PAPER P9

Management Accounting – Financial Strategy

The Examiner provides a short study guide, for all candidates revising for this paper, to some first principles of finance and financial management

Based on marking scripts for the first two diets of Paper P9, many candidates appear to have forgotten some basic facts about finance and financial management!

For example, many candidates do not know how to calculate earnings per share correctly or do not know the difference between nominal, book and market values… This article aims to provide a short study guide to some of these basic principles. It could also be useful for candidates taking examinations at managerial level.

The article is divided into four broad sections: earnings per share and the price earnings ratio; calculation of present values and yield to maturity; the various types of value; and depreciation and tax depreciation allowances.

Section 1 Earnings per share and the price earnings ratio

Earnings per share
Earnings per share (EPS) is an entity's net profit attributable to ordinary shareholders divided by the number of shares in issue. The standard accounting procedures for calculating and reporting of EPS are examined in Paper P8 Financial Analysis. The full requirements of the Accounting Standard, IAS 33 *Earnings per Share*, will not be examined in Paper P9.

However, candidates need to remember how to perform the basic EPS calculation and how it will be affected by bonus and rights issues and convertible stock.

A simple example of an EPS calculation is show below.

Example 1:
Calculation of EPS for an entity with taxable profits

	£m
Earnings before interest and tax	525
Interest on debt	75
Earnings after debt interest	450
Tax payable	125
Earnings after tax available for distribution	325

Number of shares in issue = 175 million

EPS is £325m ÷ 175 million shares = 186 pence per share

The calculation of EPS if an entity has convertible bonds in issue can be complicated, but a simple example is given below.

Example 2:
Assuming the entity's debt is in the form of convertible unsecured bonds (cubs)

Assume that the entity used in ***Example 1*** has in issue £750m cubs, convertible in 2008. The conversion ratio is five shares per £100 of the bond. Undiluted EPS is 186p as shown above. If all the holders of the bonds convert their holding into ordinary shares, this would mean an extra 37·5 million shares being issued in 2008 (750m/100 x 5) to give total number of issued shares of 212·5 million (175 million existing shares plus 37·5 million new shares). The fully diluted EPS is now £325m/212·5 million – 153p.

The entity hopes, of course, that earnings will increase before conversion takes place; the fully diluted calculation is done merely to show what would happen if earnings stood still.

An important point to remember is that EPS is a historic figure and can be manipulated by changes in accounting policies, mergers or acquisitions and so on. It is **future earnings** that should concern investors.

The price/earnings ratio
The price/earnings ratio expresses in a single figure the relationship between the market price of an entity's shares and the earnings per share. It is calculated as:

Price per share ÷ Earnings per share

Using ***Example 1*** above, and assuming that the entity's current share price is 2,250p, the P/E ratio would be 2,250p ÷ 186p = 12.

The P/E ratio is often referred to as the market capitalisation rate. This simply means that the market value of the entity's equity can be calculated by multiplying last year's earnings per share by the P/E ratio (to give the share price) then multiplying by the number of shares in issue.

The P/E is the reciprocal (in maths, a number or quantity divided into 1) of the earnings yield. Again using ***Example 1*** above, the gross earnings yield is 186p/2,250p x 100 = 8·3%. This is earnings as a percentage of the current share price. The P/E is therefore the reciprocal of this: 1 ÷ 0·083 = 12.

Section 2 The calculation of present values and yield to maturity

Present values – special cases
The use of discount tables and the calculation of present values are generally well understood by candidates. It is the calculation of some of the special cases that gives problems.

An annuity is a fixed annual payment. It may continue indefinitely, but frequently will continue only during the lifetime of a named individual. An annuity may be purchased (say, from a life assurance entity) on terms that depend on current and prospective rates of interest and the actuarial life expectancy of the purchaser. Purchasing an annuity is a useful way in which retirement income can be provided out of capital without the risk that this will become exhausted.

In financial management we can use the concept of annuities to make easier the calculation of a regular stream of receipts or payments, as shown in the following example.

