

## Diagnostic Power of Ratios

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### Abstract

Use of clues, by Arthur Conan Doyle (*a trained medical doctor himself*) who created the immortal detective Sherlock Holmes captivates readers and television audience even today. Part of the explanation perhaps can be found in the apparent superhuman ability to smell out the trail left by the hapless criminal by examining seemingly trivial tit-bits of information garnered through an uncanny ability for observation. While the bits of clues are by themselves insignificant, the conclusions arrived at are dramatic. However, to the trained mind it is "elementary dear Dr. Watson!" The use of financial ratios can achieve similar dramatic results because of the inter-relationships that exist between the various parts of the three financial statements themselves and characteristics that must somehow accompany them. The absence or presence of certain characteristics can be therefore become indicators of distortions, that must be examined and cross-verified with other data to arrive at definitive conclusions. In this chapter we propose to introduce the reader to those clues and how to link them together to arrive at a conclusion as to the reliability of financial statements as representing the true financial position of a company.

**Keywords:** Financial ratios; Financial statements; Assets; Telecommunication; Du pont formula

### Financial Ratios and What They Can Do

Our aim is to examine whether the financial numbers put out by the companies are saying what they are actually mean. In other words, whether they reflect the true financial picture of the company and as such are reliable. This scepticism of the numbers is based on the experience observed in the past where companies have presented distorted picture of their position. The other use of ratios and perhaps the more elusive one is to use ratios to predict future prospects of the company. Looking forward into the future is the riskiest form of analysis, since there is no correct answer till the future emerges. The prominence of chance events of extreme nature (*what is now known a "Black-Swan-Events" after Nicholas Nazim Taleb*) can completely invalidate the projections. These and other related aspects therefore do not form part of this book, and the reader is advised to the fact no matter how refined the methods of prediction the future will always remain unpredictable. Before committing large sums of money in the face of greatest uncertainty, investors do well to understand the odds.

In this chapter we deal with ratio-analysis mostly for their power to point to possible distortions and incongruities in financial statements, so that further investigation can be done to get to the bottom-most reality. Unlike a medical practitioner, dealing with real live data, the financial-analyst deals with data that is often riddled with assumptions and biases of the accountants and managements. It is not possible for ratio-analysis alone to uncover incongruities without other supporting data. Ratios can at best raise the antennae and send a curious feeling down the spine, or perhaps point the direction to the problem area. The reader must use his skills to collect other data regarding the company from inside and outside sources to arrive at a definitive conclusion [1].

### The Basic Analytical Approaches

To arrive at the true picture, analysts must rely on all the information they can get. But unfortunately they do not have all the information they need. They must therefore make the fullest use of whatever details the company has disclosed in their annual reports and public statements. There are in effect two basic approaches to financial statement analysis, whatever the methods that may be employed. First is to look at the company affairs from an internal view-point, a sort

of mirror reflection of what appears from within itself. The second approach is to view the company from an external angle, as investors and stake-holders would want to see it despite what the management has presented, in their public disclosure. For readability's sake we have presented the material in this chapter in two parts: Internal Viewpoint and External Viewpoint. We shall presently deal with both these viewpoints in some detail.

### Part One

#### Internal view point

The dotcom era has demonstrated that deterioration in a company's financial position occurs gradually over a period of time, but disclosures related to it come as a total surprise. At other times risk factors creep up on the company gradually, but analysis of these factors becomes clear only after the risk has become quite real. One method of spotting such situations well within reasonable time-periods is to prepare common-size statements, such as the one presented below [2].

#### The percentage balance-sheet and income statement

The immediate aspect of the balance sheet that strikes the reader is the increased borrowing levels. This has been necessitated by the increase acquisition of assets most of which are in the work-in-progress stage. Such addition to capital equipment may have been required because of the need to bid for 3G spectrum and also the hyper growth in the market for 2G services. The company is low on cash balances and had to write down general reserves to finance expansion of services. If the revenues do not pick up during subsequent years, the interest burden is sure to show up on the income statement and reduce profit-

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levels even further. But if such investments in new network elements result in fresh customer additions and revenue streams the strategy will pay off.

Financially skilled reader will learn if he looks for the subtle changes in percentages over several quarters and years to examine whether inventory is increasing as percentage of total assets. Such increases may be due to slowdown in sales or an economic downturn. In this particular case inventory has increased significantly over the previous year. The reader must then probe into the report to examine what these items of inventory are and the company's policy with regard to inventory management. Huge increases in fixed assets is a sign that the company operates in a highly capital intensive sector. Such a proportion of fixed costs to variable costs can make the earnings extremely volatile during unfavourable market conditions.

### Fixed costs and variable costs

Fixed costs are costs that will continue whether or not any units are produced. These costs are "fixed" over a specified period of time or range of production. Variable costs are costs that vary directly with the number of products produced.

It is clear then that the higher the proportion of fixed costs, more number of units must be produced and sold to reduce the average costs of each unit

Telecommunications networks are expensive to build and maintain. Telecom operators have to enrol a very large number of customers to overcome the problem of heavy network costs. But because of the competitive nature of the market, the margin of profit from each customer becomes very thin. There is one additional reason why telecom operators have to invest heavily into equipment. The reasons are technology changes, fast obsolescence of existing services and rapid shifts in customer preferences.

Yet another technique of using percentage form of P&L statement is to compare two companies based on the percentages. We present below a real life example of two telecom operators in India, Idea Cellular & Reliance Communications [3,4].

Looking at the above two companies, what strikes the reader immediately is that the two companies are nearly of the same size in terms of sales revenues, and personnel costs. Idea Cellular has made efforts to disclose various charges in detail as compared to Reliance Communications. However, the network operating costs are substantially different for the two companies. While reliance has splurged a higher amount on selling and administration expenses, it does not have seemed to have resulted in desirable outcomes. Finance charges have acted as a heavy drag on profitability in the case of Reliance Communications, which may be due to the higher debt levels and higher costs of borrowing. What is more interesting is the great gap between the two companies in the treatment of Depreciation figure. A detailed examination by the interested reader will reveal that both *tangible* (plant and Machinery) and *intangible assets* (Telecom Licenses) have been written down by large amounts by Reliance.

The intelligent executive has his tasks cut out here. He must probe into this aspect of the Reliance's operations in the Telecom market, understanding the difference between CDMA technology (*that Reliance use*) and the GSM Technology (*that Idea use*) and the implications of this choice in terms of Licensing conditions and financial impact on its operating incomes. Reliance communications is the only operator in India that operates services in both the technologies. The entry in

to GSM market was a subsequent decision which necessitated high cost of entry-licenses, and hence a larger amortization figure became inevitable in the income statement.

Overall the two companies are on different platforms in terms of operational efficiency and overall strategy. Reliance Communications' high network expenditure combined with a high-cost marketing effort to shore up a slightly less conventional CDMA technology has cost the company in terms of lower profitability and necessity to go in for high-cost debt to finance its operations. This type of analysis drawn from simple percentages to compare peer-group companies can yield satisfactory insights into the numbers. Here again, as elsewhere, the reader must be cautioned before jumping into conclusions without an in-depth reading of the entire report itself.

The Contrasting cost-structures of Idea Cellular and Reliance Communications, as evidenced by the percentage Income statement, highlights a key issue in such comparisons. A line-by-line comparison of the two companies does not in effect yield a satisfactory answer to the question of which one is more efficient. Idea Cellular is perhaps able to reduce its costs of operations, because it is a much smaller company with lower footprint in the telecom space as compared to Reliance, which has multiple products and an integrated infrastructure business. Its balance sheet is nearly three times that of Idea Cellular. Reliance has acquired futuristic business licenses like 4G capabilities and has near-ready infrastructure for deployment of BWA services. The financially savvy reader must take care not to confuse the differences with managerial efficiency which might in fact be differences in business strategy. We therefore invite the reader to explore other measures of managerial efficiency, which is the subject matter of our next section.

### Managerial efficiency measures

The goal of the *managerial efficiency* is to provide a usable and accurate tool for maximizing productivity, profit, and shareholder value, among other multidimensional goals of the modern corporation. At the outset it must be made clear that no textbook on management has as yet defined satisfactorily, as to what constitutes managerial efficiency, in practice. It is generally believed to be the result of the combined effect of management, teaming, and leadership skills on corporate productivity. Delving into the theoretical aspects of managerial efficiency and effectiveness can be an interesting pursuit in itself. But as our aim and purpose is to arrive at the real story behind the numbers presented by these managers themselves, we will deliberately refuse to walk down that lane. Instead we will focus on what a corporate body expects from the overall managerial inputs, in terms of results that are visible above the ground. Towards this objective we propose to present some ratios that may effectively point to the contribution of managerial inputs. These measures are by no means that final word on comparing corporate efficiency. As already stated, strategy and long-term game plans do constitute a key aspect of managerial contribution to overall corporate goals.

