

### 4.3.1 Profitability ratios

Profitability ratios (also referred to as profit margin ratios) compare components of income with sales. They give us an idea of what makes up a company's income and are usually expressed as a portion of each dollar of sales. The profit margin ratios we discuss here differ only by the numerator. It is in the numerator that we reflect and thus evaluate performance for different aspects of the business.

Profit (profit/loss, earning, income) is the most important criterion for evaluating commercial firms for investment decisions. The most significant predictor of firm market valuation is profitability and the likelihood of continuous profit growth. Thus, the future existence and success of corporations depends on this analysis. Consequently, there are several profitability ratios that consider different aspects of earnings performance.

Profit, in accounting, is an income distributed to the owner in a profitable market production process (business). Profit is a measure of profitability which is the owner's major interest in income formation process of market production. There are several profit measures in common use.

Income formation in market production is always a balance between income generation and income distribution. The income generated is always distributed to the stakeholders of production as economic value within the review period. The profit is the share of income formation the owner is able to keep to himself/herself in the income distribution process. Profit is one of the major sources of economic well-being because it means incomes and opportunities to develop production. The words income, profit and earnings are substitutes in this context.

#### Type of profit/loss (earning, income)

There are several important profit measures in common use. Note that the words earnings, profit and income are used as substitutes in some of these terms.

- Gross profit equals sales revenue minus cost of goods sold, thus removing only the part of expenses that can be traced directly to the production or purchase of the goods. Gross profit still includes general (overhead) expenses like R&D, S&M, G&A, also interest expense, taxes and extraordinary items.
- Earnings before interest, taxes, depreciation, and amortization (EBITDA) equals sales revenue minus cost of goods sold and all expenses except for interest, amortization, depreciation and taxes. It measures the cash earnings that can be used to pay interest and repay the principal. Since the interest is paid before income tax is calculated, the debt holder can ignore taxes.
- Earnings before interest and taxes (EBIT) or operating profit equals sales revenue minus cost of goods sold and all expenses except for interest and taxes. This is the surplus generated by operations. It is also known as Operating Profit Before Interest and Taxes (OPBIT) or simply Profit Before Interest and Taxes (PBIT).
- Earnings before taxes (EBT) or net profit before tax equals sales revenue minus cost of goods sold and all expenses except for taxes. It is also known as pre-tax book income (PTBI), net operating income before taxes or simply pre-tax income.
- Net income or earnings after tax or net profit after tax equals sales revenue after deducting all expenses, including taxes (unless some distinction about the treatment of extraordinary expenses is made). In the US, the term net income is commonly used. Income before extraordinary expenses represents the same but before adjusting for extraordinary items.
- Retained earnings equals earnings after tax minus payable dividends.



- To accountants, economic profit, or EP, is a single-period metric to determine the value created by a company in one period—usually a year. It is earnings after tax less the equity charge, a risk-weighted cost of capital. This is almost identical to the economists' definition of economic profit.

## Gross profit margin

$$\frac{\text{Gross profit}}{\text{Sales revenue}} * 100\%$$

Revenue is key in relation to performance and should always be commented on. Comments on revenue should not be limited to basic analysis such as 'Revenue has increased, which is good'. Comments should look to explain why revenue has increased in the year, examining items such as new products, new markets, promotional activity or anything relevant to the scenario.

This is the margin that the company makes on its sales, and would be expected to remain reasonably constant.

Since the ratio is affected by only a small number of variables, a change may be traced to a change in:

- selling prices – normally deliberate though sometimes unavoidable, e.g. because of increased competition or entry into a new market
- sales mix – often deliberate (company discontinuing some products)
- purchase cost – including carriage inwards or discounts
- production cost – materials, labour or production overheads

A good way to analyse gross profit margin is to ask yourself:

- Are there any reasons why the selling price has changed?
- Are there any significant changes to the costs in the year?
- Has there been any indication of a change in sales mix?

### Comparing gross profit margin over time

If gross profit has not increased in line with sales revenue, you need to establish why not. Is the discrepancy due to:

- increased 'purchase' costs: if so, are the costs under the company's control (i.e. does the company manufacture the goods sold)?
- inventory write-offs (likely where the company operates in a volatile marketplace, such as fashion retail)? or
- other costs being allocated to cost of sales – for example, research and development (R&D) expenditure?

### Inter-company comparison of gross profit margin

Intercompany comparison of margins can be very useful but it is especially important to look at businesses within the same sector. For example, food retailing is able to support low margins because of the high volume of sales. A manufacturing industry would usually need higher margins to offset lower sales volumes.



Low margins usually suggest poor performance but may be due to expansion costs (launching a new product) or trying to increase market share. Lower margins than usual suggest scope for improvement.

Above-average margins are usually a sign of good management although unusually high margins may make the competition keen to join in and enjoy the 'rich pickings'.

### Operating profit margin

$$\frac{\textit{Profit from operations}}{\textit{Sales revenue}} * 100\%$$

An alternative to operating profit margin is to calculate net profit margin, using either profit for the year or profit before tax as the numerator.

Any changes in operating profit margin should be considered further:

- Are they in line with changes in gross profit margin?
- Are they in line with changes in sales revenue?
- As many costs are fixed they need not necessarily increase/decrease with a change in revenue.
- Look at individual categories (admin expenses, distribution)

If there are significant changes within operating expenses, it is important to consider:

Are these one-off items, such as redundancies or legal cases? If so, these should be stripped out of the ratio to provide a meaningful comparison.

Are there likely to be ongoing future consequences? For example, a company opening a website to sell directly to the public is likely to have much higher distribution costs into the future.