Example 3
Calculate the value of a constant income stream of £100 per year for five years assuming the discount rate, or opportunity cost of capital, is 12%. From tables (for example on the formulae sheets accompanying the P9 examination paper, or in the CIMA Study System) the annuity factor (or cumulative present value) to be applied to such a series of receipts is 3·605. The value is therefore £100 x 3·605 - £360·50.

A perpetuity could be described as an annuity with no redemption date, that is it goes on forever. The perpetuity formula is annual income or payment divided by the discount factor, or interest rate. For example, the value of £100 income stream per annum for ever if the opportunity cost of capital is 12% would be £100/0·12 = £833·33.

Perpetuities rarely exist in real life. They are useful, however, to simplify calculations, particularly in examination conditions.

Example 4
Assume an entity is considering an investment that has the following forecast net after tax cash flows:

Year	**0**	**1**	**2**	**3**	**4**	**5**
US$000	25·0	3·5	4·8	5·6	6·8	7·2

After tax cash flows are expected to fall to US$6m in year 6 and for the purposes of evaluation the entity assumes this annual net cash flow will maintain in perpetuity from year 6 onwards. The calculation of NPV assuming a 20% discount rate is as follows:

Year	***0***	***1***	***2***	***3***	***4***	***5***
All figures in $m						
Initial investment	-25·0					
Net operating cash flows		3·5	4·8	5·6	6·8	7·2
Terminal value (6m/0·2)						30·00
Discount factor (at 20%)	1	0·833	0·694	0·579	0·482	0·402
Discounted cash flows	-25·0	2·9	3·3	3·2	3·3	14·9
Cumulative DCFs	-25·0	-22·1	018·8	-15·5	-12·2	2-7 (=NPV)

The present value of the terminal value is calculated by dividing US$6m (the expected annual net cash flow from year 6 onwards) by 0·20 (the discount rate). This gives US$30m, which is the value of a perpetual income stream of US$6m per annum if the required rate of return is 20%. However, this is the value of the cash flow stream beginning at the end of year 5. It must be discounted back to the present using the five-year discount factor, which is 0·402.

By convention cash flows, with the exception of the initial investment, are usually assumed to occur at the end of the year for evaluation purposes. This is not realistic of course, and half-yearly discount tables are sometimes used if cash flows are assumed to occur evenly throughout the year. However, simplifying assumptions sometimes have to be made in real life as well as in examinations as the effort involved in trying to estimate cash flows, say, monthly is usually not worth the relatively small increase in accuracy.

A final point on the calculation of present values concerns the use of real or nominal rates of interest – terms often confused by candidates. 'Real' means in *today's money,* that is with no estimate for inflation. 'Nominal' means after adjusting for expected inflation – that is the actual cash you expect to receive in the future. It is important to remember that if cash flows have been adjusted for inflation (that is they are nominal), the discount rate should also include an inflation component.

If cash flows have been adjusted for inflation (that is they are nominal), the discount rate should also include an inflation component. If cash flows are *real* then the discount rate should *not* include any inflation component. If real cash flows are discounted at a nominal rate, the value of the investment in under-stated. Conversely, if nominal cash flows are discounted at a real rate, the value of an investment will be over-stated. These statements assume, of course, that inflation is positive.

Note that if an exam question gives a nominal discount rate, says that cash flows are real and gives an inflation rate, the expectation is that candidates will inflate the real cash flows – recognising the year on year compounding effect – and apply the nominal discount rate. However, candidates would gain some credit if they used the real cash flows in the evaluation as long as they also adjusted the discount rate to a real rate.

The yield to maturity (YTM)
When a bond or debenture – or any fixed interest debt – is issued, it carries a 'coupon' rate. This is the interest rate which is payable on the face, or nominal value of the debt. Unlike shares, which are rarely issued at their nominal value, debt is frequently issued at par – usually £100 payable for £100 nominal of the bond. At the time of issue the interest rate will be fixed according to interest rates available in the

market at that time for bonds of similar maturity. The credit rating of the entity will also have an impact on the rate of interest demanded by the market.