### Productivity measures

At the very beginning of this book we expended considerable quantity of word-space to grapple with what we considered the foundational aspect of a business. The concept was Net worth. We understood it to mean the fair value of the business, which an investor would be willing to pay. It would automatically follow from the above, with a moments' reflection, that additions to the net worth of the company is the productivity enshrined in the operations of the company and perhaps its sole aim for the operating activities.

But the problem begins here. No matter how elegant the concept appears to be, measuring net worth in practice has proved very elusive. All that the user is left with is to fall back to reality as presented by the corporate bodies in their periodic reporting. He must then sift through the chaff and collect data which are a reasonably accurate reflection of the true financial situation within the company, the user can begin to work out ratios to measure and compare productive additions to the net worth of the company. This is what we propose to do here in the following sections.

### Return on assets

The reader must be warned that he is entering very shifty ground here. He must be cautioned that it will be very nearly like walking on quick-sand: there is no guarantee of immediate rescue at hand. But skill-full negotiation of this section and chapter is essential to achieving our original goal of attaining the nirvana of basic financial skills of analysis.

We have chosen Return on Assets (ROA) measure as an overall measure of total productivity of the company. The formula is straightforward:

$$\text{Return on Asset (ROA)} = \frac{\text{Net Profit}}{\text{Total Assets}}$$

Based on the numbers the formula represents what percentage of every rupee invested in the business is being returned as a surplus. The concept seems clear enough. Every business activity makes use of machinery, cash, facilities, vehicles, inventory, and software and so on to make a profit at the end of the period and to add to such existing useful resources over several periods. The type of resources used varies with the nature of the business. The ROA measure shows how productive these assets have been at the hands of the management.

Like all measurements, the ROA throws up some immediate issues. Having gone through the scepticism the author has managed to generate in the numbers themselves, the measurements based on such numbers itself generates further scepticism. Apart from this general problem, which applies to all the ratios being discussed here, two issues can come up. Firstly, should we use the profit figure or the cash earnings, which is a better representation of reality? Given the adversarial nature of managerial reporting of accounting profits, this argument may appear somewhat justified. Secondly, the balance sheet that lists the assets misses out the most important asset that makes all productivity possible, the manpower and their embedded skills.

Notwithstanding the above arguments, the reader will recognize that introducing qualitative factors, in to the analysis of numbers which are mostly objectively formed (*even though good many of those numbers have assumptions and estimates supporting them*) and based on regulatory guidelines, substantially devalues the methodology of such analysis. The analyst has the option to modify the ratio based on his findings. Substituting cash earnings in place of accounting profits certainly enhances the understanding of the return concept. This modified ratio is something the analyst may rely on. But as a standard usage, ROA as defined above serves the purpose and is a very good starting point for understanding a company's overall productivity. Elsewhere in the book we have defined bona-fide profits as that which makes the owners wealthier than before. If the analyst can come up with a number that accurately represents the bona-fide profits of the company, and another number that states the actual value of assets owned, he will them be able to discover the true return on assets as intended. However, the task is fraught with immense difficulties. Even

if the intelligent reader can somehow arrive at a satisfactory figure for bona-fide profits, he would not be able to reach a conclusive value for the total assets as that will come to light only in a transaction, involving the sale of such assets. For a company that is never involved in such a transaction, the true value of assets remains hidden. ROA as defined in its simplest form then must satisfy the immediate requirement as an overall indicator of a corporate entity's productivity.

### The Du Pont Formula

With the aid of the *Du Pont Formula*, the reader may be able to advance a bit further in understanding the sources of a company's productivity and consequently the concept of return on assets. The idea is generally attributed to Donaldson Brown, who developed the concept while working at E.I. du Pont de Nemours, (*world's third largest chemical company based on market capitalization in 2009*) and later successfully applied it, as Vice-president Finance in General Motors. He defined return on assets:

$$\text{Asset turnover} \times \text{Return on Sales} = \text{Return on Assets}$$

$$\frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Net Profit}}{\text{Sales}} = \frac{\text{Net Profit}}{\text{Assets}}$$

In its simplest interpretation, the Du Pont formula explains the two main aspects of efficiency. DuPont model tells that ROA is affected by:

- Asset use efficiency, which is measured by total asset turnover; (*sales/assets*)
- Operating efficiency, which is measured by net profit margin; (*net profit/sales*)

DuPont analysis helps to locate the part of the business that is underperforming. This analysis certainly answers some questions, but raises a few others. A company can improve its performance efficiency, reducing working capital requirements so that asset-turnover ratio improves. But such an action by the company may reduce its competitiveness in the market [5].

### Working Capital and Efficiency

Working capital gives an idea of the company's underlying operational efficiency. Money that is tied up in inventory or money that customers still owe to the company cannot be used to pay off any of the company's obligations. So, if a company is not operating in the most efficient manner (slow collection), it will show up as an increase in the working capital. This can be seen by comparing the working capital from one period to another; slow collection may signal an underlying problem in the company's operations.

If a company's current assets do not exceed its current liabilities, then it may run into trouble paying back creditors in the short term. The worst-case scenario is bankruptcy. A declining working capital ratio over a longer time period could also be a red flag that warrants further analysis. For example, it could be that the company's sales volumes are decreasing and, as a result, money due from customers (accounts receivables number) continues to get smaller and smaller.

On the other hand, cutting back on necessary capital expenditures will also improve the assets-turnover ratio (*in the short-run*) in two ways. It reduces the denominator (*assets*) in the equation by reducing total costs by refusing to build new assets. A further advantage is the ability to improve the return on sales due to lower costs as a result of lower depreciation. This happens because, consequent on the creation of lower amount of new capital assets, the business encounters lower

depreciation costs in future. Such an improvement in ROA however, is obviously not desirable, because future market share is likely to decline for the company that spends lower than optimum levels on capital expenditure.

The intelligent reader therefore needs to be careful in looking at these ratios, to understand how they were achieved, rather than at the numbers themselves in isolation. Generally speaking, a higher return on assets, achieved through increases in efficiency based on better utilization of shareholder’s equity investment than by increasing debt component of the assets base, is better appreciated by the market. This implies that a lower leverage and higher ROA is true managerial efficiency.

Adding more debt needs no skill and does not in any way improve operational efficiency, but introduces more volatility in the earnings number. The financially intelligent reader then recognizes that while the level of ROA achieved is of considerable significance, assiduously makes efforts to gauge the quality of ROA as reflected by the numbers. This aspect of the numbers is highlighted by a du Pont analysis of the four major telecom operators in India. The numbers are displayed below:

**Du Pont analysis of major telecom operators in India**

Above table shows two companies at the extreme ends of the du Pont spectrum, namely Bharti Airtel and BSNL. Even though the two are not strictly comparable because of the nature of their organizational structures and products, the contrast between the operational efficiencies of the two are marked. The reason for this visible divergence in returns performance both on Assets turnover efficiency and Margin of sales efficiency are not immediately clear to the general reader. BSNL is a predominantly wire-line operator having large amounts of capital already sunk into its traditional telecom services, and having entered into the mobility segment. The new services in the telecom sector require heavy but far lower investments per line as infrastructural costs. Further, BSNL has far more establishment of previously employed staff who constitute a fixed cost of operations. This heavy baggage of existing commitments drags down its margin at the operational level, the resultant Du Pont index overall a negative figure (Table 1).

On a separate plane the two other companies, Idea Cellular and Reliance Communications present a somewhat different picture. Idea Cellular is able to maintain a positive Du Pont Index even though slim, contrasts with Reliance which has a negative operational efficiency index. Further the return on capital employed is far lower than that of either the industry leader or of Idea Cellular. Reliance fell into this trap because of the adoption of CDMA platform for its services which did not prove to be successful and popular as GSM technology. Even though its capital assets are on par with BSNL and Bharti, the efficiencies are dismal on comparison with either of them, because of far lower sales revenues. In contrast Idea cellular has achieved much higher revenues with less than half the levels of assets invested into those sales.

Name of Company	Assets Turnover	Return on Sales	Return on Assets
Bharti Airtel	53.56%	20.12%	10.77%
BSNL	31.52%	-23.62%	-7.44%
Idea Cellular	50.02%	5.79%	2.81%
Reliance Communications	14.09%	-6.24%	-0.88%

Source: Compiled from the published annual reports of telecom operators 2010-11.

**Table 1:** Analysis of Major telecom operators.

**Return on equity**

Shareholders of a corporate entity have one major goal. To make a reasonable return on the money they have invested, and prospective investors look out for the level of return they can expect from a company. Equity is what is left over to the disposal of the owners of a company. Return on equity then would be defined as:

$$Return\ on\ Equity\ (ROE) = \frac{Net\ Profit}{Shareholder's\ equity}$$

Shareholders in a company receive what is left over after all other claimants to the company’s expenses have been settled off. They are usually the employees, vendors, lenders, government and shareholders, in that order. What is left over is in effect what the company actually owns or the more complete definition we had earlier given: the net worth. However, the usual definition that appears in standard textbooks of finance and accountancy is narrower. It is usually the share-capital contributed by the investors in the company. A little reflection would reveal that the original share capital grows little by little, each time the company makes a surplus in the form of net profit. These accumulations whether actually distributed or not in the form of dividends, represents growth of the original share capital.