This is affected by more factors than the gross profit margin but it is equally useful and if the company does not disclose a cost of sales it may be used on its own in lieu of the gross profit percentage.

One of the many factors affecting the trading profit margin is depreciation, which is open to considerable subjective judgement. Intercompany comparisons should be made after suitable adjustments to align accounting policies.

By the time you have reached operating profit, there are many more factors to consider. If you are provided with a breakdown of expenses, you can use this for further line-by-line comparisons. Bear in mind that:

- some costs are fixed or semifixed (e.g. property costs) and therefore not expected to change in line with revenue
- other costs are variable (e.g. packing and distribution, and commission).

### Return On Capital Employed – ROCE

$$\frac{\textit{Profit}}{\textit{Capital employed}} * 100\%$$

This shows the ability of the entity to turn its long-term financing into profit.

| Profit is measured as:                                                                                                                                                                               | Capital employed is measured as:                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>operating (trading) profit, or</li> <li>the PBIT, i.e. the profit before taking account of any returns paid to the providers of long-term finance.</li> </ul> | <ul style="list-style-type: none"> <li>equity, plus interest-bearing finance, i.e. the long-term finance supporting the business. This usually includes all finance lease liabilities, whether they are shown as current or noncurrent, or</li> <li>total assets less current liabilities</li> </ul> |

ROCE for the current year should be compared to:

- the prior year ROCE
- the cost of borrowing
- other companies' ROCE in the same industry.

Movements in ROCE should be analysed by looking for the reasons why profit has moved, and reasons for any changes in the long-term funding, such as loans or share issues.

It is important to note that ROCE can be significantly affected by an entity's accounting policies. A company that revalues their assets will have a revaluation surplus in equity. This will make their ROCE lower than a company that does not revalue their assets, making comparison meaningless.

Similar to ROCE is **return on equity (ROE)**

$$\frac{\text{Profit after tax}}{\text{Equity}} * 100\%$$

This can be used to show the return made for the year on the total equity in the business. Pretax

ROE can also be calculated using profit before tax rather than profit after tax.

Once calculated, ROCE should be compared with:

- previous years' figures – provided there have been no changes in accounting policies, or suitable adjustments have been made to facilitate comparison (note, however that the effect of not replacing non-current assets is that their value will decrease and ROCE will increase)
- the company's target ROCE – where the company's management has determined a target return as part of its budget procedure, consistent failure by a part of the business to meet the target may
- make it a target for disposal
- the cost of borrowings – if the cost of borrowing is say 10% and ROCE 7%, then further borrowings will reduce EPS unless the extra money can be used in areas where the ROCE is higher than the cost of borrowings
- other companies in same industry – care is required in interpretation, because of the possibility, noted above, of different accounting policies, ages of plant, etc.

The ratio also shows how efficiently a business is using its resources. If the return is very low, the business may be better off realising its assets and investing the proceeds in a high interest bank account! (This may sound extreme, but should be considered particularly for a small, unprofitable business with valuable assets such as property.) Furthermore, a low return can easily become a loss if the business suffers a downturn.

#### *Further points*

- Treatment of associates and investments: where the profit excludes investment income, the statement of financial position carrying amounts for associates and investments should be excluded from the capital employed.
- This gives an accurate measure of trading performance. If associates and investments are not excluded, the overall profit figure should include income from investments and associates.
- Large cash balances are not contributing to profits and some analysts therefore deduct them from capital employed (to compare operating profits with operating assets). However, it is usually acceptable not to make this adjustment as ROCE is a performance measure and management have decided to operate with that large balance.

### **Return on assets (ROA)**

Return on assets is an indicator of how profitable a company is relative to its total assets. ROA gives a manager, investor, or analyst an idea as to how efficient a company's management is at using its assets to generate earnings. Return on assets is displayed as a percentage and its calculated as:

$$\frac{\text{Profit}}{\text{Total assets}} * 100\%$$

In basic terms, ROA tells you what earnings were generated from invested capital (assets). ROA for public companies can vary substantially and will be highly dependent on the industry. This is why when using ROA as a comparative measure, it is best to compare it against a company's previous ROA numbers or against a similar company's ROA.

Remember that a company's total assets is the sum of its total liabilities and shareholder's equity. Both of these types of financing are used to fund the operations of the company. Since a company's assets are either funded by debt or equity, some analysts and investors disregard the cost of acquiring the asset by adding back interest expense in the formula for ROA. In other words, the impact of taking more debt is negated by adding back the cost of borrowing to the net income, and using the average assets in a given period as the denominator. Interest expense is added because the net income amount on the income statement excludes interest expense. An analyst that chooses to ignore the cost of debt will use this formula:

$$\text{ROA} = (\text{Net Income} + \text{Interest Expense}) / \text{Average Total Assets}$$

The ROA figure gives investors an idea of how effective the company is in converting the money it invests into net income. The higher the ROA number, the better, because the company is earning more money on less investment.

### **4.3.2 Activity ratios**

**Activity** or **turnover ratios** are measures of efficiency and, generally, the higher the better. Typically, the numerator is an operating measure such as sales (revenues) or cost of goods sold and the denominator is a balance sheet measure such as inventory or receivables. Thus, operating flows are measured against asset and other levels. Time series trends and comparisons to other companies are useful to spot red flags or potential opportunities.

The operating measures occur over the fiscal period. Therefore, the most appropriate comparison is the average balance sheet measure for the denominator. This is measured as 1h (beginning balance+ ending balance), equivalent to half of this year's balance plus half of last year's balance. Note that inventory turnover uses cost of goods sold as the numerator; all other activity ratios use sales (or total revenue) as the numerator.

