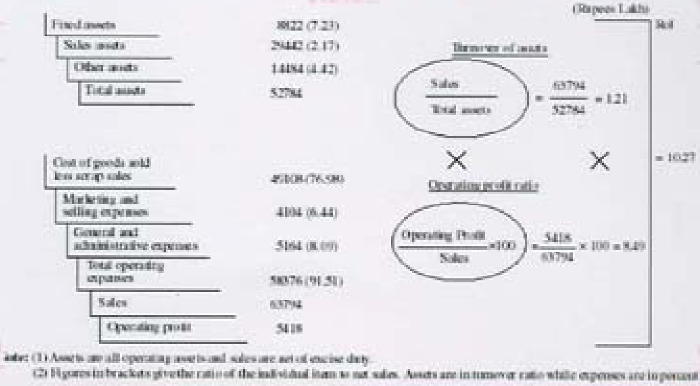
SECOND EDITION

TOTAL MANAGEMENT BY RATIOS



An Analytic Approach to Management Control and Stock Market Valuations

HRISHIKES BHATTACHARYA

Total Management by Ratios

Total Management by Ratios

An Analytic Approach to Management Control and Stock Market Valuations

Second Edition

Hrishikes Bhattacharya

SAGE Publications
Los Angeles • London • New Delhi • Singapore

First published in 1995
This Second edition published in 2007 by

Sage Publications India Pvt Ltd
B1/I1, Mohan Cooperative Industrial Area
Mathura Road, New Delhi 110 044
www.sagepub.in

Sage Publications Inc
2455 Teller Road
Thousand Oaks, California 91320

Sage Publications Ltd
1 Oliver's Yard
55 City Road
London EC1Y 1SP

Sage Publications Asia-Pacific Pte Ltd
33 Pekin Street
#02-01 Far East Square
Singapore 048763

Published by Vivek Mehra for Sage Publications India Pvt Ltd, typeset in 10/12 pt Times by Star Compugraphics Private Limited, Delhi and printed at Chaman Enterprises, New Delhi.

Library of Congress Cataloging-in-Publication Data

Bhattacharya, Hrishikes.
Total management by ratios: an analytic approach to management control
and stock market valuations/Hrishikes Bhattacharya.—2nd ed.
p.cm.
Includes bibliographical references and index.
1. Ratio analysis. 2. Management—Statistical methods. I. Title.
HF5681.R25B48 658.4'033—dc22 2007 2007031383

ISBN: 978-0-7619-3621-3 (PB) 978-81-7829-785-9 (India-PB)

The Sage Team: Sugata Ghosh and Koel Mishra

For
Orphi and Saraswat

Contents

List of Tables

List of Figures

Introduction

Your manuscript is both good and original, but the part that is good is not original and the part that is original is not good

—Samuel Johnson

The post-industrial society of Daniel Bell or the super-industrial society of Alvin Toffler have one thing in common: Uncertainity. The world is now more complex and uncertain, not because there is too little information but because there is too much information. The process of decision-making has become complex because the decision-maker now has a blast of information around the decision-field pointing often in different directions. Although the electronic revolution has made information processing simpler, it has made information choice the most difficult. In real-life situations, the quality of a decision taken is often found to be inversely related to the quantity of information.

In our drive to exploit the fullest possible data-processing capability of computers the old adage is often forgotten: management of a complex system needs only a little information and even fewer tools of decision-making and control. In this age of information deluge, organisation of information relevant to a decision-field has become the primary task of a decision-maker. The relevancy of information depends, among other things, on timeliness, purpose and, most important of all, the ability of the decision-maker to comprehend it in the shortest possible time in a high-pressure business environment.

Managerial information is generally of two kinds: primary information i.e., information for a decision-maker to take a decision and feed-back information, i.e., information for the controller to monitor and control the implementation process of a decision. Information which combines the two characteristics saves both time and costs, though feed-back information, at some stage, also aids the primary decision-making process. A carefully chosen ratio or a set of ratios can not only aid the primary decision-making process it could as well act as a highly effective monitoring tool. In other words, a ratio could be both information as well as a tool for decision-making and control.

A business system continuously generates data. Although some data can be directly used as information, in most cases further processing is required to bring out the information content of data. Various methods are available for the processing of data—both statistical and non-statistical—but data-processing by the ratio methods has the ability to bring out the maximum information content if variables that produce a ration are correctly chosen with regard to the purpose at hand. Ratios enjoy remarkable simplicity and, in spite of the problem of multi-collinearity, the information revealed by them is so direct to a particular decision-control situation that movement of a ratio or a set of ratios gives a picturesque representation of the movement of an actual business process.

The simplicity and directness of ratios attracted the minds of great analytical thinkers even in ancient times. Available records indicate that it was first used by Euclid in about 300 BC. Subsequent history of the development of the physical sciences saw intensive use of ratios. However, business applications of ratios came at a much later date. The pioneers in this field were commercial banks who first used ratios to measure their lending risks. That was in 1870. Since then, development and use of ratios, particularly in financial analysis of businesses, has been extremely fast as reviewed in Chapter 1 of this book.

Since 1916, when Henri Fayol first laid the foundations of the scientific management school, decision-making and control has remained the exclusive domain of certain specialized people. It did not permeate all levels of enterprise-functioning. This school had a limited perspective and stressed heavily on the compliance aspect of management control. Management as a positive science and a proactive art was yet to emerge. Ratio analysis was virtually confined between liquidity ratios and return on investment.

The 1960s saw the advent of business information systems and with that came the well defined functional sub-systems. Focus was on development and application of various tools of managerial decision-making and control. Operations research found its way from warfare analysis to extensive business applications. Long range planning was to become a distinct management function in large corporations. Ratio analysis or analysis by ratios entered into almost all functional areas of business as an important tool for decision-making and control. A number of function-specific ratios were developed during this period for monitoring and control of enterprise-functions.

Subsequent development of ratio analysis during the following three decades had to contend with ever changing technological environment of business, the economic crises arising out of inflation, recession and depression, and intensification of competition—all leading finally to an age of uncertainty. Development and use of financial ratios was to follow two well drawn paths: (*a*) measurement and monitoring of a firm's functional and overall performance against standards and (*b*) estimating empirical relationships, usually for predictive purposes. However, it was concurrently felt, particularly during the 1980s, that financial ratios could not fully comprehend the ever increasing complexity of business that resulted from the enterprises' need to globalise and the manufacturing revolution that preceded it. The discipline of management accounting also found its shores changing with the changes in the manufacturing strategies of businesses. Quality and cost of quality became the key words. With the increasing need to integrate functional sub-systems with the principal goals of businesses, which are now spread around the world, came the need to integrate financial accounting with the discipline of management accounting to enable a manager of an enterprise to take a total view of the business in globalised operations.

The objective of the present edition of this book is to enable an analyst and enterprise-manager to take a comprehensive view of organisational and market performance of an enterprise through the structures of ratios. In Chapter 2 an approach towards integrating business functions through ratio analysis is made. In Chapters 3–10 management function is disaggregated into manufacturing management and financial management, which are further divided into various sub-groups. Attempts are made to analyse each such sub-function through sets of financial accounting and management accounting ratios wherever feasible. In Chapter 11 models for measurement and monitoring of managerial efficiency through ratios are presented to enable a Manager to take an integrated view of different management functions of a business. Various ratio-structures are developed and their analyses are made with the help of primary data of a fairly large manufacturing company operating in India. However, the temptation to make an 'overall appraisal' of the company is diligently resisted because appraisal depends upon the objective of the individual appraisers. For example, the objective of a shareholder and that of a lender may be at variance in many respects.

In Chapter 12 ratios are used as predictor variables to enable a manager to evolve strategies for growth and prevent the business from going into bankruptcy. In Chapter 6 cash flows of a business are captured through an algebraic model. A summary of findings from empirical research is presented to highlight growth constraints followed by the development of a simple ratio-analytic growth model.

Usage of ratios for predicting business failures really began in the 1960s with the two seminal works done by W.H. Beaver and E.I. Altman. Since then, as the incidence of bankruptcy began rising in all parts of the world, particularly in the developed economies of the United States and Europe, studies on bankruptcy prediction by ratio analysis began growing. A wide variety of literature on the subject made an appearance. In Chapter 13 an in-depth review of most of the important literature is made. It has been found that findings of these empirical investigations are more contradictory than corroborative.

The survey indicates that about 25 ratios have been used in one form or the other by various researchers on the subject. Some of these ratios, which have been used earlier in Chapters 3–11 for management control and decision-making, have once again been subjected to further analysis in order to bring out their predictive power. It is observed that all these ratios are finally pointing towards development of one single fund ratio which can explain and predict business failure. Attempts are then made to develop this ratio in a ratio-analytic framework of a business enterprise.

Financial accounting ratios are extensively used for stock market valuations. This has already emerged as a new discipline. For valuation of shares of a company traded in stock exchange, it is assumed that the analysts or investors do not have information about internal management of the enterprise (insider trading is a punishable offence), which is predominantly the domain of management accounting. They rely on the published financial statements and information released by management in periodical financial statements, and announcements made from time to time on behalf of the company. Fundamental analysis for stock market valuations integrate financial accounting variables with the market. In Chapter 14 discusses stock market valuations. Financial accounting ratios are integrated with the market ratios to enable an analyst/investor to make an estimate of the present and future market price of a company's share.

The construction of the book is such that every stakeholder of an enterprise can pick up a set of ratios that fits his/her objective.

The dominant part of the present work is a result of my consulting experience, spread over a decade, with diverse companies. The rule of fidelity demands that these companies should not be named, but that does not prevent me from extending a general thank-you to all of them. My being on the Board of Directors of a nationalized bank enabled me apply and test successfully a number of ratios and, thus gain tremendous experience in the working of these ratios in credit-decisions. I thank Government of

India for putting me on the Board of the bank and to the management of the bank who helped me in implementing some of the ideas.

I must thank the first anonymous referee who reviewed the manuscript of the first edition of the book and made constructive suggestions. Thanks are also due to another referee who reviewed the book for its second edition. The updation and various other improvements of the book in its present edition are predominantly due to his suggestions. There may still be some shortcomings for which I am solely responsible.

All the years that I have taught post-graduate courses on financial management at the Indian Institute of Management, Calcutta, I have received various suggestions from my students which have enriched the contents and presentation of the book. Particular mention should be made of Alok Rastogi who helped not only in summarizing various ratios used in the book in a tabular form but also in critically reviewing the manuscript of the first edition of the book from the view point of a management student.

Messers Amiya Adhikari, Asit Manna and Subal Mukherjee shared the secretarial work of the first edition of the book. Akshoy Singha assisted me in drawing charts and diagrams in the analytical part of this work. I thank all of them for bearing my impertinence with unlimited patience. The manuscript presentation, writing of diagram and designing of various tables of the second edition of the book is done by my daughters Orphi and Saraswat who have now grown up with a remarkable knowledge of computers. My wife Gouri, as usual, carried the burden of managing a husband's growing impatience and tantrums. All of them get very angry whenever I try to thank them.

HRISHIKES BHATTACHARYA

Chapter 1

Advent, Development and Use of Ratios

We read history through our prejudices

—Wendell Phillips

INTRODUCTION

Ratio analysis owes its origin to Euclid. He, for the first time, made a rigorous analysis of the properties of ratios in Book V of his 'Elements' published in about 300 BC. Since then ratios have been used extensively as analytical tools in the fields of science and technology. Its use in financial management is, however, of recent origin (Horrigan, 1968).

With the emergence of professional management in the wake of vast industrial expansion in America and Europe during the nineteenth century, accounting systems came to be standardised. This paved the ground for the advent of accounting ratios as the most important analytical instrument for financial statement analysis. At that time, profitability of the business was the principal criterion for business performance and managerial evaluation. The first set of ratios that emerged was, therefore, the profitability ratios.

CREDIT RISK ANALYSIS

The graduation of Western economies, particularly of the United States, into modern industrial economies, needed the ever increasing support of financial institutions and banks. Credit became the prime mover of industrial activity and hence, the financial sector, at times, came to be more powerful than the industrial sector of the economy. As such, credit analysis was developing concomitantly with financial performance analysis. It was soon to become a distinct discipline. Although both the disciplines used financial statement analysis as their basis, their approaches were different. A lender's concern was to develop measures for judging the ability of the borrower to repay the loan. A number of ratios were developed during this period towards this direction. As the business of banks and financial institutions was primarily to deal in the uncertain futures of individual enterprises with less information than the enterprise managers, they suffered from a greater amount of tension than the latter. This made them demand more and more information from a business enterprise. Financial statements were enlarged to accommodate this demand and with this, credit analysis expanded the arena of ratio analysis. The credit analysis approach came to dominate the general development of ratio analysis, especially in the earlier years. Records are available to show that commercial banks began to demand financial statements and subject them to rigorous ratio analysis as early as 1870. The practice became widespread in the 1890s when the volume and flow of financial information increased greatly.

EMERGENCE OF CURRENT RATIO

This flow of data was initially analysed on a casual item by item basis; next, a comparative columner basis was developed. At about the same time, the segregation of current from non-current items began; and finally, the relationships between different items began to come under scrutiny. Sometime during the last few years of the 1890s there arose the practice of comparing current assets of an enterprise with its current liabilities (Foulke, 1961). Other ratios were developed during this period but this ratio, which came to be popularly known as current ratio, was to have a more significant and long-lasting impact upon financial statement analysis than any other ratio. Truly, the use of ratios in financial analysis can be said to have begun with the advent of the current ratio (Horrigan, 1968).

When industrial development in the Western Hemisphere reached its height at the beginning of the twentieth century, management research found a dominant place in the intellectual activity of scholars and naturally, they were drawn to such an interesting area like ratio analysis. World War I intensified such activity which resulted in the development of a large number of ratios concomitantly with operations research. Ratios first aimed at measuring the risk potential of a venture while later attempting to devise methods to minimise such risks. However, in spite of the development of such a large number of ratios, not many of them were used by business and financial analysts. Current ratio continued to be the most widely used single ratio.

This lukewarm attitude of business analysts towards the development of ratios did not, however, deter the research activity which had already gained momentum. Ratio analysis took on different dimensions. First, it moved from purely intra-firm analysis to inter-firm analysis, followed by relative ratio criteria. It then moved on to the development of absolute ratio criteria, the most famous being the 2:1 current ratio (Lough, 1917).

RELATIVE AND STRATIFIED RATIOS AND THE PROLIFERATION PROBLEM

In his seminal work, 'Study of Credit Barometrics' published in the *Federal Reserve Bulletin* (March 1919), Alexander Wall compiled from a large sample of financial statements seven different ratios of 981 firms for an unspecified time period. These firms were stratified by industry and by geographical location with nine sub divisions in each of the strata. He observed great variation between geographical areas and between types of businesses. Although he did not subject his findings to further rigorous statistical analysis as is done today, and hence it met with a lot of criticism when it was published, it can be said as we look back, that Wall's work for the first time made an overt departure from the customary usage of single ratio with absolute criterion. While dealing with many ratios Wall faced a proliferation problem which he attempted to tackle by developing a ratio index which was essentially a weighted average of different ratios, the weights being the relative value assigned to each ratio by the analyst. Wall was bitterly attacked for this Index. Strain (1929), in particular, declared that Wall was an incurably optimistic theorist futilely and absurdly chasing the ratio absolute. But as we read the modern analytical works on ratio analysis we cannot forget that it was Wall who first laid the foundation of discriminant analysis, which was to occupy an important position in empirical investigation into ratios. Wall had, in effect, popularised the ideas of using many ratios and empirically determined relative ratio criteria and thus provided the direction to future research (Horrigan, 1968).

Proliferation of Ratios

The criticism of Wall's seminal work unleashed a great interest in ratio analysis during the 1920s. Published literature on the subject during this period was really voluminous. Increasing interest was shown by different trade associations who compiled and published industry ratio data, for example, United Typothetae of America (1922). Universities and credit agencies also did not lag behind. The Harvard Business School published a similar study in 1923. In the same year the famous credit agency, Robert Morris Associates, compiled industry-wise ratios. Although this period was claimed to be the period of 'scientific ratio analysis', there was not much 'scientific' content in it because no evidence is available in the literature of this period on formulation and testing of hypotheses (Justin, 1924). However, there had been a prolific outpouring of ratios during this period. Lincoln (1925), for example, published 40 different ratios in 1925 alone.

Systems Approach

This proliferation of ratios created a problem in discerning the right kind of ratios for business and credit analysis. Time had come for a more sophisticated and systematic presentation of ratios. The first coherent system of ratios was presented by Bliss who originated the du Pont ratio system (Bliss, 1923). He believed that ratios were indicative of the status of the fundamental relationship within the business which would come to be standardised by competitive conditions. He developed a model of a firm based entirely on ratios by interweaving the relationships of ratios which measured cost and expense, turnover and financial relationships, to ratios which measured earnings. Bliss' work may be considered naive under the present standard but it contained, perhaps, the first set of pebbles, though strewn around, for a theory of ratios to develop.

Grouping of Ratios

Work towards a systematic grouping of efficacious ratios began during this period. Roy A. Foulke successfully floated the idea of grouping ratios when he was working at the National Credit office during the late 1920s. Foulke developed 14 groups of ratios during this period but these were not widely known until 1933 when his next employer, Dun & Bradstreet, began publishing them in a series which immediately became the standard-setter in industry average ratio series. Foulke upheld his 14 ratios and their accompanying criteria by citing his many years of experience in handling them. He rejected the notion of *a priori* theorising of ratios and argued that empirically obtained knowledge, especially ratio criteria, was the only possible basis for the analysis of ratios (Foulke, 1937). This 'pragmatical empiricism' of Foulke exercised so much influence among the practitioners (because it was 'practical') that it retarded the development of a testable, well-developed theory of ratio analysis. However, Foulke's 'practical' approach led to the development of parsimonious sets of ratios, because managers are not very comfortable with too many ratios. Salmi and Martikainen (1994), having reviewed the work in this area, concluded that number of essential ratios could be reduced to about 4–7 essential ratios. Subsequent researchers have become more parsimonious in selection of ratios. For example, Beaver, McNichols and Rhie (2004) chose only three ratios for bankruptcy prediction model. It has been firmly established now that too many ratios spoil the direction of analysis. Many ratios are found to be overlapping. A carefully chosen small set of ratio has superior explanatory power.

Funds Ratios

During the post-war period the 'T' form of balance sheet was being replaced extensively by the fund statement balance sheet as the latter provided a greater insight into the business. Ratio analysis also took a turn by drawing ratios from the fund statement components which came to be known as 'fund statement ratios'. Although there were some studies earlier in this field, Walter (1957) can be said to be the pioneer in specifically incorporating the funds statement in ratio analysis. This new approach gave additional strength to ratio analysis and controlled, to a large extent, the proliferation of ratios, Beaver (1966), in his study of failed companies, also computed some of his ratios from funds statement data, as we shall see later.

MEASURING MANAGERIAL PERFORMANCE AND THE BRITISH EXPERIENCE

The du Pont Chart

At about the same time as Wall's study simultaneous development was taking place in the arena of managerial performance analysis by ratios. In 1919, the du Pont Company began using one of the most comprehensive set of ratios. It was a triangle, at the top of which was the famous return on investment (RoI) ratio resulting from the multiplication of profit margin ratio and turnover of total assets resting at the two sides of the base. Although the du Pont Company claimed to have been benefited from this comprehensive ratio it was to remain virtually a secret for a long time.

During the 1950s the du Pont chart of triangle representation of RoI ratio flashed into limelight and considerable interest was shown in breaking down of ratios, particularly RoI, to gain a better insight into the working of a ratio and its managerial control. Several alternative presentation and refinements were made. Moller (1958) devised a system where inventory turnover and debtor turnover ratios were considered as sub-categories of total assets turnover ratio. Gold (1955) developed an extensive ratio model of RoI but he used mainly productivity ratios, which required physical output and productive capacity data rather than financial data. Rickey (1963) made a departure from du Pont chart by developing a framework where net worth rather than total capital (assets) stood at the apex of the triangle. Courtis (1978) presented a comprehensive diagram for a financial ratio framework based on ratios used in earlier studies for a sample of 79 firms. Laitinen (1983) presented a model of the financial relationship in a firm with a set of ratios which found support from a study of 43 publicly traded Finnish firms. Bayldon, Woods, and Zafaris (1984) evaluated a pyramid scheme of financial ratios. But in a case study they found that the pyramid scheme did not work as expected. Martikainen (1993) took the research further by classifying financial ratios and tested their stability with transformation analysis to identify the key factors that determine stock returns. All these studies, during this period, spearheaded the search for devising an integrated theory of ratio analysis, but as had also happened in the past, the interest of the researchers gradually moved away from deductive approach to empirical investigation of the ratio analysis.

British Experience

In England, the technique of ratio analysis was slow to be accepted and used in business analysis. Till 1950 there had not been much literature on this subject in Great Britain and though the accountancy ratios were talked about in academic circles, no serious attempt was made to bring this body of knowledge to England. Perhaps, the first comprehensive monograph on the subject was done by Parkinson in 1951. While drawing the attention of both business and academia to the importance of ratios, he said, that modern business had justifiably been described as a galaxy of diverse relationships; some distinct and simple, some involved and complex. These relationships included: those between the individual firm and its creditors, debtors, owners and employees; those between the firm and the industry of which it forms a part; and finally, the one to which even greater attention was now being given, those between the firm and the community as a whole. Information clarifying and promoting these relationships should accordingly be the central aim of the administrative side of business activity. Ratios measure these relationships and act as efficient tools of judgement, eliminating adventitious factors in decision-making and quickening confidence in control (Parkinson, 1951). This apt summarisation of the philosophy of ratio analysis created a lot of interest in ratios in the UK. Parkinson himself, in his monograph, discussed a number of ratios ranging from conventional solvency, capital and inventory ratios to cost budgeting and audit ratios. He also developed standard and composite ratios.

The British Institute of Management, as the pioneer body of management in England, took upon itself the task of generating interest in ratios, particularly for making inter-firm comparisons, in order to help management appraise its efficiency and to take decisions for the future. The essential premise of the British analysts was that RoI was the primary ratio to which all other ratios should be related. Ratio analysis should be a process whereby changes or differences in RoI were analysed. This premise had provided a framework within which an elaborate listing of ratios has been developed.

The establishment of the Centre for Inter-firm Comparison in the UK gave a boost to the spread of the concept of ratios among business enterprises of the country. The Centre gathers a pool of confidential data from participating organisations and publishes this data as a ‘pyramidal ratio’ system like the one developed by Bliss and used by the du Pont Company. At the top of the pyramid sits RoI looking down various expense and profit ratios on one side and various asset and liabilities turnover ratios on the other side. Unlike in the United States, ratio analysis in the UK developed with a managerial orientation as against creditor orientation but over time great similarity has been found in the listing of ratios of these two countries, though the British system appears to be more coherent than the American one.

USE OF RATIOS FOR SMALL BUSINESSES

In the United States, establishment of the Small Business Administration (SBA) generated much interest in the utility of ratios for management and monitoring of small firms. The SBA published how-to-do-it training materials for use of ratios by small businesses (Sanzo, 1960). All these efforts took ratios to the grass-roots level and popularised their use.

RATIOS IN ECONOMIC ANALYSIS

A notable development during the early 1940s which accelerated the study of the empirical basis of ratio analysis was the use of ratios for economic analysis. Ratios were found to be extensively used as independent and descriptive variables in aggregate economic research. Economists were already using the RoI ratio but now they began using a number of other ratios to describe a wide variety of characteristics of firms. As a by-product, these studies gave a fresh understanding of the behaviour of ratios over time and the variation of ratios between different groups of firms.

Several macro-economic and macro-financial ratios emerged; the oldest among them is the Capital/Output ratio, which measures the productivity of capital. With the publication of the *Report of the Committee on the Financial System* (Reserve Bank of India, 1991) macro-financial ratios like Finance ratio, Financial Interrelation ratio, Intermediation ratio, New Issues ratio etc. became very popular in India for determining the stages of financial development in an economy.

RATIOS FOR DETERMINING CORPORATE PERSONALITY

During the 1960s we find that ratios were also used to determine the psychological characteristics of firms, i.e., to determine 'Corporate Personality'. Studies in this specialised area suggested that conservative corporations maintain higher liquidity and solvency ratios (Sorter and Becker, 1964). This has become very useful for stock market analysts and credit appraisers. Both the investors and lenders now look at these ratios to determine risk characteristics of a firm.

Some researchers, at this time, began to question the very accounting basis of ratios. They had shown that Last In First Out (LIFO) inventory valuation, as opposed to First In First Out (FIFO) valuation, changed the inventory turnover ratios of a sample of firms but did not affect some other ratios (Holdren, 1964). It was also found from another study that capitalisation of leases changed a number of ratios (Nelson, 1963).

STOCK MARKET VALUATION

Financial statement analysis entered into the domain of stock market valuation in a big way after the stock market crash in the 1990s and early 2000s in United States, parts of Europe and South Asia. The system of ratio analysis came to be regarded as a source of providing important inputs to the portfolio managers to determine different characteristics of securities, which may have a bearing on their future performance. A new discipline thus emerged, which came to be known as 'Fundamental Analysis'. This new discipline borrowed many ratios from the standard financial statement analysis to evaluate the present and future performance of companies. It also added its own ratios like, Price/Earning (P/E) ratio, Price/Book value (P/B) ratio, etc. to the discipline.

VALUE RELEVANCE OF FINANCIAL STATEMENT ANALYSIS

Substantial research has been done during the recent years (and literature is growing) on value-relevant analysis of financial statements. Particular mention may be made of Barth, Beaver and Landsman (2001) and Kothari (2001) who established value relevance of financial statements in public equity market. However, for a long time it was held that in private equity markets, more specifically in the venture capital market, analysis of non-financial information is more relevant than financial statement analysis.

There are diverse types of private equity investments. The first belongs to firms where investments are made either directly by professional investors such as large companies, endowment, pension and other funds or indirectly, may be by the same investors, through intermediaries or venture capitalists. The second type includes investments by wealthy individuals arranged generally through financial consultants, lawyers, accounting firms, etc. This type is popularly called, 'Angel private equity'. There is also a third type, the informal private equity market where firms procure investments from and across a large number of both institutional investors and wealthy individuals. This diverse and not-so-well organised market is structured differently from the public equity market and as such, their practices differ substantially. Hence, it was believed that non-financial information analysis is more value relevant in this private equity market than the financial statement analysis, at best; the latter could only be complementary to the former (Amir and Lev, 1996). However during a recent study of U.S. biotechnology firms in private equity market, Hand (2005) has found that financial statement analysis is value relevant in the venture capital market, despite the fact that such markets are different from the public equity market in numerous economically significant ways and, there exists a strong relation between financial statements data and equity value in the venture capital market. He has also observed that value relevance of non-financial statement information decreases with firm maturity yielding place to financial statement analysis. He has further shown that the two are substitutes and not complementary in nature.

ENTROPY LAW, DECOMPOSITION THEORY IN RATIO ANALYSIS

An interesting development occurred in the domain of financial statement analysis with the entry of information theory, particularly the Entropy Law to measure information loss due to aggregation of accounting data and consequent derivation of ratios from such data. Theil (1967, 1969) was the first to present in 1967 a comprehensive and systematic study of the aggregation problem and loss of information by applying Entropy Law as an analytical tool. His area of primary concern was distributional issues and decomposition analysis. As work in the major business disciplines is primarily concerned with distributional issues, entropy and related measures could be used to answer such questions as, for example, how much dispersion exists in the assessed distribution of rates of return for an individual security in an investment portfolio or how are assets distributed among the entries on a balance sheet. As a result of the attractive properties of the measure and because entropy can be alternatively interpreted as a measure of information, freedom of choice, disorder and uncertainty, it was tempting to apply it to value-share data and non-negative fractions that sum to one. Quite a few studies followed thereafter. Important among them were that of Lev (1969), Abdel-Khalik (1974) and Horowitz and Horowitz (1976). Lev attempted to provide a quantitative expression which might be used as a criterion in aggregating primary data for reporting purposes. According to him the preferred level of aggregation of data in financial reports would be that level which resulted in the smallest information loss. Lev viewed the shares of the entries in a financial statement as representing the relative frequencies of the possible outcomes of an experiment in which a dollar was selected at random from the financial statement. Entropy represents the information contained in a message telling us which item was selected. The difference in entropy before and after combining two items is indeed a measure of the information loss in the sense that the message could never inform which of the two combined items had occurred. If the value of the information loss is not taken into consideration, any decision taken on reported financial statements would stand vitiated. Aigner and Sprenkle (1968) also developed a model which related the amount of information to credit granting decisions.

Abdel-Khalik (1974) followed up the Aigner and Sprenkle model with some modifications and made an extensive field study among business loan officers of commercial banks in 36 states drawn from *Polk's Directory of Banks.* His findings suggested a re-interpretation of the Entropy Law in accounting contexts. Entropy was viewed as a measure of the extent of decomposability of some sets of data and hence, according to him, information theory as used by Theil and Lev should properly be termed as 'data decomposition theory'. He concluded that loss in the decomposition index, i.e., in the entropy, due to particular aggregation used in his research was not relevant to the decision-making process. Horowitz and Horowitz (1976) examined, *inter alia,* Lev's interpretation of a financial statement as a 'probabilistic message', i.e., a message which informs one about the probabilities (fractions) of a set of items and as the probabilities of two items are combined, the information content of the message (the financial statement) decreases. They observed that although Lev's probabilistic interpretation might be considered reasonable for some purposes, it seemed inappropriate for analysing the information provided by a financial statement. They showed that the balance sheet does not simply indicate the probability of a dollar coming from one item; it also provides information on the relative size of the various items by name and that the names are not neutral. They concluded that the implication that entropy was a measure of the meaningfulness of a particular decomposition of a set of values, such as the items on a financial statement, was erroneous.

Although all these enquiries and hypotheses could not finally stand on very solid ground, they did have a beneficial contribution to the development of financial statement analysis. They revealed that accounting does not really have a satisfactory conceptual framework—only a broad outline of what financial accounting practices should be.

EMPIRICAL BASIS OF RATIO ANALYSIS

The decade of the 1930s saw increased attention being paid to determine the empirical basis of ratio analysis, though compilation of industry average ratios continued unabated. The Securities and Exchange Commission (SEC) which was formed in the USA during this time exercised tremendous influence on the quality of financial statements and ratio analysis. The SEC sponsored a project in 1936 which resulted in the publication of *Industry Report of the survey of American Limited Corporations* where a variety of ratio data of individual firms in various industries were compiled. It has also published aggregate ratio data since the 1940s with the Federal Trade Commission in their *Quarterly Financial Report for Manufacturing Corporations*. Subsequent research proceeded predominantly to underline empirical basis of financial ratios.

UNDERSTANDING THE STATISTICAL NATURE OF RATIOS

The 1960s and 1970s saw the intensification of research in understanding the statistical nature of ratios to establish the validity of ratio analysis and the extensive use of statistical techniques to establish the predictive power of ratios in credit risk analysis. The first task was not easy. Determining the statistical nature of ratios was highly complicated because of the problems of computation of average ratios in the face of differences in accounting methods; size of firm; correlation between ratios; and of a single ratio over time. Horrigan's (1965) attempt towards this direction is very commendable. He began by classifying ratios in five broad groups: (*a*) short-term liquidity ratios; (*b*) long-term solvency ratios; (*c*) capital turnover ratios; (*d*) profit margin ratios; and (*e*) RoI ratios. His research revealed that financial ratios approximately tended to be normally distributed but because of having an effective lower limit of zero in general and an indefinite upper limit they were often positively skewed. This finding was important in the sense that it established the fact that financial ratios could be subjected to the usual parametric statistical techniques. Horrigan's (1965) study of petroleum and steel firms also revealed that many of the financial ratios were significantly correlated with each other. This collinearity of ratios demands that one has to be very careful and parsimonious in the selection of appropriate ratios. His third important finding was that financial ratios, especially those involving long term components, would be significantly correlated over time. In other words, firms would tend to maintain stable relative financial ratio positions over very long periods of time although the patterns might vary between types of ratios and industries.

RISK GROUPING OF RATIOS

Besides using ratios for prediction of corporate failures, these were also used for scaling or grouping industries according to the degree of risk. Horrigan (1965) found financial ratios to be successful predictors of corporate bond rating. Melnyk and Mathur (1972) used ratios to classify corporations into similar risk groups and attempted to relate them to the companies' market rates of return. But they could not report favourable results. O'Connor (1973) studied five ratios, namely, (*a*) total liabilities to net worth; (*b*) working capital to sales; (*c*) cash flow to number of common shares; (*d*) earnings per share to price per share; and (*e*) current liabilities to inventory, but found them to be poor predictors of rates of return on common stock. The results could only be regarded as tentative, requiring further investigation. Gupta and Huefner (1972) using a form of cluster analysis grouped 20 industries according to their characteristics as reflected in four financial ratios, namely, (*a*) fixed assets turnover; (*b*) inventory turnover; (*c*) debtors turnover; and (*d*) cash velocity. For each of the four ratios they grouped the industries. No attempt, however, was made to develop groupings based on a simultaneous comparison of the ratios and thus, the industry characteristics as a whole. Falk and Heintz (1975) held that risk was affected both by the characteristics of the corporation itself and by the fact that the corporation was a part of a given industry with characteristics of its own. They developed a ranking of industry according to degree of risk based on particular industry characteristics as reflected in industry financial ratios. They chose five financial ratios, namely, (*a*) total assets to working capital; (*b*) fixed assets to total assets; (*c*) average total assets to sales; (*d*) total debt to equity; and (*e*) average receivables to sales. They used the scalogram technique. This technique introduced by Louis Guttman (1959) is mainly based on facet theory. Here an industry is considered to be in an ordinally higher group if at least one of its relevant ratios is higher than that of another industry, and all of its other ratios are higher than or equal to the respective ratios of the other industry. In Falk and Heintz's (1975) study, their five ratios were structured in a manner such that the higher the ratio greater the degree of risk associated with the industry. Based on this ranking of ratios, a partial order ranking or a scalogram of 41 industries was prepared and an in-depth examination of 23 industries was made. The researchers claimed that this method would permit analysis at the macro level by making comparisons among industries possible, thus improving the selection process for investment decision-making.

RATIOS AS PREDICTORS

During the same period, however, attention of researchers was drawn towards examining the efficacy of ratios as predictors of financial difficulties of a business. Smith and Winakor (1930) were pioneers in this attempt. They analysed the trend, over the previous 10 years, of the means of 21 ratios of a sample of firms which suffered from financial difficulties and concluded that the ratio of net working capital to total assets was the most accurate and steady indicator of failure. Though they did not use any Control Group in their study which vitiated their findings to a great extent, their attempt to evaluate the predictive power of ratios spearheaded a series of studies (which are continuing till today) aimed at predicting the failure of firms. One of the earlier researchers was Fitzpatrick (1931, 1932) who studied the trend over the previous three to five years of 13 types of ratios of 20 firms who failed during the period 1920–1929. Matching it with the study of 19 successful firms as a Control Group he concluded that though all his 13 ratios predicted failure to some degree, the net profit to net worth; net worth to debt and net worth to fixed assets ratios were generally the best indicators. At about the same time Ramser and Foster (1931) studied 173 firms with 11 types of ratios. Their observations were, that firms which turned out to be less successful and those which failed tended to have ratios which were lower than the more successful firms except that two turnover ratios, namely, sales to net worth and sales to total assets, exhibited an opposite tendency.

These studies on the predictive power of ratios reached a commendable height in Charles L. Merwin's study in 1942. He analysed the trends over the past six years of a large, unspecified number of ratios of 'continuing' and 'discontinuing' firms against 'estimated normal ratios', the latter being the estimates of what the discontinuing firms' ratios would have been if they had maintained the same average ratios as the surviving firms. He found that three ratios were very sensitive predictors of discontinuance, able to predict as early as four to five years ahead in some cases. These three ratios were: net working capital to total assets, net worth to debt and the current ratio. Even after 64 years of existence Merwin's study has not lost its credibility that we shall see in a later section.

Bankruptcy Prediction Models

Research on the predictive power of ratios continued unabated in the United States in the late 1950s and 1960s with more sophistication applied to these studies. Hickman (1958) found that times interest earned ratio and the profit to sales ratio were useful predictors of the default experience of corporate bond issues between 1900 and 1943. Saulnier, Halcrow and Jacoby (1958) observed from their study of RFC lending experiences between 1934 to 1951 that borrowing firms with poor current ratios and net worth to debt ratios were more prone to loan defaults. The most important study during this period about the predictive power of ratios was, however, made by Beaver (1966, 1968). His study can be considered to be an extensive extension of Merwin's study referred to earlier. Beaver's study encompassed a period of 10 years, 1954–1964. He found, like Merwin, that some ratios predict failure up to five years in advance. Beaver used more powerful statistical techniques than Merwin and computed ratios from fund statement data. His study was soon to become a landmark in understanding the predictive power of ratios, as we shall see later.

Univariate School

The statistical nature of ratios having been established, research in understanding the predictive power of ratios got a new lease of life. Research was found to be divided into two schools, namely the Univariate School and the Multivariate School. We have already mentioned Beaver who happened to be the pioneer in the use of univariate techniques. In modification of Beaver's 1966 study referred to earlier, the findings of his 1968 study demonstrated that ratios could not be used indiscriminately to predict failure. Beaver used the dichotomous classification test and concluded that the liquid asset measures predicted failure better than non-liquid measures even in the period immediately preceding bankruptcy. He noted that the single best predictor was the cash flow to long term debt ratio (Beaver, 1968).

Wilcox (1971) developed a theoretical model based on simple probability and the random walk theory which not only re-established Beaver's findings but explained them better. The findings of Deakin's research, who used 34 pairs of firms from 1964 to 1970 and applied Beaver's model, however, differed substantially from those of Beaver but he found that there was a marked improvement in the predictive ability of cash to sales ratio three years or less before failure (Deakin, 1972).

Backer and Gosman (1980) who studied the decision process in rating bank loans found that deterioration in certain ratios was associated with credit downgrades. These ratios were: (*a*) cash flow to total liabilities; (*b*) return on sales; and (*c*) total liability to tangible net worth. Working capital to sales-ratio, though found to be significant in some other studies was not found to be so in their study.

Univariate ratio analysis suffers from the limitation that it implies no statistical relationship between the measures. The compensating effect of ratios is also entirely ignored. For example, although a firm with poor profitability and solvency record should be regarded as a potential bankrupt, because of its excellent liquidity the situation might not appear to be all that serious. The utility of Beaver's univariate model, therefore, becomes quite limited. This made researchers turn towards multivariate models.

Multivariate School

Altman (1968, 1983) was the pioneer in using multivariate methods in evaluating the predictive power of ratios. Having short listed 22 ratios on the basis of their popularity and potential relevance to the study, he conducted a multiple discriminant analysis (MDA) on a set of equal number of bankrupt and non-bankrupt firms. He finally selected five ratios, namely, (*a*) working capital to total assets; (*b*) retained earnings to total assets; (c) EBIT to total assets; (*d*) market value of equity to book value of debt; and (*e*) sales to total assets; and finally developed a 'Z' index. The research was carry forward by Altman, Halderman, and Narayanan (1977). They updated the original Altman (1968) study considering a data period of 1969–75 with a sample size of 53 failed firms and same number of non-failed firms. Further work was done by Zmijewkski (1984) but he used only three financial ratios, namely, (*a*) net income to total assets; (*b*) total liabilities to total assets; and (*c*) current assets to current liabilities. Earlier Ohlson (1980) presented his 'O' score model. He used a sample size of 105 bankrupt firms and 2058 non-bankrupt firms for the period, 1970–76. With the help of conditional logit analysis, he identifies the following ratios as being statistically significant in affecting the probability of failure within one year: (*a*) total assets to GNP price-level index; (*b*) total liabilities to total assets; (*c*) working capital to total assets; (*d*) current liabilities to current assets; (*e*) funds provided by operations to total liabilities.

Blum (1974) in his Failing Company Model applied the MDA to 115 pairs of failed and non-failed firms. In selecting the predicting variables he rejected those ratios which might be merely incidental. Eleven ratios were finally selected. The sample of failed firms (drawn for the period 1954–68) and unfailed firms were selected on the basis of industry, sales, employees and the fiscal year. The discriminant function was computed from half the data and the other half was used to validate it. The predictive accuracy of his model was found to vary between 70 to 95 per cent over a range of five years to one year before failure.

Joy and Tollefson (1995) criticised the Altman model on grounds of ex-ante validation, the criteria used for selecting the variables and the lack of appropriate comparison. Mover (1977) applied Altman's model to 24 pairs of failed and unfailed firms and obtained approximately a 75 per cent correct classification. He then step-wise estimated the discriminant function at various periods prior to failure and found his results to be significantly better than the naive alternative. Norton and Smith (1979) used ratios from general price level statements to predict bankruptcy by using the discriminant model but found no significant difference between the predictive ability of those ratios vis-à-vis the historical cost statement ratios. Mensah (1984) used specific price level data in conjunction with historical cost data and applied various models (like multiple discriminating models in conjunction with factor analysis and logit models) on 39 ratios. Having incorporated the relative cost misclassification he found that special price level data was better if MDA was used while historical cost combined with special price level data was superior if the logit model was used. Beagley et al. (1996) found that both Altman's (1968) and Ohlson's (1980) models performed relatively well when they were estimated but they did not perform as well in more recent periods, particularly during the 1980s. They found that after re-estimating the coefficients of both the models overall performance of Ohlson's (1980) model was better.

Some researchers went deep into the assumption of multivariate distribution properties of ratios. Collin J. Watson (1990), in particular, examined the multivariate distributional properties, multivariate outliers and modified power transformations to determine whether multivariate normality could be approximated for cross-sectional samples of financial ratios so that analytical complications owing to multivariate outliers and non-normality of financial ratios could be circumvented. He selected four ratios: (*a*) current assets to sales; (*b*) quick assets to sales; (*c*) current assets to current liabilities; and (*d*) net income to total assets for examination on a sample of manufacturing companies. His finding was that the joint distribution of the financial ratios differed appreciably from multivariate normality and that the financial ratio data contained multivariate outliers. Approximate multivariate normality was obtained by deleting multivariate outliers and applying modified power transformations to the ratios. Watson held that it would now be possible to use multivariate outlier detection and transformation methods in accounting research to enhance statistical conclusion validity and to improve the effectiveness of decision models when multivariate methods that assume normality were used with financial ratios.

British Approach

In the UK, we find from Taffler's (1984) review of various prediction models for British firms that the researchers had either restricted their non-failed samples to 'sound' or 'healthy' firms or had screened out financially problematic firms. This type of a *priori* screening process went somewhat further than merely excluding loss making firms. A problem common to the 'traditional' two group corporate failure analysis is that there appears to be a grey area into which classification of firms as failed or non-failed becomes indeterminate. Peel (1987) developed a number of logit models with the aim of investigating whether a new variable, the timeliness of reporting annual accounts, enhanced the explanatory power of the two group prediction models. He found that the time lag in reporting annual accounts of private firms contributed significantly to the explanatory power and classification accuracy of nine logit models. El Hennawy and Moris (1983) applied the Altman model on their study of companies in the U.K. They found that ratios reflecting profitability characteristics were the key variables in determining a firm's 'Z' score. Peel and Peel (1987), extending the earlier work of Peel, studied 56 failed firms, 56 non-failed profit making firms and 34 non-failed loss making firms by using logit analysis, multi-logit analysis and three group discriminant models. They found that six variables, namely, (*a*) size; (*b*) the ratio of working capital to total assets; (*c*) quick assets to current liabilities; (*d*) profit before tax to sales; (*e*) total liabilities to current liabilities and (*f*) the time lag in reporting annual accounts, had greatest explanatory power.

More Recent Models for Failure Prediction

Entering the decade of the 1990s, more sophisticated techniques began to be used for analysing the predictive power of ratios. The area of concentration continued to be prediction of bankruptcy. Frydman, Altman and Kao (1985) used the Recursive Partitioning Algorithm (RPA). The methodology is non-parametric and hence, is not vulnerable to most of the criticisms levelled against parametric techniques like MDA, probit and logit models. Both RPA and MDA are Bavesian procedures with their classification rules derived so as to minimise the expected cost of misclassification. MDA makes Bavesian rules operational by assuming that the probability densities of the variables for both failed and unfailed groups are multivariately normal and the covariance matrix of the two groups are equal. RPA, however, is a non-parametric technique which minimises the expected cost of misclassification by means of a univariate splitting procedure, the only assumption being that the groups are discrete, non-overlapping and identifiable.

Frydman et al. (1985) found that the classification accuracy using the RPA was superior to that obtained under MDA, though they did not claim that RPA was always superior to MDA.

One of the disadvantages of the MDA methodology used by Altman was that the same data was used to specify and validate the model which caused an upward bias. Marais, Patell and Wolfson (1984) examined the magnitude of this bias and used the bootstrap procedure to eliminate it. This method holds that if no prior assumption is made about the form of the generating probability distribution for a data set, then the best available indication of the shape of that distribution is the empirical histogram of the data set itself. The boot-strap method derives the sampling distribution of the chosen test statistics as if the empirical distribution were the true distribution and interprets the result as an approximation to the true unknown sampling distribution of the statistics. If the empirical histogram is an average not too different from the true distribution and the chosen statistics are not too sensitive to a small change in the underlying distribution data, then the approximation should be reliable. Boot-strapping is used to estimate the over-filling bias that can occur when a researcher must both specify and evaluate a model from a limited data set.

Marais et al. (1984) used the RPA method as also the polytomous probit model and examined the sensitivity of the predictions to the choice of variables using a list of 13 ratio and non-ratio variables. They established that non-financial statement indicators could be used as surrogates for more complex ratio variables but failed to establish the superiority of RPA models.

Karrels and Prakash (1987) applied the Shapire W-statistic procedure for testing univariate normality which is a necessary condition for multivariate normality as well. They found that only a few variables satisfy the condition of univariate normality. Their findings also suggested that the simple MDA procedure with the assumption of normality satisfied gave results that were not significantly different from more complicated procedures.

Barniv and Raveh (1989) developed a new technique for predicting distress. Their technique was non-parametric and had a separation rule using a linear combination of different observations and choosing the coefficients such that the scores given to a particular group would be greater than those given to another particular group. Their findings indicated that this new procedure classified better than the MDA, logit and probit models.

Scapens, Ryan and Fletcher (1981) attempted to explain why some firms suddenly become at risk rather than why they fail. They tried to provide a theoretical framework for ratios as predictors of financial difficulties with the help of the catastrophe theory. This theory postulates that an important property of many systems is their tendency towards equilibrium and it is the critical points of a system state which represent the positions of possible equilibria. Catastrophe theory is concerned with the nature of such critical points particularly with the instabilities which may arise when the system is disturbed by some factor impinging upon it. A model derived from the catastrophe theory will have a predictive content provided that it is possible to uniquely identify the position of the system state and direction of movement in the control variables. Scapens et al. claimed that this theory might provide a basis for explaining why 'creditors suddenly withdraw credit'. They used the cusp catastrophe model and also the butterfly catastrophe model to explain the relationship between the confidence creditors have in a firm and its accounting ratios. It should, however, be understood that in the catastrophe theory, 'catastrophe' does not give a vision of disaster. It is concerned with the analytical explanation of sudden changes in those factors which determine the attainable equilibrium state of the system. While explaining the empirical implications of the model, Scapens et al. said that when 'catastrophic' changes occurred they were not necessarily associated with financial failure. The changes represented a reclassification of the firm's credit status. A reclassification of a firm as a potential failure would substantially increase the probability of its subsequent failure as credit became difficult to obtain or was recalled; but it would not necessarily fail. The catastrophe model is concerned with sudden changes in credit worthiness. However, such changes are likely to be important determinants of financial failure. The researchers claimed that some of these implications might provide an explanation for previously observed empirical phenomena which would lead to a better understanding of corporate failure. Hillegeist, Cram, Keating and Lundstedt (2004) developed an option-theoretic probabilistic model to predict corporate failure. They found from a study of large sample covering a period of 1979–1997 that the option-theoretic model had more explanatory power than that of the models of Altman (1968) and Ohlson (1980). But at the same time, they found that this model did not produce a sufficient statistic for probability of bankruptcy as the scores contained significant incremental information—the model did not reflect all available market-based information.

Research on catastrophe model was not carried forward owing to difficulty in empirical investigation. Instead, emergence of hazard models came to dominate bankruptcy prediction studies during the 1990s and also thereafter. Bankruptcy prediction studies based on single period or static models came to be criticized as it often gave biased and inconsistent probabilistic estimation. Moreover, the problem of static models is that it does not account for time. This led to the emergence of hazard models, the foundation of which was laid down in Keifer (1988) and Lancaster (1990), though the multi-period logit models used by Denis, Denis and Sarin (1997) and Pagano and Zingales (1998) to forecast initial public offerings by the firms and executive turnover had properties of hazard models. The inspiration of hazard model has come from the study of living organisms. Every such organism has finite life along a time path. The basic hazard rate, therefore, is the function of time from birth and is coupled with the notion that the cumulative probability of death prior to and up to time *t* is an increasing function of time starting at Zero and approaching one over the time. From here Shumway (2001) moved to the corporate arena where hazard rate is the probability of 'bankruptcy' as of time *t*—the ex-post event is assumed to be either zero or one in any finite period of time. He used discrete-time hazard function with a logit model. A combination of financial ratios and market driven variables like, past excess returns, standard deviation of firm's stock returns and market capitalisation were used in this model. The model produced more accurate results than alternative bankruptcy prediction models. The hazard model came to be thought of as a binary logit model that included each firm-year as a separate function. Unlike static models, hazard models can incorporate macro-economic variables that affect all firms at a given point of time.

The research on hazard models was carried forward by Beatty, Ke, and Petroni (2002) who used hazard model to predict the duration of consecutive earning increases for public and private banks. Lin, McNichols and O'Brien (2003) used it to predict duration of the time between an equity offering and the first downgrade by rating agencies. Beaver, McNichols, and Rhie (2004) used a hazard model to examine secular changes and the ability of financial statement date to predict bankruptcy. The time span covered in their study is 1962–2002. They used a parsimonious three ratios-set like, ROA (return on assets), ETL (earning before interest, tax depreciation and amortisation to total outside liabilities) and LTA (total outside liabilities to total assets). They found that this parsimonious set of ratios used in the hazard model provided significant explanatory power throughout the time period studied with only a slight deterioration in the predictive power from first period (1962–93) to second time period (1994–2002).

Over the years bankruptcy prediction by ratio analysis has become a distinct body of knowledge, Balcaen and Ooghe (2006) in their overview discussed ratio models of business failures since 1970 under four broad heads: (*a*) univariate models; (*b*) risk index models; (*c*) multivariate discriminant models; and (*d*) conditional probability models. The study also highlighted some of the problems associated with these models.

RATIOS AS PREDICTORS OF SUCCESS

Houghton and Woodliff (1987) took a new stand, somewhat away from their forerunners. They began by reiterating that the accuracy of the signals and the ability of the decision-maker to use information jointly determine the quality of decisions. In their study they focused on the prediction of success rather than failure. Financial information users were tested in information processing experiments to see if individuals could effectively use ratio data. Failure was predicted substantially better by a chance model. Success as defined by the earning per share (EPS) level was, on the other hand, not predicted any better by the chance model. This may lead one to conclude that while considering ratios, failure could be a predictable attribute while success was not.

CRITIQUE OF RATIO ANALYSIS

Major criticism of ratio analysis appeared as early as 1920s. Gilman (1925) criticised the ratio analysis on the following grounds:

1. Changes in ratios over time cannot be interpreted correctly because both the numerator and the denominator which comprise a ratio vary.
2. Ratios have a built-in tendency to divert the attention of the analyst towards certain derived figures away from absolute values which can only give a comprehensive view of the business. Ratios are nothing but ‘artificial’ measures which may suppress reality. Besides, their reliability as indicators varies widely between ratios.
3. Considering the foregoing it cannot be said that ratios could portray fundamental relationships of a business. They can at best give a superficial view of a business.

Gilman’s views were diametrically opposite to those of Bliss’ (1923) discussed earlier. The debate was interesting but unfortunately it was not carried forward, though in subsequent works on ratios, Gilman’s criticism were kept in mind. Even today when ratio analysis has reached a height of sophistication Gilman’s critique cannot be brushed aside. It still creates an uneasiness in the mind of an analyst. The veracity of Gilman’s critique lies in the fact that a comprehensive theory of ratio analysis could not be developed in spite of a large volume of empirical research.

Information Redundancy in Financial Ratios

The studies reported above reveal that various researchers used different sets of ratios on their prima facie or empirical understanding that these ratios contained specific information which could be used for prediction or description of various specific attributes of firms. Pohlman and Hollinger (1981) attempted to provide some insight into the extent to which groups of financial ratios were, in fact, information-redundant. They examined 52 ratios. The empirical technique employed by them in their study was canonical correlation analysis. The output produced by the canonical correlation analysis was used to compute redundancy indexes to measure the extent of information that was redundant in one set of ratios, given that one already had the information in another set of ratios. One set of ratios might contain much of the information to be found in a second set but the reverse might not be true. Pohlman and Hollinger's analysis of the four traditional categories of liquidity, activity, profitability and leverage across 10 years for 384 firms resulted in redundancy being found in the leverage and profitability sets, and the activity and profitability sets. Leverage and profitability ratios were found to have nearly symmetrical and relatively high redundancy indexes. The results of their study should serve as a caution to users of financial ratios trying to use the least number of ratios to achieve parsimony due to information overloading. Even though the information in a set of ratios can shed some light on a certain aspect of a firm's operations, the set of ratios used may also contain information about another aspect of the firm's operations. The first set of ratios by itself may not be an accurate indicator of the firm's financial condition. Since the information in a set of financial ratios is not always unique, the wrong conclusion may be drawn from using a too limited set of ratios.

Critique of Distributional Properties of Financial Ratios

Distrbutional properties of financial ratios were examined by Martikainen, Puhalainen and Yli-Olli (1994). They undertook an empirical investigation of the industry effects on the interrelationships between financial ratios using a sample of 74 failed firms and equal number of 'non-failed' firms. They found significant industry effects on the interrelationships between financial variables. Several other empirical studies followed like that of Lau, Lau and Gribbon (1995) and Martikainen, Perttunnen, Yli-Olli, and Gunasekaran (1995). Most of these studies examined the assumption of normality of distribution of financial ratios. Buckmaster and Saniga (1990) adopted Pearson's and Johnson's taxonomies to examine distributional forms of financial ratios. The empirical findings of these studies indicate that in many cases the financial ratios follow other than normal distribution (Salmi and Martikainen, 1994). Later we find that Konings and Roodhoft (1997) adopted a non-parametric approach to analyze cross-section dynamics of financial ratios. Mcleay (1997) attempted to determine the boundary conditions for ratios with positively distributed components.

Arya, Fellingham, Mittendore and Schroeder (2004) revisited the aggregation problem financial ratios calculated from financial statements which, they claimed, summarised a firm's fiscal position using only limited number of accounts. They argued that modern-day users of financial statements interpret the affairs of a firm in conjunction with other information. They investigated two specific areas: the reconciliation of audit evidence with management prepared financial statements, and the creation of transaction level financial ratios. The double-entry bookkeeping system was represented by network flows to make it amenable to network optimisation techniques. Ashton, Dunmore and Tippett (2004) sounded a cautionary note on the distributional properties of financial ratios based on double-entry bookkeeping system. They examined whether the innate properties of this system are such that financial ratios calculated from balance sheet summary measures implied by it would be generated by distributional forms with non-convergent moments. Their analysis revealed that even when the evolution of balance sheet summary measures like debt and equity could be described by 'well behaved' distributional processes, there is a distinct possibility that ratios derived from them will evolve in terms of distributional forms with non-convergent moments. The authors argued that this has serious implications for parameter estimation as well as the integrity of the regression or discriminant procedures, particularly for bankruptcy and financial distress prediction models based on financial ratios derived from double-entry bookkeeping system.

The studies on the distributional properties of financial ratios took a new turn with the introduction of acquisition hypotheses. Palepu (1986) employed financial ratios in logit models to investigate the usefulness of six acquisition hypotheses predicting corporate takeovers. Cudd and Duggal (2000) carried the study further. They first attempted to capture the industry-specific distributional characteristics of financial ratios. They found that after adjusting for industry-specific distributional characteristics the results were consistent with four of the six acquisition hypotheses of Palepu (1986) but without such adjustment it was consistent only with one of the hypotheses.

Critique of Proportionality Assumption of Financial Ratios

Several researchers also examined the proportionality assumption of financial ratios. In their review article, Salmi and Martikainen (1994) surmised that proportionality assumption for financial ratios is stronger within an industry than between industries. They also observed that proportionality varies from ratio to ratio, and between time periods, which indicate a temporal instability of ratio structures. Trigueiros (1997) after examining the non-proportionality in financial ratios provided an alternative approach. His study identified general postulates underlying the validity of the financial ratio measurement. He then suggested new relationships obeying the same postulates, which might replace the ratio form in the case of non-proportionality. He found that where proportionality holds, these relationships revert back to the traditional ratio.

Questioning the Time Series Properties of Financial Ratios

Tippett (1990) while exploring the possibility of providing a satisfactory theory of financial ratios with the help of continuous time stochastic calculus models examined the properties of ratios generated by two standard stochastic processes. He began by assuming that the financial aggregates from which the ratio was constructed were generated by a 'geometric' Brownian motion, which implied that the ratio itself will be both lognormally distributed and it would be a non-linear function of time. He examined the properties of a number of ratios and critically dealt with their proportionality assumption and derived the distributional and time series properties of financial ratios. He concluded from his analysis that accounting ratios were non-linear functions of time and there were relatively few occasions on which proportionality assumption of ratios could be justified. He observed that normality would be the exception rather than the rule.

Subsequent evaluation of time series properties of ratios met with mixed results. Martikainen (1991, 1992) showed that normality of distribution could be improved if economy-wide effects were considered. Ioannids, Peel, and Peel (2003) re-evaluated the time series properties of financial ratios. Their empirical study explicitly allowed for the possibility that financial ratios could be non-linear and mean reverting. With an implicit assumption that ratios are stationary and hence, amenable to classical regression modelling they hypothesised that financial ratios might follow a random walk near their target level. But the problem is that the more distant a ratio is from the target, the more likely the firm is to take remedial measures to bring it back to the target level. This behaviour results in a significant size distortion of the stationary tests which may lead to non-rejection of null hypothesis of non-stationarity. The finding undermines the use of ratios as reliable conditioning variables to explain a firm's operating and financial decisions. Neophytou and Moliero (2004) used multi-dimensional scaling techniques for predicting corporate failures, which they claimed, could visualise the main features of the data in the form of statistical maps leading to intuitive interpretation. Peel, Peel and Venetis (2004) adopted a panel data approach for empirical investigations of time series properties of financial ratios.

ALTERNATIVE TO RATIO ANALYSIS

When ratios as a tool of measurement and prediction were at the height of acquiring statistical technology some writers began enquiring into the very reasons for using ratios in preference to other direct statistical devices. They opened the enquiry by stating that users of ratios customarily assumed that the ratio was the appropriate statistical form for summarising the data without explaining what assumptions were necessary for this to be the case and whether these assumptions could be violated to make ratios amenable to statistical validation. Lev and Sunder (1979) argued that the major justification for the use of the ratio form is the removal of the influence of firm size on the numerator variable and that the tool was not up to the task for which it was being used. Whittington (1980) said that the two basic assumptions of a ratio, i.e., proportionality and linearity, would generally stand violated in an empirical relationship between a pair of accounting variables. First, there may be a constant term in the relationship and second, the relationship may be non-linear. When such is the case, Ramamoorthy (1976) preferred a direct regression approach to forecasting rather than a ratio approach. It also seemed to Whittington that for estimating empirical relationships from sample data, regression analysis should be used in preference to ratio analysis, except in cases where there were strong grounds for assuming proportionality or when a very 'rough and ready' preliminary survey was to be made. It was less clear to him that ratios were inadequate for assessment of performance against set standards. However, Whittington at the same time drew attention to the problems associated with regression analysis, particularly about the interpretation of the constant term when the observed relationship is non-linear and the problem arising from auto correlation in the error term. In conclusion he, however, did not deny the important normative role for ratios irrespective of their validity as estimates of empirical functional relationships.

These lines of argument were built upon subsequently with much vigour. Barnes (1982, 1986) used the size effect to explain the often reported non-normality of distribution of ratios. He advocated the use of regression as a method to remove the influence of scale on financial variables. Lee (1985) used four ordinary least squares regression models and a simple multivariate model which were fitted to 10 samples of data, each of which was drawn from a different industry. Data was collected on each over five years. His variables were five ratios, namely, (*a*) current assets to current liabilities; (*b*) cash flow to total debt; (*c*) total debt to total assets; (*d*) quick assets to net sales; and (*e*) net income to net sales. The findings of Lee cast doubts on the general appropriateness of the ratio form as a means of size control. The empirical investigation of McLeay and Fieldsend (1987) also revealed that both industry and size effects were important in explaining ratio behaviour and that the ratio form could not be adequately controlled for the effect of corporate size on the numerator variable. McDonald and Morris (1984), however, came up with stronger empirical support for ratios. Using ordinary least squares they estimated four regression models with six ratios, namely, (*a*) current assets to sales; (*b*) current assets to current liabilities; (*c*) cash flow to total debt; (*d*) total debt to total assets; (*e*) quick assets to net sales; and (*f*) net income to net sales. The numerators of these ratios were chosen as the dependent variables in all cases. They concluded from their findings that the intercept term was not statistically significant across the ratios studied and hence, they advocated strongly in favour of continued use of the ratio form for the purpose of financial statement analysis. McDonald and Morris were criticised by Barnes (1986) who argued that they were unduly supportive of ratio analysis because of their emphasis on the non-normal distributional form of the residuals and the difficulties implied for regression analysis. Barnes raised the key theoretical issue of the significance of the intercept term in regression results. McDonald and Morris (1986) agreed that it was a key issue but responded that their empirical results did not provide any evidence for the presence of significant intercepts. Berry and Nix (1991) observed that the conclusion of McDonald and Morris was too strongly stated. The latter's work dealt with one industry, one year and a small number of ratios. Questions which remained to be answered were: (*a*) whether the findings could be generalized to other industries; (*b*) whether the findings would be stable across time; and (*c*) whether the findings would hold for other ratios. Berry and Nix dealt with these questions in their empirical study of 37 brewing firms in the UK. They used four ratios used by McDonald and Morris and added one more to it. Namely, stock to sales, as they felt that if there was to be a departure from proportionality the relationship between stock and sales was likely to exhibit it. Their regression analysis identified only one case where the strictly proportional assumption of ratio analysis could clearly be rejected, namely, the stock and sales combination. According to them, this was the only case in which the regression approach might provide different information to ratio analysis. In all other cases their findings could not uphold the generality hypotheses of McDonald and Morris.

SUMMARY

The historical development of ratio analysis can be divided broadly into four phases. In the first phase beginning approximately in 1870 we see a spurt in the development of ratios for managerial and credit analysis. The single most important ratio developed during this period was the current ratio which continues to draw the attention of analysts even today. However, the proliferation of ratios created problems for discerning the right kind of ratios for business analysis. Attempts were made to resolve the problem by developing a coherent system of ratios. The du Pont RoI chart developed by Bliss in 1919 can be considered as the first such attempt. During the same period we also find the emergence of industry-wise ratios. Well known business schools and credit agencies began publishing these ratios on a regular basis.

In the second phase, beginning 1930, attempts were made to understand the statistical nature and empirical basis of financial ratios. A considerable volume of literature was produced on the subject. But the empirical findings of major researchers were found to be more contradictory than corroborative. The statistical approach to ratio analysis also led to the development of ratio-models for predicting corporate bankruptcy. Most important among these works are that of Merwin (1942) and Beaver (1966). While emphasis on empirical research enriched the discipline of ratio analysis it retarded the development of a comprehensive theory of ratios.

In the third phase, beginning in the later part of the 1960s, we find rigorous scientific investigation being made into the information content of financial ratios with the help of Entropy Law and decomposition theory. The problem of aggregation and consequent information loss was investigated with the help of sophisticated mathematical tools but the findings remained inconclusive. However, these studies revealed for the first time that accounting does not really have a satisfactory conceptual framework. The research on understanding the statistical nature of ratios, particularly for the purpose of predicting the health of a business, continued unabated during this period and is also being carried forward to the present.

Since 1980 we find that the discipline has entered into its fourth logical phase where the search for a theory of financial ratios has begun. Although we are yet to find a comprehensive testable theory of financial ratios, serious attempts are being made towards this direction. The discipline is now ripe enough to give birth to its own theory.

The first attempt to present a historical review of ratio analysis was made by Horrigan (1968) followed by Barnes (1987). The present review, though following in their footsteps, differs from them in the sense that here, the logical development of ratio analysis is traced to its present stage from a historical perspective. In doing so we have gone somewhat deeper into the methodologies and findings of various researchers on the subject so that a reader can have a critical look at the various applications of ratios and how these have been used.

In Chapter 2 an attempt is made to present an integrated approach to ratio analysis. The theme is carried forward throughout Chapters 3 to 10, where selected groups of ratios are presented for management control of broad functional areas of a business enterprise.

Chapter 2

Ratio Analysis: An Integrated Approach

Dispatch is the life of business,
And method is the soul of dispatch.

—Penn

INTRODUCTION

A business system acts through different centres of responsibility towards achieving a set of objectives defined for the business by its entrepreneurs, shareholders, employees, and often, the society as a whole. The function of the management is to establish strategies for attainment of these objectives and install a management information and control system to monitor the performance of the responsibility centres charged with the task of implementing those strategies. The focus of management control is on results; which is defined as reaching goals or objectives, both of a specific responsibility centre as well as of the organisation as a whole (Euske, 1984).

TOWARDS AN INTEGRATED SYSTEM

Every responsibility centre of a business system performs different functions to implement the strategies of the business system. The productivity of these functional subsystems defines the efficiency, or otherwise, of these responsibility centres. However, development of a responsibility centre purely on the basis of functional perfection alone may lead to disjointed actions, which may defeat the very purpose of the business system, namely, attainment of the established objectives of the enterprise. In order to prevent lopsided growth of functionally divided responsibility centres a management control system is needed to integrate the individual goals of such responsibility centres with the principal objectives of the business system. The purpose of such an integrated management control system is to ensure that all functional activities subserve the principal objectives of the enterprise. No responsibility centre should be allowed to become an organisation within the organisation, pursuing goals which are in conflict with the goals of the organisation itself. For example, if a certain course of action increases the reported profits of a division but, at the same time, decreases the profits of the enterprise as a whole, there is a goal incongruence which can eat into the vitals of the organisation. It is only when the management control system is integrated with the whole, that such goal incongruence can be minimised. The system shall be *total,* to ensure that all parts of the operation of the business are in balance with each other. In order to perform this balancing act, management needs control information.

FINANCIAL PARAMETERS FOR MANAGEMENT CONTROL

Management control is thus the process of assuring that resources are obtained and used effectively and efficiently in order to achieve the objectives of the organisation. It is a process carried on within the framework established by strategic planning (Anthony, 1964). Management control is fundamentally concerned with ensuring that appropriate actions are taken to implement overall organisational plans, along with the monitoring of the effectiveness of such actions and plans (Emmanuel et al., 1990). On the other hand, task control is the process of ensuring that specific tasks are carried out efficiently and effectively (Anthony, 1988).

Generally, a management control system is built around a financial structure. Unlike pure technical control, inputs and outputs are expressed in monetary units; though non-monetary measures such as time, number of persons, and reject and spoilage ratios are also used in conjunction with the monetary expression of some control variables. Being an integrated system, a management control system can be viewed as a set of interlocking subsystems. In many organisations, for example, three types of cost information are needed for management control: (*a*) costs by responsibility centres, which are used for planning and controlling the activities of supervisors; (*b*) full product costs, used for pricing and other operating decisions under normal circumstances; and (*c*) direct product costs, used for pricing and other operating decisions under special circumstances (Anthony, 1964). The analytical tool used for the purpose of control may be a break-even chart followed by the calculation of the margin of safety or profit volume ratio. By extending this analysis towards determining the investment breakeven point of the product/responsibility centre, we can finally integrate the manufacturing system with the financial structure of the enterprise.

TECHNICAL CONTROL

Technical control is a subset of management control, though till recently, it was believed to be a distinct process. Technical control is held to be a rational system which aims at establishing an optimum relationship between resources (inputs) and outputs, where such a relationship is fairly easy to establish. For example, to manufacture a given part, a certain quantity of labour and material as well as a certain sequence of machine operations can be fairly well established by a given set of technical parameters. These parameters may or may not cover all aspects of a given problem and may presuppose 'normal' or 'standard' markets and working conditions. Situations not amenable to technical control are considered as 'exceptions' and are resolved by human judgement, which is the domain of management control. Alas, real-life situations are neither 'normal' nor 'standard'! Thus, areas of pure technical control are getting limited, often to a narrowly circumscribed activity, because of the enlargement of the zone of uncertainity. Hence, the tools, techniques and models of technical control are modified and extended or new mathematical techniques are developed in order to make the management control system operate effectively in an age of uncertainity.

It should, however, be remembered that a formal management control system is only a part of the management control process. The system can aid the manager in decision-making by providing information of the right type at the right moment but it cannot force or motivate the manager to take decisions. Such motivation or stimuli must often come from sources outside the management control system. Good information does not automatically lead to good decisions.

THE DANGER OF TOO MUCH INFORMATION

A good management control system must produce relevant, intelligible information and identify key variables for management control. The rapid growth of information technology during recent times has led to a kind of information blast which often engulfs the manager with too much information. A computer specialist in charge of a Management Information System (MIS) often misses this point, that too much information and too many control variables defeat the very purpose of an integrated management control system. He often dreams about establishing an MIS that will display to the management the current status of every individual activity of the enterprise with mathematical precision. As the use of computerised technology for information analysis has emanated from the process of technical control—the forerunner of management control—such a dream or goal of an MIS manager is a logical manifestation of his basic discipline, but any attempt towards its realisation will create conflict with the goal of the management control system. It should be remembered that with the massive growth of computer technology it is possible now to do what the computer specialist dreams of doing. However, it should not be done, because neither does the management want it nor does it have time to assimilate all the details. Management only needs to know whether the process is or is not proceeding as planned and, if not, where the trouble lies. What is essential then, is that management gets this information quickly, preferably by pressing only a few key buttons, because management control does not operate on mathematical precision but on approximation.

DECISION-MAKING AND MANAGEMENT CONTROL

Generally, there are three levels of decision-making in an organisation (Parsons, 1960):

1. The institutional level for strategic planning, i.e., those concerned with the realisation of general company objectives and the

broad problems related to the position of the organisation in its environment.

2. The managerial level, which focuses on gathering, coordinating and allocating resources for the organisation.
3. The technical level, involving acquisition and utilisation of technical capacity and operational controls, e.g., production scheduling, inventory controls, productivity management etc.

There are generally two types of decision-making at all these levels, namely proactive decision-making and reactive decision-making. The former relates to planning and the latter to control. Although the two functions are distinct, they are not exclusive to each other but rather supportive or complementary in nature. Control information may often act as data for planning decisions and vice-versa. In fact, management control is an extension of the corporate planning process. A management control system cannot be developed, nor can management control be exercised effectively, unless the company has a specific objective and an overall plan for reaching that objective. In short, the management control process controls performance within the framework of a corporate plan (Mockler, 1967).

STANDARDS OF COMPARISON

One of the most important aspects of management control is to develop standards of performance. The inputs for developing standards would normally flow from the plan and hence, standards should be a true reflection of a company's goals. The success or failure of a control system depends, to a large extent, on developing good standards.

Standards may be internally developed or externally given. Internally developed standards can be sourced from the company's past performance standards or from the planning (budgetary) standards or a combination of the two.

Past performance standards are most readily available and most commonly used. A company generates its own data which is consistent in approach and methods of accounting. Hence, it is a matter of comparing 'like with like'. However, when the enterprise has been in existence for a few years only, or there is a change in technology, or substantial changes in the economy such as inflation, then past standards by itself may not be valid.

Budgetary standards are standards which emanate from the business plan of the enterprise. They avoid many of the pitfalls of past performance standards though, at the same time, past performance standards are used as inputs for developing more realistic budgetary standards. When a company measures the performance of its functions against its own predetermined standards, it has more freedom to decide on what variables are to be considered for such measurement and the parameters against which such performance will be measured. Although a management control system will basically deal with the financial aspects of a control situation, certain financial factors may, at times need to be separated out, so that performance analysis becomes more meaningful to operating personnel.

Finally, while budgetary standards operationalise the internal control of the enterprise, *external standards* link the enterprise to the industry to which it belongs and to the general economic environment of the country in which it operates.

ACCOUNTING DATA AND RATIOS

As indicated before, a control system operates on feed-back information. Initially, the annual balance sheet together with the income statement constituted the first set of feed-back information that the owner of an enterprise received. For a considerable length of time these served the purpose of both internal control and external presentation.

As the complexity of businesses grew, the periodicity of these two statements was reduced gradually for internal control purposes. Some companies now prepare these two statements even weekly. With the intensification of competition came the demand for quick decision-making in all areas of management and control in a world now beset with more complexity and uncertainity. This called for a further sharpening of decision variables. The balance sheet and income statement, in absolute values, could no longer capture, interpret and measure the diverse relationships that a business enjoys or suffers. These are now regarded as mere data, though remaining valuable as they are. In order to extract the information content from this data, for the purposes of reactive or proactive decision-making, some further processing is necessary. This processing is normally done by relating two business variables in ratio form.

PROBLEM AND PROSPECT OF PROPORTIONALITY

It has been found that while some ratios enjoy high proportionality between the two variables from which they are calculated, reflecting significant correlation, a large number of ratios do not have such a property. This creates problems for statistical analysis of ratios. As a result, statistical models developed on a set of business ratios combining both kinds, remain highly vulnerable to interpretative prediction. This weakness of ratio analysis has been brought forth by a number of researchers as mentioned in Chapter 1. However, this very property, or the absence of it, though a problem for statistical investigation, can be of help to a manager in planning and controlling the business. For example, operating profit ratio derived by dividing operating profit by sales is very difficult to change under a given technology period and market practices of a business (which remain more or less the same even in the medium term). This is because the two variables are highly interdependent. As a result, this ratio remains almost constant with both rise and fall in sales. But the asset turnover ratio derived from dividing sales by assets is not so difficult to change because these two variables are not so interrelated. The ratio can be improved either by increasing capacity utilisation of assets, resulting in larger sales, or by pruning flabby assets, particularly the slow moving current assets. One of the most important ratios, RoI, is derived by multiplying these two ratios. We shall see later, through an example, that in order to improve upon the RoI, managerial attention should be drawn more towards the asset turnover ratio because both its numerator and denominator are more amenable to independent manoeuvring rather than the operating profit ratio.