Taking an external view of the company’s operations, the investor may care little for the accruals in real assets unless he intends to remain invested in the company for subsequent periods. To such an investor, ROE then represents the dividend payments. However, looking at the company from the internal view-point, all surpluses and reserves in the balance sheet constitutes shareholder’s accumulated capital over several periods of successful operations. Both the return measures we have discussed above, ROA and ROE are known as combination ratios as the figures are derived from the Income statement and the Balance Sheet. These ratio-combinations link the reader to the economic concepts of productivity of capital.

Here again we need to qualify the purity of these measures, since there could be several variants of the same measures depending on the analytical purposes for which they are employed. For example, ROE sometimes defined as:

$$Return\ on\ Equity = \frac{Net\ Profit}{Common\ equity + Preferred\ equity}$$

To arrive at the ROE generally the equity figures as on the last day of the financial year to which the net profit relates is considered. However, imagine a situation where the company has raised capital during the last month of the financial year. This results in a distortion of the ROE figure because; the net profit does not represent the result of new capital which has been employed only for a few days. This figure will then compare unfavourably with its peer company which did not raise any capital. To overcome this problem, we can use the average capital employed by the company as denominator  $\{(equity\ at\ beginning\ of\ year + equity\ at\ end\ of\ year)/2\}$ . A similar problem may arise with regard to the net income as nominator, if we are comparing a full year return measure with the first quarter of the next year. The user then needs to annualize the earnings figure.

**How to annualize:** It is the Process of converting a rate of any length into a rate that reflects the rate on an annual (yearly) basis. This is most often done on rates of less than one year, and usually does not take into account the effects of compounding. The annualized rate is not a guarantee but only an estimate, and its accuracy depends on the variance of the rate. This rate is also known as “annualized return” and is similar to “run rate” calculated by statisticians during a cricket match.

For example, an investment that returns 1% a month returns 12% on an annualized basis. If, however, the 12% value was computed after only one month of returns, it is not certain that the 12% will be achieved for the year.

The more immediately relevant issue here is that in order to arrive at meaningful measures such as the returns figures, the reader must develop a sense of what is intended, before attempting to arrive at a definitive conclusion. These words of caution have already been alluded to in the beginning of the section on the analytical power of ratios.

### Profitability measures

We have emphasized the importance of approaching the numbers from the Balance Sheet angle due to the fact that the Balance sheet is the long term average and therefore the more reliable indicator of the company's financial health. However, the income statement is the driver of the Balance Sheet numbers. Without profitability, cash-flows dry up; operations to produce, maintain and sell get scaled down. The Balance sheet will then begin to shrink as the company is no longer able to purchase new assets or replace worn-out equipment. To use our earlier analogy from the cricket field, if the runs do not come at a reasonably good rate from every over that is bowled, it will be foolhardy to expect that the last-man standing at the wicket will hit all the required runs in the final over. If a business does not produce sufficient profits at a reasonably acceptable margin during every period, any sudden shifts in the market place or cost increases due to external factors will in turn begin to erode the balance sheet figures of total borrowing and shareholder's equity. One or two 'over with no runs' will increase the pressure during subsequent 'batting-overs' perhaps leading to a total collapse. One or two years with "big-bath-losses" for a large company may not look alarming. But if these losses are due to superior competition or inability to strategize during a paradigm shift in the market conditions, recovery in subsequent periods may not be assured. A case in point is that of the biggest telecom operator in the Indian market, Bharat Sanchar Nigam Ltd (BSNL) an incumbent player whose inability to strategically place itself in the emerging market for mobile communications in India during 2007-2010, led its downturn in revenues and profit margins. At the time of writing, its balance sheet is beginning to shrink albeit imperceptibly.

A key income statement focus for analysts is the profit margin measures (*profit as a percentage of sales*). The narrower the margin, the greater is the danger that slight volatility in earnings plunges the company into uncertain future. As already shown in our percentage income statement, the margin can be measured at several levels, either before or after deducting the various charges that gets us to the bottom line or the net profit. The most useful among these are listed below:

$$\text{Operating Margin} = \frac{\text{Operating Income}}{\text{Sales}}$$

$$\text{Operating Margin} = \frac{\text{Operating Income}}{\text{Sales}}$$

$$\text{Pre-tax Margin} = \frac{\text{Net Profit} + \text{Income Tax}}{\text{Sales}}$$

$$\text{Net Margin} = \frac{\text{Net Profit}}{\text{Sales}}$$

The different margin measures reflect managerial effectiveness on the level of profitability. Gross margin is of particular interest to traders and retailers who attempt to buy and sell at advantageous prices.

Operating margins tell the story of how well the management has run the business, trying to obtain the best cost advantages in not only buying and selling, but also in controlling selling, general and administrative expenses, which are under their control and costs like interest expenses and taxation which are sometimes beyond their control spheres. The last two ratios progressively present the profitability picture, whether they are directly or indirectly controlled by the management. The only aspect which the reader should keep in mind while analysing the margin is to isolate the effect of extraordinary items, to correctly conclude regarding the sustainable profitability margins of a company.

### The Outsider's Viewpoint

Two categories of users are keen to watch the performance parameters of a business enterprise from an outsider's stand-point, and they have higher stakes in the company than the commonly considered insiders themselves. They are the owners of the business and the lenders to the business. In the language of the professionals they are the Equity-holders and the Debt-holders. Equity-holders analysis of the company's numbers is aimed at discovering the true value of the company as reflected in its market capitalization. He therefore wishes to make an independent judgment regarding the price he will pay for a share of the company. We shall call this process 'Equity' analysis. When the Lender of monies to a business looks at the financial statements of the company, he has altogether a different focus. He wishes to confirm that the company's income is capable of supporting periodic interest payments and repayment of principal amount. We shall call this 'Credit' or 'creditworthiness' analysis. In this first section we will take up methods of credit-worthiness analysis of a business in detail.

### Credit analysis

Debt is perhaps the most important engine of business in the modern world. The credit market can make or break a corporation or even a country as recent experiences of the Economic crises in USA and European Countries (*PIGS group-Portugal, Italy, Greece and Spain*) have shown. Lenders who extend credit to corporations and Countries with their eyes half-shut not only invite doomsday to their doorsteps, but pull the whole economy down, if the scale of such lending is large enough. On a smaller scale, merchants exchanging goods based on promises to pay must evaluate the likelihood of repayments based on those promises. Banks extending short-term credits to businesses to finance their inventory purchases must evaluate the business for the probability of repayment. Commercial banks too, have this problem of creditworthiness because they borrow from other financial institutions, when they issue certificate of deposits and bonds. Financial statement analysis can significantly influence such lending decisions.

The lender and the student of finance can draw valuable conclusions from the three financial statements put out by the companies regarding its credit worthiness. We have attempted therefore to present the basic techniques and ratios that must form a valuable tool to the diagnostic attempt.

### Diagnostic ratios from the balance sheet

The Borrower must have cash to pay off its debt or must be able to raise cash when such payments are due. This is what we call liquidity. It implies that the company must have sufficient cash in its bank or must have assets that can be disposed of quickly to raise cash or have the ability to borrow more cash from others to pay off its obligations. Illiquidity is the contrasting condition of excess payments due more

than currently available assets will support. We can then arrive at a ratio which measures liquidity thus:

$$\text{Current Ratio} = \frac{\text{Current assets}}{\text{Current Liabilities}}$$

Typically a company with a ratio more than 1 will be able to meet its obligations. However, some of the components of current assets may not actually fetch the values as shown in the balance sheet (*you may recall our earlier discussion on book value and market value*) in which case the ratio tells a different story in reality. The analysis can gain more confidence in the liquidity position by applying a more stringent measure of liquidity as defined below:

$$\text{Quick Ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}}$$

Quick assets are here Cash and those Assets that can be quickly converted in to cash (*such as marketable securities and receivables*). This ratio is more popularly known as the acid-test ratio because it indicates in no uncertain terms the actual liquidity position of the company.

Sometimes it is useful to calculate the difference between current assets and current liabilities which is termed "working capital":

$$\text{Working Capital} = \text{Current Assets} - \text{Current Liabilities}$$

Such a measure is a pointer to the ability of the company to meet its obligations within the year. The reader is again warned that both these figures are in fact estimates of assets (*inventories, receivables, outstanding loans to employees etc.*) and liabilities (*payments due to suppliers, bank overdrafts etc.*) which are likely to materialize during the year. Therefore, the difference is also an estimate of the future position affability to meet the obligations. Nevertheless it is a warning on impending illiquidity if the difference is a negative figure.