Activity ratios are measures of how well assets are used. Activity ratios can be used to evaluate the benefits produced by specific assets, such as inventory or accounts receivable. Or they can be used to evaluate the benefits produced by all a company's assets collectively. The most com-

mon turnover ratios are the inventory turnover, the total asset turnover, and the accounts receivable turnover.

### Total assets turnover

This ratio indicates the extent that the investment in total assets results in sales. The resultant number is a multiplier of the sales that are generated for the investment in total assets. For example, if assets are E 100 million and sales are E 125 million, the total asset turnover is 1.25, meaning that E 1.25 of sales are generated per E 1 of asset investment.

As with any other ratio, the total asset turnover cannot be judged in isolation, but rather must be considered in conjunction with other dimensions of the company's condition and performance, the trend of the ratio over time, and industry norms.

A turnover ratio may be constructed to evaluate the use of any set of assets by comparing the gross benefit to the assets employed. For example, if you wish to focus on a company's fixed assets, you can construct a fixed asset turnover as the ratio of sales to net plant and equipment.

$$\frac{\text{Sales}}{\text{Total assets}} = \text{times pa}$$

### Net asset turnover

$$\frac{\text{Sales revenue}}{\text{Capital employed}} = \text{times pa}$$

Note: Capital employed can be used as equity plus interest-bearing debt. As an alternative, net assets (total assets less total liabilities) could also be used.

It measures management's efficiency in generating revenue from the net assets at its disposal:

- the higher, the more efficient.

Note that this can be further subdivided into:

- noncurrent asset turnover (by making noncurrent assets the denominator) and
- working capital turnover (by making net current assets the denominator).

### Inventory turnover

$$\frac{\text{Inventory}}{\text{Cost of sales}} * 365 \text{ days}$$

An alternative is to express the inventory turnover period as a number of times:

$$\frac{\text{Cost of sales}}{\text{Inventory}} = \text{times pa}$$

An increasing number of days (or a diminishing multiple) implies that inventory is turning over less quickly which is regarded as a bad sign as it may indicate:

- lack of demand for the goods
- poor inventory control
- an increase in costs (storage, obsolescence, insurance, damage).

However, it may not necessarily be bad where management are:

- buying inventory in larger quantities to take advantage of trade discounts, or
- increasing inventory levels to avoid stock-outs.

### Inventory days

Year-end inventory is normally used in the calculation of inventory turnover. An average (based on the average of year-start and year-end inventories) may be used to have a smoothing effect, although this may dampen the effect of a major change in the period.

Inventory turnover ratios vary enormously with the nature of the business. For example, a fishmonger selling fresh fish would have an inventory turnover period of 1-2 days, whereas a building contractor may have an inventory turnover period of 200 days. Manufacturing companies may have an inventory turnover ratio of 60-100 days; this period is likely to increase as the goods made become larger and more complex.

For large and complex items (e.g. rolling stock or aircraft) there may be sharp fluctuations in inventory turnover according to whether delivery took place just before or just after the year end.

A manufacturer should take into consideration:

- reliability of suppliers: if the supplier is unreliable it is prudent to hold more raw materials
- demand: if demand is erratic it is prudent to hold more finished goods.

### Receivables collection period

$$\frac{\text{Trade receivables}}{\text{Credit sales}} * 365 \text{ days}$$

If credit sales are not available, revenue should be used.



The collection period should be compared with:

- the stated credit policy
- previous period figures.

Increasing accounts receivables collection period is usually a bad sign suggesting lack of proper credit control which may lead to irrecoverable debts.

It may, however, be due to:

- a deliberate policy to attract more trade, or
- a major new customer being allowed different terms.

Falling receivables days is usually a good sign, though it could indicate that the company is suffering a cash shortage.

### Receivables days

The trade receivables used may be a year-end figure or the average for the year. Where an average is used to calculate the number of days, the ratio is the average number of days' credit taken by customers.

For many businesses total sales revenue can safely be used, because cash sales will be insignificant. But cash-based businesses like supermarkets make the substantial majority of their sales for cash, so the receivables period should be calculated by reference to credit sales

only.

The result should be compared with the stated credit policy. A period of 30 days or 'at the end of the month following delivery' are common credit terms.

The receivables days ratio can be distorted by:

- using yearend figures which do not represent average receivables
- factoring of accounts receivables which results in very low trade receivables
- sales on unusually long credit terms to some customers.

### Payables payment period

$$\frac{\text{Trade payables}}{\text{Credit purchases}} * 365 \text{ days}$$

This represents the credit period taken by the company from its suppliers.

The ratio is always compared to previous years:

- A long credit period may be good as it represents a source of free finance.
- A long credit period may indicate that the company is unable to pay more quickly because of liquidity problems.

If the credit period is long:



- the company may develop a poor reputation as a slow payer and may not be able to find new suppliers
- existing suppliers may decide to discontinue supplies
- the company may be losing out on worthwhile cash discounts.

In most sets of financial statements (in practice and in examinations) the figure for purchases will not be available therefore cost of sales is normally used as an approximation in the calculation of the accounts payable payment period.

Note: In an exam, you may be asked to calculate the working capital cycle, or asked to work the receivables/inventory/payables period from the working capital cycle.