Before we engage ourselves in calculating and interpreting other managerial aspects of ratios, it would be better to categorise certain commonly used ratios in terms of their manoeuvrability (Table 2.1). It must, however, be understood that in the final analysis all business variables

Table 2.1
Manoeuvrability of Ratios

Name of ratio	*Variable used*	*Nature of relationship between variables*			*Manoeuvrability*
		High inter-dependence	*Moderate interdependence*	*Low inter-dependence*	
Current ratio	Current assets/Current liabilities	No	Yes	No	Good
Quick ratio	Quick assets/Current liabilities	No	Yes	No	Good
Working capital ratio	Net working capital/Current assets	No	No	Yes	Very good
Stock ratio	Inventory/Current assets	No	No	Yes	Very good
Debt enquiry ratio	Outside liabilities (long term)/Net worth	No	No	Yes	Very good
Fixed assets turnover ratio	Sales/Fixed assets	No	No	Yes	Very good
Current assets turnover ratio	Sales/Current assets	No	Yes	No	Good
Return on investments (RoI)	Operating profit/Operating assets	No	Yes	No	Good
Debtor turnover ratio	Sales/Debtors	No	Yes	No	Good
Creditor turnover ratio	Purchases/Creditors	No	Yes	No	Good
Gross profit ratio	Gross profit/sales	Yes	No	No	Fair
Operating profit ratio	Operating profit/Sales	Yes	No	No	Fair
Interest cover ratio	Profit before Interest Depreciation and Tax (PBIDT)/Interest obligation	No	No	Yes	Very good
Debt service coverage ratio	PBIDT/Total debt service obligation	No	No	Yes	Very good

are interdependent on each other; the question is one of degree. Higher the interdependence between two variables, less is the manoeuvrability of the ratio derived from them.

FUNCTIONAL CONTROL BY RATIOS

Analysis and control of business operations through ratios were for a long time restricted to financial accounting data available for the balance sheet and profit and loss account. Rise in competition, demanding simultaneous improvement in quality and cost reduction, necessitated more incisive insight into the internal operations of a business. With this demand, the discipline of management accounting grew as an area distinct from financial accounting. These two disciplines together could now take a total view of the operations of an enterprise and integrate various functions of the managerial process into a whole.

Managerial functions of an enterprise can be broadly divided into the following categories:

1. Operational management:
   a. Manufacturing management
   b. Marketing and sales management
2. Financial management:
   a. Working capital management
   b. Fund management
   c. Debt service management

While debt service management is closely linked with the other two aspects of financial management of a business, manufacturing management is generally believed to be distinct from marketing and sales management as operational management is distinct from financial management. It can be said that if the operational management of an enterprise is good but its financial management is poor, then the latter may eat up the operating surplus created by the former and force the enterprise towards sickness by ultimately affecting the operational management itself. In such a situation it is possible to make a turnaround or revive the business by restructuring its financial profile. The same is, however, not always true when the operational management of a business is poor though its financial management is good. This is because success or failure of operational management is dependent, to a large extent, on the installed technology; and the productive, distributive and marketing practices of an enterprise, which are rather difficult to change, even in the medium term, except at a very high cost. Operating structure is the backbone of a business while the financial organisation is the superstructure built on it. If the operating structure is weak then the business can be said to be suffering from congenital sickness requiring massive infusion of finance and a strong-willed management for its resuscitation.

In our subsequent analysis, we shall first critically estimate operational management under two broad heads, namely manufacturing management and marketing and sales management, by two sets of ratios and then take a total view of the overall operational management of an enterprise by a third set of ratios. The same methodology will be followed when we analyse the financial management of a business.

SUMMARY

A business system aims to achieve its objectives through various subsystems of responsibility centres. These sub-systems are designed to implement the strategies formulated by the top management. The management control system helps to integrate the individual goals of these responsibility centres with the principal business goals. While efficient implementation of specific tasks is achieved through task control, technical control helps to establish the optimal relationship between inputs and outputs in the system.

Formal management control systems aim to provide a manager with the right information at the right time. However, experience shows that even this may not lead to optimal decisions. Decision-making in any organisation takes place at three levels—the institutional level (strategic), managerial level (resource allocation) and technical level (operations). It could either be a proactive or a reactive process.

One of the most important objectives of a management control system is to define the standards of performance in an organisation. These standards could be internally developed (past standards or budgetary standards) or externally given. Control systems operate on feedback information: balance sheet, income statement, etc.

A high level of complexity and uncertainty in the environment call for:

a. a sharpening of decision variables, and
b. processing two decision variables in ratio form.

The higher the interdependence between the two variables, less is the manoeuvrability of the ratio derived from them.

Management accounting and financial accounting, together, present a complete insight into the operations of an enterprise and help integrate various functions in the managerial process. Operating structure—technology; marketing practices etc.—constitute the back bone of the business while financial organisation—working capital; funds; and debt servicing etc.—is the superstructure built on it.

Chapter 3

Financial Aspects of Manufacturing Management

Orthodoxy is my doxy;
Heterodoxy is another man's doxy.

—*William Warburton*

INTRODUCTION

It is largely understood that, in the ultimate analysis, financial performance dictates the success or failure of a business enterprise and hence, financial controls must constitute the most important and significant regulators of business. Unfortunately, it has been found that manufacturing managers do not always attach much importance to financial controls. One of the reasons may be, that most manufacturing managers are, by training, the 'production people', who feel comfortable in handling the technical parameters of manufacturing operations. Anything beyond that is anathema to manufacturing managers. They are keen on determining the technical parameters of various inputs that are used and the output that is produced but when it comes to the monetary aspects of these things in terms of costs and revenue, they feel like a fish out of water. The second reason may be, that for a long time the 'blue collared' production managers were kept outside the corporate level planning and decision-making process. They were regarded more as 'implementors' than as decision-makers. Their job was to carry out the policy decisions taken at corporate headquarters far away from the factory site. With competition hotting up and the consumers' demand rising for quality products at cheaper prices, enterprising and forward looking organisations are now engaged in the process of integrating the manufacturing manager into the policy framework of corporate management. In order to smoothen this process of integration, the manufacturing manager is now being trained to appreciate the financial aspects of manufacturing management, particularly the fact that it is financial control which enables the business to evaluate trends and detect problems on time.

The success or failure of directing the manufacturing function depends largely on the ability of the manager to understand the financial aspects of every operation and to react accordingly when unfavourable financial trends are detected. Financial control enables manufacturing managers to improve the methods of operations used, establish priorities for corrective actions and measure the performance of the other workers.

FINANCIAL STATEMENTS

The principal accounting information needed for financial control and monitoring of the manufacturing function is available in the traditional income statement and balance sheet. Although these two periodical documents reflect the financial health of the entire business, certain portions of both contain valuable data that can reveal the performance of only the manufacturing function of the enterprise. In Tables 3.1 and 3.2 we have reorganised and regrouped accounting data from published annual reports of a company engaged in manufacturing both consumer and industrial electricals after making informed allocations of some grouped cost items, e.g., salaries and wages among manufacturing, marketing and general administration. These two Tables should be read with Table 3.3, which contains detailed notes on various aspects of accounting information which could not be included in the body of the standard formats. Let us call the company Universal Electricals Ltd (UEL).

Data from this company will be used to illustrate and interpret ratios for all aspects of operational and financial management of a business enterprise in the following chapters. We shall first deal with the income statements given in Table 3.1 followed by the balance sheet statements given in Table 3.2.

The most important item of the income statement that concerns the manufacturing function is the cost of goods sold which represents the aggregate cost of manufacturing the product(s) of the company, and consists of the following elements of cost:

Direct Materials

These represent materials used directly in production. Direct materials may be of two types: (*a*) raw materials which are converted into finished

Table 3.1
Universal Electricals Limited
Income Statement

(Rupees lakh)

	X0	*X1*	*X2*	*X3*
INCOME				
Domestic sales	47696	57616	67274	70108
Export sales	3341	4042	4817	7869
Gross sales	51037	61658	72091	78004
Less: Excise duty	5289	6551	8297	8032
Net sales	45748	55107	63794	69972
Scrap sales	484	703	786	706
A. Income from operations	46232	55810	64580	70678
EXPENDITURE				
1. *Manufacturing expenses*				
Direct materials:				
Imported	4063	5224	5853	5860
Indigenous	14996	16407	21847	25513
	19059	21631	27700	31373
Stores and consumables	430	416	653	600
	19489	22047	28353	31973
Spares consumed:				
Imported	9	63	47	127
Indigenous	32	37	87	121
Direct labour (manufacturing wages and salaries)	4127	5132	5932	6523
Power and fuel	329	559	479	640
Repairs and maintenance (plant and machinery)	129	168	208	246
Depreciation (plant and machinery)	568	769	792	713
Insurance	134	162	222	252
Service charges	140	130	93	111
Total manufacturing expenses	24957	29067	36213	40706
Add: Opening stock of work-in-process	2512	2681	2973	4610
	27469	31748	39186	45316
Less: Closing stock of work-in-process	2543	2972	4610	5484
B. Cost of production	24926	28776	34576	39832
Add: Opening stock of finished goods	2716	2334	2684	3463

Table 3.1 (Continued)

Table 3.1 (Continued)

	X0	*X1*	*X2*	*X3*
Add: Finished goods purchases	11237	15046	16097	15183
C. Goods available for sale	38879	46156	53357	58478
Less: Closing stock of finished goods	2328	2684	3463	3599
D. Cost of goods sold	36551	43472	49894	54879
E. Gross profit (A – D)	9681	12338	14686	15799
2. Selling, distribution and administrative expenses				
Salaries (sales and marketing)	1061	1425	1597	1710
Salaries (others)	708	775	945	1086
Forwarding, godown and packing	868	1204	1290	1311
Advertisement	336	492	502	529
Bad debts	158	23	88	496
Travelling (sales and marketing)	375	501	627	638
Travelling (others)	161	214	290	302
Vehicle expenses	36	51	62	73
Professional charges	68	45	63	91
Rent, rates and taxes	558	660	781	774
Repairs of building etc.	136	164	227	256
Depreciation (building etc.)	150	174	205	300
Audit fees	9	9	12	13
Miscellaneous expenses	1515	1960	2579	2900
F. Total selling, distribution and administrative expenses	6139	7697	9268	10479
G. Operating Profit (E – F)	3542	4641	5418	5320
Add: Other income (interest, dividend, sale of fixed assets etc.)	695	780	817	1303
H. Profit before interest and taxes	4237	5421	6235	6623
Less: Interest and commitment charges	2257	3269	4508	5093
I. Profit before taxes	1980	2152	1727	1530
Less: Taxation	700	50	700	475
J. Profit after tax	1280	2102	1027	1055
Less: Proposed dividend	346	384	384	476
K. Retained profit transferred to various reserves and surplus	**9.34**	**1718**	**643**	**579**

Table 3.2
Universal Electricals Limited
Balance Sheet

(Rupees lakh)

	X0	*X1*	*X2*	*X3*
ASSETS				
Fixed Assets				
Land and buildings	5573	6531	6830	7219
Less: Depreciation to date	873	1013	1160	1295
A. Net block	4700	5518	5670	5924
Plant and machinery	6774	9269	10330	10627
Less: Depreciation to date	3941	4680	5464	5573
B. Net block	2833	4589	4866	5054
Furniture, fixtures, vehicles etc.	975	1325	1679	1892
Less: Depreciation to date	441	569	733	867
C. Net block	534	756	946	1025
D. Operating net block (A+B+C)	**8067**	**10863**	**11482**	**12003**
E. Capital work-in-progress	698	830	720	1725
F. Total fixed assets (D+E)	8765	11693	12202	13728
Investments				
Govt. and trustee securities	35	43	43	84
Shares of subsidiary companies	156	50	50	1115
Other shares and debentures	227	538	638	665
G. Total investments	418	631	731	1864
Current Assets				
Cash and bank balances	2	7	32	78
Fixed deposit with banks	16	43	209	34
Debtors (Inland)	15240	18188	22948	25213
Debtors (Foreign)	1025	1264	1650	2824
Loans and advances	4414	5012	5546	7352
Inventories				
Raw materials	2523	3103	3905	3969
Work-in-process	2543	2972	4610	5484
Finished goods	2328	2684	3463	3599
Stores and spares	66	174	139	160
H. Total current assets	28157	33447	42502	48713
I. Miscellaneous expenditure	241	670	792	818
J. Total assets (F+G+H+I)	37581	46441	56227	65123

Table 3.2 (Continued)

Table 3.2 (Continued)

	X0	*X1*	*X2*	*X3*
LIABILITIES				
Long term liabilities				
Share capital	1920	1920	1920	2920
Reserves and surplus:	2781	2720	2660	2605
Revaluation reserve				
Capital reserve	8	–	–	–
Share premium	–	–	–	4754
Investment allowance reserve	752	891	790	702
Capital subsidy	15	15	35	35
Debenture redemption reserve	36	144	252	432
General reserve	2891	2554	3156	3654
Profit and loss account	182	459	493	482
A. Shareholders' fund	8585	8703	9306	15584
Long term loans & deposits				
Debentures	2475	5667	5449	2257
Term loans	868	5538	5688	5579
Fixed deposits	1295	1567	1543	1650
Security deposits	1479	1305	1895	2561
Deferred payment credits	360	365	269	176
Incentive loans from govt.	311	322	375	448
B. Total long term loans and Deposits	6788	14764	15219	12671
C. Total long term liabilities (A+B)	15373	23467	24525	28255
Short term liabilities				
Current liabilities:				
Bridge loans	36	–	93	2503
Trade creditors	12818	14877	18230	18643
Advance payments	4036	5233	5432	5489
Expense creditors	277	365	485	235
Bank overdraft	4608	2059	6904	9481
Unclaimed dividend	2	3	2	3
D. Total current liabilities	21777	22537	31146	36354
Provisions				
Taxation (Net)	–	–	152	–
Premium on redemption of debentures	85	53	20	38
Proposed dividend	346	384	384	476
E. Total provisions	431	437	556	514
F. Total liabilities (C+D+E)	37581	46441	56227	65123

Table 3.3
Universal Electricals Limited
Annexure to Financial Statements

Notes and assumptions

1. Capital reserve was the result of an amalgamation which was ultimately adjusted against general reserve.
2. Land and buildings were revalued on a date five years earlier than X0 by Rs 3,114 lakh. Depreciation on the same is recouped from revaluation reserve.
3. Particulars of debentures:

(Rupees lakh)

Type	*Amount*	*Interest (%)*	*Terms of redemption*	*Premium (%)*
Non-convertible	751	12	Payable in five equal annual installments starting from 30.6X4	5
-do-	218	10	Payable in full on 30.6. X2	5
-do-	249	13.5	Payable in full on 15.7. X7	5
-do-	1000	12.5	Payable in three equal installments starting from 11.5. X8	5
-do-	500	14	Payable in full on 22.3. X7	5
Convertible	3192	12.5	Convertible into 6.72 lakh equity shares of Rs100 each during X3 at a premium of Rs 375/- per share. The debentures were issued during X1	5

4. Term loan repayment schedule: *(Rupees lakh)*

X0	*X1*	*X2*	*X3*	*X4*
125	780	800	800	800

5. Materials and wages are net of capitalisation.
6. Contingent liabilities not provided for *(Rupees lakh)*

	X0	*X1*	*X2*	*X3*
a) Disputed Income Tax, Customs, Excise duty and Sales Tax	67	246	218	527
b) Bank guarantees	9624	9664	11739	14170
c) Seller's bills discounted (Drawer's bills)	922	412	1381	1896
d) Suppliers' bills discounted (Drawees' bills)	4958	5690	4608:	6125

Table 3.3 (Continued)

Table 3.3 (Continued)

7. Miscellaneous expenses include:
    a) Debenture issue expenses written off
    b) Share issue expenses written off
    c) Deferred revenue expenditure written off

Distribution of miscellaneous expenses:

(Rupees in lakh)

	X0	*X1*	*X2*	*X3*
As in 7a, b, c.	22	100	190	170
Others	1493	1860	2389	2730
Total	1515	1960	2579	2900

8. Interest and commitment charges:

	X0	*X1*	*X2*	*X3*
Fixed loans	529	1084	1463	2053
Debentures	302	367	733	513
Others	1426	1818	2312	2527
Total	2257	3269	4508	5093

9. Consumption of raw materials and spare parts (including capitalized items):

(Rupees lakh)

	X0		*X1*		*X2*		*X3*	
Raw Materials								
Imported	4076	(21.32)	5252	(24.15)	5868	(21.13)	5877	(18.68)
Indigenous	15037	(78.68)	16498	(75.85)	21895	(78.87)	25583	(81.32)
Total	19113	(10.00)	21750	(100.00)	27763	(100.00)	31460	(100.00)
Spare Parts								
Imported	9	(21.95)	63	(63.00)	47	(35.07)	127	(51.21)
Indigenous	32	(78.05)	37	(37.00)	87	(64.93)	121	(48.79)
Total	41	(100.00)	100	(100.0)	134	(100.00)	248	(100.00)

Note: Figures in bracket represent percentage to the total.

10. Repayment of Deferred Payment Credits: *(Rupees lakh)*

X0	*X1*	*X2*	*X3*	*X4*
124	126	136	112	112

11. On an average Fixed Deposits taken from the public are repaid at Rs 175 lakh per annum net of renewals.
12. Incentive loans from Government include interest free Sales Tax Loans, special incentives from State Industrial Development Corporations, Sales Tax Deferral Loans etc. None of them are due for repayment in the next seven years.

Table 3.3 (Continued)

13. Bridge loans aggregating Rs 2,503 lakh were taken during X3 against Rights Issue of Equity Shares. Earlier bridge loans were against sanctioned term loans.
14. Loans and advances are composed of the following items:

(Rupees lakh)

	X0	*X1*	*X2*	*X3*
a) Advances to suppliers of materials	2291	3627	3754	5001
b) Advances to subsidiaries for materials and services	1210	107	62	390
c) Technical know-how (net of adjustment)	251	252	607	588
d) Security deposits with landlord, Excise and Customs authorities	70	190	250	300
e) Deposits with the Excise and Customs Authorities in current account	38	81	134	186
f) Advance Income Tax (net)	150	100	–	75
g) Staff advances (vehicles and housing)	404	655	739	812
Total	4414	5012	5546	7352

15. Opening balance of inventories in X0: *(Rupees lakh)*

Raw materials	2129
Spares	51
Work-in-process	2512
Finished goods	2716
Total	7408

16. The amount of bad debt as of X3 includes Rs 403 lakh being advances paid to a subsidiary company written off under the scheme approved by the Board for Industrial and Financial Reconstruction.
17. Share premium account is net of Rs 61 lakh written off as share issue expenses.
18. During the last quarter of X3 the company made a Rights Issue of 13.12 lakh equity shares of Rs 100 each at a premium of Rs 700 per share. The issue was fully subscribed. An amount of Rs 200 per equity share was received during the year as application money representing Rs 25 towards share capital and Rs 175 towards premium. The remaining amount will be payable on allotment by the first quarter of the following year. Besides this, the company has 25.92 lakh fully paid up equity shares of Rs 100 each as on 31st December X3. The authorised share capital of the company is Rs 6000 lakh divided into 60 lakh equity shares of Rs 100 each.
19. Pursuant to a scheme of amalgamation sanctioned by the Board for Industrial and Financial Reconstruction, Indian Electrial Lamp Works Ltd. (IELWL) was amalgamated with UEL in X1. As per the terms of the scheme, UEL took over all properties, assets and liabilities of IELWL. Excess of liabilities over assets taken over by UEL on amalgamation of IELWL amounting to Rs 1,539 lakh was adjusted against capital reserve and general reserve.
20. The Company closes its annual accounts on 31st December.

products by processing, machining, etc., and (*b*) purchased items bought directly from vendors for assembly or direct sales. In case the bought-in items are composed largely of finished goods purchased from the market for direct sales without much further processing, then it should be brought out separately to evaluate the real strength of the manufacturing function. This segregation often reveals interesting facts. At times, it may so happen that the company has lost a sizable part of the market for its own manufactured products, which it tries to conceal by clubbing the finished goods purchased figure with direct materials. It may also be that certain items previously manufactured and marketed by the company under popular brand names have ceased to be cost effective vis-à-vis that of the new entrants in the field. However, since the company continues to enjoy the brand popularity of the products, it may decide to get these manufactured elsewhere, particularly in small establishments, at less cost and market them under the same brand names. All these interesting facts will be revealed only when we segregate the finished goods purchases from direct materials consumption as we have done in the case of UEL.

Seasonality: Storage of materials and the volume of their use may often depend upon seasonality, which may affect both the demand and supply side of a business. A manufacturer of sports goods will find his sales picking up during a particular sports season but raw materials for manufacturing sports goods are generally available almost uniformly throughout the year. In the case of the sugar industry, procurement of sugarcane is highly seasonal while sale of sugar is almost uniform throughout the year. In the case of the former, procurement and consumption of raw materials during peak sales seasons will be high, and are expected to taper off to normal levels during the off seasons. In the case of the sugar industry, procurement and consumption of raw materials, namely sugarcane, will be high during the peak harvesting season. There may not be any sugarcane stock left afterwards, though stock of the finished product, namely sugar, will be very high during this period and will be sold gradually over the year. Buying seasonality mainly occurs in agricultural raw materials while sales seasonality depends upon festivals and climatic changes.

Imported materials: Raw materials may be indigenously procured or imported from abroad. This information is available as a note to all published annual reports. If bulk of the materials are imported, the enterprise may be subject to the vagaries of international prices and exchange rate movements. Internally also, changes in customs duties and the government's general import policy will affect the cost and availability of materials. Lead time for receipt of materials from abroad is generally high as is also the time taken for completing the formalities of importing them. All these taken together generally keep the materials procurement department on their toes all the time. This results in larger carrying of inventories. Worse is the case when spare parts are imported for they may be critical for smooth operation of plant and machinery. Keeping this in mind, the Reserve Bank of India allows enterprises to carry one year's consumption of imported spare parts.

Valuation methods: The issue price at which materials are charged to production and the valuation of period-end inventory may affect cost and profit of an enterprise significantly. Under the First-in-First-out (FIFO) method it is presumed that materials are issued to production in order of their receipts in stocks. At times of stable prices, cost of production is correctly valued, as well as the period-end inventories. When prices are falling, however, the FIFO method over values the production while inventories are valued close to market rate. The converse is true when prices are rising. In the case of the Last-in-First-out (LIFO) method the materials are charged to production in the reverse order of FIFO, i.e., the latest receipt is the first issue. Here the production is charged close to market prices of materials but inventories are valued at historical cost, which may be over valued or under valued depending upon whether prices are falling or rising.

Some organisations pursue a middle-of-the-road policy, both for issue and valuation of materials inventories. These are generally based on simple averages, weighted averages or moving averages of the cost of materials procurement throughout a period. Materials are charged to production on the basis of a derived rate while period-end valuation of inventories is done by comparing the book value of inventories with the present market rate—generally the least of the two is taken to uphold the accounting principle of conservatism.

Methods of valuation of inventories are indicated in the annual report as a note. Whatever may be the method of valuation it should be consistently followed year after year, as otherwise, comparison of cost and profit performance of an enterprise between two periods of time will be vitiated. Any change in the method of valuation will be commented upon by the auditor in the annual report.

It is preferable to include indirect materials, stores and other consumables used directly in production but consumption of spares should be shown separately.

Manufacturing Labour Costs

In terms of cost accounting methodology, labour costs associated with manufacturing and assembling the product are treated as direct labour costs. Machine operators and assembly workers who work directly on the product itself are classified as direct labour as opposed to indirect labour provided by persons such as inspectors, maintenance people, and material handlers. They supply essential services to manufacturing but do not work on or change the product configuration. Historically, the direct labour cost was presumed to be variable with the volume of production, just like materials, which formed the basis for making break-even analysis of a product. With the rise of the collective bargaining power of labour, the desire of the firms to retain skilled workers at a fixed wage, and the advent of automated productive systems giving rise to fixed salaried service workers, there does not exist much variable direct labour. The sharp distinction between direct and indirect labour which was valid during Taylor's (1911) time has lost much of its relevance today. What is important now, is to separate the functions of an enterprise under three broad heads, namely, manufacturing, marketing, and administration, and capture all expenses incurred under each of these functions. By this definition all wages and salaries paid for manufacturing (including those of all administrative heads responsible directly for the manufacturing function whether sitting within the factory premises or at headquarters) should be treated as labour spent on manufacturing. This may cause a change in the behaviour of this cost from variable to semi-variable, but for that matter all costs are ultimately found to be semi-variable, except in the very short run. It is sufficient to identify the dominant behaviour of a group of costs for making marginal analysis of a product.

Power and Fuel

This is a direct conversion cost and includes consumption of electricity, coal, water, minerals and other fuels used during the process of manufacturing. If a company has an alternative power generating installation, expenses under this head would include diesel and other costs of running the generating set, and not the electricity consumed by units as in case of electricity bills received from the external electricity supplying agency. The nature of costs under this head suggests that it will be dominantly variable.

Maintenance and Repairs

Large companies have separate maintenance departments responsible for the maintenance and repairs of the entire plant and machinery. Small firms may not have such a distinct set up. Maintenance jobs are generally carried out by skilled workers who are ordinarily engaged in production. Although maintenance of large and complex machines often requires specialised knowledge, which might have motivated large corporations to have a separate department, the advantage of having trained staff capable of handling both manufacturing and maintenance, as in small scale industrial units, is gaining greater acceptance in current manufacturing philosophy, particularly with the advent of just-in-time (JIT) manufacturing.

When firms have separate maintenance departments they may treat it as a distinct cost centre. All expenses like salaries and wages; stores and spares; and other costs of use of capital in the department are pooled together and charged to various product departments as maintenance overheads at a predetermined rate, e.g., per hour of engagement. In such a situation, the total cost of the maintenance department may feature as such in the annual accounts of the firm without any further cost classifications under different heads, e.g., salaries and wages, stores and spares etc. However, some firms may choose to use maintenance overhead rates for internal control purposes and disaggregate the expenses of the maintenance department under different generic heads for reporting in published accounts. In the latter case, it is desirable for an analyst to pool together all such costs once again from the published accounts and determine the aggregate cost of maintenance and repairs, because he has to know the efficiency or otherwise of the maintenance department and its impact on the manufacturing function of the enterprise.

In the published annual accounts of a company, maintenance and repairs of plant and machinery and that of buildings and others are shown separately. For the buildings which are part of the factory premises, the cost should be charged to manufacturing and for those belonging to marketing and administration, the cost should be similarly assigned to them respectively. However, if the amount of repairs relating to the buildings is small (which is normally the case), then instead of hair-splitting the cost between the functions it may be assigned directly to administration, to honour the accounting principle of materiality. Maintenance and repair costs are predominantly semi-variable in nature.

Depreciation

Depreciation of fixed assets is simultaneously the cost of use of services released by such assets and their consequent diminution in value; and a provision for future replacement of such assets. It is not a cash cost in the sense that no payment is involved to any outside agency (except when a depreciation fund is invested in sinking fund investments for future replacement of assets). The amount of depreciation, though a charge to the profit and loss account of the business (because no company can declare dividend unless full provision of depreciation is made), in reality, is set aside from the profits of the company and retained in the business like any other reserves for the purpose of future expansion.

There are different methods of charging depreciation, of which the straight line method and written down value method are the most popular. In the former case, the asset is depreciated uniformly throughout its designated life. In the case of the latter, depreciation will be high during the initial years and low during the later years. A company is duty bound to disclose the methods of depreciation followed by it in respect of various classes of fixed assets. It is expected that companies should follow a uniform depreciation policy throughout the life of a particular class of assets. However, if there is a change in policy in respect of any class of assets from any particular year it should be reported in the annual accounts of the company in the form of a note which will also explain the impact of such a change on the profit or loss of the company. An analyst should make proper adjustments in view of such changes to the cost and profit figures of the company in order to obtain comparable figures for the years under study.

Mandatory provisions: Making provisions for depreciation is governed by two Acts, namely, the Companies Act and the Income Tax Act.

The former prescribes the minimum rate to be charged on various classes of assets before a company is eligible for declaring dividend, while the latter prescribes the maximum rates allowable as deductions from profit for tax purposes. It is likely, therefore, that the accounts published by the company in its annual report will vary from the one submitted to the Income Tax authority.

Revaluation of assets: During recent years it has been observed that many companies are revaluing their assets ostensibly to bring them closer to market values. Without going into the veracity of such a decision at this stage, we can immediately see that this decision will increase the amount of depreciation that can be charged on the revalued assets. Although the book value of an asset is increased consequent upon its revaluation, there is, in effect, no increase in the productive capacity of such an asset. It is logical therefore, that the manufacturing or other operating functions of the enterprise cannot be asked to bear the additional burden of depreciation for which no operational benefit has been received. A sound accounting policy, therefore, demands that the additional depreciation on the revalued portion of the asset should not be charged to operations but adjusted against the revaluation reserve created on the liability side of the balance sheet consequent upon revaluation of the asset.

The profit and loss account of an enterprise will reveal the annual depreciation (net of revaluation adjustment) as a charge against profit while the balance sheet will show accumulation of all such annual depreciation as deduction from gross fixed assets. Details of depreciation charged to various classes of assets are generally available from the schedule of fixed assets annexed to the balance sheet. It may so happen that annual depreciation figures available from the profit and loss account may not tally with the difference between the accumulated depreciation of the last two years, as available from the balance sheet. A study of the schedule of fixed assets will reveal the causes for such a difference. It may be found that some of the fixed assets might have been sold during a year and consequently, the accumulated depreciation on such assets has also been written off. This point has an important bearing on the funds flow analysis of an enterprise, as we shall see later.

The manufacturing function of an enterprise is directly responsible for the burden of depreciation on plant and machinery. It is also responsible for the depreciation on other buildings which are used by the manufacturing function, e.g., staff quarters for manufacturing people. It is desirable to obtain detailed information about the location and use of different buildings of an enterprise to allocate depreciation amongst various functions but such information is generally not available in the published accounts. In the absence of this information and in view of the fact that depreciation of buildings constitute only a small part of total depreciation in a year (the bulk being on plant and machinery), we may consider charging it to administration. Depreciation is generally treated as a fixed overhead.

Other Manufacturing Expenses or Production Overheads

These costs include all other manufacturing expenses not included above but incurred within the domain of or for the manufacturing function. One such cost is the insurance paid for plant and machinery; factory premises; manufacturing inventories like raw materials, stores and spares; work-in-process etc. Others are heat, light, gas (besides power and fuel), stationery, janitor services, royalty, and other service charges. Some of these expenses, e.g., stationery because of their small amounts are, however, clubbed together from different functions and charged to administration.

Excise duty: Although excise duty is a real cash expense which is claimed by the exchequer at the time of despatch of finished products from the factory gate, we have not included it as a part of cost of sales. This is because excise duty is beyond the control of the manufacturing function or for that matter beyond the purview of the enterprise function itself, as it is imposed by the government from outside. Besides, at the enterprise level, it is difficult to see how this expenditure is adding any further value to the product. If we want to judge the efficiency of any function we cannot make it responsible for an expenditure over which it has no control. It is desirable, therefore, to deduct the excise duty (and also sales tax for the same reason) from the gross sales and then compare it with cost of goods sold to arrive at the manufacturing gross profit.

Now, when we add up all the costs mentioned above, we obtain the figure of the total manufacturing expenses of a given year. This, however, does not tell us either the cost of production of finished goods or the cost of goods sold during that given year. For this purpose we have to take into account the following two stock items.

Work-in-Process Inventory

Like materials inventory, an enterprise is presumed to carry forward its process inventory on the opening day of the new financial year, which it 'consumes' in the next year. At the end of the year, it is left with a new in-process inventory which has consumed a part of the manufacturing expenses but has not produced any output. Therefore, in order to arrive at the true cost of production of finished goods, we have to first add the opening inventory of the work-in-process to the total manufacturing expenses and then deduct the closing inventory of the work-in-process from the earlier figure.

Some companies do not report the work-in-process inventory in their published accounts considering it to be too small. They club it with raw materials inventory. An analyst will definitely dig out this important item of manufacturing operation because, as we shall see later, it reveals important information about the technological state of an enterprise.

Finished Goods Inventory

All the goods produced in a year might not have been sold within that year. An enterprise may carry forward unsold goods of the last year and be left with some unsold stock at the end of the current year. As in the case of work-in-process inventory, we have to make similar adjustments of these stocks to arrive at the figure of cost of goods sold.

It should be remembered that there is some arbitrariness in the determination of both cost of production and cost of goods sold because all the inventories that are adjusted against manufacturing costs are valued items. None of the valuation methods, as we have described while discussing raw materials, can make an objective valuation of inventories. However, as long as the valuation method pursued by an enterprise is uniform over the years, it is possible for an analyst to obtain a near consistent picture.

Although finished goods are produced by the manufacturing function, it is not responsible for carrying its inventory beyond factory storage. When finished products leave the factory gate it is the marketing department which takes over the responsibility. The manufacturing function should be made responsible only for carrying raw materials and work-in-process inventories.

Manufacturing gross profit: Cost of goods sold is thus derived by making adjustments to the opening and closing inventories as mentioned above. This figure is then compared with the sales net of excise duty (net sales) to arrive at the manufacturing gross profit. Further adjustment should be made if purchase of finished goods for direct sales constitute a sizable part of the total sales of the business, as mentioned earlier while discussing direct materials. However, it is not always possible from published accounts to know how much of such purchases remain in inventory of finished goods to arrive at the correct figure of manufacturing gross profit. It is desirable that such information is obtained from internal sources. In the absence of that, the impact of such purchases for direct sale on total sales of the enterprise may have to be captured by a different ratio, as we shall see later.

The manufacturing function is responsible for producing a manufacturing surplus. This presupposes a sale of the product for which it has to depend upon the marketing function of the business. This is the reason why integration of the manufacturing function with the marketing function has become the order of the day, though till recently the two functions worked almost in isolation.

Plant and machinery: This is the principal asset of the manufacturing function, the 'rotation' of which generates output for sales. It includes all machines, layout installations, and equipments of manufacture and represents the primary investment of an enterprise. We should consider here only that part of plant and machinery which has gone on stream and exclude the capital work-in-progress items appearing as part of fixed assets of the company in the published balance sheet of an enterprise. As mentioned earlier, plant and machinery, like land and buildings, can be revalued upwards. However, for purposes of analysing the manufacturing strength of a business we should ignore the revaluation.

Making provisions for depreciation is more important in the case of plant and machinery than any other asset because it wears out faster than other assets due to use, or even non-use. If a company has not charged depreciation in a particular year for want of profit, or due to other reasons, the fact will be noted in the auditor's report annexed to the published profit and loss account and balance sheet along with the quantum of depreciation not so charged. In such a case, the unprovided for depreciation should be duly provided for in the profit and loss account and deducted from the assets.

As mentioned earlier, companies limited by shares provide for depreciation as per Schedule XIV of the Indian Companies Act. Proprietory and partnership firms are not governed by this enactment nor is making provisions for depreciation mandatory for them. In case of these firms, if it is found that depreciation has not been provided for, it is desirable for the analyst to restructure their accounts by making due provisions for depreciation. It is advisable to follow the same rates of depreciation as provided for in the Companies Act.

SUMMARY

Conflicts between financial management and other operational management like, manufacturing and marketing management are universal and cut across all types of organization. The primary cause behind this lies in the attitude of non-sharing of the technical aspects of primary managerial functions among the functional managers. All hold their forts unto themselves

An attempt is made in this chapter to lay bare the fundamental aspects of financial statements like, Income Statement and Balance Sheet with the example of a real-life company. Major accounting heads are discussed in a manner which is easily understandable by a manufacturing manager not trained in accounting and finance. In addition to basic financial statements attention is also drawn to the relevant information available in the other parts of the Annual Reports that have a bearing on evaluating performance of the company. We have not loaded this chapter with a discussion of different Accounting Standards that are followed for drawing up financial statements of a company. However, relevant Accounting Standards and their implications for valuation of a company are discussed in Chapter 14.

The set of financial statements presented in this chapter will be used in subsequent chapters for analyzing all functional areas of management and also for corporate control and monitoring of these functions.

Chapter 4

Ratios for Financial Control of Manufacturing Management

Amusement to an observing mind is study.

—Disraeli

INTRODUCTION

As indicated earlier, in an integrated system, management, control and monitoring of the manufacturing function should cover both financial and technical aspects. In the earlier section, we have discussed almost all the major variables that are dealt with by a typical manufacturing function. Our purpose now is to capture the movement of these and other related variables through ratios in order to bring out the information contained therein for intelligent interpretation.

The financial aspects of the manufacturing function of our sample company, UEL, will be captured through ratios calculated between different sets of variables as revealed in the published profit and loss account and balance sheet of the company. Its techno-financial aspects will be captured through management accounting ratios calculated from technical and other derivatives of financial variables.

FINANCIAL ACCOUNTING RATIOS

Plant Turnover Ratio

This may also be called plant utilisation ratio. Its calculation and manner of movement for UEL are given:

	X0	*X1*	*X2*	*X3*
Cost of Production	24926	28776	34576	39832
Plant and machinery (depreciated)	2833	4589	4866	5054
Ratio	8.80	6.27	7.11	7.88

Although it is preferable to calculate this ratio by using the actual number of units produced in a given period, for a multi-product unit like UEL, where usage of plant or production facilities may be common for more than one product, we may have to calculate it by cost of production. Calculated this way, this ratio enables us to take a corporate view of total plant utilisation.

Nature of the Ratio: During the initial years when all plant parameters have not been fully synchronised the system may suffer from production instability, which will be reflected by an erratic movement of this ratio. When teething problems are over, capacity utilisation of the plant increases gradually. As a consequence this ratio will also show a gradual improvement. Then it reaches a plateau where it should remain more or less stable for quite some time. The reason behind this stability is embedded in the natural law of decay which declares that all organic and inorganic things will move gradually towards their final destruction. For plant and machinery it will be a gradual loss of productive capacity, in spite of all repairs and maintenance (Bhattacharya, 1992). The effect of this decay is captured, though partially, by taking the depreciated value of the asset as the denominator, which when matched against a corresponding decline in the volume (value) of the product (at least in a normative sense) as the numerator, gives rise to a stable ratio over the life of the plant. An enterprise is, however, not expected to wait till the plant finally dies out at the cost of a faster increase in the cost of production and consequent loss in market competition, particularly where an advanced machine has already arrived. It will have a programme for gradual replacement of equipment in order to stay in the market. This will have the effect of a constant improvement of the ratio. It follows, therefore, that if this ratio is suffering from a declining trend, then the business is failing to make use of its plant capacity. This may be due to a bottleneck in its productive system or a fall in the demand for its product, compelling a decrease in production.

Determining the trend: We now look at the movement of this ratio for UEL. It was highest during X0, immediately falling very low in X1. It made some improvement during the following two years but is still way behind the X0 figure. The movement of this ratio is erratic which makes it difficult to discern the trend except by statistical methods. Although, in order to really derive the trend we need data for a period larger than four years and to use sophisticated statistical tools, a quick estimate of the trend can be made by using the following formula:[1]

$$\frac{x_1 + 2x_2 + 3x_3 + 4x_4 + \cdots + nx_n}{x_1 + x_2 + x_3 + x_4 + \cdots + x_n} \quad \substack{\geq \\ <} \quad \frac{N+1}{2}$$

Where $x_1, x_2, \ldots, x_n$ are values of the ratio for year 1, 2, …, n and N is the total number of years for which the ratio is calculated.

The trend may be regarded as rising, flat or declining if the right hand side (RHS) is greater than, equal to or less than the left hand side (LHS). By this formula the trend of the plant utilization ratio of UEL appears to be flat as revealed by the following calculation:

$$\text{LHS} = \frac{8.80 + 2 \times 6.27 + 3 \times 7.1 + 4 \times 7.88}{8.80 + 6.27 + 7.11 + 7.88} = \frac{74.19}{30.06} = 2.49$$

$$\text{Which is almost equal to the RHS} = \frac{4+1}{2} = 2.5$$

Case of UEL: The analyst now has to enquire why the ratio was so high during X0 and fell so low in X1, because if we ignore the year X0 then the ratio shows a rising trend. It might be that X0 was an extraordinary year or that in X1, there was new addition to the plant, the capacity of which

[1] Trend values can also be calculated by the semi-average method or by using a regression equation of the type $y = a + bx$ or its non-linear version, $y = ax^b$; but derivation under these methods is rather complicated. As we are only interested to know whether the trend is rising, flat or declining and not so much about the trend values, we can avoid these complications by using this simple formula.

is yet to be fully utilised. In fact, for UEL there had been a substantial addition to the plant in X1, which pulled down the ratio in that year (and had the effect of making the overall trend almost flat). Subsequently, there has been a constant improvement in plant utilisation as revealed by the rising trend of this ratio since X1.

Materials Consumption Ratio

Derivation of this ratio and its movement for UEL are given:

	X0	*X1*	*X2*	*X3*
Direct materials consumption including stores and consumables	19489	22047	28353	31973
Net Sales	45748	55107	63794	69972
Ratio (%)	42.60	40.00	44.44	45.69
Trend:		*Upward*		

Nature of the Ratio: This ratio indicates materials consumption as percentage of sales, which is expected to be constant over a period of time because direct materials are predominantly of variable nature during a given technology period. During the initial steaming off period of the plant, the ratio may be high but it should soon settle down to a normal level and continue at that level during the given technology period. An upward movement of this ratio generally indicates increasing wastage or rise in the cost of materials. The latter conclusion is valid only when it has not been possible for the company to pass over the rise in the cost of materials to the consumer, which it should have ordinarily done. If the company is of a monopolistic type, the failure to pass over the rise in cost may be due to high price elasticity of the product and/or a rise in the availability/demand for substitute goods in the market. If the company is a price taker in a competitive market, then the failure could be attributed only to its internal inefficiency because other competitors are able to hold on to the price line in spite of a rise in materials cost. This may indicate that the company's plant and machinery has become obsolete by arrival of new machines in the market which save on materials consumption per unit of output produced.

Case of UEL: In the case of UEL, the latter conclusion may not be true because in X1 there had been a massive investment in additional plant and machinery that should have lowered the ratio. The ratio really did go down by more than two percentage points in X1 as compared to X0 but immediately thereafter, the ratio shot up by about five percentage points and crossed even the ratio obtained in X0, i.e., the year prior to investment in new machines. This may mean that even with the renewal of plant and machinery the company has not been able to make any savings on its materials consumption (which may be due to the wrong choice of machines) and as a price taker it has also not been possible for the company to pass on the cost increase to the market. If this rising trend in materials consumption is not arrested in time there is a possibility that the company would become a marginal firm.

Treatment of Scrap Sales: It may be seen that while calculating this ratio we have taken net sales as the denominator and not the total income from operations, because the latter includes income derived from the sale of scrap. Materials are consumed for the production of output. Scrap is nothing but waste having a market value. For some products, using a particular technology, some amount of scrap may be normal but for that reason one cannot take it out from the list of wastages and include it in the list of outputs. Materials are consumed for producing sales in spite of the scrap. Hence, gross materials consumption should be related to net sales to estimate the material efficiency of the manufacturing system.

Some companies are found to deduct scrap sales from the materials consumption figure in their published accounts. This approach, though falling within the domain of accepted accounting policies (because the profit or loss figure of the firm remains unchanged), gives a wrong value of materials consumption and, to an extent, suppresses a fall in material efficiency. Besides, this approach also distorts the figure of operating inflow of the firm on which many other ratios are dependent, as we shall see later.

While we are on materials we should also calculate the following two import ratios which indicate the vulnerability of an enterprise to the vagaries of the international materials market.

Materials Import Ratio

	X0	X1	X2	X3
Imported materials	4063	5224	5853	5860
Direct materials consumption	19059	21631	27700	31373
Ratio (%)	21.32	24.15	21.13	18.68
Trend:		*Downward*		

Note: The figures are taken from the profit and loss account which exclude materials consumption for capitalised items.

A manufacturing company like UEL, which has to depend on imports for about 20 per cent of its materials consumption, suffers from vagaries in international commodity markets, exchange rate movements and volatile government policy towards imports. Criticality of imported materials is a dominant factor in this respect because the entire manufacturing function of an enterprise may come to a halt due to non-availability of critical items. Although it is expected that with the signing of the General Agreement on Tariffs and Trade (GATT) and the subsequent formation of the World Trade Organisation there will now be more free movement of materials across countries, which will reduce uncertainties in the materials market to a large extent, the threat of adverse movements in exchange rates will remain. This will make it difficult for an enterprise to quote a stable price for its product if the import content of materials is very high. Firms like UEL are therefore required to move towards developing indigenous sources of materials. The downward trend of the materials import ratio for UEL suggests that the company is moving in the right direction.

Spares Import Ratio

This ratio which, at times, is more critical than the materials import ratio is calculated for UEL.

	X0	X1	X2	X3
Imported Spares	9	63	47	127
Consumption of Spares	41	100	134	248
Ratio (%)	21.95	63.00	35.07	51.21
Trend:		*Upward*		

The import component of spares precedes purchase of imported machinery or domestically produced machines with an import content. For UEL the spares import ratio was 22 per cent in X0 which shot upto 63 per cent in X1, when the enterprise went in for large scale investment in plant and machinery, then dipped down to 35 per cent but again shot up to 51 per cent. It is likely that the company purchased mostly imported or high import content machines. Apparently, this is not a very alarming situation, if along with import of machines the company has also assured itself of a regular supply of spares. The manufacturing system, however, remains under threat all the time because sources of spares may dry up owing to the closure of the supplier company, design changes or even temporary disturbances in international transport and communication systems.

Due to these uncertainties in the supply of both imported materials and spare parts many companies are found to hold large inventories for these items, which often are beyond reasonable levels even considering the risk of stock non-availability. We shall discuss this under materials inventory turnover ratio.

Manufacturing Labour Ratio

The method of calculating this ratio and its movement for UEL are as follows:

	X0	*X1*	*X2*	*X3*
Manufacturing wages and salaries	4127	5132	5932	6523
Net sales (cost of production)	45748 (24926)	55107 (28776)	63794 (34576)	69972 (39832)
Ratio (%)	9.02 (16.56)	9.31 (17.83)	9.30 (17.16)	9.32 (16.38)
Trend (ignoring X0):		*Flat (Downward)*		

Note: Figures in brackets represent cost of production and ratio based on it.

Nature of the Ratio: As we have discussed before, since the largest component of this cost is factory wages, it should be dominantly variable with sales. Hence, the ratio will reveal a near constancy or a gradual downward movement over a given technology period. The reason behind the latter phenomenon is that, though the cost is dominantly variable, a part of it, representing wages of skilled workers and salaries of supervisory and managerial staff, is fixed in nature which will have the effect of pulling down the ratio as sales increase. The reverse will be true when sales fall. In highly capital intensive and automated industrial units this phenomenon is frequently observed.

Case of UEL: For UEL this ratio calculated on net sales remains almost constant since X1, when the company made large investments in plant. The post X1 ratio is, however, higher than the ratio obtained in X0. Apparently, for a 100 per cent manufacturing concern (which UEL is not, as we shall see later) this manner of movement of the ratio would be disturbing, because with the renewal/modernisation of the plant labour cost is expected to go down similar to materials cost. It is true that there had been a substantial increase in sales in X1, compared to X0, and this trend continued during the next three years but, ordinarily, there should be no reason why the labour ratio should also increase; on the contrary, there is every case for its decline if UEL were a fully manufacturing concern. In a new technology period this ratio is expected to stabilise at a lower level. Apparently, there is no reason why the equilibrium should be reached at a higher level, unless, the enterprise has deliberately installed labour intensive technology, which it often does to absorb surplus labour who cannot be disposed of except at the cost of tremendous social unrest. However, the situation would not be so disturbing if, on enquiry, it is found that the firm had made a new wage agreement simultaneously with the renewal of the plant. Here too the manufacturing labour ratio would once again stabilise, though now at a higher level, unless there is a fall in labour productivity.

Purchase of Finished Goods: Our enquiry has, however, revealed one important fact as discussed later under the head, trading ratio. Purchase of finished goods for direct sales constitute more than one fifth of net sales of UEL. Manufacturing labour would not have been associated with these purchases or sales. In a case like this, it is preferable to calculate this ratio on cost of production instead of net sales. This we have done and the figures are given in brackets with the original figure. This modified ratio, suddenly moving upwards in X1 and declining since then, surpassed even the achievement of X0 in X3, which indicates improvement in labour absorption by the manufacturing function.

Trading Ratio

The calculation of and movement of this ratio for UEL are given:

	X0	*X1*	*X2*	*X3*
Purchase of finished goods	11237	15046	16097	15183
Net sales	45748	55107	63794	69972
Ratio (%)	24.56	27.30	25.23	21.70
Trend:		*Slightly downward*		

Nature of the Ratio: We have already indicated that firms, whose purchase of finished goods for direct sales comprises a sizable part of net sales, should separate this component from the materials consumption figure (where it may be 'carefully' hidden). It should be dealt with separately, as otherwise, we may get a distorted materials consumption ratio for the manufacturing function. As these purchases are purely for trading purposes, not forming a part of manufacturing, the ratio is called trading ratio. When the trading ratio of a manufacturing concern is high, the one conclusion that can be safely reached is that the internal economy of manufacturing these products within the plant is no longer available but a brand goodwill still exists in the market which the company intends to cash on. If these products were among the ones previously manufactured by the company then it is likely that the company is an old enterprise and it can no longer carry large overheads for the manufacture of these products due to stiff competition from new companies, particularly in the small scale sector, with low overheads.

Case of UEL: For UEL the ratio indicates that the purchase of finished goods for direct sale comprises more than one fifth of its net sales, which is quite substantial. In fact, the ratio would have been larger if we had known the sale value of these purchased products. From the published accounts it is not possible to find out how much of these purchases remained unsold in stock. Assuming this to be a regular feature of the company, we can hold, that the average stock position remained more or less the same, and hence, all such purchases are presumed to have been sold within the given year.

High Overheads: A high trading ratio for a manufacturing company cannot sustain the enterprise for long. Ultimately, the enterprise has to regain its manufacturing strength if it desires to stay in the market. The very emergence of a trading ratio in a manufacturing firm indicates the existence of high overhead costs. It signals a warning, that if these overheads are not reduced and controlled by proper restructuring of manufacturing and administrative functions, then other products would soon also be affected, resulting in a movement of more items from the manufacturing list to the trading list. The process would not, however, end there. The uncontrolled overheads would soon start eating into the margins on the products in the trading list itself.

Spares Consumption Ratio

The calculation and movement of this ratio for UEL are as follows:

	X0	*X1*	*X2*	*X3*
Consumption of spares	41	100	134	248
Net sales (cost of production)	45748 24926)	55107 (28776)	63794 (34576)	69972 (39832)
Ratio (%)	0.09 (0.16)	0.18 (0.35)	0.21 (0.39)	0.35 (0.62)
Trend (ignoring X0):		*Upward*	*(Upward)*	

Note: Figures in brackets represent cost of production and the ratio based on it.

Nature of the Ratio: Consumption of spares, though representing a small percentage of net sales or cost of production, reveals many an important thing about the state of the manufacturing function of an enterprise. Spares are consumed mostly for maintenance and repairs and in machine set up. In the case of the former, it is often clubbed together with other maintenance costs but it is preferable to separate it out for closer examination, as has been done in the case of UEL. It is a semi-variable expense which is expected to rise with the decrease in the life of the plant. This rise should, however, be slow.

Case of UEL: In the case of UEL we find that the ratio calculated as a percentage of net sales or as a percentage of cost of production (which should be the method for UEL because of its high trading ratio) is showing a rather steep rise throughout the period. This is in spite of the renewal of the plant in X1, when ordinarily the ratio should have fallen. This may signal a loosening of control in the manufacturing function. Slackening controls tend to be revealed first in the smallest cost centres. Most of the spares are probably being consumed not so much for value addition but because of wastage. A steep rise in the spares consumption ratio indicates that a culture of wastage is engulfing the organisation, though it may not be visible immediately.

Power and Fuel Consumption Ratio

The derivation and movement of this ratio for UEL are given:

	X0	*X1*	*X2*	*X3*
Consumption of power and fuel	329	559	479	640
Net sales (cost of production)	45748 (24926)	55107 (28776)	63794 (34576)	69972 (39832)
Ratio(%)	0.72 (1.32)	1.01 (1.94)	0.75 (1.39)	0.91 (1.61)
Trend (ignoring X0):	*Upward(Upward)*			

Note: Figures in brackets represent cost of production and the ratio based on it.

Nature of the Ratio: Consumption of power and fuel, like materials, being highly interlinked with level of production should be dominantly variable in nature. Hence, this ratio should be constant over a given technology period, after the production parameters settle down to normalcy.

Case of UEL: For UEL the trend of this ratio is upward. A rising trend would either indicate simple wastage or worn out state of machines which demand more power per unit of rotation than before. The first speaks of slackening of manufacturing controls while the latter indicates the time for replacing worn out machines. The latter may not be the case for UEL because in X1 substantial investment in plant had been made, which should have lowered down this ratio. It appears that some of the cost parameters of UEL, though small in magnitude, are settling down at a higher level after renewal of the plant in X1.

Maintenance Ratio

This ratio should be calculated both on net sales (cost of production) as well as plant and machinery.

The calculation and movement of the two ratios for UEL are as follows:

		X0	*X1*	*X2*	*X3*
a)	Maintenance and repairs (plant)	129	168	208	246
	Net sales (cost of production)	45748 (24926)	55107 (28776)	63794 (34576)	69972 (39832)
	Ratio (%)	0.28 (0.52)	0.30 (0.58)	0.33 (0.60)	0.35 (0.62)
	Trend:	*Moderately Upward (Same)*			
b)	Maintenance and repairs (plant)	129	168	208	246
	Plant and machinery	2833	4589	4866	5054
	Ratio (%)	4.55	3.66	4.27	4.87
	Trend:	*Moderately Upward*			

Note: Figures in brackets represent cost of production and the ratio based on it.

Nature of the Ratio: It is a general rule that costs of maintenance and repairs rise with the age of the machines. This rise, however, must be gradual, as has been the case with UEL. If there is a sharp increase in this cost it may indicate that maintenance is not being done in an organised manner—it is treated more as a ‘fire fighting’ exercise. In most Indian organisations what exists really is ‘repair-maintenance’. Maintenance people get together around the machines only when the ‘smoke comes out’. This is costly both in terms of cost of maintenance and resultant loss in production.

On the other hand, the high and sharply rising cost of maintenance and repairs may indicate that the machines are also wearing out fast, signalling their replacement. At which level of maintenance a machine needs to be replaced has been discussed under management accounting ratios.

Low or declining maintenance cost, within a given technology period, may not always mean good manufacturing health of the plant. It may in fact be just the opposite. When an organisation is not doing well financially, repairs and maintenance is often the first sacrifice. This small decision has a tremendous snowballing effect upon the manufacturing system itself. Machines are like human beings in terms of maintenance of health. If we postpone treatment of a small ailment, because we do not have either the money or the time, then often a time comes when, with all the money and time, we are unable to save ourselves. This lesson, often forgotten when it is needed most, is true for both men and machines!

Materials Inventory Turnover Ratio

This is also called velocity of materials inventory. The derivation and movement of this ratio for UEL are given:

	X0	*X1*	*X2*	*X3*
Materials consumption (including stores)	19489	22047	28353	31973
Materials Inventory (including stores)	2523	3103	3905	3969
Ratio	7.72 (47)	7.11 (51)	7.26 (50)	8.06 (45)
Trend:		*Almost Flat*		

Note: Figures in brackets indicate number of days holding which is derived by dividing 365 days with the turnover ratio.

Components of Materials and their Valuation: UEL does not maintain a separate inventory for stores, though consumption is shown separately. Either the entire stores are consumed (written off) within the year of their purchase or whatever stocks remain at the end of the year are clubbed together with materials inventory. We have already discussed at length, the problem of inventory valuation and indicated that if a consistent method of valuation is not followed, subsequent analysis and estimation of profit may be tainted. It is necessary, therefore, to find out from the annual reports whether there has been any change in the methods of valuation and, if so, necessary adjustments should be made to the reported inventory and profit before embarking on any analysis. However, in the case of UEL there has not been any such change during the period under review.

Nature of the Ratio: It should be remembered that each piece of material carried to inventory contributes negatively to the profitability of the business in terms of (*a*) the cost of physically carrying the inventory, and (*b*) the interest (opportunity) cost of the funds blocked in it. This is the main reason why there has now been a movement towards zero inventory manufacturing system globally. Attempts are being made by large corporations, spearheaded by Japanese enterprises, to so synchronise materials supply with the productive system, through proper vendor development, that there would be no need to hold any inventory of materials. ‘The rapidly accumulating literature regarding stock is strong testimony to the realisation of the enormous significance of this most hazardous item. [. . .] For stock creates the shallows on which many a good administration and many an otherwise efficient accountancy system will founder' wrote Parkinson (1951: 45). How true this is even today! The growing interest in zero inventory or JIT manufacturing systems in recent years has several reasons. One of them is the realisation that the economics of bulk buying may be more than forfeited by stock harbouring. One of the most important objectives of a purchase manager is to increase the velocity of materials stock and this can be achieved not by bulk buying but by prudent buying.

Case of UEL: The message is loud and clear. Enterprises must move towards reducing the level of inventory, if not making it zero. As long as that is not possible, it is essential that the inventory turnover ratio is held at a constant level. UEL has done so. On an average, UEL is holding about 48 days of materials consumption in inventory. This is much lower than the 83 days holding prescribed under RBI norms. However, it should still be pointed out, that for a company whose profit before tax (PBT) is Rs 1,530 lakh, the interest cost alone for carrying the present level of inventory is more than Rs 700 lakh.

The Problem of Dead Stock: If the materials inventory turnover ratio is worsening for quite some time then it is likely that the enterprise is carrying increasing amount of dead stock in its inventory, which it is unable to write off for fear of registering a substantial fall in profit or even making a loss. This fear takes over a company specially at a time when it is suffering from a cash crunch. Instead of taking a hard, though prudent, decision at this juncture to prevent eating up of capital, many a company decides to postpone the decision to a later date, waiting for 'good times' and, in the process fuel the cycle of decay, and delay the arrival of that very 'good time'. Some simple calculations will make it clear. For every hundred rupees of 'dead stock' carried in the books of account a company has to pay Rs 50 as income tax (because profit is inflated to that extent) and a likely dividend of say Rs 15. Now, even ignoring the opportunity cost of carrying the 'dead stock', the net cash outflow for the company will be Rs 65 against which no matching asset now exists. This cash outflow will recur year after year as long as the company carries this 'dead stock' in its books of account. The result is a continuous deterioration of its cash position. A low materials inventory turnover ratio may also be due to the high import content of materials consumption. We have seen earlier that the materials import ratio for UEL is high, at around 20 per cent. Let us now see how the company is managing its inventory of imported materials with the help of the following ratio.

Imported Materials Inventory Turnover Ratio

	X0	*X1*	*X2*	*X3*
Consumption of imported materials	4063	5224	5853	5860
Inventory of imported materials	538	749	825	741
Ratio	7.55 (48)	6.97 (52)	7.09 (51)	7.91 (46)
Trend:		*Almost flat*		

Note: Figures in brackets represent number of days of consumption.

Case of UEL: It appears that for UEL movement of both the total materials inventory turnover ratio and imported materials turnover ratio are almost the same. The trend is flat at around 48 days. This is good considering the uncertainties in the imported materials market. It may be that the company has been able to locate stable sources of supply of imported materials, which it has to, because about twenty per cent of its materials consumption is imported.

Work-in-Process Inventory Turnover Ratio

This is also called velocity of work-in-process inventory. Calculation of this ratio and how it has moved in UEL for four years are given:

	X0	*X1*	*X2*	*X3*
Cost of production	24926	28776	34576	39832
Work-in-process inventory	2543	2972	4610	5484
Ratio	9.80 (37)	9.68 (38)	7.50 (49)	7.26 (50)
Trend:		*Downward*		

Note: Figures in brackets indicate number of days of holding.

Nature of the Ratio: While materials inventory is primarily market driven, work-in-process inventory is dominantly technology given. When an enterprise buys a technology, it essentially buys a process of manufacture. All manufacturing processes are continuous, though apparently some of them may look disjointed. Work-in-process is, therefore, central to the manufacturing system of an enterprise and it is also here that the first dose of working capital (asset) is generated (Bhattacharya, 1990).

Raw materials gain value as these are absorbed in the conversion cycle and this value addition is done by wages and other non-material operating expenses engaged in the cycle. When the value addition is complete the raw material is converted into an output. This conversion cycle may be of a few minutes, hours, days, months or even years. Whatever may be the duration, if we could stop the line at any point of time, we would find values being held at different stages of the process, which are yet to be converted fully into outputs.

The aggregate of all these values—what we call work-in-process— is composed mainly of costs which are proportional to the level of production, and hence the turnover of work-in-process or its velocity should be constant during a particular technology period.

Case of UEL: It appears that the velocity of work-in-process inventory of UEL has fallen. From 37 days of holding in X0 the company now holds 50 days of cost of production in work-in-process inventory. It should, however, be recalled that in X1 the company made considerable investment for renewal of its plant and machinery. It may be that the company is yet to gain full control of its production parameters, which has given rise to the higher than normal holding in the work-in-process or that the new technology itself demands higher holding. The latter is likely to be true because it appears that the work-in-process inventory is settling down at around 50 days of holding as the ratio for X2 and X3 suggest. The actual take-off with the new technology might have begun in X2.

Bottlenecks in Production: For companies where this is not the case, a fall in this turnover ratio indicates that serious bottlenecks have cropped up in the manufacturing process, causing wastage of materials and other operating resources. More serious than this is the loss of management control over manufacturing expenses, resulting in a break down of their proportionality/variability with the volume of production, i.e., more and more expenses are now becoming fixed in nature against falling productivity. For UEL this is not true because we have already seen that the materials consumption ratio and the manufacturing labour ratio are more or less constant, indicating their variable nature. As we shall see later, the gross profit ratio of UEL also supports this conclusion. The only disturbing fact is that prior to renewal of its machines, the company had a higher velocity of its work-in-process, which it has lost after the renewal. The analyst thus has to enquire into the reasons behind it. It is likely that the answer may lie in the efficacy or otherwise of the new technology, or recent renewal, of the plant.

Although this may not be the case with UEL, a continuous fall in the velocity of work-in-process inventory in a given technology period may also be indicative of deteriorating conditions of plant and machinery, which enlarges the conversion cycle of the manufacturing process and results in holding of more value in the work-in-process. If the machines are not replaced soon, the enterprise may lose its competitive advantage.

A fall in the work-in-process velocity has to be investigated very thoroughly because this is one of the most important ratios to determine the manufacturing viability of an enterprise.

Technology Updation Ratio

This ratio is not calculated every year but only over a period of time. For UEL it is calculated for a four-year period.

	X0–X3
Gross addition to fixed assets (including capital work-in-progress) during the period	7443
Accumulated depreciation during the period	2480
Ratio	3

Nature of the Ratio: One of the principal objectives of charging depreciation to profit and loss account is to create an internal fund for replacement/ renewal of plant and machinery in order to keep the manufacturing outfit up to date. The present ratio tries to capture the attitude of the enterprise towards modernisation of the plant. It is expected that over a period of time an enterprise should fully utilise the depreciation reserve for renewal/ replacement of its plant. Tax authorities also view it from this angle while allowing depreciation as a deductible expenditure from income. In fact, for enterprises desiring stability with growth, capital expenditure is an on going process. Hence, the ratio of aggregate capital expenditure to depreciation should at least be 1, if not more, because depreciation reserve forms only a part of the total funding of fixed assets addition (other parts coming from reserves and loans). It is preferable if this ratio is calculated from the date of commencement of the business for a block of say, five years, using a moving average for both the numerator and denominator.

Case of UEL: For UEL, the ratio which covers a four-year period appears to be very high. This is by way of example only. We do not know how the company fared in the earlier periods. While calculating and interpreting this ratio we should also keep in mind that gross block reported in the published balance sheet is the net of deletion of assets, by way of sale or other modes of disposal.

An enterprise whose technology updation ratio is less than 1 for successive periods may lose its competitive edge owing to worn out machines. This has been the case with many of our protected industries.

Protection Ratio

This ratio is calculated in the following manner:

$$\frac{\text{Landed price of the imported product}}{\text{Domestic cost of the product}}$$

Nature of the Ratio: This ratio is becoming more and more important during recent years, particularly with the liberalisation of the economy and signing of GATT by India and her subsequent entry to the World Trade Organisation. If landed price of the imported product (CIF price) is less than the cost of the same product produced domestically by an enterprise, i.e., when this ratio is less than 1, the product becomes so vulnerable to governmental policy changes towards reducing or lifting of tariffs that it may just be wiped out from the market.

If this ratio is equal to 1, then the enterprise can be said to be producing goods of international quality. If it is greater than 1, it indicates the export potential of the product.

We have not been able to calculate this ratio for products of UEL because relevant data is not available.

Gross Profit Ratio

We measure the efficacy or otherwise of the total manufacturing function of an enterprise by this ratio, which we have calculated for UEL.

	X0	*X1*	*X2*	*X3*
Gross Profit / Net Sales	9681 / 45748	12338 / 55107	14686 / 63794	15799 / 69972
Ratio (%)	21.16	22.39	23.02	22.58
Trend:		*Upward*		

Components of Gross Profit: Truly speaking, in order to evaluate the performance of the manufacturing function, the numerator should be manufacturing gross profit only and hence, its calculation should exclude all non-manufacturing income like direct sale of purchased finished goods, as in the case of UEL. The ratio should be calculated on net sales, excluding other incomes of operating type like sale of scraps. As mentioned before, the objective of the manufacturing function is to generate output (sales), not scraps. The manufacturing function cannot take credit for it, whatever be the value of the scrap.

For UEL we have not been able to separate that part of sales which represents purchase of finished goods for direct sales, because no such information is available from published annual accounts. However, we have been able to locate the income from sale of scraps from the schedule of consumption of materials. This we have ignored in gross profit calculation.

Nature of the Ratio: As the expenses that are taken into consideration for netting off against sales to derive gross profit are dominantly variable in nature, the normative behaviour of the gross profit ratio should be constant over a given technology period. Erratic variations would suggest instability of the manufacturing function, which may happen as a start up problem during the initial period. If it continues thereafter, then it indicates a serious structural problem of the manufacturing function or of the enterprise as a whole, which, if not corrected in time, may soon render the company sick.

A similar conclusion can be reached when the gross profit ratio is falling because, as we have already discussed, it may suggest a failure of the manufacturing function to control its expenses and maintain its proportionality with sales. This means many expenses are becoming fixed in nature while the productivity is falling or that the machines have become old, demanding on the one hand more and more converter inputs, and on the other, wasting increasing amounts of material inputs (Bhattacharya, 1992). In both the cases, the enterprise will become sick if adequate corrective steps are not taken in time. A falling gross profit ratio is a sure way down the hill towards closure.

It is unlikely for the gross profit ratio to register any remarkable rising trend in a given technology period, except during the initial take-off years. When the technical parameters of the plant get fixed and the man-machine synchronisation is established, the ratio will also settle down and maintain a stable trend. An increasing trend thereafter may mean further refinements in resource exploitation by new techno-managerial methods or by gradual updation of technology.

Case of UEL: For UEL, the gross profit ratio improved in X1 with the renewal of plant and thereafter it registered a marginally upward trend at a steady average of 22.66 per cent. This suggests a good absorption of technology.

The gross profit ratio should be examined along with the work-in-process turnover ratio. It may be observed that findings, analyses and conclusions reached with both the two ratios will be more or less the same. Together they indicate the direction of movement of the manufacturing function of an enterprise.

Chapter 5

Ratios for Operational Control of Manufacturing Management

All sunshine makes the desert.

—Arab Proverb

INTRODUCTION

Management accounting is a hybrid of cost accounting. According to the Macmillan Dictionary of Accounting 'It is that part of accounting which is concerned mainly with internal reporting to the manager of an enterprise. It emphasises the control and decision-making rather than the stewardship aspects of accounting' (Parkar, 1984). The traditional discipline of management accounting is under fire now, because it has not been able to snap its umbilical cord embedded in financial and cost accounting; and provide the dynamism required in a fast changing technological environment and ever increasing market competition. Operating managers are generally dissatisfied with their current cost accounting practices, investment justification methods, and performance evaluation systems. They believe that management accounting systems should be improved to meet their increasing demand for information in a rapidly changing environment. These observations have been well documented in recent accounting literature as cited by Kim and Kwak (1994).

PROBLEMS OF TRADITIONAL MANAGEMENT ACCOUNTING METHODS

Johnson and Kaplan (1987) formulated the basic problem of traditional management accounting in the following words:

> In this time of rapid technological change, vigorous global and domestic competition and enormously expanding information processing capabilities, management accounting systems are not providing useful, timely information for the process control, product costing, and performance evaluation activities of managers (p. xi).

The traditional cost and management accounting models derived from scientific management movement, which stressed adherence to standards determined by industrial engineers and emphasised management of manufacturing operations by variance analysis, could no longer help managers to cope with the market demand of continuous improvement in quality, yields, manufacturing process times, and efficiencies. Managers, engaged in the task of continuous improvement, need information to detect problems quickly. Variance analysis against centrally determined static standards, which often become historical, has distanced itself from the day-to-day problems being faced by today's operating managers to cope with the demands of globalisation of the market place, in terms of inputs and outputs, and labour. The focus of operational control systems has to shift from centrally determined standards to providing timely, accurate and relevant information for local management. Operational control systems, in a dynamic manufacturing and marketing environment, should be so designed as to feature timely reports on actual operations, including the actual (not allocated) quantities and unit costs of resources consumed; in addition to a variety of non-financial indicators, to enable operating managers to control and monitor operations on a day-to-day basis. Trends are to be calculated both in financial and non-financial terms, with the target for non-financial data being perfection: zero defects, 100 per cent yield, 100 per cent on time delivery etc. (Kaplan, 1989).

MAJOR TRENDS

The compulsion to change the approach of management accounting to problem solving has basically come from the emergence of a new manufacturing environment across the globe. Howell and Soucy (1987) identified, among others, the following major trends in manufacturing.

Higher Quality: In USA and other advanced countries of the world during the decades of the 1950s, 1960s and 1970s and in India during the

1980s, low prices were regarded as the primary basis for competition; quality being defined as a standard level of acceptability. This misguided manufacturing philosophy led many an advanced economy of the world to lose their competitive advantages to newer economies, and forced a number of developing countries to remain 'protected' within the bounds of outdated technology. Business managers have now learnt the hard way, that high quality and low cost are not alternative strategies. Rather, high quality is totally consistent with low cost because costs of quality (COQ) such as scrap, rework, warranty claims, and finally, loss of business are real costs that eat into the profitability of a business.

Lower Inventories: It is now being revealed that while direct financial costs to carry inventories can be significant, there are other indirect and qualitative costs which often outweigh the financial costs. Examples include, increased space requirement, additional handling and recording costs, slower throughput, higher scraps and wastage. It is also being increasingly felt that the, traditional reasons advanced for holding high inventories are not always valid. They simply mask organisational deficiencies in sales, engineering, procurement, as well as manufacturing. All these realisations led to the movement of JIT manufacturing, where the key note is zero inventory level. One of the most important operational objectives of the JIT philosophy is to reduce the suppliers base and develop quality vendors by proper vendor ratings. The JIT system suggests qualifying vendors on the basis of quality and delivery performance to eliminate the need for safety stocks and thus save both on outlay of funds and the interest cost.

Flexible Flow Lines: The international trend in manufacturing is to establish multiple product flow lines within a factory, as against functionally organized process flows. Multiple mini product line factories are created by first splitting up large groups of similar equipment and then bringing together all different types of equipment required in the manufacturing process. The resultant tightened flow moves the product quickly through the process, reinforcing quality, minimizing material handling and inventory, and finally, instilling employee identification with the end product. The idea behind the flexible flow line is that a production process is no longer dedicated to any particular product; it is flexible enough to produce more than one product along the line.

One of the greatest contributions of the flexible flow line process is the reduction in the wide variation between throughput time and actual process time, which is also the objective of the JIT manufacturing system. Throughput time for a product (or service) is a summation of processing time, inspection time, movement time, and waiting time. It has been found that for many operations processing time is less than 5 per cent of throughput time (Kaplan, 1989). The modern school of management accounting regards all time, except processing time, as non-value added time.

Automation and Information Technology: There can be no doubt that automation is creating the most visible impact on and has made possible the enormous progress witnessed in manufacturing, by increasing productivity and quality, but, more important than this, is its impact on the discipline of management accounting. In order to sustain this progress, managers need newer control information and decision models. The attempt to modify the existing information variables and decision models to 'fall in line' with the automated manufacturing system may not always be successful. An entirely new approach may be called for to aid managers to successfully operate in a competitive environment. It should be remembered that automation, by itself, cannot solve the competitive problems; rather, it may at times, create more problems than solving them. In fact, one of the challenges before management accountants is to evaluate correctly the alternative proposals to business automation. Automation is not to be considered as the cure all, neither is the decision to automate to be regarded as a casual alternative. Western economies have learnt the lesson the hard way; developing economies cannot afford the same.

Computers are being extensively used to monitor and control operations, including automatic monitoring of a process and making adjustments to ensure consistency and quality of output. They are also being used to generate operational and financial data about what is happening on the shopfloors and provide management accounting information such as materials utilisation ratio; cost of each operation; and various costs of quality. The emerging 'new factories' require management accountants to identify and address many non-financial areas of manufacturing performances. 'Measures such as customer complaints, vendor performance, defect free units, cycle time, schedule attainment and others need to be developed to measure the critical factors of quality, service and cost. Traditional methods of analysing a company's performance need to change to reflect the changing fundamental characteristics of a business' (Howell and Soucy, 1987: 27).

For long, management accountants worked only with financial data to measure productivity, cost and profitability. They did not feel comfortable dealing with non-financial and qualitative data. However, it is increasingly being felt that in many areas of operational control and monitoring, financial data can at best provide an indirect measure of performance. The most important case in point is productivity. Under the traditional system, accurate measurement of productivity is often impossible because accounting systems are designed to capture money based transactions only, which can easily mask any period-to-period changes in real productivity. Modern day managers need direct measures of productivity (Kaplan 1989). Financial measurement standards are often not meaningful in the shopfloor.

THE NEED FOR A MODERN MANAGEMENT ACCOUNTING INFORMATION SYSTEM

In the foregoing paragraphs we have tried to portray the emerging scenario of the discipline of management accounting against the backdrop of the changing shores of manufacturing across the world. Elsewhere we shall discuss the need for the management accounting approach to the marketing function, which till recently was virtually neglected by the management accountants. One should, however, remember that the success of a new system depends on the tightness of mapping between the system and the process being measured, because decision-making is largely based on the observation of the system, not the production process (Nanni, 1991). Observation reveals the flow of information through the system and indicates not only the important control points but also the essential control variables.

Information is a commodity whose demand rises with uncertainty, and the speed at which information is demanded depends upon the elements of dynamism present in the business environment, which can be both internal and external. These objective conditions are not only present in the global business environment today, they are going to remain in the years to come. The demand for new management accounting information will, therefore, continue to rise in this dynamic and uncertain business world. In such conditions the most important aspects of management accounting information will be accuracy, relevance, and easy understandability for operating managers. By accuracy we do not mean mathematical accuracy but 'managerial accuracy', based often on approximation and aggregation, because by the time the information is processed to its ultimate accuracy much of its relevance will be lost. Information is relevant only when it is timely, otherwise it loses its value to the decision-maker, because both the predictive and feed-back value of the information is lost. Understandability refers to the quality of information that permits reasonably informed users to perceive its significance (Kieso and Weygandt, 1989). Keeping these three aspects in mind, management accountants should make explicit choices about information content, format, level of aggregation and approximation, and also cost of producing the information. Ratios are one of the simplest and most cost effective methods of presenting management accounting information. They can reasonably satisfy the criteria required of a good information system in a dynamic business environment.