The yield to maturity (or redemption) is the effective yield on a redeemable security, taking into account any gain or loss due to the fact that it was purchased at a price different from the redemption value.

Example 5
You are asked to put a price on a bond with a coupon rate of 8%. It will repay its face value of £100 at the end of 15 years (t). Other similar bonds have a yield to maturity of 12% (r).

The price of the bond is:

£8 x (annuity factor for t = 15, r = 12) + £100 x (discount factor for t = 15, r = 12)

= (£8 x 6·811) + (£100 x 0·1827) = £72·76

What we are doing here is adding the NPV of 15 years of interest payments to the present value of the sum receivable on redemption.

The example can be turned round to calculate the YTM. If the price of the bond is known to be £78·40, what is the yield to redemption? This is basically an internal rate of return calculation and the answer is approximately 11%.

A connected issue which is frequently misunderstood by candidates is the relationship of face, or nominal, value to market value and coupon rate (on debt) to rate of return. The relationship of nominal value to market value of shares is discussed later in this article. In this section debt, or bonds, are discussed.

Example 6
An entity issues bonds at par (the face or nominal value) with a coupon rate of 12%. This means that for every £100 of debt the buyer will receive £12 per annum in gross interest. Assume that interest is payable annually (it is usually paid bi-annually but this would require more tricky calculations). Mr. A bought £1,000 of this debt on 1 January 2003. He will receive £120 in interest every year as long as he owns the bond. This might be until it matures, if it is dated debt, or it might be when he sells it in the market. If the opportunity cost to investors of bonds of similar risk and maturity is 12%, then the coupon rate and the rate of return are the same.

However, assume that inflation increased at a much higher rate than expected by the market when the bond was issued. In January 2007, the opportunity cost to investors of similar bonds has risen to 15%. Mr. A continues to receive £120 on his £1,000 nominal value but no new buyer would pay £1,000 to get a return of 12% – they now want 15%. The price of the bond therefore falls to the level where the return on the debt is 15%. This is £80 per £100 nominal of the bond.

Mr. B buys £1,000 nominal of the bond in January 2007. He will receive £120 per year in interest, just like Mr. A, but as Mr. B will have paid only £800 for the £100 bond his return is 15% (120/800 x 100). The coupon rate stays at 12%, the nominal value at £1,000 but the rate of return is 15% and the market value £800.

Section 3 The various types of value

Nominal value
Many candidates in the Paper P9 examination appear not to understand the relationship between nominal value and market value of shares. In fact, there is no express relationship, although a common misunderstanding is that it is the price at which the shares were originally issued. This is not necessarily the case.

Ordinary shares may be issued with a nominal value of say, 10p each. These shares will continue to be referred to as 10p shares even though the price at which they are bought and sold on the stock market may differ substantially from this.

Dividends are usually paid in pence per share and are not based on nominal values, as is usually the case with fixed interest securities.

Book value

Book values apply to both assets and liabilities. The book value of an asset is the net result of the accounting procedures and adjustments to which the balance has been subjected; for example depreciation charges. However, it is not necessarily any guide to the true market value of the asset.

Paper P9 is more likely to be concerned with the differences between book and market values of shareholder's equity – a liability. In book-value terms this is the sum of the ordinary share capital shown in the balance sheet plus the value of all shareholders' reserves (share premium account, revaluation reserve, retained earnings and so on.) This value may be quite different from the market value of equity. This is mainly because (a) it reflects accounting procedures and adjustments and (b) it is a historic figure. Market values reflect investors' expectations about future earnings from the entity's assets.

Market value

This is the value of an asset based on the amount it is believed it would command if sold. Some assets, such as securities, are traded regularly on an organised market and their value is relatively simple to establish. The market value of, for example, specialised plant and machinery may, however, be more difficult to establish.

The market value of shares in a public listed entity is simply the share price multiplied by the number of shares in issue. The share price reflects investors' expectations of future earnings; the book value reflects the accounting value of past asset purchases and earnings.