Despite all the precautions the lender may employ before loaning monies to the businessman, they frequently discover that they are saddled with bad lending that end up in default. Companies sometimes end up in bankruptcy and creditors are left standing at their doors hoping to recover at least part of the money. In a situation of liquidation, the creditors wish to estimate how much they can actually salvage from the sinking concern. There are many ratios that provide reasonable confidence to the lender. We start with the broadest.

$$\frac{\text{Total Assets}}{\text{Total Liabilities}}$$

This is the broadest measure of asset protection. The bigger the number, the greater is the sense of relief for the lender. Total liabilities can be easily discovered by subtracting shareholder's equity from total assets. Put in another way, if the owners have pumped in more capital than debt, the lenders feel safer. This is due to the fact that shareholders have lower preference than debt-holders to receive payment in the event of liquidation. This brings us to the most common measure of the Lender's view of a business: Debt-to-Equity ratio.

$$\text{Debt-to-equity Ratio} = \frac{\text{Total Debt}}{\text{Total Equity}}$$

Finance companies generally exhibit a ratio higher than 1 for the D/E ratio. But conventional companies have a ratio less than 1. For Banks however, the ratio most commonly used is called the "Capital Adequacy ratio" which is a measure of the bank's ability to meet all its depositors in case of run on the bank. (*The reader may understand here that in most countries, the Central Bank, acts as "a lender of the last resort" and consequently bank failures are less frequent. The reader*

*is advised to read up the events in the USA related to the bankruptcy of Lehman Brothers and Bank of America. "The Ascent of Money" by Niall Ferguson is an excellent account*)<sup>6</sup>. The cardinal failure in all these cases was the failure to maintain standard levels of Capital Adequacy Ratio.

### What constitutes debt?

Here the intelligent reader would have raised this valid query. What constitutes debt? In the Balance Sheet you will notice two types of debt: Long-term borrowing shown just below the Share capital number and short-term debt, which is shown under current liabilities. Strictly speaking short-term overdrafts is used to finance seasonal working capital needs such as festival season inventory buying. However, some businesses have revolving credit arrangements with their creditors. This must indeed be considered as long-term debt. There is danger to the company of exposure to interest rate fluctuations in such arrangements. Long-term debt with floating rate interest rates is also subject to volatility of interest burden in the income statement. Yet another aspect of debt calculation is the existence of Preferred Stock.

### Preferred stock

Preferred stock generally has a fixed rate of dividend that must be paid out before dividends to common stockholders, if dividends are declared. Each company may have different terms and conditions for issue of such share. The best way to think of Preference shares is to see it as having characteristics of both debt (fixed dividends) and equity (potential appreciation).

There are pros and cons when looking at preferred shares. Preferred shareholders have priority over common stockholder in the event of liquidation and they have a fixed dividend (paid before common stockholders), but they have no voting rights and less potential for appreciation.

Legally speaking preferred-stock is equity as it ranks junior to debt in liquidation, and failure to pay dividend is not default. However, treating it purely as equity is not a correct for the analysis of financial flexibility, because of the various conditions attached to preferred stock. Usually they have cumulative preference for dividend, at other time they may have sinking fund provisions just like bonds. Risk to the lender substantially changes when preferred stock is present in the capital structure.

The other important aspect is to find out if the company has any lease agreement in its financing of capital equipment, or in its operating arrangements. Lease arrangements are in fact debt obligations shown as "rental expense" in the income statements. They are also called off-balance sheet items, as they do not appear in the Balance Sheet. The 'rental expense' on account of lease charges is fixed payments that constitute a prior claim on earnings and lenders must be wary of these before considering extending further debt. The total amount of debt in most cases would be equivalent to 7 or 8 times the 'rental expense' figure. In most instances leasing has only a thin cosmetic effect of disguising debt.

There are other ingenious ways through which some management disguises debt obligations by taking them off the balance sheet. A common method is to form joint ventures or affiliate companies whose operations are critical to the parent. They may receive dividends from these companies yet show no liabilities as matching their revenues. These are in fact *several obligations* as against *joint obligations* in legal language. Some parent companies may take over 100% of the debt of the joint venture partner since its operations affect the parent's

performance. The reader should also be aware of emerging financing methods like “sale and buy-back arrangements” which are nothing but debt in another form.

### Sale and buyback

A method of financing in which an owner sells an asset or property to an investor or lender on cash-basis, and immediately buys it back on a long-term mortgage basis to retain possession, title, and use. This method avoids selling-off of an asset and enables its owner to continue to enjoy depreciation and tax benefits. The reader will notice that the asset then will no longer appear in the Balance Sheet.

Another angle to the obligations that the company may have to meet in future is the issue of Employee benefits, such as pension and post-retirement medical benefits. These are usually funded (*meaning thereby that investments in assets have been fully made for these eventualities*): however, the reader should look out for those obligations which are not fully funded or not funded at all. In the event of liquidation, claims by such groups of employees will take precedence over other creditors.

Like all analytical approaches, ratio analysis must be forward-looking rather than backward-looking. The reason is that past is seldom a yardstick of future events. The Intention of the management to obtain more capital at cheaper rates overrides many of their decision making processes. They may even liquidate existing debt to convince creditors that they mean well and that they no longer intend to pursue the reckless course of borrowing heavily that got them into the financial mess. However, many CEO’s betray this intention when they are tempted by acquisition prospects which they imagine will increase their net worth or sphere of influence. It is important for the intelligent reader to keep a lookout for signs such as these, before arriving at a conclusion regarding the creditworthiness of the company’s numbers they are reading. There are also other ratios which the reader should cross-check along with those from the Balance Sheet, which we have discussed. They are from the Income statement and the Cash Flow Statement, which we propose to examine now.

### Diagnostic ratios from the income statement

Up until now we have place emphasis on liquidity and risk assessment to the company’s assets. How-so-ever important that may be, the key inference related in effect to the overall profitability of the company. Without profits, no company can attempt to maintain liquidity or asset values. High flow of cash through the system is because the assets are productive, the managerial input is effective and company has ability to face the current market environment. The implication here is that credit analysis cannot ignore the income statement and its underlying ratios. Merely relying on the current ratio or the acid test ratio may distort the view presented to the prospective creditor and threatens the safety of the existing Lender. In the ensuing section we propose to examine the profitability aspect of a business for drawing conclusions about its overall financial position. We use the P&L statement of Bharti Airtel as a starting point.

Here are the profitability ratios for Bharti Airtel for the year ended March 31<sup>st</sup> 2012.

$$\text{Operating Margin} = \frac{\text{Operating Income}}{\text{Sales}} = \frac{143,016}{416,038} = 34.37\%$$

$$\text{Pre-tax Margin} = \frac{\text{Net Profit} + \text{Income Tax}}{\text{Sales}} = \frac{747,89}{416,038} = 17.97\%$$

$$\text{Net Margin} = \frac{\text{Net Profit}}{\text{Sales}} = \frac{57,300}{416,038} = 13.77\%$$

Bharti Airtel’s Operating Margins are typically higher than other telecom operators in India. This is largely due to the company’s ability to keep its total operating expenses lower than its peers. The company achieved this remarkable feat by innovative cost management techniques unknown to the industry, especially the ability to outsource most of its network operations to Telecom equipment suppliers like IBM and Eriksson.

To get a clearer picture of the company with regard to its credit worthiness, the reader must refer to the Balance sheet. We have reproduced the company’s corresponding balance sheet for the year as on March 2012.

Liquidity Ratios for Bharti Airtel are worked out from its Balance Sheet as on #1<sup>st</sup> March 2012.

$$\text{Current Ratio} = \frac{\text{Current assets}}{\text{Current Liabilities}} = \frac{148,084}{488,873} = 0.30$$

$$\text{Quick Ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}} = \frac{39,234}{488,873} = 0.08$$

$$\text{Working Capital} = \text{Current Assets} - \text{Current Liabilities} = 148,084 - 488,873 = -340789$$

$$\frac{\text{Total Assets}}{\text{Total Liabilities}} = \frac{1,570,616}{1,036,808} = 1.51.$$

$$\frac{\text{Total Debt}}{\text{Total Equity}} = \frac{690,232}{533,808} = 1.29.$$

Looking at these ratios gives a different picture. The company is likely to face liquidity issues during the year as it has a rather high negative working capital figure. It will have difficulty in meeting obligations and may have to fall back to further short-term borrowings which are already high. This view is further confirmed by the two ratios for assessing liquidity. The current ratio is less than 1 and current assets are just about 1/3<sup>rd</sup> of its current obligations. The quick ratio is precariously low as the cash and near-cash securities reserves are in fact less than 1% of its payment obligations. The overall picture which is a rough guide to credit-worthiness also does not look good as its total debt exceeds total equity by nearly 30%. A further reading of the report shows that the weighted average cost of borrowing from the previous year has nearly doubled during the current year along with the more than doubling of the total outstanding borrowing figure. This position in the consolidated accounts is the result largely due to the company’s overseas new acquisitions in Africa and Bangladesh Infratel Networks Ltd. which have been largely financed by borrowings.