In the following paragraphs we shall first present a choice of management accounting ratio for the manufacturing function. Later we shall do the same for the marketing function.

MANUFACTURING PRODUCTIVITY (RATIO)

Definition of Productivity

Manufacturing productivity itself is a ratio or the product of two ratios as will be revealed from the following definition:

> Manufacturing Productivity is a finite measurement that encompasses the performance level of operators of production machinery as well as the utilization of that machinery (Smith, 1981: 17–18).

The operational aspect of the above definition can be broken down into the following objectives of manufacturing management:

1. Machine operator(s) must meet established performance standards of machine output.
2. Plant management must see that the machines are being manned and operated with a minimum amount of downtime to ensure their maximum utilisation.

For purposes of management control and monitoring, the first objective can be reduced to a performance ratio while for the second objective an utilisation ratio can be constructed. The marriage of these two ratios gives rise to productivity.

Performance Ratio

Performance measurement of a manufacturing operation is generally done by comparison of actual operator output to standard operator output. The performance ratio will, therefore, take the following form:

$$\text{Performance ratio} = \frac{\text{Actual units produced}}{\text{Standard units}}$$

Let us explain this ratio by way of an example drawn from a particular product section of UEL which runs continuously for three shifts a day.

There are four operators working in each shift of eight hours. The standard piece rate is 60 units an hour for each operator. Hence, standard output for each shift will be 60 × 4 × 8 = 1920 units.

The weekly performance control chart of the section now compares the actual output with the standard and calculates both individual and sectional performance ratios (Table 5.1).

Performance ratio for each product section can also be quickly calculated by dividing the actual output produced with the standard output of the section without going into the details by each shift and operator. This product section performance ratio is an important feedback information for top management. However, for the purpose of control and monitoring at the shop floor level it is desirable to calculate performance ratio both by shift and operator, as has been done in Table 3.4.

This performance control chart enables a production manager to pull up the laggards (operators A, I and H) and reward the performers (operators C, E, G, K and L).

Difficulty in Setting up Standards: We should, however, remember that there is some element of subjectivity in fixing up any standard of performance. Although the technical standard of output of a machine can be derived from the technical parameters of a machine, this is subject to the working facilities available in a particular manufacturing organisation, the work culture prevalent in the enterprise as a whole, and also on negotiations with the unions. Above all, the maxim that standards should not be too high to

Table 5.1
Weekly Performance Control Chart

Shift/Operator (a)	*Actual output (b)*	*Standard output (c)*	*Performance ratio (d) [col. blc]*
FIRST SHIFT			
Operator A	2940	3360	0.875
Operator B	3220	3360	0.958
Operator C	3500	3360	1.042
Operator D	3290	3360	0.979
Shift total	12950	13440	0.964
SECOND SHIFT			
Operator E	3535	3360	1.052
Operator F	3220	3360	0.958
Operator G	3430	3360	1.021
Operator H	2905	3360	0.865
Shift total	13090	13440	0.974
THIRD SHIFT			
Operator I	2975	3360	0.885
Operator J	3185	3360	0.948
Operator K	3570	3360	1.063
Operator L	3360	3360	1.000
Shift total	13090	13440	0.974
Product section total	5590	5760	0.970

be perceived by the operators as unachievable or too low to be bereft of any challenge, also brings forth an element of subjectivity in fixing up an optimum standard. Due to all this, the modern day management accounting discipline warns against the natural tendency of reducing the standards to rigid benchmarks. A mechanism must be developed by which standards are made flexible, so as to accommodate any change in the performance variables mentioned above, as well as made rigid, so as not to undermine the competitive advantage of the manufacturing function.

Case of UEL: A look at the performance control chart of the product section of UEL may suggest an upward revision of the standard, (only if this is found to be the pattern for quite some time) because, except for operators A, H and I, most low performers are within 5 per cent of the standard and

50 per cent of the operators have either met or exceeded the standard. If the standard is so revised (not by this finding alone but after taking into consideration other aspects as mentioned earlier), then the performance ratios have to be recalculated subject to the new performance standard.

Utilisation Ratio

Definition: The utilisation ratio operationalises the capacity utilisation of the plant at the floor level. In terms of manufacturing management the term 'utilisation' can be expanded to mean a measure of the number of hours a machine is actually being operated compared to the number of hours the machine is available for production. The essence of this definition can be captured by the following ratio:

$$\text{Utilisation ratio} = \frac{\text{Actual man-machine hours}}{\text{Available man-machine hours}}$$

Let us explain this ratio by drawing an example from the same product section of UEL which has four machines manned by one operator each. As indicated earlier, the section runs continuously for seven days a week. Other things remaining same, available weekly man-machine hours of the section can be calculated by the following formula:

$$\begin{array}{ccccccc} \text{Number of machines} & \times & \text{Hours per shift} & \times & \text{Shifts per day} & \times \\ (4) & \times & (8) & \times & (3) & \times \\ \text{Days in a week} & \times & \text{Machine crew size} & = & \text{Available man-machine hours} & \\ (7) & \times & (1) & = & 672 & \end{array}$$

For the week under investigation it has been found that all the four machines taken together have worked for 610 man-machine hours. Utilisation ratio for the product section can now be calculated as follows:

$$\frac{\text{Actual man-machine hours}}{\text{Available man-machine hours}} = \frac{610}{672} = 0.908$$

Productivity of the section for the given week is finally determined in the following manner:

$$\begin{array}{ccccc} \text{Performance ratio} & \times & \text{Utilisation ratio} & = & \text{Productivity} \\ (0.970) & \times & (0.908) & = & (0.88) \text{ or } (88\%) \end{array}$$

Nature of the Ratio: As already mentioned, utilisation ratio measures the extent of use of available capacity of the productive system. It is highly sensitive to productivity measurement as will be evident from the earlier example. A 97 per cent performance ratio is reduced to a productivity of 88 per cent due to a lower utilisation ratio of 91 per cent. Any increase in utilisation ratio will have a corresponding effect on productivity. For example, if utilisation ratio is increased by 5 per cent, i.e., if it were possible to work 33.6 man-machine hours more, then the productivity would also have increased from 88 to 93 per cent. The contrary will happen when the utilisation ratio decreases by the same percentage points. If productivity of the manufacturing function is falling, it is likely that the cause is a falling utilisation ratio, which not only pulls down the productivity but also leaves an increasing amount of capacity costs (fixed overheads) unabsorbed.

However, utilisation is also related to performance to a certain extent. For example, if performance is controlled, then downtime will be minimised simply because production supervisors will now be correcting their production problems faster than before. One should, however, remember that utilisation is generally more affected by production planning and control than by downtime. A low utilisation ratio is indicative of inefficient production planning and control, which may eat into the high performance ratio of operators and thereby reduce the overall productivity of the manufacturing function.

Downtime Ratio

Nature of the Ratio: These days, downtime is one of the most talked about aspects of the manufacturing function, as it has come under severe attack by the value management theorists of the new school of management accounting. They regard it as a non-value added function. Downtime tasks mainly consist of setup, machine adjustments, rework, materials arrival time, repairs, tooling, training, etc. It is often found that all these downtime tasks absorb approximately one-fourth to one-half of all direct labour hours available (Smith, 1981).

Downtime ratio attempts to relate time on production with the time on non-production in the following manner:

$$\text{Downtime ratio} = \frac{\text{Direct labour hours on downtime}}{\text{Total direct labour hours worked in the plant}}$$

Case of UEL: In one of the plants of UEL the year end analysis of direct labour hours reveal the following figures:

Total direct labour hours worked:	8,556
Direct labour hours on production:	6,454
Direct labour hours on downtime:	2,102

Downtime ratio of the plant will therefore be:

$$\frac{2102}{8556} = 0.25 \text{ or } 25\%$$

The ratio is quite high, though not off the mark of worst international standard. It is preferable to take this ratio plant-wise to make inter-plant comparisons possible, and monthly or quarterly to enable the plant management to take corrective steps in time. Along with the calculation of downtime ratio detailed analysis of the components of downtime as mentioned earlier should be made, to locate the major reasons for taking timely actions.

Priority Control Ratio

Nature of the Ratio: This is one of the most important ratios for day-to-day plant management. Many enterprises who are found to continuously suffer from tension to meet deadlines are also found to be bereft of a priority control procedure as a part of their manufacturing system.

Priority control is a procedure which helps decide the status of orders in manufacturing and indicates which orders should be worked first. In other words, it establishes work priorities and helps the production planning department to decide which orders to review for rescheduling or even cancellation.

In priority control, there are three conditions which can exist for any given order in relation to the schedule, namely, (*a*) on schedule; (*b*) ahead of schedule and (*c*) behind schedule. The priority status of a particular job can be captured by the following ratio:

$$\text{Priority control ration} = \frac{\text{Data line work days available}}{\text{Number of days work to be done}}$$

The status of the job may be regarded as on schedule, ahead of schedule and behind schedule if the ratio is equal to 1, greater than1 and less than 1 respectively. The ratio can be explained by way of the following illustration.

Case of UEL: The product section chosen at UEL had four orders on hand as on 1st January. It was found that order code PS-42 was to be delivered on 1st March. An examination of the work-in-process revealed that 70 days' work was needed to complete the job. However, date line work days available between 1st January and 1st March were only 59 days (unless it is a continuous shift operation, work days will exclude Sundays and holidays). The ratio for this job will, therefore, be 59/70 or 0.84. The job is, therefore, behind schedule. Table 5.2 now gives the status of all the four jobs on hand.

Table 5.2
Priority Control Chart as on 1st January

Job order code	*Date line workdays*	*Days needed*	*Priority*	*Status*
PS-42	59	70	0.84	Behind Schedule
ML-3	10	15	0.67	Behind Schedule
TO-91	20	20	1.00	On Schedule
HL-40	30	15	2.00	Ahead of Schedule

We can now write the action design for different priority control ratios (Table 5.3).

Table 5.3
Priority Control Action Design

Value of priority ratio	*Status*	*Actions to be taken*
Less than 1	Behind Schedule	Expedite. Run order with the lowest ratio first.
Equal to 1	On Schedule	Follow the schedule.
More than 1	Ahead of Schedule	Delay manufacture until the ratio reaches 1 or slightly less.

Replacement Ratio

Nature of the Ratio: While discussing maintenance ratio, we have pointed out that ordinarily the ratio will rise gradually with the age of the machines. This has been the case with UEL. However, a stage may be reached when the cost of maintenance and repairs becomes so high that it is no longer viable to continue with the same machines. This non-viability also comes from increasing levels of materials wastage and a faster fall in the production capacity of the machine as it ages. A high maintenance cost is often associated with longer downtimes, resulting in lower realisation of the productive capacity of the machine. Now, if increasing levels of maintenance cost is an indicator of the deteriorating condition of the machine, and a rise in materials wastage coupled with a fall in productive capacity is indicative of the wearing out of the machine, then the maintenance ratio itself can be modified to determine the time for replacement of a machine. This modified ratio is called replacement ratio.

$$\text{Replacement ratio} = \frac{\begin{array}{c}\text{Present value of maintenace costs for the}\\ \text{remaining estimated life of the machine}\end{array}}{\text{Net replacement cost of the machine}}$$

Maintenance costs here include direct maintenance, labour costs, materials, power, stores and spares etc. Replacement cost of the machine is the net of the salvage value of the existing machine. The ratio should be calculated individually for all major machines and equipments of the enterprise.

When the replacement ratio of a machine is close to or greater than 1 it will be prudent for the firm to replace the machine with a new one. Let us explain this by way of an example.

Suppose, in the year of review (zero year) maintenance cost of a particular machine is Rs 10,000, which is increasing at 10 per cent per year. Current replacement cost of the machine, net of the salvage value, is Rs 40,000. The opportunity cost or discount rate of the enterprise, net of taxes, is 20 per cent p.a. The machine still has an estimated life of five years. The following calculation will enable the firm to take a decision about replacement of the machine.

Year	*Maintenance cost (Rs)*	*Discount factor @ 20%*	*Present value of maintenance cost (Rs)*
0	10000	1.0000	10000
1	11000	0.8333	9166
2	12100	0.6944	8402
3	13300	0.5787	7702
4	14640	0.4822	7060
Total:	61040	Total:	42330

$$\text{Replacement Ratio} = \frac{42325}{40000} = 1.06$$

As the ratio is more than 1, it is desirable to replace the machine with a new one. Some firms may not, however, wait for the ratio to reach 1. They may decide to replace the machine when the ratio becomes, say 0.60, because a new machine, besides making savings on maintenance costs, also brings in advanced technological improvement of its production parameters. Replacement policy at a lower level of replacement ratio also protects a firm against technological obsolescence.

Lead Time Ratios

Nature of the ratio: Lead time is *all* the time spent in a plant or a product section. This is also called total process time or throughput time, which includes in-process time where actual input conversion takes place and also idle time which includes the following:

1. Set up time
2. Queue time (materials waiting to be worked)
3. Delay time (machine problems etc.)
4. Wait time (finished operation waiting to be moved to next operation)
5. Transit time

Lead time can therefore be summarised in the following equation:

Lead time = In-process time + Idle time

As mentioned before, the new management accounting school regards every time which does not add value to the product as idle time. Only the in-process time is the value added time.

It is observed that non-value added time is often as high as 60 per cent of total process or throughput time of a manufacturing organisation (Smith, 1981).

We shall now calculate two ratios to understand the impact of value added and non-value added time on the manufacturing function of a product section. The example is once again drawn from the same product section of UEL where in-process time is found to be nine hours out of a total process time of 24 hours.

Value Flow Ratio

$$\frac{\text{In process time}}{\begin{array}{c}\text{Total process time}\\ \text{(lead time)}\end{array}} = \frac{9}{24} = 37.5\%$$

Non-Value Flow Ratio

$$\frac{\text{Idle time}}{\begin{array}{c}\text{Total process time}\\ \text{(lead time)}\end{array}} = \frac{15}{24} = 62.5\%$$

Case of UEL: It appears that the value flow ratio of this product section is quite low. Concerted efforts are needed to increase this ratio. Since in process time is generally technology given, it is very difficult to improve upon the value flow ratio by reducing this time. Attention is thus directed towards the non-value flow ratio, because any fall in this ratio will automatically increase the value flow ratio. A decrease in the non-value flow ratio essentially means a reduction of total process time, which, in effect, implies a reduction of idle time.

In addition to calculating the non-value flow ratio of the entire plant or a product section, it is advisable to calculate this ratio for all the components of non-value flow, with a view to drawing up action plans for their reduction. It should be remembered that any improvement in the value flow ratio ultimately improves the competitive advantage of an enterprise.

Cost of Quality Ratio

It has been mentioned in the introduction to management accounting ratios that COQ is now receiving increasing attention of operational managers, as it has turned out to be one of the most important variables of operational control to enable a firm to stay in market competition.

Components of Quality Costs: COQ typically includes the following cost items:

1. *Warranty costs*: Whenever this cost is incurred it indicates that the product has failed to perform its intended functions. The cost chain progresses with the customers' complaint followed by investigation of returned goods and ends with their sorting, testing, storing etc.
2. *Scrap costs*: These costs are the result of systems' failure internal to the manufacturing function of the enterprise, whereby materials and parts have become totally useless for the purpose for which these have been bought. Besides materials and parts, scrap costs also include labour spent and overheads unabsorbed.
3. *Rework costs*: These costs are also due to internal systems' failure and include materials, labour, and overheads incurred when a defective product is sorted, inspected, tested, and finally reworked, to recover the parts or materials for further use.
4. *Appraisal costs*: These are also called monitoring or inspection costs and include costs associated with inspecting the product to assure compliance with the company or customer specifications for materials, parts, and other bought-in components. Appraisal costs also include costs to inspect the manufacturing process and costs associated with determining vendor quality.
5. *Engineering costs*: These costs fall within the domain of prevention costs and include the following items of cost:

   A. *Design review*: Under this head are included costs incurred for reviewing design changes, so that existing products can be improved in quality by eliminating quality problems, and also reviewing of new products prior to release of product designs.

   B. *Design changes*: Costs under this head are incurred when the original product designs are found to be inadequate and defective, calling for reworking on the designs.

C. *Product qualification*: These are costs incurred in testing of the product at the pilot plant and qualification of new products for major changes in existing product lines.

6. *Administration Costs*: These include salaries for quality control managers and support costs such as testing, gauging, calibration etc.

Hidden Quality Costs: All quality costs mentioned earlier are available from accounting records. There are, however, many more. There are hidden quality costs such as lost customer goodwill, leading to shrinkage of market share, and other opportunity costs that occur when an organisation manufactures poor quality products (Albright and Roth, 1992). These hidden costs, though often much more than the recorded quality costs, are difficult to quantify. Various methods have been proposed to estimate 'true quality costs', including the most talked about Taguchi's quality loss function that uses a quadratic model (Ishikawa, 1985). The American Society for Quality Control, in its evaluation of various methods for estimating hidden quality costs, strongly recommends the Taguchi method. It, however, also cites examples of companies, who through experience, found out a 'multiplier effect' between measured failure costs and true failure costs. Westinghouse Electric Corporation, in the US, reported a multiplier of at least three or four to the accounting costs of quality when determining true failure costs (Campanella, 1990). The Westinghouse method appears to be more straightforward and easy for use by managers. We shall adopt here a multiplier of 2 to our COQ ratio in order to take a broader view of costs of quality in Indian enterprises, such as UEL. The COQ ratio will, therefore, take the following form:

$$\text{Cost of quality ratio (\%)} = \frac{\text{Costs of quality}}{\text{Sales}} \times 2$$

Case of UEL: We understand that a quality control programme is underway in UEL. In Table 5.4 we have collected various costs of quality and calculated COQ ratios for each cost item and also for the enterprise as a whole (Table 5.5).

A COQ ratio beyond 6 per cent is of great concern for the manufacturing management because a company may not even earn an operating profit of 10 per cent on sales. A total COQ ratio more than 10 per cent is of equal concern, because for a mature company operating in a competitive environment, it is difficult to increase sales by more than 20 per cent p.a.

Table 5.4
COQ Monitoring Table

(Rupees in lakh)

COQ category	*X3 year end cost*	*COQ (%)*	*Current Year*			
			First Qtr. end cost	*COQ (%)*	*Second Qtr. end cost*	*COQ (%)*
Warranty	652	0.93	197	0.95	229	0.92
Scraps	1671	2.39	431	2.08	433	1.74
Rework	1432	2.05	358	1.73	279	1.12
Appraisal	2900	4.14	789	3.81	662	2.66
Engineering	161	0.23	54	0.26	47	0.19
Administration	622	0.89	176	0.85	179	0.72
Total	7438	10.63	2005	9.68	1829	7.35
Net sales	69972		20709		24898	

Table 5.5
COQ Summary Table

Ratio	*X3 year end*	*First Qtr. end*	*Second Qtr. end*
COQ ratio	10.63	9.68	7.35
Total COQ ratio	21.26	19.36	14.70

Note: Total COQ ratios have been derived by multiplying the periodical COQ ratios with 2 as discussed earlier.

The COQ monitoring table of UEL indicates that as on X3 its COQ ratio was quite high, which might have motivated the company to embark on a quality control plan. The major costs involved were appraisal followed by scrap and rework. In fact, the three quality costs are linked in a chain; one following the other. There can be no doubt that the company is quality conscious, which is reflected by a very low COQ ratio for warranty. But this is achieved at a very high appraisal cost. Continuous inspection of materials and parts, and close monitoring of the production process, is required to ensure conformation of the product to company or customer specifications. Existence of high appraisal costs itself is a pointer to the fact that materials and parts are not of conforming quality and the production process is not properly synchronised. This results in increased ‘internal failures’ by way of rejections, followed by high costs of scraps and rework. It appears from the Table 5.4 that, to start with, the company had targeted a reduction in appraisal costs, by improving the quality of materials and proper synchronisation of the production process. This consequently reduced both the scrap and rework costs, without affecting warranty costs, as the performance of the following two quarters suggests.

In a quality control programme it is always preferable to break down COQ into individual items, so as to locate the prime contributors, and pick up only few of them at a time to make the programme meaningful to operating managers and allow the campaign to gain acceptance at all levels of the enterprise.

Vendor Quality Ratio

Nature of the Ratio: We have seen that one of the major sources of quality costs is a poor supplier base, both in terms of quality of materials and timeliness of delivery. A large supplier base is often a poor supplier base—a fact which dawned on manufacturing organisations only in the last decade. This prompted global organisations like, for example, Xerox Corporation, to reduce its supplier base to only about 400 from a phenomenal 5,000, and embark on a vendor development programme to ensure steady supply of quality materials. This step itself enabled the corporation to save a phenomenal sum of $100 million (McGrath and Hoole, 1992).

Just-in-Time System: One of the most important requirements of JIT manufacturing is to ensure quality material suppliers by proper rating, followed by a programme of vendor development. There are a number of methods available for total vendor rating by combining price, quality and delivery, through a complex weighting scheme which is often subjective in nature. When quality is of paramount importance, one of the simplest and easily understandable criterion to judge and monitor a vendor is by lot acceptance criterion, which is denoted by the following ratio.

$$\text{Vendor quality ratio (\%)} = \frac{\text{Number of lots accepted}}{\text{Number of lots inspected}}$$

Vendor Classification: In Table 5.6we have classified vendors in terms of this ratio and also prescribed action points against each category.

Table 5.6
Vendor Quality Rating Table

Category	*Vendor Quality Ratio (%)*	*Action to be taken*
A	90	Simple follow-up. Continuous development programme.
B	80	Close follow-up. Monitor development.
C	60	Vigorous follow-up. Close monitoring.
D	40	Delete.

Vendor quality ratio by lot acceptance criterion is free from any subjectivity. It tells a lot about vendor performance which no other ratio can tell.

Chapter 6

Ratios for Financial and Operational Control of Marketing and Sales Management

He that despiseth small things
should fall by little and little.

—*Ecclesiasticus*

INTRODUCTION

For, a long time it was believed that the marketing and sales function of an enterprise cannot be planned, measured, controlled, and monitored by accounting techniques. There appeared to be many well ingrained attitudes on the part of accountants which were prejudicial to marketing. This emanated from insufficient recognition of the contribution and importance of marketing to overall company performance. On the other hand, until recently the focus in marketing had been on generating sales, and the key yardstick of effectiveness had been growth in sales revenue.

ISOLATION FROM ACCOUNTING AND FINANCE FUNCTION

While lip service was given to profit, financial data needed to define and measure profit was lacking. Marketing management had little communication with accounting. People in marketing, and especially in sales, tended to view the financial staff with suspicion, perhaps as a defence mechanism for their own fiscal naivety. (Mossman, Crissy and Fischer, 1978). The findings of major empirical studies also suggest that the majority of accounting techniques and measures were, till recently, not regarded as particularly useful in planning and control within the marketing function (Ratnatunga, Pike and Hooley, 1988). Dunk and Kenny (1983) investigated the usefulness of performance measures as perceived by marketing department managers and found that the vast majority of measures that marketing rated as significantly useful were non-accounting measures. The only exceptions were the management accounting techniques for product and price analysis, as reported by Wilson and Bancroft (1983).

NEED FOR INTEGRATION OF MARKETING FUNCTION

With the rise of competition in a recessionary market condition across the world, the marketing function gained unprecedented importance during the 1980s. At the same time, it was thought that the marketing function can no longer remain isolated from other organisational functions of the enterprise. It had to be integrated with both the manufacturing and accounting/finance functions of the business. The techniques of financial and management accounting thus had to be modified to cater to the special requirements of the marketing function.

The primary objective of today's marketing function is to increase the market share of the enterprise and contribute positively to the profitability of the business. The objective is no longer only to increase sales, as in the older days. Profitability of each unit sold is now also a concern of marketing management. The product should not only be salable; it must be profitable too. Marketing and sales management should, therefore, be brought at par with the other part of operating management, namely manufacturing management, for purposes of its evaluation and monitoring in terms of asset and expense utilisation and its capability of generating a functional profit. The following ratios for marketing and sales management have been developed keeping this objective in mind. Financial accounting ratios are discussed first followed by management accounting ratios in Section V.

FINANCIAL ACCOUNTING RATIOS

Sales Assets Turnover Ratio

The derivation and movement of this ratio for UEL are given:

	X0	*X1*	*X2*	*X3*
Gross Sales	51037	61658	72091	78004
Trade debtors + finished goods inventory	19515	22548	29442	33532
Ratio (%)	2.62	2.73	2.45	2.33
Trend:		*Downward*		

Components of the Ratio: Trade debtors should not only include export receivables but also sellers' bills discounted (drawers' bills) with the bank. The latter information is generally available in the annual report under the head contingent liabilities. Gross sales should include excise duties because debtors are raised not in net sales but in full value. It is preferable, however, to exclude scrap sales because, though some of these sales may get into debtors and to that extent may contaminate the analysis, sale of scrap is normally made from the factory; the marketing department is hardly called upon to make these sales.

Nature of the Ratio: The primary asset of the marketing department is the finished goods inventory that it receives from the manufacturing function. Secondary assets are debtors, which arise out of its own activities. These two types of assets are, what we call, sales assets. Efficiency of the marketing function rests primarily upon how fast it is turning over these assets, that is, what the velocity of sales assets is.

We shall calculate separately the individual velocity of each of these assets later under the head working capital management. For purposes of evaluating marketing management, we consider the sales assets in aggregate, not from the point of view of fund management but from the point of view of assets utilisation, similar to utilisation of aggregate plant and machinery by the manufacturing function.

Case of UEL: It appears that the trend of the velocity of sales assets in UEL is downward. If an enterprise is adding variety to its product line, velocity of sales assets may fall owing to broadening of its stocking base and larger credits granted for market penetration. However, this should be for a short period only. The ratio should stabilise soon. In case of UEL, however, it has not happened. The ratio is showing a downward trend, except in X1 when it showed some improvement. It indicates that the company, having perhaps been pushed out from a sellers' market into a buyers' market, is losing its competitive advantage.

Direct Marketing Expenses Ratio

The derivation and movement of this ratio for UEL are as follows:

	X0	*X1*	*X2*	*X3*
Direct Marketing Expenses	2798	3645	4104	4281
Net Sales	45748	55107	63794	69972
Ratio (%)	6.12	6.61	6.43	6.12
Trend (ignoring X0):		*Flat (Downward)*		

Components of the Ratio: Direct marketing expenses include salaries and allowances for marketing and sales people, forwarding expenses, sales commission, travelling, bad debts, and advertisements. It excludes 'unusual items' such as, large investments in big promotional/publicity campaigns (which are generally amortised over a period as part of miscellaneous expenditure) or bad debts, which are not of a trading nature, like Rs 403 lakh written off by UEL as advances paid to a subsidiary under a scheme approved by the Board for Industrial and Financial Reconstruction (see Table 3.3).

Nature of the Ratio: Direct marketing expenses are generally semi-variable in nature. The ratio should, therefore, be moving slowly downward as sales increase (which is happening in the case of UEL, if we exclude the year X0). This is because the marketing department is established with a particular sales capacity, which is gradually realised (or capacity cost absorbed) over a period of time, just like the plant in the manufacturing department.

In fact, manufacturing and marketing functions should be so synchronised that once a certain realisable capacity of production (sales) is installed in the factory, a similar capacity should also be built up in the marketing department, so that when production picks up, the marketing and sales function is ready to convert production into sales quickly. Unfortunately in many companies (particularly those in the medium and small scale sector), this synchronisation is often not done to avoid unnecessary overheads when there are no sales. As a result, the marketing and sales department gets stretched beyond capacity, causing a downturn in its efficiency. It is observed that capacity addition to the marketing and sales function is often a slower process than capacity addition in the manufacturing function.

Case of UEL: Incidentally, it appears from the movement of the direct marketing expenses ratio in UEL that both the manufacturing and marketing functions of the company have moved in tandem. The rise of the ratio in X1 indicates that the company might have invested in capacity expansion of the marketing and sales department when it increased its plant capacity. The subsequent fall in the ratio indicates that it is realising this capacity.

Promotional Ratio

The derivation of this ratio is given below:

$$\frac{\text{Sales promotion expenditure}}{\text{Net Sales}}$$

It is generally expressed in percentage form.

Components of the Ratio: Sales promotion expenditure includes advertisement, publicity, discount, rebate and commission on sales. Aggregate annual expenditure on advertisement and publicity are to be taken into account and not the annual amortisation charged to the profit and loss account. Net sales should exclude excise duties, sales tax, discount, rebate and commissions.

Nature of the Ratio: Although it is difficult to measure directly the impact of promotional expenditure on sales because of the time-lag between the expenditure and actual rise in sales, it is possible to judge the impact over a period of time. For firms who are marketing a new product or those who intend to capture a larger market share or build up their own 'niche', the ratio is expected to be high during the initial years of the campaign. When the product is established, the ratio is expected to follow a course of dynamic stability. A steep upward trend of this ratio may indicate that the firm is losing in competition and there may be a need for diversification. On the other hand, a downward trend may often suggest complacency—taking the market for granted—which has been a cause for the ruin of many firms. It should be mentioned at the same time that high promotional expenses do not necessarily mean a high promotional ratio. Neither is the opposite true, because the denominator (net sales) controls this ratio. A successful promotional campaign involving a large expenditure may, in fact, lower the ratio with a more than proportionate rise in sales, while an unsuccessful campaign will push up the ratio.

During recent times the promotional ratio is found to vary between as low as 1 per cent and as high as 14 per cent of sales across major industry groups as the following Table will show. When an economy opens up on the path of liberalization, like that of India, the promotional ratio is expected to rise owing to increased competition. Industries where intensity of competition is high—like, cement, beer and alcohol, drugs, and pharmaceuticals—the ratio is also high. Lowest ratio is observed in industries which enjoy near monopoly status like, electricity or where demand for the products outstrips supply like, real estate.

Industry-wise Promotional Ration (%)

Industry groups	*March 2003*	*March 2004*	*March 2005*
Aluminium and aluminium products	3	3	2
Automobile	5	4	4
Automobile ancillaries	3	3	3
Cement	14	14	14
Communication services	5	5	7
Drugs and pharmaceuticals	8	8	8
Electrical machinery	6	6	5
Electricity	1	2	1
Hotels and tourism	4	4	4
Industrial construction	5	1	2
Information technology	2	2	2
Mining	3	3	3

(Continued)

(Continued)

Industry groups	*March 2003*	*March 2004*	*March 2005*
Petroleum products	3	3	3
Real estate	2	3	2
Recreational services	4	6	6
Steel	4	3	3
Transport services	4	4	4
Chemicals	4	4	4
Food and beverages	5	6	5
Paper and paper products	5	4	4
Textiles	4	4	4
Consumer durables	5	5	5
Beer and alcohol	10	10	9
Tobacco products	5	5	5
Plastic products	4	4	5
Tyres and tubes	7	7	7

Return on Marketing Assets

Components of the Ratio: Like manufacturing, the marketing function receives finished goods as ‘raw materials’, which it converts into sales through a marketing and sales process. The conversion cost of the marketing function may be called direct marketing expenses, as we have already seen. Total cost in the marketing and sales department will, therefore, be cost of sales (representing finished goods) plus direct marketing expenses, as shown subsequently. Marketing contribution has also been calculated separately.

	X0	*X1*	*X2*	*X3*
A. Net sales	45748	55107	63794	69972
B. Cost of sales	36551	43472	49894	54879
C. Direct marketing expenses	2798	3645	4104	4281
D. Total cost in marketing and sales department (B + C)	39349	47117	53998	59160
E. Marketing contribution (A – D)	6399	7990	9796	10812
F. Marketing contribution as % of net sales	13.99	14.50	15.36	15.45

Marketing assets comprise sales assets, as discussed earlier, plus other fixed assets belonging to the marketing and sales department, namely, furniture, fixtures and office equipment. UEL has 11 marketing divisions. It has been found that 60 per cent of all furniture, fixtures and equipments of UEL belong to these marketing divisions. Total marketing assets of UEL are now calculated:

	X0	*X1*	*X2*	*X3*
A. Sales Assets	19515	22548	29442	33532
B. Furniture, Fixtures & Equipments	320	454	568	615
C. Marketing Assets (A + B)	19835	23002	30010	34147

We can now calculate the ROMA of UEL as follows:

	X0	*X1*	*X2*	*X3*
Marketing contributions	6399	7990	9796	10812
Marketing assets	19835	23002	30010	34147
Ratio (%)	32.26	34.74	32.64	31.66
Trend:		*Downward*		

Case of UEL: The ROMA of UEL is showing a somewhat downward trend. This is in spite of the fact that the direct marketing expenses ratio has shown consistent improvement since X1; as is the case with marketing contribution as a percentage of sales. If we now bring in the turnover of sales assets and consider all the four ratios together, we can better understand the health of the marketing and sales function of UEL.

It is seen that the turnover of sales assets is showing a downward trend, as is the ROMA. While the contribution as a percentage of sales is improving, the trend of the direct marketing expenses ratio also is good for UEL. The villain of the piece is, therefore, the turnover of sales assets. The marketing and sales function of UEL is doing well in terms of expenses and margin on sales but failing to make good use of the sales assets in terms of generating enough sales. This results in a fall in the ROMA.

MANAGEMENT ACCOUNTING RATIOS

Velocity of Distribution Channel Ratio

Nature of the Ratio: This ratio tries to capture the existence of bottlenecks in the distribution channel of an enterprise. There are normally three lock gates in a distribution channel through which products pass to a consumer. These are warehouse, wholesaler or distributor and retailer. If there is no bottleneck in any of these lock gates then turnover of inventory at every stage will be the same. The form of the ratio, which has to be calculated for every stage of the distribution channel, is as follows:

$$\text{Velocity of distribution channel} = \frac{\text{Sales (despatch) at warehouse/ wholesaler/retailer}}{\text{Stock at warehouse/wholesaler/retailer}}$$

The ratios should be calculated at least quarterly, if not monthly, to locate the bottlenecks and take corrective actions quickly. Let us explain this ratio by way of an example.

Case of UEL: Table 6.1 gives the turnover of stock at various stages of the distribution channel of a product segment of UEL for four periods.

Table 6.1
Turnover of Stock at Different Stages

Stage	*Period I*	*Period II*	*Period III*	*Period IV (Target)*
Turnover of stock at warehouse	15	29	16	24
Turnover of stock at wholesaler/distributor	20	20	14	24
Turnover of stock at retailer	20	24	16	24

It appears that all the three stages of the distribution channel are not synchronised. In period I there is a lower ratio at the warehouse stage as compared to the wholesaler and retailer stages, indicating over production, resulting from wrong demand projection, giving rise to overstocking at the warehouse. In period II turnover of stock at both the warehouse and wholesaler stages has matched but the demand at the retailer stage has picked up faster, depleting the stock at that end without proper replenishment. The frustrating experience of the retailer in not getting the replenishments on time made him slow down on the product in period III, while in expectation of high demand, stocks had been stepped up in both the warehouse and wholesaler stages. The resultant effect is the slowing down of turnover ratio at all the three stages. This lower level 'equilibrium', emanates from inherent imbalances in the distribution channel. This might have forced the marketing department to establish proper communication, perhaps through a sales conference followed by installation of a formal MIS, to synchronise all the three stages at a targeted turnover ratio of 24.

Once a bottleneck is located along the distribution channel, further investigation is called for to unearth the reason for such a bottleneck. The cause may be external to the business. There may be other competitors trying to eat into the market share of the enterprise or consumer resistance is building up at the retail outlets. Both call for urgent steps to gear up the marketing function to arrest the progress of competitors and neutralise consumer resistance.

It is desirable to calculate and monitor these ratios for every product/ market segment of the enterprise.

Average Age of Debtors Ratio

For the purpose of control and monitoring of debtors, this is one of the most widely used ratios. It takes the following form:

$$\frac{\text{Debtors at the end of the period}}{\text{Credit sales during the period}} \times \text{Number of days in the accounting period}$$

We can depict the movement of this ratio by taking data from a product segment of UEL namely, the fan division, for the year X3.

Month end	*Credit sales (Rs)*	*Debtors (Rs)*	*Average age of debtors (days)*
February	700	500	20
March	500	350	22
April	400	370	28
May	600	520	27
June	900	780	26
July	1300	1130	27

It appears that the average age of debtors has risen after March and remained almost constant at around 27 days from April to July. As the product segment is fans, it is expected that sales will pick up during the summer season.

Average age of debtors during a busy season may also rise, but only marginally. In case of UEL's fan division it has risen by about a week, which may not be that marginal, considering the fact that a week's debtors on July sales block as much as Rs 325 lakh at an interest cost of approximately 18 per cent p.a. It may be that the vigour of the sales people during the peak season was not quite matched by the vigour of the collection staff.

A rise in the average age of debtors indicates either a failure of the credit policy of the firm or of the collection department or both.

Margin Variance Ratio

Nature of the Ratio: Margin is the market pronoun for discount allowed to dealers/retailers on the price of the products sold. The list price margin may not ordinarily vary because it is market given, which a company would not like to alter because it may have an adverse effect on the psychology of the market. For this reason, the list price margin for a product is often found to be almost historical in nature. However, due to various promotional practices like rewards, gifts, renting of shelf-space, reimbursement of transport cost, and partial reimbursement of cost of sales staff, the actual margin may vary widely from the list price margin. This variance is captured by the following ratio:

$$\text{Margin variance} = \frac{\text{Actual margin}}{\text{List price margin}}$$

The ideal ratio should be close to one. But, at times, it may rise when an enterprise makes a deliberate attempt to penetrate into a market or increase its existing market share substantially by a large promotional campaign. However, in a competitive economy, it is likely that other competitors will follow suit quickly, as a result of which the industry as a whole will suffer. The force of the market will soon equalise the ratio for all the players, though at a higher level. It is difficult then to bring the ratio down close to one because the dealers' expectation may have increased by then.

Replacement Sales Ratio

This ratio is calculated primarily for consumer durables, other white goods, office equipment etc., that enjoy a replacement advantage after the lapse of a certain period of time, which may not be very long, as in case of industrial machinery and equipments.

Suppose for example, when a refrigerator is sold by a firm for the first time, it expects that the refrigerator will be replaced by the customer in the sixth year. If the customer does replace the refrigerator from the same firm in the designated replacement year, then total sales of that year will comprise new sales for that year plus replacement sales. When sales of an enterprise are growing at a particular rate and replacement sales are being captured by the firm duly, then in the first replacement year the rate of sales growth is expected to shoot up, following which the firm will experience a new but higher rate of sales growth.

We can thus write the ratio in the following form:

$$\text{Replacement ratio} = \frac{\text{Sales of the replacement year}}{\text{Replacement sales}}$$

Note: The ratio should be calculated in number of units sold.

For a growing enterprise the ratio should be reasonably above one. If it is equal to or less than 1 the firm may not be getting all its replacement sales. A downward movement of this ratio is a sure indication that the company is losing out to competition, may be because there has not been any product development since the product was first launched or no attempt was made, to retain customer goodwill by proper after sales service and maintenance publicity.

Chapter 7

Ratios for Corporate Control of Operational Management

Necessity of action takes away
The fear of the act, and
Makes bold resolution
The favourite of fortune.

—*Quarles*

INTRODUCTION

We have discussed so far ratios for two functional divisions of the operating management of an enterprise, namely, manufacturing and marketing. In order now to enable corporate management to take a total view of the operating management of the business certain special ratios will be discussed.

Fixed Assets Turnover Ratio

This ratio is also named as velocity of fixed assets. Derivation and movement of this ratio for UEL are given, both before and after revaluation of fixed assets:

	X0	*X1*	*X2*	*X3*
a) Net sales	45748	55107	63794	69972
Operating fixed assets (before revaluation)	5286	8143	8822	9398
Ratio	8.65	6.77	7.23	7.45
Trend (ignoring X0):		*Upward*		

(Continued)

(Continued)

	X0	X1	X2	X3
b) Net sales	45748	55107	63794	69972
Operating fixed assets (after revaluation)	8067	10863	11482	12003
Ratio	5.67	5.07	5.56	5.83
Trend (ignoring X0):		*Upward*		

Components of Fixed Assets: Operating fixed assets exclude capital works-in-progress as these are yet to enter into production. Depreciated value of fixed assets (net block) are taken because sales (production) generation capacity of fixed assets fall as they age, and hence net sales of a given year can be compared only with the present state of the fixed assets of the enterprise.

Revaluation of Fixed Assets: Some of the fixed assets of UEL were revalued on a date five years before X0, as indicated in the notes to the annual report. Fixed assets net of revaluation can be calculated by deducting from the fixed assets the revaluation reserve (net of depreciation adjustment), as appearing on the liability side of the balance sheet. We have already indicated, while discussing plant utilisation ratio, that revaluation of fixed assets is merely a book adjustment. There is neither any cash inflow nor any fresh addition to existing capacity. Hence, real velocity of fixed assets would remain unaffected by any revaluation or devaluation. For internal control purposes it is advisable, therefore, to ignore revaluation while calculating the turnover ratio of fixed assets, in order to understand correctly how efficiently the fixed assets of the firm are being utilised. There is, however, one strong argument in favour of calculating this ratio on revalued assets. It enables the analyst to understand the sales capacity of assets at their current value and compare it with that of the new entrants in the market, who would have bought these assets at current prices. This argument also holds good for calculation of RoI, as we shall see later. We have, therefore, calculated this ratio both before and after revaluation. When fixed assets are revalued, the fixed assets turnover ratio will obviously fall, as is evident from the calculation of this ratio before and after revaluation, but the trend of the ratio will not normally be affected.

Nature of the Ratio: If the fixed assets turnover ratio of an enterprise is falling, one can immediately draw the conclusion that it's commercial viability is being eroded. The reasons may be both internal and external to the firm, though one may influence the other. Internally, the technical capacity of the assets might have fallen due to age or there may be production bottlenecks due to faulty line balancing or there are labour problems which remain unresolved or it may simply be a failure of the marketing function of the enterprise. Externally, the firm may be losing in competition due to both technological and product obsolescence.

There may also be a general recession in the economy, in which case a downward trend in this ratio will be experienced by almost all the firms in that particular industry.

It is often argued that the interpretation of this ratio may get contaminated during a period of inflationary price rise, in the sense that it may hide an actual fall in sales. The best way to overcome this problem is to take sales by quantity rather than by value. However, for a firm manufacturing multiple products or the same product in various sizes and dimensions, calculation of the ratio becomes too complex to be handled by practicing managers. The other option is to make an inflationary adjustment to sales by a chosen index. However, for purposes of inter-firm comparison, it is not necessary to make any such adjustment because inflationary price rise will be common to all the firms in a given industry.

Case of UEL: In the case of UEL, the trend of both the ratios is upward since X1 but it is yet to reach the level of the ratio obtained in X0. This is because the substantial investment in fixed assets made in X1 is yet to be fully exploited. However, the trend of the ratio suggests that the ratio will soon move beyond the X0 figure.

Normally, for a manufacturing organisation with high capital intensity, a fixed assets turnover ratio beyond 5 (before revaluation) is good. UEL's ratio is much more than that. We should, however, remember at the same time, that about 25 per cent of its net sales are derived not from its manufacturing operation but from trading activity, which demands much lower outlays of fixed assets.

Total Assets Turnover Ratio

It is also called the velocity of total assets. For UEL this is calculated both before and after revaluation of fixed assets.

	X0	X1	X2	X3
a) Net sales	45748	55107	63794	69972
Total operating assets (before revaluation)	34400	42045	52748	60091
Ratio	1.33	1.31	1.21	1.16
Trend (ignoring X0):	*Downward*			
b) Net sales	45748	55107	63794	69972
Total operating assets (after revaluation)	37181	44765	55408	62696
Ratio	1.23	1.23	1.15	1.12
Trend (ignoringX0):	*Downward*			

Components of Operating Assets: Total operating assets would exclude investments, capital work-in-progress and other assets which do not contribute to the generation of sales. The question now arises as to the treatment of amortised expenditure clubbed together under the head miscellaneous expenditure. Examples of such expenditure are preliminary expenses, share issue expenses, patent, copyrights, technical knowhow, expenditure on large advertisement etc. These are called fictitious assets (goodwill is also one such fictitious asset which we shall deal with separately) because they do not have any physical existence, except in the books of account of the enterprise. Some of these ‘assets’ are pure expenses (preliminary expenses and share issue expenses) and stay in the balance sheet as such. These expenses cannot be charged to the profit and loss account in a single year as they are large in amount. Other miscellaneous expenditure like cost of technical knowhow, copyright, patents and even large promotional campaigns, are not merely expenses but congealed services. Like any other productive asset, their benefit is enjoyed by the operating functions over a long period of time. These assets should therefore form part of the operating assets of a business. For UEL we have ignored miscellaneous expenditure altogether from the calculation of operating assets because it comprises mainly of expense items (Table 7.1). We have, however, brought in technical knowhow from the schedule of loans and advances.

Goodwill is a special kind of fictitious asset which represents super earning capacity of an enterprise or its assets. This is raised in the books of account of a company when there is a merger, or in the case of a partnership firm, when a new partner is taken in or an existing partner retires. Whatever

Table 7.1
Operating Assets of UEL

(Rupees lakh)

	X0	*X1*	*X2*	*X3*
Fixed assets (excluding capital work in progress)	8067	10863	11482	12003
Operating current assets	28389	32805	42330	48993
	36456	43668	53812	60996
Other non-current but operating assets: Security deposits	70	190	250	300
Staff loans and advances	404	655	739	812
Technical know how	251	252	607	588
Total operating assets after revaluation	37181	44765	55408	62696
Less: revaluation reserve	2781	2720	2660	2605
Total operating assets before revaluation	34400	42045	52748	60091

Note: For detailed calculation of operating current assets see Chapter 4(I) ‘Working Capital Management’.

may be the reason, financial prudence demands that goodwill be written off as soon as possible, either to the debit of existing reserves or by a charge to the profit and loss account over a moderately short period of time. Since goodwill represents the super earning capacity of an enterprise, and since financial prudence demands that it should be written off as early as possible, the very existence of goodwill in the books of accounts of an enterprise beyond a reasonable period points to the fact that the enterprise might already have lost the ‘goodwill’, because its earning capacity is no longer such that it could write off the goodwill faster. In fact, the super earning capacity of a business is reflected in the faster velocity of its assets as compared to other firms in an industry. There is no need to show it separately as goodwill in the books of accounts. It is desirable, therefore, to exclude goodwill from the calculation of operating assets. Incidentally, UEL does not have goodwill in its books of accounts.

Nature of the Ratio: When a firm is experiencing an upward trend in the velocity of operating fixed assets but a downward trend in the velocity of total operating assets, a reasonable conclusion would be that while the firm is gaining in its manufacturing strength it is losing in the area of both marketing and working capital management. The situation, however, is better than what would have been had the contrary been true because, as we have mentioned earlier, it is difficult to arrest the downfall of a firm if it is losing on its manufacturing viability.

Case of UEL: The turnover ratio of total operating assets in UEL is not only low but it is falling too while the fixed assets turnover ratio is rising, as we have seen earlier. This means that the current assets of the company are not being turned over as fast as the fixed assets. Current assets comprise more than 75 per cent of total operating assets of UEL. The largest item in the current assets list is that of debtors, which is more than 60 per cent of current assets and about 50 per cent of total operating assets. The major cause is therefore debtors, whose turnover ratio must be falling, as we shall see later.

Operating Profit Ratio

The derivation and movement of this ratio for UEL have been calculated as follows:

	X0	*X1*	*X2*	*X3*
Operating Profit	3542	4641	5418	5320
Net sales	45748	55107	63794	69972
Ratio (%)	7.74	8.42	8.49	7.60
Trend:			*Flat*	

Components of Operating Profit: Operating profit is generally recognised before interest and taxes. It is argued that as the operating managers are not responsible for financing the business, they cannot be burdened with interest cost. Hence, the operating profit ratio, which is a measure of evaluating the performance of the operating function, should ignore interest and other financing charges. The ratio calculated for UEL is based on this argument. There is another viewpoint which claims that operating managers should be made responsible for interest on working capital loans, because a major part of the current assets, (the financing of which is done by raising working capital loans) is generated or used by the operating function only. This argument suffers from short sightedness, because if we extend it further we would have to make operating managers also responsible for interest on term loans because financing of the fixed assets which are used by the operating function, is done by raising term loans. As a result, virtually the entire interest burden of the business becomes the responsibility of the operating function, although operating managers take no decisions about the financial structure of the business. This is onerous. Hence, we ignore interest cost while calculating the operating profit ratio. If we have to judge the performance of the operating function based on the handling of relevant current assets, we should use separate ratios like turnover of raw materials, work-in-process inventory, and turnover of sales assets.

Nature of the Ratio: The general trend of the operating profit ratio in UEL is flat, though it has fallen in X3. As sales and operating profits are highly related (in fact the latter is derived from the former), the normal tendency of this ratio is to remain constant over a given technology period, though with the increase in sales some small improvement may be noticed as fixed costs get distributed over larger volumes. The reason behind the fall in the operating profit ratio of UEL in X3 can be ascribed to a general rise in cost, as various expense ratios described earlier have revealed, and also in general and administration expenses, as we shall see later. The difference between gross profit and operating profit is the general and administration expenses. Hence, if the gross profit ratio is showing a flat or slightly upward trend but operating profit ratio is showing a downward trend then the basic reason for this gap must be the general and administration expenses, which have either remained unabsorbed because of their already existing high level or are increasing disproportionately with sales. In the case of UEL, not only has the gross profit ratio fallen in X3, the general and administration expense ratio has also risen at the same time. These two together have pulled down the operating profit ratio.

General and Administration Expense Ratio

The derivation and movement of this ratio in UEL are as follows:

	X0	*X1*	*X2*	*X3*
General & administration expenses	3341	4052	5164	6198
Net sales	45748	55107	63794	69972
Ratio (%)	7.30	7.35	8.09	8.86
Trend:		*Upward*		

Nature of the Ratio: General and administration expenses being semi-variable in nature should register a downward trend with rise in sales, because the fixed component of this cost group gets spread over a larger amount of sales. If this trend is upward at a time when sales are also rising, an obvious conclusion is that the semi-variable character of this expense group is lost, at least during the period under investigation. This loss may be either because the variable components of this expense group have lost their proportionality and are rising more than proportionately with sales or the fixed components have lost their fixity or both. At times, pressure of expansion may create such an anomalous situation, particularly when the expansion falls outside the planned or coordinated growth path of the enterprise.

Case of UEL: Such a pressure might have been created in UEL because the ratio has begun to rise since X1 when there was considerable addition/renewal of capacity. The administrative structure of the company may have had to be expanded to cope with the expansion in sales, resulting in disproportionate rise in administration expenses. It is expected that the situation would soon be brought under control when the expenses would reach a stable state, though at a higher level than before. The ratio would start falling slowly as the sales increase. If the trend continues to be upward even after a reasonable period of time, then serious attention has to be given to the administrative structure of the business, which might have become too heavy and hence, is doing an injustice to the operating function of the business by eating into its operating profit.

Value Coverage Ratio

The derivation and movement of this ratio for UEL have been calculated as follows:

	X0	*X1*	*X2*	*X3*
Consumption of all materials	31096	37752	45063	48044
Value added	14295	18140	21148	22938
Ratio	2.18	2.08	2.13	2.09
Trend:			*Flat*	

Definition of Value Added: The Bureau of Public Enterprises of India in its annual report on public sector companies (1973–74), defines value added as 'value of production less cost of direct materials consumed'. Direct materials include all converter inputs like stores, spares, power, fuel, and water. Value of production is further defined as 'sales and services rendered plus/minus accretion/decretion in the value of work in progress and finished goods'. In terms of this definition the valued added of UEL is calculated for four years (Table 7.2).

Table 7.2
Value Addition in UEL

(Rupees lakh)

		X0	*X1*	*X2*	*X3*
	Net sales	45748	55107	63794	69972
	Inventory adjustment:				
	Work-in-process	31	429	1638	874
	Finished goods	(388)	356	779	136
A.	**Value of production**	45391	55892	66211	70982
	Raw Materials	19059	21631	27700	31373
	Stores, spares and consumables	471	516	787	848
	Power and fuel	329	559	479	640
	Purchase of finished goods	11237	15046	16097	15183
B.	**All materials**	31096	37752	45063	48044
C.	**Value added (A–B)**	14295	18140	21148	22938

Value added is the ultimate source of profit. Some writers contend that the value added, as defined and illustrated earlier, suffers from subjective methods of valuation of inventories, which may differ from one firm to the other and even within the same firm, from one year to the other. They also hold that there can be no value added unless goods produced are sold and hence, value added should be defined as sales minus all materials (throughout) consumed in sales quantity (Chakraborty, 1972). Martin's (1964) total earning concept which is similar to the value added concept also supports this alternative definition. This definition, however, not only does some injustice to the manufacturing function, which is primarily responsible for producing value and not for its realisation, it also suffers from short sightedness (emanating mainly from accountants' conservatism) in the sense that unrealised value addition is nothing but accrued income and hence, the enterprise should take credit for it.

Nature of the Ratio: Value coverage ratio indicates the extent of value added coverage of materials (Chakraborty, 1980). It is a measure of the net output of a firm in relation to the value of the throughput which it processes. Lower the ratio greater is the net output produced in relation to the throughput. For example, if the ratio is less than 1 then it may be concluded that the conversion processing done by the firm on its materials is of a very high degree. Another conclusion could be that the product is not material intensive. Among other things, technological progress at the operational level means savings on materials. Automated production processes and value engineering are some of the technological innovations directed towards reducing wastage and economising on the cost of materials of a product by locating alternative materials. All these call for large investment in plant and machinery. Generally speaking, a low intensity of labour and material demands high intensity of capital. The two are inversely related. However, the low intensity of labour in advanced technological conditions means high value addition per unit of labour employed. The value coverage ratio implicitly captures the technological environment of an enterprise. Lower the ratio higher is the capital intensity.

A downward trend in the value coverage ratio suggests an increasing level of value addition by economising on cost and use of materials and maximising the value of labour with modern instruments of production. On the other hand, an upward trend of the ratio suggests wastage or uneconomic use of materials, less skilled workforce, and technological obsolescence.

Case of UEL: The trend in the value coverage ratio of UEL is, however, flat—indicating virtually a 'status quo' in technology. This might have emanated from a deliberate policy decision of the management not to go in for a high capital intensive productive system for high value added products. Being an old organisation it gradually acquired a large workforce which it does not want to replace now by capital intensive technology. The investment in plant and machinery made in X1 might have gone largely towards labour intensive technology and hence, there could not be any improvement in the value coverage ratio of the company.

Return on Investment (RoI)

This ratio is also called return on assets (RoA). Calculation and movement of this ratio for UEL are determined both before and after revaluation of fixed assets.

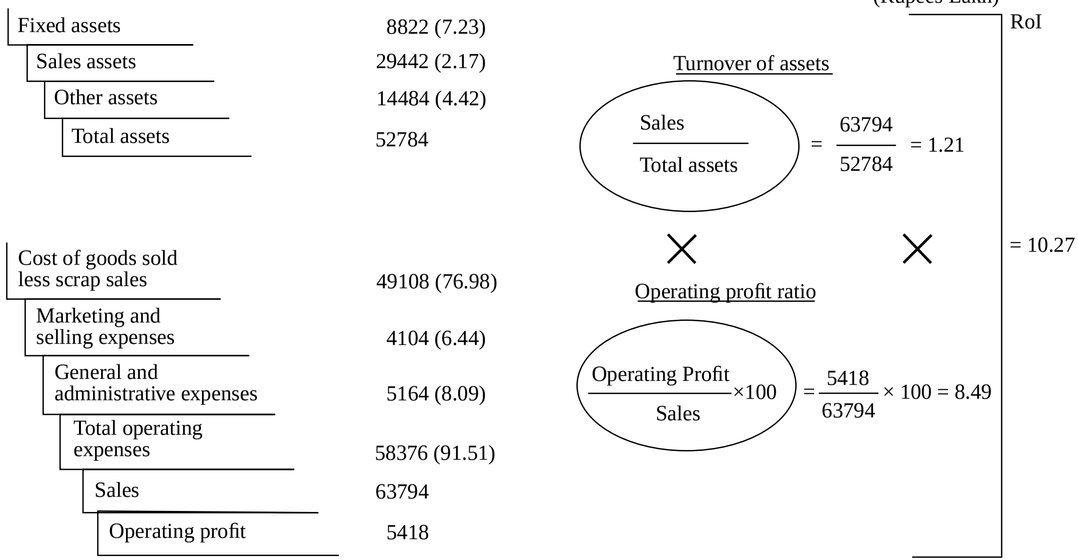
	X0	*X1*	*X2*	*X3*
a) Operating profit	3542	4641	5418	5320
Total operating assets (before revaluation)	34400	42045	52748	60091
Ratio (%)	10.30	11.04	10.27	8.85
Trend:		*Downward*		
b) Operating profit	3542	4641	5418	5320
Total operating assets (after revaluation)	37181	44765	55408	62696
Ratio (%)	9.53	10.37	9.78	8.49
Trend:		*Downward*		

Nature and Components of the Ratio: This is the most comprehensive ratio for operating management, as it translates the financial objective of a firm into such operating terms as selling prices, profit margins, sales turnover, production costs, and capital equipments (Newman, 1966). It thus integrates the major functional sub-systems to the overall objectives of the enterprise. Figures 7.1 and 7.2 explain the integrating character of this ratio by analysing the performance of UEL for two years under various functional sub-systems. The RoI chart is depicted in two downward ladders, where each step leads to the next step below it. For ease of understanding we have taken up only the RoI calculated before revaluation.

The RoI chart captures the movement of two important sets of ratios, velocity of functional groups of assets on the one hand and expense group ratios on the other, towards the financial objective of the business, namely RoI, through operating profit ratio.

Figure 7.1
Return on Investment Chart of UEL for 19×2

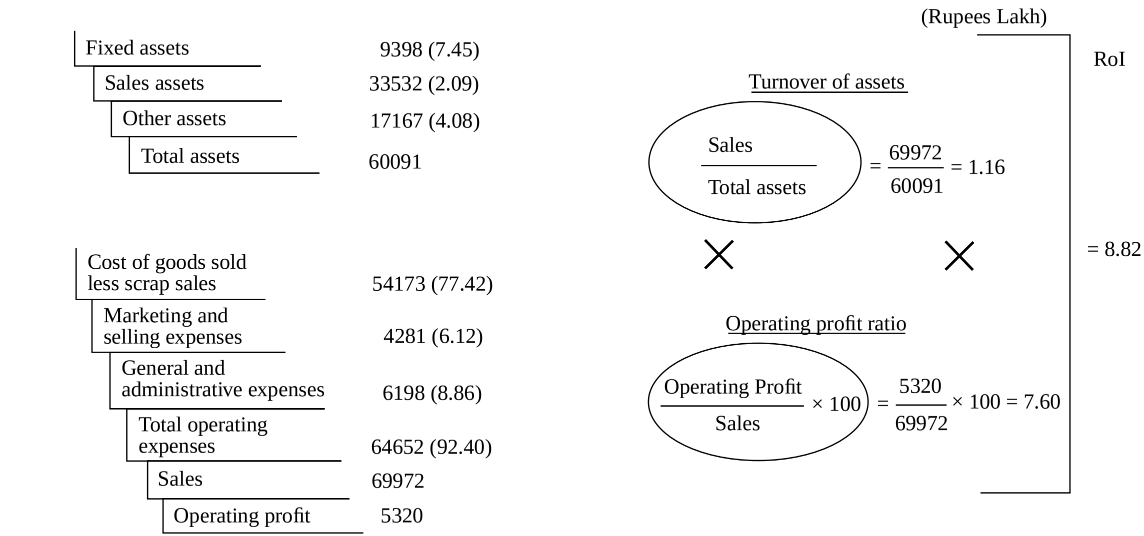
(Rupees Lakh)



Note: (1) Assets are all operating assets and sales are net of excise duty.
(2) Figures in brackets give the ratio of the individual item to net sales. Assets are in turnover ratio while expenses are in percentage form.

Figure 7.2

Return on Investment Chart of UEL for 19×3



Note: (1) Assets are all operating assets and sales are net of excise duty.

(2) Figures in brackets give the ratio of the individual item to net sales. Assets are in turnover ratio while expenses are in percentage form.

Case of UEL: Comparative analysis of the two RoI charts reveals that fall of RoI in X3 is primarily due to worsening of expense group ratios; turnover of total assets has worsened only marginally. The manufacturing function has done a somewhat better job in generating sales (production) indicated by an improvement in fixed assets turnover ratio, but this improvement has been eaten up by the marketing and finance function (working capital management) whose turnover ratios have fallen. The RoI chart directs the attention of the corporate management to areas where tightening of the belt is required and to asset segments whose performance needs improvement.

The RoI chart reveals that in the ultimate analysis, RoI is the product of two ratios, namely turnover of total assets and operating profit ratio, i.e.,

$$\frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Operating profit}}{\text{Sales}} = \frac{\text{Operating profit}}{\text{Total assets}}$$

How to improve RoI: It is obvious that improvement in any one of these two ratios will ultimately improve RoI. The purpose behind explaining the RoI in its expanded form is to draw attention to the manoeuvrability of each of these two ratios in terms of the relationship existing between their numerators and denominators. Though in the case of UEL operating profit ratio can be improved to some extent by making concerted efforts towards reduction of expenses, it is generally not possible to make much improvement in this ratio because of high correlation between the two variables that make this ratio. The ratio will be more or less constant during a given technology period. We have already seen earlier that the trend of this ratio in UEL is flat. Attention of the management should, therefore, be drawn more towards the total assets turnover ratio whose numerator and denominator are not so related with each other; there is scope for manipulation of either of these two variables without affecting the other. The total assets turnover ratio can be improved by increasing capacity utilisation of say, fixed assets, but the same improvement can be achieved by pruning down the asset base of the firm by say, discarding slow or non-moving current assets, by squeezing flabby inventories, and by increasing realisation of debtors.

Need for Uniform Accounting Policy: In order to correctly interpret the RoI, an uniform accounting policy should be followed while calculating the asset base of the firm. For example, the asset base of the firm may change if there occurs any revaluation of assets as in the case of UEL. RoI of the firm changes with the revaluation of assets. Some analysts prefer RoI calculation on revalued assets claiming it to be more realistic. This is because by revaluation assets are brought closer to their market value and thus become comparable with operating profit, which is predominantly derived at current prices, except to the extent it is contaminated by valuation of inventories under different methods of valuation, e.g., LIFO, FIFO etc.

There is much strength in this argument and that is the reason why we have calculated the RoI of UEL after revaluation of its fixed assets. In fact, when fixed assets and inventories are not restated for price level changes after acquisition, net income is overstated and investment is understated. Thus, enterprise managers who retain older, mostly depreciated assets, report much higher RoIs than those who invest in new assets or revalue assets from time to time (Kaplan, 1984). It should, however, be remembered that whatever may be the accounting policy for determining the value of the asset base of a firm, it should be uniformly followed for determining the RoI.

It is often claimed that an enterprise having a RoI below the rate of return available on the safest securities (treasury bills and bonds) is not earning its keep. This is not often true. When the objective of a company is to maximize the return to or wealth of its shareholders, an RoI less than the return on the safest securities may often satisfy this objective. This we shall examine later by a different ratio called return on shareholder's fund.

SUMMARY

Financial control constitutes the most important regulator of a business. It can help the manufacturing manager in improving his methods of operation, prioritizing remedial action, and defining standards of performance. The balance sheet and income statement contain valuable data which can be used for the financial control and monitoring of a manufacturing function.

The most important control variable for a production manager is the cost of goods sold, which consists of the following cost elements:

1. *Direct materials*: These represent both the raw materials (to be processed) including stores and consumables as well as sub-assemblies or assemblies sourced directly from the vendors.
2. *Manufacturing labour*: Costs associated with manufacturing/assembly of the product are called direct labour costs and costs associated with the supply of essential services to manufacturing are called indirect labour costs.
3. *Power and fuel*: This includes the cost of electricity, coal, water or any other fuel used in the process of manufacturing.
4. *Maintenance and repair*: This generally includes expenses on salaries, wage, stores and spares, etc. The total cost could be charged to user departments as maintenance overheads at a predetermined rate or by any other allocation method.
5. *Depreciation*: This non-cash expense is essentially a provision for future replacement of assets, and hence, appears as a reserve for future expansion. The two most popular methods of charging depreciation are the Straight Line Method (SLM) and Written Down Value (WDV). Provisioning of depreciation is governed by two Acts, namely Companies Act (schedule XLV for declaring dividend) and the Income Tax Act (for taxation purposes).
6. *Production overheads*: Expenses like insurance of plant and machinery, stocks, cost of stationery, and janitor services are included under this head. Excise duty should not be considered a part of cost of sales, because the organisation does not have any control over this cash outflow.
7. *Work-in-process inventory*: In order to calculate cost of production of finished goods, we need to add opening work in process to the total manufacturing expenses and then deduct the closing work in process from it.
8. *Finished goods inventory*: The adjustment for any unsold stocks at the end of the previous year and this year needs to be done in a similar way as that for work in process.

Manufacturing gross profit = The difference between the sales (net of excise duty) and the aggregate of the above costs (under the head cost of goods sold) is represented as manufacturing gross profit (loss).

FINANCIAL ACCOUNTING RATIOS

Financial aspects of the manufacturing management of an enterprise are evaluated in Section II with the help of a set of financial accounting ratios. The balance sheet and profit and loss accounts of a real-life company are used to explain these ratios. Table 7.3 summarises these ratios.

Table 7.3
Summary of Financial Accounting Ratios

No.	*Ratio*	*Definition*	*Nature and purpose*
1.	**Plant turnover ratio**	Cost of production/ Plant and machinery (depreciated)	As the capacity utilisation of the plant increases, the ratio should show a gradual improvement and finally, reach a plateau.
2.	**Materials consumption ratio**	Direct materials consumed (including stores and consumables)/Net sales	This ratio is expected to be constant over a period. An increase in this ratio could mean a disproportionate rise in materials cost which could not be passed over to consumers or it could simply be materials wastage.
a)	**Materials import ratio**	Imported materials/ Direct materials consumption	This ratio indicates the sensitivity of an enterprise to the vagaries of the international commodity markets, exchange rate fluctuations, and government policy.
b)	**Spares import ratio**	Imported spares/ Spares consumption	-do-
3.	**Manufacturing labour ratio**	Manufacturing wages and salaries/Net sales or cost of production	Factory wages are variable with sales but managerial salaries are fixed, hence the ratio is likely to decrease with an increase in sales.
4.	**Trading ratio**	Finished goods bought/Net sales	A high trading ratio for a manufacturing firm is not a healthy sign. It indicates growing non-viability of its major products.
5.	**Spares consumption ratio**	Consumption of spares/Net sales or cost of production	This ratio is expected to rise with a decrease in the life of the plant.

Table 7.3 (Continued)

Table 7.3 (Continued)

No.	*Ratio*	*Definition*	*Nature and purpose*
6.	**Power and fuel consumption ratio**	Consumption of power and fuel/Net sales or cost of production	This expense has a high inter linkage with the level of production. The ratio should become constant once the production parameters are stabilised.
7.	**Maintenance ratio**	Maintenance and repairs of plant and machinery/Net sales or cost of production	This ratio is expected to rise with the age of the machines.
8.	**Materials inventory turnover ratio**	Materials consumption/ Materials inventory (both inclusive of stores)	This ratio is also called velocity of materials inventory. Inventory valuation technique affects the ratio. Aim should be to increase the ratio.
9.	**Imported materials inventory turnover ratio**	Consumption of imported materials/ Inventory of imported materials	This ratio attempts to capture the exposure of the firm to the vulnerability of supply sources in foreign centres. A stable ratio is desirable.
10.	**Work-in-process inventory turnover ratio**	Cost of production/ Work-in-process inventory	Work-in-process inventory is essentially technology driven. Velocity of work-in-process should therefore be constant over a technology period.
11.	**Technology updation ratio**	Gross addition to fixed assets (including capital work-in-progress)/Accumulated depreciation during the period	This ratio captures the attitude of the enterprise towards modernisation of plant and machinery. For a growing enterprise, the ratio should at least be 1.
12.	**Protection ratio**	Landed price of the imported product/ Domestic cost of the product	Export competitiveness of the organisation is reflected if the ratio exceeds (or is at least equal to) 1. If it is less than 1, the enterprise runs the risk of being wiped out from the market once protection is lifted by the government.
13.	**Gross profit ratio**	Gross profit/Net sales	The ratio should be constant over a given technology period. A falling ratio indicates incipient sickness of an enterprise.

MANAGEMENT ACCOUNTING RATIOS

Operating managers are generally dissatisfied with current cost accounting practices, investment justification methods, and performance evaluation criteria. Systems and models derived from scientific management movement are unable to cope with the market demand of continuous process and product improvement. Operational control systems need to focus on timely reports on actual operations, so as to achieve the goals of zero defects, 100 per cent yield and 100 per cent on time delivery.

The management needs to realize that high quality and low cost are consistent with each other. While the JIT philosophy aims at reducing the organisational and operational deficiencies of a productive system, flexible flow lines help reduce the wide variation between throughput time and the actual process time.

Profitability, cost, and productivity can be measured accurately only when financial data as well as non-financial data (qualitative data) are considered simultaneously in a scientific manner. Ratios form the simplest and most cost effective method of presenting management accounting information. The following ratios have been found to be useful to judge the technical efficiency of manufacturing management (Table 7.4).

Table 7.4
Summary of Management Accounting Ratios

No.	*Ratio*	*Definition*	*Nature and purpose*
1.	**Manufacturing productivity (ratio)**	Refer to (a) and (b) given below.	The two ratios under this head capture the performance level of the operators and the utilisation of the machinery.
a)	**Performance ratio**	Actual units produced/Standard units	At the shop floor level it is essential to calculate this ratio both by shift and by operator.
b)	**Utilisation ratio**	Actual man-machine hours/Available man-machine hours	This ratio indicates the capacity utilisation of the plant at the floor level.
2.	**Downtime ratio**	Direct labour hours on downtime/Total direct labour hours worked in the plant	This ratio attempts to relate production time and non-production time (e.g. setup, machine adjustments, rework, etc.).

Table 7.4 (Continued)

Table 7.4 (Continued)

No.	*Ratio*	*Definition*	*Nature and purpose*
3.	**Priority control ratio**	Date line work days available/Number of days work to be done	It helps to establish work priorities and production planning to decide which orders to review for rescheduling, cancellation, etc.
4.	**Replacement ratio**	Present value of maintenance costs for the remaining estimated life of the machine/Net replacement cost of the machine (net of salvage value)	This ratio indicates when replacement of the machine has become due because of deterioration of its productive capacity.
5.	**Lead time ratios**	Refer to (a) and (b) following.	As lead time equals process time plus idle time the two ratios under this head indicate the magnitude of non-value flow of a manufacturing process.
a)	**Value flow ratio**	In process time/ Total process time	Any improvement in this ratio improves the competitive advantage of the enterprise.
b)	**Non-value flow ratio**	Idle time/Total process time	It indicates the level of non-value items. It is essential to calculate this ratio for all components of the non-value flow.
6.	**Cost of quality ratio**	Cost of quality × 2/ Sales	It measures the impact of quality costs on the profitability of a business. Quality costs refer to the apparent as well as the hidden costs of quality.
7.	**Vendor quality ratio**	Number of lots accepted/Number of lots inspected.	This ratio differentiates between vendors. It is free from subjectivity suffered by other ratios used for determining vendor quality.

MARKETING AND SALES FUNCTION

Financial Accounting Ratios

The objective of the marketing function has shifted from increasing sales to increasing the market share of the enterprise and thereby contributing significantly to the profitability of the business. There is a need now to bring the marketing and sales function at par with the manufacturing function. The financial ratios summarised in Table 7.5 are used to evaluate the profit generating capability of this function.

Table 7.5
Summary of Financial Accounting Ratios (Marketing and Sales Function)

No.	*Ratio*	*Definition*	*Nature and purpose*
1.	**Sales assets turnover ratio**	Gross sales/(Trade debtors + finished goods inventory)	It measures the efficiency of the marketing function in terms of the velocity of sales assets. Higher the ratio, the better it is.
2.	**Direct marketing expense ratio**	Direct marketing expenses/Net sales	This ratio should generally be stable or falling slowly with rise in sales as direct marketing expenses are normally semi-variable in nature.
3.	**Promotional ratio**	Sales promotion expenditure/Net sales	The ratio attempts to judge the impact of promotional campaigns on sales over a period of time. A steep upward trend may indicate that the firm is losing in competition while a downward trend may suggest complacency—taking the market for granted.
4.	**Return on marketing assets (ROMA)**	Marketing contribution/ Marketing assets	A lower ratio indicates that sales assets are not generating a reasonable level of sales.

Management Accounting Ratios

Technical aspects of the marketing and sales function are analysed with the help of the management accounting ratios summarised in Table 7.6

Table 7.6
Summary of Management Accounting Ratios (Marketing and Sales Function)

No.	*Ratio*	*Definition*	*Nature and purpose*
1.	**Velocity of distribution channel**	Sales (despatch) at warehouse, wholesaler or retailer/Stock at warehouse, wholesaler or Retailer	A fall in this ratio indicates existence of bottlenecks in the distribution channel of an enterprise.

Table 7.6 (Continued)

Table 7.6 (Continued)

No.	*Ratio*	*Definition*	*Nature and purpose*
2.	**Average age of debtors**	Debtors at the end of the period x Number of days in the accounting period/Credit sales during the period	An undue increase in this ratio indicates the failure of the credit policy of the firm or that of the collection department.
3.	**Margin variance**	Actual margin/List price margin	Ideally, the ratio should be 1.
4.	**Replacement sales ratio**	Sales of the replacement year/Replacement sales	Typically calculated for consumer durables which do not have a very long life span. For a growth oriented company, it should be close to 1.

CORPORATE CONTROL AND MONITORING OF OPERATIONS

In the earlier sections we have discussed ratios for the separate evaluation of manufacturing management and marketing and sales management, which together constitute the operating management of an enterprise. In the last section we discussed ratios which are useful at the policy level for control and monitoring of the overall operations of the business. Table 7.7 summarises the ratios discussed in that section.

Table 7.7
Summary of Ratios for Operating Management

No.	*Ratio*	*Definition*	*Nature and purpose*
1.	**Fixed assets turnover ratio (FATO)**	Net sales/Operating assets (before and after revaluation)	This ratio is also called velocity of fixed assets. Any decline in this ratio is a cause for concern as it indicates an erosion of the commercial viability of the enterprise.
2.	**Total assets turnover ratio (TOTA)**	Net sales/Total operating assets (before and after revaluation)	An upward trend in FATO but a decline in the TOTA indicates consolidation of manufacturing strengths but erosion of marketing and working capital management.

Table 7.7 (Continued)

Table 7.7 (Continued)

No.	*Ratio*	*Definition*	*Nature and purpose*
3.	**Operating profit ratio**	Operating profit before interest and taxes (OPBIT)/Net sales	Gross profit minus operating profit represents the general and administration expenses. An increase in the gross profit ratio but a decline in the operating profit ratio indicates a disproportionate increase in the general and administration expenses.
4.	**General and administration expense ratio**	General and administration expenses/Net sales	These expenses are semi-variable in nature. Hence, the ratio should show a declining trend with rise in sales.
5.	**Value coverage ratio**	Consumption of all materials/Value added	Value added is the ultimate source of profit. This ratio captures the technological environment of the enterprise. Lower the ratio, higher the capital intensity.
6.	**Return on investment (RoI or RoA)**	OPBIT/Total operating assets, (before and after revaluation)	This is the most comprehensive ratio for overall evaluation of operating management as it translates the financial objectives of a firm into operating terms like selling price, profit margin, and production costs. RoI can be improved by bringing about an improvement in the TOTA and/or expense group ratios. However, TOTA is easier to manipulate, say by improving the capacity utilization, or by pruning the asset base.