An error sometimes made by candidates is to calculate the market value of equity by correctly multiplying the share price by the number of shares in issue, then adding the accounting value of reserves. This is mixing together two different things.

Section 4 Depreciation and tax depreciation allowances

Depreciation is the recognition in accounting of the diminution in the value of fixed assets, which occurs as a result of time or use. The calculated amount of depreciation for a period of time is credited to the asset account in the balance sheet, thus reducing its 'book value', and debited to the profit and loss account, thus showing the cost of using the asset as a charge against revenue. There are many different methods used for calculating depreciation, each based on a different concept.

The Paper P9 syllabus is not specifically concerned with the accounting treatment or methods of depreciation. The key point to remember is that depreciation is not cash. If a question requires a discounted cash flow calculation based on profit figures that include depreciation (or other non-cash items) then these items have to be added back to profits or losses to arrive at operational cash flows.

However, tax depreciation allowances (called the *tax shield* in the USA and many text books) do have a cash value. The important point is that tax depreciation allowances themselves are not cash, but they affect the tax liability of an entity, which in turn affects tax payable or refundable. Tax depreciation allowances do therefore have an effect on cash flow and their calculation needs to be understood.

Different tax depreciation allowance rates may apply to different types of asset and it is important to note that the rate of book depreciation, which is determined by the entity, does not have to be the same as the rate of the tax depreciation allowance, which is determined by a country's tax authority.

The following simple example combines the above points.

Example 7

An entity is planning an investment that requires capital expenditure of £100m in machinery. This capital cost will be written off against the profits from the investment in equal instalments over 4 years; the investment's expected life. The investment will attract tax depreciation allowances of 25% per annum on a reducing balance basis. The entity pays tax at 20% per annum, payable in the year the liability arises. Its cost of capital is 10% per annum.

The pre-tax profit forecast for the next 4 years, after deducting depreciation, is as follows:

Year	**1**	**2**	**3**	**4**
Pre-tax profits (£m)	10	25	40	50

Calculate the NPV of the investment. Assume that, apart from depreciation, profit equals cash flow. All figures (except the discount factor) are in £m and rounded to the nearest whole number for convenience.

Step 1 – calculate tax depreciation allowances

		Tax relief at 20%
Investment	100	
Year 1 allowance – 25%	25	5
Written down value	75	
Year 2 allowance – 25%	19	4
Written down value	56	
Year 3 allowance – 25%	14	3
Written down value	42	
Year 4 allowance – 25%	11	8
Written down value (and balancing allowance)	32	
Total relief over the life of the asset		20

(This is a useful check – total should equal £100 x 20%)

Step 2 – calculate operational cash flows

Year	**1**	**2**	**3**	**4**
Pre-tax profits	10	25	40	50
Add back book depreciation	25	25	25	25
Operational cash flows	35	50	65	75

Step 3 – calculate tax liability

Year	**1**	**2**	**3**	**4**
Operational cash flows	35	50	65	75
Tax at 20%	7	10	13	15
Less relief on tax depreciation	-5	-4	-3	-8
Tax payable	2	6	10	7

Step 4 – calculate NPV

Year	**0**	**1**	**2**	**3**	**4**
Investment	-100				
Operational cash flows		35	50	65	75
Tax payable		-2	-6	-10	-7
After tax cash flows	-100	33	44	55	68
Discount factor for 10%	1	0·909	0·826	0·751	0·683
DCF	-100	30	36	41	46

NPV = £53

Concluding comment:
This article is not intended to replace any of the study texts. Its purpose is to highlight some basic concepts and procedures which many candidates fail to fully understand. If anything discussed above is new to the reader, or poorly understood, they should study that particular aspect in one of the recommended texts.

Readings

CIMA Study System 2006 Edition by John Ogilvie and Christine Parkinson
CIMA Official Terminology 2005 Edition

Both published by CIMA Publishing and Elsevier and available to buy via the CIMA website. Go to the following link: www.cimapublishing.com