At this point the reader begins to wonder whether the company will be able to meet its fixed payment obligations to its lenders. The margin measures we have discussed above reflect the management’s efficiency in utilizing its resources. However, if we can arrive at the number of times the net operating revenue covers the fixed charges like rentals and interest payments, it might be useful. Fortunately we can have such a figure. In its simplest form:

$$\text{Fixed charges coverage ratio} = \frac{\text{Net Profit} + \text{Income Taxes} + \text{Interest Expense}}{\text{Interest Expense}}$$

We can work out this from Bharti Airtel’s Income statement.

$$\text{FCC Ratio} = \frac{57,300 + 17489 + 13962}{13962} = 6.47 \text{ Times}$$

The Leading Telecom operator is comfortably placed with regard to the payment of its fixed interest charges, considered in isolation. Telecom operations in India are high fixed cost ventures, subject hyper-competition in a low-priced market. If the revenues begin to erode position may turn out to be difficult for Bharti. To garner information regarding the strength of the revenue stream the reader must turn to other sources. The financial statements are by and large pictures about the past events and therefore needs to be handled as such. At the time of writing this book, reports from various quarters are emerging which show that Airtel's position is far from comfortable. The company's quarterly revenues have been falling for the 7<sup>th</sup> quarter in a row. The much hyped acquisitions have not turned out to be gold-mine the company was hoping it would be. Noises emanating from the Board room have a worried flavour to them. With a mega-scale of operations and strong brand image the company management may yet need all skills to weather the oncoming storm.

### Diagnostic ratios from the cash flow statement

As a natural follow up of the above analysis one must turn to the Cash-flow statement for some answers which are not present in the other two statements. This statement analyses the company's sources and use of cash at the most basic level. Corporations are generally reluctant to issue new capital, for fear of diluting the existing shareholders' interest. This means that if there is a shortfall in operational cash the companies generally turn to borrowing. This reduces a company's financial flexibility and profitability in later periods. For industries such a Telecommunications which are highly capital-intensive, the key ratio to look out for is the cash-flow to capital expenditures.

#### Cash-flow from operations

##### Capital Expenditures

Generally, the higher the ratio, the higher is the financial flexibility. But here we must add a word of caution. The ratio for Airtel from its cash-flow statement is  $(128,341/126,118=1.01)$  is just one. This just about explains company's eagerness to borrow heavily in the open market to maintain its future competitiveness. If a company cuts back investments this ratio will improve, but it leads ultimately to a loss of financial flexibility in subsequent periods.

Another useful ratio to predict sustainability of cash -flows in future is to estimate the level of depreciation as a percentage of Cash from operations. This is so because Depreciation is somewhat a stable figure in the short-run. A higher percentage of Depreciation to Operating cash flow means that the company is assured of a higher proportion of cash flow that is fixed, at least in the medium term.

Perhaps the most important of the ratios from the Cash-flow statement is the percentage of Capital Expenditures to Depreciation.

#### Capital Expenditures

##### Depreciation

If the ratio is less than 1.0 over several periods, suggests that the company is consistently failing to replace its assets and is then exposing itself to competition and may face gradual liquidation. But the reader should not automatically come to the conclusion that just because the ratio looks alright, everything is fine with the company's future.

There are three reasons why this is not correct. First is inflation. This means that the same rupee amount spend while acquiring the assets will fetch lower capacities than originally obtained, even though

technological advances may have completely revamped the production process. In that case, the company will need to push investments even harder to stay in the same market-space. This happened to all incumbent Telecom operators during the De-monopolization of the sector in many countries during the late 1980's and 1990's. It is no surprise that many incumbent operators (*mostly government controlled*) went under during subsequent periods.

The second reason is the fundamental dichotomy between depreciation (an accounting concept, which follows the matching principle we so emphatically stated in an earlier chapter) and the actual wear and tear of the equipment in question. The danger is that a strong ratio may hide the actual worthlessness of the equipment. BSNL was the leading telecom operator in India producing annual revenues of over 350 billion up until 2007. What was not understood by the management was that more than 70% of this revenue was accruing from Landline services, piggy-backing on a large network of physical wires and lines that overnight a suffered loss of value due to the disruption from mobile telephony. An examination of the ratios up until 2007 based on BSNL financial reports gives no inkling of this impending catastrophe.

Thirdly, capital expenditures must match competitor outlays rather than depreciation. Any company that fails to keep eye on the competitors every move and match it or exceed it will eventually lose market share.

### Putting it all together

**The power of combination ratios:** We have already seen some powerful combination ratios, which combine the earnings numbers with the Balance Sheet figures, in the form of Returns ratios, relative to assets or capital investments. These measures act as a link between credit analysis as viewed by the creditors and productivity of capital as generally managed by the professional executives. We have seen the analysis of returns on assets and the du point approach and shall not dwell on them, therefore in this section. Instead, we shall move on to another set of measures which will point to the quality of the assets that the company's balance sheet displays. These are called Turnover ratios, as a category by themselves. The two most prominent assets that the balance sheet must have apart from the fixed assets are: Receivables and Inventories.

### Average days of receivables

The foundational reasoning behind the turnover ratios is the notion that a company requires to extent a certain amount of time to customers to pay up for the products it has sold and it normally receives time for payment for goods purchased. This results in not only a mismatch between revenue and cash but purchases and cash outflows. This system prompted the accountants to introduce the accrual concept and is a foundational principle for the matching concept. If for example, all customers paid up for sales within the 30 days terms that the company follows, the amounts due from customers (*also called the accounts receivable*) at any point of time will be exactly 8.2% of annual sales  $(30/365=8.2)$ . Looking at the same number from the opposite direction, 8.2 represent the number of days that the sales revenue due from customers is outstanding. "Days sales outstanding" (DSO) is also known as the "*average collection period*" or "*receivable days*". It measures how fast the customers pay their bills. We have worked out the number of receivable days from the Airtel's Income statement and Balance sheet numbers.

Day's sales outstanding (DSO) are calculated as:

$$\begin{aligned} \text{Average days of receivables} &= \frac{(\text{ARBY} + \text{AREY}) / 2}{(\text{Annual Sales} / 365)} \\ &= \frac{(54,929 + 63735) / 2}{(416,038 / 365)} = 50.90 \end{aligned}$$

Where: ARBY=Accounts receivable at the Beginning of the Year

AREY=Accounts Receivable at the End of the Year

As long as the company continues to sell on the same terms as at present, the level of receivables will rise as sales increase, but the ratio will remain the same. If at any time, the ratio deteriorates (*meaning an increase in the number*) it would imply several factors at work. The immediate question is why it is taking longer to collect payments, is the customer unhappy with the product, or is in financial difficulties? Are sales people increasing the sales by offering more discounts, or are they dealing with less creditworthy customers? Is there a problem with the collection software of the agents involved? Is there leakage in cash collected? It takes management skills and other accompanying data to arrive at the right answer and take initiatives that focus on appropriate solutions.

The DSO number is an important criterion for judging the quality of receivables and sales. This number varies from industry to industry and like all other ratios, by region, economy and seasonality. Whatever the background, a deteriorating ratio over several periods is a red flag. Unless that company has reflected this fact by increasing the provision for doubtful debts, it may have to write off some portion of the income at some future period. Businesses looking at an acquisition proposal may be interested to know the target company's financial flexibility management practices. DSO may even reveal extreme accounting artistry with the numbers as in the case of Sunbeam, the story we have narrated earlier.

### Inventory turnover ratio

If a company has piled up unsold inventory, the asset shown in the balance sheet under the heading current assets will show an increase. But the value of that inventory can be far less than the historical cost shown in the balance sheet. This could be the case with a fashion store that has leftover clothes from the previous season or a computer manufacturer who has a large stack of desktop computers designed around an out-of-date processor chip. A rise in the level of inventory without a corresponding sympathetic rise in sales is a precursor to inventory write-off. We can arrive at this symptom through the calculation of Inventory turnover ratio.

$$\text{Inventory Turnover ratio} = \frac{\text{Annual sales}}{(\text{IBY} + \text{IEY}) / 2}$$

Where: ARBY=Inventory at the Beginning of the Year

AREY=Inventory at the End of the Year

Of course, it is possible that sales have fallen thereby increasing the Inventory turnover ratio. However, the implications are quite different. The value of inventory may not have suffered, but drop in sales creates a glut nevertheless, prompting the management to cut back production. But this takes time. In the meantime precious cash is locked up in inventory, thereby making the company short of resources for much needed activities, net impact being loss of financial flexibility. Profitability may take a hit as price-cuts or discounts are needed to get rid of excess goods.

A possible distortion in the interpretation of this ratio is apparent.