### **Relationship between *ratios profitability and activity***

ROCE can be subdivided into profit margin and asset turnover.

$$\text{Profit margin} * \text{Asset turnover} = \text{ROCE}$$

$$\frac{\text{PBIT}}{\text{Sales revenue}} * \frac{\text{Sales revenue}}{\text{Capital employed}} = \frac{\text{PBIT}}{\text{Capital employed}}$$

Profit margin is often seen as an indication of the quality of products or services supplied (top-of-range products usually have higher margins).

Asset turnover is often seen as a measure of how intensively the assets are worked.

A trade-off may exist between margin and asset turnover.

- Low-margin businesses (e.g. food retailers) usually have a high asset
- turnover.
- Capital-intensive manufacturing industries usually have relatively low asset turnover but higher margins (e.g. electrical equipment manufacturers).

Two completely different strategies can achieve the same ROCE.

- Sell goods at a high profit margin with sales volume remaining low (e.g. designer dress shop).
- Sell goods at a low profit margin with very high sales volume (e.g. discount clothes store).

### **4.3.3 Liquidity ratios**

Liquidity in the context of financial analysis refers to a company's ability to satisfy its short-term obligations using assets that are most readily converted into cash. Assets that may be converted into cash in a short period of time are referred to

as liquid assets. These assets are listed in financial statements as current assets. Current assets are often referred to as working capital, since they represent the resources needed for the day-to-day operations of the company's long-term, capital investments. Current assets are used to satisfy short-term obligations, or current liabilities. The amount by which current assets exceed current liabilities is referred to as the net working capital.

Does the company have the cash and other current assets to pay liabilities as they come due? Most current assets are converted to cash and most current liabilities are paid in cash when due. Current marketable securities generally are investments of excess cash into liquid debt securities to earn a return until the cash is needed for operations. Marketable securities are treated as cash (or near cash) for analysis. In most cases, relatively large cash balances are considered good news.

Accounts receivable are credit terms given to customers on sales. Some percentage of receivables will become delinquent and end up as bad debts. The credit terms that companies give is an important component related to revenue analysis. A company can increase sales by expanding credit sales to higher-risk customers. This will increase revenue in the short term, but receivables will increase and bad debts can be expected to rise in the near future.

**Inventory** represents goods available for sale, either purchased (merchandizing firms) or manufactured, plus raw materials and work in progress for manufacturing firms. There are different inventory accounting techniques (last-in first-out versus first-in first-out or average, perpetual, or periodic) plus all firms must use lower of cost or market. Large inventory may signal relatively inefficient operations. Also, excess inventory or rising inventory levels may be a red flag related to potentially obsolete inventory or operating problems.

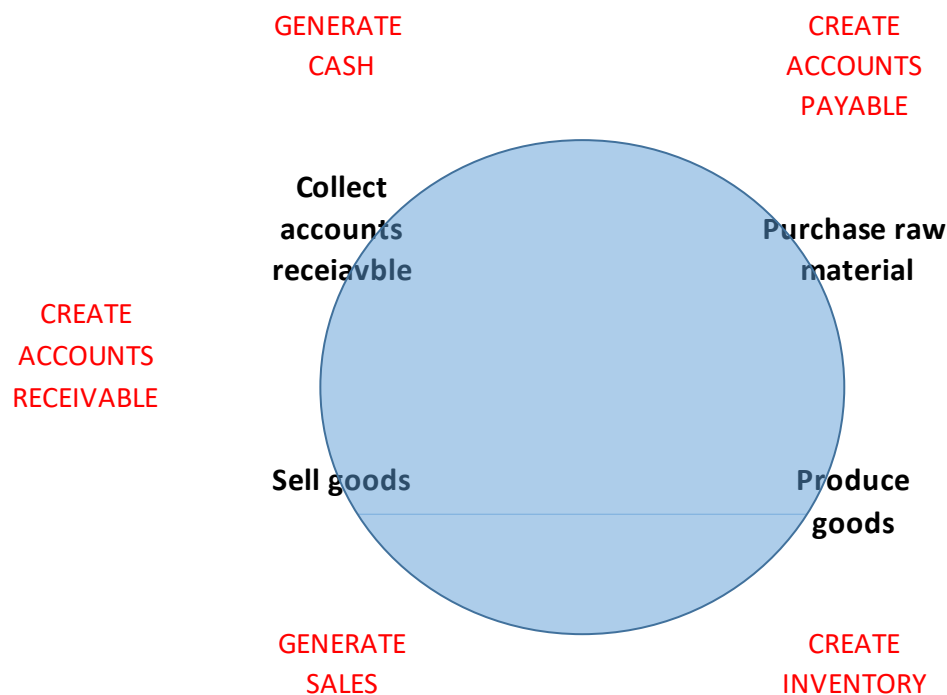
**Current liabilities** are obligations to be paid or liquidated with current resources, usually within one year. The largest category usually is accounts payable, the amount owed to suppliers. Many companies have a policy to delay payment as long as possible to conserve cash.

## Operating cycle

How much liquidity a company needs depends on its operating cycle. The operating cycle is the duration between the time cash is invested in goods and services to the time that investment produces cash. For example, a company that produces and sells goods has an operating cycle comprising four phases, as we diagram in Exhibit 4.4.

The operating cycle is the length of time it takes to convert an investment of cash in inventory back into cash through the collections on sales. Considering that not all purchases a company makes are paid immediately with cash, we can use another cycle metric, the net operating cycle, to capture the length of time it takes to convert an investment of cash in inventory and back into cash considering that some purchases are made on credit.