Chapter 8

Ratios for Working Capital Management

It is the bright day
That brings forth the adder,
And that craves wary walking.

—*Shakespeare*

INTRODUCTION

Once a firm has installed plant and machinery, it requires working capital to fund current assets generated by the operating functions of the business. The manufacturing function generates raw materials inventory and work-in-process inventory, while the marketing and sales function holds finished goods inventory and generates debtors. Other current assets like cash, advance payments, and prepaid expenses are held for the operating function.

NATURE OF CURRENT ASSETS

Current assets are a burden on the business. These exist because of imperfections in the manufacturing system and markets for materials and finished products. If the manufacturing system could be properly synchronised with the market at both ends, then an enterprise would be able to operate virtually on the basis of a 'stockless production'. JIT manufacturing aims at attaining such an objective. If the product market has always been a cash market, then the enterprise would not require funds for holding debtors. Every entrepreneur dreams of such perfections and, hence, he hates the building up of current assets along his productive-distributive chain. Every piece of current asset demands funds.

Providing for funds has a cost. From this emanates the objective of working capital management: reduce current assets to their minimum. The operational aspect of this objective is to maximise the velocity of current assets.

STRATEGY OF WORKING CAPITAL MANAGEMENT

If current assets are to exist as 'necessary evils', the objective of a funding operation will be least-cost financing, with minimum risk to the business. Major sources of working capital finance are supply creditors, advance payments from customers, overdrafts from banks and financial institutions, and net worth. Supply creditors and customer credits are the least costly—almost free of cost—among all sources of working capital finance but, they are also risk prone. Default in paying a creditor has an adverse effect on the credit worthiness and standing of the firm, as it sends nervous signals to other creditors, who may suddenly descend upon the firm demanding all payments and stopping all supplies. As no firm can pay up all its creditors at one time, except by selling off its assets, the consequence of a default in payment may be as disastrous as the winding up of the business altogether. In order to safeguard against such eventualities, the concept of net working capital (NWC) has been evolved. NWC is the positive difference between current assets and current liabilities. As it comes from long-term sources (net worth + term loans), it provides a stable cushion against the occasional maturity gap between current assets and current liabilities.

NON-CURRENT ASSETS AND LIABILITIES

Historically, certain assets and liabilities have continued to be classified as current assets and current liabilities and reported as such in the balance sheet of a firm. On closer examination we may observe that some of them may not qualify as being 'current' in nature. For example, dealers' deposits made to or by the firm, which are repayable only on termination of the contract on an uncertain date, are not current in nature, though they are traditionally classified as current assets and current liabilities respectively in balance sheets. In order to distinguish these assets from other current assets, the Reserve Bank of India has evolved a concept called non-current assets and has specified certain current liabilities to be reckoned with long term liabilities only. It has also indicated that non-current assets being long term in nature should be financed from long term sources, including non-current liabilities.

NON-OPERATING CURRENT ASSETS AND LIABILITIES

There are, however, certain assets (and liabilities) which are current in nature but are not considered as operating current assets (or liabilities). Investments in securities is a case in point. There can be no doubt that investments in market securities satisfy most of the criteria of ‘currentness’, and thereby qualify to be included as current assets, except when these are in subsidiary companies or in unquoted shares. Some of these investments do not contribute to the production of goods and services, unless the enterprise itself is an investment company. When an enterprise finds itself flush with excess cash, which it may not require for sometime to come, it may park the idle cash in short term market securities to get a quick return. This is normal business practice, but such investments cannot form part of operating current assets, as even otherwise the idle cash would not have contributed to the operating functions of the business. Some investments may, however, be made in the normal course of business, particularly in approved government and trust securities, which can be used from time to time as tender or other deposits required by various government departments for bids and contracts. These investments can, therefore, form part of operating current assets.

In case of other current assets, the tests to be applied are similar to that of investments, which will be explained gradually as we begin the analysis of the current assets and current liabilities of UEL (Table 8.1). It should be emphasised that non-current assets and liabilities are not necessarily non-operating in nature. For example, security deposits may be non-current, but not non-operating, in nature.

Table 8.1
Analysis of Current Assets and Current Liabilities of UEL

(Rupees lakh)

	X0	*X1*	*X2*	*X3*
Operating Current Assets				
Cash and bank balances	2	7	32	78
Fixed deposit with banks	16	43	209	34
Government and trustee securities	35	43	43	84
Debtors: Inland	15240	18188	22948	25213
Foreign	1025	1264	1650	2824
Bills discounted	922	412	1381	1896
Inventories: Raw materials	2523	3103	3905	3969
Work-in-process	2543	2972	4610	5484
Spares	66	174	139	160
Finished goods	2328	2684	3463	3599
Advances to suppliers of materials and parts	3501	3734	3816	5391
Advance payment of tax (net)	150	100	–	75
Deposit with excise and customs in current account	38	81	134	186
A. ***Total***	28389	32805	42330	48993
Operating Current Liabilities				
Sundry creditors (trade)	12818	14877	18230	18643
Advance payments	4036	5233	5432	5489
Expense creditors	277	365	485	235
Bank Loan: Overdraft	4608	2059	6904	9481
Bills discounted	922	412	1381	1896
Provision for taxation (net)	–	–	152	–
Proposed dividend	346	384	384	476
B. ***Total***	23007	23330	32968	36220
Operating Net Working Capital (A – B)	5382	9475	9362	12773
Non-Current				
Assets Investments: Subsidiaries	156	50	50	1115
Others	227	538	638	665
Security deposits	70	190	250	300
Staff loans and advances	404	655	739	812
Technical know how	251	252	607	588
C. ***Total***	1108	1685	2284	3480
Non-Current Liabilities				
Bridge loans	36	–	93	2503
Unclaimed dividend	2	3	2	3
Premium on redemption of debentures	85	53	20	38
D. ***Total***	123	56	115	2544

Table 8.1 (Continued)

Table 8.1 (Continued)

1. Debtors should include sellers' bills discounted and purchased with banks or other financial institutions. This figure is available from notes to the balance sheet under the head contingent liabilities or by private enquiry. Correspondingly, liabilities to banks and financial institutions should be increased by this amount. This is because of the double-entry book keeping system which first cancels the accounts of those debtors on whom bills are drawn and then cancels the bills account when these are discounted. The proceeds of the discounted bills reduce the debit balance in the cash credit (overdraft) account of the enterprise. Debtors, however, do continue to exist in reality till the time bills drawn on them are paid. Hence, true level of debtors must reflect the accounts of those unpaid debtors whose bills have been discounted. Deferred debtors should be excluded from current debtors because the amounts are realisable over a long period of time.

   Deferred debtors should, therefore, form part of non-current assets. However, the instalments receivable during the current period may be treated as current assets.
2. Only advance payments made to suppliers of materials and services should be treated as current assets. Any such payment made to suppliers of capital goods, including know how, should be treated as non-current assets, because the payment is not made for the current operations of the business. Advance payments made to subsidiaries for supply of materials and such in the normal course of business should be treated as current assets (as in case of UEL), otherwise it should be removed to non-current assets.

   Advance payments received from customers for supply of finished goods are part of current liabilities but when these are received against sale of fixed assets these should be treated as non-current liabilities.
3. Security deposits made with the excise and customs departments or with suppliers, landlord etc., which are refundable only on termination of a contract, should be treated as non-current assets because of their long term character. Deposits in current account with excise and customs authorities adjustable against goods cleared should form part of current assets.

   Similarly, security deposits received from customers which are refundable only on termination of contract should be regarded as non-current and form part of the long-term liability of the business.
4. Staff loans and advances repayable within a year are current assets but housing and vehicle loans given to members of the staff, which are generally repayable over a long period, are to be treated as non-current assets, as in the case of UEL.
5. Bridge loans are generally taken to bridge the gap between issue or sanction and the actual receipt of money from long term sources like shares and debentures issue or sanctioned loans from term lending institutions. As the character of these loans is long term, though taken for a short period, these should be treated as non-current liabilities.
6. While dividend payable for the current year is to be treated as current liabilities, unclaimed dividend should be removed to non-current liabilities because by terms of the Companies Act, control over this account is virtually shifted to the Central Government.

We are now ready to calculate ratios for working capital management. We shall begin with turnover ratios of inventories. Two such ratios have already been calculated under manufacturing management, namely, turnover of raw materials, and work-in-process inventories. One ratio, namely, sales assets turnover ratio, has been calculated under marketing and sales management. It should be pointed out here that current assets management comes under the concurrent jurisdiction of the respective operating function and working capital management. We are, therefore, repeating the first two ratios here in order to get a total picture of working capital management. The third ratio is discussed in detail.

FINISHED GOODS INVENTORY TURNOVER RATIO

	X0	*X1*	*X2*	*X3*
Materials inventory turnover ratio	7.72 (47)	7.10 (51)	7.26 (50)	8.06 (45)
Work-in-process inventory turnover ratio	9.80 (37)	9.68 (38)	7.50 (49)	7.26 (50)
Finished goods inventory turnover ratio				
Cost of goods sold	36551	43472	49894	54879
Finished goods inventory	2328	2684	3463	3599
Ratio	15.70 (23)	16.20 (23)	14.41 (25)	15.25 (24)
Trend:		*Flat*		

Note: Figures in brackets represent days.

This ratio, which is also called velocity of finished goods inventory, measures on the one hand, the performance of the operating function in scheduling the production and disposal of finished products and, on the other, the performance of working capital management in respect of monitoring the funding operation. It is here that the operating function often comes into conflict with the finance function. While the manufacturing manager desires to increase the rate of production, the marketing manager wants to have enough ‘stock’ at every point of the distributive system. Wider the range of products, greater is the desire for stocking, and larger is the demand for funds made on the finance manager, who often suffers from a fund crunch and increasing cost of financing. In order to integrate these three functions with the corporate goals of market share and profitability, there should be one common objective for all these functions in the area of inventory management. This goal should be to increase the turnover rate of finished goods inventory. All three functional managers should keep in mind that every additional unit carried to the inventory eats into the profitability of the business.

Zero Inventory: Worldwide, the operating function is being reorganised upside down towards achieving a zero inventory situation across the productive-distributive system of the enterprise. The 'push' concept of manufacturing and distribution is being replaced by the 'pull' concept, as in the JIT system. In this system, the product is pulled through the manufacturing process, starting with customer demand and working back to incoming materials, as against developing a production plan, buying materials, releasing it to the factory floor and pushing it through the plant; and then modifying sales to what is available for sale, or more accurately, what there is too much of and needs to be sold (Howell and Soucy, 1987). Among other benefits, the 'pull through' productive-distributive system eliminates inventory between the stages of production and distribution by integrating all the operating functions of the business. The world is hurrying away from the traditional economies of mass production to the economies of mass customisation (Ross, 1990). The greatest economy is achieved by economising on valuable funds blocked in stocks and saving on costs of physically carrying inventories. The latter cost often outmatches the cost of funding.

Nature of the Ratio: If the finished goods inventory turnover ratio of an enterprise is falling, one conclusion could be that while the market for the company's product is shrinking, its manufacturing system is not able to prune down its production, may be to avoid 'layoffs'. If the situation is allowed to continue the company may soon find itself submerged under piles of unsold stocks, which will choke the supply of funds to the company so essential for its survival.

Occasionally, the finished goods inventory turnover ratio of an enterprise may fall when it launches a big promotional campaign. All stocking points are filled up in anticipation of increased sales. A part of the promotional strategy may also be to capture the shelf space of dealers to forestall entry of competitors. Both these steps will result in a temporary rise in the holding of finished goods inventory and consequent fall in its turnover ratio. A successful promotional campaign would soon have a positive impact upon the ratio, which must rise above the pre-promotional level to prove the efficacy of the campaign.

This turnover ratio reflects, to a large extent, the competitive advantage of an enterprise. It should be compared with the industry average to locate the competitive position of an enterprise in the market place.

Case of UEL: The trend in the turnover ratio of finished goods inventory in UEL is flat, at about three weeks. Ordinarily this may appear to be reasonable for a manufacturing concern, but if we consider the fact that approximately 25 per cent of its sales are trading items, predominantly consumer durables of a wide range and variety, it should have a faster turnover. Other products of the company, such as switch gears, transformers, and communication systems, are dominantly customised items, where the turnover ratio should also be much higher. Hence a three weeks' inventory of finished stock may not be that reasonable. Besides, in spite of the fact that the company is dominantly manufacturing customised products, it is yet to take advantage of the pull through productive-distributive system. This is evident from the fact that the turnover ratio of finished goods inventory is unsynchronised with the turnover ratios of work-in-process and materials inventory.

The flat trend of the ratio is indicative of the fact that steps are not being taken to reduce the inventory, particularly when the company is suffering from a fund crunch, as we shall see later. If the present level of inventory is reduced by one week, the company would get Rs 1,000 lakh worth of funds released for use and save at least Rs 200 lakh by way of interest and carrying cost. This is almost equivalent to making additional net sales of Rs 2,600 lakh at the current rate of operating profit.

Finished goods inventory being a valued item, the analyst must see that a consistent method of valuation has been followed by the enterprise during the period under investigation. Otherwise necessary adjustments to the stock figures have to be made.

DEBTORS TURNOVER RATIO

The derivation and movement of this ratio for UEL are as follows:

	X0	*X1*	*X2*	*X3*
Gross sales	51521	62361	72877	78710
Trade debtors	17187	19864	25979	29933
Ratio	3.00 (122)	3.14 (116)	2.81 (130)	2.63 (139)
Trend:	*Downward*			

Note: Figures in brackets represent number of days.

Components of the Ratio: Gross sales are inclusive of excise duty and scrap sales, as both have entered into debtors by way of credit sales. Trade debtors should include bills discounted and purchased as explained earlier.

Debtors are often the largest of all current assets of an enterprise. UEL is no exception. In X3 they constituted about 38 per cent of all operating current assets. It is claimed that debtors are the second most liquid asset of all operating current assets, next only to cash and bank balances. However, these are also the most troublesome and risk prone assets of a firm. Debtors' realisation provides the life line cash for an enterprise. A well drawn out credit policy, followed by careful monitoring, is the key to the financial viability of a business.

Increasing volume of debtors without a matching increase in sales, reflected by a fall in debtors turnover ratio (as is happening in UEL), is an indication of the slowing down of the collection machinery or an extended line of credit allowed or forced upon the enterprise. This may be due to several external economic reasons like general or sectoral recession in the market. In such a case, falling debtors turnover ratio will be experienced by almost all the units in the industry. During a recession, a seller's market is often found to be converted into a buyer's market, who may now demand a longer line of credit and thus pull down the ratio.

A sharply falling trend in the debtors turnover ratio may also suggest that the company is losing out to competition. Frantic efforts may thus be made to save the existing market, first by offering a larger discount and then by offering an extended line of credit. All these efforts may not be able to save the company ultimately. The increasing cost of financing and the ever increasing level of debtors will force the company into a vicious circle. The primary source of the problem may be technological. Firms with modern technology might have come to the market with better quality goods at cheaper prices, or it may be that the company, which was so long a virtual monopoly, now finding itself in a competitive market is unable to pass on the high overhead costs to consumers, as it could do previously by arbitrary price increases. The solution to the problem, therefore, rests not in extending the credit line but in cost cutting or technological improvement.

Composition of Debtors: The composition of debtors has an important bearing upon keeping the debtors turnover ratio low. Companies who have a small sales base, comprising of only a few large customers, often suffer from a low debtors turnover ratio. This is particularly true of small and medium sized firms. Large customers are not always prompt to pay up because, by virtue of their command over the suppliers, they can afford to delay payment and enjoy implicit free financing of their inventories. Worse is the case when government and public sector undertakings are the buyers. They may not default but they inordinately delay. It is advisable, therefore, to have a broader sales base, though the proposition may not be liked by the sales people who prefer to deal with a few large customers only.

Case of UEL: The trend of the debtors turnover ratio in UEL is downward. Nearly 20 weeks of sales are blocked with debtors, which is a very high figure. It is no wonder that the company is passing through a fund crisis. As indicated earlier, the company is an old company which was virtually enjoying a monopoly in a number of their product segments. With many new entrants in the field now, the company is unable to hold on to its market share.

The easy way out to withstand competition is to allow a longer line of credit. The company's goodwill is still selling and it has also built up an aggressive sales force who can sell, but the dealers are demanding an extended credit period because they now have competitive options. The collection and monitoring machinery has slowed down considerably as compared to the drive by sales in order to hold on to the market share. On top of this, some of the largest buyers of the company's products are state electricity boards and telecommunication departments, who are not known to be good debtors.

CREDITORS TURNOVER RATIO

The derivation and movement of this ratio have also been calculated for UEL:

	X0	*X1*	*X2*	*X3*
Purchases	31176	37881	45351	47489
Trade creditors	12818	14877	18230	18643
Ratio	2.43	2.55	2.49	2.55
	(150)	(143)	(147)	(143)
Trend:		*Flat*		

Note: Figures in brackets represent number of days.

Components of the Ratio: Purchase figures are not available directly from the profit and loss account. These can be calculated in the following manner.

(*Rupees lakh*)

	X0	*X1*	*X2*	*X3*
Consumption of materials, stores and spares	19530	22147	28487	32221
Add: Closing inventories of materials and spares	2589	3277	4044	4129
	22119	25424	32531	36350
Less: Opening inventories of materials and spares	2180	2589	3277	4044
Purchase of materials etc.	19939	22835	29254	32306
Add: Purchase of finished goods	11237	15046	16097	15183
Total purchases	31176	37881	45351	47489

This ratio reflects the purchase and payment policy of an enterprise; its market standing; and cash flow position.

Nature of the Ratio: When an enterprise is a monopsonic buyer it can command good credit from suppliers by simply bullying them. Such an enterprise also suffers from a lax buying policy. It forgets that inventories may be available ‘free’ but there are real costs involved in carrying these inventories. If the market turns against the firm simultaneously with shortage of materials and entry of other competitors in the field, then the suppliers recoil back on the firm. It is difficult at that point to retrace its lax buying policy which by now has been ingrained in the system. Suppliers now demand faster payment and shortening of credit lines, which comes as a shock to the firm and creates tremendous confusion, both at the operating and policy level.

Overtrading: This situation is akin to 'overtrading' on the buying side, which may also happen when there is a glut in the raw materials market and there are too many suppliers vying with each other to sell their products. They will then offer larger discounts and extended lines of credit. And enterprise may fall prey to such a situation. The over enthusiastic entrepreneur may be tempted to give an extended line of credit to his buyers and become callous towards realisation of debtors, because enterprise pressure on him is low as suppliers are always there who will supply but wait for any length of time to get paid! Suddenly when the market turns adverse or any bottleneck in production develops, resulting in a fall in sales, the castle collapses under the thrust of liquidity. Gains in discounts and length of credit may often be offset, not only by the cost of carrying additional inventories, but also by the risk of carrying large creditors.

Case of UEL: UEL's creditors turnover ratio is consistently low, and is equal to that of its debtors turnover ratio. In a sense, these two are synchronised, but this synchronisation is not a desirable one, particularly when it is at a low level, because it does not leave any elbow room between creditors' maturity and debtors' realisation. In this case the low creditors turnover ratio is the result of slow realisation of debtors. The company does not have enough operating cash flow to pay its creditors in time. Hence, the company must have sufficient NWC to stave off a liquidity crisis till the time it can increase the velocity of debtors to outmatch that of creditors considerably.

UEL's buying policy also has to be examined in this connection, to find out whether its purchase function has been tuned properly to its changing position in the market place. UEL has been able to maintain its materials inventory turnover ratio almost at a constant level during the past four years, which is much below the norm prescribed by the Reserve Bank of India. This suggests a tightening of the purchase function. The situation would have been worse if a low creditors turnover ratio had moved in tandem with a low materials inventory turnover ratio.

The most enviable position that an enterprise can enjoy is when velocity of its debtors outmatches the velocity of its-creditors by a comfortable margin. This leads us to the next ratio.

MARKET COMMAND RATIO

The derivation and movement of this ratio in UEL are as follows:

	X0	X1	X2	X3
Debtors turnover ratio	3.00	3.14	2.81	2.63
Creditors turnover ratio	2.43	2.55	2.49	2.55
Ratio	1.23	1.23	1.12	1.03
Trend:		*Downward*		

Nature of the Ratio: When an enterprise is a monopoly seller and a monopsonic buyer it can command credit at both ends of the market and can virtually operate at a zero or even negative NWC position, without running the risk of overtrading on either side of the market. Even without being a leader in the market a careful finance manager can operate effectively at zero NWC, if he could pursue a policy of one month's credit on sales and three months' credit on purchases. This policy will enable him to build up a reasonable level of current assets without resorting to any other source of finance. The following example will make it clear.

Suppose a firm buys uniformly at Rs 1,000 per month on three months' credit and sells uniformly at Rs 1,000 per month at one month's credit. If the policy of the company is to maintain one month's inventory, the following (Table 8.2) will be the current account balance sheet of the firm after three months (ignoring profit).

Table 8.2
Current Account Balance Sheet

Liabilities	*Rs*	*Assets*	*Rs*
Creditors	3000	Inventory	1000
		Debtors	1000
		Cash	1000
	3000		3000

The policy which has given rise to such a balance sheet is neither unusual nor unreasonable. The most important requirement of such a policy is maintenance of high credit worthiness with suppliers and strict collection from and follow up with buyers.

It can be seen from this current account balance sheet that the firm has built up an inventory of one month's consumption and cash of one month's cost of sales. Now, even if the debtors' realisation is lengthened due to some unforeseen circumstances, the firm can first fall back on its inventory and then on its cash to maintain continuity of sales, and still pay its creditors without resorting to NWC or other sources of finance, provided the defaulting debtors pay up within the next two months.

Debtors turnover ratio and creditors turnover ratio of this firm being 12 and 4 respectively, the market command ratio becomes 3, which enables the firm to operate on a zero NWC. A market command ratio of 3 can, therefore, be regarded as a reasonable target for an effective finance manager. A ratio of 5 will make him a monopoly seller and a monopsonic buyer.

Case of UEL: Market command ratio of UEL is not only low, it is also moving downwards. Such a situation suggests that the company is getting affected on both sides of the market.

WORKING CAPITAL PERFORMANCE RATIO

The derivation and movement of this ratio in UEL are as follows:

	X0	*X1*	*X2*	*X3*
Trade debtors	17187	19864	25979	29933
Trade creditors + advance payment from customers	16854	20110	23662	24132
Ratio	1.02	0.99	1.10	1.24
Trend:		*Upward*		

Nature of the Ratio: This ratio indicates the mode of financing of debtors. It is used more to control working capital of the product or functional division of an enterprise. The division may be asked to self finance its current operations, meaning thereby that the ratio should be at least 1. However, it has to be seen that there is a judicious mix of the two sources of financing. Normally, corporate management would prefer advance payments over supply creditors for divisional financing and hence, might set a maximum limit for supply creditors. For example, it may direct that not more than 60 per cent of total debtors' financing should be by way of supply creditors, and set the targeted working capital performance ratio of divisions accordingly.

At the corporate level also similar restrictions on supply creditors' financing can be imposed while fixing up targets for the working capital performance ratio.

CASH TURNOVER RATIO

The derivation and movement of this ratio have been calculated for UEL as follows:

(*Rupees lakh*)

	X0	*XI*	*X2*	*X3*
Cash operating expenses	41593	50767	60391	65185
Cash and bank balances	2	7	32	78
Ratio	20780 (<1 day)	7252 (<1 day)	1887 (<1 day)	836 (<1 day)

Cash operating expenses for UEL are also calculated which will be used for calculating other ratios later:

(*Rupees lakh*)

	X0	*X1*	*X2*	*X3*
Total manufacturing expenses	24957	29067	36213	40706
Purchase of finished goods	11237	15046	16097	15183
Selling, distribution and administrative expenses	6139	7697	9268	10479
	42333	51810	61578	66368
Less: Depreciation	718	943	997	1013
	41615	50867	60581	65355
Less: Miscellaneous expenditure written off	22	100	190	170
Cash Operating Expenses	41593	50767	60391	65185

Nature of the Ratio: Broadly speaking, holding of cash in the till or in current accounts of banks is necessitated to insure against the sudden lengthening of the productive-distributive chain of a business, so that continuity of production is not disturbed. In fact, this is cash stock like any other stock waiting to be converted into operating expenses in the event of a bottleneck in production or delay/default by debtors. Similarly, as with other current assets, carrying of this cash stock costs the enterprise, both in terms of blockage of valuable funds and interest thereon. Hence, the objective of any business is to hold a minimum level of cash stock: it is cash flow which generates profit for the business; cash stocks eat into that profit.

Case of UEL: UEL holds less than one day's cash operating expenses in cash stock, which is much below the international minimum. *This should not* surprise us. In India, the cash credit system of working capital financing has taken away many of the problems of cash management, as are being faced by major European and American enterprises, where the loan system of working capital financing is prevalent. In these countries, short period excess cash cannot be made use of in temporarily bringing down working capital loans. Hence, firms have to find avenues for short term investments of such excess funds. This is one of the reasons why the short-term money market is so well developed there. In India, however, one of the most profitable avenues for short term investment of excess cash is the cash credit account itself. Any excess cash not required now may be deposited in the cash credit account which will reduce its balance and save (earn) interest on that amount for the period for which this cash is not needed. Later, when the need arises, the money can be withdrawn by simply writing a cheque. Hence, in India, enterprises enjoying the cash credit facility from banks do not need to hold any cash balance except for petty expenses. In any case, cash balances should never exceed more than a day's cash operating expenses. UEL's performance in this respect is still good but what makes us anxious is that it is showing a worsening trend, as the falling cash turnover ratio suggests.

OVERTRADING RATIO

The derivation and movement of this ratio for UEL have been calculated as follows:

	X0	*X1*	*X2*	*X3*
Net working capital	5382	9475	9362	12773
Credit sales	51521	62361	72877	78710
Ratio (%)	10.45	15.19	11.85	16.23
Trend:		*Upward*		

Sales are inclusive of scrap sales and excise duty. In the absence of a complete break up, we have assumed all sales are on credit (which is usually the case with UEL).

When a Firm Overtrades: Earlier we had mentioned that a firm having a market command ratio of 3 and above can operate on zero or even negative NWC, under conditions of a tight credit and collection policy. Many firms do not enjoy such a command in both sales and supply markets. At present, UEL is one of them. For this type of firm, NWC becomes the determining variable for expansion of sales (credit).

Increased sales may also mean insolvency. The upward limit to sales is determined not by competition but by liabilities incurred and the consequent encroachment on NWC when they fall due for payment (Parkinson, 1951). Unfortunately, this important point is often missed in the race for expansion. An elaborate discussion on this issue has been made in Chapter 6.

Firms overtrade with undue credit expansion forgetting the consequent costs and jeopardy to solvency. Worse is the situation when this credit expansion is done by dilution of credit standards (which usually is the case). When this happens, with the deterioration in the quality of expanded debtors, supply creditors also increase to support additional inventories; and now, if any large order is cancelled, debtors default or delay in payment, or any bottleneck develops in manufacturing, then the firm may face a tremendous liquidity crisis when creditors fall due for payment. This crisis can be stalled only if the firm has sufficient NWC to fall back on. One of the major sources of NWC is retained profit. Expansion in sales (credit) must therefore be supported by increased level of savings. Firms on the path of expansion should not only have a sufficient level of NWC to start with but must follow a consistent policy of expanding that NWC at the same time.

The overtrading ratio relates sales expansion with the NWC base. It indicates the extent of overtrading done by a firm.

It is difficult to determine the ideal overtrading ratio because of variations in trade practices, but a range can be provided. A firm may be said to be overtrading dangerously if the ratio is 5 per cent or below. At 10 per cent it is highly risk prone. The firm gains a comfortable position as the ratio moves from 10 to 20 per cent.

If the ratio is beyond 20 per cent, the firm may be doing undertrading instead of overtrading, i.e., economic use of capital is not being made. In a sense this is under utilisation of the sales generation ‘capacity of capital’. The result is a fall in RoI and return on shareholders’ fund.

Case of UEL: For UEL, the overtrading ratio shows an upward trend. This signifies the fact that it is following a policy of NWC expansion with rise in sales, except in the year X2 when the ratio fell by 8.43 per cent (with an absolute fall in NWC level as compared to X1), while the sales expanded by 16.80 per cent. This created real liquidity problems in the company, which might have forced them to go in for expanding their capital base, and hence the NWC, by a rights issue in X3.

CREDIT STRENGTH RATIO

This may also be called short term debt equity ratio. Derivation and movement of this ratio for UEL are as follows:

	X0	*X1*	*X2*	*X3*
Current liabilities (operating)	23007	23330	32968	36220
Net worth	8344	11225	11706	17269
Ratio	2.76	2.08	2.82	2.10
Trend:	*Downward (erratic)*			

Nature of the Ratio: From the financial point of view net worth provides credit strength to the business, as the lender (creditors) will invariably examine the net worth of an enterprise to assess the ultimate risk of making loans. Financial institutions have developed standards of debt equity ratio for long term lending, which we shall discuss later. Current liability holders have similar claims on net worth and since most of them are unsecured lenders (suppliers), except the Banks who hold charge on current assets, net worth becomes more important to them for assessing the risk of default. This is because, being unsecured creditors, they may ultimately have to fall back on the net worth in case of non-payment. This is the reason why net worth is calculated at its tangible value, including revaluation reserve.[1]

A lender's prudence should also be the financial prudence of the business to keep a check on itself against the risk of 'overtrading' on the supply side of the market. The allure to enjoy 'free' or easy credit is tremendous and because of this temptation there should be a self imposed discipline against undue expansion of current liabilities. One should remember that it is the unsecured creditors who, because of their vulnerability, send more

[1] For calculation of net worth see debt equity ratio under Section III of this chapter.

nervous signals to the market and damage the goodwill of the business faster than secured lenders.

The financial discipline mentioned above should be imposed as a policy decision. For example, current liabilities must not increase beyond a certain multiple of tangible net worth. Operational control of this policy decision is done through the credit strength ratio.

Case of UEL: Although we are not aware of the existence of any such policy decision in UEL, some insights into its handling of current liabilities can be made. The general trend of the credit strength ratio in UEL is downward, though erratic. On an average, current liabilities are more than twice that of net worth. Considering the fact that the current assets of UEL are much higher than fixed assets, which will necessarily demand more current liability financing, a credit strength ratio between 1.75 and 2.0 provides a reasonable cover and control against undue expansion of short term credit, without making the firm too conservative. A ratio higher than this, which is the case in UEL, indicates a higher than desirable dependence on current liabilities, which may turn out to be dangerous if the company does not have enough asset margins to fall back on, as we shall see later.

DIVERSION RATIO

The derivation and movement of this ratio for UEL are as follows:

	X0	*X1*	*X2*	*X3*
Net working capital	5382	9475	9362	12773
Working capital gap	10912	11946	17647	24150
Ratio (%)	49.32	79.32	53.05	52.89
Trend:		*Somewhat downward*		

The working capital gap is calculated according to the Tandon Committee Report (Reserve Rank of India, 1975), i.e., gross operating current assets minus operating current liabilities before bank finance for working capital.

Nature of the Ratio: A falling trend of this ratio suggests that either the current fund is being spent to finance losses or it is being increasingly used to finance long term assets of the firm. Whatever may be the cause, it is nothing but diversion of the current fund.

Financial prudence dictates that the current fund should not be utilised to build up long term assets, unless the firm has a high market command ratio (even then, the Reserve Bank of India would not allow any such diversion). This is because in such a case the cushion available between current assets and current liabilities is lost. In case of any mismatch between the maturity payment of creditors and current assets' realisation, the firm will have no other alternative but to sell out its fixed assets. This course of action not only takes time but is fraught with the risk of endangering the goodwill of the firm and eroding its operating strength.

When the diversion ratio is falling, the stake of the firm in financing its current operation is on the wane. If the declining trend is not arrested in time, then it is likely that the firm will soon become the baby of the lending banker. At that stage, the banker will have no other option but to carry this unwanted baby at an increasing cost of maintenance or to kill it at a total loss to himself. This is the reason why this ratio is now being regarded more as a banker's ratio than a business ratio.

Case of UEL: In UEL, though the trend of this ratio is somewhat downward, the stake of the company in financing its current operations is very high—at around 50 per cent of the working capital gap. This may make the bankers happy but not the trade creditors, because their turnover ratio is low, as we have seen earlier. In fact, a large volume of trade creditors contributed to the lowering of the working capital gap.

CURRENT RATIO

This ratio for UEL is calculated both before and after bank finance for working capital. Both current assets and current liabilities are operating in nature.

		X0	*X1*	*X2*	*X3*
a)	Current assets	28389	32805	42330	48993
	Current liabilities (before bank finance)	17477	20859	24683	24843
	Ratio	1.62	1.57	1.71	1.97
	Trend:	*Upward*			

(Continued)

(Continued)

		X0	*X1*	*X2*	*X3*
b)	Current assets	28389	32805	42330	48993
	Current liabilities	23007	23330	32968	36220
	Ratio	1.23	1.41	1.28	1.35
	Trend:		*Somewhat upward*		

Historical Status of the Ratio: As mentioned in Chapter 1, current ratio is one of the oldest financial ratios which enjoyed a more significant and long lasting impact upon financial statement analysis than any other ratio (Horrigan, 1968). Roy A. Foulke (1961) noted its origin to be in 1891 and found it to have been used primarily by lenders. In fact, till today, at least in India, current ratio is central to the appraisal system of banks. Every 'slip back' in current ratio is viewed with disapproval by bankers. They justify this stand by claiming that they are more concerned about the short term liquidity of the borrower, because their own lending is short term in nature. A major source of liquidity is believed to be current assets, and of these, cash and marketable securities come first; followed by debtors and inventories; the last being the slowest in realisation. With the first two current assets, a quick ratio has also been developed, with current liabilities as the denominator, to assure a banker about the quick realisation potential of his loan. Historical standards of a minimum current ratio of 2 and a minimum quick ratio of 1 are still regarded by bankers as safe and comfortable. Although the Tandon Committee (Reserve Bank of India, 1975) at one time diluted the standard of current ratio to 1.17, it made it very clear at the same time, that over a period of time, the ratio has to be pulled up first to 1.33 and then to 1.79.

The Tandon Committee was followed by the Chore Committee (Reserve Bank of India, 1979) to carry forward the new discipline of credit appraisal and management propounded by the former. However, recommendations are beset with contradictions. On the one hand they advocated a departure from security oriented lending in favour of need based and purpose oriented lending, declaring that the real security of borrowed funds is not the collateral but the efficient running of the business, but on the other hand, they insisted that the current ratio of the firm should be improved. The Reserve Bank of India added a further rider by disallowing any 'slip back' of existing higher current ratio to the minimum prescribed by the Committee.

Modern Trends: We have seen earlier that modern day financial management regards current assets as 'necessary evils', because the very existence of current assets contributes only negatively to the profitability of a business. Other things remaining the same, the efficiency of a business is found to be inversely related to the level of current assets. Hence, the modern approach of working capital management is to reduce current assets.

We have also seen, by way of an example, that a firm having some command on both sides of the market can function with considerable efficiency if its market command ratio is 3 and the resultant current ratio is 1. Negative contribution to profitability is at its minimum here, as apart from the carrying and management costs of inventory and debtors the firm suffers no other costs. Hence, efficient firms tend to move towards lower current ratios.

Real Meaning of Liquidity: Let us now examine the liquidity aspect of current ratios. For long we have been led to believe that current assets provide the greatest liquidity to a business and the criterion to determine the liquidity of an asset is its easy convertibility into cash. By this criterion, inventories are the least liquid of all current assets. In reality, however, current assets do not provide liquidity; rather they block liquidity. A business would have higher liquidity if it had no current assets and had only cash flows. The paradox is like this—after blocking liquidity (cash flow) into various current assets, a business then tries to find out which among the assets provides quick liquidity (cash flow)!

Now, let us probe the real meaning of liquidity in the context of modern day business management. Generally speaking, liquidity is meant to ensure the smooth operation of all business functions. Different functional managers view liquidity from the specific angle of their operations; the purpose of liquidity being the removal of bottlenecks in their respective fields of operation. These bottlenecks are also functionally oriented, namely, production bottlenecks, marketing bottlenecks, and financial bottlenecks. The manufacturing manager on the shop floor and the marketing managers at various distribution points do not have much use for cash or for that matter any other current assets, except inventories, to maintain continuity of their respective operations. A firm may have plenty of cash in its till or in the bank, but if there is a shortage of materials in the market then any amount of cash stock will not be able to provide liquidity to the manufacturing manager. The line of production will stop for want of materials and consequently the line of distribution will also come to a halt for want of finished goods from the manufacturing function. The firm as a whole will now suffer from a dearth of liquidity, which incidentally, is not the absence of cash but of inventories.

Thus, the focus of liquidity management being maintenance of a smooth flow of inventories, a finance manager faces a financial bottleneck when he does not have money to acquire inventories, because a major part of sales is either blocked in debtors or their realisation is unmatched with the payment pattern of suppliers. There may be large quantities of materials available in the market but if the firm does not have any cash to buy them, then in the ultimate analysis, the problem has to be resolved by the proper structuring of the liquidity of the business.

We saw from the current account balance sheet of a hypothetical firm, while discussing market command ratio, that even though the current ratio is 1, the arrangement of the current assets has been made such that even if debtors do not pay in time, the demand of the matured creditors can be met by liquidating the cash in hand. The continuity of production and distribution can also be maintained, at least for a month, by putting the inventories to immediate use. It is thus the arrangement of current assets which is important, not the volume of current assets or for that matter, the size of the current ratio.

Quality of Current Assets: Now comes the question of the quality of current assets. A firm may have a 'good' current ratio, as large as 2, but the current assets may be composed of dead or slow moving inventories and de facto bad debts, which the firm is unable to write off, may be, for fear of showing a reduced profit. We have indicated earlier that continuance of such a state of affairs means increasing cash outflows not warranted by the actual performance of the business. While the financial strength of the business is really weakening, a high current ratio is giving a false perception of liquidity.

Is a Low Current Ratio Always Good?: A low current ratio may not always reflect the efficiency of financial management. If there is not much of a difference between the velocities of current assets and current liabilities, or if the difference is negative, the current ratio will generally be low. UEL is a case in point. The velocity of total operating current assets on gross sales of UEL in X3 is 1.60 and that of total operating current liabilities on cost of goods sold is 1.52. This small difference in velocity has given rise to a rather small current ratio of 1.35 in X3 (after bank finance). This does not speak of good financial management of the business (though, it satisfies the minimum current ratio criterion of 1.33 under the second method of lending recommended by the Tandon and Chore Committees). For every Rs 100 lakh gross sales made by UEL, as much as Rs 60 lakh gets blocked in current assets, releasing only Rs 40 lakh to the system to pay for current operations. This is a considerable cut by any standard, which compels the enterprise to delay/default in payment of creditors, as we have shown while discussing the creditors' turnover ratio of UEL. A high (or positive) velocity difference between current assets and current liabilities, means better working capital management, subject of course to optimization of risk involved in creditors' financing.

Current Ratio under Cash Credit System of Financing: Under the cash credit system of working capital financing by banks in India, the de facto nature of this loan turns out to be more permanent than long term loans. As long as the firm is a going concern, question of repayment of cash credit would not normally arise. Since the firm does not suffer from current repayment obligations under this system, some writers suggest that cash credit should be removed from the list of current liabilities and be bracketed under long term liabilities. In fact, though bankers have not yet agreed to treat cash credit as such, many companies have removed this from under the head of current liabilities and, by placing it under the head secured loans, ignore it for calculation of net current assets (or NWC). Under such treatment, calculation of current ratio would also be different. We have, therefore, calculated two current ratios for UEL: one excluding bank finance and the other including it. The first is the ratio for the business and the second is the ratio for the banker.

The business current ratio of UEL shows a definite upward trend and is reaching the 'ideal' standard of 2 quickly. It can be seen that the level of current assets is rising faster than that of current liabilities (trade)—the latter remained almost stationary in the last two years. We have already explained that in the matter of current assets' management the company is not doing well. The almost stationary state of trade current liabilities would, therefore, call for an increasing level of bank finance and NWC to fully fund the current assets, as is evidenced by a smaller banker's current ratio. There may be two reasons for the almost constant level of trade current liabilities. First, the company might have taken a deliberate policy decision to gradually increase the turnover of trade creditors by making payments faster in order to bring them down to a manageable level. This, however, is not the case, as the high but almost constant creditors turnover ratio of UEL suggests. The second reason may be that the company might have controlled its purchases and, by simultaneously following the same payment policy, has reduced the level of creditors. The latter is likely to be the case with UEL.

GUARANTEE COVER RATIO

The derivation and movement of this ratio for UEL have been calculated as follows:

	X0	*X1*	*X2*	*X3*
Gross sales	51521	62361	72877	78710
Bank guarantees outstanding	9624	9664	11739	14170
Ratio	5.35	6.45	6.21	5.55
Trend:		*Flat*		

The figure for bank guarantees outstanding, which should include letters of credits also, is available from the notes annexed to the annual report under the head contingent liabilities.

Nature of the Ratio: An enterprise obtains guarantees and letters of credit from banks for various purposes: supply of materials, performance contract, tenders and bids, delivery of materials from a bonded warehouse or from excise and customs authorities, etc. Of these, materials supply is the most dominant. This is an off balance sheet item, both for the enterprise and for banks, because there is no receipt or layout of funds from either side, though banks often demand margin money and/or collaterals against guarantees issued by them. Liability of the guarantee continues till it is fulfilled. In case of default, the bank issuing the guarantee pays up the liability and recovers the amount from the firm. The guaranteed liability is real, like any other liability, though it is contingent on the happening of certain specified events.

As guarantees are available at a very low cost (though the real cost of enjoying that guarantee is the same as in the case of funded liability), many firms have a tendency to overstretch the limit. It may be pointed out that failure to pay up guaranteed liability is worse than non-payment of funded liability, because in the former case goodwill of the firm is affected, both to the guarantee holder (e.g. supplier) and also to the banker who issues the guarantee. In the ultimate analysis, as it is sales revenue which must support any contractual operating obligation, both the firm and the banker should see that guaranteed liabilities have enough coverage of sales revenue. The guarantee cover ratio indicates the extent of this coverage.

Case of UEL: The trend of this ratio in UEL is flat. On an average, sales revenue covers outstanding guarantees by six times, i.e., 60 days of sales cover outstanding guarantees in the event of the firm's failure to perform the guarantee. It is difficult to lay down a general standard of guarantee coverage because one has to take into consideration the other repayment obligations of the enterprise, the 'cash component' of its sales revenue, and the level of supply creditors. Considering the fact that on all these aspects the performance of UEL is not good, the guarantee cover ratio appears to be on the low side, meaning thereby, that in the event of a first failure it will be difficult for the company to save itself from the second failure.

CONTINGENCY RATIO

The derivation and movement of the ratio for UEL are as follows:

	X0	*X1*	*X2*	*X3*
Profit before taxes	1980	2152	1727	1530
Disputed statutory liabilities	67	246	218	527
Ratio	29.55	8.75	7.92	2.90
Trend:		*Downward*		

Nature of the Ratio: Disputed statutory liabilities include liabilities to various revenue authorities like excise, customs, sales tax; and other statutory authorities like the Provident Fund Commissioner, and Environmental Protection Agencies. When any of these liabilities, as assessed by various authorities, is contested by the assessee and not provided for in the books of accounts, it is shown under the head contingent liabilities annexed as notes to the annual report. The fact that no provision for these liabilities has been made indicates the belief of the management that there is a very good chance that the company will win these cases. This may not always be true. It has been found that many companies deliberately put a sizable part of statutory liabilities, particularly excise duties, on dispute in order to take advantage of long drawn legal procedures. This perhaps may be the reason why the Reserve Bank of India, for a long time, treated disputed excise and certain other tax liabilities as part of current liabilities for purposes of calculating Permissible Bank Finance. Only in recent times has the Reserve Bank of India withdrawn this stipulation considering the higher credit need of the industrial sector.

Whatever may be the reason for putting disputed statutory liabilities under the contingent liabilities head, the accounting principle of conservativism suggests that probable expenses be provided for as much as possible to protect a firm from eating out of its capital. If the firm still feels (and for justifiable reasons) that some of these disputed liabilities need not be provided for, it should see, at least, that these are sufficiently covered by the profit before taxes, against which these liabilities would have a claim in the event of the firm losing the legal battle.

Case of UEL: For UEL this coverage was highest in X0—the contingency ratio being nearly 30. It soon started declining quickly and, at the end of X3, the coverage was just about 3 times, i.e., the disputed statutory liabilities constituted nearly one-third of PBT—and that's a high proportion! In view of the fact that excise and other tax laws are becoming simpler with the passage of every Finance Bill, there is apparently no reason why disputed liabilities should increase more than proportionately with rise in sales or in profit. In UEL, however, this is exactly what has happened. It may be that the company, on the face of shortage of profit and a severe cash crunch, found an easy way out in withholding payment of some of these liabilities by making them disputed. More often than not, a sharply falling trend in the contingency ratio suggests tightening of the cash position of a firm.

Chapter 9

Ratios for Debt Service Management

Take care to be an economist in prosperity
There is no fear of your being one in adversity.

— Zimmermann

INTRODUCTION

The ability of an enterprise to generate profit is not always synonymous with its debt service capacity. It has often been found that companies are unable to service their debts in spite of making a large amount of profit. This problem has been analysed elaborately in Chapter 6. This section is, in fact, the foundation for Chapter 6. Here, we have first discussed conventional ratios for evaluating the debt service capacity of an enterprise and then brought out their deficiencies as real measures for debt service management. Finally, an alternative ratio is presented which can take care of the shortcomings of conventional ratios.

INTEREST COVERAGE RATIO

The derivation and movement of this ratio for UEL are as follows:

	X0	*X1*	*X2*	*X3*
Profit before interest and taxes (PBIT)	4237	5421	6235	6623
Interest	2257	3269	4508	5093
Ratio	1.88	1.66	1.38	1.30
Trend:		*Downward*		

This ratio is just the reciprocal of interest incidence ratio discussed later except that instead of operating profit the ratio is based on PBIT to include any non-operating income (as in the case of UEL) for the earning of which funds had been laid (e.g., investments) and hence, interest paid thereon.

Nature of the Ratio: The ratio is considered to be predominantly a lenders' ratio, which is used most extensively by bond rating agencies all over the world. While individual bond holders (lenders) may calculate their own ratio, from the company's point of view, the overall coverage ratio stresses the company's ability to meet all its interest obligations. In Western countries coverage is calculated for fixed interest obligations. In India, theoretically cash credit is treated as short term finance but in reality it is more or less a permanent arrangement, where interest is payable quarterly. Hence, when calculating the ratio, annual interest obligations should include cash credit interest also.

The interest coverage ratio indicates the margin of safety between interest obligations and net income of the enterprise. In developed countries, it is widely held that the ratio should be between 5 and 7. Such a high coverage is possible there because of low debt equity ratio. In developing economies like India, where debt equity ratio is generally high, a lower coverage is nothing but expected. Generally, for a manufacturing firm in India, a coverage of 3 is a reasonable standard. A ratio higher than this may imply a risk averse management who, in spite of making a good profit, prefers to keep the debt equity ratio at a low level. It may also be that the company is using more 'free' market credit than interest bearing loans. In that case the long term debt equity ratio may be low but the total debt equity ratio will be high. On the contrary, a very low interest coverage ratio, say below 2, may indicate a risk prone management with a highly geared capital structure or it may simply be that the loan funds are not paying their way.

Case of UEL: Interest coverage ratio in UEL exhibits a dismal picture, both in terms of value and movement, over the last four years. The ratio has come down to a mere 1.30 in X3, which may make any lender nervous. The present level of operating profit does not justify loading of the capital structure with debt capital to such a large extent.

DEBT SERVICE COVERAGE RATIO

The derivation and movement of this ratio for UEL have been calculated.

	X0	*X1*	*X2*	*X3*
Profit before interest, taxes and depreciation (PBITD)	4955	6364	7232	7636
Interest + annual repayment obligations × [1/(1 – t)]	3105	5431	7166	7267
Ratio	1.60	1.17	1.01	1.05
Trend:		*Downward*		

Note: ‘t’ is the rate of income tax.

Components of the Ratio: As debt service obligations are payable in cash, depreciation being a non-cash expenditure is written back. Similar will be the case regarding any write-off of amortised expenditure. For UEL we have ignored the writing-off of miscellaneous expenditure because, in fact, there has been a net addition to these amortised costs.

The income tax rate for UEL is assumed to be 50 per cent. As principal payments are made after taxes, it is necessary to adjust this figure by the factor [1/(1 – t)]. For UEL, the adjustment factor will be 1/0.50, i.e., the annual repayment obligations will be divided by 0.50 so that they correspond to interest payments, which are made before paying taxes.

The annual repayment obligations of UEL, as available from supplementary information attached to the annual report, have been calculated.

(*Rupees lakh*)

	X0	*X1*	*X2*	*X3*
Repayment of:				
Term loans	125	780	800	800
Fixed Deposits	175	175	175	175
Deferred payment credits	124	126	136	112
Debentures	–	–	218	–
Sub Total	424	1081	1329	1087
Dividing by 0.50	848	2162	2658	2174
Interest obligations	2257	3269	4508	5093
Total	3105	5431	7166	7267

While interest coverage ratio takes into account only one component of debt service, namely financing charges, the debt service coverage ratio stresses the ability of a firm to honour the whole range of debt services, namely interest and principal repayments. While calculating annual repayment obligations, it is desirable to include lease payments and also fixed dividends payable on preference shares, but to exclude all non-recurring outflows like bridge loans.

Standard and Nature of the Ratio: The widely used minimum standard for debt service coverage ratio is 1.5. If the ratio is above 1 and below 1.5, but the firm is still operationally viable, then by suitable spacing of the repayment period of term debts it is possible to save the company from a perennial cash strain. If, however, the ratio is close to 1 or less that that, then the firm may just be surviving on balance. A financial erosion is in sight. A declining trend in the ratio may indicate an overly ambitious expansion plan, not justified by the operating strength of the business. A persistently low and falling ratio is an obvious indication that the firm is at pains to meet the heavy debt service obligations without contracting further loans and thus walking into a debt trap. As a fall out of this, the firm will begin to rely heavily on trade creditors. Soon there will be default on this score also. Unless, the capital structure of the business is reorganised drastically, and the repayment terms of loans rescheduled, the only logical next step would be to wind up the firm.

Case of UEL: The debt service coverage ratio of UEL is as bad as its interest coverage ratio. In X0 it was 1.60, just above the minimum standard. The company was unable to hold on to even this minimum level. The fall in the value of the ratio has been very sharp during the following years, and in X3 it was just about 1. There is no doubt that the company is facing a severe financial strain to meet its debt obligations. It will soon start defaulting payments, if it is not doing so already. As mentioned before, the capital structure of the company is highly overloaded with debts not warranted by its operating income, though the operating function itself cannot be blamed. The problem is more structural than operational. UEL is suffering from a mismatch between its operating structure and financial structure. It may be argued that the capital investment made by the company in X1 is yet to be exploited fully and three years may not be sufficient time for that. Ordinarily, this kind of argument would have some merit but how far this is true for UEL is questionable. We have already seen that the fixed assets turnover ratio of UEL is showing a definite upward trend since X1, indicating increased utilization of fixed assets. This gain has been lost on the working capital side of the business, as reflected in the downward movement of the total assets turnover ratio. This is explained more fully by the fact while net sales of UEL increased by 29.97 per cent between X1 and X3, operating current assets of the company increased by 49.35 per cent during the same period. The case is, therefore, not so much of under exploitation of the productive potential of fixed assets but of a highly unbalanced working capital structure of the business. The funding imperatives of a more than proportionate increase in current assets severely disturbed the equilibrium of the financial structure. The intra-structural adjustments that followed pushed up the average cost of capital and reduced the value of coverage ratios to a dangerous level.

PRIORITY OBLIGATIONS RATIO

The derivation and movement of this ratio for UEL are as follows:

	X1	*X2*	*X3*
Net cash flows	4416	1272	285
Priority outflows	4350	5837	6180
Ratio	1.02	0.22	0.05
Trend:		*Downward*	

Debt Service Coverage Ratio vs Priority Obligations Ratio: Debt service coverage ratio discussed before gives a fair indication of the ability of the enterprise to service its debts, but it does not tell the entire story. The numerator of the debt service ratio, which is the conventional cash flow estimate (PBIDT) of an enterprise, does not include working capital items. It is possible that a part of the PBIDT may be blocked in current assets, reducing the cash content of the profit. Since expenses and other cash obligations are to be paid in cash only, a good PBIDT or for that matter a good debt service ratio may not always enable a firm to disburse all its cash payments. This important point is often missed in the spree of expansion. Many firms have become 'sick' as they expanded with remarkable growth in sales and profit, because all the profits that they made did not contain all the cash that they needed. We shall deal with this problem of growth separately in Chapter 6. The priority obligations ratio, as discussed here, may be treated as an introduction to the broader analysis of the problem of growth oriented companies proposed in Chapter 6.

Net cash flows (NCF) is defined as the difference between cash inflows (net of incremental debtors) and cash outflows (gross of incremental inventories but net of incremental creditors). Priority outflows is defined to include all cash obligations with a debt service character like interests, principal repayments, lease rentals, and preference dividends, the non-payment of which may make a firm liable for a winding up petition (Table 9.1).

Nature of the Ratio: Priority obligations ratio should at least be 1.50 to provide a reasonable cushion against sudden lengthening of the working capital cycle. Bond holders, institutional lenders, bankers, and other obligatees may calculate their own coverage after making adjustments for other claims. This is an excellent and much superior ratio then debt service coverage ratio for corporate bond ratings. From the company's point of view, the profitability criterion of any expansion proposal must be tempered with the 'cashability' of operations. Profit is often a matter of opinion; it can be 'manufactured' also but cash is the real thing, both when it is In and when it is Out.

Profit creates an immediate obligation to pay taxes and dividends—and these have to be paid in cash. Companies are often found to approach banks for ad hoc limits to pay for these expenditures. These additional loans create a disequilibrium in the capital structure of the business. Initially, this cash shortage is thought to be of a 'purely temporary nature' which can be overcome in a few days, but more often than not this does not happen because of the rigidity of the working capital structure of the business. Historically, the decision to pay dividends has always been based upon the amount of profit that a firm makes but payment of dividends can be made only if there is a positive cash flow. The problem is that while NCF can never be greater than PBIDT, it can be less, which is what makes it difficult for a company to pay taxes and dividends and other obligations.

Table 9.1
Net Cash Flow Statement of UEL

(*Rupees lakh*)

	X1	*X2*	*X3*
Gross sales	61658	72091	78004
Scrap sales	703	786	706
	62361	72877	78710
Less: Increase in debtors (excluding bills purchased and discounted)	3187	5146	3439
A. Operating Cash Inflows	59174	67731	75271
Cash manufacturing expenses (excluding depreciation)	28298	35421	39993
Purchase of finished goods	15046	16097	15183
Excise duties	6551	8297	8032
Cash selling, distribution and administration expenses (excluding depreciation and amortised miscellaneous expenditure written off)	7423	8873	10009
Income Tax	50	700	475
	57368	69388	73692
Add: Increase in materials inventory (Including stores and spares)	688	767	85
Add: Increase in loans and advances	598	534	1806
	58654	70689	75583
Less: Increase in creditors (Trade creditors + expenses creditors + advance payments)	3344	3672	220
	55310	67017	75363
Less: Opening cash and bank balances	2	7	32
B. Operating Cash Outflows	55308	67010	75331
C. Net Operating Cash Flows (A – B)	3866	721	(60)
Other Incomes	780	817	1303
Less: Increase in investments	213	100	1133
	567	717	170
Less: Increase in fixed deposits with Banks	27	166	(175)
D. Non-Operating Cash Flows	540	551	345
E. Net Cash Flows (C + D)	4406	1272	285
Interest Expenses	3269	4508	5093
Repayment Obligations	1081	1329	1087
F. Priority Outflows	4350	5837	6180

Financial prudence demands that priority flows, such as payment of interest, lease rentals, and repayment of term loans, should be made only from operating surpluses, otherwise the firm will enter into a debt trap. However, even when a firm has sufficient operating surplus, it may be forced to contract further debts if its NCF is not sufficient to meet its priority obligations. Loans are then contracted, not to produce and make profit, but to repay loans. The matter will be clear if we compare the profit criterion and cash criterion of judging the debt service capacity of UEL.

(*Rupees lakh*)

	X1	*X2*	*X3*
Profit Before Interest, Depreciation and Taxes (PBIDT)	6364	7232	7636
Net Cash Flow (NCF)	4406	1272	285
Debt-Service Coverage Ratio	1.17	1.01	1.05
Priority Obligations Ratio	1.02	0.22	0.05

Case of UEL: It may be seen that the NCF of UEL for all the three years is much below the PBIDT. Cash content of PBIDT was only 17.59 per cent and 3.73 per cent in X2 and X3 respectively. The movement of the debt service ratio indicates that the company was somehow able to meet its debt service obligations but the priority obligations ratio indicates that, except in X1, the company just did not have any money to service its debts. The situation would have been much worse if we had ignored the non-operating inflows. Net Operating Cash Flow (NOCF) came down substantially in X2 and reached a negative figure in X3.

UEL must already be defaulting on payments. The company may either have to reschedule the repayment terms of its debts or contract further loans to pay the instalments. The low cash content (NCF) of PBITD brings to focus sharply the immediate need of restructuring the working capital of the company. Unless this is done, the company may just be postponing a bankruptcy petition.

ASSET MARGIN RATIO

The derivation and movement of this ratio for UEL are calculated both before and after revaluation of fixed assets.

		X0	*X1*	*X2*	*X3*
a)	(Debt capacity of fixed assets) – (Term loans + debentures)	785	–1648	–1058	330
	Debt Capacity of fixed assets (excluding revaluation)	4488	6730	7156	8342
	Ratio (%)	17.49	–24.49	–14.66	3.96
	Trend:		*Downward*		
b)	(Debt capacity of fixed assets) + (Term loans – debentures)	2871	392	937	2284
	Debt capacity of fixed assets (including revaluation)	6574	8770	9151	10296
	Ratio (%)	43.67	4.47	10.24	22.18
	Trend:		*Downward*		

Definition: Debt capacity of fixed assets is defined as the ability of fixed assets to raise loans through mortgage. Term lenders, including trustees for debenture holders, keep a margin on fixed assets while granting loans. At the minimum level this margin is 25 per cent. Hence, against an asset worth Rs 100 an enterprise can expect to get a loan of Rs 75. This is what is called the debt capacity of assets. For UEL, debt capacity of fixed assets (including capital work-in-progress) has been taken as 75 per cent of the book value. Term loans include deferred payment credits and debentures exclude convertibility of Rs 3,192 lakh (refer Table 3.3, note 3).

Case of UEL: Financial institutions are not generally willing to consider revalued assets when deciding the margin, because revaluation is a matter of the subjective opinion of the valuer. However, exceptions are made in the case of certain kinds of assets like land and buildings. Here too lenders demand a much higher margin than the prescribed minimum. In India, one of the main purposes behind revaluation of fixed assets is to raise additional loans, which is not otherwise available against the book value of the assets. UEL might have revalued its landed properties with this objective in view, as its asset margin ratio, without considering revaluation, became negative in X1 (when it raised term debts) and continued to be so till X3 (when it showed a marginal positive figure). Even the ratio calculated on revalued assets indicates that the company does not have much debt capacity left in its fixed assets to raise further loans.

Nature of the Ratio: While discussing the overtrading ratio and credit strength ratio we had indicated the relevance of asset margin ratio in providing a cushion, which becomes so important to an enterprise when it goes in for credit expansion, both in the output market and input market. If any of the two markets turns adverse or there happens to be a mismatch of creditors' maturity with debtors' realisation, then a good asset margin ratio enables the firm to withstand the shock by raising mortgage loans. In the absence of such a margin, it is dangerous for a firm to attempt 'overtrading' in any of the two markets. In the matter of raising mortgage loans it is not the net worth that matters so much as the availability of unencumbered assets.

We have seen that UEL's debt equity ratio is considerably lower than the institutional standards prevalent in India, which may give a false impression that the company has a considerable debt capacity.

The debt capacity of net worth (as determined by the debt equity ratio) becomes meaningless in absence of a good asset margin ratio. A low debt equity ratio only indicates that, in case of future expansion with new assets, the company does not have to bring in additional equity to the extent of the difference between the present debt equity ratio and the normative standard prescribed by the financial institution, provided the projected operating income is sufficient to service additional debt.

In fact, the ability of a firm to raise debts depends upon three ratios: debt equity ratio, asset margin ratio, and the operating profit ratio. If any of these three ratios is not performing well it becomes difficult or inadvisable for a firm to raise additional debt.

DEBT REPLACEMENT RATIO

The derivation and movement of this ratio for UEL are as follows:

	X0	*X1*	*X2*	*X3*
Retained earnings	934	1718	643	579
Long term debts	6911	11628	12142	12712
Ratio	0.14	0.15	0.05	0.04
Trend:		*Downward*		

Nature of the Ratio: This ratio indicates the debt replacement behaviour of an enterprise. It becomes important when the firm has moved forward on the path towards expansion with a large amount of borrowed capital or when its present capital structure is loaded with high cost borrowed funds. Notwithstanding what has already been said about gearing the capital structure with a view to maximising the return on shareholders fund, at times, the operating profit of an enterprise may be such that it is unable to support a given debt structure, leave alone contribute anything to the equity. In such a situation, it becomes incumbent upon the firm to replace the high cost debt as early as possible through increased savings in the form of retained earnings. The debt replacement ratio should then move upwards. If, however, the ratio is moving downwards it indicates that the company is not saving enough to replace its debts; it must be paying out dividends not warranted by its operational performance. It is not essential that the company must replace all its debts. It will always attempt to keep a balance between debt and equity to maximise return on shareholders' fund, but one must remember that repayment of debt should come only from retained earnings and not from another borrowed source or from new capital issues. When a debt is repaid from retained earnings, net worth of the firm increases, which enables it to contract further debt, if necessary.

For a long time the Indian corporate sector is being chastised for its dismal savings behaviour, which is creating a strain on the resources available for lending. It has long been the hope of financial institutions in India that the corporate sector will gradually replace its debt by retained earnings and thus reduce the debt equity ratio to an optimal level, so that lendable resources could be more equitably distributed. This is the reason why the financial sector has finally moved towards an average debt equity ratio of 1.5. At the corporate level, this means that the debt replacement ratio should move upwards.

Case of UEL: At UEL, the debt replacement ratio is moving downwards and has reached as low as 0.04 in X3. Had the company targeted a debt replacement ratio of 0.15 (which the company had in earlier years), i.e., on an average had it desired to replace every long term debt in seven years, then in order to come at least near the target it should not have paid any dividend in the last two years. This would have pushed up the debt replacement ratio to around 0.12 and enabled the company to replace its high cost debt at a faster rate. As discussed before, the pressure of equity and other market considerations might have acted as deterrents to such a policy alternative.

Chapter 10

Ratios for Corporate Control of Financial Management

The philosophy which affects
To teach us a contempt of money
Does not run very deep.

—Henry Taylor

INTRODUCTION

At the policy level, corporate management is primarily concerned with maintaining a balanced capital structure, divided broadly between equity and debt, and ensuring a reasonable return to the stakeholders. Financial management draws its guidelines from such policies decided at the board level. In this Section we have discussed five ratios which can be used by top management to evaluate and monitor the finance function in its implementation of the financial policies of the enterprise.

DEBT EQUITY RATIO

The derivation and movement of this ratio for UEL are calculated both before and after revaluation of fixed assets:

		X0	*X1*	*X2*	*X3*
a)	Long term debts	6911	11628	12142	12712
	Net worth (equity) (including revaluation reserve)	8344	11225	11706	17269
	Ratio	0.83	1.04	1.04	0.74
	Trend:		*Downward*		

(Continued)

(Continued)

b)	Long terra debts	6911	11628	12142	12712
	Net worth (equity) (excluding revaluation reserve)	5563	8505	9046	14664
	Ratio	1.24	1.37	1.34	0.87
	Trend:		*Downward*		

Components of the Ratio: Long term debt includes all long term borowings like debentures, term loans from financial institutions and banks, deferred payment credits, long term incentive loans from government, but excludes all equity oriented loans, e.g., fully convertible debentures (as issued by UEL in X1 and converted to equity in X3). The question now arises as to the treatment of bridge loans, fixed deposits, other security deposits, and finally, preference shares.

If a bridge loan is taken pending disbursement of term loans it should form part of the long-term debt of a company. If it is taken against issue of equity capital or the like (e.g. fully convertible debentures of UEL) it should form part of equity.

Fixed deposits are generally of medium term duration. In India, companies can issue fixed deposits for a maximum period of three years. By the terms of the Capital Issue (Control) Act these then do not qualify as long-term debts, as 'debt' is defined by the Act to include borrowing repayable not earlier than five years. The Reserve Bank of India has taken a pragmatic view by treating all fixed deposits not repayable within one year as part of long-term liabilities. For the purposes of our analysis we have followed the definition of the Reserve Bank of India.

We had indicated earlier that as security deposits are ordinarily repayable only on termination of contract at an indeterminate date these should be treated as long-term debts.

Preference Shares: Preference share capital receives two different kinds of treatment: one from the Controller of Capital Issues and the other from the Reserve Bank of India. The former regards all preference shares redeemable not later than 12 years as debt and beyond 12 years as equity, while the latter regards all such shares as part of debt only. In fact, as an instrument of financing, preference shares are only a shade better than any other long-term loan, with regard to interest (dividend) and repayment obligations. It is, therefore, difficult to treat it as part of equity simply because it has a longer redemption period than other term instruments. We, therefore, tend to agree with the Reserve Bank definition. Only irredeemable preference shares (no longer available in India) can be treated as part of net worth. UEL does not have any preference share capital.

Besides bridge loans, all other non-current liabilities of UEL are considered as part of long-term debt. Particular mention must be made for making provisions to pay the premium on the redemption of debentures. Unlike debenture redemption reserve, this liability is written off at the time of redemption of debentures. Hence, it cannot form part of net worth. It should be recognised with debentures only.

Equity: Equity is to mean net worth of a business and includes: paid-up ordinary share capital, share premium, capital subsidies by government, free reserves, and all other equity-type loans and debentures as discussed earlier. How do we treat revaluation reserve? Some writers suggest that since revaluation reserve is neither a free reserve nor is there any cash flow to the business due to such revaluation, it should not be treated as part of net worth. Others contend that since lenders are concerned with the present value (net) of a business and they invariably value the assets of a business at current prices for any lending decision, there is nothing wrong in recording this value in the books of accounts and thus include revaluation reserve in net worth for the purpose of calculating the debt capacity of an enterprise in terms of both equity and assets. A number of American writers prefer the latter approach, though in India it is still to gain acceptance. Van Horne (1986), in particular, mentions that while debt ratios are generally calculated on book value figures, it is sometimes useful to calculate these ratios using the market value of assets.

On the basis of this discussion we have calculated the debt equity ratio (both before and after revaluation), the net worth (equity) and long-term debts of UEL (Tables 10.1 and 10.2).

Capital Structure Irrelevance Theory: Debt equity ratio (referred to as ‘gearing’ in the UK and ‘leverage’ in USA) is generally acknowledged as a relevant and significant element or aspect of the capital structure of a business enterprise, representing the measure of balance between the two most important components of capital (Madan, 1978). This balancing act translates itself into solving an optimisation problem between maximising the wealth of the shareholders and risk associated with debt. Traditionally, it was believed that judicious use of the debt equity combination (leverage) can increase the total value of a firm. Modigliani and Miller (1958) made a formidable attack on this traditional belief by declaring that no matter how one divides up the capital structure of a firm between debt, equity and other claims, there is a conservation of investment value. The fundamental basis of this declaration is the thesis that as the total investment value of a firm depends upon its underlying profitability and risk, it is invariant with respect to relative changes in the firm's financial structure. Two firms alike in every respect, except capital structure, must have the same total value; if not, arbitrage operation will cause the two firms to sell in the market at the same total value (Modigliani and Miller, 1969). Some critiques of the capital structure theory (Hangen and Pappas, 1971) have shown that an increase in the debt equity ratio increases not only the expected return but also the risk. In a perfect capital market both return and risk increase proportionately so that they offset each other with respect to their effect on share price.

Table 10.1
Net Worth (Equity) of UEL

(*Rupees lakh*)

	X0	*X1*	*X2*	*X3*
Paid up ordinary share capital	1920	1920	1920	2920
Share premium	–	–	–	4754
Investment allowance reserve	752	891	790	702
Capital subsidy	15	15	35	35
Debenture redemption reserve	36	144	252	432
Capital reserve	8	–	–	–
General reserve	2891	2554	3156	3654
Surplus (profit and loss a/c.)	182	459	493	482
Debentures fully convertible to share capital	–	3192	3192	–
Bridge loans (against share issue)	–	–	–	2503
	5804	9175	9838	15482
Less: Miscellaneous expenditure	241	670	792	818
Networth (before revaluation)	5563	8505	9046	14664
Add: Revaluation reserve	2781	2720	2660	2605
Networth (after revaluation)	8344	11225	11706	17269

Table 10.2
Long Term Debt of UEL

(*Rupees lakh*)

	X0	*X1*	*X2*	*X3*
Debentures (excluding convertibles)	2475	2475	2257	2257
Term loans	868	5538	5688	5579
Fixed deposits	1295	1567	1543	1650
Security deposits	1479	1305	1895	2561
Deferred payment credits	360	365	269	176
Incentive loans from government	311	322	375	448
Bridge loans (against term loans)	36	–	93	–
Unclaimed dividend	2	3	2	3
Premium on redemption of debentures	85	53	20	38
Long Term Debt	6911	11628	12142	12712

Market Imperfection: The irrelevance of capital structure as proposed by Modigliani and Miller assumes the absence of market imperfections. To the extent that there are capital market imperfections such as, differential rates of interest, corporate tax structures, bankruptcy costs, and institutional restrictions regarding investment and lending behaviour, changes in the capital structure of a firm may affect the total size of the 'corporate pie'. That is to say, the firm's valuation and cost of capital may change with changes in its capital structure (Van Horne, 1986).

Almost all the earlier mentioned capital market imperfections are present in all the economies of the world in varying degrees. In developing economies, e.g. India, the magnitude of these imperfections is high because of the direct administrative control of various segments of the money and capital markets that still exists despite recent liberalisation moves made by the governments of some of these countries. The debt equity ratio or leverage, therefore, plays a vital role in capital structure decisions of an enterprise, on the one hand, and lending decisions of financing institutions on the other. The latter point was emphasised by the Reserve Bank of India while sending *Detailed Guidelines for the Financial Institutions and Commercial Banks* issued as part of the government's decisions on the recommendations of the Industrial Licensing Policy Enquiry Committee. The guidelines emphasised that 'all the financial institutions concerned will have to exercise their judgement in consultation with the Industrial Development Bank of India to see that the ratio between 'debt' and 'equity' of the assisted industrial concern is reasonably maintained at all times in the interests of the shareholders and the financial institutions which may already hold or come to hold investments in the concern' (Madan, 1978, p. 10), Although, over a period of time, the financial institutions have adopted a more flexible and pragmatic approach in regard to debt equity ratio, the basic principle remains the same.

Risk vs Profitability: As indicated at the beginning of this Section, the debt equity ratio attempts to measure the balance between the two important components of capital structure. This balance is necessary because, in matters of profitability and risk, these two components are inversely related to each other. Within the framework of this principle, the debt equity ratio of an individual enterprise depends upon the risk taking capacity of its management; the level of investment required for a particular industry—in a highly capital intensive industrial unit dependance on debt may be higher than in a low capital intensive industrial unit—the norms of financial institutions; and finally the debt service capacity of the enterprise. Debt equity ratio is found to vary within a wide range, from less than 1 to 3. In India, the average debt equity ratio across industry was found to have moved up from a conservative initial level of below 1 to 1.5 and finally to 2, from the early 1960s, as the country witnessed large scale industrial development (Madan, 1978). The general institutional norm for debt equity ratio is being reduced now to 1.5, for more judicious allocation of lendable resources among a larger number of enterprises. The general level of debt equity ratio varies between 1 and 2 in Europe and from 0.50 to 1 in USA, though for the latter it is total debt equity ratio.

Case of UEL: The trend of the debt equity ratio in UEL is downwards, which on the face of it indicates increasing reliance on equity to finance its fixed assets. Apparently, it may seem that the company follows a conservative policy regarding capital structure decisions, which may be supported by the fact that when UEL went in for a major expansion in X1 its debt equity ratio improved only marginally. The infusion of debt capital almost matched that of equity capital. However, such a conclusion may not be valid. It may simply be that the income generation capacity of the company is not sufficient to warrant contracting of further long term debt; it might already be defaulting on repayment obligations which has affected its credit worthiness with lending institutions. Since we have already examined this aspect of UEL separately under debt service management it is sufficient to mention here that with an average operating profit of 7.5 per cent it may be too risky for the company to take on an additional debt service burden. The low debt equity ratio of UEL vis-à-vis current institutional norms indicates that the company has unutilised debt capacity, but its low operating income does not allow it to make full utilisation of this capacity. It may also be that the company does not have many unencumbered assets left to raise further long term loans. This we have examined under asset margin ratio earlier.

The debt equity ratio by itself may give a wrong confidence to lenders. For example, UEL's ratio of 0.74 (0.87 before revaluation) in X3 suggests that for every Rs 1.74 (1.87) of long term assets, lenders have financed 74 paise (0.87 paise), which is equivalent to 42 (46) per cent. Apparently, this may mean that concerned asset values could shrink by 58 (54) per cent before lenders could stand to lose. Whether this is valid depends upon the market value of assets and the cash flow positions of the business.

TOTAL DEBT EQUITY RATIO

The derivation and movement of this ratio for UEL are as follows:

		X0	*X1*	*X2*	*X3*
a)	Total debt	29918	34958	45110	48932
	Net worth (equity) (including revaluation reserve)	8344	11225	11706	17269
	Ratio	3.59	3.11	3.85	2.83
	Trend:		*Downward*		
b)	Total debt	29918	34958	45110	48932
	Net worth (equity) (excluding revaluation reserve)	5563	8505	9046	14664
	Ratio	5.38	4.11	4.99	3.34
	Trend:		*Downward*		

Note: Total debt includes operating current liabilities.

Nature of the Ratio: This ratio takes into account the entire financial structure of the business, divided broadly between equity and total outside liabilities. Although this form of ratio is yet to become widely used in India, particularly with the financial institutions, in major industrialised nations like the United States and Japan this form of ratio is most prevalent. Some analysts argue that trade creditors and similar short term liabilities allow only a temporary use of assets (notably inventory) and thus they are not really a form of borrowing to finance the firms resources. In other words, current liabilities are not a permanent part of the capital employed by the firm and hence, it would be unwise to include it in calculating debt equity ratio. Besides, the variable nature of working capital needs, and consequently that of current liabilities, would create fluctuations in the ratio of a kind and degree quite different from and often unrelated to the elements of the capital structure. This overall ratio may, therefore, create more confusion than sharpening the edge of financial analysis (Madan, 1978).