If the price of a commodity rises due to a sudden spurt in demand or a temporary shortage, the inventory turnover ratio might show a dramatic improvement. This is true for Kerala based jeweller-shops that experience increases in gold prices on a daily basis during 2011 and 2012, yet physically the quantity of goods sold or the stock of inventory remains more or less the same as before. The converse is also true in the case of a price-cut in response to poor off-take. One solution is to use "Cost of goods sold" in the numerator instead of sales figure as both numerator and denominator then will be based on historical costs.

### Debt to cash flow ratio

We could look at the financial flexibility of the company from the point of view of a lender by calculating the total debt the company holds as a percentage of the Cash-flow-from-operations.

The Formula will then be:

$$\text{Total Debt to Cash Flow} = \frac{\text{Total Debt (Short-term + Overdraft + Long-term)}}{\text{Cash Flow from Operations}}$$

The ratio looks at the business unit from the point of view of cash that is available in the bank rather than the accountants' view of earnings which is sometimes not so real. Let us consider the case of an imaginary company which has a total debt obligation of Rs.100 crore and a cash flow from operations of Rs. 20 Crs per annum. The ratio then states that the company can clear its debt in 5 years' time if it uses all its cash for debt repayment. No company can earmark all its cash for debt servicing however, but the ratio reveals that such a company is definitely in a better position than another which has Rs.80 crs debt and a cash flow of Rs.10 crs yearly. The Later Company will then be able to redeem its total debt in 8 years if all cash goes for redemption. But it will face redemption pressure if the maturity period of the debt changes or interest rates moves up due to rebalancing of debts.

The ratio then is a fairly reliable measure of the financial flexibility of the Company, as it is fashioned from numbers that are hard and somewhat more realistic and therefore would reflect a more real picture of the ability to meet such obligations. We have presented this unconventional ratio at the end of this section on credit analysis because the other commonly used ratios for measuring credit-worthiness suffer from definite known weaknesses which are the result of the accounting process itself. Here I invite the reader to revisit the two major ratios in vogue. The popularity of debt-equity ratio in textbooks on finance and management discussions constitutes an exalted position in business journalism. But it suffers from a major weakness. Equity value cannot be assessed realistically till the company is involved in a sale/purchase transaction. (Accountants refuse to record anything other than historical values unless a premium is realized through a sale.) Therefore the true value of the ratio is unknown even so, it will be more hazardous to compare two or more companies based on this ratio. Fixed coverage ratio also lacks conviction as it is based on earnings as the numerator and you have already learnt that earnings are subject to the accountant's opinion. This is because the accountant can and often do use the depreciation number to boost earnings. But cash flow cannot be manipulated (*except in extreme cases where the company is fraudulent*) and debt obligation is also a real number that represents real cash outflow.

### Can we predict bankruptcy?

Any discussion on the creditworthiness of a company naturally leads to the problem of bankruptcy. The Lender and the ordinary investor must be able to answer the question as to whether it is absolutely certain that the company will not go into liquidation in the near future.

Many readers might imagine that the question is somewhat farfetched and perhaps irrelevant because bankruptcy is the last resort action of the business to protect its assets, and to salvage whatever remains of the unfortunate enterprise before complete erosion of the net worth. So far in this book we have approached the issue of creditworthiness from calculating ratios from the numbers put out by the management. We have shown that a careful analysis of the ratios after eliminating the biases built into the numbers can reveal a lot about the quality of risk involved in lending to the company. We used basically two techniques. One was to compare the ratios against some well-established norms prevalent in the industry among peer-groups resulting in a ranking of those companies and the other was the trend analysis of the ratios themselves for the particular company. The later technique will be discussed in more detail in a later section on comparative ratio analysis.

This discussion is still incomplete because we have not yet answered the question as to how to rank a company if two ratios which are related are in conflict with each other. For example, how would the reader rank a company that reflects a poor debt-equity ratio but is fixed-charges coverage ratio is excellent? (*The reader may recall that Bharti Airtel exhibits this characteristic while looking at its ratios.*) In other words is coverage more important than leverage? This requires more thought than a mere subjective opinion of the reader. Fortunately for us statistical studies have attempted to establish a relationship between ratios and default. One such model which attempted to closely establish a relationship between the financial profile and loan default, otherwise called bankruptcy, is the Edward I. Altman's Z-score model.

### Altman's z-score

A mathematical formula developed in the 1960s by NYU Professor Edward Altman that attempts to express the chances of a public company going bankrupt within a two-year time period. The number produced by the model is referred to as the company's Z-score, which is a reasonably accurate predictor of future bankruptcy. The model is specified as:

$$Z = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E$$

Where

Z=Score

A=Working Capital/Total Assets

B=Retained Earnings/Total Assets

C=Earnings before Interest & Tax/Total Assets

D=Market Value of Equity/Total Liabilities

E=Sales/Total Assets

The zeta model returns a single number, the z-score, to represent the likelihood of a company going bankrupt in the next two years. The lower the z-score, the more likely a company is to go bankrupt. A z-score lower than 1.8 indicates that bankruptcy is likely, while scores greater than 3.0 indicate bankruptcy is unlikely to occur in the next two years. Companies that have a z-score between 1.8 and 3.0 are in the grey area, bankruptcy is not easily predicted one way or the other.

We have presented this analysis primarily because; we believe that mathematical models based on actual statistical information collected from real market correlating financial variables with the propensity to default have certain distinct advantages. The foremost among them is the elimination of biased opinions of analysts which are fairly more subjective in comparison. The second aspect is that in real practice

rating agencies like Moody's and Standard and Poor have arrived at their default rating evaluations through such and process. Academic studies like the Z-score have confirmed this process rather than contradict them. The rating by agencies is a probability ranking of default within next one year, next two years and next twenty years and so on. These conclusions are merely vindicated by the academic studies. The reader must remember that even though this is so, quantitative models, sometimes very elegant and sophisticated cannot substitute for human judgment in its entirety. As stated elsewhere in this book, prediction is always defective, especially if it is about the future since probabilities are most often based on past data extrapolated to represent future. It is good to remember that future is never a continuation of the past even though it might appear to be so.

One another albeit important aspect is that default and shutdowns might occur for reason other than financial. Companies are forced out of business because of environmental issues or other social factors even though they might be sound financially.

Another interesting yet valid approach to the issue of default is to compare book-value (*of a company's obligations*) with the market value (*unit value of a share × number of shares outstanding*) of the company. In theory, owner's equity or Net worth as we have defined is the residual value of the company after it has met all its obligations to its external creditors. We then proceeded to inform that the market value of this equity is the price at which an investor is willing to buy the assets of the company, in an arm's-length transaction. Therefore if at any time, if the market value of the equity falls below the total value of a company's liabilities, it means that a unit of stock of the company is worthless. In fact the company is bankrupt. Simply by watching the trend of share-price values must therefore be able to predict an oncoming bankruptcy.

As has become our habit, we end this section with a word of caution. Looking at share prices is certainly a useful way of arriving at the company's financial health, but it is not infallible. At best it is a good signal. Like most signals it has to be interpreted and decoded. Let us imagine the case of a company that borrows heavily to buy-back its own shares. The result is that its debt-to-equity ratio rises dramatically; also its share price in the market tends to rise. Larger loan boosts earnings-per-share due to tax advantages of financial leverage and reduced number of shares outstanding. Such rises in share prices does not in fact improve its default risk but considerably increases it. A further consideration while relying purely on mathematical calculations is that companies do change their capital structure in response to take-over bids or to finance an attractive acquisition. Such actions can render ratio analysis irrelevant. The second problem is that not all companies have shares which trade on the stock market. In such cases substituting the share-prices of a peer-group company is not a solution as this method cannot expose the specific problems and internal conditions of the company in question. The reader must dissect the financial statements through ratio-analysis and turn simultaneously to other data to arrive at a definitive conclusion about the default risk of the businesses they are interested in.

### Equity Analysis

Everyone is an expert on the stock market. The number of books and write-ups on the subject on stock-picking is as numerous as the stocks themselves, perhaps only more. From the highly sophisticated models built by PhD's in mathematics to the 'panwallah' on the streets in 'Lal-Darwaza' of Ahmadabad's sprawling business community, everyone seems to know what stocks will hit the roof and what should

be avoided. In the midst of all these noises and voices, why would the author of this book attempt to explore the subject of equity analysis? The answer is rather straight. This section is not about stock-picking at all. We will deal with the topic in a purely simple form, intended to introduce the concepts of equity evaluation in only so far as it throws a definite light on the aspects of valuation of that portion of shareholder's stake in the business. Its relevance is its ability to enhance the reader's financial skills. The task may look simplistic at first, but is a complex enough task to reduce its sophistication to a basic form, as we promised to keep the book free of jargons.

