Value metrics: use with care

Using accounting rates of return as a measure of value is simple in theory, but tricky in practice. **Chris Higson** explains the issues and adds a note of caution

Accounting rates of return on capital are used to measure economic return in business and to identify whether companies are creating or destroying value. Investors use accounting returns to rank companies when selecting stocks. Value-based management has encouraged companies to use accounting returns for measuring performance and in compensation schemes for managers. Regulators and competition authorities use accounting returns to identify excess profits.

In all these applications, accounting returns are being used as value metrics in the sense that they are being compared, explicitly or implicitly, to the cost of capital. This is a stern test of accounting data and in this article the reliability of accounting returns as value metrics is discussed.

We can see why, in principle, an accounting rate of return on capital measures economic return by recalling some basic investment theory. An activity creates value when it is expected to produce cash flows with a higher value than if the resources were put to their next best use. Assume the resources are assets and capital is not rationed (so the activity is not competing for funds against other projects). Then the test of value creation is whether the value of the expected cash flows from using the assets, discounted at the company's cost of capital, is greater than the cost of the assets.

If a company buys £10m of assets today and uses them to generate a cash flow worth £12m today, it has created £2m of value. In the language of capital budgeting the investment has a net present value (NPV) of £2m. Equivalently, value is created when the expected cash flows net of investment have a yield or internal rate of return (IRR) which is greater than the cost of capital.

Since there is a close relationship between value and return, we can judge economic performance in either way, by examining the quantity of value created, or by comparing a rate of return to the cost of capital. (Note that NPV and IRR are equivalent ways of thinking about economic performance apart from cases when internal rates of return are ambiguous. These cases are explored in standard finance texts.)

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The widget project

My grandmother has provided £10,000. On January 1, I will rent a room, buy a widget press for £8,000 and invest £2,000 in an inventory of widget blanks. I will trade for a year, making and selling widgets. I expect to receive cash from customers of £15,000 and to spend another £6,000 for widget blanks and £2,000 for rent. I estimate the machine could be sold for £5,000 at the end of the year.

At the end of the year, therefore, I will be left with a machine worth £5,000, no inventory and receivables of £1,500 from customers who have yet to pay. Is the project worth doing? Note that my grandmother got the money by selling some of her equities and these equities were expected to return 8 per cent on average, so 8 per cent is the opportunity cost of the capital used in the project.

Using the techniques of capital budgeting we would appraise the project by calculating its IRR and its NPV. As is conventional (though crude) we assume all revenues are collected as cash, and expenses paid in cash, at the end of the year (date 1), apart from the investment which is made at the beginning of the year (date 0). Also assume the machine can be sold, and the outstanding receivables collected, on the last day of the year, and there is no tax. Table 1 shows a discounted cash flow (DCF) analysis for the widget project.

Table 1
DCF analysis of the widget project

Project cash flows are:

	Date 0	Date 1
Investment in machine and inventory	(10,000)	
Operating cash flow (15,000 – 6,000 – 2,000)		7,000
Realise the assets (machine, 5,000, receivables, 1,500)		6,500
	(10,000)	13,500

For a single period project, the IRR is easy to calculate as follows:

(13,500/10,000) – 1 = 0.35 = 35%

The present value of the future cash flow is given by:

13,500/(1+8%) = 12,500

So the NPV of the project, the present value of expected cash flows less the initial investment, is £2,500. On either criterion, the project is worth doing: the IRR of 35 per cent is above the 8 per cent cost of capital and the NPV is positive.

How would this project have looked in accounting terms? Profit would be calculated as shown in Table 2.

My accounting return on capital, measured using beginning capital, is:

(3,500/10,000) = 35%

So accounting return on capital and IRR give the same answer.