All these arguments do not hold much ground today when firms have to compete for funds in a perennially rationed financial market, where the cost of funds is increasingly eating into a greater percentage of sales revenue. In this changing scenario a careful management of short-term debts allows the firm to take advantage of inexpensive (and frequently free) funds that it would otherwise have to borrow at higher rates. Besides, short-term debts represent obligations of the firm. If capital structure ratios measure a degree of financial risk by showing how much the firm owes, they should reflect all debts owed by the firm (Hampton, 1989).

In the United States, Canada and Japan, total debt equity ratio is more prevalent. Japan is a particular case in point where borrowed funds played the most dominant role in the growth of Japanese industry during the post-World War period, when there was acute shortage of risk capital (equity). Historically, Japan has evolved the highest total debt equity ratio, of around 5, while the preferred value of this ratio in the United States is 1.

In India, like any other developing country, where there is a dearth of risk capital, total debt equity ratio is expected to be high. Given this background, an outer limit of this ratio can be fixed at around 3, meaning thereby that net worth should provide at least 25 per cent of the overall capital requirements of a firm. Within this overall ratio separate limits can be fixed for short-term debt equity ratio (credit strength ratio) and long-term debt equity ratio, depending upon the asset composition of the firm.

Case of UEL: In UEL this ratio is showing a downward trend, similar to that of the long-term debt equity ratio, reflecting the company's increasing reliance on equity. The average ratio is still on the higher side, both before and after revaluation. This is due to the fact that the company's average short-term debt equity ratio is high, signifying higher than desirable reliance on short term credit, particularly trade creditors, as we have seen before.

RETURN ON SHAREHOLDERS' FUND

This ratio is called return on equity (RoE) or return on net worth, and is calculated as follows:

	X0	*X1*	*X2*	*X3*
Profit after tax (PAT)	1280	2102	1027	1055
Net worth (excluding revaluation reserve)	5563	8505	9046	14664
Ratio (%)	23.00	24.71	11.35	7.19
Trend:		*Downward*		

Composition of the Ratio: For the purpose of this ratio net worth should exclude revaluation reserve because it is not a part of the savings of the shareholders, though it may be the reward for their waiting. Besides, the shareholders do not really have any claim on the revaluation reserve as it is not distributable to them in any form, including issue of bonus shares. The argument that inclusion of revaluation reserve brings the net worth closer to market value holds good only for inter-firm comparisons, provided all firms have revalued their assets.

Net worth should also include 'near-equity' loans like fully convertible debentures or bridge loans taken against share capital issue. Till the time these loans are not fully adjusted against equity, interest is payable on them. It is desirable, therefore, to adjust interest payments on these loans with Profit After Tax (PAT) in order to arrive at the correct value of this ratio. In case of UEL, however, we have not been able to obtain interest figure separately for these loans. Hence, interpretation of this ratio for UEL is subject to this limitation.

If there are any preference shareholders, dividend payable to them should be deducted from PAT before calculating this ratio.

PAT is the actual return that a company can give to its shareholders; part of it is given in the form of immediate cash dividends and the remaining part is retained in the business as savings, which is virtually a capital contribution by the shareholders. The latter is recognised by issuing bonus shares at a subsequent date. A shareholder of a company not only expects regular dividend but also capital appreciation of his shares in the secondary market which, among other things, depends on return on shareholders' fund or a variant of it, namely, earning per share (calculated by dividing PAT with number of equity shares outstanding). In the United States this ratio is very important. Firms in the US generally operate on a short-term profit maximisation model, largely because their current performance is judged by shareholders more critically. They might lose confidence and sell their shares if RoE is falling. This will have the effect of increasing the cost of capital for the company.

Capital Structure Leverage: As discussed earlier, notwithstanding the capital structure irrelevance thesis of Modigliani and Miller, a highly geared company will have higher RoE than a company with low gearing. Risk associated with such gearing will also follow the same pattern. This is primarily because interest expense is tax deductible whereas dividends and retained earnings are not allowable deductions for tax purposes. The following example will make it clear.

	Company A	*Company B*
Equity (shareholders fund)	1000	500
Debentures @ 15% p.a.	—	500
Total fund	1000	1000
PBIT	250	250
Less: Interest @ 15% p.a.	—	75
PBT	250	175
Less: Income Tax @ 50%	125	88
PAT	125	87
RoE	12.5%	17.5%

It is evident that RoE for the levered company (B) is much higher than the unlevered company (A). This is because, in a sense, government pays a subsidy to the levered company for the use of debt. This subsidy, given in the form of a tax shield, is therefore a thing of value which increases the overall value of the firm. Hence, greater the amount of debt, greater the tax shield and greater the value of the firm, all other things remaining the same. This proposition, therefore, suggests that an optimal strategy will be to take on a maximum amount of leverage (Modigliani and Miller, 1963).[1]

This strategy is, however, often not consistent with the real behaviour of firms, primarily due to two reasons. First, maximum amount of leverage is associated with maximum amount of risk, also in terms of servicing the debt burden by real cash flows. If the income is consistently low or negative, not only is the tax shield on debt reduced or even eliminated, the cash flow burden of interest payments on high debt may throw the firm to the brink of bankruptcy. Second, companies can adopt various other ways of reducing their tax burden like leasing, various investment allowances including backward area and social welfare investments, to name but a few. The greater the ability of the firm to shelter income in other ways, the lesser the importance of tax shield on debt, specially in an uncertain world where even the corporate tax rate is altered by the government every other year. In view of this, the company may like to use less debt, all other things remaining the same (De Angelo and Masulis, 1980).

Between these two extreme views on capital structure decision lies the concept of optimal usage of both debt and equity to ensure a reasonable but consistently rising return on shareholders' fund on the one hand, and to minimise the impact of risk of debt capital by spreading it judiciously among various sources of credit on the other. The most important point common to both approaches is, however, the dependence of the income generation capacity of the enterprise on both the debt and equity service capacity of the firm.

---

[1] Tax shield and consequent increase in the value of the firm can be explained as follows: For company B the tax shield available is Rs 75 × 0.50 = Rs 37.5 assuming a 50 per cent corporate tax rate. Assuming the debenture debt to be permanent (perhaps by simultaneous redemption and new issue), the present value of the tax shield can be calculated as *trdlr* or simple *td,* where r is the interest rate on debt (d) and t is the corporate tax rate. For company B, the present value of the tax shield is, therefore, 0.50 × 500 = Rs 250. This increased valuation occurs because the stream of income to the investors in company B is Rs 37.5 per year greater than that in company A, the present value of which @ 15% p.a. is exactly Rs 37.5/0.15 = Rs 250. The value of a firm can, therefore, be defined as value unlevered + value of tax shield.

Operating Profit Allocation Approach: Finally, it all boils down to the question of allocation of the operating profit between debt, capital and equity capital. Once an enterprise sets a particular target for return on equity, the quantum of debt must depend upon the servicing capacity of the residual balance of the operating profit. When debts exceed this limit or operating profit itself falls, then RoE will fall because once debts are contracted servicing obligations of these debts become fixed. If operating cash flows cannot service both interest and repayment obligations, the firm will be forced to contract further debt, which will further reduce the operating profit and consequently, depress the RoE.

Case of UEL: In UEL the ratio has fallen sharply during the last two years. Even granting the fact that increases in net worth *during X1–X3* will need a gestation period to contribute to the profit, the sharp fall cannot be fully attributed to this phenomenon. It can be seen that PAT remains almost stationary, except in X1, although operating profit during this period has shown considerable improvement. This means that a major part of the operating profit has now been allocated for servicing the interest obligations of increased debts. Consequently, the company is no longer able to service its equity at around 22 per cent, which it did in the first two years of our study.

CAPITAL STRUCTURE RATIOS

Sources of Capital: Our analysis of the capital structure of an enterprise has so far been restricted to its two broad divisions, namely, debt and equity. Although sources of equity are more or less homogeneous in character with regard to their degree of risk and servicing, the same is not true of the various sources of debt. There should, therefore, be a further exercise in optimising various sources of debt within the broad optimisation parameters of total equity and total debt. All these optimisation exercises finally determine the capital structure policy of an enterprise.

We have already mentioned earlier that the starting point in deciding a capital structure policy is to fix the target for return on shareholders' fund and then decide on appropriate policies for various sources of capital with due regard to their servicing and risk. We have also indicated that any imbalance created in the capital structure will ultimately affect the return on shareholders' fund. In Table 10.3 we have made a detailed analysis of

Table 10.3
Capital Structure Ratios of UEL

(Amount in lakh)

Sources of capital / *Year*	*Net worth*	*Debentures*	*Term loans*	*Fixed deposits*	*Security deposits*	*Other term liabilities*	*Bank overdraft*	*Trade creditors*	*Advance payments*	*Other current liabilities*	*Total capital employed*
X0											
Amount	8344	2560	1264	1295	1479	31	4608	13095	4036	348	37340
Ratio (%)	(22.35)	(6.86)	(3.39)	(3.47)	(3.96)	(0.83)	(12.34)	(35.07)	(10.80)	(0.93)	(100.00)
X1											
Amount	11225	2528	5903	1567	1305	322	2059	15242	5233	387	45771
Ratio (%)	(24.52)	(5.52)	(12.90)	(3.42)	(2.85)	(0.70)	(4.50)	(33.30)	(11.44)	(0.85)	(100.00)
X2											
Amount	11706	2277	6050	1543	1895	375	6904	18715	5432	538	55435
Ratio (%)	(21.12)	(4.11)	(10.91)	(2.78)	(3.42)	(0.68)	(12.45)	(33.76)	(9.80)	(0.97)	(100.00)
X3											
Amount	17269	2295	5755	1650	2561	448	9481	18878	5489	479	64305
Ratio (%)	(26.85)	(3.57)	(8.95)	(2.57)	(3.98)	(0.70)	(14.74)	(29.36)	(8.54)	(0.74)	(100.00)
Trend	Upward	Downward	Upward	Downward	Upward	Downward	Upward	Downward	Downward	Downward	

Note:

1. Net worth includes revaluation reserve, bridge loans taken against issue of shares, and fully convertible debentures. Miscellaneous expenditure is deducted from the value of gross net worth so calculated.
2. Debentures include premium on redemption of debentures but excludes fully convertible debentures.
3. Term loans include deferred payment credits and bridge loans taken pending disbursement of sanctioned term loans.
4. Other term liabilities include incentive loans from government.
5. Trade creditors include expense creditors.
6. Other current liabilities include unclaimed dividend, provision for taxation and proposed dividend.

various capital sources of UEL and calculated their ratios on total capital employed to find out whether UEL is experiencing any imbalance in its capital structure, and its possible effect on the return on shareholders fund.

The general tendency of various capital structure ratios as revealed in the chart can be summarised as:

1. Name of the ratios showing upward movement
   A. Net worth
   B. Term loans
   C. Security deposits
   D. Bank overdraft
2. Name of the ratios showing downward movement
   A. Debentures
   B. Fixed deposits
   C. Other term liabilities
   D. Trade creditors
   E. Advance payments
   F. Other current liabilities

Case of UEL: It appears that in the last four years UEL has predominantly moved towards equity and institutional loans (banks included) rather than market sources for funding its operations. The largest addition to term loans was made in X1. The level remained almost constant during the next three years, though the ratio had fallen owing to expansion in the total funds base. This means that not much repayment had been made during these three years or that further loans were contracted to pay the instalments. At the same time, addition to net worth was made by issue of fully convertible debentures. Equity and institutional financing is less risky than other market sources but it is more costly at the same time. We have already seen, while discussing return on shareholders fund, that UEL was unable to service its equity even at half the rate of its earlier years, in spite of the fact that its operating profit ratio maintained the desirable stability to a large extent. This means that the servicing cost of institutional debts is making larger inroads into the operating profit. If moving more towards equity and institutional funding was a deliberate policy decision of UEL, it must be said that it was not based on the operating profit allocation approach, as discussed earlier. This has created an imbalance in the capital structure of the company.

The same imbalance is observable in the matter of linking up market sources of finance, where the dominant tendency of the ratios is downwards. These sources of finance are cheaper but more risky than the other two sources mentioned earlier, particularly in terms of goodwill and the impact of failure in servicing these sources on the organisation. The company might have previously overstretched itself on these sources which has affected its credit worthiness in the market. As a result, UEL is no longer able to exploit the market further. It is now forced to consolidate its position on these sources of financing, which made the relevant capital structure ratios register a downward trend with the rise in the total capital of the business. The imbalance thus created was shifted to equity and financial institutions, causing further imbalance in the capital structure of the company as a whole by virtually snapping its linkage with RoE, which is supposed to be the fulcrum that determines the capital structure of a business enterprise.

INTEREST INCIDENCE RATIO

The derivation and movement of this ratio for UEL are given:

	X0	*X1*	*X2*	*X3*
Interest	2257	3269	4508	5093
Operating profit	3542	4641	5418	5320
Ratio (%)	63.72	70.44	83.20	95.73
Trend		*Upward*		

This ratio indicates the consequences of capital structure decisions of an enterprise. This also indicates how the finance function is doing vis-à-vis the operating function. For UEL this relationship must be worse, as the movement of the ratio suggests. The ratio is not only high at the beginning of the four year period, it is also rising so fast that there is a likelihood it might soon reach 100 per cent and eat away all the operating profit of the Company. All our discussions so far on various capital structure ratios of UEL have pointed towards this direction only.

How then is the company showing a positive PAT and paying dividend as well? The following ratio explains the position.

NON-OPERATING INCOME RATIO

	X0	*X1*	*X2*	*X3*
Non-operating income	695	780	817	1303
Profit before tax	1980	2152	1727	1530
Ratio (%)	35.10	36.25	47.31	85.16
Trend		*Upward*		

The size and movement of the non-operating income ratio of UEL indicates that the Company is virtually surviving on its non-operating income. Had there been no non-operating income, the company would not have been able to pay any dividend during the last three years. The paradox is that when UEL had virtually made no profit on its operations and hence, it should not have paid any dividend, rather than save it to reduce some of the costlier loan burdens and make a beginning of reorganising its capital structure, UEL had to maintain a steady rate of dividend. Such is the cost of equity; not so much in terms of actual dividend pay out but the strain it creates on the economy of the enterprise. It is often claimed that equity is the risk free capital of the enterprise, but those who sit in the board room know for certain where the real risk lies.

SUMMARY

Working Capital Management

Working capital management essentially deals with the management of current assets. Every piece of current asset blocks funds and hence, prima facie, it contributes negatively to the profitability of a business. A higher level of current assets does not always indicate higher liquidity of a business. Hence, the modern approach of financial management calls for reduction in current assets to the bare minimum.

Current assets are funded partly by trade creditors, advance payments from customers, bank borrowings; and partly by equity. Net working capital is the difference between current assets and current liabilities. While analysing the working capital management of a business we must make a distinction between current assets and non-operating current assets to arrive at the true level of current assets.

The following ratios (Table 10.4) were discussed in Section I to evaluate the working capital management of a business. Materials inventory turnover ratio and work-in-process turnover ratio belong concurrently to both operating management and working capital management and have already been discussed in Chapter 3 (Section II).

Table 10.4

Summary of Ratios for Working Capital Management

No.	*Ratio*	*Definition*	*Nature and purpose*
1.	Finished goods inventory turnover ratio	Cost of goods sold/Finished goods inventory	This ratio is also called velocity of finished goods inventory. Inventory forms a significant portion of current assets. If the ratio is flat or falling it may indicate an inherent conflict between the finance and marketing functions. The former tries to reduce the stock level (so as to reduce the cost), while the latter tries to stock more and more, so as to meet all demand. This ratio also draws attention to the lack of synchronisation between the productive and distributive functions of the enterprise.
2.	Debtors turnover ratio	Gross sales/ Trade debtors	This ratio is also called velocity of debtors. Debtors often form a significant portion of the current assets. This ratio reflects the changes in the level of debtors due to changes in the level of sales. A decline in this ratio could be due to the failure of the collection machinery or due to extended lines of credit granted to the customers.
3.	Creditors turnover ratio	Purchases/ Trade creditors	This ratio reflects the purchase and payment policy of the firm; its market standing; and the cash flow position. Lower the ratio, higher is the dependence on creditors.
4.	Market command ratio	Debtors turnover ratio/ Creditors turnover ratio	This ratio measures the command of the enterprise in both the supply and sales market. A market command ratio of 3, enables an enterprise to operate efficiently even with zero net working capital, without endangering the liquidity of the business.
5.	Working capital performance ratio	Trade debtors/Trade creditors + Advance payment from customers	This ratio is primarily used for monitoring the performance of autonomous divisions of an enterprise. Often a minimum and maximum value of the ratio are prescribed to lessen the dependence of divisions on financing from headquarters and to check uncontrolled expansion of credit sales.

Table 10.4 (Continued)

Table 10.4 (Continued)

No.	*Ratio*	*Definition*	*Nature and purpose*
6.	Cash turnover ratio	Cash operating expenses/ Cash and bank balances	This ratio focuses on the cash holding policy of the firm. A decline in this ratio indicates higher levels of idle cash. In India, due to the existence of the cash credit system of working capital financing, many of the problems related to cash management are not encountered. This ratio should normally be very high in Indian enterprises.
7.	Overtrading ratio	Net working capital/Credit sales	This ratio relates sales expansion with the net working capital base of the enterprise. A low ratio indicates that the enterprise is engaged in overtrading. On the contrary, a high value of this ratio indicates undertrading, which results from under utilisation of the sales generation 'capacity of capital'.
8.	Credit strength ratio	Current liabilities (operating)/ Net worth	This ratio, also called the short term debt equity ratio, is widely used by firms to maintain financial discipline. A very high value indicates overdependence on current liabilities, which could be dangerous if it is not backed by a high asset margin ratio.
9.	Diversion ratio	Net working capital/ working capital gap	This ratio helps to establish the relation between net working capital and the working capital gap.
10.	Current ratio	Current assets/Current liabilities (before and after bank finance)	This ratio is central to the appraisal system of commercial banks. Higher the velocity difference between current assets and current liabilities, better is the working capital management, subject to the optimisation of creditor's financing.
11.	Guarantee cover ratio	Gross sales/Bank guarantee outstanding	This ratio indicates the potential threat to a firm which overstretches itself on this off-the-balance-sheet but quasi-credit facility. Higher the ratio, larger the safety coverage.
12.	Contingency ratio	PBT/Disputed statutory liabilities	This ratio may often indicate a tightening of the cash position of the firm. A rising ratio may mean that the firm is trying to postpone payment of statutory dues by making them disputed.

Debt Service Management

Efficiency or otherwise of the financial management of a business is reflected by its ability to generate enough cash flows to service various sources of funds. While servicing of equity may wait, at least for some time, failure to service debts may eventually invite a winding up proceeding. Lenders will feel less confident if the debt service management of an enterprise is poor, and this may have a snow balling effect upon the firm. As a result, fund sources may dry up and the average cost of capital of the firm will rise. The following ratios (Table 10.5), which are also called lenders' ratios, were analysed in Section 2 to measure the debt service capacity of a business.

Table 10.5
Summary of Ratios for Debt Service Management

No.	*Ratio*	*Definition*	*Nature and purpose*
1.	Interest coverage ratio	PBIT/Interest (PBIT includes non-operating income).	It measures the ability of an enterprise to meet its interest obligations out of current earnings. A low value indicates a risk prone management with a highly geared capital structure. However, this ratio is generally low in countries like India where debt equity ratio is high.
2.	Debt service coverage ratio (DSCR)	PBITD/Interest + Annual repayment obligations × [1/(1—t)]	It takes into account fixed obligations like principal repayments, lease payments and fixed dividends. If the value is less than 1, financial erosion is in sight. A declining trend indicates over ambitious expansion, often not justified by the operating strength of the business.
3.	Priority obligations ratio	Net cash flows/ Priority outflows (Priority outflows are those, the non-payment of which, shall render the firm liable for a winding up petition).	The ratio should at least be 1:5 so as to ensure a reasonable cushion against any sudden lengthening of the working capital cycle. This ratio is better than debt service coverage ratio for corporate bond ratings.

Table 10.5 (Continued)

Table 10.5 (Continued)

No.	*Ratio*	*Definition*	*Nature and purpose*
4.	Asset margin ratio	Debt capacity of fixed assets – Term loans – Debentures/ Debt capacity of fixed assets (before and after revaluation)	Debt capacity means the ability of the assets to raise loans by mortgage. In case of a mismatch between the creditor's maturity and the debtor's realisation, a high asset margin ratio enables the firm to withstand the shock by raising mortgage loans.
5.	Debt replacement ratio	Retained earnings/Long-term debts	This ratio indicates the debt replacement behaviour of an enterprise. A downward movement indicates that the company is not saving enough to replace its debts. It might be paying out dividends not warranted by its operational performance.

Corporate Financial Management

In Section III we had discussed six ratios which enable corporate management to control and monitor the overall financial management of an enterprise. Table 10.6 summarises the use of these ratios.

Table 10.6
Summary of Ratios for Corporate Financial Management

No.	*Ratio*	*Definition*	*Nature and purpose*
1.	Debt equity ratio	Long-term debt/Net worth (before and after revaluation reserve). Long-term debt includes debentures, term loans, redeemable preference shares, deferred credits, bridge loans, etc. but does not include equity oriented loans, e.g., FCD etc.	This ratio indicates the gearing of the capital structure of an enterprise. It is found to vary within a wide range extending from less than 1 to 3. In terms of risk and profitability, debt and equity are inversely related to each other.
2.	Total debt equity ratio	Total debt/Net worth (before and after revaluation reserve). Total debt includes current liabilities also.	An overall ratio of 3 could be fixed, within which separate limits are carved out for short-term and long-term debt equity ratios. This ratio is yet to gain ground in India.

Table 10.6 (Continued)

Table 10.6 (Continued)

No.	*Ratio*	*Definition*	*Nature and purpose*
3.	Return on shareholders' fund	Profit after tax/Net worth (Net worth should exclude revaluation reserve)	This ratio is also called return on equity (RoE). In general, a highly geared company will have a higher RoE (due to the availability of the tax shield on interest payments). However, the risk associated with a highly leveraged firm is fairly high.
4.	Capital structure ratios	Individual item of capital employed/Total capital employed	This ratio is to be calculated for every source of fund like net worth, term loans, sundry creditor and bank borrowings, in order to locate any imbalance in the capital structure of the business and its effect on RoI and RoE.
5.	Interest incidence ratio	Interest/Operating profit	It indicates the consequence of a particular capital structure decision of an enterprise and measures the inter-se efficiency of the finance and operating functions of an enterprise. A high and rising ratio indicates the inroads into the operating strength of the enterprise by the finance function.
6.	Non-operating income ratio	Non-operating income/ Profit before tax	It is a measure of the income accruing from operations outside the mainline business of the enterprise. A high growing ratio may often indicate that the enterprise is just thriving on its non-operating income

Chapter 11

Measurement and Monitoring of Managerial Efficiency: A Ratio-Analytic Approach

How I like to be liked
and what I do to be liked?

—*Lamb*

INTRODUCTION

So far we have discussed a number of ratios divided under separate functional groups within the broad managerial divisions of an enterprise, namely, operating management and financial management. Each ratio dealt with a particular aspect of a function, though some are common between more than one function. Depending upon a person's interest and stake in the enterprise e.g. shareholder, lender etc., the analyst will select a group of ratios which best reflect the status of that particular stake.

All these ratios and their various groupings are useful for judging different aspects of the functional performance of an enterprise, but a correct choice of a ratio or a group of ratios is often a difficult task. Attempts of various researchers towards this direction have not yet proved very successful. A reason for this may be the linearity assumption in ratio analysis which does not often hold good in real life situations. Another reason could be that in the absence of a proper theory of ratio analysis (as indicated in Chapter 1 and elaborated further in Chapter 7), the choice of ratios often suffers from subjectivity and personal bias of the analyst. For all these reasons, managers are often found to become distrustful of ratio analysis and shun it as a tool for management control. In this Chapter we shall present alternative ratio models for the measurement and monitoring of efficiency of important management functions.

Broadly speaking, a business enterprise can be said to be functioning efficiently if:

1. sales are rising;
2. costs are under control;
3. generation of current assets (working capital) is not out of proportion with rise in sales;
4. the capital structure is in a state of dynamic equilibrium; and
5. profitability is rising.

Profitability being the essential condition of a business enterprise trying to achieve its goals, sales is the kingpin around which the business system rotates; the rotational force coming from a flow of funds in the form of assets and costs. The sales performance of a business can simply be measured by indexing sales from year to year by value or by quantity. Whether costs, current assets and the capital structure of a business have also moved with the sales index in the right direction to generate a profit can be judged by matching them with the sales or profitability index. This we shall do in order to develop models for judging the efficiency of different aspects of management.

EFFICIENCY OF COST MANAGEMENT

The efficiency of cost management can be judged by first developing a performance index of different cost functions and then multiplying it with the expense utilisation index.

Performance Index

Performance index is defined as:

$$\text{Performance Index } (PI_{om}) = \frac{I_s \sum_{i=1}^{N} \frac{C_{i(t-1)}}{C_{it}}}{N}$$

where: C_i = Individual cost items
I_s = Sales index defined as: $\frac{S_t}{S_{t-1}}$
N = Number of cost items
i = 1, 2, 3, …, N

The model is explained in Table 11.1 with the example of UEL.

Table 11.1
Cost Indices for UEL

	X3	*X2*	*X1*
Sales Performance	69972	63794	55107
	63794	55107	45748
Index	1.10	1.16	1.20
Cost Performance			
1. Raw material consumption including stores etc.	28353	22047	19489
	31973	28353	22047
Index	0.89	0.78	0.88
2. Direct labour	5932	5132	4127
	6523	5932	5132
Index	0.91	0.87	0.80
3. Purchase of finished goods	16097	15046	11237
	15183	16097	15046
Index	1.06	0.93	0.75
4. Power and fuel	479	559	329
	640	479	559
Index	0.75	1.17	0.59
5. Spares	134	100	41
	248	134	100
Index	0.54	0.75	0.41
6. Repairs and maintenance (plant)	208	168	129
	246	208	168
Index	0.85	0.81	0.77
7. Other manufacturing expenses (excluding depreciation)	315	292	274
	363	315	292
Index	0.87	0.93	0.94
8. Direct marketing expenses	4104	3645	2798
	4281	4104	3645
Index	0.96	0.89	0.77

Table 11.1 (Continued)

Table 11.1 (Continued)

	X3	*X2*	*X1*
9. General and administration expenses (excluding depreciation)	4959	3878	3191
	5898	4959	3878
Index	0.84	0.78	0.82
Total of all Expenses	65355	60581	50867
Total of all Expense Indices	7.67	7.91	6.73

Performance index for operating management of UEL can now be calculated as follows:

	X3	*X2*	*X1*
$PI_{oM} =$	$\frac{1.10 \times 7.67}{9}$	$\frac{1.16 \times 7.91}{9}$	$\frac{1.20 \times 6.73}{9}$
Or	0.94	1.02	0.90

It is possible for the operating management to measure and monitor the performance of individual cost functions by calculating the performance index for each item of cost. When the index for a particular cost item is less than 1 it indicates a more than proportionate increase of this cost, compared with sales. When it is more than 1 it indicates a less than proportionate rise with sales. Let us explain this by calculating the performance index for direct marketing expenses.

	X3	*X2*	*X1*
$PI_{ME} =$	1.10 × 0.96	1.16 × 0.89	1.20 × 0.77
Or	1.06	1.03	0.92

It can be seen that in X1 UEL suffered a more than proportionate rise in marketing expenses causing a fall in its performance index below 1. However, in the following two years the index improved consistently to more than 1, which suggests that the company was able to keep the direct marketing expenses under control, by not allowing it to expand even proportionately with sales. For example, in X2 the sales rose by 16 per cent but direct marketing expenses increased by 12.60 per cent only, which improved its performance index by 11.96 per cent.

Expense Utilisation Index

While the performance index for an individual cost function is helpful for measuring and monitoring that particular cost item, the overall performance index for the cost function as a whole may give a misleading impression, because in averaging no distinction is made between small and large cost items. A reduction of Rs 10 in an item costing Rs 30 may improve the overall performance index considerably but the real impact of this reduction on the total cost may be negligible. Some such cost items are repairs and maintenance, consumption of spares, power and fuel, etc., as we find in the case of UEL. In order to circumvent this problem one may be tempted to ignore these cost items altogether, declaring them to be too small to merit consideration. However, following the same argument it can be said that if we ignore these items the overall performance index cannot be treated as a tool for measuring and judging the efficiency of the total cost function of the enterprise. It must be remembered that small cost items, if not properly controlled and monitored, may soon become monstrous figures shaking the very foundation of the enterprise.

The assignment of weights to different cost items can be thought of as a means to resolve this problem. However, weights are always subjective in nature, often reflecting the individual biases and prejudices of the manager. Most measurement models currently in use are criticised precisely for the subjectivity inherent in assigning weights to measurement variables.

The problem can be looked at from a different angle. When a firm spends on cost it creates a 'working capacity' for the operating management, who are to utilise it for producing sales. If a certain amount of operating expenses was able to generate a particular level of sales, in the last year, it is expected that this year also at least the same ratio will be maintained. A fall in the ratio will suggest a lower utilisation of the 'working capacity' and a rise in the ratio will indicate higher utilisation of the given 'capacity'. This leads us to the development of the expense utilisation index.

$$\text{Expense Utilisation Index } (UI_{CM}) = \frac{E_{t-1}}{E_t}$$

where: E = Total expenses/Net sales

For UEL the UI_{CM} may be calculated as follows:

(*Rupees lakh*)

	X3	*X2*	*X1*	*X0*
Total expenses	65355	60581	50867	41615
Net sales	69972	63794	55107	45748
E	0.93	0.95	0.92	0.91
E_{t-1}	0.95	0.92	0.91	–
E_t	0.93	0.95	0.92	0.91
UI_{CM}	1.02	0.97	0.99	–

The UI_{CM} FOR UEL indicates that the utilisation of 'working capacity' made available to the operating management has been stable except in the year X2, when it was two percentage points lower. This suggests that in spite of the overall performance index of UEL in X2 being the highest at 1.02 (may be due to high indices for smaller expense items like power and fuel, and spare consumption), its utilisation of the given expense volume ('working capacity') had been the lowest. Final measurement of the efficiency of cost management should then be a product of the overall performance index and utilisation index.

Efficiency index of cost management = Overall performance index × Expense utilisation index

or $EI_{CM} = PI_{OM} \times UI_{CM}$

Let us calculate this for UEL.

	X3	*X2*	*X1*
$PI_{OM} \times UI_{CM}$ =	0.94 × 1.02	1.02 × 0.97	0.90 × 0.99
Efficiency index of cost management (EI_{CM}) =	0.96	0.99	0.89

It appears that cost management at UEL has improved since X1. EI_{CM} was highest in X2 at 0.99 but it could have been equal to or greater than the performance index, if it had better utilised the expenses as in the other two years. For example, if UI_{CM} in X2 was equal to that of X3, then the EI_{CM} would have increased to 1.04. On the other hand, if the UI_{CM} had been just five decimal points less, then the EI_{CM} would have been as low as 0.94.

EFFICIENCY OF WORKING CAPITAL MANAGEMENT

The principle followed in developing a model for measuring and monitoring the efficiency of working capital management is the same as in cost management. If there is a more than proportionate rise in current assets with the increase in sales, the costs of an enterprise also increase, both in terms of blockage of additional funds and the interest thereon. A firm cannot be said to have an efficient working capital management if it is registering a more than proportionate rise in current assets. As discussed before, modern day financial management aims at reducing the level of current assets without, of course, ignoring the risk of stock outs, etc. This is similar to that of cost management, where quality cannot be sacrificed at the expense of reducing costs. The model for measuring the efficiency of working capital management is as follows:

$$\text{Performance Index } (PI_{WCM}) = \frac{I_s \sum_{i=1}^{N} \frac{W_{i(t-1)}}{W_{it}}}{N}$$

where: I_s = Sales index
W_i = Individual group of current assets
N = Number of current assets group
i = 1, 2, 3, …, N

The indices for working capital items are worked out in Table 11.2.

Table 11.2
Indices of Working Capital Items for UEL

(*Rupees lakh*)

	X3	*X2*	*X1*
1. Debtors	25979	19864	17187
	29933	25979	19864
Index	0.87	0.76	0.87
2. Raw materials inventory	3905	3103	2523
	3969	3905	3103
Index	0.98	0.79	0.81
3. Work-in-process inventory	4610	2972	2543
	5484	4610	2972
Index	0.84	0.64	0.86

Table 11.2 (Continued)

Table 11.2 (Continued)

	X3	*X2*	*X1*
4. Finished goods inventory	3463	2684	2328
	3599	3463	2684
Index	0.96	0.78	0.87
5. Spares inventory	139	174	66
	160	139	174
Index	0.87	1.25	0.38
6. Advances	3816	3734	3501
	5391	3816	3734
Index	0.71	0.98	0.94
7. Cash	32	7	2
	78	32	7
Index	0.41	0.22	0.29
8. Other current assets	252	86	51
	118	252	86
Index	2.14	0.34	0.59
Total of current assets	48732	42196	32624
Total of indices	7.78	5.76	5.61

Note: Other current assets include government and trustee securities and fixed deposits with banks but exclude advance payment of income tax and security deposits.

Overall performance index of working capital management can now be calculated for UEL.

	X3	*X2*	*X1*
Performance Index (PI_{WCM}) =	$\frac{1.10 \times 7.78}{8}$	$\frac{1.16 \times 5.76}{8}$	$\frac{1.20 \times 5.61}{8}$
Or	1.07	0.84	0.84

Note: Sales indices (I_S) remain same.

As in the case of cost management indices, control and monitoring of individual groups of current assets can be done through their respective indices by multiplying them with the sales index (I_S) of the given year. Let us take the example of Debtors:

	X3	*X2*	*X1*
Debtors index	0.87	0.76	0.87
I_S	1.10	1.16	1.20
PI_{DR}	0.96	0.88	1.04

It would appear that although the debtors index was the same in X1 and X3, performance of this current asset was much better in X1 than in X3. This is because there had been a less than proportionate rise in debtors with rise in sales in X1, while the rise was more than proportionate in X3.

We can now calculate the working capital utilisation index for UEL. The model appears as the following.

$$\text{Working capital utilisation index } (UI_{WCM}) = \frac{A_{t-1}}{A_t}$$

where: A = Current assets/Sales

Let us calculate this for UEL.

	X3	*X2*	*X1*	*X0*
Current assets	48732	42196	32624	28201
Net sales	69972	63794	55107	45748
A	0.69	0.66	0.59	0.62
UI_{WCM}	0.96	0.89	1.05	–

The purpose of this utilisation index is to measure to what degree the working capital of the firm has been utilised to generate sales. It can be seen that the working capital performance index of UEL was the same in both X1 and X2, but its working capital utilisation was much better in X1 than in X2. Hence, UEL must have managed its working capital much more efficiently in X1 than in X2.

We can now measure the overall efficiency of working capital management by the following formula.

Efficiency index of working capital management = Overall performance index × Working capital utilisation index

Or

$$EI_{WCM} = PI_{WCM} \times UI_{WCM}$$

For UEL this is calculated as follows.

	X3	*X2*	*X1*
EI_{WCM} =	1.07 × 0.96	0.84 × 0.89	0.84 × 1.05
Or	1.03	0.75	0.88

As mentioned before, though PI_{WCM} for both X1 and X2 are the same, UEL fared worse in X2 because its volume of current assets went up more than proportionately with the rise in sales. However, the company improved its working capital management in X3 when both PI_{WCM} and UI_{WCM} increased considerably, giving rise to an efficiency index of 1.03.

EFFICIENCY OF FUNDS MANAGEMENT

We have mentioned in Chapter 4 Section III that the focal points for determining the optimal capital structure of a business are the earning capacity of its assets (total capital employed), indicated by RoI, and the policy regarding return on shareholders fund (equity). When a target for RoI is envisaged, a leverage policy then has to be formulated, keeping in mind the cost and risk associated with various sources of capital, so that the targeted RoE becomes achievable. A properly drawn up leverage policy should also include a dividend policy to decide how much to pay out and how much to retain, so that the equity base is not unduly enlarged to dampen the RoE.

CAPITAL STRUCTURE POLICY

Suppose, gross capital employed by a company is Rs 100 and earning capacity of its assets or the targeted RoI is 25 per cent. The company intends to restrict the equity to 20 per cent of gross capital employed and ensure a minimum RoE of 38.75 per cent. Costs of long-term borrowing and short term borrowing for working capital finance are 15 per cent and 20 per cent respectively. Corporate income tax is 50 per cent.

The capital structure policy of the company can be formulated along the following lines.

The target RoE being 38.75 per cent on an equity of Rs 20 the company has to ensure an absolute PAT of Rs 20 × 0.3875 = Rs 7.75. With a 50 per cent corporate income tax, PBT should be Rs 15.50 out of a PBIT of Rs 25. This leaves Rs 25 – 15.50 = Rs 9.50 as amount available for interest payment on a total debt of Rs 100 –20 = Rs 80. Average cost of debt, therefore, cannot exceed 11.875 per cent p.a.

Now many permutations and combinations of debentures and bank borrowings can be tried to see whether they meet the maximum average interest of 11.875 per cent p.a. It will soon be seen that in the present example where interest on debentures is 15 per cent p.a. and that on bank borrowing is 20 per cent p.a., none of the combinations could meet the requirements of maximum average cost of debt at 11.875 per cent p.a. Hence, the company may have to partly rely on free suppliers' credit. Without going into complicated mathematical formulations to resolve the problem of allocation of funds amongst the three sources, we have iterated alternative debt structures and arrived at the following optimal capital structure of the company (Table 11.3).

We can check whether the capital structure in Table 11.3. can ensure a 38.75 per cent RoE with an RoI of 25 per cent.

Table 11.3
Optimal Capital Structure

Sources	*Amount (Rs)*
Equity	20
Long-term debts	30
Bank overdraft	25
Trade creditors	25
Total capital employed	100

		Rs.
Profit Before Interest and Tax		25.00
Less:	Interest on long-term debt @ 15% = 4.5	
	Interest on bank overdraft @ 20% = 5.0	9.50
Profit Before Tax		15.50
Less: Income tax @ 50 %		7.75
Profit After Tax		7.75

$$\text{Return on Equity} = \frac{\text{Profit after Tax}}{\text{Equity}} = \frac{7.75}{20} = \qquad 38.75\%$$

The capital structure policy of the company can now be stated as:

1. Equity (shareholders' fund) should not exceed 20 per cent of gross capital employed.
2. Long-term debt equity ratio should be 1.5.
3. Bank borrowing for working capital finance should not be more than 25 per cent of gross capital employed.

Suppose four firms having the same initial capital structure as in Table 11.3 and other similar conditions have now moved to another year of operation, their present capital structure and RoE are as follows (RoI remaining the same at 25 per cent):

(*Rupees Lakh*)

		Company A		*Company B*		*Company C*		*Company D*
Equity		32.00 (21.33)		30 (20.00)		30.00 (20.00)		34 (22.66)
Long-term debts		35.00 (23.34)		57 (38.00)		45.00 (30.00)		30 (20.00)
Bank overdraft		45.00 (30.00)		30 (20.00)		37.50 (25.00)		54 (36.00)
Trade creditors		38.00 (25.33)		33 (22.00)		37.50 (25.00)		32 (21.34)
Total capital employed		150.00 (100.00)		150.00 (100.00)		150.00 (100.00)		150.00 (100.00)
PBIT @ 25% RoI		37.50		37.50		37.50		37.50
Less interest on:								
Long-term debt	5.25		8.55		6.75		4.5	
Bank overdraft	9.00	14.25	6.00	14.55	7.50	14.25	10.8	15.30
PBT		23.25		22.95		23.25		22.20
Less: Income tax		11.62		11.47		11.62		11.10
PAT		11.63		11.48		11.63		11.10
RoE		36.34%		38.26%		38.75%		32.65%

Note: Figures in brackets represent percentage to the total.

The simple example of leverage illustrated here explains the concept of capital structure imbalance. Although total capital employed and RoI are the same for all the firms, except for Company C none of the other three firms is able to achieve the targeted RoE. For Companies A and C, PBIT and PAT are the same, but Company A is well below the RoE target, primarily because its equity is disproportionately enlarged. Company A is also disbalanced between long-term debts and bank overdraft. Although, for Company A the interest effect is counter balanced, its debt policy (which depends on other considerations besides interest cost) is defeated. Worse is the case of Company D which has registered the lowest RoE with a totally imbalanced capital structure.

Company C is able to meet the RoE target because its capital structure is in complete equilibrium with the RoE target, as can be judged from percentage of individual capital sources to total capital employed. The percentage figures for other companies indicate the extent of deviation from equilibrium.

Once, the capital structure of a firm is derived from the financial policy of an enterprise, as discussed in the beginning of this section, equilibrium factors should be determined for each individual capital source with reference to the percentage contribution to the total capital employed as illustrated in Table 11.4 with the help of the example first cited.

Table 11.4
Equilibrium Factors for Different Capital Sources

Capital source	*Percentage contribution*	*Equilibrium factors(e) (100/percentage contribution)*
Equity	20	5.000
Long-term debts	30	3.333
Bank borrowing	25	4.000
Trade creditors	25	4.000
Total capital employed (%)	100	

We can now devise the performance index of funds management.

$$\text{Performance Index of funds management } (PI_{FM}) = \frac{\sum_{i=1}^{N} f_i e_i}{F_t N}$$

where: F_t = Total capital employed in the given year
f_t = Individual capital source
e_t = Equilibrium factor for the corresponding f_t
N = Total number of capital sources.
i = 1, 2, 3, …, N

Each stage in calculating PI_{FM} as per the above model has significance for measuring and monitoring the capital structure performance.

The equilibrium factors are policy-derived control valves for individual capital sources. These are designed to measure the deviation of a capital source from its assigned percentage contribution to the total capital employed by the enterprise. If a particular capital source is in consonance with the policy, then the model will give its value as 1. Let us break up the model to explain this.

We have seen before that Company C is in full equilibrium with all its capital sources. The performance index for an individual capital source, namely equity, will be as follows:

$$PI_{FM(E)} = \frac{\text{Equity} \times e}{F_t} = \frac{30 \times 5}{150} = 1$$

A similar result will be obtained for all other capital sources of Company C.

We can now calculate the performance indices of individual capital sources and also the overall performance index (PI_{FM}) of the four companies:

	Equity	*Long-term debts*	*Bank overdraft*	*Trade creditors*	PI_{FM}
Company A	$\frac{32 \times 5}{150}$	$\frac{35 \times 3.33}{150}$	$\frac{45 \times 4}{150}$	$\frac{38 \times 4}{150}$	$\frac{608.55}{150 \times 4}$
Index	1.07	0.78	1.2	1.01	1.02
Company B	$\frac{30 \times 5}{150}$	$\frac{57 \times 3.33}{150}$	$\frac{30 \times 4}{150}$	$\frac{33 \times 4}{150}$	$\frac{591.81}{150 \times 4}$
Index	1.00	1.27	0.80	0.88	0.986
Company C	$\frac{30 \times 5}{150}$	$\frac{45 \times 3.33}{150}$	$\frac{37.50 \times 4}{150}$	$\frac{37.50 \times 4}{150}$	$\frac{600}{150 \times 4}$
Index	1.00	1.00	1.00	1.00	1.00
Company D	$\frac{34 \times 5}{150}$	$\frac{30 \times 3.33}{150}$	$\frac{54 \times 4}{150}$	$\frac{32 \times 4}{150}$	$\frac{613.9}{150 \times 4}$
Index	1.13	0.67	1.44	0.85	1.02

Individual indices of capital sources of Company C and its PI_{FM} are all 1, signifying perfect equilibrium, as envisaged in its corporate financial policy.

The capital structures of all other companies are in disharmony with their corporate objective of RoE, though their operational performances are similar.

Overall performance indices of Companies A and D are more than 1. A close examination of the inter-se movement of the capital sources of these two firms will reveal that funds have moved from sources with lower equilibrium factors to sources having higher equilibrium factors. In case of Company B the opposite has happened; funds have moved from sources with higher equilibrium factors to sources having lower equilibrium factors. This inter-se movement of capital sources has resulted in a PI_{FM} of less than 1 for Company B.

The general rules that flow from these observations are as follows:

1. The capital structure of the firm will be in equilibrium if and only if indices of all capital sources are equal to 1. If any one of the indices

is not equal to 1, then PI_{FM} will also not be equal to 1, signifying a disequilibrium in the capital structure.

2. When the capital structure is not in equilibrium and PI_{FM} is greater than 1, it signifies movement of funds from capital sources with lower equilibrium factors (higher percentage contribution to total capital employed) to capital sources with higher equilibrium factors (lower percentage contribution to total capital employed).
3. When the capital structure is not in equilibrium and PI_{FM} is less than 1, it signifies movement of funds from capital sources with higher equilibrium factors (lower percentage contribution to total capital employed) to capital sources with lower equilibrium factors (higher percentage contribution to total capital employed).

These three rules laid down here are fundamental to managing and monitoring the capital structure of a business. If PI_{FM} is greater than 1 and capital sources with lower equilibrium factors are costlier than capital sources with higher equilibrium factors, then operation of rule 2 will push up the RoE, though within the given RoI. The same situation will occur by virtue of the operation of rule 3 if PI_{FM} is less than 1 but capital sources with lower equilibrium factors are cheaper than capital sources with higher equilibrium factors. We can understand the first case by taking the example of Company A and just reversing the cost of two capital sources, namely, long-term debts and bank overdraft.

		Company A
		Rs
PBIT		37.50
Less interest on:		
Long-term debts @ 20%	= 7.00	
Bank overdraft @ 15%	= 6.75	13.75
PBT		23.75
Less: Income tax @ 50%		11.87
		11.88
RoE		37.13%

It is clear that when long-term debts for Company A, whose PI_{FM} is greater than 1, have become costlier, the RoE has improved from 36.34 per cent to 37.13 per cent. This is because the equilibrium factor of long-term debts is higher than that of bank overdraft. We have already seen in the original example that Company B, whose PI_{FM} is less than 1, has registered the second highest RoE amongst the companies in disequilibrium, because the equilibrium factor for long-term debts was originally lower than that for bank overdraft. However, within a given RoI, whether such a RoE is desirable is debatable, from the point of view of the risk profile of various capital sources on the basis of which the firm originally decided on a particular capital structure policy.

The total capital employed for all the four companies has been uniform at Rs 150 in the second year of their operation. Hence, with a given RoI of 25 per cent, the PBIT of all the companies is also the same at Rs 37.50. In the third year, the total capital employed by these companies may be different because of dissimilar PAT figures and different dividend and reserve (retained profit) policies pursued by them. Any amount of profit retained by a company may enlarge its equity base. Other capital sources of the company must then be adjusted to keep the capital structure in equilibrium, with reference to the targeted RoE of 38.75 per cent p.a.

Let us now determine what should be the dividend policy of a company and consequent movement of its fund sources to enable it to reach an equilibrium capital structure within a targeted RoE (RoI remaining the same at 25 per cent). We will first calculate the movements of the capital structures of Company A, Company B and Company C towards equilibrium followed by explanations of the different strategies adopted by them.

	Company A		*Company B*		*Company C*	
Third Year						
Equity		32.00		30.00		35.82
Long-term debts		48.00		45.52		53.72
Bank overdraft		40.00		37.50		44.78
Trade creditors		40.00		37.50		44.78
Total capital employed		160.00		150.52		179.10
PBIT at 25% RoI		40.00		37.63		44.78
Less interest on:						
Long-term debts	7.20		6.83		8.06	
Bank overdraft	8.00	15.20	7.50	14.33	8.96	17.02
PBT		24.80		23.30		27.76
Less: Income tax		12.40		11.65		13.88
PAT		12.40		11.65		13.88
RoE		38.75%		38.83%		38.75%
Fourth Year						
Equity		38.60		35.83		42.76
Long-term debt		57.90		53.75		64.14

(Continued)

(Continued)

	Company A		*Company B*		*Company C*	
Bank overdraft		48.25		44.79		53.45
Trade creditors		48.25		44.79		53.45
Total capital employed	193.00		179.16		213.80	
PBIT at 25% RoI		48.25		44.79		53.45
Less Interest on:						
Long-term debt	8.68		8.06		9.62	
Bank overdraft	9.65	18.33	8.96	17.02	10.69	20.31
PBT		29.92		27.77		33.14
Less: Income tax		14.96		13.88		16.57
PAT		14.96		13.89		16.57
RoE		38.75%		38.75%		38.75%

CAPITAL STRUCTURE STRATEGIES FOLLOWED BY DIFFERENT COMPANIES

Company A: This company was in disequilibrium in the second year of operation (PI_{FM} = 1.02). It ended with a PAT of Rs 11.63. It did not want to change its equity base in the third year which remained at Rs 32. The equity being 20 per cent, total capital employed should have been Rs 160 in the third year. It paid out Rs 6.64 as dividend (slightly more than 50 per cent) and with the surplus reduced the bank overdraft to Rs 40. Other capital sources now increased by their designated proportion to total capital employed. In the fourth year no downward adjustment of any capital source is needed as a result of the enlargement of the equity base due to retained earnings (after paying dividend at 50 per cent of PAT). Total capital employed is first determined and then other capital sources are also increased in proportion to the total capital employed.

Company B: This company was in disequilibrium in the second year of operation (PI_{FM} = 0.986). It did not pay any dividend in that year but utilised the PAT entirely towards reducing its long-term debts to Rs 45.52. Its equity base remaining the same, it increased its bank overdraft and trade creditors by Rs 7.50 and Rs 4.50 respectively. In the third year of operation the Company still remained somewhat away from equilibrium as its RoE is 38.33 per cent. Out of a PAT of Rs 11.65 it paid out Rs 5.30 as dividend and retained Rs 5.83 to enlarge the equity to Rs 35.83. It then increased other capital sources accordingly in the fourth year of operation and consequently reached the equilibrium position.

Company C: This company was already in equilibrium in the second year of operation (PI_{FM} = 1). It could pursue a uniform dividend policy (50 per cent of PAT) in full. With the enlargement of its equity base due to retained earnings it increased other capital sources in proportion to the total capital employed and remained in equilibrium in both years.

FUNDS UTILISATION INDEX

'Capacity utilisation' of Funds is definitely reflected by the return it gives, i.e., RoI. Although in our earlier analysis we have kept RoI constant for all the four companies, it may not always be the case. A firm might have done well in a given year in terms of PI_{FM} but its RoI might have fallen from that of the previous year, signifying lesser utilisation of 'funds capacity' in generating operating profit. Overall efficiency of funds management is therefore affected by the ability of the enterprise to earn a stable, if not increasing, RoI. This aspect of funds management is captured by the following index.

$$\text{Funds utilisation index } (UI_{FM}) = \frac{RoI_t}{RoI_{t-I}}$$

As in the illustrative companies we have assumed a uniform RoI for all the three years, the UI_{FM} for these companies will be 1 throughout.

Measurement of efficiency of funds management is finally done by the following formula.

$$\text{Efficiency index of funds management } (EI_{FM}) = PI_{FM} \times UI_{FM}$$

As UI_{FM} of our illustrative firms are all 1, the efficiency index (EI_{FM}) will be the same as PI_{FM}.

FINANCIAL RISK RATIOS

The models discussed above attempt to measure the efficiency of three important management functions, namely, cost management, working capital management and funds management. It may have been observed that under cost management we have not considered interest cost, as it does not necessarily depend on sales but rather on the leverage performance of the enterprise giving rise to a particular capital structure. The capital structure may go out of balance under pressure of disproportionately high interest costs, and create disequilibrium in the working capital structure of the enterprise, in spite of a good sales performance. In such a situation, interest costs will rise and RoE will fall. The same result may also be obtained if the leverage of the firm shrinks, owing to a faulty capital structure policy of the firm, notwithstanding efficient functioning of cost and working capital management. Interest cost is predominantly a function of the capital structure of a business.

All varieties of return ratios of a business calculated with whatever denominator variable (assets, equity, sales, etc.) do not give any assurance to the company management or the outside investor that there shall not occur any variation (more particularly, downward variation) in these rates of return in future. Business managers and investors know from their experience that the only assurance they have in the matter is that there shall surely be variations in future returns. This is essentially what risk is all about.

As, in the ultimate analysis, returns depend upon sales, it is the variability in sales that makes the business risky. Since there shall be variation in sales it becomes important to know how vulnerable the return is to the variation in sales. The vulnerability of return principally depends on the cost structure of an enterprise. If all costs are variable to sales and aggregate of such costs is not more that 100 per cent of sales, the firm would not incur any loss even at zero level of sales. Although it is claimed that in the long run all costs are variable, in the short run it is difficult to ensure such a cost structure. Some costs remain fixed and have been paid for no matter what the level of sales is. The source of variation in operating profit, therefore, lies in the existence of fixed costs; its quantum would determine the degree of variation in operating profit as a result of variation in sales. Because of the existence of this fixed cost, the percentage change in operating profit due to a percentage change in sales will be greater than percentage change in sales. This vulnerability or simply speaking, the operating risk is measured by Operating Leverage Ratio.

OPERATING LEVERAGE RATIO

The ratio is calculated as shown below.

$$\text{Operating Leverage Ratio (OLR)} = \frac{\text{Contribution}}{\text{Contribution} - \text{Fixed costs}} = \frac{\text{Contribution}}{\text{Operating Profit}}$$

Let us understand the properties of this ratio with the help of the following example.

Particulars	*Rs*
Sales	100000
Less Variable costs (80%)	80000
Contribution	20000
Less Fixed costs	10000
Operating profit	10000

OLR = 20000/10000 = 2

If sales is increased by say, 10 per cent, the operating profit will increase by the OLR times the percentage rise in sales, that is,

2 × 10% = 20%

CHECK

Particulars	*Rs*
Sales increased by 10%	110000
Less Variable costs (80%)	88000
Contribution	22000
Less Fixed costs	10000
Operating profit	12000

The percentage rise in operating profit is

2000/10000 = 20%

Another property of the operating leverage is its symmetric behaviour. That is, if in the above example, sales decline by 10 per cent, the fall in operating profit will also be 20 per cent.

CHECK

Particulars	*Rs*
Sales decreased by 10%	90000
Less Variable costs (80%)	72000
Contribution	18000
Less Fixed costs	10000
Operating profit	8000

The percentage fall in operating profit is as shown below,

12000 – 10000/10000 = 20%

The risk lies in this symmetric behaviour of the OLR. An OLR of 1.5 is good while 2 is quite challenging. The business becomes more risky with the rise in OLR.

We can now revert to UEL and examine the movement of OLR. Costs of goods sold (COGS) are considered to be predominantly variable while selling, distribution and administration expenses (SDA) are considered to be predominantly fixed in nature. The figures have been taken from Table 3.1.

		X0	*X1*	*X2*	*X3*
	Net Sales (including scraps)	46232	55810	64580	70678
	Less Variable Costs (COGS)	36551	43472	49894	54879
A.	**Contribution**	9681	12338	14686	15799
	Less Fixed costs (SDA)	6139	7697	9268	10479
B.	**Operating profit**	3542	4641	5418	5320
	OLR(A/B)	2.71	2.66	2.71	2.97
	Trend			*Upward*	

It appears that the OLR of the company, which remained more or less stable during the first three years, is now showing signs of rising. The size of the ratio is also much beyond 2. This is primarily due to rise in fixed costs. The vulnerability of the operating profit of the company to variations in sale is moderately high.

FINANCIAL LEVERAGE RATIO

This ratio attempts to measure the impact of a percentage rise or fall in operating profit on the Profit Before Tax (PBT) of the enterprise. In other words it tries to assess the vulnerability of the financial structure of the business. It has often been found that, though the operating structure of the business is good with say, an OLR of 1.5, the financial structure is so high a cost that it eats into the profitability of the firm. The ratio is given by,

$$\text{Financial Leverage Ratio (FLR)} = \frac{\text{Operating Profit}}{\text{Operating Profit} - \text{Interest}} = \frac{\text{Operating Profit}}{\text{PBT}}$$

From our first example:

Particulars	*Rs*
Operating Profit	10000
Less interest cost	5000
Profit before tax (PBT)	5000
Financial leverage ratio (FLR)	2

FLR behaves the same way as OLR. If operating profit rises or falls by say, 10 per cent, then the PBT will rise or fall by

$2 \times 10\% = 20\%$

In our second example operating profit rose by 20 per cent with a 10 per cent rise in sales. The PBT will, therefore, rise by,

$2 \times 20\% = 40\%$

CHECK

Particulars	*Rs*
Operating Profit	12000
Less interest cost	5000
Profit before tax (PBT)	7000

Percentage rise in PBT due to a rise in operating profit is,

7000 – 5000/5000= 40%

FLR is as symmetrical as OLR. A percentage fall in operating profit will reduce the PBT by that percentage fall times the FLR. A high cost capital structure of a firm makes it vulnerable to the downward movement of the operating profit. An FLR of 1.5 indicates a good mix of debt and equity; 2 is challenging. The financial risk of enterprise increases as the FLR moves beyond 2. However, An FLR below 1 indicates that the firm is highly risk-averse and hence not taking up projects, which could add value to the business.

FLRs of UEL are calculated below.

	X0	*X1*	*X2*	*X3*
A. Operating Profit	3542	4641	5418	5320
Less Interest	2257	3269	4508	5093
B. PBT	1285	1372	910	327
FLR(A/B)	2.76	3.38	5.95	16.27

It appears that the company's financial structure has worsened over the years. The present size of the FLR is more than 16, which has thrown the company into severe financial crisis. A sharp rise in FLR is the primary indication that the company is either stretching itself too far or it has already entered into a debt-trap.

Analysts are often lured to marry the OLR with FLR to come up with a single ratio. This approach is faulty because the resultant ratio—Contribution/PBT—does not give any indication as to where to look for what. It should be remembered that the two ratios serve two different purposes. The OLR tells us about the riskiness of the operating structure, which may not have anything to do with the financial structure of the enterprise.

OVERALL CORPORATE EFFICIENCY

One may be tempted now to construct an efficiency measurement model for an enterprise as a whole by combining the three models. This may call for assignment of weights to the three management functions. Some may attribute equal importance or weights to all the three functions, in which case a simple average will serve the purpose. If different weights are assigned, a weighted average has to be taken. Assignment of weights will depend upon the user of the information or stakeholders of the business, e.g., the shareholders, management, lenders, supply creditors, rating agencies, etc.

SUMMARY

At the macro level, a business enterprise may be said to be functioning effectively if its sales are rising, costs are under control, current assets are not growing disproportionately to sales, and finally, its profitability is rising.

Overall corporate efficiency can be measured in terms of the efficiency with which costs, working capital and funds are being managed. Efficiency of these three management functions can be determined with the help of the following models.

1. *Efficiency of cost management* can be judged in terms of the product of the performance index and the expense utilisation index.

    A. Performance indices for individual cost elements are first developed. These indices are helpful for measuring and monitoring individual cost items. However, the performance index for the cost function as a whole may give a distorted picture because of aggregation. Hence, the need to bring in another factor called the expense utilisation index.
    B. Expense utilisation index, which is the ratio of total cost to net sales, measures utilisation of the cost pool ('working capacity') of the enterprise.

2. *Efficiency of working capital management* can be evaluated in terms of the increase in the level of current assets in relation to the increase in sales. The philosophy behind this is that the level of current assets should be reduced to the minimum. Performance indices for individual working capital items are first developed, followed by computation of the overall performance index. The working capital utilisation index is developed in a similar way as

that for cost management. It helps to measure how best the working capital has been used to generate sales. Finally the 'efficiency index' for working capital management is computed by multiplying the overall performance index for working capital management with the working capital utilisation index.

3. *Efficiency of fund management* is evaluated in terms of the parameters that go towards defining the optimal capital structure of an enterprise. The most important of these parameters are targeted RoI and RoE. Based on these, suitable leverage and dividend policies are determined. The capital structure having thus been determined, the equilibrium factors for each capital source (100/percentage contribution of the capital source to the total capital employed) are then used to compute the performance index of funds management. As a general rule, the capital structure of the firm would be in equilibrium, if and only if, the index of every capital source is equal to 1. A performance index greater than 1 indicates movement of funds from capital sources with lower equilibrium factors to those with higher equilibrium factors. If the capital source with higher equilibrium factors are cheaper than those with lower equilibrium factors, the RoE would increase, within the same RoI (and vice versa). The efficiency index of funds management is then derived as the product of the performance index and the utilisation index. The latter is nothing but the RoI Index of the enterprise.

An efficiency model for the enterprise as a whole could be developed by assigning appropriate policy weights to the three management functions.

Chapter 12

Financial Strategies of Growth Oriented Companies: A Ratio-Analytic Framework

Lo! as the wind is,
so is mortal life:
A moan, a sigh,
or a storm, a strife.

—*Edwin Arnold*

INTRODUCTION

Growth is a biological phenomenon, as is death; and in the process of growth the germs of death are sown. Nature ordains that movement along the growth path—from life to death—should be quasi-static in nature. It is predetermined by Nature that development means progress, through dynamic equilibria, which do not permit violent jerks and extraordinary strains on the system. If there are any such jerks and strains, Nature signals a warning to all and the steady state is disturbed. If the signal is overlooked or the warning not heeded, death comes prematurely—the final act of Nature.

LIMITS TO GROWTH

This cycle of life and death is known to all; yet it is a wonder that we often forget, or to put it more aptly, we do not want to remember, particularly when we are experiencing high growth. Ironically, this is the time when we need to remember this the most. Perhaps, what we should realise is that there are limits to growth. While it is true that there is no limit to human invention and innovation, growth variables are so arranged that only a particular rate of growth is possible at a particular time and space. If the system is strained to achieve beyond this predetermined rate, the ordered structure gets disturbed and catastrophe may take over the system.

HUMAN ORGANISATION

What is true of living organisms is equally true of organisations, because the greatest of all living beings—human beings—staff and manage these organisations. They carry with them their innate childhood (biological) need for growth. When they enter an organisation, the desire to grow remains, though biological growth has been completed by then. Organisational space replaces biological space. The organisational man now desires to grow within the organisation. Since his growth is most likely to depend upon the growth of the organisation, he continuously pushes the organisation along a growth path. This is how a tiny unit can grow into a mammoth multinational company.

GROWTH VARIABLES AND CONSTRAINTS

In this dynamic process whenever attempts are made to maximise growth variables, constraints are overlooked. It is forgotten that constraints often create the conditions for growth. The key word then is optimisation; not maximisation.

The most important growth variable of a business organisation is sales. Some other variables commonly called growth variables are, in fact, either instruments (assets) or resultant (profit) from sales. It is principally through sales that the market standing of a business is determined. Naturally, therefore, the major focus of a business is primarily on increasing sales.

Key supporting variables for sales are assets. Every item sold uses a part of the services released by fixed assets and blocks revenue (funds) in current assets. All these assets need investments, which may be obtained either as capital contribution (including savings in the form of reserves and surpluses) and/or loans (both short- and long-term). Financing strategies for sales expansion in a company essentially means financing an equivalent growth in assets.

These strategies are in effect the result of an exercise in optimisation between various sources of funds. Strategically it boils down to a particular debt-equity choice, as we shall see later.

IMPORTANCE OF CURRENT ASSETS

When we say that an expansion of sales requires a matching growth in assets to support it, for a concern which has already gone on-line, this predominantly means growth in current assets. This is because fixed assets like plant and machinery have already been installed with a designated capacity which is not going to change within a reasonably long period. However, a minimum amount of capital expenditure may have to be continuously committed for proper maintenance of the existing technological structure of the enterprise. It is important, therefore, to first analyse and understand the current assets structure of an enterprise and also examine the financing strategies for it.

CURRENT ASSETS AS CONSTRAINTS

Unlike fixed assets, analyses of current assets require detailed investigations into every item of current assets. Their financing also calls for detailed probing into each and every item of current liabilities as well as NWC, which is expected to come from long-term sources, i.e., primarily from equity.

Current assets are first generated essentially on the shop floor of an enterprise. The productive system of a manufacturing organisation operating under a given technology determines the core working capital of a business. This given technology, once installed, is expected to remain in an enterprise for a sufficiently long period of time, except in a few fast growing industries like electronics. This technology which embodies a manufacturing process, however, acts as the first constraint to the growth of a business. A perpetual motion machine, or for that matter, even a momentary production process, remains the ideal of scientists and technologists. A process may have more than one stage, each of which may take some minutes or hours; or the line itself may not be balanced, which would require balancing by addition of more work stations to different stages of the process.

The distributive system of a given product/business begins from the time of factory storage and ends when it reaches the final consumer, through different units of organisation along the chain like warehousing, wholesaler/distributor and retailer. Each of these units, including the final consumer, operating under their own constraints impose further constraints on the manufacturing enterprise. On the other side of the chain, raw material markets behave in a similar fashion with all the constraints of their trade practices, ordering time, etc., thus burdening the recipient enterprise with further constraints. The result of all these constraints is the blockage of funds into various current assets of the firm, namely, inventories, debtors and cash. Had there been no such constraints, the funds blocked in current assets could have been utilised for productive purposes. Current assets, though assets, are never desired by an enterprise. Their very existence denotes that a business is suffering from constraints and their levels indicate the degree of this suffering. Current assets contribute only negatively to the business. Given a choice, no entrepreneur would ever desire to hold current assets.

PROPORTIONALITY

Unfortunately, this desire is hardly ever fulfilled. Enterprises continue to hold current assets due to compulsive constraints and these need proper management and financing. As current assets are generated through complex but inter-related subsystems of an enterprise, which remain more or less constant under a given technology and distributive system (whose output is sales/production), they bear a close relationship, not only with sales/production but also with each other. If the technology is replaced or there are changes in the distributive system or practices, there may emerge new relationships between the variables, but these new relationships shall also remain more or less constant for the changed technology period. (Bhattacharya, 1990).

On the financing side also, similar relationships are observable among the financial variables, because the lending policy of financial institutions and banks as well as the market practices of supply creditors (who also suffer from the same technology and distributive constraints) remain more or less constant in a given period.

CASH FLOW

Prudent management of current assets and current liabilities should give rise to a flow of cash which is the life blood of an enterprise. This flow of cash, however, should be distinguished from stock of cash; the latter being a current asset taken as an insurance against unforeseen circumstances like lengthening of the productive-distributive line of the business. There are various measures of cash flow; the two most important being Profit Before Depreciation (PBD) and Profit Before Interest, Tax and Depreciation (PBITD) or simply Profit After Tax (PAT). These two measures are based on the income statement of an enterprise which do not include working capital items, namely, current assets and current liabilities. As a result of this, although these two measures can give a realistic indication of a company's cash position at times of steady sales, they often fail to do so when the corporate pendulum swings in the direction of faster sales or impending recession. On the contrary, these two measures give a disastrously euphoric feeling to managers that they have more cash or less cash than they really have (Stancill, 1987). This gives rise to wrong financing strategies of current assets, leading either to a shortage of real cash flow with which to pay the bills or excess cash balance with which the enterprise does not know what to do. Both the situations may ultimately drive an unit to sickness.

In what follows next we shall try to examine how this wrong strategy based upon an erroneous understanding of cash flow can ruin an enterprise. This hypothesis is based on the premise that an enterprise manager's prime motive is to grow and grow, particularly when the net profit (PBD or PBITD or PAT) of the enterprise is also growing with faster growth in sales. Unfortunately, all this net profit may not contain much cash flow to ensure a smooth running of the business, as we have seen while discussing priority obligations ratio in Section II of Chapter 4.

NET CASH FLOW APPROACH

We shall now try to capture the entire gamut of cash flow operations of a business within its working capital structure. The model is being developed within the general framework of the Tandon and Chore Committee recommendations on leading principles relating particularly to the norms for holding different current assets and current liabilities (Reserve Bank of India, 1975 and 1979) using the methodology for calculating permissible bank finance (PBF) for working capital (Bhattacharya, 1990). The model, which we may call the NCF model, is a growth model which will capture the arrangement of different growth variables at different rates of growth of a business.

The Model

Let S_o be the initial sales and '*g*' the rate of growth in sales. Growth in Sales (SLS) can be expressed as:

$$SLS = S_o (1 + g)^t \tag{1}$$

where t = 1, 2, 3, …, n period.

Cost of Goods Sold (COGS) has two components, one is the fixed part and the other which varies with sales. Hence:

$$COGS = A + cS_o (1 + g)^t \tag{2}$$

where '*A*' is the fixed portion of the expenses and '*c*' is the coefficient for variable expenses.

Debtors (DRS) for cash flow purposes will be:

$$DRS = dS_o (1 + g)^t \tag{3}$$

where '*d*' is percentage of sales made on credit,

However, DRS for purposes of calculation of PBF will be different because as per lending norms, DRS is to be held not in terms of sales but in terms of COGS.[1] Hence:

$$DRS = d[A + cS_o (1 + g)^t] \tag{4}$$

[1] Lending norms are as per Reserve Bank of India Guidelines. These have since been liberalised to allow banks to take debtors at full value while calculating PBF. This does not change the basic working capital structure of the firm.

Finished Goods Inventory (FGI) is also to be held in terms of COGS. Hence:

$$FGI = m\,[A + cS_o\,(1 + g)^t] \qquad (5)$$

where '*m*' is the percentage held as FGI.

Although Work In Process Inventory (WIP) is to be held in terms of Cost of Production (COP) as per norms, we are presenting it in terms of COGS. The difference between COGS and COP represents only the stock adjustment of FGI, which for the majority of normally functioning companies will not be much. Hence:

$$WIP = w\,[A + cS_o\,(1 + g)^t] \qquad (6)$$

For presentation or Raw Materials Inventory (RMI) in our scheme we first have to calculate Raw Materials Consumption (RMC). RMC is a variable expense and hence forms part of the total variable expenses represented by $cS_o\,(1 + g)^t$. Now taking '*k*' as the percentage representing RMC, it can be denoted as:

$$RMC = k\,cS_o\,(l + g)^t \qquad (7)$$

and

$$RMI = ik\,cS_o\,(1 + g)^t \qquad (8)$$

where '*i*' is the percentage representing RMI.

Other Current Assets (OCA) which are of minor value consisting of cash, accrued expenses, etc. can now be represented as follows:

$$OCS = o\,[A + cS_o\,(1 + g)^t] \qquad (9)$$

where '*o*' is the percentage held as cash and other current assets.

In terms of the lending norms prescribed by the Tandon and Chore Committees (Reserve Bank of India, 1975 and 1979), Selling and General Administration Expenses (SXP) appear after COGS. Hence, these are not inventoried for purposes of calculation of PBF. This can be denoted as:

$$SXP = X + h\, S_o\, (1 + g)^t \tag{10}$$

where '*X*' is the fixed part of SXP and '*h*' is the coefficient of variable part of the SXP.

In order to calculate the level of Sundry Creditors (CRS), we have to first calculate Raw Materials Purchases (RMP), because credit allowed by suppliers is in terms of purchase volume.

$$RMP = RMI^t + RMC^t - RMI^{t-1}$$

Replacing each of the above variables by equations (8), (7) and (8) respectively it can be rewritten as:

$$RMP = ikc\, S_o\, (1 + g)^t + kc\, S_o\, (1 + g)^t - ike\, S_o\, (1 + g)^{t-1}$$

$$\text{or } RMP = kc\, S_o\, [1 + (1 + i)\, g]\, (1 + g)^{t-1} \tag{11}$$

CRS will therefore be:

$$CRS = bkc\, S_o\, [1 + (1 + i)\, g]\, (1 + g)^{t-1} \tag{12}$$

where '*b*' is the percentage of purchases received on credit.

Combining current assets equations, i.e., DRS + FGI + WIP + RMI + OCA Gross Current Assets (GCA) for purpose of cash flow calculations can be simplified as:

$$GCA = S_o\, (1 + g)^t\, [c(m + w + o) + ikc + d] + A(m + w + o) \tag{13}$$

and

$$GCA^1 = cS_o\, (1 + g)^t\, [d + m + o + w + ik] + A(d + m + o + w) \tag{14}$$

for purposes of calculating PBF which is given by:

$q\, GCA^1 - CRS$.

Replacing the latter we get:

$$PBF = q\, [cS_o\, (1 + g)^t\, (d + m + o + w + ik) + A(d + m + o + w)] - bkc\, S_o\, [1 + (1 + i)\, g]^{t-1} \tag{15}$$

where '*q*' is the margin requirement as percentage of GCA demanded by banks under method II of lending norms.

Interest on bank finance (CCI) for working capital is given by:

$$CCI = e\,[q\,(GCA^1) - CRS] \tag{16}$$

where '*e*' is the rate of interest on cash credit.

Term loan being a contract with the lender for repayment in periodic instalments we should determine the instalment payment (TLT) as follows:

$$TLT = (L_o\, l)\,\theta\,(t - \tfrac{1}{l}) \tag{17}$$

The amount of term loan (TLN) at any periodic interval will, therefore, be:

$$TLN = L_o\,(1 - lt)\,\theta\,(t - \tfrac{1}{l}) \tag{18}$$

$$\text{INTEREST ON TERM LOAN (TLI)} = L_o\,[1 - 1\,(t - 1)]\,r\,\theta\,(t - \tfrac{1}{l}) \tag{19}$$

where L_o = initial amount of term loan;
1 = periodic instalment payment as percentage of L_o;
r = rate of interest on term loan; and
$\theta\,(t - \tfrac{1}{l}) = o$ for $t > \tfrac{1}{l}$ and 1 for $t \leq \tfrac{1}{l}$

Depreciation (DPN) on fixed assets though not an outflow of cash is deductible from profit for tax purposes. This can be written as:

$$DPN = vF_{t-1} \tag{20}$$

where '*v*' is the rate of depreciation.

Other variables used in this model are simply addition and/or deduction of one variable or a group of variables from another variable or a group of variables discussed earlier. We are, therefore, not giving their full algebraic form. These are written only in their generic forms.

$$PBIT = SLS - (COGS + SXP + DPN) \tag{21}$$

$$PBT = PBIT - (TLI + CCI) \tag{22}$$

$$PAT = PBT\,(1 - u) \tag{23}$$

where '*u*' is the tax rate.

$$\text{Cash Profit (CPF)} = \text{PAT} + \text{DPN} \tag{24}$$

$$\text{Dividend (DIV)} = p\,(\text{PAT}) \tag{25}$$

$$\text{Research \& Development Expenditure (RND)} = j(\text{PAT}) \tag{26}$$

$$\text{Capital Expenditure (CEX)} = f(\text{PAT}) \tag{27}$$

where ‘*p*’, ‘*j*’ and ‘*f*’ respectively are percentages of PAT allocated.

$$\begin{aligned}\text{Surplus (SUR)} &= \text{PAT} - (\text{CEX} + \text{RND} + \text{DIV})\\ \text{OR} &= \text{PAT}\,[1 - (p + j + f)]\end{aligned} \tag{28}$$

The general equation for cash flow from operations (CFO) can now be written as:

$$\text{CFO} = \text{PAT} + \text{DPN} + \text{A CRS} - \text{A GCA} \tag{29}$$

where $\Delta\ \text{CRS} = \text{bkc}\ S_o\ g\ [1 + (1 + i)\ g]\ (1 + g)^{t-2}$
and, $\Delta\text{GCA} = S_o\ g\ [c(w + m + o) + ikc + d]\ (1 + g)^{t-1}$

$$\begin{aligned}\text{NCF} &= \text{CFO} - (\text{TLT} + \text{CEX} + \text{RND} + \text{DIV})\\ \text{or} &= \text{PAT}\,[1 - (p + j + f)] + \text{DPN} + \text{A CRS} - \Delta\ \text{GCA} - \text{TLT}\end{aligned} \tag{30}$$

Fixed assets (FAT) at the end of a designated period can be written as:

$$\text{FAT} = F_t = F_o\,(1 - v)^t + \sum_{i=1}^{t} \text{PAT}_i \times f\,(1 - v)^{t-1} \tag{31}$$

where ‘F_o’ is the initial Fixed Assets and ‘v’ is the rate of depreciation.

$$\text{Share Capital (CAP)} = \text{CAP}_o \tag{32}$$

which is assumed to remain constant in the projected period.