## Two approaches to equity valuation

Foremost among all keen observers of a business are the owners themselves who wish to see their original contribution into the business growing year after year. This is the true meaning of profits. Any other number does not constitute real profits. Accruing wealth and in a concrete form of annual pay-outs, is otherwise called dividends. He might be willing to sacrifice present dividends in the hope of greater dividend pay-outs sometime in the future. But dividend is the basic motivation. Analysis that attempts to reveal the true and fair value of a unit of stock in a business based on wealth creation in its real sense is known as "fundamental analysis". Those who adopt this method are convinced that the financial characteristics of the company in question reveal a lot about its value. They therefore believe that the market for securities and stocks take all available information about a company both as revealed in its accounting statements as well as those that fall outside the purview of accounting information. This essentially implies that the market is efficient enough to incorporate all available information about a stock before arriving at its price. (*The price is the "fair-price" we had introduced earlier in the book as the price that two parties are willing to pay dealing at an arm's length.*)

Fundamental analysis can break-up the financial statement of companies into various ratios and attempt to eliminate biases involved in accounting process. However, there are those who argue and demonstrate that the prices of shares are as a matter of fact influenced by events which cannot be captured by accountants in their well-constructed statements. For example, a company subject to hostile raid by a competitor, will exhibit share prices not realized by fundamental analysis. Ownership pattern perhaps is a greater influence on such matters. This is true in situations of leveraged buyouts or liquidation by court interference.

Then again there is the hitherto unexplained influence of "market-sentiment" which sways prices of the shares even though such fluctuations are not warranted by fundamental factors. Such views have prompted certain section of the market-oriented analysis to abandon the concept of fundamental analysis and purely use the data of prices obtaining in the market to analyse the stock values. Past behaviour of prices of shares is therefore used to predict future values. Their approach is generally referred to as "Technical Analysis" as it relies on purely computerized data crunching to uncover patterns of behaviour of such data. Sometimes this is called "charting" as they tend to extensively rely on "charts" of data and graphs that reveal patterns to predict future direction of the graphs themselves.

Scattered in places in this book the author has ventured to reveal his inability to subscribe to the view that the past, merely because it did occur, is a reliable basis for prediction to the future. Someone here might say: that he "bets a million rupees that the sun will rise tomorrow!" Yes, indeed the sun will rise, but what if the person did not rise in the morning to win the bet? This book therefore, will not criticize

the practitioners or the methods of technical analysis, but suffice it to say that most data series exhibit a particular pattern because of the fundamentals driving the data to the surface and not because the data elements did occur in the past. Cyclicity and patterns are observable all over in nature, but what explains and predicts their behaviour is the causality and interrelationships among variables. In this book, we will approach equity analysis from a fundamental standpoint, namely, future values of stock are driven both by the present financial situation of the business and its future earnings capability. However, we recognize simultaneously that prediction of earnings is hazardous because of the existence of "black swan events" which are events that cannot be predicted by anyone. Consider the events of 'September 11' in the USA, which no one on earth could have predicted, not even the perpetrators themselves. But these events have affected the earnings of insurance companies and so on in an extraordinarily direction, hitherto unanticipated by anyone.

## The dividend based model

We have hinted rather emphatically that investors expect returns in the form of dividends from the business (*either distributed or accumulated*) that in effect add to the wealth of the investor over a period of time. Perhaps the most intuitive appeal of the argument is that from this concept of future dividends, we can build a discount model for the present price of a single unit of share of the company. It will then follow that the current price of a unit of stock in a business is the discounted value of all expected future dividends. Here the smart reader may point out an apparent contradiction with the statements in the previous paragraph, namely, when the future is itself uncertain how could one predict the dividends pay-outs? True indeed, the problem can be overcome if we vary the applicable rate of discounting to suit the expectation of future dividends. A high discount rate will then represent a more uncertain world and a lower rate reflects lot more confidence. This is entirely left to the individual as prediction is always entwined with subjective affiliations. The uncertainty premium or the risk premium that a certain level of dividend will not materialize is the mark-up that investors will demand on the risk free rate that individual can get if he invested his money elsewhere in absolutely no risk situation. As an example government treasury bonds returns currently fetches 8% return, and is assured. To motivate the investor to place a bet on a unit of stock in a business 8% + a premium (say 4%) is needed to cover uncertainty of realization. We may call this the "required returns" for investment decision into a stock. Then the price of stock is:

$D$  = current dividend rate

$P = D/K$   $P$  = Current Stock price

$K$  = required rate of return

Here is the critical part. If your analysis of the statements of accounts put out by the company through ratio analysis and other methods described in the book reveals that the appropriate discount rate is in fact higher, than what the current price of the stock in the market implies, you will conclude that the stock is over-priced. In other words your analysis concludes that the future dividends are not so certain, you will apply a higher discount rate in the formula, making the price of stock lower as a result. The important element in this analysis of the price behaviour of a stock in the market is the "required rate of return" which is a subjective element.

## What about appreciation?

When introduced this way the intelligent reader, perhaps based

on observations from real world, would turn around to pose what he would consider a legitimate question. "People buy stocks not only for the dividends expected, but also for the appreciation in price of the stock. Should not the valuation of a stock include this aspect as well?" The concept can perhaps elegantly counter this question, in a fully convincing manner. The answer to the above poser is another equally powerful poser. Why should the price of a stock increase unless there is an expectation of future dividends to rise? In a situation where there is no growth of dividends at all the valuation of a share will be exactly the same as before assuming that the interest rate and certainty of these dividend pay-outs do not change. The stocks prices will raise only if the dividend-returns are expected to rise with more or less certainty, else the stock value remains or may even fall. The foundational concept of future dividends as the basis for valuation of a business is established more than before.

### The price-earnings ratio

The P/E ratio is a valuation ratio of a company's current share price compared to its per-share earnings. This is among the most popular ratios in investment literature. However, it is as popular as it is misunderstood. As a matter of fact, this ratio came into financial literature, not because the dividend models were defective, but because it was not easy to compare companies based on it. The difficulty arose due to two main reasons. First and foremost it required basic understanding of financial models of discounted cash-flow method and related concepts. Secondly it was initially a static model that did not seem to fit in with growth companies that ploughed back earnings back into the company to fire future growth prospects.

We propose to deal with issue of growth companies in this section, as we have already explained to the reader the fundamental concepts of discounting elsewhere in this book. For the present in order to fully appreciate that the valuation of growth companies can be better understood by the dividend discount models itself, we need to digress into the concept of Price-earnings ratio. The reason is that the two concepts are interrelated.

P/E ratio is calculated as:

$$P / E \text{ ratio} = \frac{D / K}{\text{Earnings Per share (EPS)}}$$

For example, if a company is currently trading at Rs.43 a share and earnings over the last 12 months were Rs.1.95 per share, the P/E ratio for the stock would be 22.05 (Rs.43/Rs.1.95).

The most commonly heard ratio in the street is also perhaps the least understood.

In general a higher value for P/E ratio suggests that investors expect higher earnings growth in the future compared to companies with a lower P/E. This logic follows from our earlier model of dividend based valuation. Thus if we substitute the formula for Price from the Dividend discount model, we get:

$$P / E \text{ ratio} = \frac{D / K}{\text{Earnings Per share (EPS)}}$$

The above formula suggests that, the value of P/E depends on the discounting factor applied by the investor or the required rate of return that follows directly from the certainty or uncertainty of dividends that are expected from the company in future. Let us now assume that the growth rate in dividend-pay-outs for a company of any size is *g* (growth). Our Formula for the price of a share then can be recast as follows:

$$P = D / (K - g)$$

Let us try to understand the implications of this formula in some detail. Let us assume a company with the following numbers in their books. Total earnings Rs.4, 000,000, number of shares outstanding 15,000,000. The current market price of a share is Rs.48.75. If dividends are expected to grow at a definite rate of say 10% per year, and the investor has already a required rate of return is 13% (which we explained earlier as the assured rate of return in an absolutely certain investment like treasury bond, say 8% plus his subjective premium for the uncertainty of return from the dividends, say 4%), then we substitute these numbers in like this:

$$P = \frac{\{(4, 000, 000 / 15, 000, 000)\}}{(0.13 - 0.10)}$$

$$P = 1.2 / 0.03$$

$$P = \text{Rs.}40$$

The above illustration was brought in merely to demonstrate that an expected growth in dividends decreases the discounting factor by that much percentage (3% in this case) and therefore increases the price of the share in question, which otherwise would have been 9.23 (1.2/0.13=9.23). A ten per cent expected growth in dividends brings in a dramatic increase in the current price of the share. This model is then valid even if the growth rates of dividends is not uniform over the future, even though the calculations become a little more involved.

Continuing with our argument we can expand the above formula to work out the P/E ratio thus:

$$P/E = \frac{D/(K-g)}{\text{EPS}} \text{ where EPS} = \text{Earnings per share}$$

This formula reveals that if the expected growth rate in earnings is high then the P/E ratio also will be a high figure, which is not a surprising result because it is intuitively true. A high EPS produces a higher multiple because it in turn reduces the uncertainty of dividends, and shows up a lower discounting factor in our formula for P.