- The number of days a company ties up funds in inventory is determined by:
- The total amount of money represented in inventory The average day's cost of goods sold



**Working capital** is net current assets:

$$= \text{total current assets} - \text{total current liabilities}$$

This is one measure of liquidity. Since cash and other current assets are needed to pay current obligations, negative working capital is a potential red flag. Working capital and other measures of liquidity are particularly important when evaluating credit decisions. Common liquidity ratios are shown

When analysing position, this can be split down into short-term liquidity (looking at working capital) and long-term solvency (focusing on debt levels).

### **Working capital cycle (cash cycle)**

$$\begin{aligned} \text{Working capital cycle} &= \text{Inventory turnover period (days)} \\ &+ \text{receivables collection period} - \text{payables payment period} \end{aligned}$$

The working capital cycle shows the length of time between incurring production costs and receiving cash returns from these.

There are two ratios used to measure overall working capital:

- the current ratio
- the quick or acid test ratio.



**Current ratio** (or working capital ratio)

$$\frac{\text{Current assets}}{\text{Current liabilities}}$$

The current ratio measures the adequacy of current assets to meet the liabilities as they fall due.

A high or increasing figure may appear safe but should be regarded with suspicion as it may be due to:

- high levels of inventory and receivables (check working capital management ratios)
- high cash levels which could be put to better use (e.g. by investing in noncurrent assets).

The current ratio measures the adequacy of current assets to meet the company's short-term liabilities. It reflects whether the company is in a position to meet its liabilities as they fall due.

Traditionally, a current ratio of 2:1 or higher was regarded as appropriate for most businesses to maintain creditworthiness. However, more recently a figure of 1.5:1 is regarded as the norm.

The current ratio should be looked at in the light of what is normal for the business. For example, supermarkets tend to have low current ratios because:

- there are few trade receivables
- there is a high level of trade payables
- there is usually very tight cash control, to fund investment in developing new sites and improving sites.

It is also worth considering:

- availability of further finance, e.g. is the overdraft at the limit? – very often this information is highly relevant but is not disclosed in the accounts
- seasonal nature of the business – one way of doing this is to compare the interest charges in the statement of profit or loss with the overdraft and other loans in the statement of financial position; if the interest rate appears abnormally high, this is probably because the company has had higher levels of borrowings during the year
- long-term liabilities, when they fall due and how will they be financed • nature of the inventory – where inventories are slow moving, the quick ratio probably provides a better indicator of short-term liquidity.

**Quick ratio** (also known as the liquidity and acid test)

$$\frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}}$$

The quick ratio is also known as the acid test ratio because by eliminating inventory from current assets it provides the acid test of whether the company has sufficient liquid resources (receivables and cash) to settle its liabilities. Normal levels for the quick ratio range from 1:1 to 0.7:1.

As well as analysing how 'safe' a business is by looking at the current and quick ratio, it is important to look at why they have moved by talking in more depth about working capital.

### Cash

As well as talking about the working capital ratios below, it is also useful to comment on any movement in cash in the year.

- Look at where any major cash inflows have come from in the year.
- Identify where the cash has gone in the year.

As much as possible, this should be done with reference to the scenario. A simple discussion of 'cash has gone up, which is good' is unlikely to be worth many marks. A discussion should be based around whether cash has gone up from the company's performance or from other sources, such as taking on more debt.

Like the current ratio it is relevant to consider the nature of the business (again supermarkets have very low quick ratios). Sometimes the quick ratio is calculated on the basis of a six-week timeframe (i.e. the quick assets are those which will turn into cash in six weeks; quick liabilities are those which fall due for payment within six weeks). This basis would usually include the following in quick assets:

- bank, cash and short-term investments
- trade receivables.

thus excluding prepayments and inventory.

Quick liabilities would usually include:

- bank, cash and short-term investments
- trade receivables.
- bank overdraft which is repayable on demand
- trade payables, tax and social security
- dividends.

*Income tax liabilities may be excluded.*

When interpreting the quick ratio, care should be taken over the status of the bank overdraft. A company with a low quick ratio may actually have no problem in paying its amounts due if sufficient overall overdraft facilities are available.

## 4.3.4 Debt ratios

**Leverage** (also called solvency) considers the capital structure of the firm and the evaluation of the relative risk and return associated with liabilities (especially long-term debt) and equity (or ownership). Equity is associated with common stock, although preferred stock is part of the equity structure in some firms. Essentially, equity is a residual value, also called net assets (which are equal to total assets - total liabilities). Another way to consider the balance sheet is assets are on the left and the sources of the assets on the right. Both stockholders and creditors are stakeholders in the firm.

A company can finance its assets either with equity or debt. Financing through debt involves risk because debt legally obligates the company to pay interest and to repay the principal as promised. On the other hand, equity financing does not obligate the company to pay anything; dividends are paid at the discretion of the board of directors. There is always some risk, which we refer to as business risk, inherent in any operating segment of a business. But how a company chooses to finance its operations -the particular mix of debt and equity, its capital structure -may add financial risk on top of business risk. Financial risk is the extent that debt financing is used relative to equity. The greater the company's use of debt in its capital structure, the greater its risk.

A number of technical accounting issues influence the evaluation of debt. However, it is worth noting that real and potential liabilities exist whether or not reported on the balance sheet. Contingencies, operating leases, defined benefit pension commitments, and other postemployment benefits are associated with liabilities that require additional analysis.

Debt is defined as total liabilities. This may be an oversimplification, but it is easy to determine and compare across firms. Other definitions of debt can be useful for additional analysis. Total equity at market value is defined as closing stock price at some specific date multiplied by the number of shares outstanding at the end of the fiscal period under study.