Now:

Designate CAP; SUR; TLN; PBF; CRS as *Liabilities;*
Designate FAT; DRS; RMI; FGI; WIP; OCA as *Assets.* and finally:

$$\text{Fund Gap (GAP)} = \text{Assets} - \text{Liabilities} \tag{33}$$

Assumptions and Explanations

The basic assumptions of this model are the unchanging market conditions and technology. This is nothing new. Similar assumptions are made for project evaluation. The effect of these assumptions is an unchanging cost and working capital structure of the enterprise. For individual variables the basic assumptions boil down to the following:

1. COGS as a percentage of sales remains constant.
2. RMC as a percentage of COGS remains constant.
3. SXP is divided into two parts through a linear regression equation of y = mx + b type.
4. In case of depreciation written down value method has been followed. Depreciation percentage is fixed.
5. Dividend as a percentage of PAT is taken to remain constant. This is a normal practice followed by a majority of companies. Although dividend is classified as a discretionary outflow, a company can hardly use this discretion. For a growing company, shareholders demand an increasing return on their equity capital. This, however, does not call for an increasing pay out ratio. A fixed percentage on a growing PAT can take care of this. For the purpose of this model the percentage is taken to fall in line with the previous trend of an individual company.
6. Without envisaging any technology replacement, a company in order to stay in business in a competitive environment, has to spend some minimum amount on R&D and some minimum sum on capital expenditure for keeping the productive system efficient. For the purpose of this model both these are taken to be 10 per cent of PAT except in the case of the metal product company where it is taken at 5 per cent.
7. Income tax as a percentage of PBT is the average rate paid by an individual company after availing itself of various concessions, rebates, etc. available under the Act.
8. The turnover ratios (expressed in percentage form in our model) of all current assets and sundry creditors are assumed to be constant, as these ratios basically reflect the total effect of prevalent technology and market practices on a given unit in an industry and the relative position of the company with respect to its customers. These ratios normally do not change much, except in the long run. Essentially then, cash flow can be divided under the following three groups:

    1. *Cash flows which vary either directly or implicitly with sales*
        A. Cost of goods sold
        B. Variable selling and general administration expenses

C. Change in debtors
D. Change in inventories (FGI, RMI and WIP)
E. Change in other current assets
F. Change in creditors and working capital finance (PBF)
G. Interest on working capital finance (PBF)

2. Cash flows which remain fixed
A. Fixed selling and general administration expenses
B. Term loan instalments
C. Term loan interest

3. *Cash flows which vary with profit*
A. Income tax
B. Dividend
C. Minimum capital expenditure
D. R&D expenditure

Deciding the Sample for Study

The financing strategies of current assets of various enterprises, as they grow, are now tested on the basis of the above model. For this purpose we chose seven industry groups and one company each from these groups, except textiles and chemicals, from which three and two companies respectively were taken. All these companies (including the first company from the textile and chemical industries) represent a random number from the random number table. More than one company was chosen from the textile and chemical industry groups because we wanted to examine whether the sickness suffered by the chosen companies and these two industries in general was due to a wrong growth strategy followed by them in the face of faster growth in sales. A trading company was finally included in the sample to see whether the hypothesis is equally applicable for a trading enterprise as well. Table 12.1 summarises the sample chosen.

Findings of Empirical Investigation

We have chosen four representative companies from the sample which reflect the general findings and conclusions of this study. In order to maintain anonymity, these companies are named by the industry to which they belong. These are listed in Table 12.2 along with certain special parameters.

Table 12.1
Number of Sample Companies in Various Industry Groups

Industry group	*No. of companies*
Textiles	3
Tyres and tubes	1
Automobiles	1
Chemicals	2
Metal products	1
Drugs and Pharmaceuticals	1
Paints and dye stuff	1
Trading companies	1
Total	11

Source: Bombay Stock Exchange Directory and Annual Reports of the sample companies.

Table 12.2
Reporting Companies

Name / *Parameters*	*Textile company*	*Chemical company*	*Metal products company*	*Automobile company*
Income tax (% of PBT)	30	50	50	15
Dividend (% of PAT)	20	35	50	49
Capital expenditure (% of PAT)	10	10	5	10
Research and development expenditure (% of PAT)	10	10	5	10

As mentioned earlier, the parameter for income tax is determined on the basis of the average tax liability of the company after taking into consideration different concessions and rebates availed of by an individual company. The parameter for dividend captures the past practice of the company. It has been assumed that both the parameters will remain stable during the period under study. The parameters for capital expenditure and R&D have been discussed earlier.

The projections based on the NCF model take off from zero year, which is the year immediately after which a particular company began growing at rates much faster than its average growth rate during the five years prior to zero year. In Tables 12.3–12.13, five important growth variables are projected at different rates of growth. Figures 12.1–12.11 show PAT and NCF for the various companies.

Table 12.3
Textile Company (growing at 7% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Sales	2761	2954	3161	3382	3619	3872	4144
Profit After Tax (PAT)	127	130	141	151	159	168	176
Retained earnings	76	78	85	90	96	101	106
Total assets	2417	2500	2589	2693	2810	2942	3090
Net Cash Flow (NCF)	–	21	5	26	32	37	40

Table 12.4
Textile Company (growing at 12.5% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Sales	2761	3106	3494	3931	4423	4975	5597
Profit After Tax (PAT)	127	131	149	162	176	190	205
Retained earnings	76	92	104	114	123	133	143
Total assets	2417	2451	2632	2849	3104	3399	3741
Net Cash Flow (NCF)	–209	–93	1	2	–1	–6	

Table 12.5
Textile Company (growing at 13% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Sales	2761	3120	3526	3984	4502	5087	5748
Profit After Tax (PAT)	127	134	149	163	177	191	207
Retained earnings	76	80	89	98	106	115	124
Total assets	2417	2607	2826	3085	3386	3736	4140
Net Cash Flow (NCF)	–	29	–66	–44	–48	–56	–67

Table 12.6
Chemical Company (growing at 22% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Sales	5383	6567	8012	9775	11925	14549	17749
Profit After Tax (PAT)	774	1010	1281	1606	2000	2479	3060
Retained earnings	348	455	576	723	900	1115	1377
Total assets	3113	3686	4404	5292	6389	7736	9389
Net Cash Flow (NCF)	–	–65	–64	–5	36	83	138

Table 12.7
Chemical Company (growing at 28% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Sales	5383	6890	8820	11289	14450	18496	23675
Profit After Tax (PAT)	774	1070	1429	1883	2461	3197	4138
Retained earnings	348	481	643	847	1107	1439	1862
Total assets	3113	3840	4793	6030	7629	9688	12336
Net Cash Flow (NCF)	–	–165	–196	–162	–158	–155	–154

Table 12.8
Metal Products Company (growing at 9% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Sales	4566	4977	5425	5913	6445	7025	7658	8347	9098
Profit After Tax (PAT)	258	297	340	385	433	485	542	603	670
Retained earnings	103	119	136	154	173	194	217	241	268
Total assets	3177	3325	3499	3702	3931	4149	4482	4808	5169
Net Cash Flow (NCF)	–	66	37	64	67	70	75	81	87

Table 12.9

Metal Products Company (growing at 13% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Sales	4566	5160	5830	6588	7445	8413	9506	10742	12138
Profit After Tax (PAT)	258	313	376	444	521	607	704	813	936
Retained earnings	103	125	150	178	208	243	282	325	374
Total assets	3177	3417	3706	4046	4442	4903	5432	6041	6738
Net Cash Flow (NCF)	–	18	–27	5	3	1	0	–1	–2

Table 12.10

Metal Products Company (growing at 17% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Sales	4566	5342	6250	7313	8556	10011	11713	13704	16033
Profit After Tax (PAT)	258	329	413	509	619	748	898	1073	1277
Retained earnings	103	132	165	203	248	299	359	429	511
Total assets	3177	3510	3920	4416	5011	5722	6566	7565	8744
Net Cash Flow (NCF)	–	–31	–94	–64	–77	92	–109	–128	–150

Table 12.11
Automobile Company (growing at 40% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Sales	28250	39550	55370	77518	108525	151935	212709	297793	416910
Profit After Tax (PAT)	5270	5900	9076	13427	19466	27872	39599	55979	78877
Retained earnings	3689	2360	3630	5371	7786	11149	15840	22392	31551
Total assets	20256	25235	32135	42182	56591	77067	106002	146750	204008
Net Cash Flow (NCF)	–	–769	1156	1980	2898	4186	5990	8517	12054

Table 12.12
Automobile Company (growing at 60% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Sales	28250	45200	72320	115712	185139	296223	473956	758330	1213328
Profit After Tax (PAT)	5270	7102	12548	21121	34760	56516	91265	146809	235632
Retained earnings	3689	2841	5019	8448	13904	22606	36506	58724	94253
Total assets	20256	27785	39880	59787	92129	144314	228196	362748	578335
Net Cash Flow (NCF)	–	–1858	82	705	1310	2218	3836	6327	10313

Table 12.13

Automobile Company (growing at 80% p.a.)

(Rupees lakh)

Year / *Variables*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Sales	28250	50850	91530	164754	296557	533803	960845	1729522	3113139
Profit After Tax (PAT)	5270	8303	16502	31068	57189	104120	188516	340360	613617
Retained earnings	3689	3321	6601	12427	22876	41648	75406	136144	245447
Total assets	20256	30334	48644	82325	143592	254439	454467	814963	1464252
Net Cash Flow (NCF)	–	–2948	–1427	–1784	–2974	–5122	–8956	–15873	–28322

Figure 12.1
Textile Company
(Growing at 7% per annum)

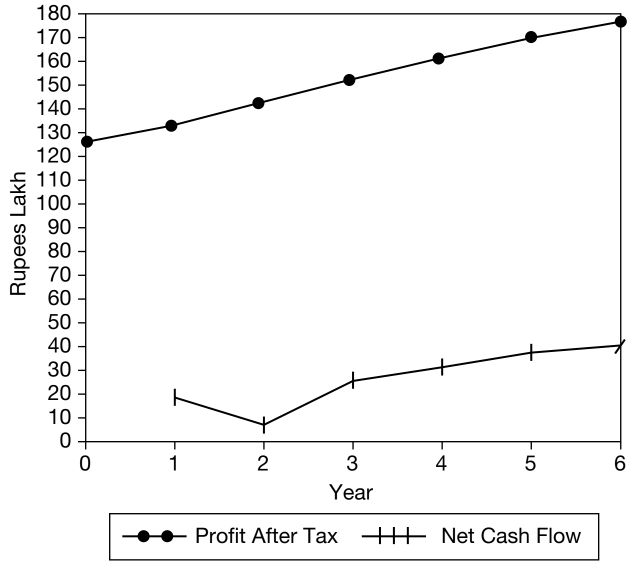


Figure 12.2
Textile Company
(Growing at 12.5% per annum)

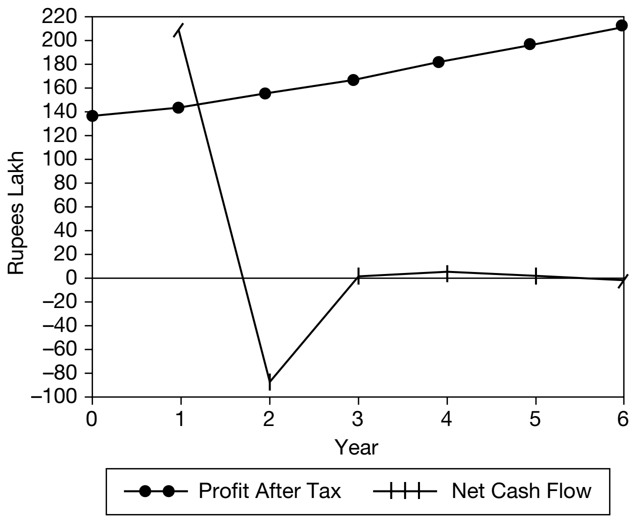


Figure 12.3
Textile Company
(Growing at 13% per annum)

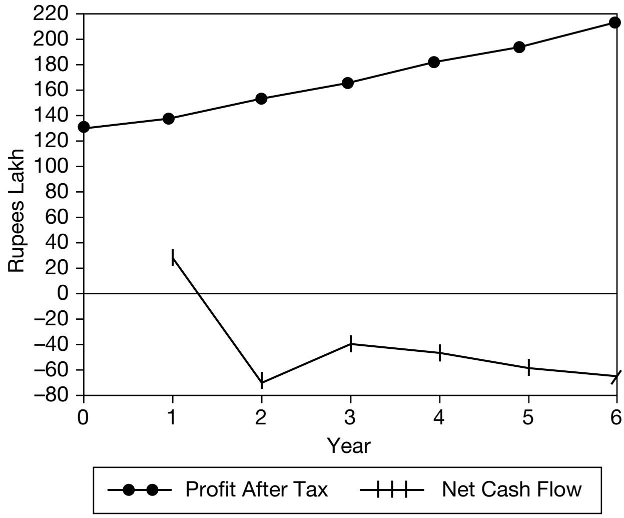


Figure 12.4
Chemical Company
(Growing at 22% per annum)

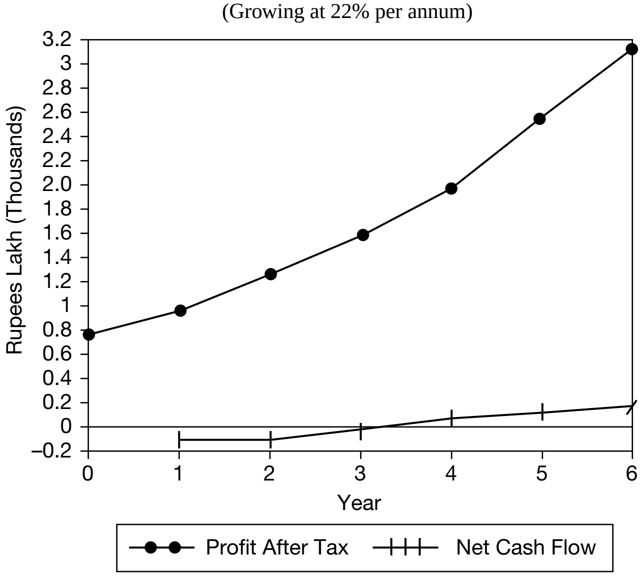


Figure 12.5
Chemical Company
(Growing at 28% per annum)

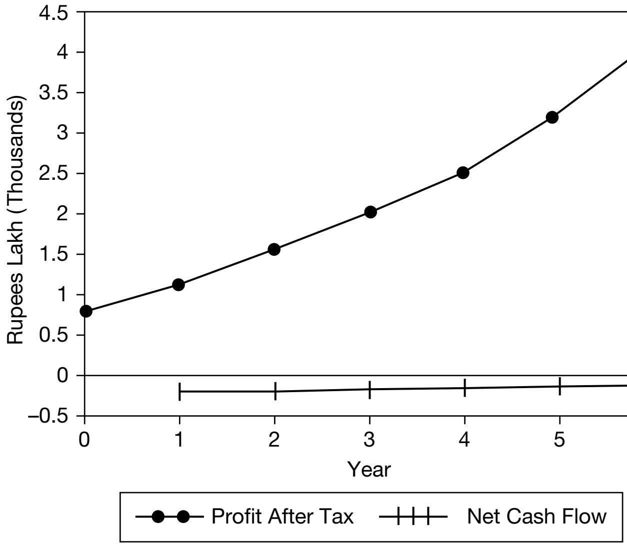


Figure 12.6
Metal Products Company
(Growing at 9% per annum)

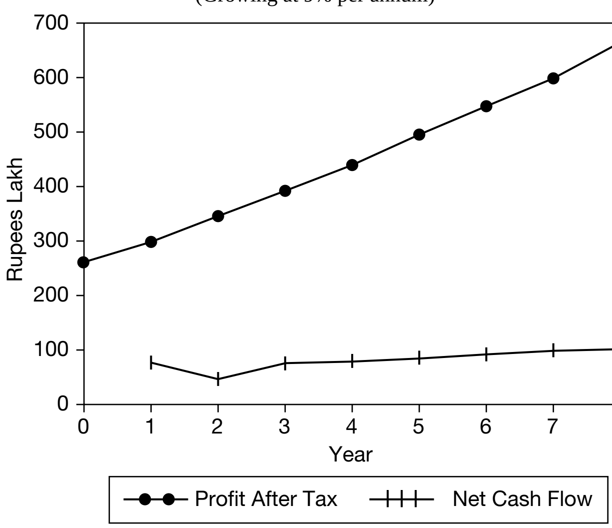


Figure 12.7
Metal Products Company
(Growing at 13% per annum)

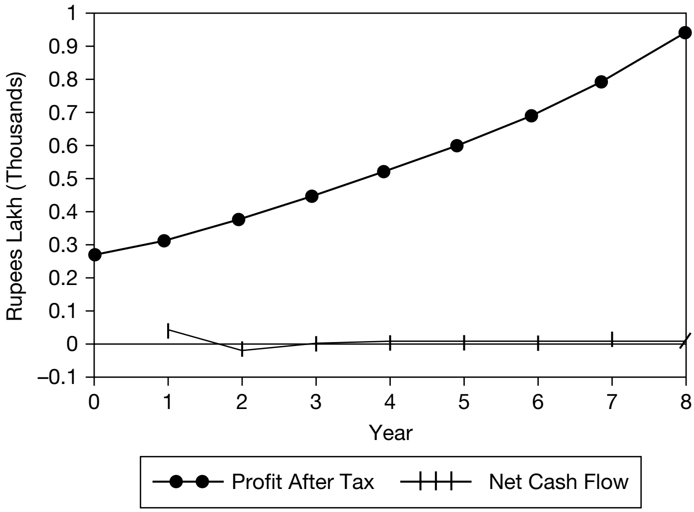


Figure 12.8
Metal Products Company
(Growing at 17% per annum)

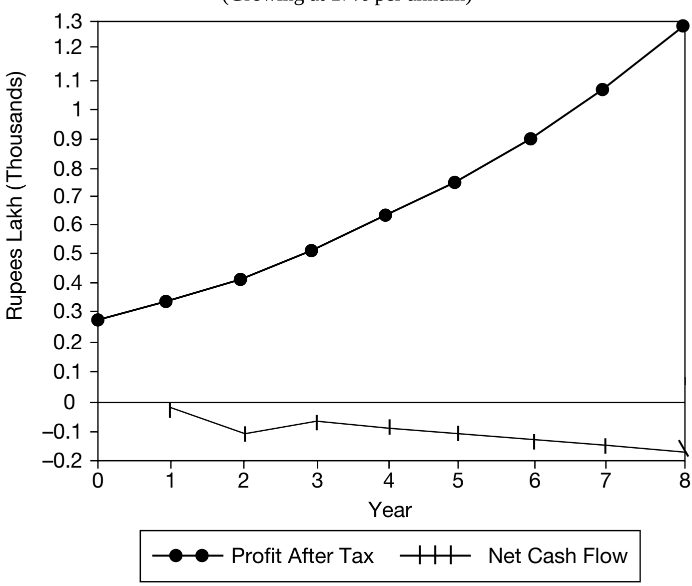


Figure 12.9
Automobile Company
(Growing at 40% per annum)

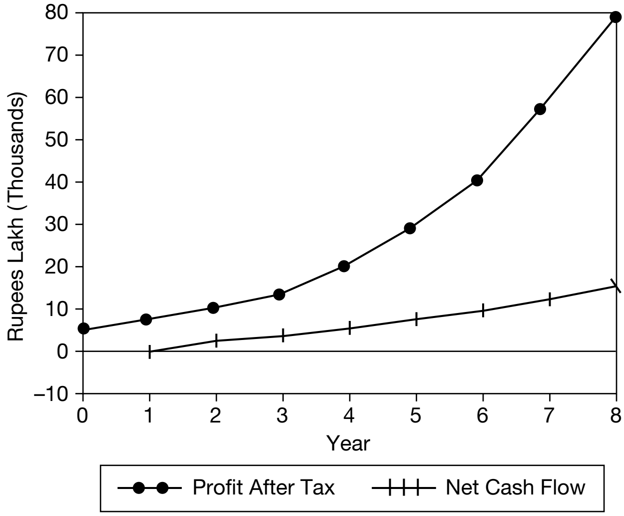


Figure 12.10
Automobile Company
(Growing at 80% per annum)

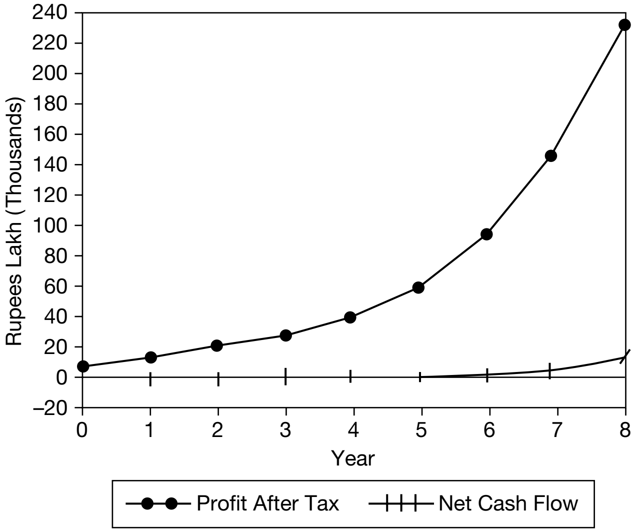
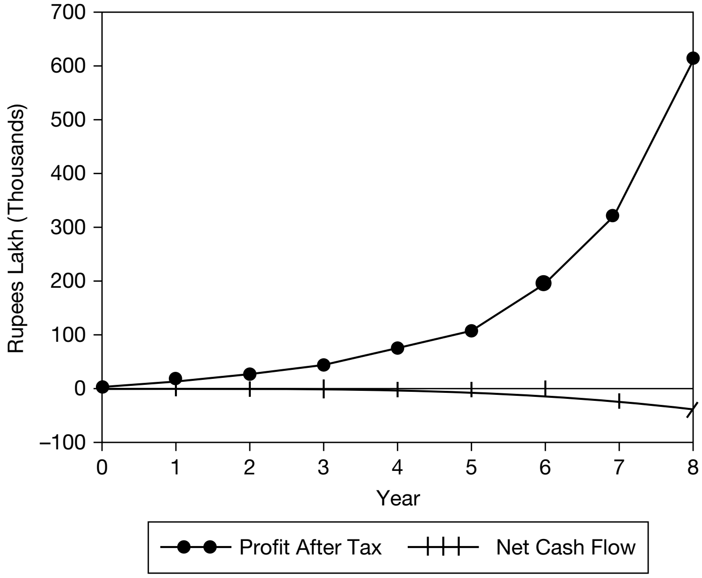


Figure 12.11
Automobile Company
(Growing at 90% per annum)



It can be seen that when all these companies grow at a moderate rate PAT and NCF are both positive. However, when they want to grow at a rapid pace, growth of PAT is phenomenal but NCF becomes negative, which immediately suggests that the companies' financial structures cannot withstand such a rapid expansion. The prospect of this phenomenal growth in PAT lures enterprise managers to grow at a rapid pace but since the cash position—which is often lost sight of—cannot sustain such ambitious expansion, the company enters a liquidity crisis. The dialectic of growth is such that once a company decides to grow rapidly and presses the growth button, growth takes on its own speed. It is difficult then to retrace steps. In most cases the decision becomes irreversible. A company which was growing soundly at a moderate rate starts going downhill, because it wanted to grow faster than the designated rate.

This leads us to conclude that every enterprise has a unique maximum rate of growth under a given technology and market condition, which does not change except in the very long run. This rate is unique for a given enterprise, which may not have direct relation with the average growth rate of the industry to which the enterprise belongs. This is because movement of a number of growth variables is dependent upon the internal decision-making environment of an organisation which include, inter alia, the risk taking behaviour of the management.

It can also be seen that, ignoring the take off year, the textile company suffers from a negative NCF when it attempts to grow beyond 12.5 per cent p.a. The NCF dips down rapidly as it tries to grow beyond the threshold rate. For the metal products company a similar situation is reached at around 13 per cent rate of growth. The chemical company hits the bottom at around 22 per cent but the automobile company reaches such a stage at a very high threshold level, between 60 per cent and 80 per cent. The textile company became a sick unit within three years of its attempt to grow at 16 per cent p.a. The case was finally referred to the Board for Industrial and Financial Reconstruction. The chemical company met with the same fate within two years of its attempt to grow at 24 per cent. The metal products company suddenly closed down after four years, during which it was growing between 15 to 18 per cent in each year. The automobile company is still doing very well, though its growth rate has since fallen. All these findings give us some idea about the maximum permissible growth rate for each of these companies.

DETERMINING THE LIMITS TO GROWTH

While it is evident now that every business enterprise is endowed with a maximum permissible growth rate determined by its technological, managerial and market environment, the rate is not always known to the enterprise. It may also be that the enterprise managers in their desire to grow do not always analyse the financial structure of their businesses, which is a product of the above three factors. A strategy for financing growth generally gets shaped within such a financial structure.

Any financing strategy essentially depends upon the capacity of a firm to raise and service a particular type of capital. In both competitive and controlled economies, capacity is dominantly externally determined. Servicing is not. It is principally internally determined. In the case of equity as a source of financing, the question of servicing looms large in the minds of finance managers than in the case of debt, for the singular reason that servicing equity is a perpetual obligation and this obligation rises over time. Although payment of dividend is discretionary in nature, no company management can afford to use this discretion to the disadvantage of equity stakeholders. Even when the company's profits are low or there is such an emergency that dividend payment should be reduced to zero, management is often found to be reluctant to use this discretion (Donaldson, 1962).

CAPITAL APPRECIATION

Moreover, equity stakeholders demand, though not directly from the company as such, an appreciation of capital invested by them. Although this appreciation takes place in the secondary market, and the company management never gives any direct assurance to its stakeholders about any such appreciation, they cannot afford to ignore it. This appreciation essentially depends upon the actual growth and growth prospects of a company.

RETAINED EARNINGS

There is a general belief among equity stockholders that in order to enable their company to grow they must sacrifice a part of the profit and retain it in the company, which they will eventually get back in the form of increased dividend and capital appreciation in the secondary market. This belief is invariably hammered in at every annual general meeting of shareholders. Unfortunately, this belief is often found to be placed in the realm of fantasy. Even in the United States, a close examination of 50 of the largest mature publicly held companies revealed that in most of the cases profits simply never found their way to shareholders, either as dividends or as higher share value over time. For more than half of these companies a large portion of retained earnings simply disappeared and they include many renowned corporate champions like Coca-Cola, Procter & Gamble and American Express to name a few (Ball, 1987).

If we assume that retained earnings are invested by a company for the long-term benefit of the shareholders, it can be regarded as a deferred dividend. This deferred dividend may come to the shareholders in the form of real dividends, bonus shares and capital appreciation in the secondary market. This is how an equity shareholder is enriched. One of the major ways by which a shareholder is enriched is by market appreciation of his shares, which taken together with dividend pay out and bonus shares should, over a period of time, compensate the stakeholder for the earnings he has been retaining in the business. If, however, the shareholders' enrichment falls below the retained earnings, it may be that the market has decided that the enterprise is investing its retained earnings ineptly (Ball, 1987). One of the reasons for inept use of retained earnings is the adequacy or otherwise of its provision—it has to be at a level matching with the desired growth in sales. If it is inadequate, not only will the desired growth in sales not be achieved, savings may also be frittered away. On the other hand, if it is excessive as compared to the target rate of sales growth, the excess fund will remain idle, which will depress the return on equity and consequently the market price of its shares, and hence, shareholders' enrichment.

Retained earnings are important in financing the growth of a business by providing additional equity, on the basis of which the company can fetch additional debt. A business enterprise operates within a given financing pattern, which may be competitively determined in the market or by government fiat, as in a controlled economy. Debt and equity together form the capital structure of a business to finance assets. As any expansion in sales demands a matching growth in assets, and retained earnings determine the availability of additional capital to finance the required expansion, consequent upon a particular growth in sales, retained earnings turn out to be the most important growth variable of a business enterprise. The importance of retained earnings was aptly highlighted by Aragon (1982) when he said that the growth potential of a company is essentially determined by the amount retained by a business. If a company attempts to grow faster than its growth potential, it will run into trouble. Most rapidly growing companies fail to foresee this difficulty and ultimately find themselves in a severe liquidity crisis. Often the only answer to the severe liquidity problem is a cut back in growth plans.

THE GROWTH MODEL

The above hypothesis can be captured by the following simple model:

$$G = \frac{r(1+d)}{a-[r(1+d)]}$$

where G = Potential growth rate
a = Asset/Sales ratio
r = Retained earning as percentage of sales
d = Debt equity ratio

It may be further clarified that *a* gives assets required for a given amount of additional sales; *r* gives equity available in the form of retained earnings for a given amount of sales; *d* gives debt available for a given amount of equity and finally, *r (1 + d)* gives funds available from a given amount of additional sales to acquire assets required to support further sales.

Simulated Exercises

The model can be tested by the following simulated exercises: Let us assume the following for a company:

a = 0.50
d = 2
r = 0.03

Potential growth rate of this company should be:

$$G = \frac{r(1+d)}{a-[r(1+d)]}$$

or

$$G = \frac{0.03(1+2)}{0.50-0.03(1+2)}$$

or

$$G = 21.95\%$$

Let us see what happens when this company, within the given parameters, grows at 21.95 per cent annually (Table 12.14) and when it tries to grow beyond that rate, say at 25 per cent (Table 12.15).

Table 12.14
Case I
Sales growing at 21.95% p.a.

Year	*Sales*	*Assets*	*Δ Assets*	*Δ Equity*	*Δ Debt*	*Shortage/Excess (Col. 5+6–4)*
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
0	10000	5000	5000	1667	3333	—
1	12195	6098	1098	366	732	—
2	14872	7436	1338	446	892	—
3	18136	9068	1632	544	1088	—
4	22117	11058	1990	663	1327	—
5	26972	13486	2428	810	1618	—

Table 12.15
Case II
Sales growing at 25% p.a.

Year	*Sales*	*Assets*	*Δ Assets*	*Δ Equity*	*Δ Debt*	*Shortage/Excess (Col. 5+6–4)*
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
0	10000	5000	5000	1667	3333	—
1	12500	6250	1250	375	750	–125
2	15625	7812	1562	469	938	–155
3	19531	9765	1953	586	1172	–195
4	24414	12207	2442	732	1465	–245
5	30518	15259	3052	916	1831	–305

It is seen that in Case 1, the company can grow up to its potential growth rate, i.e. 21.95 per cent, without any liquidity problem, but if it plans to grow beyond that rate, say at 25 per cent p.a., it immediately faces a liquidity crisis. If the company pursues this higher growth rate it will soon become sick. The company may either have to retrace its steps to fall within its potential growth rate or will have to continuously supply equity funds at an increasing rate, either from additional retained earnings or from fresh issue of equity shares. If it can do neither, then the only other option available is to renegotiate a still higher debt equity ratio with financial institutions, banks and other creditors. All these avenues are not always open to an enterprise because additional retained earnings mean lower dividends to shareholders, which the latter may resist; fresh issue of equity capital may not be acceptable to the market; and finally, it is very difficult to make financing agencies agree to a higher debt equity ratio beyond normal standards.

INFINITE GROWTH

Retained earning is, therefore, the kingpin among growth variables, because it is the determining variable for fund availability to a business to finance assets required for sales expansion. However, the aim of a business enterprise is always to grow, and hence, the enterprise manager will desire to look for such an arrangement of growth variables which enables the enterprise to grow at any rate ad infinitum. If we examine the growth model given earlier we can see that when $r(1 + d) = a$, sales can grow at any rate infinitely. Hence, retained earnings as percentage of sales or r should be as follows:

$$r = \frac{a}{1+d}$$

On the other hand when $r(1 + d) = a$, then the enterprise will garner more funds than is required to finance additional assets to support increased sales. This will first result in lesser dependence on debt financing and then in idle funds. The latter may depress the shareholders' enrichment unless a diversification plan is formulated.

Now keeping r and a constant, debt equity ratio or d can also be changed to permit larger or infinite growth. This can be derived in the following manner:

For infinite growth: $a = r(1 + d)$

or

$$\frac{a}{r} = 1 + d$$

or

$$d = \frac{a}{r} - 1$$

Empirical Support

Let us now go back to the study of four companies analysed in this chapter. Required parameters for the growth model presented here are given in Table 12.16 for these four companies.

Table 12.16
Growth Parameters

Parameters	*Textile company*	*Chemical company*	*Metal products company*	*Automobile company*
Total debt equity ratio *(d)*	2.40	0.55	2.44	1.36
Assets sales ratio (*a*)	0.875	0.578	0.696	0.717
Retained earnings as % of sales *(r)*	0.0275	0.0646	0.0225	0.130

It may be mentioned that we have taken total debt equity ratio which includes, for purposes of debt, both long-term and short-term borrowings plus sundry creditors, because in calculating the assets sales ratio we have taken both long-term (fixed assets) and short-term assets (current assets) at different rates of growth of sales.

Maximum permissible growth rate of sales for all the above four companies can now be calculated.

Textile Company:

$$G = \frac{r(1+d)}{a-[r(1+d)]} = \frac{0.0275(1+2.40)}{0.875-[0.0275(1+2.40)} = 0.1196 \mathbf{V}\ 12\%$$

(*Table 12.4 and Figure 12.2 will support this finding*)

Chemical Company:

$$G = \frac{0.0646(1.55)}{0.578-0.0646(1.55)} = 0.210 \mathbf{V}\ 21\%$$

(*Table 12.7 and Figure 12.4 suggest this rate*)

Metal Products Company:

$$G = \frac{0.0225(3.44)}{0.696-0.0225(3.44)} = 0.125 \mathbf{V}\ 12.5\%$$

(*Table 12.9 and Figure 12.7 suggest this rate*)

Automobile Company:

$$G = \frac{0.130(2.36)}{0.717-0.130(2.36)} = 0.75 \mathbf{V}\ 75\%$$

(*Table 12.12 and Figure 12.10 support this finding*)

SUMMARY

The most important growth variable of a business organisation is sales; the key supporting variables being assets, both fixed and current. Financing strategies for sales expansion essentially boil down to choosing an optimal debt equity ratio. In a company's attempt to maximise the growth variables, it is essential not to overlook the constraints, because the key word is optimisation and not maximisation.

The first constraint to growth is the technology of the manufacturing process, as it is the major determinant of the core current assets of the business. The next set of constraints emanates from the distribution system of the enterprise. Management of all these constraints leads to the building up of current assets, which bear a close relationship with the level of sales of the organisation. Current assets are financed partly by trade creditors and partly by bank borrowing and net worth. Prudent management of current assets and liabilities should generate enough cash flows to cover priority obligations and discretionary investments. Historically the cash generating ability of a business is measured either by PBIDT or simply by PAT. However, the use of these two parameters for measurement of cash flows may often lead to severely erroneous results—profits may simply not contain any cash! The NCF approach is a far superior model to judge the cash generation capacity of a business. It captures the entire gamut of cash flows of a business within its working capital structure. The cash flows can be segregated in terms of those which vary directly or implicitly with sales; those which remain fixed; and those which vary with profit.

The NCF model, along with the assumptions and results of an empirical investigation, has been explained in this chapter. Some of the important findings are:

1. When firms grow at a moderate rate, both PAT and NCF are positive; when they grow at a rapid rate, PAT will rise rapidly but NCF may become negative. This implies that the firm's financial structure cannot withstand such rapid expansion. From these findings one can conclude that every enterprise has a unique maximum rate of growth under a given technology and market condition. Crossing the border may lead to disaster.

2. A strategy for financing growth is dependent on the ability of a firm to raise and service a particular type of capital source. Whether the economy is competitive or controlled, the ability to raise capital is externally determined whereas the ability to service loans is determined internally (divided payout ratio, etc.).
3. Retained earnings are considered to be the most important condition for growth of a business. Under a given debt equity norm and restrictive access to capital markets, it is retained earnings which finally determine the rate of expansion of a business.

These findings and observations are used to develop a growth model. A closer look at the model reveals that for every firm it is possible to define a maximum permissible growth rate, beyond which, the firm could face a liquidity crisis. Growth has to be managed by manipulating the asset sales ratio, debt equity ratio, and retained earning within the overall constraints imposed by the working capital structure of the enterprise.

Chapter 13

Towards a Financial Theory of Corporate Bankruptcy: A Ratio-Analytic Approach

I will utter what
I believe today,
If it should contradict
All I said yesterday.

—Wendell Phillips

INTRODUCTION

While reviewing the development of ratio analysis in Chapter 1 we have indicated the use of ratios made by a number of researchers for predicting corporate failures. In this Chapter we shall critically review, at length, some of these works and then move to identifying a single predictor ratio in an attempt to lay down a financial theory of corporate bankruptcy.

STUDIES DURING THE GREAT DEPRESSION

Smith and Winakor (1930, 1935) were perhaps the first to embark upon a study of the use of financial ratios as predictors of financial difficulties for business enterprises. They initially analysed a sample of 29 firms with 21 ratios. The study was extended later to 183 firms for a period of 10 years (1923–1931). They used a modified mean of ratios which was computed from the inner half of their data. They found that the ratio of net working capital to total assets was the most accurate and steady indicator of failure, its decline beginning 10 years before the onset of financial difficulties.

Although they covered a long period in their study, they did not use a control group of successful firms during the period for the purpose of validating their conclusions.

Fitzpatrick (1931) was aware of the drawback of the study done by Smith and Winakor. In his first study he adopted a case-by-case method of analysis and studied the trend of 13 ratios for 20 firms which had failed during the period 1920–1929. This study was then followed by a comparative analysis of a matched sample of 19 successful firms. He claimed that although all the ratios chosen by him did predict failure to some degree, net profit to net worth, net worth to debt, and net worth to fixed assets were the best predictors.

During the same time Ramser and Foster (1931) analysed 11 types of ratios for 173 companies whose shares were registered in the State of Illinois. They computed the first and third quartiles but their analysis mainly centred upon the median ratios at the time of registration. Their observation was that the firms which were less successful and those which failed tended to have ratios which were lower than the more successful firms, except that two turnover ratios, sales to net worth and sales to total assets, exhibited an opposite tendency.

CONTINUING AND DISCONTINUING FIRMS

The search for the predictive power of ratios continued and a number of studies came out during the period following the 1930s. The most important among these studies was that of Merwin (1942) who, perhaps for the first time made a sophisticated analysis of the predictive power of ratios. He analysed the trends for the previous six years of a large, unspecified number of ratios of 'continuing' and 'discontinuing' firms. He compared industry mean ratios of 'discontinuing' firms against estimated 'normal ratios', which were the estimate of what the 'discontinuing' firms ratios would have been if they had maintained the same average ratios as the surviving firms. This estimate of 'normal ratios' was necessary in his study because each year of discontinuance represented an assortment of calendar years. From his findings Merwin concluded that three ratios, namely, (a) net working capital to total assets; (*b*) net worth to debt; and (c) current ratio were very sensitive predictors of discontinuance, up to as early as four to five years in some instances. Merwin's study is seminal in the sense that his study remains credible to a large extent even today.

Hickman (1958) based corporate bond issues in the United States covering a long period from 1900 to 1943. He found that the interest coverage ratio and the net profit to sales ratio were the most important predictors of bond default. Along similar lines another study was made by Saulnier et al. (1958) on RFC lending experiences on loan defaults during the period 1934 to 1951. They found that borrowing firms with lower current ratios and net worth to debt ratios were more prone to loan default.

Moore (1957) made a study of the quality of credit under cyclical conditions and identified current ratio, net working capital to total assets ratio, and the net worth to debt ratio as the principal predictors of the failure of firms.

USE OF UNIVARIATE STATISTICAL TECHNIQUES

Beaver's first study (1966), made 24 years after Merwin's work, though much advanced in its analytical part, retained or reaffirmed many of the findings of Merwin. He analysed the ability of ratios to predict the failure of firms during 1954–1964 and he also found that some ratios predict failure up to five years in advance. Beaver is a pioneer in making use of univariate techniques in analysing the predictive power of ratios for financial failure. He tested 79 pairs of bankrupt and solvent firms. He concluded from his study that 'based solely upon a knowledge of the financial ratios, the financial state of the firm can be correctly predicted to a much greater extent than would be expected from a random prediction' (p. 114). Beaver was, however, more careful in his subsequent study (1968) when he found that ratios could not be used indiscriminately to predict failure. He concluded from the findings of his second study that liquid ratios predict failure better than non-liquid ratios, one to two years before failure. The following ratios were used by him in his second study, which was a shortened list of his earlier study:

1. *Non-liquid Asset Ratios:*
   A. Cash flow to Total debt
   B. Net income to Total debt
   C. Total debt to Total assets.

2. *Liquid Asset Ratios*:
   A. Total Asset Group:
      (*i*) Current assets to Total assets
      (*ii*) Quick assets to Total assets
      (*iii*) Net working capital to Total assets
      (*iv*) Cash to Total assets
   B. Current Debt Group:
      (*i*) Current assets to Current debt
      (*ii*) Quick assets to Current debt
      (*iii*) Cash to Current Debt
   C. Net Sales Group:
      (*i*) Current assets to Sales
      (*ii*) Quick assets to Sales
      (*iii*) Net working capital to Sales
      (*iv*) Cash to Sales

Beaver used a dichotomous classification test to determine the error rates a potential creditor would experience if the firms were classified into failed and non-failed on the basis of their financial ratios. He could accurately classify 78 per cent of his sample of firms five years before failure. His best predictor ratio was cash flow to total debt, which was found to have the highest and longest early warning interval prior to failure.

USE OF MULTIVARIATE STATISTICAL TECHNIQUES

Altman (1968), who was a pioneer in the use of multivariate methods in the analysis of ratios for prediction of failure, saw that univariate ratio analysis could not take into account any statistical relationship between the measures, resulting in the possibility of compensating errors. He used discriminant analysis to rank firms on the basis of a weighted combination of five ratios, namely, (*a*) working capital to total assets; (*b*) retained earnings total assets; (*c*) earning before interest and tax to total assets; (*d*) market value of equity to book value of debt; and (*e*) sales to total assets. His results were 95 per cent effective in selecting future bankrupt firms in the year prior to bankruptcy. However, the predictive ability of the model declined rapidly as the number of years prior to failure increased. For example, five years prior to bankruptcy, the accuracy percentage was found to be only 36 per cent. Altman's 'Z' score model and its prediction accuracy are given here:

The Model

$$Z = 0.012 \times X_1 + 0.014 \times X_2 + 0.033 \times X_3 + 0.006 \times X_4 + 0.999 \times X_5$$

where: X_1 = Working capital to Total assets
X_2 = Retained earnings to Total assets
X_3 = Earning before interest and tax to Total assets
X_4 = Market value of equity to Book value of debt
X_5 = Sales to Total assets
Z = Overall index

The best value of cut off as predicted by Altman can be tabulated as follows:

Predictive status	*'Z' value*
Bankrupt	1.81 or less
Cannot say	1.81 – 2.99
Healthy	More than 2.99

Altman tested the model on the same sample which generated the following prediction accuracy:

Year before bankruptcy	*Accuracy (%)*
1	95
2	72
3	48
4	29
5	36

Since an upward bias was found to exist in the results because the same date was used for both the development of the model and its testing, a second test was conducted on a secondary sample of bankrupt and healthy firms. The accuracy was found to be 79 per cent one year prior to failure.

COMPARING UNIVARIATE AND MULTIVARIATE SCHOOLS

It was found, however, that in the second to fifth years prior to failure, the discriminant model led to more misclassifications than did Beaver's dichotomous test using only the cash flow to total debt ratio. The correct classification rates from the two studies of Beaver and Altman, as summarised by Deakin (1972), are given in Table 13.1.

Table 13.1
Classification Error Rates for Predicting Future Bankruptcy

Year before failure	*Beaver's cash flow to total debt*	*Altman's discriminant function*
1	13	5
2	21	28
3	23	52
4	24	71
5	22	64

From the comparative analysis of the classification error rates Deakin observed that although Beaver's empirical results suggested that his method had greater predictive ability, the method used by Altman had more intuitive appeal. In his research he first replicated Beaver's study, using the same ratios Beaver had used. Then he searched for the linear combination of all the 14 ratios used by Beaver which best predicted potential failure in each of the five years prior to failure.

Deakin found that while most of the ratios tended to be consistent with those observed by Beaver in respect of classification error rates, one ratio, namely cash to sales, was consistently and significantly different. It showed a much lower misclassification.

RAPID EXPANSION AS A CAUSE OF FAILURE

Another observation made by Deakin was that failed firms tended to expand rapidly in the third and fourth year prior to failure. An examination of the capital structure of the firms studied indicated that the expansion was financed by increased debt and preferred stock, rather than equity or retained earnings. The funds raised were invested in plant and equipment rather than in liquid assets. These firms were later unable to generate the sales and net income needed to support heavier debt and hence, they lost their assets rather rapidly after the third year prior to failure.

The results of Deakin's discriminant analysis indicated that misclassification errors averaged 3 per cent, 4.5 per cent and 4.5 per cent for the first, second and third year respectively but increased markedly in the fourth and fifth year, rising to 21 per cent and 17 per cent respectively.

Beaver, Mcnichols and Rhie (2004) used a more parsimonious three-ratio set in their hazard model:

a) EBITDA to Total liabilities
b) Total liabilities to Total assets
c) Net income to Total assets

They found that this set of variables used in the hazard model provided significant explanatory power. The model remained robust throughout the period of their study (1962–2002).

PROBABLE CAUSES OF FAILURE

Blum (1974) began by defining the business firm as per Beaver's definition (1966), as a reservoir of financial resources and its failure as a probability, in terms of the expected flows of these resources. He then listed the following probable causes of failure:

1. Small size of the reservoir as against a larger size, which acts as a buffer against uncertainties.
2. Small inflow of resources from operations in both the short term and long term.
3. Larger claims on resources by creditors.
4. Greater outflow of resources required by the operation of the business.
5. Higher variability of inflows and outflows which makes it difficult to predict future events.
6. Industry location of a firm's business activity being more in a 'failure prone' segment.

Blum constructed his failing company model with reference to the three common denominators underlying the cash flow framework, namely, liquidity, profitability and variability; and used the following ratios/measures:

Ratios/Measures	*Purpose*
1. Quick flow ratio defined as: (Cash + Notes receivables + Market securities + Annual sales)/12 / (Cost of goods sold – Depreciation expenses + Selling and Administrative expenses + Interest)/12	To measure the size of the reservoir—resource inflow to resource outflows.
2. Net quick assets to Inventory	To measure the relationship of both current liabilities and inventory to the highly liquid quick assets.
3. Cash flow to Total liabilities	To measure the resource inflow to total claims
4. Net worth at book value to Total liabilities 5. Net worth at market rates to Total liabilities	To measure the size of reservoir to total claims
6. Rate of return to Common stockholders	To measure profitability
7. Standard deviation of net income 8. Slope for net income trend line 9. Standard deviation of quick assets to Inventory 10. Trend break for quick assets to Inventory	To measure the variability and the trend of resource inflow and indicate the short term liquidity of the business

Blum applied the multiple discriminant technique to 115 pairs of failed and non-failed firms. The discriminant function was computed from half of the data and the other half was used to validate it. The predictive accuracy of his model was found to be as follows:

Years before failure	*Accuracy (%)*
1	93–95
2	80
3	70
4	70
5	70
6 & 7	Not statistically significant

Blum compared his failing company model with Beaver's best ratio, namely, cash flow to total debt and found to his surprise that his findings were similar to that of Beaver, though the latter had used the univariate approach to ratio analysis in contrast to his own multivariate model. Blum also found that his results were good when he used a non-ratio model based on absolute quantities to predict bankruptcy.

Mover (1977) applied Altman's 1968 model to 24 pairs of failed and non-failed companies one year before failure and obtained only a 75 per cent correct classification. He hypothesised that the high error rate was due to temporal and firm size reasons. He then made a step-wise discriminant analysis at various periods prior to failure. He compared the results to the 'naive' alternative and found them to be significantly better. Altman's model was re-estimated and the sales to total assets and equity to book value of debt were both eliminated from the model. Altman, Halderman and Narayanan (1977) updated the first study of Altman considering a data period of a 1969–75 and a sample size of 53 failed firms and 53 non-failed firms. Ohlson (1980) used a conditional logit model with a sample size of 105 bankrupt firms and 2058 non-bankrupt firms for a data period of 1970–76. He identified the following basic variables as being statistically significant in affecting the probability of failure within one year:

a) Total assets to GNP price-level index;
b) Total liabilities to total assets
c) Working capital to Total assets
d) Current liabilities to Current assets
e) Net income to Total assets
f) Funds provided by operations to Total liabilities

Zmijewski (1984) brought three of the above ratios for his bankruptcy prediction model, namely (*a*) net income to total assets; (*b*) total liabilities to total assets and (*c*) current assets to current liabilities.

APPLICATION OF PRINCIPAL COMPONENT ANALYSIS

Altman et al. (1974) applied Altman's 1968 model for commercial loan evaluation in the textile industry. They first made a univariate analysis. Results of this preliminary work were subjected to principal component analysis to develop a linear discriminant model. They found 21 ratios to be significant from an array of 41 ratios. Libby (1975) subjected Beaver's 14 ratios to principal component analysis and a varimax rotation to 30 failed and 30 non-failed companies and identified the following ratios:

1. Net income to Total assets, measuring profitability
2. Current assets to Sales, measuring activity

3. Current assets to Total assets, measuring asset balance
4. Cash to Total assets, measuring cash position
5. Current assets to Current liabilities, measuring liquidity

The predictive abilities of the 14 ratio set of Beaver and the reduced set of five ratios were then compared. It was found that the original 14 ratios were able to correctly predict 54 out of 60 cases based upon the derivation sample and 41 out of 60 predictions based upon double cross validation. The reduced set of five ratios correctly predicted 51 and 43 cases out of 60 cases based upon the derivation sample and double cross validation respectively.

MEASURING THE IMPACT OF FINANCIAL RATIOS

Kennedy (1975) attempted to measure the impact of financial ratios and the direction of the impact to determine their usefulness in predicting the bankruptcy or solvency of a firm. He defined impact of a financial ratio as given by the difference between the value of its likelihood ratio and 1. If the likelihood ratio is equal to 1, then the item will have no impact on the prior odds. With the odds stated in favour of bankruptcy, the value of the likelihood ratio for a financial ratio will be greater than 1, when the item is more probable, given a firm that will bankrupt. The larger the value, the greater the impact on the odds. When the financial ratio is more probable, given a firm that will become bankrupt, its likelihood ratio will be positive but less than 1. The greater the distance from 1, the greater the impact. Having thus defined impact and its direction, Kennedy took four ratios for experimentation, namely (*a*) tangible equity to debt ratio (shareholders' equity minus intangible assets divided by current plus long term liabilities); (*b*) current ratio; (c) inventory turnover ratio (net sales divided by average annual inventory); and (*d*) quick ratio (cash plus marketable securities plus accounts receivables divided by current liabilities).

These four ratios were derived from Cohen et al's (1966) eight ratios which need to be tabulated (Table 13.2) to understand the grouping of ratios used by the researchers:

Table 13.2
Financial Ratios for the Four Subcomponent Ratings of the Credit Rating Based on the Bank's Financial Analysis of an Applicant's Financial Statement

Bank's share of risk	*Tentative solvency*	*Final solvency*	*Profitability*
Tangible equity to debt ratio	Current ratio	Cash plus marketable securities to total current liabilities	Pre-tax profit to total tangible assets
		Quick ratio	Net profit to tangible net worth
		Inventory to total current assets	Inventory turnover

Kennedy's sample of business firms consisted of 12 companies, six bankrupt and six solvent, taken from Beaver's 79 pairs of failed and non-failed firms. His findings brought out the importance of equity to debt ratio. With the impact measure, its accuracy made it the most useful financial ratio. Within each industry its accuracy was greater than that of all other ratios, except the quick ratio in the electronic components industry and the current ratio in the motor vehicles industry. It was more accurate for bankrupt than for solvent firms. In contrast, the findings for the inventory turnover ratio were much less conclusive. With the impact measure the turnover ratio was as useful as the current and quick ratios.

APPLICATION OF RECURSIVE PARTITIONING ALGORITHM AND OTHER STATISTICAL TECHNIQUES

Frydman, Altman and Kao (1985) used RPA (a non-parametric technique under Bayesian procedures which minimises the expected cost of misclassification by means of a univariate splitting procedure) for prediction of bankruptcy and compared it with MDA. They used, inter alia, the following ratios:

1. Cash to Total assets
2. Cash flow to Total debt
3. Cash to Total sales
4. Current assets to Total sales

5. Current assets to Current liabilities
6. Current assets to Total assets
7. Retained earnings to Total sales
8. Net income to Total assets
9. Quick assets to Total sales
10. Total sales to Total assets
11. Working capital to Total sales
12. Quick assets to Current liabilities
13. Total debt to Total assets
14. Working capital to Total assets
15. Market value of equity to Total capitalisation

They found that the classification accuracy using RPA was superior to that obtained under MDA, though they did not claim that the former was always superior to the latter.

Karrels and Prakash (1987) applied the Shapire w-statistic procedure for testing univariate normality of ratios. They found that only the following variables satisfied the condition of univariate normality:

Normal

1. Working capital ratio
2. Gross profit margin
3. Earning per share
4. Total debt to Total capital
5. Cash flow per share
6. Retained earnings to Total assets
7. Current assets to Total assets
8. Quick assets to Total assets

Log-normal

1. Tangible assets coverage
2. Market value of equity
3. Sales to Accounts receivables
4. Investment × 100 to Sales
5. Value of stock to Total debt

In the data set, the researchers took many more non-failing companies than failing companies to remove a sampling bias. They also avoided pairing of failed companies with non-failed companies because they thought that pairing was mostly arbitrary which gave rise to bias. They concluded from their observations that simple MDA, with the assumption of normality satisfied, gave results that were not significantly different from more complicated procedures and that it was possible to develop very simple models with improved predictive ability without using complicated procedures in selecting appropriate ratios.

A COMBINATION OF RATIO AND NON-RATIO MEASURES

Peel and Peel (1987) classified their sample into 56 failed, 56 profit making non-failed companies and 34 loss making non-failed companies and experimented with an array of financial variables. They found the following variables to have the greatest explanatory power in predicting failures:

1. Size of the firm
2. Working capital to Total assets
3. Quick assets to Current liabilities
4. PBT to Sales
5. Total liabilities to Current liabilities
6. Funds flow to Current liabilities
7. Net worth to Total liabilities
8. Funds flow to Current assets
9. Total assets to Current assets
10. Funds flow to Net capital employed
11. Time lag in reporting accounts

The findings of their primary research under a 'traditional' logit model suggested that although the misclassification rates, both within and out of the sample, for the failed and profit making non-failed firms were reasonable, a high percentage of the loss making non-failed firms in the holdout sample was misclassified. The application of multilogit models did improve the result but their incremental information content was found to be marginal only. Gupta and Sekhar (1988) broke away from the 'pure statistical school' and attempted to capture the differentiating power of a ratio by arraying an equal number of sick and non-sick sample companies in terms of 56 ratios. The array was then inspected to find out the cut off point which would divide the array into sick and non-sick zones, with the least number of misclassifications. This was then converted into a percentage to arrive at a 'percentage classification error' which the authors claimed to be the measure of a ratio's differentiating power. They found out that all balance sheet ratios were far inferior to that of profitability ratios in respect of their forewarning properties. The worst performer was the current ratio.

THE PROLIFERATION PROBLEM

The survey of major works done here on the subject of the predictive power of ratios may leave one somewhat perplexed. One may get lost in the maze of ratios treated under various empirical studies giving conflicting results. One may tend to agree with Foster (1978) when he said that published literature on the subject had mostly been of the brute empirical kind. Scapens, Ryan and Fletcher (1981) said that a major criticism of many of these studies was the limited theoretical base for the empirical work and that little consideration was given to the causal relationship between accounting ratios and corporate failure.

Balcaen and Ooghe (2006) made life somewhat easier by providing an overview of 35 years of ratio analytic study of bankruptcy. They grouped the studies under four heads; (*a*) univariate analysis; (*b*) risk-index models; (*c*) multivariate discriminant analysis and (*d*) conditional probability models. They drew attention to several weaknesses of the studies namely, arbitrary definition of failure, non-stationarity and data instability, sampling selectivity, choice of optimization criteria, neglect of time dimension of failure, absence of application focus in failure prediction modelling etc. However, the review has shown that no new ratio of any significance has emerged during the post 1990 period. The researchers are found to be concentrating more on the technical and methodological issues of financial ratios rather than inventing new ratios for failure prediction modelling. Presently, the tendency is towards using a parsimonious set of ratios.

THE CAUSALITY ASPECT VS DEGREE OF ASSOCIATION

It should be understood that ratios by themselves do not cause failure of a firm (except to the limited extent when creditors taking notice of worsening relevant ratios may take such action that aggravates failure). Ratios being derived from a comparison of two financial variables at a given point of time indicate a relationship between the two variables. If the two variables are chosen correctly and the derived ratio interpreted properly it provides a basis for analysing the state of affairs of a business. It may be one single ratio or a combination of ratios and/or their movement over a period of time which enables an analyst to understand and predict the health of a business. The ruling approach is to take a combination of ratios which together can indicate the health of a business and predict its continuance or failure. MDA came in as a handy tool to choose this combination. In order to understand the properties of ratios, they were subjected to statistical analyses in a number of studies which created more problems than solving them. Problems of multicollinearity, autocorrelation, normality and information redundancy are some examples. Most of the statistical analyses made so far inherently resulted in measuring the degree of association between a combination of variables and the failure of a firm. However, degree of association between two variables and their causal relationship are not one and the same. The latter is more important to understand why a firm fails than the former, which may simply suggest a degree of association without establishing any causal relationship.

FLOW RATIOS VS STOCK RATIOS

Some 25 ratios have been used in the literature surveyed earlier. Frequency of their appearance in different works vary from one to four. Most of these ratios have been discussed, at length, in Chapters 3–11 from the point of view of management control and monitoring of the operating and financial functions of a business. Here, once again, we shall analyse each of these ratios in trying to understand, in particular, their abilities to predict the state of health of a business. Numerators and denominators of the ratio forms are arranged in a particular order for ease of discussion which may not always conform to the style of the users of these ratios in their respective studies surveyed earlier. The ratios will be discussed under two broad classifications, namely, *flow ratios* and *stock ratios*. A flow ratio is defined as a ratio which is derived from two variables, one of which at least is a flow variable. In the case of a stock ratio both the variables are stock variables. A flow has a rather universal characteristic of affecting almost every stock variable while a particular stock variable may often stand independently of another stock variable.

Flow Ratios

Sales to Total Assets

This ratio is also called total assets turnover ratio. It is generally believed that this ratio reflects the production characteristics of an industry, in a sense representing the asset base necessary to generate a given sales volume. A firm belonging to a particular industry will generally be governed by the characteristics of that industry. Hence, a meaningful interpretation of this ratio will call for its comparison with the industry average. Generally speaking, it may be said, that a lower ratio would be indicative of a need for a heavier asset base per unit of output, which may be a high risk situation as claimed by Falk and Heintz (1975). If the firm level ratio is away from the industry average or if the distance is increasing over a period of time, then there is a probability that the firm is losing out to competition and it may soon be forced out. At the firm level, a falling ratio indicates decreasing sales generating capacity of the assets. In other words, a unit of output now has to service additional level of assets, services of which may just not be needed. As a result, profit per unit of sales will be declining. In a situation like this a firm can continue to operate only if there is a continuous inflow of funds from outside the business.

Sales to Fixed Assets

This is also called fixed assets turnover ratio. It reflects the capital intensity of the production process and also the composition of fixed assets. According to Gupta and Huefuer (1972) it also reflects vertical integration, plant size and level of mechanisation. In short, this ratio reflects the technological level of a firm which, in effect, means output generation capacity of fixed assets. Normally, this ratio should show an upward trend during the initial period, then reach and remain on a plateau for the major part of the life of the fixed assets and ultimately show a downward trend along which slope a decision has to be taken for the replacement of fixed assets. When output generation capacity of fixed assets falls, it simultaneously increases the cost of production due to increased repairs and maintenance, wastage of raw materials, and higher consumption of power and fuel. All these will make the firm lose out to competition, causing further fall in sales revenue and consequently lower generation of net funds for operations.

A fall in this ratio may also be indicative of a demand recession in spite of the technology level. This recession may be general, industry specific or firm specific. Whatever be the type, sustenance of a firm will depend upon continuous infusion of funds to the business.

Sales to Inventory

This is also called inventory turnover ratio. Inventory for purpose of this ratio includes finished goods inventory and work-in-process inventory. In respect of the former, this ratio generally reflects product life and in respect of the latter it reflects the conversion process. Work-in-process inventory is a direct result of the given technology and level of production. As the technology of production for a given firm remains unchanged for quite sometime and as the items of cost that form the work-in-process inventory are dominantly variable in nature, work-in-process turnover ratio, under normal conditions and optimum exploitation of technology, should remain constant during the given technology period. When this particular ratio is found to be decreasing it indicates that the productive structure of the firm is losing its cohesion, resulting in increased consumption of input per unit of output produced. The increasing level of blockage of funds in the work-in-process inventory, if not corrected in time, may choke the production process, signalling the time for replacement of technology or else a slide downhill (Bhattacharya, 1990).

Blockage of funds in finished goods inventory is the result of a given production process, distributive practice and product life of the output. Seasonality of sales also contributes to the building up of inventory at different points of time. As all these characteristics do not undergo much change, except in the long term, the turnover ratio derived from this variable should also remain constant over a period of time under optimum functioning of the productive-distributive system of a firm. The ratio may, however, worsen at times as a result of deliberate policy decisions like filling up of retailers' shelf space to thwart competition and/or to penetrate a market segment. Except under situations like this, worsening of this ratio may reflect an overall recessionary condition, in which case the industry average ratio should also worsen in tandem. At the firm level, if the ratio is falling it may indicate lengthening of the distributive chain, product obsolescence or erosion of market share. The immediate effect on the firm will be increased demand for funds, resulting in additional interest cost and consequently a fall in profit.

Sales to Accounts Receivables

This is also called receivables turnover ratio. It indicates at once the average collection period of sales or, in other words, the average credit terms allowed by the firm. Given an option no business would like to sell on credit. Cash sales or a very low collection period is the ultimate objective.

If sales is regarded as the growth variable of a business, receivables is the first constraint to such a variable. This is because sales, being a credit item in accounting terminology, is meant to release a liability (funds) unto itself for further growth, but a part of which, when eaten up by receivables, builds up resistance along the path of energy (funds) flow which can be overcome only by engaging more energy (funds). Hence, the lower the receivables turnover ratio, the higher is the resistance in the energy (funds) flow and hence, the higher is the demand for energy (funds) to overcome such resistance.

Cash Flow to Total Debt and Cash Flow to Long-Term Debt

These two ratios should be analysed simultaneously, though their frequency of appearance in the empirical researches surveyed earlier differs significantly. The two ratios indicate the capacity of a firm to service its debts. Servicing of long-term debt entails repayment of the principal amount by instalments and periodical interest payment; while servicing of short-term debt requires repayment of the principal by lump sum amounts plus interest (except in case of trade creditors). Cash flow calculations for servicing debt must take into account blockage of funds by working capital items. Once this is done it may often be found that there is virtually no cash in the cash flow. Such a situation may force a firm to enter into a debt-trap where it has to continuously borrow funds to service its debt. This pushes up the level of borrowed funds without making any contribution to sales generation.

Sales to Current Assets

This is also called current assets turnover ratio, which aggregates to itself all the individual current assets discussed earlier. If we regard current assets as any other asset, then this ratio may be regarded as indicative of the sales generating capacity of current assets. The lower the ratio, more is the amount of current assets required per unit of sales, which means the higher the requirement of funds (at a higher cost) and the lower the profit.

Current assets, unlike fixed assets, do not have a built in output capacity. Sales (output) flows from fixed assets while current assets flow from sales (output). As indicated before, a part of the flow is captured and kept idle by current assets. Every item of current assets is the result of some constraint—technological or distributive—operating on the firm. It cannot but negatively contribute towards the profitability of a firm. The approach to the management of current assets is towards their reduction (or optimisation). The higher the current assets level as compared to sales, the lower the turnover ratio, and once again, the higher the requirement for funds. All other consequences as mentioned earlier would follow, if the required funds are not made available.

PBIT to Total Assets

The popular version of this ratio is RoI. This indicates the operating strength of a business because it combines both the sales generating capacity of assets and the profitability of sales. Generally speaking, if this ratio is below the pre-tax return on safe market securities, then it can be concluded that the business is unable to utilise its assets capacity. If it is falling over time, it is indicative of decreasing internal generation of funds and, as it is not always possible to stop or reduce dividend payment, the pay out ratio increases resulting in a smaller amount of retained earnings which consequently reduces the debt capacity of the firm. When a firm faces such a situation, not only does its expansion programme get hampered, renewal of plant and machinery also becomes difficult. The firm loses out to competition due to higher costs of production. Failure becomes imminent.

Sales to Quick Assets

This ratio, which is also called quick assets turnover ratio, is a derivative of current assets turnover ratio. Quick assets being composed of cash, marketable securities and receivables may not give a meaningful ratio for purposes of determining the health of a business when the numerator is sales. It would be better to compare it with current liabilities to estimate the ability of a business to discharge its current liabilities. However, if we look at this ratio from the point of view of blockage of funds then it is preferable to have more funds blocked in quick assets than in other non-quick current assets, e.g., inventories. This ratio should, therefore, be interpreted with current assets turnover ratio. The question is how do we interpret the movement of this ratio over a period of time? When the ratio is increasing then it may be said that a smaller amount of sales is being blocked in quick assets. If the overall current assets turnover ratio is also falling in tandem then it may suggest an improvement in current assets management; otherwise it indicates some hardening of current assets, particularly inventories, where comparatively more current funds get blocked.

Sales to Cash

This is also called cash turnover ratio. It is difficult to understand why so many researchers used this ratio for predicting the health of a business. As a derivative of quick assets, cash represents the most liquid part of the total assets of a firm; but as a stock item, cash also has the highest negative contribution to the profitability of a business. It should be remembered that this cash is not cash flow but an asset where valuable working funds of a business get blocked. No doubt it provides an insurance to the business against unforeseen lengthening of its productive-distributive chain but, because idle cash does not contribute anything positive to the profitability of a business, all attempts should be made to minimize its holding. A high average level of cash holding may give a euphoric feeling of high liquidity. This will, however, be only short-lived, because it indicates that the firm is unable to invest its precious cash resources either within the business itself or outside. This will eventually eat into the internal generation of funds. A high cash turnover ratio indicates better resource (assets) management, which alone can ensure the ultimate liquidity of a business.

Return on Sales

This is also called net profit ratio. This ratio by itself, does not reveal much. It is better understood when compared with the industry average. A fall in the industry average indicates a general rise in the cost of inputs or government duties, which the firms are unable to pass on to the consumers. A fall in the firm level ratio against the industry standard indicates worsening cost management. It may be that variable costs are losing their proportionality and/or high capacity costs are finding smaller amounts of sales for absorption. It is difficult in such a situation to hold on to the firm's RoI. If reduction of costs is not possible, because of hardening of cost bases, then the normal tendency of the firm would be to enlarge its sales base in order to maintain its RoI. This may necessitate offering longer credit lines to buyers which, on the other hand, will increase the demand for additional funds and result in higher bad debts. As a consequence of all these the original objective of maintaining the Rol itself may be defeated.

Retained Earning to Sales

This is a very important ratio to judge the growth potential of a business. It is surprising that this ratio has been used by one researcher only. Many firms, with their inherent desire to grow, push their growth buttons at a geometric rate. In the process they turn a blind eye to the growth potential of the firm, which is often uniquely given to it by its internal operating and financial structure and the distributive environment. The two most important financial variables to be considered are asset sales ratio and the debt equity ratio. The former indicates the additional assets required for additional sales and the latter indicates whether such a fund is available. These two together endow a unique growth rate on a firm, which is difficult to supersede. If this ratio is falling against rising sales, the firm will soon face a funds crunch. This may force the decision maker to think in terms of retracing steps but it may be too late, because once the growth button is pressed all growth variables are unleashed and it is difficult then to capture them together for reverse action. As a consequence, a well-to-do firm may soon find itself going downhill because it wanted to grow faster than its designated growth rate (Bhattacharya, 1992).

Another variation of this ratio, namely, retained earnings to total assets has been used by two researchers.

Sales to Net Working Capital

This is also called working capital turnover ratio, which is a derivative of current assets turnover ratio. Net working capital provides that elbow room between current assets and current liabilities which enables a firm to stave of any mismatch between their maturities. Essentially, the funds for net working capital must come from long term resources of the business to ensure its stability. Assuming a proportional impact of sales on current assets and current liabilities, the net working capital should also enjoy the same proportionality. The resultant turnover ratio should, therefore, be stable, if not increasing over time. On the contrary, if it is falling, it indicates a larger build up of current assets or a fall in the level of current liabilities or both. Whatever be the reason, the demand for funds will rise, the non-availability of which may lead to default in payments and possible failure of the firm.

Gross Profit Margin

This is essentially the operating profit ratio, if gross profit is calculated as PBIT. The margin not only indicates the operating strength of a firm, it also provides the essential leverage in the financial structure of the business. The margin has to carry the interest obligation first, followed by tax payments, and leave a sufficient amount in reserve after dividend payment. A lender calculates his interest coverage ratio on this gross profit to make sure that he has sufficient leverage. A fall in the gross profit margin, with an increase in the interest burden, is considered a dangerous situation because it may force a firm into a debt-trap. A fall in the gross profit margin will also leave a smaller amount for dividend payment and a still smaller amount in reserve, so essential, if not so much for financing expansion, but for providing, at least a cushion between debt and equity.

Earning Per Share

This is a derivative of RoE, also known popularly by its abbreviation EPS. Being related only to the issued share capital of the company it immediately speaks of the gearing of equity share capital and links it to the dividend pay out ratio. It should be remembered that a high EPS encourages shareholders to demand a return on their holdings, either by way of dividend or bonus shares. The latter course of action, having enlarged the equity share capital base, immediately reduces the EPS. A good company will have its EPS dipping down intermittently with the periodic issue of bonus shares. On the other hand, a high dividend paying company, which is not issuing any bonus shares, will not have any such intermittent fall in EPS. A fall in the EPS, when adjusted for bonus issues, implies a fall in the RoI and consequently reflects downgrading of the operating structure of the firm. The information content in EPS and RoI is more or less the same as far as their use in predicting the failure of a business is concerned.

Stock Ratios

Current Assets to Total Assets

This ratio indicates the asset composition of a firm, which again is indicative of its technology status and trading practices. A firm with high capital intensive technology is likely to have a large investment in fixed assets, but its investment in current assets will be determined largely on the production pattern (work-in-process inventory); nature of product, namely, consumer goods, intermediate products or capital goods (finished goods inventory); market position, namely, leader or follower; monopolistic or competitive (receivables); and uncertainty or lead time in the supply market (raw materials inventory). Current assets holding of a firm also depends on margin and volume of sales. For example, in case of low margin high volume products like cigarettes overall current assets holding of a firm may be high—at times higher than the fixed assets—while for a low volume high margin product the situation may be just the opposite.

As current assets do not contribute to the profitability of a firm but demand instead additional funds; for every increase in sales activity a healthy company would necessarily like to maintain this ratio of asset composition at least in a stable condition. A decreasing ratio reflecting better management of working capital is always welcome, but if the ratio is increasing it may reflect a disproportionate rise in current assets (in some unlikely cases it may also be due to reduction of fixed assets), which may cause a 'diversion' of funds to non-value added assets with its consequential negative impact on profitability.

It is claimed, however, that current assets denote liquidity. If that be so, it would be better to compare current assets with current liabilities, which we shall do later.

Quick Assets to Total Assets

This is a variation of the above ratio. Composition of quick assets being cash, marketable securities and receivables, this ratio draws our attention towards the most liquid part of the total assets of a firm. As quick assets are meant for discharging current liabilities, liquidity of a business is better determined by comparing quick assets with current liabilities. However, if quick assets as percentage of total assets is decreasing while current assets as percentage of total assets is increasing, then it may be due to disproportionate rise in inventory. This means hardening of the funds of the business.

Cash to Total Assets

This is another type of current assets to total assets ratio. It should be pointed out here that this cash is not a flow but stock held as a buffer against lengthening of receivables maturity. Under a normal economic environment, a high ratio indicates the risk averse attitude of the firm and/or its inability to engage cash resources profitably. A high or increasing ratio may give a euphoric feeling of liquidity, but as this cash is idle stock in which costly funds of the business are engaged, the revenue generation capacity of the firm will be impaired to the extent of this ratio.

Current Assets to Current Liabilities

This is popularly known as current ratio, which dominated the early part of the history of ratio analysis. It still comes first in the minds of analysts and finance managers whenever they want to measure the liquidity of a business.

Generation of current assets is a result of the operating structure of a business, which is independent of its financial structure. The latter comes up to match the former, which essentially means supplying funds to fill up the reservoir. One such source of supply is current liabilities which mature for payment periodically. This demand for periodic payments poses a threat to the business because defaulting on them may have a snowballing effect forcing the firm into bankruptcy. Current liability planning (which also includes repayment of long-term loans by instalments) should, therefore, be done in such a way so as to ensure that there is a matching cash flow to the business when current liabilities mature for payment. For a going concern the only item of current assets which could supply operating cash flow periodically is receivables. Current liability planning should, therefore, conform to the periodicity of receivables. Cash and marketable securities are risk assets taken as insurance against lengthening of the receivables payment time. No other current assets provide any liquidity towards periodical discharge of current liabilities of a going concern.

In effect, the entire stock inventory is not capable of supplying direct cash to the business, as long as the firm is a going concern and essential funds are blocked in them. It is desirable, therefore, that this fund should come from long-term stable sources. If inventory is the largest contributor to the composition of current assets, cash generation capacity of current assets will be lower, without making any difference to funds blockage. A high current ratio, therefore, does not necessarily speak of high liquidity but surely indicates high blockage of long-term funds.

Quick Assets to Current Liabilities

This ratio is popularly known as quick ratio. As indicated in current ratio this is the true liquidity ratio for current debt holders of a going concern. When the paying capacity of the assets of a going concern have to be tested for their ability to meet short-term obligations, none other than receivables, marketable securities and cash stock could stand such a test. This is the reason why this ratio is also called the acid test. We have already said that current liabilities which suffer from periodic maturity are to be contracted, keeping an eye on the periodicity of receivables payment and not on the liquidity of marketable securities and cash, which are only buffer stocks. Standard quick ratio should be around 1. If the ratio is falling, it may indicate a lowering down of the (current) debt paying capacity of the firm. On the other hand, an increasing or high quick ratio may indicate a risk averse attitude of the firm or its inability to engage cash resources (where valuable funds are blocked) into profitable investments.