The price to book ratio is the accounting equivalent of NPV. Imagine that my simple project above were traded on the stock market. Its market capitalisation at January 1 would be the market's evaluation (present value) of future cash flows, precisely what we valued at 12,500. Price to book is NPV expressed as a ratio:

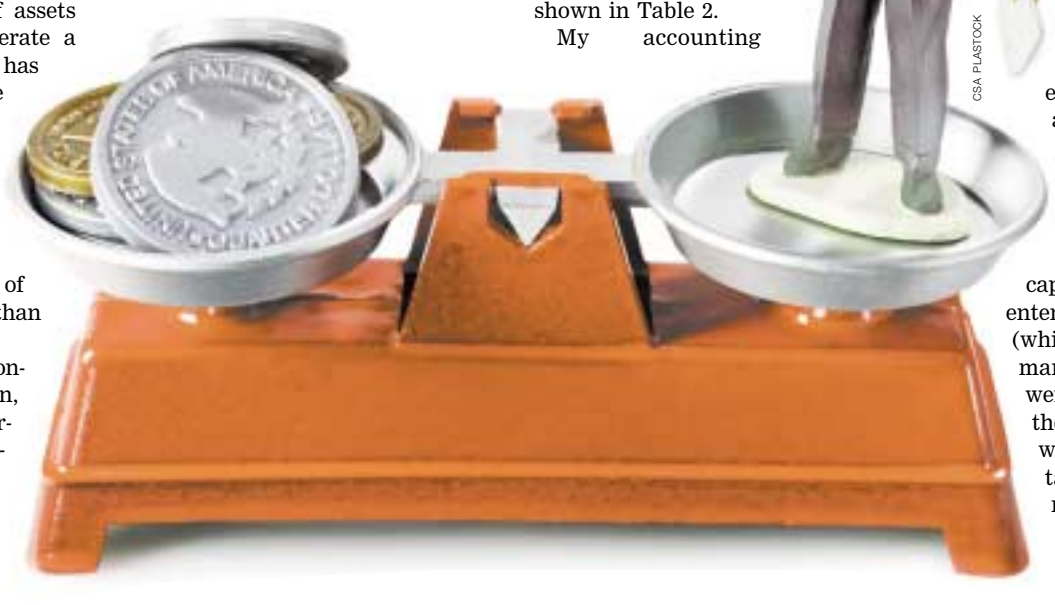
12,500/10,000 = 1.25

Table 2
Accounting analysis of the widget project

Revenue:		
paid in cash during year	15,000	
outstanding at year end	1,500	16,500
Cost of materials:		
paid during year	6,000	
outstanding at year end	2,000	(8,000)
Rent		(2,000)
Depreciation of machine		(3,000)
Operating profit		3,500

My balance sheets are:

	Date 0	Date 1
Cash		7,000
Receivables		1,500
Inventory	2,000	
Machine	8,000	5,000
	10,000	13,500
Equity - invested	10,000	10,000
- retained profit		3,500
	10,000	13,500



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Importance of taxes

The company must pay corporation tax on its income, so the company's cost of capital, which is the investors' required return, relates to income after corporate taxes. For comparison with the cost of capital, we need an after-tax measure of return on capital. Consider two traditional measures of accounting return on capital. Operating return is operating profit (before interest paid and tax) divided by operating assets. It is an enterprise-level measure of return in the sense that operating assets are financed by both equity and loans. The return to investors is measured by return on equity, which is earnings (after interest paid and tax) divided by equity shareholders' funds.

Since earnings are after-tax, return on equity can be benchmarked against the cost of equity capital. However to find an enterprise-level return on capital (which in this case will be benchmarked against WACC, the weighted average of the costs of the loan and equity capital) we will need to calculate an after-tax operating return. A moment's thought suggests that this will not be entirely straightforward. We need a

measure that is pre-interest paid, but after tax, which is not the order of things in the income statement. The problem is that the tax reported in the income statement contains tax paid on operating profit but also the tax paid on other income, less tax saved on interest payments. We resolve this by calculating net operating profit after tax (NOPAT), where T is the corporate tax rate, as:

NOPAT = Operating profit –
(Tax + Net interest paid x T)