Leverage ratios are relatively easy to interpret for credit decisions: the lower the better. As debt increases, the potential for credit default decreases. The interpretation for equity investment decisions is more difficult, since increasing debt would increase return on equity. From an equity perspective, the relative debt is evaluated. Too high increases credit risk, too low means reduced return on equity.

The main points to consider when assessing the longer-term financial position are: gearing and overtrading.

**Gearing ratios** indicate:

- the degree of risk attached to the company and
- the sensitivity of earnings and dividends to changes in profitability and activity level.

Preference share capital is usually counted as part of debt rather than equity since it carries the right to a fixed rate of dividend which is payable before the ordinary shareholders have any right to a dividend. Gearing will include all interest-bearing debt, and show it as a proportion of equity, or as a proportion of the total long-term financing (being equity plus interest-bearing debt).

#### High and low gearing

✓ In highly geared businesses:

- a large proportion of fixed-return capital is used
- there is a greater risk of insolvency
- returns to shareholders will grow proportionately more if profits are growing.

✓ Low-geared businesses:

- provide scope to increase borrowings when potentially profitable projects are available
- can usually borrow more easily.

#### Relatively stable profits

Loan stock interest must be paid whether or not profits are earned. A company with erratic profits may have insufficient funds in a bad year with which to pay the interest. This would result in the appointment of a receiver and possibly the liquidation of the company.

#### Suitable assets for security

Most issues of loan capital are secured on some or all of the company's assets which must be suitable for the purpose. A company with most of its capital invested in fast depreciating assets or inventory subject to rapid changes in demand and price would not be suitable for high gearing.

The classic examples of companies that are suited to high gearing are those in property investment and the hotel/leisure services industry. These companies generally enjoy relatively stable profits and have assets which are highly suitable for charging. Nonetheless, these are industries that could be described as cyclical.



Companies not suited to high gearing would include those in the extractive, and high-tech, industries where constant changes occur. These companies could experience erratic profits and would generally have inadequate assets to pledge as security.

We use financial leverage ratios to assess how much financial risk the company has taken on. There are two types of financial leverage ratios: component percentages and coverage ratios. Component percentage compare a company debt with either its total capital (debt plus equity) or its equity capital. Coverage ratios reflect a company's ability to satisfy fixed obligations, such as interest, principal repayment, or lease payments.

The component-percentage financial leverage ratios convey how reliant a company is on debt financing by comparing the amount of debt to either the total capital of the company or to the equity capital. The total debt-to-assets ratio is a measure of the proportion of assets that are financed with debt (both short-term and long-term debt):

#### **Total debt-to-assets ratio**

$$\frac{\text{Total debt}}{\text{Total assets}}$$

#### **Debt/equity ratio:**

The debt-to-equity ratio, also known as the debt ratio, indicates the relative uses of debt and equity as sources of capital to finance the com-pany's assets, evaluated using book values of the capital sources:

$$\frac{\text{Total debt}}{\text{Total shareholder's equity}}$$

$$\frac{\text{Loans} + \text{Preference share capital}}{\text{Ordinary share capital} + \text{Reserves} + \text{Non - controlling interest}}$$

**Percentage of capital employed** represented by borrowings:

$$\frac{\text{Loans} + \text{Preference share capital}}{\text{Ordinary share capital} + \text{Reserves} + \text{Non - controlling interest} + \text{Loans} + \text{Preference share capital}}$$

One problem with looking at risk through a financial ratio that uses the book value of equity is that most often there is little relation between the book value and its market value. The book value of equity consists of:

- The proceeds to the company of all the stock issued since it was first incorporated, less any treasury stock (stock repurchased by the company).
- The accumulation of all the earnings of the company, less any dividends, since it was first incorporated.

The book value generally does not give a true picture of the investment of shareholders in the company because:

- Earnings are recorded according to accounting principles, which may not reflect the true economics of transactions.
- Due to inflation, the dollars from earnings and proceeds from stock issued in the past do not reflect today's values.

In contrast, the market value is the value of equity as perceived by investors. It is what investors are willing to pay, its worth. So why bother with the book value of equity? There are two reasons. First, it is easier to obtain the book value than the market value of a company's securities; second, many financial services report ratios using the book value, rather than the market value.

We may use the market value of equity in the denominator, replacing the book value of equity. To do this, we need to know the current number of shares outstanding and the current market price per share of stock and multiply to get the market value of equity.

In addition to the leverage ratios that use information about how debt is related to either assets or equity, there are a number of financial leverage ratios that capture the ability of the company to satisfy its debt obligations. There are many ratios that accomplish this, but the two most common ratios are the times interest coverage ratio and the fixed charge coverage ratio.

### Interest cover

$$\frac{\text{Profit before interest and tax}}{\text{Interest payable}}$$

Interest cover indicates the ability of a company to pay interest out of profits generated:

- low interest cover indicates to shareholders that their dividends are at risk (because most profits are eaten up by interest payments) and
- the company may have difficulty financing its debts if its profits fall
- interest cover of less than two is usually considered unsatisfactory.

A business must have a sufficient level of long-term capital to finance its long-term investment in noncurrent assets. Part of the investment in current assets would usually be financed by relatively permanent capital with the balance being provided by credit from suppliers and other short-term borrowings. Any expansion in activity will normally require a

broadening of the long-term capital base, without which 'overtrading' may develop.

Suitability of finance is also a key factor. A permanent expansion of a company's activities should not be financed by temporary, short-term borrowings. On the other hand, a short-term increase in activity such as the 'January sales' in a retail trading company could ideally be financed by overdraft.

