periods during the 1940s, 1970s and 1980s.

But in the 1920s and 1930s the issue was price deflation. This was associated with the restoration of the gold standard and the subsequent depression. Factors that contribute to deflation include the development of the global economy and advances in technology. Many manufactured goods, particularly in the electronics industry, and raw materials have been falling steadily in price for at least the past decade. Japan is one country that has experienced an extended period of deflation, associated with falling prices and low or nil interest rates.

Deflation affects various aspects of management accounting. In a situation of price deflation, the purchasing power of money rises over time: 5 per cent annual deflation may be taken to indicate that £1 at year zero and £0.95 at year one have the same purchasing power. This implies that "real" interest rates are higher than the "nominal" or "money" rates quoted by banks. Take the following simple investment appraisal as an example. Consider a project that involves a £100 initial investment and which generates annual cash inflows of £40 (year one), £40 (year two) and £30 (year three) at year-zero price levels. The current cost of money is 1 per cent and the annual deflation rate is 5 per cent. Using a 1 per cent interest rate to discount the cash inflows, this gives the project a positive net present of £7.93, which suggests that the project is viable. But the approach is wrong because it ignores deflation. To appraise the project properly, you have the option of using either a "real" interest rate with cash flow figures projected at current (year zero) price levels (see figure 1), or a "money" interest rate with cash flow figures projected at future price levels (see figure 2).

Deflation is not only a mathematical phenomenon. The recent experience in Japan suggests that it affects the behaviour of investors, managers, employees and consumers. Much of that impact is in essence psychological in origin. Deflation may affect business decision-making in several ways.

- Investing in projects that have long payback periods (or even no payback periods) at projected future price levels may require some courage.
- Borrowing to finance the purchase of assets that are going to shrink in money value over time may also require some courage. Money interest rates may be low, but real interest rates are higher and people will eventually realise this.
- It may be difficult to reduce some costs – eg, wages – in line with deflation. This may make many projects less attractive than would otherwise be the case.
- Consumers may start to defer purchasing decisions if prices are falling. This may be irrational, but it will make the general climate for investment less attractive.

John Keynes stated in The General Theory of Employment, Interest and Money that "nothing is more injurious to the volume of trade and investment than steadily sagging price levels". He was writing about deflation in the 1930s, but his comments could apply equally to modern conditions. In recent years Japan has seen the Nikkei index fall from a peak of 38,000 to its current level of around 10,000. Residential property prices have fallen by as much as 60 per cent in many Japanese cities. Deflation may be set off by a decline in real prices for many manufactured goods, particularly in the electronics industry, and raw materials have been falling steadily in price for at least the past decade. Japan is one country that has experienced an extended period of deflation, associated with falling prices and low or nil interest rates.
goods, but it can induce a deflationary spiral leading to low growth and recession. A general atmosphere of falling asset values is not conducive to investment and consumption.

One of the main roles of the management accountant is to prepare reports that provide a guide to the performance of individual areas of a business. This requires that the capital engaged in each area and the profit generated by each area are identified and reported in a way that allows meaningful comparisons to be made. Comparisons may be between areas of the business or against appropriate external benchmarks.

The impact of general price deflation on performance appraisal is the mirror image of the impact of inflation. If prices are falling, then:
- depreciation of fixed assets will tend to be overstated and the reported book value of fixed assets on the balance sheet will also be overstated;
- stock valued at historic cost will tend to be overstated;
- holdings of cash and debtors will increase in real value without any associated gain showing in profit calculations;
- financial liabilities – eg, creditors and borrowings – will tend to increase in real value without any associated loss showing in profit calculations.

These factors will tend to reduce the meaningfulness of financial control reports generally and will make it hard to compare the performance of different areas of the business, because each will be affected differently. For example, a division that uses a high proportion of fixed assets will find that its performance (as measured by both profit and ROCE indicators) will be artificially depressed, compared with one that doesn’t.

The management accountant may therefore have to adopt and selectively deploy special “deflation accounting” techniques. For example, the possibility of charging depreciation on the basis of the replacement cost of fixed assets, rather than on their historic cost, may be considered.

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Questions 4(a) and 5 of the November 2001 IDEC exam revealed two weaknesses in the approaches taken by a number of candidates when answering questions on net present value. These were a failure to use:
- cumulative discount rates, which save calculation time;
- annualised cash flows, which can help when comparing projects.

Both of these weaknesses could have resulted from the candidates’ unfamiliarity with the cumulative present value tables, which are always provided at the end of the question paper. Instead they preferred to use annual discount rates, which entailed many more individual calculations that ate into valuable exam time.

Cumulative present value tables, as their name implies, simply total the discount rates from year one to the year in question. So, if the cash flow is the same each year for, say, five years, instead of doing five separate multiplication calculations and then totalling the result, a single calculation can be made. If the cash flow starts in year two and runs until the end of year six – ie, five years – the cumulative rate for year six should be read from the tables and the rate for year one subtracted from it. The resulting figure should then be multiplied by the annual (not the cumulative) cash flow to obtain the total net present value (see figure three).

The calculation of annualised cash flows is particularly useful when comparing alternative projects that have different durations. If one project lasts four years and another will take six years, how can they be compared fairly? If the four-year project has a larger net present value it would be correct to conclude that it is financially more desirable, but this is actually unlikely to be the case. If the six-year project has a larger NPV, which is more likely, how do we decide whether its NPV is sufficiently large to make it the preferable investment?

One way to decide is to divide the total NPVs by four and six respectively to obtain an annual figure. But this would not be quite correct, because the cash flows have been discounted. Instead, the NPVs should be divided by the sum of the annual discount rates, which can be obtained from the cumulative present value tables.

This technique could have been used to answer question 4(a) in the November 2001 paper (see panel, overleaf), although alternative approaches were perfectly acceptable and the model answer below illustrates one of them.

Question 4(a) can be answered by calculating the NPVs for a reliable and unreliable machine and dividing by the cumulative discount rates (3.312 and 0.926 respectively) to obtain an annualised cash flow.

Buying a reliable machine:

<table>
<thead>
<tr>
<th>Year</th>
<th>PV (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>–18,000</td>
</tr>
<tr>
<td>1–4</td>
<td>26,466</td>
</tr>
<tr>
<td>5</td>
<td>8,967</td>
</tr>
</tbody>
</table>

Annualised cash flow = £8,937 ÷ 3.312 = £2,698

<table>
<thead>
<tr>
<th>Years</th>
<th>Annual cash flow</th>
<th>Discount rate</th>
<th>Present value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–2</td>
<td>–£100,000</td>
<td>(0.926 + 0.857)</td>
<td>–178,300</td>
</tr>
<tr>
<td>3–7</td>
<td>£50,000</td>
<td>(5.206 – 1.783)</td>
<td>171,150</td>
</tr>
</tbody>
</table>

NPV = –7,150

R should therefore not invest in the project.