We can also get at NOPAT by working up from profit after tax:

NOPAT = Profit after tax
+ Net interest paid x (I – T)

We then have:

After-tax operating return
= NOPAT/(Operating assets)

Take the example of Brigand & Co, which has the following data:

Operating profit	100
Interest received	10
Interest paid	(30)
Profit before tax	80
Tax	25
Earnings	55

Brigand has average operating assets of 500. The local corporate tax rate (T) is 35 per cent. To find NOPAT, which is operating profit after tax, we need to know the tax on the operating profit. The actual tax paid is 25, but this reflects the fact that the company got a tax deduction at 35 per cent on its net interest payments of 20; a deduction of 7. So tax on operating profit must have been:

25 + 7 = 32

and NOPAT is:

100 – 32 = 68

Though the statutory tax rate is 35 per cent, Brigand's effective tax rate is not 35 per cent and 32 is not 35 per cent of 100. Taxable profit reflects the various allowances (and disallowables) in the tax code, carried-forward losses, investment tax credits and so forth. The NOPAT calculation reasonably assumes that interest paid (received) is deducted (taxed) at the marginal, statutory, rate and that the tax breaks that reduce the effective tax rate relate to operating profit.

An alternative way of getting NOPAT is from the bottom-up, working back from earnings. NOPAT is profit after tax plus interest paid, net of the tax shelter on interest. In Brigand's case this is 20 – 7 = 13. So,

NOPAT = 55 + 13 = 68

Brigand's after-tax operating return is thus 68/500 = 13.6 per cent.

Internalising the cost of capital

In the Brigand example, if the WACC was 8 per cent we would conclude that after-tax operating return of 13.6 per cent reflected superior performance. The difference between return and cost of capital is called spread. Brigand's spread was 5.6 per cent.

The same data can be presented in a different way. If we make a charge against NOPAT for the cost of using capital as operating assets during the year, the surplus is residual income.

Residual income = NOPAT
– (Operating assets x WACC)

Brigand had a NOPAT of 68 and assets of 500. Its WACC is 8 per cent, so its residual income is:

68 – (500 x 8%) = 28

Residual income is also known as economic value added (EVA) and economic profit. The term "EVA" was coined by a consulting firm, Stern Stewart. Its version of EVA also incorporates a number of accounting adjustments, designed to correct shortcomings of actual accounting.

Great claims are made for residual income measures, but the statement that a company has positive residual income is logically identical to saying it is earning a return greater than its cost of capital. Both metrics hold the same information. In simple terms, when we ask if a company is earning a return greater than the cost of capital, we are asking whether:

Profit/Capital > WACC

Multiplying both sides by capital, the question becomes whether:

Profit > Capital x WACC

Moving the right hand side over to the left, recasts the question in terms of whether residual income is positive:

Profit – (Capital x WACC) > 0

Data integrity

In the simple world of the widget project, it is easy to see why accounting returns and price to book gave the same answer as IRR and NPV. View each year in the life of a company as an investment project. The company starts with a stock of assets and has earnings during the year, some of which are distributed as dividend (that is, cash flow to investors) and the rest are retained, increasing assets. The fundamental accounting identity is:

Earnings ≡
(dividend + increase in assets)

For a one-period project the IRR is:

IRR = (cash flow + increase in assets)
/opening assets

So the accounting return measured on the opening assets of the company will be identical to the IRR:

IRR = earnings/opening assets

In practice, the reliability of an accounting measure of return as a value metric depends crucially on the accounting. In capital budgeting we know that NPV or IRR will only be correctly measured if the assets committed at the outset are measured at their opportunity costs, all incremental cash flows over the project life are identified and the recovery of any assets that remain at the end is included at their opportunity cost. By analogy, for accounting to have the data integrity of capital budgeting, three things are needed.

First, the accounting identity has actually to hold, so that all balance sheet changes pass through earnings.