A major addition to noncurrent assets such as the construction of a new factory would not normally be financed on a long-term basis by overdraft. It might be found, however, that the expenditure was temporarily financed by short-term loans until construction was completed, when the overdraft would be 'funded' by a long-term borrowing secured on the completed building.

## 4.4 Limitations ratio analysis

Ratios are a tool to assist analysis.

- They help to focus attention systematically on important areas and summarise information in an understandable form.
- They assist in identifying trends and relationships.

However ratios are not predictive if they are based on historical information.

- They ignore future action by management.
- They can be manipulated by window dressing or creative accounting.
- They may be distorted by differences in accounting policies.

A basic assumption of financial ratios and other financial analysis tools is that the numbers used are correct. Basic income statement and balance sheet numbers can be misstated or manipulated in a variety of ways. Managers have earnings management incentives, which suggests that basic financial statement numbers may be fallible. A primary purpose of the detailed accounting analysis is to determine to what degree the financial statement numbers can be relied upon. If not reliable, the ratio analysis is less useful for decision purposes.

Asset values shown in the statement of financial position at historical cost may bear no resemblance to their current value or what it may cost to replace them. This may result in a low depreciation charge and overstatement of profit in real terms. As a result of historical costs the financial statements do not show the real cost of using the noncurrent assets.

### **Creative accounting**

Creative accounting refers to the accounting practices that are designed to mislead the view that the user of financial statements has on a company's underlying economic performance. Typically, creative accounting is used to increase profits, inflate asset values or understate liabilities.

In the past companies could smooth profits to maintain a steady upward trend by making use of general provisions. An upward profit trend is reassuring to both existing and potential investors or of benefit to bonus seeking directors. As the restrictions on provisions have tightened, companies have found other ways to manipulate profit, such as unsuitable revenue recognition or inappropriate accruals.

Creative accounting techniques can also be used to manipulate the gearing level of a company. A company that is highly geared has high interest payments that reduce the amount of distributable profit available to shareholders and increases the risk associated with the company, making it more difficult to obtain future lending.



Other reasons for creative accounting could include the desire to influence share price, to keep the company's financial results within agreed limits set by creditors, personal incentives or to pay less tax.

### **Window dressing**

Window dressing is a method of carrying out transactions in order to distort the position shown by the financial statements and generally improve the position shown by them.

Examples of window dressing include:

- a company might chase receivables more quickly at the year end to improve their bank balance;
- a company may change its depreciation estimate i.e. by increasing the expected useful economic life of an asset, the depreciation charge will be smaller resulting in increased profits; and
- an existing loan may be repaid immediately before the year end and then taken out again in the next financial year.

### **Choice of accounting policies**

It is necessary to be able to assess the impact of accounting policies on the calculation of ratios. Comparison between businesses that follow different policies becomes a major issue if accounting standards give either choice or judgement to companies i.e. IAS 40 or IAS 16.

### **Transactions with related parties**

If a company trades with related parties, such as other companies within the same group or other companies run by the same directors, then these transactions may not be at market price. This can involve items such as purchase or sale transactions at rates other than market value or loans carrying interest rates not at market value.

The impact of these on the company must be assessed to give a fair comparison with other entities, and to show the position which would be obtained if the company was removed from the group and no longer enjoyed such transactions.

### **Seasonal trading**

Ratio analysis can be distorted when a company has seasonal trading. For example, a company may position their year-end to be after a particularly busy period so that inventory levels are lower than usual making the inventory count a less time consuming process. This in turn will generally mean that current asset levels are higher from a bank/receivables point of view and that trade payables are lower (where suppliers have been paid for the supply of the inventory to meet demand for the busy period). The timing of such financial reporting would improve the results from the ratios and make the company appear to be more solvent. In comparison if the financial statements had been drawn up at a different period in time then the results could be quite different.

### **Limitations of ratio analysis**

- Although there are general guidelines (for example, the quick ratio should not normally be less than 1:1), there is no such thing as an 'ideal' ratio. A quick ratio of less than 1:1 would be acceptable in some businesses, but dangerously low for many others.
- Unless ratios are calculated on a uniform basis, from uniform data, comparisons can be very misleading.
- The statement of financial position shown in the financial statements may not be representative of the financial position at other times in the year. Many businesses set the end of their accounting period to a date on which there is a relatively low amount of trading activity. Retail organisations often have an end of February accounting date (after the peak preChristmas trading and the January sales). As a result, the items on a statement of financial position are not representative of the items throughout the accounting period.

Consider inventory levels in a retail organisation. They may vary throughout the year with lows at the end of a season and highs at the start of the season.

Adding opening and closing inventory and dividing by two will not produce a fair average.

- Ratios based on historical cost accounts do not give a true picture of trends from year to year. An apparent increase in profit may not be a 'true' increase, because of the effects of inflation.
- Financial statements only reflect those activities which can be expressed in money terms. They do not give a complete picture of the activities of a business.
- The application of accounting policies in the preparation of financial statements must be understood when attempting to interpret financial ratios.
- The earning power of a business may well be affected by factors which are not reflected in the financial statements. Thus, these do not necessarily represent a complete picture of a business, but only a collection of those parts which can be translated into money terms. For example, the size of the order book is normally ignored in financial statements.
- Ratios must not be used as the sole test of efficiency. Concentration on ratios by managers may inhibit the incentive to grow and expand, to the detriment of the long-term interests of the company.
- A few simple ratios do not provide an automatic means of running a company. Business problems usually involve complex patterns which cannot be solved solely by the use of ratios.