However, the P/E ratio doesn't tell us the whole story by itself. It's usually more useful to compare the P/E ratios of one company to other companies in the same industry, to the market in general or against the company's own historical P/E. It would not be useful for investors using the P/E ratio as a basis for their investment to compare the P/E of a technology company (high P/E) to a utility company (low P/E) as each industry has much different growth prospects.

The P/E is sometimes referred to as the "multiple", because it shows how much investors are willing to pay per rupee of earnings. If a company were currently trading at a multiple (P/E) of 20, the interpretation is that an investor is willing to pay Rs.20 for Rs.1 of current earnings.

It is important that investors note an important problem that arises with the P/E measure, and to avoid basing a decision on this measure alone. The denominator (earnings) is based on an accounting measure of earnings that is susceptible to forms of manipulation, making the quality of the P/E only as good as the quality of the underlying earnings number. The intelligent reader perhaps spotted the full potential of such an analysis. Let us imagine that a company's management has "creatively" used accounting skills to manipulate its earnings that show up as a higher EPS in the annual report. The analysis using techniques we have described will reveal this inconsistency and therefore he will assign a higher discounting factor to eliminate the potential distortion in pricing because of the manufactured earnings figure. Such a company

cannot hope to have its shares valued at the same multiple as another peer-group company that has not indulged in such inconsistent accounting practices.

### Why P/E multiples vary

We have listed below a random set of telecoms in various countries, to show that P/E ratios can vary widely between companies even within the same industry. This will be true for companies within the same country. The issue here that we will try to answer is why P/E ratios vary (Table 2).

Large cap companies like Telecommunications operators do not show P/E multiples as uniformly as we would normally expect. The reasons could be anyone of the following:

- Managements have a reputation for erratic changes in policy, such as ill-conceived acquisitions that makes prediction of earnings difficult for the investor
- Company may be known to have manipulated earnings in the past or reported “earnings surprises” that were not consistent with reality
- Regulatory and governmental policy predictability in many countries is responsible for sudden earnings pressure for many telecoms in recent years.
- Falling ARPU of Telecommunications in hyper-growth markets have placed pressure on returns on assets

The analysis may be mistaken in these perceptions, but it is generally observed that smaller companies have lower multiples than larger competitors who are better capitalized. China Telecommunications sector is perhaps the largest in the world and has high potential for further growth because of the expanding economy and population. So is the situation in its neighbouring country India, and it is not unreasonable to expect higher multiples for companies that operate in these economies as compared to a mature market like the United states currently in the throes of a downturn. India’s leading Telecom operator has been under pressure due to a spate of acquisitions in Africa and Bangladesh financed by debt. It has been facing declining earnings margin over several quarters in a row. This is perhaps reflected in lower P/E ratios.

Faced with lower multiple estimates as a signal from the market many managements attempt to defend the indefensible, namely that their share prices are undervalued. However, the arguments often revolve around forward-looking analysis of future potential. Investors would do very well to remember that it is much easier to create a positive image of the company than re-cast its current operations to improve all round efficiencies. The other danger for the unwary investor

lurks in the creation of “trends” almost like fashion fads. During the late nineties, it was fashionable for all outfits, however small to be known as software-solutions provider or as being related to internet or telecommunications industry. Unreasonable multiples were attached by the euphoric markets to such companies, and write-ups about their future potential appeared in every publication like mushrooms after the rain.

Attaching too much credibility to high multiples of P/E without the real numbers to show for it is a destructive tendency that hurts the uninformed investor. When the telecom and internet bubble burst, these companies no longer wished to be associated with it. A similar story repeated during 2003-2005 when banking was considered the future success mantra. Mutual fund managers even created the concept of sector-funds that invested solely in banking companies. Then it shifted to energy and power generation companies, when RNRL (Reliance Natural Resources Ltd) a reliance owned company reached stratospheric heights in terms of P/E multiples. Such stories are examples to drag us back to the concept of fundamentals based analysis to arrive at an independent evaluation of the company numbers to assess the real risk of earnings in future and to apply a reasonable discounting factor to such earnings to estimate future potential.

### How do we know if P/E is realistic?

The previous paragraph may have prompted many readers to wonder, how then do we know is the P/E multiples are real or imaginary? Sustainability of growth rates as we discussed not only in connection with the calculation of P/E ratio, but also in a critical examination of growth rates in the past is to be carefully understood. How can we be sure that past growth will be maintained into the future? The answer is probably not. The answer is definitely no if the growth rates are sustained by anything other than accumulation of retained earnings per share. Here we are again emphasizing our earlier position on growth in dividends. We showed that a business is accumulating wealth when its net worth grows from year to year. Net worth makes the businessman wealthier. Dividends are nothing but portion of the net worth that is distributed to the owners. What is not distributed accumulates as retained earnings. We can then define earnings per share as:

$$\text{Asset turnover} \times \text{Return on sales} \times \text{Leverage} \times \text{Book Value per Share} = \text{Earnings per Share}$$

or

The more familiar statement:

$$\frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Assets}}{\text{Net worth}} \times \frac{\text{Net worth}}{\text{Shares Outstanding}} = \frac{\text{Net income}}{\text{Shares outstanding}}$$

Earnings per share will not grow merely because the sales increase, since it is cancelled out by the denominator for return on sales. Any attempt by the management to enlarge its profit margins, will attract new competitors into the market and the subsequent competitive pressures will drive down the margins. Similarly, increasing the leverage to take advantage of borrowed funds as opposed to owner’s equity funds cannot go on beyond a limit. Lenders will then get alarmed at the abnormal debt-to-equity ratio of the company and will refuse to lend more money as they fear for the ability of the company to repay principal and interest. Aggressive management tactics to squeeze existing capital equipment and other assets to improve asset turnover efficiency will not succeed in the long-run because of the operation of the universal law of diminishing marginal productivity of capital. Most interesting of all is the hard truth that a company’s book-value per

Rank	Company name	P/E ratio
1	Cellcom Israel	5.25
2	USA Mobility	5.8
3	Telefonica Brasil	10.99
4	Turkcell Iletisim Hizmetleri	13.68
5	TELUS Corporation	16.03
6	Bharti Airtel Ltd	16.71
7	United States Cellular Corporation	18.53
8	Telular Corporation	27.97
9	Vimpel-Communications	36.21
10	China Unicom	52.61

Table 2: P/E ratios between companies.

share will not raise at all if the company distributes all its net income earnings in the form of dividends to its shareholders. This is the reasons why you may have seen in the real market situation that share values do not spike proportionately to increases in dividends immediately on its announcement. It also implies that the company can earn its traditional return on equity invested if it ploughs back profits rather than distribute it to shareholders. This leaves us with only real increases in net profits that will boost earnings per share.

One another way of course is to reduce the number of shares outstanding, by buying back a company's own shares. However, stock-buyback if resorted to against other growth opportunities will be self-defeating. Between 1995 and 1999 IBM resorted to buying back its own shares by borrowing funds, and therefore exposed itself to more financial risk. Such a move has been seen through by the market and the growth story has been self-limiting. However, if a company has idle cash in the bank far more than it can deploy profitably in investment opportunities, an attempt to boost the EPS through share buyback cannot be faulted.

## Summary

This has been a rather longish chapter, as compared to its predecessors, but with a good reason. The key message to take away from this discussion is, indeed, that a clear understanding of the financial statements is a foundational requirement for analysing a business. The basic concepts that we have presented at the start of this book namely the concept of net worth gets clearer and more vivid with each progressive chapter. Ratio analysis is aimed at laying bare the various angles that the users of financial statements may wish to explore, confirm and satisfy about the business. We looked at the techniques of ratio analysis from an internal point of view to understand the working of the company and its consistency in reporting. We also needed the

statements to break apart the creditworthiness of the company and how safe the lenders are to assume repayments periodically. Here the issue that statements are subject to manipulation much of it perfectly legal. We warned the reader to equip him with all the tools described, but be wary of the games the managements may play, but not to be too complacent about them, as factors that lie outside the accounting statements do influence the net worth of a business.

Finally we came to the aspect of company's value in terms of fundamental analysis based on a clear understanding of the financial statements. Highly volatile market for securities do not represent any kind of analysis at all, but are largely based on emotional sentiment ruling at the split moment of decision-making by the players. While this indeed is a fact to be reckoned with, it rightly belongs to behavioural scientists to explore. Long term players in the market must take into account the valuation based on fundamental analysis that has its invaluable foundation in financial statements. Stock may move in frenzied reaction to events of little consequence to a company's fundamentals, however, in the long run the true value of a share depends on the ability of a business to generate sufficient earnings and cash in future. Previous performance of a stock must be seen in this light, which moves sympathetically with its earnings' potential after eliminating all sentimental short-term movements.

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