> "Returns look very different between companies that grow organically and those that grow by acquisition"

Earnings must be comprehensive, or in current parlance, "clean-surplus". Second, the balance sheet needs to be complete in that it records all the assets and claims over which property rights have been established. Third, these assets and claims need to be valued at opportunity cost.

In practice, accounting rarely meets this ideal and though practising analysts and consultants make adjustments to the reported numbers, the goal remains elusive. There are three problem areas.

Comprehensive income

The traditional role of the income statement is to describe profit from operations. But, for example, part of the return that a company delivers to its investors may take the form of unrealised holding gains on assets such as real estate. These may not be recognised, but even when they are, they will rarely be passed through the income statement. Earnings will not be comprehensive if key balance sheet changes, such as gains and losses on foreign exchange, and gains and losses on revaluation, are taken direct to reserves in the balance sheet rather than passed through earnings.

Balance sheet completeness

There are two main reasons why the balance sheet may be an incomplete list of a company's assets and claims.

First, under the historic cost convention of accounting, assets will only be recorded if they were acquired in a transaction rather than as windfalls. Moreover, conservatism dictates that managers should write off the costs of building intangible assets such as brands, human capital and research and development (R&D) as they are incurred, rather than carry them in the balance sheet. As a result, balance sheets usually do not carry the intangible assets of the company. One modest exception, which may be capitalised, is a rather limited class of expenditure on applied R&D of products with a known market and which can reasonably be expected to be profitable. Acquired, rather than home-grown, intangible assets are sometimes carried, though these are never subsequently revalued.

It is common practice in calculating value metrics to capitalise R&D expenditure, but not other intangible-building expenditure. Companies that grow by takeover may make very large investments in goodwill, which is the difference between the cost of an acquired company and the identifiable (in terms of balance sheet recognition) assets acquired. Internationally, the goodwill asset is amortised over widely varying periods. Hence accounting returns look very different between companies that grow organically and those that grow by acquisition, and also between acquirers in different countries.

Second, the company may have written contracts to keep assets off the balance sheet. Companies write operating lease contracts to shift tangible fixed assets, and the corresponding liabilities, off the balance sheet. Factoring the sales ledger, or using consigned inventory, may keep current assets off balance sheet. Analysts commonly capitalise operating leases to enhance completeness of the balance sheet, but such devices are hard for outsiders to observe and there is usually no attempt to adjust for them.

Balance sheet values

Though the balance sheet is usually complete in tangible fixed assets, by default fixed assets are carried at their historic costs that, particularly for long-lived assets such as land and buildings, may bear little relation to current values. Internationally, revaluation of fixed assets is either not permitted, as in the US, or has unfavourable tax consequences, as in much of Europe. In the Netherlands and the UK, where revaluation is allowed, it is found predominantly in property-rich sectors such as hotels and drinks, where it is occasional and partial – not all asset classes are necessarily revalued. Though acquired, rather than built, intellectual property assets are sometimes carried in the balance sheet, these are never subsequently revalued. It is not common for analysts to attempt to re-express fixed assets in current prices.

Current assets and liabilities are more likely to approximate current values. As short-life assets they are carried at reasonably current prices and have to be written down to realisable value when this falls below cost. Deviations from current value occur when accounting standards permit or encourage "hidden-reserves" in the form of undervalued assets. One example is the use of LIFO (last in, first out) for inventory valuation in the US; another is the excessive write-down of receivables by making general provisions which are common in some continental European countries.

Conclusion

The reliability of a value metric depends crucially on how the accounting is done. To provide the data integrity of capital budgeting, profits would need to be measured comprehensively and the balance sheet would have to measure the opportunity cost of all company assets and liabilities. These balance sheet requirements are very difficult to achieve in practice, so comparisons with the cost of capital need to be treated with caution.

Further reading

- Edwards, J.S.S., Kay, J.A. and Mayer, C.P. (1987) *The Economic Analysis of Accounting Profitability*, Oxford University Press.
- Higson, C. (1995) *Business Finance*, Oxford: Butterworths.