### **Inter-firm**

It can be useful to compare ratios for an individual company with those of other firms in the same industry. However, comparing the financial statements of similar businesses can be misleading because:

- the businesses may use different accounting policies
- ratios may not be calculated according to the same formula (for example, there are several possible definitions of gearing and ROCE)
- large organisations can achieve economies of scale (e.g. by negotiating extended credit periods, or discounts for bulk buying with suppliers) while these measures may not be available to smaller businesses
- companies within the same industry can serve completely different markets and there may be differences in sales mix and product range. These can affect profitability and activity ratios such as profit margin and expenses to sales.

### **Sector comparisons**

It can be useful to compare ratios for an individual company with the sector as a whole. However, it must also be noted that the sector will incorporate companies of different sizes so it may not be a like for like comparison.

### **Additional information**

In practice and in examinations it is likely that the information available in the financial statements may not be enough to make a thorough analysis.

You may require additional financial information such as:

- budgeted figures
- other management information
- industry averages
- figures for a similar business
- figures for the business over a period of time.

You may also require other nonfinancial information such as:

- market share
- key employee information
- sales mix information
- product range information
- the size of the order book
- the long-term plans of management

### Selecting and interpreting ratios

Interpretation of ratios one at a time is difficult since there is no “good” or “bad” value when viewed in isolation. Ratios should be selected that have meaning for that company. For example, inventory turnover for Pfizer is not very meaningful because the investment in inventory is of little consequence for pharmaceutical company. But inventory turnover is very important for, say, a retailer such as Wal-Mart. And whereas investment in research and development is important for Pfizer, this is much less so for Wal-Mart Stores.

For example, if a company has negative earnings, the price-earnings ratio is meaningless. As another example, consider a company that has negative book value of equity (and, yes, this can happen). In this case, any ratio that uses book value of equity, such as the debt-equity ratio, is meaningless.

### Choosing a Benchmark

To make comparisons, the analyst will likely want to compare the company with other companies. But identifying the other companies in the same or similar lines of business presents a challenge. A system that has been used for many years for classifying companies by lines of business is the Standard Industrial Classification (SIC) system, which was developed by the Office of Management and Budget. However, starting in 1997, another classification system, North American Industry Classification System (NAICS) replaces SIC codes with a system that better represents the current lines of business. Using the NAICS, we can classify a company and then compare this company with other of that class.

Classifying companies into industry groups is difficult because most companies have more than one line of business. Do we classify a company into an industry by the line of business that represents:

- The most sales revenue generated?
- The greatest investment in assets?
- The greatest share of the company's profits?

It is not clear which is the most appropriate method and a company may be classified into different industries by different financial services and analysts.

In making comparisons, there is an issue of whether the benchmark should be all other companies in the industry (say, an average), or the leading companies in the industry. Consider the case of Dow Chemical. Dow Chemical is a manufacturer of basic chemicals. The primary competitors to Dow Chemical in this industry are E. I. du Pont de Nemours and Union Carbide, though there are also a number of smaller competitors such as Georgia Gulf and Millenium Chemicals. When comparing Dow Chemical to the industry,

- Should we use just the two major competitors as the industry benchmark? If so, so we simply average DuPont's and Union Carbide's ratios or do we weight them in some manner (e.g., by market share)?
- Should we consider the smaller competitors at all?
- Should we compare Dow Chemical with the largest or the most profit-able company in the industry?

The benchmark that we choose may affect the conclusions that we draw with respect to a company's operating performance.

### Using Ratios in Forecasting

We often examine trends in ratios and other financial data to predict the future, forecasting the future based on historical trends. For example, we may extrapolate a trend in sales or a trend in operating profit. And though this may result in a reasonable forecast for the immediate future, the business environment is very complex and many factors can affect the future performance or conditions of a company.

Consider forecasting Pfizer's net income for 2000 and beyond, based on net income data from 1990 to 1999. We begin by estimating the trend in the net income over this period, as we graph in Exhibit 4.28. The net income appears to follow a



linear path through these years, as we show in Panel A. However, when we use this path to forecast net income for the years 2000 to 2004, we find that this trend does not fit well, as indicating in Panel B of this exhibit. That's because the forecast we make using 1990-1999 data does not consider, among other things, the company specific events such as discontinued operations and merg-ers that took place in the 2000-2004 period.

This illustrates why we develop forecasts using information in addition to the basic trend, such as forecasts of company-specific events, as well as economic and market conditions.

But we need to be careful in predicting the future revenues or income of a company based solely on the past. As companies mature, growth slows and this needs to be considered in making any forecasts. How much does growth slow? It depends on many factors, including industry structure (e.g., degree of competition), changing demographics, and government regulation.

## SUMMARY

Financial analysis of a company requires a wealth of information. There is so much information available and so much of the analysis can be computerized, that the challenge for the analyst is to select the appropriate tools, gather the pertinent information, and interpret the information.

Financial ratio analysis requires understanding the accounting

information that is used in these ratios. In addition to calculating financial ratios, the analyst must look at company and industry specific information that helps explain the trends and changes in trends that the financial ratios may reveal. In addition to the company and industry analysis, the financial analysis must also be able to put the analysis of the financial ratios in context of the economy in general.

Analysis is becoming more important following the recent scandals as investors and financial managers are learning to become more sceptical of accounting information and look more closely at trends in data, comparisons with other companies, the relation between management compensation and earnings, and footnote disclosures. It is not necessarily the case that all of the scandals could have been detected with closer scrutiny, but there were warning signs in the trends and hints in foot-notes that should have at least raised the caution flags among analysts.