Cash to Current Liability

This is also called cash ratio. It should be remembered, once again, that this cash is not flow but stock. It forms part of quick ratio. Although cash is the most liquid of quick assets, a high cash ratio does not necessarily speak of the good health of a business. It may give a euphoric feeling of liquidity to creditors but the real condition of the firm may just be otherwise, because holding of idle cash beyond the minimum buffer requirement entails blockage of funds without any return, which may ultimately eat into the very vitals of the business. However, under conditions of uncertainty, either in the input market or in the output market or in both, a firm may hold high cash stock, as a result of which the cash ratio may rise. Whatever be the reason and however justified it may be, the action wjll have an effect on the revenue generation capacity of the funds of the business.

Total Liability to Tangible Networth

This ratio is popularly called (total) debt equity ratio. This is a very important ratio which simultaneously reveals a number of things about the financial health of a business. The often talked about financial leverage emanates from the debt equity structure of a firm. An increasing or high debt equity ratio indicates high risk of the business, so much so that it always lives under the threat of creditors' takeover. For creditors, particularly long-term lenders, a low equity stake is always threatening. For equity holders, though at times they may gain due to gearing, the burden of carrying the debt may be so high, both in respect of interest payment and instalment repayments, that it may often eat up the entire operating profit of the firm and put a heavy pressure on the cash flow of the business, leading the firm into a debt-trap.

In a lenders' market, debt equity ratio is mostly given. The borrowing firm is often the policy taker. In such a situation the ruling debt equity ratio often determines the debt capacity of a firm. This is very important for a firm when it embarks on a policy of expansion through market penetration, which may necessitate carrying of larger receivables and inventories.

When the firm is on a growth path, the ruling debt equity ratio often determines its limits to growth, because any additional sales will demand a matching growth in assets (given by the assets to sales ratio), which can be funded only by the incremental funds available to the business in terms of a given debt equity ratio. If the growth button of a business is pressed without considering these two ratios, then the firm will soon face a funds crunch which will not stop at forestalling the planned growth. It may also throw the firm on the brink of a liquidity crisis because, as mentioned in Chapter 12, it then becomes difficult for the firm to recall the growth variables and retrace itself from the path of expansion (Bhattacharya, 1992).

Long-Term Liability to Total Assets

This is a variation of the asset margin ratio. It provides the debt capacity of the assets of a firm, particularly when the borrowed funds are acquired by attaching the assets of the business. A firm may have the required debt capacity in terms of the ruling debt equity ratio, but in the absence of debt capacity of assets it may not be able to raise funds against the existing assets. If the firm overtrades in such a situation, it may put itself at risk, because when the market turns adverse then it will not have any cushion left to withstand the shock.

Net Working Capital to Total Assets

Net working capital represents the availability of long-term funds to meet net current assets. Classical financial discipline demands that a part of current assets should be financed from stable long-term sources in order to provide a cushion against lengthening of the operating cycle of the business. It follows, therefore, that long-term funds should have a margin left after financing of fixed assets for making a contribution to the funding of current assets. From this point of view, a better ratio than the present one would be net working capital to current assets or simply (net) working capital ratio. The present ratio, however, has been used in three studies surveyed in this book.

Net working capital coming from long term sources is presumed to be a stable fund which does not suffer from short term maturity problems. A high or increasing net working capital to total assets ratio indicates that the funding of current assets by short term liabilities is low or declining. A low or decreasing ratio, on the other hand, indicates that the necessary cushion between maturity payment and maturity receipts, is small or getting squeezed. The latter situation is risky but fund releasing, while the former is risk averting but fund consuming. A desirable situation is arrived at by a trade-off between profitability and liquidity.

Market Value of Equity to Book Value of Debt

This ratio is designed to capture market reactions to the debt structure of a business. Since the net worth of a company has a bearing on the market value of its shares, a company having a high debt equity ratio may not be viewed favourably by the capital market because of the likelihood that its EPS will be low due to heavy interest burdens. A moderately geared capital structure will have a higher EPS and dividend ratio, which will give a reasonable price earning ratio. If the market value of equity is taken to mean total market capitalisation of equity shares and then compared with the book value of the debt, the resultant ratio will give an idea about the confidence reposed by the market in the financial structure of the business. If the ratio is increasing, it may be a consequence of the reduction in debt or an increasing EPS. Contrary may be true if the ratio is falling.

FUNDS: THE ALL PERVADING VARIABLE

From the foregoing analyses and interpretations of ratios used by major researchers in predicting the failure of a business enterprise, we find that funds comes out very sharply as the all pervading variable affecting the health of a business. All the 25 ratios discussed earlier either explicitly or implicitly attempt to capture the movement of funds and its effect on business performance. In that sense, most of these ratios suffer from a kind of information redundancy.

A business enterprise is established to generate sales and make profit. The generation of sales demands funds for acquisition of assets—both fixed and current. When the business fails to make proper use of its assets, volume of sales may fall or high cost sales are generated. Both result in a loss of funds. The firm will now be required to operate with lesser funds, which will depress the sales further. If the situation persists year after year, sickness is inevitable; followed by failure. Under the circumstances the firm can be saved only by continuous infusion of funds from external sources. As long as this external injection of funds is possible, the firm may continue to be loss making but non-failing.

Besides financing explicit assets, funds also provide cash flows to the business to pay for transient assets, namely, expenses. Sales (being a credit item and hence a source of funds) are expected to provide such flows. A part of these flows are first absorbed by incremental assets. If nothing is left after such absorption, then the firm will not be able to pay for any of its expenses. If expenses are more than the residual fund value of the sales, the firm will not be able to fund the expenses fully except by inviting flows from other sources of funds. The latter means that the firm attempts to generate a matching or positive net funds inflow to the business. The determining factor is thus net funds inflow. It is possible for a firm to continue to pay for its expenses, particularly cash expenses, even when the latter exceeds the sales value, but this is possible only as long as the net funds inflow exceeds or equals the expenses. This means that the firm may not be making any profit but it will not fail. An example will make it clear.

Suppose a trading firm with no investment in fixed assets achieves sales in the zero year of Rs 4,800 spread uniformly throughout the year. Its expenses are Rs 6,000, also spread uniformly. Sales are on one month's credit while expenses are paid after four months. The policy of the firm is to maintain 15 days' inventories of expenses. Table 13.3 and 13.4 show the funds and cash flow statements and balance sheet extract of the firm for that year.

In Table 13.5 we have made the firm grow at 20 per cent p.a. for the next two years. It can be seen that the positive funds/cash gap of the zero year has become negative, while accumulated losses have increased from Rs 1,200 in the zero year to Rs 4,368 in the second year.

Let us now assume that the firm is not selling at a loss but is not making a profit either, i.e., it is selling exactly at the cost of sales. The working capital structure also remains the same. The results of the operation of the firm for three years are given in Table 13.6, assuming a 20 per cent growth in sales p.a.

Table 13.3
Funds and Cash Flow Statement

Funds flow statement		*Cash flow statement*	
	Rs		Rs
Funds inflow from sales	4800	Sales	4800
Less: Funds blocked in receivables	400	Less: Receivables	400
	4400	*Cash inflow* (A)	4400
Less: Funds blocked in inventories	250	Operating expenses	6000
Residual funds value of sales	4150	Add: Inventories	250
Add: Funds inflow from creditors	2000		6250
Net funds inflow	6150		
Less: Funds outflow for expenses	6000	Less: Creditors	2000
		Cash outflow (B)	4250
Funds gap (+)	150	*Cash gap* (A–B) (+)	150

Table 13.4
Balance Sheet Extract

Liabilities	*Rs*	*Assets*	*Rs*
Sundry Creditors	2000	Receivables	400
		Inventories	250
		Cash	150
		Loss (Rs 6000–4800)	1200
Total	2000	*Total*	2000

Table 13.5
Funds Flow Statement, Cash Flow Statement and Balance Sheet Extract of an Illustrative Firm-I

	Year 0	*Year I*	*Year II*
Funds Flow Statement			
Funds inflow from sales	4800	5760	6912
Less: Δ Funds blocked in receivables	400	80	96
	4400	5680	6816
Less: Δ Funds blocked in inventories	250	50	60
Residual funds value of sales	4150	5630	6756
Add: Δ Funds inflow from creditors	2000	400	480
Net funds inflow	6150	6030	7236
Less: Funds Outflow for expenses	6000	7200	8640
Funds gap	(+)150	(–)1170	(–)1404

Table 13.5 (Continued)

Table 13.5 (Continued)

	Year 0	*Year I*	*Year II*
Cash Flow Statement			
Sales	4800	5760	6912
Less: Δ Receivables	400	80	96
A. Cash inflow	4400	5680	6816
Operating expenses	6000	7200	8640
Add: Δ Inventories	250	50	60
	6250	7250	8700
Less: Δ Creditors	2000	400	480
B. Cash outflow	4250	6850	8220
Cash gap (A–B)	*(+)150*	*(–)1170*	*(–)1404*
Balance Sheet Extract			
Liabilities			
Sundry creditors	2000	2400	2880
Accumulated funds gap	–	1020	2424
Total	2000	3420	5304
Assets			
Inventories	250	300	360
Receivables	400	480	576
Cash (being positive cash gap)	150	–	–
Accumulated loss	1200	2640	4368
Total	2000	3420	5304

Table 13.6
Funds Flow Statement, Cash Flow Statement and Balance Sheet Extract of an Illustrative Firm-II

(*Rupees*)

	Year 0	*Year I*	*Year II*
Funds Flow Statement			
Funds inflow from sales	4800	5760	6912
Less: Δ Funds blocked in receivables	400	80	96
	4400	5680	6816
Less: Δ Funds blocked in inventories	200	40	48
Residual funds value of sales	4200	5640	6768
Add: Δ Funds inflow from creditors	1600	320	384
Net funds inflow	5800	5960	7152
Less: Funds Outflow for expenses	4800	5760	6912
Funds gap	(+)1000	(+)200	(+)240

Table 13.6 (Continued)

Table 13.6 (Continued)

(*Rupees*)

	Year 0	*Year I*	*Year II*
Cash Flow Statement			
Sales	4800	5760	6912
Less: Δ Receivables	400	80	96
A. Cash inflow	4400	5680	6816
Operating expenses	4800	5760	6912
Add: Δ Inventories	200	40	48
	5000	5800	6960
Less: Δ Creditors	1600	320	384
B. Cash outflow	3400	5480	6576
Cash gap (A–B)	(+)1000	(+)200	(+)240
Balance Sheet Extract			
Liabilities			
Sundry creditors	1600	1920	2304
Total	1600	1920	2304
Assets			
Inventories	200	240	288
Receivables	400	480	576
Cash (being positive cash gap)	1000	1200	1440
Total	1600	1920	2304

It can be observed from Table 13.6 that in spite of the firm not making a profit or loss it is able to maintain the growth rate because net funds inflow is more than the funds outflow. Another interesting feature is that though the firm is now cash rich, it will not be able to pay any dividend except out of capital (net worth) because it has not made any profit, i.e., in accounting terminology, it has no credit item to debit for payment of dividend. Net accretion of funds from operations is zero.

These tables bring forth the important causal relationship between funds and sales. In our analyses of various ratios used by earlier researchers we have seen that almost all the ratios either explicitly or implicitly tried to capture this causal relationship between funds and sales in predicting sickness or bankruptcy of a firm. Most of these ratios, however, could only capture a part of this relationship, except perhaps the sales to total assets ratio used by Ramser and Foster (1931). Here too the point was missed in the array of 10 other ratios used by them.

All the financial ratios used for predicting the health (or bankruptcy) of a firm can, therefore, be merged into two funds related ratios. One such ratio is the *sales (revenue) to funds ratio* or *Funds Turnover Ratio* (FTR) and the other is *Funds outflow to Funds Ratio* (FFR).

Funds Turnover Ratio

Let us first examine the movement of the FTR in the illustrative firms in Table 13.7.

Table 13.7
Movement of Funds Turnover Ratio

	Year 0	*Year I*	*Year II*
Firm (making loss)	2.4	1.68	1.30
(Table 7.5)	(7.38)	(7.38)	(7.38)
Firm (no profit no loss)	3	3	3
(Table 7.6)	(8)	(8)	(8)

It can be seen that in the case of the firm making a loss that the FTR is falling continuously (even assuming that the funds gap has been funded in full), because a part of the total fund is being absorbed by the losses, releasing smaller amounts for sales activity. If we adjust the losses against total funds available (in the zero year the positive funds gap of Rs 150 should additionally be adjusted against the total funds available), we arrive at the *effective working fund* available to the business.[1] When sales are compared with this we obtain the *normative funds turnover ratio* which, in the present case, is constant (given in brackets) for all the three years, assuming that all funds flow items maintain a proportional relationship with sales. This means that although the normative funds turnover ratio of the loss making firm is 7.38, the actual ratio is much smaller than that and it is also going down, because losses are increasingly absorbing funds inflow.

In the case of the no profit no loss firm the FTR remains constant at 3 for all the three years (assuming once again the proportionality of funds items) because there has not been any funds loss. If we adjust the cash

[1] Effective working fund = Total fund – Accumulated losses – Positive funds gap, if any. Positive funds gap, which is represented by cash stock, is deducted because it is expected that this additional cash will discharge the equivalent amount of funds (liability) of the business. If, however, a given level of cash stock is essential for a business, like any other current assets, then the normative funds tunover ratio will be equal to actual funds turnover ratio.

stock against the total funds, the normative ratio increases to 8 and remains at that level under the same assumption.

In fact, from the point of view of funds analysis, current assets and losses do not make any difference because both absorb funds without making any positive contribution either to sales generation or to profitability. This part of funds may be called *non-revenue generating funds.* In the case of the loss making firm, the normative funds turnover ratio being 7.38, sales would have been Rs 14,760, Rs 17,712 and Rs 21,254 in the zero year, first year and second year respectively, had there been no losses and no current assets. For the no profit no loss firm the figures would have been Rs 12,800, Rs 15,360 and Rs 18,432 with a normative funds turnover ratio of 8. One important lesson we can learn from this analysis is that lesser the funds blocked in (current) assets and losses, higher the FTR and hence, larger the volume of sales. It follows, therefore, that if a firm is experiencing a fall in the FTR, it may be either due to a falling sales volume or an increasing level of assets or losses or both. In such cases, the net funds inflow will also fall. The reasons may be external to the firm (depression, recession, etc.) or internal (bottlenecks in the productive-distributive line) but the effect will be reflected in a fall in the FTR.

We have already seen that a firm may remain liquid even if it is not making any profit (Table 7.6). Hence, other things remaining constant, like no demand for dividend by shareholders, it is the fall in liquidity, not profitability, that makes a firm fail. Liquidity is defined here as:

Funds inflow > Funds outflow

Funds inflow is defined as *gross funds inflow* comprising the following parts:

1. Operating funds inflow composed of sales and other income;
2. Non-operating funds inflow composed of incremental creditors, loans, and net worth.

Similarly, funds outflow is defined as *gross funds outflow* comprising the following parts:

1. Operating expenditure composed of all expenses due to operations including interest; lease payments; repayment of loans and other term obligations; taxes and dividends; and
2. Non-operating expenditure comprising all incremental assets.

It should be pointed out here that all funds inflows and funds outflows in a given period are current in nature, irrespective of the sources from/to which they are emanating/going.

Finally, funds is defined as *gross funds* of the business at any given point of time, i.e., the total liabilities of the business without making any downward adjustment for non-operating assets (capital work-in-progress) or non-performing assets (accumulated losses), because, for the former there must have been a funds outflow due to progress payments and for the latter funds have already been absorbed (lost).

Gross funds are composed of the following two parts:

1. Non-revenue generating funds blocked in current assets and absorbed by accumulated losses, as already mentioned, and engaged also in capital work-in-progress.
2. Revenue generating funds engaged primarily in fixed assets and also in investments.

The former expands the funds base of the business but does not increase sales while the latter does both.

When capacity utilisation of fixed assets is rising, revenue generation of the business will also be increasing. Hence, the non-revenue generating funds remaining constant, the FTR will be increasing. If non-revenue generating funds are also increasing then it will eat into a part of such a rise. On the other hand, if capacity utilisation is declining and non-revenue generating funds are also declining, then the fall in the FTR may be (partly) arrested.

Funds Outflow to Funds Ratio

If funds outflow is greater than operating funds inflow (revenue) the firm faces an initial liquidity problem because of the negative funds gap, which now has to be filled from additional sources. This will increase the funds base of the firm. It should be remembered that any funds inflow, except from out of sales, to meet this negative funds gap expands the funds base of the business, a part of which may be non-revenue generating. If we now evolve a ratio as FFR then the impact of this funding decision will be reflected by a fall in this ratio.

We have shown earlier that if a firm experiences a fall in the FTR (for whatever reasons) it will result in a fall in the net funds inflow to the firm, a consequence of which will be diminishing liquidity of the business. The two ratios, namely FTR and FFR, therefore, capture the liquidity position of the business from two sides. As long as the FTR is greater than FFR the firm will not fail.

In terms of the FTR a firm can be in any of the nine situations grouped under A, B and C as shown in Figure 13.1. We can now present nine hypothetical situations in terms of FFR (Figure 13.2).

Figure 13.1
Possible Movements of Sales and Funds in Terms of Fund Turnover Ratio

Sl. No./Group	Situations			
Group A				
1.	↑	Sales;	↔	Funds
2.	↑	Sales;	↓	Funds
3.	↔	Sales;	↓	Funds
Group B				
4.	↓	Sales;	↓	Funds
5.	↔	Sales;	↔	Funds
6.	↑	Sales;	↑	Funds
Group C				
7.	↓	Sales;	↑	Funds
8.	↓	Sales;	↔	Funds
9.	↔	Sales;	↑	Funds

Legend:

Increasing = ↑

Constant = ↔

Decreasing = ↓

Figure 13.2
Possible Movements of Sales and Funds in Terms of Funds Outflow to Fund Ratio

Sl. No./Group			Hypothetical Situations	
Group A				
1.	$\uparrow$	FoF;	$\leftrightarrow$	Funds
2.	$\uparrow$	FoF;	$\downarrow$	Funds
3.	$\leftrightarrow$	FoF;	$\downarrow$	Funds
Group B				
4.	$\downarrow$	FoF;	$\downarrow$	Funds
5.	$\leftrightarrow$	FoF;	$\leftrightarrow$	Funds
6.	$\uparrow$	FoF;	$\uparrow$	Funds
Group C				
7.	$\downarrow$	FoF;	$\uparrow$	Funds
8.	$\downarrow$	FoF;	$\leftrightarrow$	Funds
9.	$\leftrightarrow$	FoF;	$\uparrow$	Funds

Legend:

Funds Outflow = FoF	Constant = $\leftrightarrow$
Increasing = $\uparrow$	Decreasing = $\downarrow$

It is necessary now to match the real situations depicted in Figure 13.1 with the hypothetical situations depicted in Figure 13.2 in order to establish the causal relationship between the two variables (ratios). The following theorems will help us to do this.

Theorem 1: When funds outflow increases, the level of funds can neither remain constant nor can it fall, because an increasing outflow of funds needs a matching rise in the level of funds for a going concern. Hence, it can only increase.

Theorem 2: When funds outflow is constant, level of funds can neither fall nor increase; it can only remain constant because of the following reasons:

A. If funds outflow increases then by virtue of Theorem 1 level of funds would also increase.
B. If funds outflow falls then the firm will not need all the funds any longer. Hence, there shall be a matching fall in the level of funds.

Theorem 3: When funds outflow falls, level of funds can neither increase nor can it remain constant; it can only fall, because of the following reason:

A. If funds outflow falls then there is no need for the firm to increase the level of funds nor to keep it constant at the previous level, as by virtue of the 'matching principle' the fall in the funds outflow is matched only against a fall in the funds level by virtue of Theorem 2(B).

These three theorems can finally be summarised as:

1. When funds outflow falls, level of funds will also fall.
2. When funds outflow is constant, level of funds will also be constant.
3. When funds outflow increases, level of funds will also increase.

These three theorems, therefore, reject all situations depicted in Group A and Group C of Figure 13.2 leaving only Group B to be matched against Figure 13.1.

Theorem 4: When sales (revenue) increases, is constant, or decreases but level of funds remains constant, then by virtue of Theorem 2 funds outflow will also be constant. Hence, FTR will also increase, be constant or fall but FFR will remain constant throughout. By virtue of this, situations 1, 5 and 8 in Figure 13.1 are all matched with situation 5 in Figure 13.2.

Theorem 5: When sales (revenue) increases or is constant but the level of funds falls, then by virtue of Theorem 3 funds outflow must also fall. Hence, FTR will increase while FFR will remain constant. Thus, situations 2 and 3 in Figure 13.1 are matched with situation 4 in Figure 13.2.

Theorem 6: When sales (revenue) decreases or is constant, but the level of funds increases, then by virtue of Theorem 1 funds outflow must also increase. Hence, FTR will fall while FFR will remain constant. As a result, situations 7 and 9 in Figure 13.1 are matched with situation 6 in Figure 13.2.

Theorem 7: When both sales (revenue) and level of funds increase or decrease proportionately, funds outflow will also increase or decrease in tandem. Hence, both FTR and FFR will be constant.

Theorem 8: When both sales (revenue) and the level of funds increase, there will be a consequential rise in funds outflow. If the rate of increase in sales (revenue) is lower than the rate of increase in the level of funds, then both the FTR and FFR will fall, but the FTR will fall faster than the FFR.

Theorem 9: However, in Theorem 8 if the rate of increase in sales (revenue) is higher than the rate of increase in the level of funds, then both the FTR and FFR will rise, but the FTR will rise faster than the FFR. By virtue of Theorems 7, 8 and 9, situation 6 in Figure 13.1 is matched with situation 6 in Figure 13.2.

Theorem 10: When both sales (revenue) and the level of funds decrease, there will be a consequential fall in funds outflow. If the rate of decrease is sales (revenue) is higher than the rate of decrease in the level of funds, then both the FTR and FFR will fall, but the FTR will fall faster than the FFR.

The effect of this theorem on the nature of movement of FTR and FFR is similar to that under Theorem 8.

Theorem 11: However, in Theorem 10 if the rate of decrease in sales (revenue) is lower than the rate of decrease in the level of funds, then both the FTR and FFR will rise, but the FTR will rise faster than the FFR.

The effect of this theorem on the nature of the movement of FTR and FFR is similar to that under Theorem 9.

By virtue of Theorems 7, 10 and 11, situation 4 in Figure 13.1 is matched with situation 4 in Figure 13.2.

Matching Figure 13.1 with Figure 13.2 gives Figure 13.3.

Figure 13.3
Effect of Matched Sales-Funds Situations on Funds Turnover

Sl. No.	Sales-Funds situation (1)	Funds outflow-Funds situation (2)	Effect on FTR (3)	Effect on FTR (4)
Group A				
1.	↑ Sales; ↔ Funds;	↔ FoF; ↔ Funds;	↑	↔
2.	↑ Sales; ↓ Funds;	↓ FoF; ↓ Funds;	↑	↔
3.	↔ Sales; ↓ Funds;	↓ FoF; ↓ Funds;	↑	↔
Group B				
4.	↓ Sales; ↓ Funds;	↓ FoF; ↓ Funds;	↑ ↔ ↓	↑ ↔ ↓
5.	↔ Sales; ↔ Funds;	↔ FoF; ↔ Funds;	↔	↔
6.	↑ Sales; ↑ Funds;	↑ FoF; ↑ Funds;	↑ ↔ ↓	↑ ↔ ↓
Group C				
7.	↓ Sales; ↑ Funds;	↑ FoF; ↑ Funds;	↓	↔
8.	↓ Sales; ↔ Funds;	↔ FoF; ↔ Funds;	↓	↔
9.	↔ Sales; ↑ Funds;	↑ FoF; ↑ Funds;	↓	↔

Legend:

Increasing = ↑

Constant = ↔

Decreasing = ↓

Note: Large (increasing or decreasing) arrows under Column 3 indicate more than proportionate rise or fall of FTR against the corresponding FFR under Column 4.

For ease of understanding and manipulation it is advisable to capture the essence of Theorems 1 to 11 in precise mathematical formulations of the two ratios, namely, FTR and FFR.

Let,

I = operating funds inflow comprising sales and other income, simply called *revenue.*

E = operating e xpenditure composed of all expenses due to operations including interest, lease payments, dividends etc., simply called operating *funds outflow.*

ΔA = All incremental assets due to operations in the current period.

F_o = Level of funds at the beginning of the period.

F_c = Level of funds at the closing of the period.

F_c or level of funds at the closing of the period can be further defined as below:

$F_o + \Delta A - (I - E)$
or $F_o - I + (E + \Delta A)$,
where $(E + \Delta A)$ represents gross funds outflow of the current period. For a going concern F_c will always be greater than zero, i.e., $F_o - I (+) (E + \Delta A) > 0$.

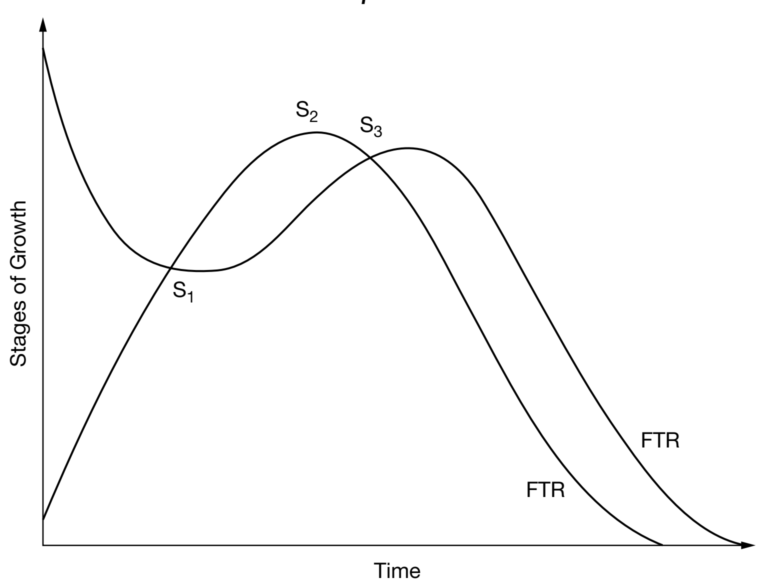
Mathematical formulations of the two ratios will, therefore, be of the following order:

$$\text{Funds Turnover Ratio (FTR)} = \frac{I}{F_0 - I + (E + \Delta A)}$$

$$\text{Funds Outflow Funds Ratio (FFR)} = \frac{E + \Delta A}{F_0 - I + (E + \Delta A)}$$

With the help of these two ratios we can now sketch the life cycle of a firm through various stages of growth and decline as in Figure 13.4.

Figure 13.4
Life Cycle of a Firm and Movement of Funds Turnover Ratio and Funds Outflow to Funds Ratio



EXPLAINING THE LIFE CYCLE OF A FIRM

Stage I

During the early stages when the firm has begun utilising its capacity, the likely relation between the growth variables will be as follows:

$$F_o < I < F_c$$
$$I < (E + \Delta A)$$
$$Hence: F_c > F_o$$

Under these conditions, though FTR will always be less than FFR, as revenue gradually increases FFR will fall and FTR will rise. When revenue becomes equal to F_o, i.e., when the firm is in a position to generate enough revenue which is at least equal to the initial funds employed by the business, FFR will be 1 while FTR will continue to be less than 1. This will result in continued expansion of the funds base till the time FFR begins its downward journey and meets the FTR, i.e., when $I = E + \Delta A$. The firm now reaches its *funds break even level.* From this stage it moves over to its growth phase in Stage II.

Stage II

In this stage the firm inherits the large expansion of funds level from Stage I. It is likely that its revenue generation, though on the rise and now more than funds outflow [$I > (E + \Delta A)$], will remain, for sometime, less than F_o.

As revenue continues to rise, F_c starts falling gradually. Revenue first equals F_o (when FFR once again becomes 1) and then exceeds it. The firm now enters into its highest stage of growth.

The likely relationship between the growth variables at this stage will be:

$$I > (E + \Delta A)$$
$$F_c < F_o$$
$$But: I < F_o + E + \Delta A \text{ i.e., } F_c > O$$

The firm is now generating enough revenue which can not only pay for the funds outflow but leave behind some resources to pay off some of the liabilities (funds) as well. Hence, F_c will be less than F_o, unless the firm decides to invest these excess funds in building up additional capacity in terms of fixed or current assets or a mixture of both.

At this stage both FTR and FFR will rise but the rise in FTR will be more than the rise in FFR.

With the gradual fall in funds level, consequent upon the rise in revenue—meaning thereby that the firm is now in a position to generate higher amounts of revenue with lesser amounts of funds—the FTR will reach its highest peak.

Stage III

After being at its peak stationary state, the firm may now experience a decline in revenue, resulting in a gradual fall in FTR while FFR continues to rise. A stage is reached when, once again, $I = E + \Delta A$ and hence FTR = FFR. This is the critical point in the life of the firm. The FTR, which was already experiencing a decline, will soon be followed by the FFR on its downward slope. The firm will now be forced to operate below its funds break even level.

It should be pointed out here that, at this stage, there may be cases where revenue has not fallen. There might even be a rise in revenue in some cases but rise in funds outflow $(E + \Delta A)$ outmatches revenue. As this gap increases, F_c continues to rise and becomes greater than F_o. FFR now moves along a downward slope with FTR, which was already on the decline. The fall in FTR, however, becomes faster than FFR. Along this downward slope, expansion in F_c is largely due to the compulsion of funding, the rise in costs and/or generation of 'non-contributing' assets. The pressure will soon be felt on revenue, which will then show a definite declining trend. The relationship between different growth variables at this stage will be similar to that of Stage I. Unfortunately, such a relationship will now subsist on the downward slope of the firm.

The FTR, which now falls much faster than the FFR, will cause a very large expansion of the funds base. Revenue will soon become less than F_o, while continuing to be less than $(E + \Delta A)$, i.e., the revenue generation capacity of the funds of the business would be falling drastically. As revenue declines further, F_c becomes larger and larger in every period. Both FTR and FFR will now tend asymptotically towards zero, though FTR will worsen faster than FFR.

TOWARDS IDENTIFYING A SINGLE PREDICTOR RATIO

We have seen that when the falling FFR curve meets the rising FTR curve the firm reaches its funds break even level. From here it enters into its highest growth phase (Stage II). After reaching its highest peak, the firm now experiences a downturn with a falling FTR curve and a rising FFR curve. When these two curves meet once again, in Stage III, the most critical point in the life of the firm is reached because immediately after that the firm is forced to operate below its funds break even level. Both the FTR and FFR curves are now on their downward slopes. As FTR falls faster than FFR and the gap between the two curves increases, the firm becomes sick. A stage is reached when both FFR and FTR tend asymptotically towards zero. The firm is now dead for all practical purposes, though it can be kept clinically alive for sometime by a continuous infusion of funds.

It can be seen from Figure 13.4 that analytically the FTR curve belongs to the family of second degree equations, while the FFR curve belongs to the family of third degree equations. While it is easy to handle the first equation, it is difficult to handle the given nature of the third degree equation for predictive purposes. When we have to denote x_o as the point where $f(x)$ is maximised, with respect to x_o and x_1 as the point where $f(x)$ equals zero (i.e. the point where the firm reaches its dead level), we cannot obtain closed form solutions for x_o and x_1 which are valid uniformly in the coefficients because of analytic intractability. The only alternative left, therefore, is to study the difference $(x_1 - x_o)$ numerically, case by case. Due to this analytical difficulty a search for an alternative solution resulted in locating a single ratio, the time series curve of which is found to be amenable to analytical presentation. Given the nature of the two curves, where both the variables (ratios) have the same denominator (F_c), it is possible to divide the two ratio forms and evolve a single ratio, which will take the shape of a second degree equation. This new ratio, which we can call *health ratio*, is derived in the following manner:

$$\frac{\textit{Revenue (I)}}{\textit{Funds level } (F_c)} \times \frac{\textit{Funds level } (F_c)}{\textit{Funds outflow (FoF)}} = \frac{\textit{Revenue (I)}}{\textit{Funds outflow (FoF)}}$$

Figure 13.5 captures the movement of this ratio through the three stages of a firm's life, while in Figure 13.6 the movement of all the three ratios is charted graphically.

Figure 13.5
Life Cycle of a Firm and the Health Ratio

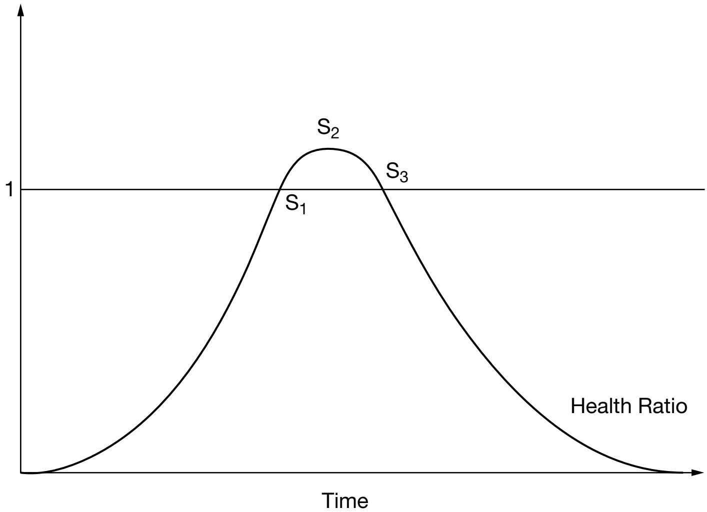
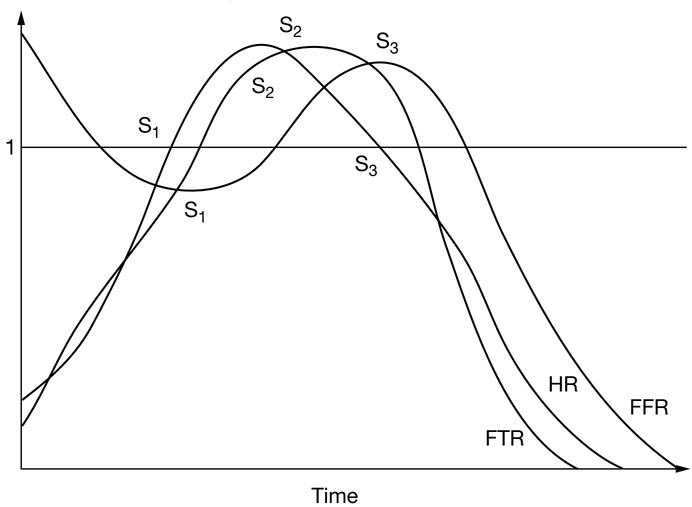


Figure 13.6
Life Cycle of a Firm and the Movement of Funds Turnover Ratio, Funds Outflow to Funds Ratio and Health Ratio



Legend: FTR = Funds Turnover Ratio
FFR = Funds Outflow to Funds Ratio
HR = Health Ratio

It can be seen that the health ratio curve belongs to the family of second degree equations, the likely form of which will be as follows:

$$Y = -a + bt - ct^2$$

(We may ignore the lower asymptote because although the firm may be kept clinically alive along the asymptote, for all practical purposes it is already dead at the beginning of the asymptote).

The downturn of the firm occurs at that value of *t* for which the first derivative of the equation equals zero. The slope of the equation now determines at which *t* value $f(t) < O$, i.e., when the firm will reach the dead level.

It may be possible that sometimes a full second degree equation cannot be fitted into a particular time series data. The left hand side of the health ratio curve may show a tendency of a linear rise to the peak, from where the downturn may take on a sharper fall towards the bottom.

As we are interested in knowing at which *t* value the firm reaches the dead level, we can ignore the left hand side of the curve from the peak and concentrate on its right hand side, which can be captured by a second degree equation of the following order:

$y = a - ct^2$; where $t = 1$ at peak level.

It may be seen now that the firm will reach its dead level when,

$$t \geq \sqrt{\frac{a}{c}}$$

SUMMARY

A comprehensive review of almost all the major ratio-analytic studies made on prediction of corporate failure reveals that some 25 ratios have been used in one form or another for this purpose. A further in-depth study of these ratios is made under two broad heads, namely, flow ratios and stock ratios. A flow ratio is defined as a ratio where one of the two variables is a flow variable while in the case of a stock ratio both the variables are stock variables. All the 25 ratios used by various researchers are ultimately found to be, explicitly or implicitly, trying to capture the movement of funds and its effect on business performance. Funds appear to be the all pervading variable affecting the health of a business. All these ratios are then merged into two funds related ratios, namely, FFR and FTR.

It has been found that if an enterprise is experiencing a fall in FTR, it may be due to a fall in sales volume or an increase in the level of assets or losses. The reason may be external to the firm (recession) or internal to the organisation (bottlenecks in the productive-distributive line).

A firm may remain liquid even if it is not making any profit. It is ultimately the fall in liquidity that makes a firm fail. Liquidity is defined as funds inflow ≥ funds outflow. The former comprises all sales: other incomes; incremental liabilities like creditors, loans, and net worth; while the latter is composed of all operating expenses: interest payments, lease rentals, repayment of loans and other term obligations, taxes, dividends, and all incremental assets.

Funds base or gross funds engaged in a business can be divided into two parts: *(a)* non-revenue generating funds blocked in current assets and capital work-in-progress and also absorbed by accumulated losses; and *(b)* revenue generating funds engaged in fixed assets and investments. The former expands the funds base of the business but does not increase sales while the latter does both.

When funds outflow is greater than operating funds inflow (revenue), the enterprise faces an initial liquidity problem because of the negative funds gap. This gap has to be filled up by additional sources. This will force an increase in the funds base of the firm, a part of which is non-revenue generating. If we now evolve a new ratio called, funds outflow to funds ratio (FFR), then the impact of the above funding imperative will be reflected by a fall in this ratio.

With the help of 11 funds theorems developed in this Chapter, different stages of the life cycle of a business enterprise are explained in terms of the two ratios, namely, FTR and FFR. Table 13.8 summarises the findings:

Table 13.8
Summary of Stages of Growth of a Business Enterprise

No.	*Stage of life cycle*	*General state of the funds ratios*	*Remarks*
1.	Early growth stage	FTR < FFR	At the last phase of this stage the firm reaches the funds break even level when FTR = FFR.
2.	Expansionary stage	FTR > FFR	With gradual fall in funds level and consequent upon the rise in revenue, the FTR will reach its highest peak.

Table 13.8 (Continued)

Table 13.8 (Continued)

No.	*Stage of life cycle*	*General state of the funds ratios*	*Remarks*
3.	Declining stage	FTR < FFR	After operating at peak level for some time, the firm now experiences a decline in revenue. This results in a gradual fall in FTR, while FFR continues to rise. The firm now falls down to its funds break even level, when once again FTR = FFR. As the fall in FTR is faster than the fall in FFR, the former will soon be lower than FFR. This will cause a large expansion in the funds base, bulk of which will be non-revenue generating. This will force the firm into sickness.

Having thus observed the explanatory power of the two funds ratios in predicting the health of a business, an attempt is made to derive a single health ratio by dividing FTR with FFR. The health ratio now takes on a very simple form:

$$\frac{\text{REVENUE}}{\text{FUNDS OUTFLOW}}$$

Movement of this ratio along a time scale indicates at which stage of the life cycle a firm is operating.

Chapter 14

Valuation and Stock Market Ratios

A pessimist is somebody who
complains about the noise
when opportunity knocks.

—Oscar Wilde

INTRODUCTION

When an investor enters the stock market to buy shares of a company his risk-return profile is somewhat different from that of a person who puts his entire savings in Post Office savings bank instruments or in securities issued and guaranteed by government, or in a bank, where he has an implicit guarantee against non-payment. That is, the investor in stock market securities is prepared to take a larger risk in the expectation of a higher return. But he may not be willing to part with the liquidity of his investments so, he will put the money in such shares which can be sold quickly (either for his immediate financial needs or, when he feels that there are adverse movements in the market).

Individuals differ in their risk-taking ability. Knowledge about the target companies and understanding the intricacies of stock markets improves the risk profile of an investor. This Chapter preciously attempts to do that. But still, there shall exist variations in the risk profiles of investors because complete knowledge of both the present and future state of affairs can never be made available.

TECHNICAL ANALYSIS

There are basically two approaches to stock market analysis: Fundamental analysis and Technical analysis. Fundamental analysis attempts to derive the 'intrinsic value' of a stock by analyzing the economic fundamentals of a business within a risk-return framework encompassing the economic and financial factors of the economy as a whole and the industry in particular. Technical analysis, on the other hand, contends that it is not necessary to study the economic fundamentals to establish the price movement of a stock because the past price movements will indicate the future trend. The basic philosophy and assumptions of technical analysis are well summed up by Levy (1966) as follows:

1. Market value of a stock is determined solely by the interaction of supply and demand which on the other hand, is governed by several factors, both rational and irrational including opinions, moods, guesses and blind necessities. The market weighs all these factors continually and automatically.
2. Except minor fluctuations in the market, stock prices tend to move in trends which persist for an appreciable length of time.
3. Changes in trend are caused by the shifts in supply and demand relationship. These shifts, no matter why they occur, can be detected sooner or later in the action of market itself.

Technical analysts are thus not concerned with why the change in equilibrium value occurred, but only with the fact that there is a definite movement and they can take advantage of this change in equilibrium value to derive above average returns. They are somewhat suspicious of financial statements; most of the data used by them are derived from the stock market itself (Reilly, 1979). At the background of technical analysis lie the theory of mass psychology which holds that people move between pessimism, fear and panic, on the one hand, and confidence, high optimism and greed, on the other. Stock market captures this crowd behaviour at the average level which gets reflected in price movements.

Technical analysts claim that stocks recommended by them outperform the market (Brock and Le Baron, 1992). In an earlier study Dawson (1985) found that though, on the face of it, stocks recommended by technical analysis outperformed the market but after adjusting for trend, risk and trading commissions no such out performance could be noticed.

There are a fairly good number of concepts and strategies presently available in the armory of technical analysis. With the development of computing technology the existing concepts and techniques are getting perfected and new techniques are being evolved. We shall discuss some of these concepts/strategies which have stood the test of time and are commonly in use.

Dow Theory

No discussion on technical analysis can begin without recognizing the foundation laid down by Charles Dow, publisher of the Wall Street Journal, in the late 1880s. He stated that the stock prices move in trends that are analogous to the movement of water. There are principally three such types which should be analyzed over time. These are, (1) major trends that are like tides in the ocean, (2) intermediate trends that can be compared with waves, and (3) short-run movements that are similar to ripples. A technical analyst's job is to find out which way the major trend or tide is moving. At the same time, he should recognize that an increase or decrease does not go straight up or down; there shall be waves and ripples in between which, Dow labelled as intermediate reversal. He held that every recovery will reach a high point above the prior peak while each reversal would have trough above the prior period trough. In the former case, the trading volume would be high while in the latter case, the volume would be relatively small. When this to and fro movement from the major trend ceased to occur it could be concluded that the major trend might be ready for a permanent reversal.

Support and Resistance

The support level of a stock develops when the price, having increased earlier, experiences a reversal because of profit booking by some investors. The investors, who did not buy the stocks when they first rallied, enter when it experiences some reversal. This leads to an increase in the support level of the stock.

A resistance level develops when the price of the stock experiences a steady decline from a peak level. As the stock starts declining, the investors who bought the stock at a higher price would wait to get out of it at an opportune moment. When the break-even price is reached or the target price comes up, sell orders go out in the market which increases the supply of the scrip in the market; any price rise is thus abruptly reversed.

Momentum and Contrarian

Momentum investors hold that the stocks that have risen significantly over a certain time period would continue to rise further. Conversely, stocks that have experienced decline during the same period would continue to fall further. Hence, they adopt a buy strategy in the former case and a sell strategy in the latter.

Contrarian investors, as the name suggests, behave contrary to general market behaviour. These investors do not exhibit knee-jerk reactions when the market reacts to a bad news such as a fall in earning. In such a situation when most of the investors would start selling, the contrarians would quietly buy when the price has fallen too far-down, as they believe that the price would soon go up because the overreacting investors who have sold out earlier would now come back realizing their mistake and push up the demand.

Similarly, when the market reacts strongly to a rise in earning, the general investors would push up the price too far by constant buying. A contrarian would sell out at that point believing that the market has overreacted to the good news and pushed the price far beyond the fundamental value. When the overreacting investors realize this mistake they would start selling, which will drive the price southbound.

Technical analysts not only follow the price movements, they also watch the volume changes which are indicative of changes in supply and demand of a company's stock or the market stocks in general. A price rise associated with large volume increase indicates a large demand.

As technical analysts are constantly on the look out for major price trend of scrip or the market in general, statistical tools come in handy for them. Some of the tools are, moving averages, bar charts, point-and-figure charts, trend analysis, oscillators, stochastic methods etc.

The methodology of technical analysis rests on the assumption that history tends to repeat itself in the stock market. However, a large part of the methodology of technical analysis lacks strict logical explanation (Sharpe, Alexander and Bailey, 1995).

Technical analysts do not want to go beyond what is happening now and its immediate past and what is likely to happen in the near future. They talk mostly of trading strategies, not so much of investment strategies. The major challenge to technical analysis comes from Efficient Market Hypothesis to which we are coming now.

MARKET EFFICIENCY

The question which is always present in the mind of an investor when he buys shares of a company is whether the value of the securities is worthy of the price he is paying. The sceptism emanates from the belief that the market may not often be sufficiently efficient to determine the right price of the security. But a large quantity of literature exists on ‘efficient market hypothesis’ since it was first formulated by Fama (1965). Despite many misgivings voiced by several researchers about the existence of efficient market in real-life situation, the hypothesis still holds ground as nothing better has yet come up to explain the price movements in stock markets. It is our inability to keep faith in the logic of the market—may be due to anxiety, greed or other human failings—that makes the market inefficient or appear to be inefficient.

In simple terms, efficient market hypothesis holds that security prices fully reflect all available information. In other words, market price of a security is an unbiased estimation of its intrinsic value based on available information. The hypothesis further assumes that access to information is costless for all investors who are also capable of analyzing the information to arrive at a judgment about the future performance of the scrip and adjust their holdings accordingly. The basic arguments stem from the economic theory of perfect competition where market price of a product reflects its fair value and no one can make more than the normal profit. In an efficient market, securities are always sold at fair value hence mispricing and arbitrage profit is not possible.

Fluctuation in the price of securities, which are commonly observed, is not a negation of efficient market hypothesis; on the contrary, it upholds the hypothesis. As present price of a security reflects all the available information, any new information will similarly be absorbed by all investors, which will have an impact on the market simultaneously and change the price level. Any new information cannot be known in advance (otherwise, it ceases to be new). If it is related to any previous information, then it becomes predictable, and thus the information loses the quality of being new. It follows, therefore, that change in the price of a security cannot also be predicted in advance; it is closely random.

A stock market, as it develops, tends towards market efficiency. The reason behind this is simple. If there is any discrepancy between the price and value of a security, it will be spotted by an analyst who shall move quickly to gain on the disparity. As soon as he moves, his action implicitly informs the market about the existence of the disparity, which encourages others to move the market similarly. The combined actions of the market operators will soon wipe out the disparity and bring back the price to its intrinsic value.

It is often claimed that in real-life situation efficient market hypothesis may not always hold; there is divergence between the intrinsic value and the market price. There are several reasons which we shall discuss later. The strongest point of the hypothesis is that in spite of all such aberrations the market will ultimately move towards the equilibrium between price and value. How much time it will take may not be predictable but the fact that the market will ultimately throw up the value-equivalent price makes it important for the investor to know the mechanisms of value determination under the assumptions of efficient market and then, measure the deviation from the available market price and take a position either to sell or buy the security, and if he is a smart operator, he can make some money by playing on the aberrations (and lose too if his interpretation goes wrong). But the market will ultimately correct the aberrations.

Forward Looking Investors

From an accountant's perspective value of the share of an enterprise essentially depends upon the book value of the business. To be precise, it is the net value of the business available to the equity shareholders after discharging all outside obligations. This is the 'gone concern' view of business valuation; the emphasis here is on the stock rather than the flow. On the other hand, an investor views the business as a 'going concern' and values it in terms of the productivity of the assets; the emphasis here is on future profit flows. To put it simply, when an investor buys the shares of a company he essentially looks for expected return or payoffs from such investment. This simple truth is central to the valuation exercise, which, is popularly known as Fundamental Analysis. It begins with an attempt to understand the business of the enterprise and ends with developing forecasts for future profit flows.

Categories of Investors

Before we embark on fundamental analysis we need to distinguish between two categories of investors. The first one constitutes the promoters or shareholders who have controlling interest in the business and the second category comprises 'outside investors' who individually cannot exercise management control of the enterprise because of small holdings or does not want to interfere despite having sizable holdings (institutional investors and lenders). The first category of investors or the 'inside investors' have inside information about the operations of the business, that is, they have both financial accounting and management accounting information that we have discussed earlier. Hence, they are better equipped to value the business, more particularly, to evaluate a business strategy to see whether it would add value to the business. But the 'outside investors' are expected not to have access to inside information (even if they have and they trade the securities on the basis of such information, they are liable to be prosecuted for insider trading). This Chapter is addressed to 'outside investors' whose source of information could only be those which are in the public domain. Major source of information is the financial statements and supplementary reports published annually and/or quarterly by a company. These statements are prepared primarily for the information of shareholders. Over a period of time disclosure requirements enacted in statutes like, Companies Act and various amendments thereof, the Accounting Standards formulated by both national and international accounting boards and regulations framed by Securities and Exchange Board of India (SEBI) have compelled companies to disclose more and more information relating to the affairs of their business so that the stakeholders can take more informed decisions. Besides periodical publication of financial statements, companies do declare various strategies they intend to employ relating to new investments, financing decisions, business collaboration, product launching etc. and also recruitment and departure of key personnel. An investor is expected to evaluate these strategies in terms of their impact on the profitability of the enterprise and estimate the change in the expected return on shares to revalue his holdings.

Annual Reports

The most important source of information is the Annual Report and Accounts of the company, which contains, besides accounting statements for the past two years, other relevant information pertaining to the affairs of the company. The Annual Report of a typical company is expected to contain the information/disclosure besides the accounting statements. These are analyzed in Table 14.1.

Table 14.1
Contents of Annual Reports and their Usages

Contents		*Usage*	
A.	**Report of the Director**		
I)	**Responsibility Statement of Directors**	a)	To note whether the accounting policies are consistently followed conforming to appropriate accounting standards to arrive at the profit of the company and whether sufficient care is taken to maintain the accounting records of the company.
II)	**Corporate Governance Statement**		
1.	Composition of the Board	a)	To note the movement of key directors/executives of the company and assess its impact on company's future performance.
2.	Number of independent directors	a)	To examine whether the Board is well balanced to ensure proper checks and balances in the decision-making process.
3.	Number of Board meetings held and attendance of the directors	a)	To note whether meetings of the Board are held regularly and directors are taking enough interests in the affairs of the company.
4.	Audit Committee	a)	To ensure that the company has effective internal control over its functions and it is following appropriate accounting policy.
		b)	To note whether the audit committee is truly independent i.e., it is composed of independent directors only.
		c)	To note the number of meetings held and attendance to such meetings to verify that it is actually fulfilling its purpose.
5.	Remuneration paid to executive directors and senior officers	a)	To analyze whether the growth in the remuneration paid is proportionate to the growth of the company keeping in mind the competitive structure of the employment market of the executives.
		b)	To note the remuneration paid to promoter-directors, particularly of family managed companies, to examine whether there is a tendency to siphon-off fund when the company is not doing well.
		c)	When there is a remuneration committee of the Board it is necessary to examine the constitution of such a committee to see whether it is filled with non-executive directors to ensure objectivity in fixing remuneration.
6.	Employees Stock Options Scheme (ESOP)	a)	To note whether the price of the stock option is not at variance with the market price of the share as on the date of granting option.

Table 14.1 (Continued)

Table 14.1 (Continued)

	Contents		*Usage*
		b)	To note the methods adopted for calculating the fair value of the options and the employee compensation cost and its impact on the EPS of the company.
7.	Shareholders/investors Grievance Committee	a)	To note whether majority members of the committee are independent directors to remove management bias or apathy towards grievance redressal.
		b)	To note the number of meetings held, attendance to the meetings and number of complaints received and pending to see whether due importance is given to its declared objectives.
8.	Prevention of insider trading	a)	To note whether there exists a code of conduct which prohibits purchase/sale of shares of the company by employees who possess any price-sensitive information.
III)	**Share Holding Distribution and Pattern**	a)	To note the promoters' shareholding to understand the extent of majority control of the enterprise.
		b)	To distinguish between a family managed and professionally managed company.
		c)	To note the extent of public holding of shares to determine the level of dispersion of holding and the liquidity of shares in the stock market.
IV)	**Monthly Share Price Data and Volume of Shares Traded in Major Stock Exchanges**	a)	To analyze the variation of company's share price vis-à-vis indices of major stock exchanges where the company is listed e.g., BSE, NSE etc.
		b)	To compare the market price of the share with the fundamentals of the company to locate any overvaluation or undervaluation.
		c)	To note the volume traded in stock exchanges for determining the liquidity of the shares in the market.
V)	**Management Discussion and Analysis**		
1.	Macroeconomic analyses	a)	To understand how the company is positioning itself in the emerging socio-economic developments of the country and that of the world economy, and the growth strategies it intends to follow.
2.	Performance highlights	a)	To analyze the performance of the company over past years to form a prima facie opinion about the movement of different business variables.

Table 14.1 (Continued)

Table 14.1 (Continued)

	Contents	*Usage*
		b) To note how net profit is allocated between reserves and dividends for determining the approach of the company towards future growth and financing thereof. c) To note in particular whether there has been any draw down from the past profits for maintaining the dividend rate.
3.	Business segment analysis	a) To identify growing and losing segments, their future prospects and contribution to revenue and profitability of the company. b) To evaluate the strategies of the company in each segment. c) To note whether the company is contemplating to add/delete segments and strategies proposed thereof, like acquisition, merger, demerger etc. and evaluate each such strategy within a risk-return framework.
VI)	**Significant Accounting Policies**	a) To see whether the accounting policies conform to the generally accepted accounting standards. b) To note, in particular, policies regarding revaluation of fixed assets and valuation of investments and their impact on balance sheet and profit and loss account of the company. c) To note whether the accounting policies are being followed consistently over the years. If there is any departure in any given year, note its impact on the declared profit of the company.
VII)	**Auditors Report**	a) To note disputed statutory liabilities not provided and estimate their impact on the profitability in the event of any of these becoming payable. b) To note whether the company has defaulted in servicing its debt obligations and the reasons thereof. c) To note whether any short-term loans raised by the company has been used to finance long-term investment and analyze its impact on liquidity. d) To note whether the company has incurred cash losses despite reporting profit. e) To note if there are any ‘qualifications’ and judge their impact on profitability and valuation of business.

FUNDAMENTAL ANALYSIS

When a person buys a stock of shares of a company he is in fact buying an asset, which he hopes, will generate a stream of periodical income for as long as he holds the asset, and when he sells it he will be able to recover at least the capital he has invested in this asset. When these two conditions are fulfilled the investor enjoys the satisfaction that he has not lost in the bargain i.e., the price he has paid for his investment equals the value congealed in it. This is true of any asset, as it is true of stocks of a company. However, the big difference between any other asset, say real estate and the shares of a company is that the latter is dependent primarily on the future performance of the company which is basically organic in nature while the former is predominantly inorganic. Since the investor parts with his cash right now in the expectation of a future stream of income (which, in turn depends upon the future performance of the company) the question that bothers him is whether his estimation of future stream of income is correct or not. Fundamental analysis tries to address this question.

It is generally held that fundamental analysis tracks down the value of a company in the long run. But this 'fundamental truth' is often forgotten whenever there occurs a crisis in the stock market. One of the biggest stock market crises that occurred in the recent part started in 2000 and went on for a period of three subsequent years during which the market lost more that 30 per cent in value. This crisis preceded nearly two decades of rising stock market indices and along with it came the rising expectation of investors. Some analysts even predicted that Dow Jones Industrial Averages would rise to 36000 by 2004 from the 1999 level of 11000 (Glassman and Hassett, 1999). The bull was led first by Leveraged Buy-outs (LBO) of 1980s and then by the Internet boom of mid-1990s. During the frenzy people forgot the fundamentals—virtually throwing them out as dead rats before the bubble burst and people went back to following the fundamentals once again.

Fundamental analysis has the following three components;

1. Measurement of company's past performance
2. Prediction of company's growth variables in the light of its past performance and future prospects
3. Estimating the value of the company in terms of above and comparing it with the market price to determine whether the share is overvalued, undervalued or just right.

Measuring Past Performance

In the earlier chapters, we have used several ratios to evaluate different aspects of a company's performance. For the present analysis we shall use select sets of financial ratios under the following headings.

1. Growth
2. Cost
3. Capital structure

In making a choice of ratios we have kept in mind the limited time available to an investor to make an investment decision in an era of fast changing stock market scenarios facilitated by on-line trading. We have, therefore, limited ourselves to a few select ratios which are capable of critically measuring the performance of a company under each head and which are amenable to prediction. These ratios will be discussed and analyzed for a real-life company which is listed in all major stock exchanges of India, though the name of the company is changed to MNO Limited or MNOL.

Background of the Company and the Industry

The company being discussed is the leader in tobacco products in the country. Although during the past six years the company has diversified itself to food products, lifestyle outfits, stationery and gift items, hotels, paperboards, and packaging etc., tobacco remains its core business activity contributing nearly 70 per cent of the total corporate turnover and about 90 per cent of its business profit.

The shareholding pattern of the company indicates that it is a professionally managed company. Presently, banks, financial institutions, insurances companies, and mutual funds together hold about 34 per cent of the company's equity followed by foreign companies (32 per cent) and foreign institutional investors (18 per cent). The remaining 16 per cent is with the general public. The company is headed by a Professional Manager. Non-executive Directors account for 50 per cent of the membership of the board. The Audit Committee has four members of which three are independent directors. The Compensation Committee of the Board comprises only Non-executive Directors. Of the five members three are independent directors.

The Annual Reports of the company reveal that they attend the meetings of the Board regularly and other committees of the Board to which they are members.

The total number of firms in the tobacco industry is about 66 but many are small in size and market share. Major firms are only about 12 of which MNOL commands about 88 per cent of the market share.

The industry has been subjected to multiple taxation—cigarettes are one of the highest taxed items in this country both at the Centre and State levels. Marketing operations of the industry are highly regulated. The 'Cigarettes and Other Tobacco Products (Prohibition of advertisement and regulation of trade and commerce, production, supply and distribution) Act' of 2003 has become effective from 1 May 2004. Further, the international Framework Convention of Tobacco Control of which India is a signatory was ratified on 27 February 2005, which is expected to impose stricter controls on the industry. Presently, there are severe restrictions/bans on advertisement and publicity. Although India is the third largest producer of tobacco in the world after Brazil and China her export constitutes only about 3 per cent of world export of tobacco due to various restrictions imposed in the country for cultivation and development of tobacco plantation. But all these have not deterred the rising sales of this industry.

Financial statements of MNOL for the past five years are given in Table 14.2 and Table 14.3.

Table 14.2
Balance Sheets of MNO Limited

(*Rupees in crore*)

Liabilities	*X1*	*X2*	*X3*	*X4*	*X5*
Share Capital					
Authorised (3000 lakh ordinary shares of Rs 10 each)	300	300	300	300	300
Issued, Subscribed and Paid-up	245	245	248	248	250
Reserves & Surpluses					
General reserve	2245	3157	4047	5048	6227
Debenture redemption reserve	56	72	11	0	0
Share premium	274	306	285	296	380
Capital reserve	2	6	2	3	3
Capital redemption reserve	0	72	0	0	1
Revaluation reserve	63	68	62	60	61
Contingency reserve	366	363	367	368	363
Profit & Loss account	283	176	344	388	611
A. Shareholders Fund	**3534**	**4465**	**5366**	**6411**	**7896**

Table 14.2 (Continued)

Table 14.2 (Continued)

Liabilities	*X1*	*X2*	*X3*	*X4*	*X5*
Loans					
Secured					
Debentures	120	143	22	0	0
From banks (cash, credit etc.)	410	71	20	32	89
Term loans	35	38	0	0	0
Unsecured					
From banks	207	0	27	24	80
From others	87	85	48	65	76
B. Loan Fund	**859**	**337**	**117**	**121**	**245**
C. Deffered Tax Liabilities	**0**	**147**	**64**	**88**	**376**
Current Liabilities					
Sundry creditors	1210	1643	2054	2806	1895
Deposits (Trade)	31	52	26	29	13
Unclaimed dividend	9	10	12	14	17
Interest accrued	8	8	1	1	1
D. Total Current Liabilities	**1258**	**1713**	**2093**	**2850**	**1926**
Provisions					
Taxation (net)	61	99	143	56	151
Retirement benefits	12	15	15	18	25
For subsidiaries	0	0	50	50	50
Proposed dividend	245	335	371	495	773
Tax on dividend	25	0	48	64	109
E. Total Provisions	343	449	627	683	1108
Total Liabilities (A + B + C + D + E)	**5994**	**7111**	**8267**	**10153**	**11551**
Assets					
Fixed Assets	2520	4136	4252	4741	5746
Less Depreciation	707	1238	1246	1443	1796
	1813	2898	3006	3298	3950
Add Capital work-in-progress	146	387	163	314	186
A. Total Fixed Assets	**1959**	**3285**	**3169**	**3612**	**4136**
Investments					
Long-term trade investments	48	103	6	6	7
Subsidiaries	963	26	850	868	804
Other long-term investments	22	480	107	310	374
Sub-total	1033	609	963	1184	1185
Current investments	0	78	674	1897	2717

Table 14.2 (Continued)

Table 14.2 (Continued)

Liabilities	*X1*	*X2*	*X3*	*X4*	*X5*
Sub-total	1033	687	1637	3081	3902
Less provisions	26	28	28	27	27
B. Total Investments	**1007**	**659**	**1609**	**3054**	**3875**
Current Assets, Loans & Advances					
Inventories					
Raw materials	857	705	785	810	1195
Stores & spares	57	88	79	85	92
Packing materials	4	18	22	35	39
Work-in-process	6	12	17	17	22
Finished goods	221	371	348	589	655
C. Total Inventories	**1145**	**1194**	**1251**	**1536**	**2003**
Sundry debtors	193	320	230	250	548
Less Provisions	90	116	23	20	20
D. Total Debtors	**103**	**204**	**207**	**230**	**528**
E. Total Cash and Bank	**35**	**270**	**380**	**34**	**56**
Other Current Assets					
Deposits with Govt. bodies etc	400	444	759	748	136
Interest accrued	2	5	23	33	8
Dividend receivable	0	0	0	3	0
Others	296	313	34	34	0
Sub-total	698	762	816	818	144
Less provisions	2	1	1	1	1
F. Total Other					
Current Assets	**696**	**761**	**815**	**817**	**143**
G. Sub-total (C + D + E + F)	**1979**	**2429**	**2653**	**2617**	**2730**
Loans & Advances					
Loans to subsidiaries	360	0	140	151	177
Advances with subsidiaries	61	0	57	64	59
Loans to others	141	183	167	173	29
Advances with Govt. bodies	281	328	293	299	356
Other trade advances	223	245	196	196	202
Sub-total	1066	756	853	883	823
Less provisions	17	18	17	13	13
H. Sub-total	**1049**	**738**	**836**	**870**	**810**
I. Sub-total (G + H)	**3028**	**3167**	**3489**	**3487**	**3540**
Total Assets (A + B + I)	**5994**	**7111**	**8267**	**10153**	**11551**

Table 14.3
Profit and Loss Accounts of MNO Limited

(*Rupees in crore*)

Revenue	*X1*	*X2*	*X3*	*X4*	*X5*
Gross sales	8683	9840	11025	11815	13350
Less excise duty	4475	4781	5159	5345	5710
A. Net Sales	**4208**	**5059**	**5866**	**6470**	**7640**
Expenditure					
Raw materials	1492	1890	2248	2388	2770
Salaries, wages etc.	274	311	346	416	467
Stores & spares	65	91	93	102	118
Power & fuel	74	119	138	159	219
Rent, rates & taxes	33	50	51	55	93
Insurance	15	24	30	33	39
Repairs	49	69	66	65	85
Outward freight	96	141	171	198	261
Advertisement & promotion	183	180	219	265	220
Market research	13	16	19	27	29
Traveling & conveyance	51	58	69	83	98
Brokerage & discounts	2	3	2	6	5
Commission on sales	2	9	15	18	18
Bad and doubtful debts	4	2	5	1	3
Postage, telephones etc.	15	20	19	19	23
IT services	14	21	33	39	51
Training cost	9	8	7	6	10
Legal expenses	5	10	10	12	11
Loss on investments	3	1	0	1	1
Interest & bank charges	101	73	35	30	45
Miscellaneous expenses	145	147	185	206	339
Fixed assets & stores discarded	4	7	14	14	11
Depreciation	140	198	237	242	313
Sub-total	**2789**	**3448**	**4012**	**4385**	**5229**
Less transferred to fixed asset	36	28	31	8	26
B. Total Expenditure	**2753**	**3420**	**3981**	**4377**	**5203**
C. Operating Profit (A – B)	**1455**	**1639**	**1885**	**2093**	**2437**
Add other incomes	145	142	171	225	236
Add exceptional incomes	0	0	0	0	354
Profit Before Tax	**1600**	**1781**	**2056**	**2318**	**3027**
Less income tax	594	591	685	725	836
Profit After Tax	**1006**	**1190**	**1371**	**1593**	**2191**
Less proposed dividend	245	334	371	495	773
Sub-total	761	856	1000	1098	1418
Less income tax on dividend	25	0	48	63	110
Retained Earning	**736**	**856**	**952**	**1035**	**1308**

Growth Ratios

The most important growth variable of a business is its sales. A company may produce high-quality products at the least possible cost, but if it cannot sell them, inventories get piled up causing subsequent erosion of liquidity which may lead to bankruptcy. It is true that a business exists for making profit but sales is the condition of such profit.

Often a company's sales growth is measured in terms of its percentage growth over a period. Financial newspapers and markets are elated when a company reports high percentage growth in sales in the current period as compared to the previous periods. If sales growth is accompanied with a growth in profit as well, the market reacts strongly and favourably. When, however, there is a sales growth but profit has not increased commensurate with the rise in sales or as compared to the last period, then the market is found to be subdued. These views are often misleading. First, because the base year's sales may be too low or too high giving rise to high percentage growth or low percentage growth of sales respectively. This makes inter-firm comparison difficult. Second, a company may have huge assets but generate slower growth in sales while another company in the same industry may generate same or higher growth in sales with a comparatively smaller assets-base. Hence, a company's sales performance should be measured in terms of utilization of assets rather that percentage growth in sales. This leads us to consider the following ratio, which we have discussed earlier.

Fixed Assets Turnover Ratio

We may recall this ratio as,

$$\text{Fixed Assets Turnover Ratio (FATR)} = \frac{\text{Net sales}}{\text{Operating fixed assets}}$$

As discussed in Chapter 7, we shall take the depreciated value of fixed assets and net of any revaluation. Sales are taken net of excise duty. The notes to the Accounts of the company indicate that the fixed assets include depreciated value of trademarks and goodwill. We have also argued in that Chapter that it is a prudent financial practice to write off goodwill over a period of time and, therefore, it is desirable to exclude goodwill from operating fixed assets. In terms of new accounting standards introduced in United States and Europe during 2001 and 2005 respectively there is no need to amortize goodwill as such, but the acquirer company should periodically examine whether the acquired or merged business for which the goodwill is raised has lost its value. In the event of its losing value the goodwill will be treated as impaired and consequently written down. Indian accounting standards though do not recognize internally generated goodwill, have provided for amortization of goodwill and other intangible assets over a period of time. MNOL has been writing off goodwill and trademarks, the former being the result of amalgamation of subsidiary companies. As no additional productivity has been added to the assets of the erstwhile subsidiary companies we deem it necessary to exclude these assets from the calculation of operating assets. Similar is the case with revaluation reserve arising out of revaluation of fixed assets, which is also deducted from operating assets. The ratio is now calculated as below.

Fixed Assets Turnover Ratios

	X1	*X2*	*X3*	*X4*	*X5*
Net sales	4208	5059	5866	6470	7640
Operating fixed assets	1745	2820	2933	3227	3880
Ratio	2.41	1.79	2	2	1.97
Trend			*Downward*		

It may be seen that there has been a substantial fall in the ratio in year X2 as compared to the earlier year. In that year paper and paperboard subsidiary of the company was amalgamated with the parent company. In the following four years the company has not been able to retrace the position it had in year X1. In fact, with the amalgamation of the hotel subsidiary in the year X5 the ratio fell further, though it was not substantial.

It appears that the Fixed Assets Turnover ratio of the company having fallen from a high of 2.41 in X1 is now settling down to around 2, which is likely to continue in future. When we exclude the amalgamation years of X2 and X5 we find that the company's capital expenditure net of depreciation is about Rs 280 crore annually on an average, though there are inter-year variations. Assuming that the same level of investments continues for the next three years, the company is likely to have the following level of fixed assets and sales; the latter is calculated by multiplying the projected level of fixed assets with a projected turnover ratio of 2.

Projected Fixed Assets and Net Sales

(*Rupees in crore*)

	X6	*X7*	*X8*
Fixed assets	4416	4696	4976
Net sales	8832	9392	9952

The rationale behind this simple predictive methodology is that FATR is in fact, a 'technical coefficient' under a given technology of production and distribution, which remains stable in a given technology period. When there is a major technological change in a particular year a new FATR will emerge, which will be used to predict sales for the following years. We repeat here that sales is a function not of time but of assets of the firm. Only when it is regarded as such, the inter-year variation of sales can be explained meaningfully.

In our subsequent analysis we shall attempt to measure other performance areas of the company, solely, in terms of sales. The logic runs as follows. The purpose of the sales revenue is to pay for the expenses made to generate sales; profit and loss being the residual function. The risk for the company increases when the profitability of sales is on the decline, which, in turn, means that either the expenses are rising disproportionately to sales or that the company is unable to pass on the rising cost to the consumer or both. Second, when we talk about financial structure of a firm we are essentially talking about financing of sales. Notwithstanding the hypothesis of Modigliani and Miller, (1958) of capital structure irrelevance, two companies having same sales volume and operational structure may be substantially different in terms of profitability and risk. Hence, in the final analysis the value of a company depends upon how sales are paid for and how it is financed. We shall first measure the cost performance of the company in terms of sales.

Cost Ratios

Expenses are broadly classified as variable expenses and fixed expenses. This classification is not based on strict mathematical precision but on the normative behaviour of such expenses. In a manufacturing company, operating expenses are found to be predominantly variable while the general and administration expenses are considered to be predominantly fixed. From the income statement of MNOL the following expenses are divided into three groups as Selling, General and Administrative expenses and therefore considered as fixed.

> *Rates and taxes, insurance, postage and telephone etc., IT services, training expenses, legal expenses, miscellaneous expenses, advertisement and promotion, market research, depreciation etc.*

Commission on sales, though a selling expense, is excluded from the above list as it is predominantly variable. Other expenses are grouped under manufacturing expenses. Interest and loss on investments are excluded, as these are not operating expenses. The ratios are calculated below.

Operating Expenses Ratio

		X1	*X2*	*X3*	*X4*	*X5*
Manufacturing expense Ratio (MER)	Net sales	4208	5059	5866	6470	7640
	Manufacturing expenses	2077	2672	3136	3442	4029
Ratio		2.03	1.89	1.87	1.88	1.9
Trend				*Downward*		
Selling, Admn. & General expenses Ratio (SAGR)	Net sales	4208	5059	5866	6470	7640
	Selling, Admn & general expenses	572	674	810	904	1128
Ratio		7.36	7.5	7.24	7.16	6.77
Trend				*Downward*		
Operating expenses Turnover Ratio	Net sales	4208	5059	5866	6470	7640
	ME + SAG	2649	3346	3946	4346	5157
Ratio		1.59	1.51	1.49	1.49	1.48
Trend				*Flat*		

As mentioned earlier we have calculated these two ratios not in percentage form as we have done earlier, but as turnover ratios by putting sales as the numerator variable, which we intend to maintain for calculating other ratios.

The two expense ratios calculated above reflect their normative behaviour. The manufacturing expense being predominantly variable the trend of the ratio remains flat except for the year X1. The selling, administrative and general expenses being largely fixed the ratio shows a declining trend with the rise in sales except for the year X2. The reasons behind the exceptions have been discussed earlier. This being the generally conforming behaviour of these ratios we find that as compared to X1 there has been a rise in expenses as all the three turnover ratios are on the declining trend. In fact, during this period the total operating expense ratio has gone up by 4 percentage points when calculated as percentage of sales, meaning thereby that the operating profit as percentage of sales has also gone down as a consequence of that.

Projections

Manufacturing Expense Ratio (MER) is settling down at around 1.9. Since the ratio is variable with respect to sales we take it that it will remain at 1.9 for the next three years of projection. The Selling, General and Administrative Ratio (SAGR) is declining. For purpose of projecting this ratio we shall be adopting the same method that we have so far been using for trend determination (Chapter 4) with some modifications. The formula is given below.

$$x_{n+1} = \frac{[x_1 + 2x_2 + 3x_3 + 4x_4 + \cdots + nx_n] \times 2x_n}{[x_1 + x_2 + x_3 + x_4 + \ldots + x_n] \times (n + 1)}$$

Where x_{n+1} is the ratio predicted for the first projected year (n+1).

In the present case of predicting SAGR X1 has been excluded since it is an unusual year. Hence the year X2 is taken as x_1. The predicted ratio for the year X6 (which is x_5) will be,

$$x_5 = \frac{[7.50 + 2*7.24 + 3*7.16 + 4*6.77]2* 6.77}{[7.50 + 7.24 + 7.16 + 6.77]* (4+1)} = 6.66$$

To predict the ratio in X7 (x_6), the calculation is done by incorporating the predicted ratio for x_5 in both the numerator and denominator. The procedure is repeated for the subsequent projected years. Projected SAGR for the years X6, X7 and X8 will thus be 6.66, 6.52, and 6.35 respectively. We can project the operating expenses of MNOL under the two heads for the projected sales of the next three years.

Projected Operating Expenses

(*Rupees in crore*)

		X6	*X7*	*X8*
Manufacturing Expenses	Net sales (P)	8832	9392	9952
	MER (P)	1.9	1.9	1.9
A.		4648	4943	5238
Selling, Admn. & general expenses	Net sales (P)	8832	9392	9952
	SAGR (P)	6.66	6.52	6.35
B.		1326	1440	1567
Operating profit [Net sales-(A+B)]		2858	3009	3147

Capital Structure Ratios

Although Modigliani and Miller (1958) theorem of Capital Structure Irrelevance holds in a tax free environment, it is the existence PF tax which motivates a company to finance its operations partly from debt to save on taxes on interest payment and thus increase shareholders' value. Optimal level of debt will be such when marginal savings on taxes ceases to add value.

