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. ■

Bob Scarlett is the author of the CIMA Study System *Management Accounting: Performance Management*. The Study Systems are core texts on the recommended reading list and are available from CIMA Publishing. Telephone: +44 (0)20 8849 2229/2277, or e-mail: publishing.sales@cimaglobal.com

Cut to the chase

Carol Cashmore

Save precious exam time by using the cumulative present value tables provided

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:

Year		PV (£)
0	cost £18,000	–18,000
1-4	contribution £8,000 x 3.312	26,496
4	sale £600 x 0.735	441
		8,967

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

Figure 3 Sample usage of cumulative discount rates

Company R is considering investing in a project that has an outflow in years one and two of £100,000 a year, followed by an annual inflow from years three to seven of £50,000. The company's cost of capital is 8 per cent. Should R invest in this project?

Years	Annual cash flow	Discount rate	Present value
1-2	–£100,000	(0.926 + 0.857) = 1.783	–178,300
3-7	£50,000	(5.206 – 1.783) = 3.423	171,150
		NPV	–7,150

R should therefore not invest in the project.

Question 4(a)

DigitPP owns 20 print and computer shops. At present it hires its 35 photocopying machines from Rentit at an annual rental of £5,600, payable monthly. (Assume year-end cash flows for simplicity.) The rental agreement covers a 24-hour repair service that helps DigitPP to maintain its high reputation for a quick and reliable service. DigitPP estimates that each machine generates £7,600 of contribution each year.

XX company is trying to break into the UK market and offers to sell DigitPP new machines for £18,000 each, payable on installation. DigitPP is considering this and has found some research which suggests that each machine stands a 0.7 chance of being reliable and a 0.3 chance of being unreliable. The reliability of the machines will be discovered by the end of the first year. All machines that are reliable at the end of year one will still be reliable at the end of year four.

If a machine proves reliable, DigitPP will keep it for four years in total and it will generate a contribution of £8,000 each year, after which time the machine will be scrapped and sold for £600. If the machine proves unreliable, it will be scrapped after a year and sold for £400. An unreliable machine is expected to generate a contribution of £5,000 every year.

Prepare calculations to show whether a rented or purchased machine is the financially better option. The company's cost of capital is 8 per cent.

Buying an unreliable machine:

Year		PV (£)
0	cost £18,000	–18,000
1	contribution and sale (£5,000 + £400) x 0.926	5,000
		–13,000

Annualised cash flow
= –£13,000 ÷ 0.926
= –£14,039

Expected annual cash flow from purchasing a photocopying machine
= (£2,698 x 0.7) – (£14,039 x 0.3)
= –£2,323

Equivalent cash flow of renting a machine
= £7,600 – £5,600 =
= £2,000
(The rental figure is already expressed in the required way – ie, as an annualised cash flow. There is no need to multiply by 3.312 only to divide by the same figure.)

Annualised cash flows are more than a time-saving technique; they should also have been used as part of the answer to one of the issues raised in question 5 (*see panel, below*). A good answer would state that the differences were caused by two factors – the different size of the original investments and the duration of the projects – but the latter factor is the relevant part for this article.

Project A lasts for three years, whereas projects B and C last for six and nine years respectively. The NPV method assumes that at the end of year three, when project A ends, no further investment is made in a project of a similar nature and that the funds released earn the time value of money – ie, the cost of capital. The IRR method simply calculates the rate of return over the three years. If a straight comparison is then made between the IRRs of the three projects, the assumption is that the money from project A is re-invested in a project giving a similar return. This is the reason why the NPV method ranks project A in third place and IRR ranks it first. To take account of this, the result of the NPV calculation should be modified as follows to give an annualised figure:

Project	A	B	C
NPV at 10 per cent	14,376	22,040	31,432
Cumulative discount rate	2.487	4.355	5.759
Annualised cash flow	5,780	5,061	5,458
Ranking	1	3	2

The annualised cash flow method ranks project A first, as it gives an annualised cash flow of £5,780 for three years. If funds could be reinvested in a project equal to A in year four and again in year seven, the investment would generate an annual value of £5,780 for nine years and would definitely be ranked first. A judgment is required on whether it is better to choose the longer project, C (which also requires a larger initial investment), and earn the equivalent of £5,458 a year for nine years; or whether it is better to take the shortest project, A, and earn the equivalent of £5,780 a year for three years on the assumption that another financially acceptable project will be available at the end of that period.

Uncertainty surrounding cash flows expected in the more distant future would also influence the decision, as would uncertainty over the discount rate itself (A is less sensitive to a change). In addition, the different size of the initial investments is an important factor to consider. This can be dealt with by calculating a profitability index for each project – ie, dividing the NPV by the initial investment (cash outflow) and ranking the projects accordingly. ■

Question 5

MN plc has a rolling programme of investment decisions. One of these is to consider mutually exclusive investments A, B and C. The following information has been produced by the investment manager:

	Investment decision		
Project	A	B	C
Initial investment	£105,000	£187,000	£245,000
Cash inflow for A, years 1 to 3	£48,000		
Cash inflow for B, years 1 to 6		£48,000	
Cash inflow for C, years 1 to 9			£48,000
Net present value at 10% pa	£14,376	£22,040	£31,432
Ranking	3	2	1
Internal rate of return	17.5%	14%	13%
Ranking	1	2	3

Prepare a report for the management of MN plc that includes an explanation of the reasons for the differences between the NPV and IRR rankings. Use project A to illustrate the points you make.

Carol Cashmore was the examiner for the May 2002 intermediate level Management Accounting – Decision-Making examination