Debt and Debt-Equivalents—Lease

Capital structure of a company has two components: Debt and Equity. Debts include all interest bearing loan funds. Supply and other market creditors are not considered as debts for purpose of capital structure calculations. Besides the formal debts shown in the main body of the balance sheet, there maybe off-balance sheet liabilities some of which should be recognized as debt. One important example is lease. Lease rentals paid by the lessee is nothing but the cost of debt-financing of the assets subject to depreciation, which accrues to the lessor. Assuming a straight-line depreciation the asset value of the lease is determined as below.[1]

$$\text{Asset value of the lease} = \frac{\text{Annual lease rental}}{i_d + 1/\text{Asset life}}$$

Where, i_d is the cost of debt.

For example, assume that the lease rental of an asset with a life of 5 years is Rs 6 lakh p.p. and the cost of debt is 8 per cent. The asset value of the lease will be,

$$\frac{\text{Rs 6 lakh}}{0.08 + 1/5} = \text{Rs 21.43 lakh}$$

---

[1] See, Tom Copeland, Tim Koller and Jack Murrin (2000) for full explanation of the method. *Valuation-Measuring and managing the value of companies* John Wiley & Son, 3rd Edition, Inc., US, 2000.

According to the Indian Accounting Standard, AS 19 (The Indian Institute of Chartered Accountants of India, 2002) there is a difference between finance lease and operating lease. While the former is recognized as a transfer of substantially all the risks and rewards incidental to the ownership, in case of the latter, there is no such substantial transfer. The Standard requires the recognition of a finance lease as an asset and liability on both the sides of a balance sheet in the books of the lessee, at fair value, at the very inception of the lease. Some of the illustrative examples given in AS 19 for treating a lease as a finance lease are,

1. when the ownership of the asset is transferred to the lessee by the end of the lease period,
2. where the lease term is for the major part of the economic life of the asset, and
3. when the leased asset is of a specialized nature such that only the lessee can use it without any major modifications.

The Standard provides that if the fair value of the leased assets exceeds the present value of the lease rentals at a discount rate, (which may be implicit in the lease rental or it may be the lessee's incremental borrowing rate), then the latter will be recognized as the value of the leased asset. The depreciation of the leased asset should be provided for in accordance with a consistent policy as provided in AS 6. Once the asset value of the lease is determined it is raised in the books as asset and the corresponding liability is similarly incorporated in the balance sheet.

Another debt-equivalent is under or unfounded pension of retirement benefits. Companies often do not provide fully for employee benefits in the hope of making good the individual liability as and when it arises. This kind of decision is also influenced by factors such as tax consideration and availability of cash flows. Indian Accounting Standard, AS15 requires that where the contribution paid to the Retirement Benefits Fund during a year is lower than the required contribution during the year to meet the accrued liability the shortfall should be charged to the profit and loss account. Auditors are duty bound to report if there is any under funding of these items. In such a situation the analyst should treat the unfounded liability as a debt, as if, the company would have provided for it by raising a loan at the current rate of interest.

Equity

As explained in Chapter 10, equity is synonymous with the tangible net worth of a company, which include paid-up capital, retained earnings in the form of various reserves adjusted by accumulated losses, amortized expenses, and other fictitious assets. Net deferred tax assets, as introduced by AS 22 from the year 2001, should also be treated as part of equity as the benefit of these would be accrued to the company over a period of time. For example, if the company adopts a different rate of depreciation on its assets for accounting purpose and a different rate for taxation purpose and there accrues a positive difference between the two in a given accounting year, it should be treated as deferred tax liability. On the other hand, when an expense item is debited to the profit and loss account (for example, contribution to employees' retirement benefit fund or provision of bad and doubtful debt, etc.) but it is allowed for tax purpose only in the subsequent years on payment basis, then a deferred tax asset is created. In general, all the timing difference between the taxable income and accounting income in a given period should be treated as deferred tax liability or assets as the case may be and the net assets position is treated as part of equity.

We are now ready to calculate the equity (tangible net worth) and debt (interest paying) of MNOL.

Total Long-term Fund

(*Rupees in crore*)

	X1	*X2*	*X3*	*X4*	*X5*
Paid up capital	245	245	248	248	250
Reserves & surpluses	3226	4152	5056	6103	7585
Deferred tax assets (net)	0	147	64	88	376
Tangible Equity	**3471**	**4544**	**5368**	**6439**	**8211**
Loan					
Fund	859	337	117	121	245
Total Long-term Fund	**4330**	**4881**	**5485**	**6560**	**8456**

Notes: 1. The company does not have any financial lease but only operating leases comprising premises, godowns, stores etc., which are generally between 11 months and 9 years generally and are usually renewable by mutual consent on mutually agreeable terms. The aggregate lease rentals payable are included under the head 'Rent' in the Profit and Loss account. Leased properties are already included as part of fixed assets in the books of accounts of the company on the basis of professional valuations.

2. Reserves and surpluses exclude revaluation reserves.

Various capital turnover ratios are now calculated in the table below.

Capital Turnover Ratios

		X1	*X2*	*X3*	*X4*	*X5*
Equity turnover ratio	Net sales	4208	5059	5866	6470	7640
	Tangible equity	3471	4544	5368	6439	8211
Ratio		1.21	1.11	1.09	1	0.93
Trend				*Downward*		
Loan turnover ratio	Net sales	4208	5059	5866	6470	7640
	Loan fund	859	337	117	121	245
Ratio		4.9	15.01	50.53	53.47	31.18
Trend				*Upward*		
Total capital turnover ratio	Net sales	4208	5059	5866	6470	7640
	Total long-term fund	4330	4881	5485	6560	8456
Ratio		0.97	1.04	1.07	0.98	0.9
Trend				*Downward*		

Over Capitalization

The movement of the above ratios suggests that the company is getting over capitalized. Its sales generation is equal to, (if not less than) the capital employed. One could argue that the company may have invested, in the long run, assets whose sales generation capacity would be realized over a period of time. But the sales trend for the past five years is not indicative of it. The second reason could be that the company does not have much investment opportunities or being an old company (where conservatisms sets in) it is not willing to take the risks of major diversifications away from its tobacco and hotel businesses. This conservatism is also reflected in its capital structure policy where debt constitutes a very insignificant part. The company is nearly a zero-debt company. On the face of it, this may provide an assurance to the shareholders against the risk of bankruptcy but at the same time, they are being deprived of additional value, which could have been created. (In fact, with the given equity level the company could have expanded its capital structure by at least three times with a given debt-equity ratio of 2). It can be said that MNOL is a 'cash rich' company. In the absence of alternative capital investment projects the company is increasingly ploughing back its cash to security investments, as the following ratio will reveal.

Movement of Investment to Total Assets Ratio

	X1	*X2*	*X3*	*X4*	*X5*
Investment to Total assets ratio	0.73	8.90	9.18	21.53	26.59

Note: Investments exclude investment in subsidiaries.

The company is unable to make use of its huge cash debt capacity despite investments in hotels for the reasons mentioned above. There could also be a case of agency problem here, where managers always prefer to finance the business by as much equity as possible to enable them to maximize ‘free cash flows’; debt financing reduces this opportunity (Jensen, 1986)

It appears that there is a case for reduction of equity and, if necessary, funding such reduction by raising same amount of debt. A lower equity base coupled with tax advantage in debt financing will enhance the return on equity not only for the remaining shareholders but also for those who are paid off by providing them cash for alternative investment opportunities. If the company does not have in vision much of investible opportunities in future there is no point in increasing the reserves by a lower payout ratio, rather there is a case for increasing the ratio substantially so that the shareholders are benefited by an increased level of cash dividends.

The operating profit of the company has all along been more than 30 per cent of net sales. It is thus able to maintain a good level of earning per share that we shall see later. This has been possible due to the near monopoly of the company in the tobacco market. This coupled with the fact that tobacco being an addictive product the company does not face much of consumer resistance against rise in prices. (We have said earlier that despite high taxes and severe regulatory restrictions, sales of the industry is growing.) The company also enjoys an implicit protection, as foreign direct investment in tobacco business is not allowed for the present. But the rate at which the domestic economy is opening up it is not unlikely for the government to open up this sector for foreign competition in the near future. When that happens the company will face pressure on its margin and market share. The industry is already facing inroads of contraband tobacco products in the Indian market. Although no authentic estimate of contraband market is available, there is a feeling in the industry that it would not be less than 15 to 20 per cent. The company remains vulnerable on these counts.

Projections

Assuming that the conservative stance of the company will continue in the future the following projections are made for the next three years.

We have first projected the total long-term fund position of the company and then that of equity; the remaining gap constitutes debt. Relative ratios are predicted using the same methodology used earlier.

Projected Level of Capital Fund, Equity and Debt

(*Rupees in crore*)

		X6	*X7*	*X8*
Capital turnover ratio (CTR)		0.88	0.85	0.82
A. Capital Fund	Net sales (P) / CTR	10036	11049	12137
Equity turnover ratio (ETR)		0.9	0.87	0.84
B. Total Equity	Net sales (P) / ETR	9813	10795	11845
Projected Debt (A – B)		223	254	289

Note: We have assumed that there shall be no external raising of equity capital. The source of accretion is expected to be retained earnings only

SEGMENT ANALYSIS

Before entering into the domain of valuation of equity shares of MNOL it is necessary to evaluate performance of its different business segments. The company has five major business segments. In Table 14.4 we have analyzed the performance of these segments.

Table 14.4
Performance of Major Business Segments

(*Rupees in crore*)

Segment Name		*X2*	*X3*	*X4*	*X5*
Cigarettes & Tobacco					
Assets		2334	2303	2325	2083
		46.08	**42.8**	**38.13**	**30.08**
Sales		8021	8764	9230	10002
		77.25	**68.87**	**77.64**	**69.03**
Profit		1693	1924	2033	2289
		94.48	**87.02**	**95.85**	**87.7**
Ratios					
Assets Turnover ratio		3.44	3.81	3.97	4.8
Return on assets (Profit/Assets)	[%]	72.53	83.54	87.44	109.89

Table 14.4 (Continued)

Table 14.4 (Continued)

Segment Name		*X2*	*X3*	*X4*	*X5*
Margin on sales (Profit/Sales)	[%]	21.11	21.95	22.03	22.88
FMCG—Others					
Assets		70	123	255	345
		1.38	**2.29**	**4.18**	**4.98**
Sales		22	109	304	563
		0.21	**0.85**	**2.56**	**3.88**
Profit		–73	–122	–174	–195
		–4.07	**–5.52**	**–8.2**	**–7.47**
Ratios					
Assets Turnover ratio		0.31	0.89	1.19	1.63
Return on assets (Profit/Assets)	[%]	–104.28	–99.18	–68.23	–56.52
Margin on sales (Profit/Sales)	[%]	–331.82	–111.93	–57.23	–34.63
Hotels					
Assets		855	1037	1049	1511
		16.89	**19.27**	**17.2**	**21.82**
Sales		162	193	258	577
		1.56	**1.51**	**2.17**	**3.98**
Profit		–50	10	33	141
		–2.79	**0.45**	**1.55**	**5.4**
Ratios					
Assets Turnover ratio		0.19	0.19	0.25	0.38
Return on assets (Profit/Assets)	[%]	–5.85	0.96	3.14	9.33
Margin on sales (Profit/Sales)	[%]	–30.86	5.18	12.79	24.44
Agri-business					
Assets		480	523	636	874
		9.48	**9.72**	**10.42**	**12.62**
Sales		1148	1658	1709	1780
		11.05	**12.99**	**14.37**	**12.29**
Profit		11	84	90	96
		0.61	**3.8**	**4.24**	**3.68**
Ratios					
Assets Turnover ratio		2.39	3.17	2.69	2.04
Return on assets (Profit/Assets)	[%]	2.29	16.06	14.15	10.98
Margin on sales (Profit/Sales)	[%]	0.95	5.07	5.26	5.39
Paper, Paperboards etc.					
Assets		1325	1392	1834	2111
		26.16	**25.87**	**30.07**	**30.49**

Table 14.4 (Continued)

Table 14.4 (Continued)

Segment Name		*X2*	*X3*	*X4*	*X5*
Sales		1031	1163	1253	1565
		9.93	**9.12**	**10.54**	**10.8**
Profit		162	226	230	280
		9.04	**10.22**	**10.84**	**10.73**
Ratios					
Assets Turnover ratio		0.78	0.84	0.68	0.74
Return on assets (Profit/Assets)	[%]	12.22	16.24	12.54	13.26
Margin on sales (Profit/Sales)	[%]	15.71	19.43	18.35	17.89
Segment Totals					
Assets		5065	5380	6098	6924
Sales		10384	12754	11888	14489
Profit		1792	2211	2121	2610

Notes: 1. Figures in bold represent percentage of of Segment totals.
2. Negative percentages are put here to indicate movement of that variable.

The analyses made in Table 14.4 indicate that in the Cigarettes and Tobacco segment assets are declining both in absolute terms and as a percentage of segments total. Although the contribution of this segment towards the sales and profit of all the segments taken together is decreasing, their growth in absolute terms is quite substantial. (It appears that both the sales and profit of this segment as percentage of segment totals are repeating every alternate year.) ROA (Return on Assets) of this segment is now about 110 per cent. The margin on sales remains almost constant at around 22 per cent, which indicates that the company has been able to pass on the increasing excise duty to the consumers.

The FMCG—Others segment constitutes garments, stationery and gift items, packaged and ready-to-eat food products, agarbatti, matches etc. The company has been increasing investment in this segment consistently over the past four years. Sales have improved but losses are also increasing. The company has been saying in its Annual Reports for the past four years that performance of this segment largely reflects startup and business development costs. One wonders whether four years is a sufficient time to show some profitability.

The Hotel segment is consistently showing improved results. The company has already established its linkage with an international hotel chain, and new hotels are coming up almost every year. Both the ROA and margin on sales, which were negative in the X2, have shown considerable improvement during the next three years.

In the Agri-business segment also the company has been consistently increasing its investment but both the Assets Turnover Ratio and ROA are on the declining trend and the margin on sales remains more or less constant over the years. Its contribution to total segment performance both in respect of sales and profit is also declining.

In respect of Paper and Paperboard segments the company has been stating in its Annual Reports that this segment incorporates the impact of the amalgamation of a subsidiary on April 1 2001. Contribution of this segment to the total segment performance remains almost constant. The Assets Turnover Ratio is quite small and, there is not much improvement in sight.

Overall, it can be concluded that except the Cigarettes and Tobacco and the Hotel segments, the performance of the other segments of the company is not very encouraging.

EARNING PER SHARE AND RETURN ON EQUITY (RE)

Earning Per Share (EPS) is calculated by dividing the net earning (after tax) with the number of equity shares outstanding. So far we have dealt with the operating profit of the company to understand the operating viability of its business. In doing so, we have ignored other incomes, particularly from investments on one side and interest and taxation on the expenditure side. It is necessary to consider these items now to calculate the EPS. However, any extraordinary item of income and expenditure will continue to be excluded from our calculation, as these are not recurring in nature, though as per AS 20 the company should report EPS including any extraordinary items of income or expense recognized in a given year.

Earning per share of the company over the past five years is calculated below.

Calculation of Earning, Dividend and Retained Earning Per Share

(*Rupees in crore*)

	X1	*X2*	*X3*	*X4*	*X5*
Operating profit	1559	1713	1920	2124	2483
Less Interest	101	73	35	30	45

(Continued)

(Continued)

	X1	*X2*	*X3*	*X4*	*X5*
	1458	1640	1885	2094	2438
Less Loss on investments	3	1	0	1	1
	1455	1639	1885	2093	2437
Add Other incomes	145	142	171	225	236
	1600	1781	2056	2381	2673
Less Income Tax	594	591	685	725	837
Profit After Tax (PAT)	**1006**	**1190**	**1371**	**1693**	**1836**
No. of Equity shares (lakh)	2450	2450	2480	2480	2500
Earning Per Share (EPS)	**41.46**	**48.57**	**55.28**	**64.23**	**73.44**
Less Dividend per share (including taxes)	11.02	13.63	16.89	22.5	25.7
Retained Earning Per Share	**30.04**	**34.94**	**38.39**	**41.73**	**44.74**
[Tangible Total Equity]	***3471***	***4544***	***5368***	***6439***	***8211***

Notes: 1. In the year X5 the company had an exceptional income of Rs 354 crore or 3540/250 = 14.16 per share. The company maintained last year's dividend payout ratio of 35 per cent, which in absence of the exceptional income would have been Rs 25.70 per share and the retained earning per share would have been Rs 47.74. With the exceptional income the company paid out Rs 883 crore or Rs 35.32 per share. That is, Rs 9.62 per share has come from Rs 14.16 per share of exceptional income.

2. It appears that the company did not have to pay any tax on the exceptional income in the year X5 because at 31.30 per cent (last year's rate) the tax amount of Rs 836 crore appearing in the financial statement is similar to the one calculated above without the exceptional income.

Application of Accounting Standards for EPS calculation

The balance sheets of the company reveal that the paid up capital of the company has increased in the year X3 and X5. As the increase is not substantial for purpose of our present analysis we can safely assume that such increases have taken place at the beginning of the year. However, it is necessary to discuss in the present context the relevant provisions of Indian Accounting Standards (AS20), which has become effective from April 1 2001.

Basic EPS

When shares are issued during the year the number of equity shares, for purpose of EPS calculation, should be the weighted average of the equity shares outstanding, i.e., the number of equity shares outstanding at the beginning of the period adjusted by the number of shares issued or bought back during the period multiplied by the time-weighting factor. For example, assuming that MNOL had issued 20 lakh equity shares with a face value of Rs 10 per share which was paid up and credited during the month of June in the year X5, then the weighted average number of equity shares would have been 2480 × 6/12 + 2500 × 6/12 = 2490 lakh instead of 2500 lakh as shown in the balance sheet at the end of the year X5.

Diluted EPS

When hybrid debt-capital instruments or other potential equity shares are issued there is dilutive potential both in respect of income and equity capital that must be adjusted for calculation of EPS. For example, in case of convertible bonds, till the time these are converted into equity shares interest would be payable at coupon rate and after the conversion dividends would accrue to these newly converted equity shares. Therefore, there is a dilution of both the earnings and the equity shares that need to be adjusted for calculation of EPS. The following illustration will make it clear.

Assume that MNOL had 12 per cent convertible debentures of Rs 100 each aggregating Rs 200 lakh convertible in the year X5 to 10 equity shares of Rs 10 each per bond; net profit of the company in the year X5 is Rs 1836 crore and the basic EPS is Rs 73.44. Interest expense for the current year on convertible bonds @ 12 per cent p.a. is Rs 24 lakh. Income tax saving on this expense is Rs 8.40 lakh assuming a tax rate of 35 per cent. Hence, adjusted net profit is Rs 183600 lakh + 24 lakh – 8.40 lakh = Rs 183615.60 lakh. As against this number of equity shares resulting from conversion of debentures is 20 lakh making the total to 2500 lakh. Diluted EPS would therefore, be Rs 73.45 as against basic EPS of Rs 73.44. The difference is small owing to our assumption of small amount of conversion, but it explains the procedure.

Dilution of EPS also takes place when a company has outstanding Employees Stock Options (ESO) that would result in the issue of equity shares for less than the fair value, the extent of dilution being the fair value less than the issue price. From April 1 2001 every listed company is mandatorily required to disclose both the basic and diluted EPS in accordance with AS 20. A study of the financial statements of MNOL reveals that there is no significant difference between the basic EPS and diluted EPS for the years under study.

In the following table the ratios discussed above are presented formally.

Other Incomes Ratio, Return on Equity, Pay out Ratio and Retained Earning Ratio

		X1	*X2*	*X3*	*X4*	*X5*
Other incomes ratio	Other income (net) / Operating profit	9.1	8.25	8.9	10.6	9.5
Trend				*Flat*		
Return on Equity	Profit after tax / Tangible equity	28.98	26.19	25.54	24.74	22.36
Trend				*Downward*		
Pay-out ratio	Dividend per share / Earning per share	26.84	28.06	30.55	35.03	35
Trend				*Upward*		
Retained earning ratio	Retained earning / Earning per share	73.16	71.94	69.45	64.97	65
Trend				*Downward*		

Projections

Although a bulk of ‘other incomes’ of the company constitute investment incomes, there may be other sources for example, rental income etc., which are not revealed in the balance sheet. As the ‘Other incomes’ are clubbed together under a single head, we have related this to the operating profit and calculated the ratio as such in the earlier table. For purpose projection we take the average of this ratio over the five-year period, which comes to 9.27, say 9.30 per cent. Projection of other ratios, as per the methodology outlined earlier is given below.

Projection of ROE, Pay Out Ratio and Retained Earning Ratio

	X6	*X7*	*X8*	*Average*
Return on Equity (%)	21.5	20.47	19.32	20.43
Payout Ratio (%)	36.73	38.77	41.2	38.9
Retained Earning (%)	63.27	61.23	58.8	61.1

Finally, projections of per share earning, dividend and retained earning are made hereafter.

Projected Profit after Tax, Earning, Dividend and Retained Earning Per Share

(*Rupees in crore*)

	X6	*X7*	*X8*
Projected operating profit	2858	3009	3147
Add Other income @ 9.3% of operating profit	266	280	293
Projected PBIT	**3124**	**3289**	**3440**
Less Interest on projected Debt @12% p.a.	27	31	35
Projected PBT	**3097**	**3258**	**3405**
Less Income tax @33%	1022	1075	1124
Projected PAT	**2075**	**2183**	**2281**
Projected EPS	**83**	**87**	**91**
Less projected dividend per share	31	34	37
Projected Retained Earning Per Share	**52**	**53**	**54**

STOCK MARKET VALUATION

Price/Earning (P//E) Ratio

With this ratio we enter into stock market valuation. This is the most talked about ratio of the stock market and mostly, misunderstood or misinterpreted. The primary reason behind this confusion is that the ratio tries to relate the present earning to the future earning of the enterprise, as the analysis of the ratio would reveal. The ratio is given by,

$$\frac{\text{Market price per share}}{\text{Earning per share}}$$

The numerator of the ratio is based on a 'going concern' approach; it assumes a continuity of operation, whereas the denominator is based on the accountants' 'gone concern' approach; it does not tell anything about the future earning potential of the company. The latter is implicit only in the market price of the share. A common sense approach will tell us that if earning is constant year after year, then the market price of any asset, whether it is a share or a property will be equal to its face value. For example, if a fixed deposit of Rs 1000 with a bank earns 10 per cent p.a. for five years, present value of the deposit will remain at Rs 1000 only as the following calculation will show.

$$\text{Value/Price of the Deposit} = \frac{100}{(1.10)} + \frac{100}{(1.10)^2} + \frac{100}{(1.10)^3} + \frac{100}{(1.10)^4} + \frac{100}{(1.10)^5}$$

$$= \text{Rs } 1000$$

In the above example, as the present earning and future earning are same, the value/market price of the deposit remains same assuming there is no change in the market interest rate. Considering now that the investor wants to move out from the rather safe haven of bank deposit to stock market he would definitely ask for a premium on the rate of deposit to cover the risk, which is say, 2 per cent. Hence his required rate of return (r) will now be 12 per cent. If now he opts to invest his Rs 1000 in a stock which gives a constant return of Rs 100 p.a., the value of the share would be as follows:

$$\text{Value of share} = \frac{100}{(1.12)} + \frac{100}{(1.12)^2} + \frac{100}{(1.12)^3} + \frac{100}{(1.12)^4} + \frac{1100}{(1.12)^5} = \text{Rs } 927.91$$

The example makes it clear that the investor has paid more than the intrinsic value of the share.

It is not necessary that the earning per share would remain constant. There may be cases where the present earning of Rs 100 may grow by say, 8 per cent p.a. The value of the share in such a situation will be as follows.

$$\text{Value of share} = \frac{108}{(1.12)} + \frac{116.64}{(1.12)^2} + \frac{125.97}{(1.12)^3} + \frac{136.05}{(1.12)^4} + \frac{1146.93}{(1.12)^5} = 1016.34$$

The investor has now made a wise decision to buy the share at a market price of Rs 1000, as it is somewhat higher than his expected price at his own opportunity cost of 12 per cent p.a.[2] In other words, the investor should buy a share which satisfies his own required rate of return but which may be different from the implied rate of return of the investment.

In the first example, which is equivalent to a bond, the implied rate of return is 10 per cent as the present value of the income streams discounted

[2] For simplicity's sake it has been assumed that the investor will get back his original capital of Rs 1000 at the end of fifth year. In fact, he is expected to get more, as the market price of the share at the end of the fifth year is expected to be more under the circumstances.

at 10 per cent is exactly equal to Rs 1000. This implied rate of return (10 per cent) is less than the opportunity cost of the investor (12 per cent), hence it is not an acceptable proposition for him. The opportunity cost of the investor is satisfied only when the cash flow is growing by 8 per cent p.a.

It may be seen that in both the examples we have not distributed earnings between cash dividends and retained earnings; we have assumed, instead that the company pays out its entire EPS as dividend, that is, EPS=DPS. But it may not necessarily be true in all cases. Generally, a part of EPS is paid out as dividend, retaining the other part for investment in assets for future growth. The second example shown above (where the EPS is growing) is possible, without any earning retained for future growth, only when existing assets of the company are producing increasing returns due may be to the rise in capacity utilization. The only saving in such a situation is the depreciation amount which is invested in capital maintenance. One-time ventures or companies, which do not have growth opportunities, may decide to pay out the entire EPS to its shareholders. On the other extreme, there may be companies that do not pay dividend at all as they have plenty of growth opportunities. Investors are prepared to sacrifice present dividends in the expectation of higher future dividends and/or higher capital appreciation. The shares of the second category of companies are often called 'growth stocks' as against 'income stocks' as the former category signifies. This leads us to the interesting question of what constitutes the shareholders' reward.

VALUATION MODELS

The shareholders' can be rewarded by cash dividends and/or capital appreciation of shares in the market. Expected return (r) would, therefore be,

$$r = \frac{D_1 + (P_1 + P_0)}{P_0}$$

And, P_0 = Current price = $D_1 + P_1 / (1 + r)$;

Where, D_1 = Dividend in period 1, and $(P_1 – P_0)$ is the capital appreciation, when $P_1 > P_0$.

The above proposition can be formally presented as follows assuming that the dividend is growing at a constant percentage (g).

$$P_0 = \frac{D_0(1+g)}{(1+r)} + \frac{D_0(1+g)^2}{(1+r)^2} + \frac{D_0(1+g)^3}{(1+r)^3} + \frac{D_0(1+g)^4}{(1+r)^4} + \frac{D_0(1+g)^5 + I}{(1+r)^5}$$

where: P_0 = Present value of the share
D_0 = Current dividend
g = Compound rate of growth in dividend
r = Required rate of return
I = Original investment

When we examine the numerator of the last term of this model where the original investment (I) features we would see that over a long period the discounted value of 'I' will tend towards zero. The model can, therefore, be rewritten as follows.

$$P_0 = \frac{D_0(1+g)}{(1+r)} + \frac{D_0(1+g)^2}{(1+r)^2} + \frac{D_0(1+g)^3}{(1+r)^3} + \cdots + \frac{D_0(1+g)^\infty}{(1+r)^\infty}$$

The model implies that as the holding period of the investors extends to infinity, the stock of shares becomes equivalent to perpetual bonds. This is also intitutively correct as even when an investor holds the stock for a shorter period because when he quits he would desire to get back the terminal price which is higher than the price at which he had bought it and his buyer would similarly pay for it as he would do the same calculations. The process goes on with successive investors over an infinite time horizon. When this process is considered as a continuous flow what remains ultimately is the discounted value of dividends. This is the reason why it is called dividend discount model of share valuation. It was first developed by J.B. Williams way back in 1938.[3] Despite various criticisms of the model, it remains robust and continues to be the fundamental model in valuation analysis. The beauty of the model is that it can accommodate many of these criticisms and market variations.

Assuming now that r is greater than g, the above equation can be expressed as,

$P_0 = \frac{D_1}{r-g}$, where D_1 is the cash flow at time 1, i.e., the numerator of the RHS of the model given above.

[3] *The Theory of Investment Value,* by J.B. Williams, Harvard University Press, Cambridge, Mass, 1938.

Rearranging the aforementioned equation the expected return becomes,

$r = \frac{D_1}{P_0} + g$, which in other words, means dividend yield plus its rate of growth (g). This is also called Market Capitalization Rate.

When a company follows a uniform policy of retaining a constant percentage of its net earning (RER), which on the other hand, means a constant payout ratio, the retained earning is expected to be invested in the company and earn at the rate of its existing ROE. This will result in a growth of dividend, which can be expressed as,

$$g = \text{RER*ROE, and } P_0 = \frac{(1 - \text{RER})\text{EPS}}{r - g},$$

where (1–RE) is the payout ratio.

Price/Earning ratio will, therefore, be equal to, $\frac{P_0}{\text{EPS}} = \frac{(1 - \text{RER})\text{EPS}}{r - g}$.

In absence of any RE the equation will become,1/(r – g).
In our first example cash flow being constant, 'g' will be zero. Hence,

$r = \frac{100}{1000}$ or 10%. In the second example, $r = \frac{D_1}{P_0} + g = \frac{108}{1016.34} + .08$ or, 0.1862 or 18.62%.

P/E ratio in the first case is 1/0.10 or 10, and in the second case it is 1/(0.1862 – 0.08) or 9.42.

Assuming that the above company now decides to retain a constant percentage of its earning each year, which is represented by 'b', the dividend payout ratio would be
$1 - b = D_1/E_1$; hence,

$$P_0 = \frac{(1 - \text{RER})\text{EPS}}{r - g}, \text{ and}$$

$$\text{P/E ratio} = \frac{P_0}{\text{EPS}} = \frac{(1 - \text{RER})}{r - g}$$

In our last example if the company retains say, 40 per cent of its profit, the new P/E ratio will be,

$$\frac{1 - 0.40}{0.1862 - 0.08} = 5.65$$

While retained earning is an important source of growth we should recall that it presupposes availability of opportunities for investment in the absence of which retention may not generate any growth, rather it may reduce the ROE owing to increased equity base. Besides, ROE and the retention may also change over time. The possibilities are real but it is not difficult to accommodate them into the basic models presented above.[4]

Predicting the Future Value

All stock market reporting would invariably feature P/E ratio that relates market price to the latest EPS reported by the company. Based on EPS announcements and various other announcements made by the company from time to time the stock market takes a daily (if not hourly) view of the company's earning prospects, which finally gets expressed by certain multiples of the last reported EPS. The present earning and the future prospects are thus linked in determining the current market price of the company's share. In other words, if the market estimates higher level of future earnings than the present level, then the P/E ratio will be high. The contrary will happen if the market expects a lowering down of future earning from the present level. In the final analysis the P/E ratio indicates the anticipated growth in earnings of a company. Fundamental analysis helps us in estimating growth of earnings in future.

We are now ready to predict the market price of the share and P/E ratio of MNOL. For this purpose we need the following information;

1.	Current closing market price of the share (P_0)	= Rs 895.80[5]
2.	Current dividend per share (D_0)	= Rs 25.70
3.	Average return on equity (average of three projected years)	= 20.43%
4.	EPS for the next projected year (E_1)	= Rs 83
5.	Retained earning ratio (average of 3 years) [b]	= 61.1%
6.	Payout ratio (average of 3 years) [1 – b]	= 38.9%

[4] For a more thorough exposition of basic valuation models see, *Financial Management and Policy*, James C. Van Horne, Chapter 2, ninth edition, Prentice-Hall of India, New Delhi, 1994.

[5] The market price of the share for the real company has been taken from the monthly stock price data published in capitaline.com.

We need to first calculate the required return (r). As the projected EPS and dividend per share are known, so also the current market price, we can straightway calculate 'r' with the current dividend. For this we have to first calculate the growth rate of dividend G = b*ROE = 0.611*0.2043 = 0.1248 or 12.48%. Hence,

$$r = \frac{25.70}{895.80} + 0.1248 = 0.0287 + 0.1248 = 0.1534 \text{ or } 15.34\%$$

Expected market price of the share in the next projected year (P1) will be,

$$P1 = \frac{D_1(1+g)}{r-g} = \frac{31(1.1248)}{0.1534 - 0.1248} = \text{Rs } 1215 \text{ and,}$$

$$\text{P/E ratio} = \frac{P_1}{EPS_1} = 1215/83 = 14.64$$

P/E ratio, as calculated by our earlier formula, will be,

$$\frac{1-0.611}{0.1534 - 0.1248} = 13.60$$

CHECK

From the monthly stock price data of the company published by capitaline.com available for the first ten months of year X6 the following averages are calculated.

	Share Price	*P/E Ratio*
1. Average of High and Low	Rs 1203	14.34
2. Average of High, Low and Closing	Rs 1215	14.44
3. Average of Closing price	Rs 1228	14.64

It appears that the market price and the P/E ratio are following the predicted figures, which on the other hand, means that the market is following the fundamentals of the company as analyzed in this chapter.

Average market price of the share of this company and the P/E ratios for the next two projected years (P_2 and P_3) can be calculated similarly.

Price/Book Value (P/B) Ratio and Book Value to Market Value (BV/MV) Ratio

Book value of equity is a typical accounting measure of equity given by paid up capital plus accretion to reserves net of any accumulated losses and fictitious assets. In other words, it is the tangible net worth of a firm discussed earlier. This is also the denominator variable for calculating ROE of a firm. As with any other book-value variable, this is also historical in nature; it does not tell us about its real worth in terms of its earning power. Two firms may have similar amount of equity but their value may vary because of different returns. What matters therefore, is the intrinsic value of the equity measured by its earning power, which typically belongs to the domain of fundamental analysis discussed so far. However, like P/E ratio attempts are often made to link the book value of equity to the market through P/B ratio. Let us calculate this for MNOL.

Market price of the share of the company as on the close of last year ending X5 is Rs 895.80 (see the previous example). Book value of an equity share as on the same date is calculated below.

$$\text{Book value of a share} = \frac{\text{Tangible equity}}{\text{Number of equity shares}} = \frac{\text{Rs 8211 crore}}{\text{25 crore}} = \text{Rs 328.44}$$

$$\text{P/B ratio} = \frac{\text{Market price of a share}}{\text{Book value of a share}} = 895.80/328.44 = 2.73$$

The P/B ratio calculated above tells us that under the existing conditions any accretion to equity will generate an additional market value equal to the P/B multiple of 2.73. This ratio is often used by acquirers to decide on the price to be paid for acquisition of a company.

At times, some companies are found to overstate their profits by not charging interest accrued on various instruments of borrowing to Profit and Loss account but by adjusting it against reserves and surpluses as redemption premium. Examples of such instruments are, zero coupon bonds, various discount bonds including deep discount bonds, where interest is accrued annually but paid only on maturity. There is nothing illegal about it as Companies Act does permit such a practice, but in the process, the profit is overstated. Although, the size of equity (net worth) may not change, the market price of the share may get distorted because of the market's heavy reliance on P/E ratio where equity does not feature. P/B ratio may capture this anomaly to a large extent because the denominator variable of this ratio is the net worth that does not get affected due to the above practice. It is necessary, therefore, not to consider P/E ratio in isolation, but along with P/B ratio. When the P/E ratio and P/B ratio are moving in consonance over a period of time it may be concluded that the market is valuing the stock correctly.

The reciprocal of P/B ratio is the Book Value/Market Value (BV/MV) ratio. Interesting researches have been made by using the latter form of this ratio, particularly of Fama and French (1992) who found from an extensive empirical research that relatively low values of BV/MV ratio characterizes growth stocks and relatively high values characterizes value stocks. They have also found that on an average the larger the size of the BV/MV ratio, larger the rate of return.

Growth stocks are generally defined as stocks experiencing rapid increases in earnings whereas value stocks are such stocks whose market prices seem to be low relative to the measure of their worth (Sharpe, Alexander and Bailey, 1995). (It should be mentioned at the same time that this is only a broad definition. There exist differences of opinion among analysts in distinguishing between growth stocks and value stocks.) Market Indexes are often drawn for these two categories of stocks. For example, S & P 500 stocks are first divided into two groups based on the size of their BV/MV ratio and then a separate index is drawn for S&P/BARRA Value stocks Index and S&P/BARRA Growth stocks Index.

RATIOS FOR PORTFOLIO MANAGEMENT

So far we have discussed methods of valuation of shares of a company. An investor may desire to hold shares of a number of companies, that is, portfolio shares either on his own or through a mutual fund. His object is to diversify the risk and maximize the return.

Investment Risks

Generally, the risk is defined as variation in returns. The first kind of risk occurs from changes that may be peculiar to the company or a specific industry to which the company belongs, such as strikes, lockouts, regulatory changes, tariffs, change in management, movement of key management personnel etc. The events may be random and their occurrence cannot be predicted in advance but the risks associated with such events are manageable to a large extent. From an investor's point of view this risk can be minimized to a large extent by diversifying the investment portfolio among a large number of companies and industries as these events may not occur simultaneously for all companies and/or industries. As the number of companies/industries increases, the overall risk of the portfolio gets minimized. Extending this argument a little further we can say that by increasing the contents of the portfolio with a sufficiently large number of companies the investor can eliminate this risk. This is the reason why it is called diversifiable or unsystematic risk. But all the risks cannot be so diversifiable. There are certain risks, which are uncontrollable both for the companies and the investors. These risks are external to a company as they emanate from changes in socio-economic conditions of the economy and include such incidents as, war, drastic political changes, inflation, depression etc. These events affect all the industries and companies. This kind of risk is called systematic risk. It has been found that generally, diversifiable or unsystematic risks account for about 75 per cent of the total risks while remaining 25 per cent are due to systematic risks.[6]

As he cannot do away with the systematic risk by diversifying, the focus of the concern of the portfolio investor is the measurement of the systematic risk and adjusting the required rate of return accordingly. We can safely assume that the stock market index of major stock exchanges, which comprises a large number of companies, is a well diversified portfolio, hence it has virtually eliminated the unsystematic risk. Any volatility in the returns of this index can, therefore, be ascribed to systematic risk. Suppose now that the volatility, as measured by Coefficient of Variation (CV_m)[7] of index returns is 10 per cent and the same for an individual company's share (CV_p) is also 10 per cent we may tend to conclude that as both the

[6] See, Van Horne, 1986.

[7] Coefficient of Variation is given by $SD/\bar{x}$, where $\bar{x}$ is the mean and SD is the standard deviation of the sample. SD of a sample observation is calculated by $\sqrt{[\Sigma(x_i - \bar{x})^2/n - 1]}$. The reader may refer to any standard text book for this purpose.

index and the individual stock are moving in tandem, the stock is neither better off nor worse off than the market. But the return from the share of an individual company suffers from both unsystematic and systematic risk while the index carries only systematic risk. Hence, if $CV_p = CV_m$, then the individual company's stock must be performing better than the market. The same holds when, $CV_p < CV_m$ but its performance is superior to the former because here the combined risk of the individual company's stock is less than the systematic risk of the market. When, $CV_p > CV_m$ it may be concluded that the individual stock in addition to carrying fully the systematic risk of the market is also carrying additional diversifiable risk. The proposition can now be written in ratio form as CV_p/CV_m. The ratio may be called Risk Performance Ratio. Different implications of this ratio are analyzed in Table 14.5.

Table 14.5
Implications of Different Values of Risk Performance Ratio

A.	$CV_p/CV_m = 1$	The individual stock is performing better than the market.
B.	$CV_p/VC_m > 1$	The individual stock is performing worse than the market, as in addition to carrying the systematic risk fully it is also carrying additional diversifiable risk.
C.	$CV_p/CV_m < 1$	The individual stock's performance is superior to the market and that of (a) above.

Treynor's Ratio

There are two well-established ratios to measure the performance of an investment portfolio. The first such ratio was developed by Treynor (1965). He stated that risks associated with investments can be divided into two components, namely the risk emanating from general market fluctuations, and risk produced by the unique fluctuations in the particular security in a portfolio. He identified the first risk (i.e., the risk produced by general market fluctuations related to the portfolio) as the beta (β) coefficient, which is the slope of the 'characteristic line' that defines the relationship between rates of return for a portfolio over time and rates of return from an appropriate market index during the same period. The higher the beta, the more sensitive the portfolio is to market returns and the greater its market risks. Treynor implicitly assumes that a portfolio is perfectly diversifiable so that the systematic risk is the only relevant risk. Treynor's ratio, known also as Reward-to-Volatility Ratio (RVR), is given by,

$$\text{RVR} = \frac{\bar{R}_p - \bar{R}_p}{\beta}$$

where: $\bar{R}_p$ = Average rate of return from portfolio during time period.
$\bar{R}_f$ = Average rate of return for time period on a risk-free investment say, Treasury Bills.
β = Expected change in the rate of return of the portfolio associated with 1% change in the market return.

Beta (β) is calculated by the following statistical formula.

$$\beta = \frac{T \times \Sigma xy - (\Sigma y \,\&\, \Sigma x)}{(T \times \Sigma x^2) - (\Sigma x)^2}$$

where, x is the excess return of the market index over return on risk less security and y is the excess return of the portfolio over the risk less security. T is the number of periods.

As the investor in a market portfolio is taking a risk, his expected return should be greater than the return from risk-free instruments. He must, therefore have a benchmark against which to compare the performance of his portfolio. This is given by average return from a market index minus average return from risk-free assets or, $\bar{R}_m - \bar{R}_f$. Against this benchmark he compares the performance of the portfolio as below.

$(\bar{R}_p - \bar{R}_f) > (\bar{R}_m - \bar{R}_f)$ = The portfolio is performing better than the market.
$(\bar{R}_p - \bar{R}_f) = (\bar{R}_m - \bar{R}_f)$ = The portfolio's performance is similar to the market.
$(\bar{R}_p - \bar{R}_f) < (\bar{R}_m - \bar{R}_f)$ = The portfolio is performing worse than the market.

Treynor has also developed an indicator of portfolio performance which is given by

Alpha $(\alpha) = \dfrac{\Sigma y}{T} - \left(\beta \times \dfrac{\Sigma x}{T}\right)$, where x and y are excess returns of market index and that of portfolio respectively over return from risk-free investments. A positive value of Alpha for a portfolio indicates that the portfolio's average return is greater than the bench mark, suggesting superior performance. A negative value of Alpha indicates the opposite.

One need not take the trouble of calculating the Beta, as several investment banks, rating agencies and, investment advisors publish Beta of individual stocks and also for market portfolio of products, for example mutual funds. Generally, Betas are found to be positive and they are observed to lie between 0.4 and 1.9 (Fisher and Jordan, 1996). But there may be cases where Beta is much lower than 0.4, particularly when the variation between the excess return of the market index and the portfolio is not much.

The greater the Beta, the greater is the systematic risk. In fact, Beta of a share or portfolio, say mutual fund, indicates the impact of market movement on the return expected from a stock or a portfolio. Suppose, Beta of a stock is 1.7 and the market is expected to provide 15 per cent return over the next year, the stock is expected to provide an increase in return of approximately, 1.7 × 15 per cent = 25.5 per cent. But, as the Beta is high, the return from the stock is highly volatile, which makes it vulnerable to the opposite movement of the market. If market expects a decline in return by the same percentage, the stock's return is expected to decline by the same 25.5 per cent. On the other hand, a stock having a small Beta would be less sensitive to changing market returns and, therefore, less risky.

As the numerator of the ratio (RVR) represents the risk premium and Beta is the measure of the risk sensitivity, the ratio indicates the portfolio's return per unit of risk. Hence, larger the value of RVR, the more preferable is the portfolio. Putting differently, the greater the Beta, the greater the risk, hence greater will be the expected return required. As against this, the lower the Beta, the lower the risk and lower will be the expected return required.

Sharpe's Ratio

This ratio for measuring performance of a portfolio was developed by William F. Sharpe (1966). He assumed that all investors are able to borrow or lend at the risk free rate and that all investors share the same set of expectations.[8] Sharpe's ratio is also called Reward-to-Variability ratio (RVAR). The simplified form of the ratio is given by,

$$\text{RVAR} = \frac{\bar{R}_p - \bar{R}_p}{\delta_p}$$

[8] These are the basic assumptions of Capital Assets Pricing Model (CAPM). For a fuller discussion of the model the reader may refer to any standard text book on financial management, for example, Van Horne (opp.cit.) or the original paper of Sharpe, 'Capital Asset Prices: A Theory of Market Equilibrium under conditions of Risk', *Journal of Finance*, 19(4) 1964, pp. 425–442.

where, δ_p is the standard deviation of the portfolio returns. Benchmark return of Sharpe is given by, $(\bar{R}_m - \bar{R}_f)/\delta_m$. If RVAR is greater than the benchmark return, the portfolio can be said to have outperformed the market. If it is less, the portfolio's performance is not as good as the market.

The difference between Treynor's ratio (RVR) and Sharpe's ratio (RVAR) is that while the former is obtained by dividing the portfolio's average excess return by its beta, the latter involves dividing the portfolio's average excess return by its standard deviation The Sharpe's ratio not only evaluates the portfolio on the basis of portfolio returns but also takes into account how well diversified the portfolio is. If a portfolio is highly diversified, that is, it does no longer bear any unsystematic risk, then the Sharpe's ratio comes closer to the assumptions of Treynor and the two ratios will produce identical rankings among different portfolios, as the total variance of the portfolios would be the systematic variance only. Any difference is attributable to poor diversification of the portfolio.

We shall now explain the above risk-return ratios with the help of an example. In Table 14.6 data for eleven periods (T) are given for Return on 91 days Treasury Bills (R_f), Index Return (R_m) and Return from an Equity Mutual Fund (R_p). The Index chosen is S&P CNX Nifty 500, which represents 96 per cent market capitalization. The mutual fund is a growth fund, i.e., there is no dividend payout.

Table 14.6
Calculation of Variables for Risk-Return Ratio-I

Period	*Return on treasury bills (R_f) (a)*	*Index return (R_m) (b)*	*Mutual fund return (R_p) (c)*	$(R_p - R_p)^2$	$(R_m - R_m)^2$
1	5.3653	2.8087	5.1046	2.1029	11.8399
2	5.1183	8.6578	4.1944	5.5713	5.7994
3	5.3653	3.8886	5.8282	0.5279	5.5744
4	5.4065	6.3582	5.4106	1.3091	0.0118
5	5.4889	4.8806	8.7992	5.0375	1.8742
6	5.1595	6.9438	7.4979	0.8895	0.4819
7	5.0406	9.0677	6.3134	0.0583	7.9416
8	5.5714	11.5267	6.8189	0.0698	27.8477
9	5.7364	6.6366	8.8169	5.1173	0.1498
10	5.9428	5.1541	6.3019	0.0639	1.2001
11	6.5634	2.8229	7.0163	0.2130	11.7423
Average	**5.5235**	**6.2496**	**6.5548**	**Σ20.9605**	**Σ74.4630**

Other calculations are made in Table 14.7.

Table 14.7
Calculation of Variables for Risk-Return Ratio-II

Period	*Index excess return (x) [b – a]*	*Mutual fund excess return (y) [c – a]*	x^2	y^2	*xy*
1	–2.5566	–0.2607	6.5362	0.0680	0.6665
2	3.5395	–0.9239	12.5281	0.8536	–3.2701
3	–1.4767	0.4629	2.1806	0.2143	–0.6836
4	0.9517	0.0041	0.9057	0.0000	0.0039
5	–0.6083	3.3103	0.3700	10.9581	–2.0137
6	1.7843	2.3384	3.1837	5.4681	4.1724
7	4.0271	1.2728	16.2175	1.6200	5.1257
8	5.9553	1.2475	35.4656	1.5563	7.4292
9	0.9002	3.0805	0.8104	9.4895	2.7731
10	–0.7887	0.3591	0.6220	0.1290	–0.2832
11	–3.7405	0.4529	13.9913	0.2051	–1.6941
Σ	**7.9873**	**11.3439**	**92.8113**	**30.5619**	**12.2262**

We shall first consider the Treynor's ratio (RVR) followed by Sharpe's ratio (RVAR). The Risk Performance Ratio will be discussed last. For Trenyor's ratio we need to calculate Beta and Alpha.

$$\beta = \frac{(T \times \Sigma xy) - (\Sigma y \times \Sigma x)}{(T \times \Sigma x^2) - (\Sigma x)^2} = \frac{(11 \times 12.2262) - (11.3439 \times 7.9873)}{(11 \times 92.8113) - (7.9873)2} = 0.0458$$

$$\alpha = \frac{\Sigma y}{T} - \left(\beta \times \frac{\Sigma x}{T}\right) = \frac{11.3439}{11} - 0.0458 \times \frac{7.9873}{11} = 0.998$$

As Alpha is positive, the Fund's average return is better than the benchmark return as we shall see below.

$$\text{Treynor's ratio (RVR)} = \frac{\bar{R}_p - \bar{R}_p}{\beta} = \frac{6.5548 - 5.5235}{0.0458} = 22.51$$

The small Beta of the given portfolio suggests that the variation between market's excess return and portfolio's excess return is very little. The Fund carries a small amount of systematic risk. This has resulted in a high value of the ratio. But this ratio does not tell us the impact of the variation of the portfolio's return, which is given by Sharpe's ratio.

The benchmark return is, $\bar{R}_m - \bar{R}_f$ = 6.2496 – 5.5235 = 0.7261 while, $\bar{R}_p - \bar{R}_f$ = 6.5548 – 5.5235 = 1.0313, which is larger than the benchmark suggesting a superior performance of the Fund.

$$\text{Sharpe's ratio (RVAR)} = \frac{\bar{R}_p - \bar{R}_p}{\delta_p} = \frac{6.5548 - 5.5235}{1.4478} = 0.7123$$

where, the Standard deviation of portfolio return (δ_p) =

$$\sqrt{\frac{\Sigma(R_p - R_p)^2}{T-1} = \frac{20.9605}{11-1}} = 1.4478$$

The bench mark return for Sharpe's ratio is given by,

$$\frac{\bar{R}_m - \bar{R}_f}{\delta_m} = \frac{6.2496 - 5.5235}{2.7287} = 0.2661$$

where, the Standard deviation of Index return (δ_m) =

$$\sqrt{\frac{\Sigma(R_m - R_m)^2}{T-1} = \frac{74.4630}{11-1}} = 2.7287$$

As the RVAR is greater than the benchmark return (0.7123 > 0.2661), the Fund's performance is better than the market.

The Risk Performance Ratio (RPR) discussed earlier in this section is now calculated below.

$$RPR = \frac{CV_p}{CV_m} = \frac{0.2209}{0.4366} = 0.50$$

Where, CV_p = $(\delta_p)/R_p$ = 1.4478/6.5548 = 0.2209, and CV_m = $(\delta_m)/R_m$ = 2.7287/6.2496 = 0.4366.

As RPR is less than 1, the risk performance of the portfolio is better than the market.

Information Ratio

This ratio is also called Appraisal ratio. It was first developed by Treynor and Black (1973) to measure the performance of a Fund which has taken risk beyond the unavoidable (systematic) risk. In other words the ratio attempts to evaluate whether in taking additional risk the Fund Manager has acted on right kind of information. If he had, then the Fund must be generating positive differential returns for the Fund as compared to the benchmark. The ratio is calculated as below:

$$\text{Information ratio} = \frac{\alpha}{\text{SD of Random Error Terms}}$$

Random error term can be defined simply as the difference between the mean of the population and the individual value of the population. In other words, a specific value of the population is equal to its mean plus/minus some amount that prevents the individual value being equal to the mean. These additional sums are called random error terms. Standard deviation of random error terms is calculated by the following formula:

$$\text{SD of Random Error Terms} = \frac{[\{\Sigma y^2 - (\alpha \times \Sigma y)\} - \{\beta \times (\Sigma xy)\}]}{(T-2)^{1/2}}$$

We have already calculated α and β for our example of the Mutual Fund. From the information processed in Table 14.7 we can now calculate the SD of Random Error terms:

SD of Random Error Terms =

$$\frac{[30.5619 - (0.998 \times 11.3439) - (0.0458 \times 12.2262)]}{(11-2)^{1/2}}$$

$$\text{or, } \frac{19.24 - 0.56}{3}$$

or, 6.23

Information ratio of the Mutual Fund will, therefore, be 0.998/6.23 = 0.16. A positive value of the ratio indicates superior performance. Higher it is better the performance. This ratio can be used to make comparative analysis of the performance of different Mutual Funds.

Expense Ratio

This ratio is often overlooked by the investors but is becoming very crucial in the present day when the management expenses of the Mutual Funds are on the rise and there are complaints that Fund Managers are loading the investors with exorbitant amount of expenditure, which is often lavish in nature, without adding value to the investors' capital. Mutual Funds are obliged to publish perspective information along with Income Statement and Balance Sheet, which contains, *inter alia*, the Fund-wise expense ratios. The ratio is defined as the percentage of assets that is spent to run a mutual fund. The expenses include, among other things, management and advisory fees, cost of travelling, consultancy fee, publicity expenses write-offs, amortization etc. but do not include brokerage costs for trading portfolio securities and change in unrealized depreciation in investments. The ratio is calculated as below:

$$\frac{\text{Aggregate of Expenses}}{\text{Average Daily Net Assets Value}} \times 100$$

Given below are examples of some selected Mutual Funds of different categories to explain this ratio:

Generally speaking, the expense ratio should not be more than 2.5 per cent. An increasing trend of the ratio is indicative of over spending but at the same time, expenses by absolute value should also be considered. For example, in case of Bond Fund the ratio has increased to 2.20 per cent in the third year but the actual expense per unit has decreased substantially but in case of Equity Fund though the expenses have increased, the ratio has decreased due to rise in NAV.

SUMMARY

Stock market ratios are essentially based on fundamental analysis, which is a forward looking concept as against typical financial statement analysis, which is primarily historical in nature.

The difference between stock market ratios and other financial and management accounting ratios lies in its approach and choice of ratio-set. Although the set may be chosen from amongst those used in financial statement analysis, the construction of the ratios may be different. What is important is to choose variables, which are critical in determining the future value of the business, which on the other hand, means that the ratios so chosen should be amenable to prediction. The most critical variable of a business is sales. If sales do not happen, nothing happens. Hence, in any valuation exercise all other operating variables including the financing variables should be linked to sales. In accordance with this we have chosen, reconstructed and developed operating and capital structure ratios as

Table 14.8
Expense Ratios for Selected Mutual Funds

	Bond fund			*Equity fund*			*Balanced fund*			*Opportunity fund*		
Year	*1*	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*
Expenses per unit	0.44	0.70	0.55	0.25	0.40	0.48	0.21	0.24	0.42	0.20	0.43	0.45
Average Daily NAV	26.20	37.90	25.00	9.58	17.72	20.35	10.20	11.70	20.25	9.30	20.29	21.03
Expense Ratio (%)	1.68	1.85	2.20	2.61	2.26	2.36	2.06	2.05	2.07	2.15	2.12	2.14

turnover ratio of sales. These ratios are capable of predicting future value of a business. Stock market ratios are expected to reflect the fundamentals of a business.

The ratios discussed in this Chapter are summarized in Table 14.9.

Table 14.9
Summary of Ratios

Ratio	*Definition*	*Nature and purpose*
	A. Operating and Cost Structure Ratios	
1. Fixed Assets Turnover Ratio (FATR)	$\frac{\text{Net Sales}}{\text{Opeating Fixed Assets}}$	It indicates the efficiency of the enterprise in assets utilization for generating sales. A declining trend indicates the falling productivity of assets.
2. Manufacturing Expense Ratio (MER)	$\frac{\text{Net Sales}}{\text{Manufacturing Expenses}}$	It indicates the efficiency of the enterprise to maintain the variability of manufacturing expenses with sales. A declining trend suggests that some of the variable expenses are becoming fixed.
3. Selling, Administration and General Expenses Ratio (SAGR)	$\frac{\text{Net Sales}}{\text{Selling, Administration and General Expenses}}$	As the sales increase the ratio should increase because most of these expenses are fixed in nature.
4. Operating Expenses Turnover Ratio	$\frac{\text{Net Sales}}{\text{ME + SAG}}$	This ratio indicates enterprise control over its total expenses. An increasing trend in the movement of this ratio suggests efficiency in cost management.
	B. Capital Structure Ratios	
5. Equity Turnover Ratio	$\frac{\text{Net Sales}}{\text{Tangible Equity}}$	It indicates how much sales is generated per one rupee of equity invested in the business. While a high ratio coupled with an increasing trend may be welcome to the shareholders as it increases ROE and EPS but if it is done with very high amount of debt then the enterprise may run the risk of bankruptcy.

Table 14.9 (Continued)

Table 14.9 (Continued)

Ratio	*Definition*	*Nature and purpose*
6. Loan Turnover Ratio	$\frac{\text{Net Sales}}{\text{Loan Fund}}$	A low value of this ratio coupled with decreasing trend indicates increasing reliance of the enterprise on debt fund, which may be risky. On the other hand, a high ratio indicates that the company is not utilizing its debt capacity properly to increase shareholders value.
7. Total Capital Turnover Ratio	$\frac{\text{Net Sales}}{\text{Total Long Term Fund}}$	This ratio is a combination of the above two ratios. It indicates how much sales is generated per rupee of capital invested in the business. A high value of this ratio with increasing trend indicates increasing level of capital utilization while a small and falling ratio may indicate overcapitalization.
C. Business Segment Ratios		
8. Assets Turnover Ratio	$\frac{\text{Segment Sales}}{\text{Segment Assets}}$	This indicates whether the assets invested are generating enough sales to justify the continuation of the segment. A falling ratio may indicate that it is time to dispense with the segment.
9. Return on Assets	$\frac{\text{Segment Profit}}{\text{Segment Assets}}$	Same as above-
10. Margin on sales	$\frac{\text{Segment Profit}}{\text{Segment Sales}}$	A falling ratio, except when the segment has been newly added, indicates that the products of this segment may be losing out in competition.
D. Stock Market Ratios		
11. Earning Per Share (EPS)	$\frac{\text{Profit After Tax}}{\text{Number of Equity Shares}}$	This is a typical investor's ratio as on this, dividend and market value of shares are dependent. If this ratio shows a falling trend, it is indicative of the decline in the intrinsic value of the business.

Table 14.9 (Continued)

Table 14.9 (Continued)

Ratio	*Definition*	*Nature and purpose*
12. Dividend Payout Ratio	$\frac{\text{Dividend}}{\text{Earning Per Share}}$	As valuation of shares depends to a large extent on growth in dividend, a falling trend of this ratio would indicate lower valuation.
13. Retained Earning Ratio	$\frac{\text{Retained Earning}}{\text{Earning Per Share}}$	A rising trend of this ratio apparently indicates growth potential of the business. But if the enterprise does not have growth opportunities a falling trend is justified.
14. Price/Earning Ratio	$\frac{\text{Market Price per Equity share}}{\text{Earning Per Share}}$	This is a futuristic ratio, which reflects market's expectation of the growth potential of a company. A high P/E ratio generally indicates long-term growth prospects of a company while a low P/E Ratio may indicate the opposite.
15. Price/Book Value (PB) Ratio	$\frac{\text{Market Price per Equity share}}{\text{Book value of a equity share}}$	Higher the ratio, higher is the earning power of equity.
16. Risk Performance Ratio	$\frac{\text{Co-efficient of variation of market returns of an equity stock}}{\text{Co-efficient of variation of returns from a stock Market Index}}$	If the ratio is equal to or less than one, it indicates that the risk performance of an individual stock is better than the market. If it is more than one, the individual stock is performing worse than the market.
17. Treynor's Ratio (Reward-to-Volatility Ratio)	$\frac{\bar{R}_p - \bar{R}_f}{\beta_p}$	It indicates a portfolio's return per unit of risk. Higher the ratio, higher is the expected return required from a stock.
18. Sharpe's Ratio (Reward-to-Variability Ratio)	$\frac{\bar{R}_p - \bar{R}_f}{\delta_p}$	Same as above, except that it measures the variability of stock returns.
19. Information Ratio	$\frac{\alpha}{\text{SD of Random Error Terms}}$	It indicates whether the Fund Manager has acted on relevant information while taking additional risk in generating excess returns.

Table 14.9 (Continued)

Table 14.9 (Continued)

Ratio	*Definition*	*Nature and purpose*
20. Expense Ratio	$\dfrac{\text{Aggregate of Expenses}}{\text{Average daily Net Assets Value}}$	A rising trend of this ratio indicates that the Fund Manager is spending excessively without creating value for the investors.

References and Select Bibliography

All history is but a romance,
unless it is studied as an example.

—Croly

Abdel-Khalik, Rashad A. (1974). 'The Entropy Law, Accounting Data and Relevance to Decision-making'. *The Accounting Review* (April), pp. 271–283.

Aigner, D.G. and Sprenkle, C.M. (1968). 'A Simple Model of Information and Lending Behaviour'. *Journal of Finance* (March), pp. 151–166.

Albright, Tohomal L. and Roth, Harold P. (1992). 'The Measurement of Quality Costs: An Alternative Paradigm'. *Accounting Horizons* (June), pp. 15–27.

Altman, E.; Halderman, R. and Narayanan, P. (1977). 'Zeta Analysis: A new model to identify bankruptcy risk of corporations'. *Journal of Banking and Finance*, 1(1), pp. 29–54.

Altman, E.I. (1968). 'Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy'. *Journal of Finance* (September), pp. 589–609.

———. (1983). *Corporate Financial Distress.* John Wiley and Sons: New York.

Altman, E.I.; Margarine, M.; Schlosser, M. and Vernimmen, P. (1974). 'Financial and Statistical Analysis for Commercial Loan Evaluation: A French Experience'. *Journal of Financial and Quantitative Analysis* (March), pp. 195–211.

Amijewski, M.E. (1984). 'Methodological issues related to the estimation of financial distress prediction models'. *Journal of Accounting Research*, Volume 22, pp. 59–82.

Amir, E. and Lev, B. (1996) 'Value relevance of non-financial information: The wireless communications industry'. *Journal of Accounting and Economics*, Volume 22, pp. 3–30.

Anthony, Robert N. (1964). 'Framework for Analysis'. Reprinted in *Readings in Management Control.* Robert J. Mockler (ed.). First Indian Reprint D.B. Taraporevala Sons & Co: Bombay.

———. (1988). *The Management Control Function.* The Harvard Business School Press: Boston.

Aragon, G.A. (1982). *A Manager's Complete Guide to Financial Techniques.* The Free Press: New York.

Arya, A.; Fellingham, J.C.; Mittendore, B. and Schroeder, D. (2004). 'Reconciling Financial Information at Varied Levels of Aggregation'. *Contemporary Accounting Research*, Volume 21, pp. 303–324.

Ashton, D.; Dunmore, P. and Tippet, M. (2004). 'Double-Entry Bookkeeping and the Distributional Properties of a Firm's Financial Ratios'. *Journal of Business Finance & Accounting*, 31(5–6), pp. 583–606.

Backer, M. and Gosman, M.L. (1980). 'The Use of Financial Ratios in Credit Downgrade Decisions'. *Financial Management* (Spring), pp. 361–383.

Balcaen, S. and Ooghe, H. (2006). '35 years of studies on business failure: An overview of the classical statistical methodologies and their related problems'. *The British Accounting Review*, 38(1), pp. 63–93.

Ball, B.C. (Jr.). (1987). 'The Mysterious Disappearance of Retained Earnings'. *Harvard Business Review* (July–August), pp. 56–63.

Barnes, P. (1982). 'Methodological Implications of Non-Normally Distributed Financial Ratios'. *Journal of Business Finance and Accounting* (Summer), pp. 51–62.

———. (1986). 'The Statistical Validity of the Ratio Method in Financial Analysis: An Empirical Examination: A Comment'. *Journal of Business Finance and Accounting* (Winter), pp. 627–632.

———. (1987). 'The Analysis and Use of Financial Ratios: A Review Article'. *Journal of Business Finance and Accounting* (Winter), pp. 449–461.

Barniv, Ran and Raveh, Adi (1989). 'Identifying Financial Distress: A New Non-Parametric Approach'. *Journal of Business Finance and Accounting* (Summer), pp. 361–383.

Barth, M.E.; Beaver, W.H. and Landsman, W.R. (2001), 'The relevance of the value relevance literature for financial accounting standard setting: Another view'. *Journal of Accounting and Economics*, Volume 31, pp. 77–104.

Bayldon, R.; Woods, A. and Zafaris, N. (1984). 'A note on the pyramid technique of financial ratio analysis of firms performance'. *Journal of Business Finance & Accounting*, 11(1), pp. 99–106.

Beagley, J.; Ming, J. and Watts, S. (1996). 'Bankruptcy classification errors in the 1980s: An empirical analysis of Altman's and Ohlson's model'. *Review of Accounting Studies*, Volume 1, pp. 267–284.

Beatty, A., Ke, B. and Petroni, K. (2002). 'Earnings management to avoid earnings decline across publicly and privately held banks'. *Accounting Review*, 77(3), pp. 547–570.

Beaver, W.H. (1966). 'Financial Ratios as Predictors of Failure'. Empirical Research in Accounting: Selected Studies Supplement to Journal of Accounting Research (4), 1966, pp. 71–111.

———. (1968). 'Alternative Accounting Measures as Predictors of Failure'. *The Accounting Review* (January), pp. 113–122.

Beaver, W.H.; McNichols, M.F. and Rhie, J.W. (2004). 'Have financial statements become less informative? Evidence from the ability of financial ratios to predict bankruptcy', Working Paper Series, http://ssrn.com.

Berry, R.H. and Nix, S. (1991). 'Regression Analysis vs Ratios in the Cross-Section Analysis of Financial Statements'. *Accounting and Business Research* (Spring), pp. 107–117.

Bhattacharya, Hrishikes (1987). 'Towards a Comprehensive Theory of Working Capital Management: A Techno-Financial Approach'. *Economic and Political Weekly,* Review of Industry and Management (29 August), pp. M101–M110.

———. (1990). *Bank Lending: Principles, Theory, Practice.* Naya Prokash: Calcutta.

———. (1992). 'Limits to Growth: Financing Strategies of Growth-oriented Companies'. *Economic and Political Weekly,* Review of Industry and Management (28 November), pp. M158–M165.

———. (2001). *Working Capital Mangement—Strategies and Techniques*. Prentice-Hall of India (P) Ltd: New Delhi.

Bliss, James H. (1923). *Financial and Operating Ratios in Management.* Ronald Press Company: New York.

Blum, M. (1974). 'The Failing Company Discriminant Analysis'. *Journal of Accounting Research* (Spring), pp. 1–25.

Brock, Lakonishok, J. and Le Baron B. (1992), 'Simple technical trading rules and stochastic properties of stock returns'. *Journal of Finance*, 47(5), pp. 1731–1764.

Buckmaster, D. and Saniga, E. (1990). 'Distributional forms of financial accounting ratios: Pearson's and Johnson's taxonomies'. *Journal of Economic and Social Measurement*, Volume 16, pp. 149–166.

Bureau of Public Enterprises of India. (1973–74). Annual Report on the Working of Public Sector Companies. Bureau of Public Enterprises: New Delhi.

Business Standard. (1995). 'Big Companies Hike Sales Promotion Expenditure' (2 June), pp. 2–3.

Campanella, J. (ed.). (1990). *Quality Costs Committee, Principles of Quality Costs* (Second Edition). ASQC Quality Press: Milwaukee.

Chakraborty, S.K. (1972). 'Ratio Analysis and Inter-Firm Comparisons: Some New Emphases'. In Chakraborty, S.K.; Bhattacharya, K.K.; Ghosh, S.K. and Rao, N.K. *Topics in Accounting and Finance.* Oxford University Press: Calcutta.

———. (1980). 'Materials Management—Some Management Accounting Insights'. *Decision* (January), pp. 44–50.

Cohen, Kalman J.; Gilmore, Thomas C. and Singer, Frank A. (1966). 'Bank Procedures for Analysing Business Loan Applications'. Cohen, J.K. and Hammer, F. (ed.). *Analytical Methods in Banking.* Richard D. Irwin Inc.: Homewood, IL.

Copeland, Tom; Koller, Tim and Murrin, Jack (2000), *Valuation—Measuring and Managing Value of Corporation,* (Third edition). John Wiley and Son Inc: New York.

Courtis, J.K. (1978) 'Modelling a financial ratios categoric framework'. *Journal of Business Finance &Accounting*, 5(4), pp. 371–386.

Cudd, M. and Duggal, R. (2000). 'Industry distributional characteristics of financial ratios: An acquisition theory application'. *The Financial Review,* 35(1), pp. 105–120.

Dawson, S.M. (1985), 'Singapore share recommendation using technical analysis'. *Asia Pacific Journal of Management*, 2(3), pp. 180–188.

De Angelo, H. and Masulis, R.W. (1980). 'Optimal Capital Structure under Corporate and Personal Taxation'. *Journal of Financial Economics* (March), pp. 3–29.

Deakin, E.B. (1972). 'A Discriminant Analysis of Predictors of Business Failures'. *Journal of Accounting Research* (Spring), pp. 167–169.

Denis, D.J.; Denis, D.K. and Sarin, A. (1997). 'Ownership Structure and Top Executive Turnover'. *Journal of Financial Economics*, 45(2), pp. 193–221.

Donaldson, G. (1962). 'New Framework for Corporate Debt Capacity'. *Harvard Business Review* (March–April), pp. 117–131.

Dunk, A.S. and Kenny, G.K. (1983). *Departmental Assessments, Managers' Perceptions of the Usefulness of Accounting and Non-Accounting Measures.* Paper presented to AAANZ Conference. 1983.

El Hennawy, R.H.A. and Morris, R.C. (1983). 'The Significance of Base Year in Developing Failure Prediction Models'. *Journal of Business Finance and Accounting* (Summer), pp. 209–224.

Emmanuel, Clive; Otley, David and Merchant, Kenneth (1990). *Accounting For Management Control* (Second edition). Chapman and Hall: London.

Euske, K.J. (1984). *Management Control: Planning, Control, Measurement, and Evaluation.* Addision–Wesley Publishing Co.: Reading, MA.

Falk, H. and Heintz, J.A. (1975). 'Assessing Industry Risk by Ratio Analysis'. *The Accounting Review* (October), pp. 758–779.

Fama, E.F. (1965). 'The Behaviour of Stock Market Prices'. *Journal of Business*, Vol. 38, pp. 34–105.

Fama, Eugene F. and French, Kenneth R. (1992). 'The Cross-Section of Expected Stock Returns', *Journal of Finance*, 47(2), pp. 427–465.

Fisher Donald E. and Jordan, Ronald J. (1996). *Security Analysis and Portfolio Management*, (Sixth Edition). Prentice-Hall of India (P) Ltd: New Delhi.

Fitzpatrick, Paul J. (1931). *Symptoms of Industrial Failures.* Catholic University of America Press: Washington DC.

———. (1932). *A Comparison of the Ratios of Successful Industrial Enterprises with those of Failed Companies.* The Accountants Publishing Company: Edinburg, U.K.

Foster, G. (1978). *Financial Statement Analysis*. Prentice-Hall: Englewood Cliffs, NJ.

Foulke, Roy A. (1937). 'Financial Ratios Become of Age'. *The Journal of Accountancy* (September), pp. 209–210.

———. (1961). *Practical Financial Statement Analysis*. McGraw-Hill Book Company: Hights town, NJ.

Frydman, H.; Altman, E.I. and Kao, D.L. (1985). 'Introducing Recursive Partitioning for Financial Classification'. *Journal of Finance (March)*, pp. 269–291.

Gilman, Stephen (1925). *Analysing Financial Statements*. The Ronald Press Company: New York.

Glassman, J. and Hassett, K. (1999). Dow 36000: *The New Strategy for Profiting from Coming Rise in Stock Market*. Three Rivers Press: New York.

Gold, Bela (1955). *Foundations of Productivity Analysis*. University of Pittsburgh Press: Pittsburgh.

Gupta, L.C. and Sekhar, A. (1988). *Controlling Corporate Sickness*—L*essons from Experiences for Managers and Bankers*. Oxford University Press: New Delhi.

Gupta, M.C. and Huefner, R.J. (1972). 'A Cluster Analysis Study of Financial Ratios and Industry Characteristics'. *Journal of Accounting Research* (Spring), pp. 77–95.

Guttman, Louis (1959). *Introduction to Facet Design and Analysis*. Proceedings of the 15th International Congress of Psychology, Amsterdam.

Hampton, John J. (1989). *Financial Decision Making*—C*oncepts, Problems and Cases*. Prentice-Hall Inc.: Englewood Cliffs, NJ.

Hand, John, R.M. (2005), 'The value relevance of financial statements in the venture capital market'. *The Accounting Review,* 80(2), pp. 613–648.

Hangen, R.A. and Pappas, J.L. (1971). 'Equilibrium in the Pricing of Capital Assets, Risk-bearing Debt Investments and the Question of Optimal Capital Structure'. *Journal of Financial and Quantitative Analysis* (June), pp. 523–540.

Hickman, Braddock W. (1958). *Corporate Bond Quality and Investor Experience.* Princeton University Press: Princeton, NJ.

Hillegeist, S.; Cram, D.; Keating, E. and Lundstedt, K. (2004). 'Assessing the probability of bankruptcy', *Review of Accounting Studies,* 9(1), pp. 5–34.

Holdren, George C. (1964). 'Lifo and Ratio Analysis'. *The Accounting Review* (January), pp. 76–85.

Horowitz, Ann R. and Horowitz, Ira (1976). 'The Real and Illusory Virtues of Entropy-based Measures for Business and Economic Analysis'. *Decision Sciences* (July), pp. 121–136.

Horrigan, James O. (1965). 'Some Empirical Bases of Financial Ratio Analysis'. *The Accounting Review* (July), pp. 558–568.

Horrigan, James O. (1968). 'A Short History of Financial Ratio Analysis' *The Accounting Review* (April), pp. 284–294.

Houghton, K.A. and Woodliff, D.R. (1987). 'Financial Ratios—Corporate Success and Failure'. *Journal of Business Finance and Accounting* (Winter), pp. 537–553.

Howell, R.A. and Soucy, S.R. (1987). 'Major Trends for Management Accounting—The New Manufacturing Environment'. *Management Accounting* (July), pp. 21–27.

Institute of Chartered Accountants of India. (2002). *Compendium of Accounting Standards*, New Delhi.

Ioannidis, C.; Peel, D. and Peel, M. (2003). 'The Time Series Properties of Financial Ratios: Lev Revisited'. *Journal of Business Finance and Accounting*, Vol. 30, pp. 699–714.

Ishikawa, K. (1985). *What is Total Quality Control? The Japanese Way.* Translated by D.J. Lu. Prentice-Hall: Englewood Cliffs, NJ.

Jensen, Michael C. (1986), 'Agency costs of free cash flow, corporate finance and takeovers', *American Economic Review*, Volume 76, pp. 323–339.

Johnson, H.T. and Kaplan, Robert (1987). *Relevance Lost: The Rise and Fall of Management Accounting.* Harvard Business School Press: Boston.

Joy, O.M. and Tollefson, J.O. (1975). 'On the Financial Application of Discriminant Analysis'. *Journal of Financial and Quantitative Analysis* (December), pp. 723–740.

Justin, W.H. (1924). 'Operating Control through Scientific Analysis'. *The Journal of Accountancy* (September), pp. 183–195.

Kaplan, Robert S. (1984). 'Yesterday's Accounting Undermines Production'. Harvard Business Review (July–August), pp. 95–101.

———. (1989). 'Management Accounting for Advanced Technological Environments'. *Science* (August), pp. 820–824.

Karrels, G.V. and Prakash, A.S. (1987). 'Multivariate Normality and Forecasting of Business Bankruptcy'. *Journal of Business Finance and Accounting* (Winter), pp. 573–593.

Keifer, N.M. (1988). 'Economic duration data and hazard functions' *Journal of Economic Literature*, Volume 26, pp. 646–679.

Kennedy, Henry A. (1975). 'A Behavioural Study of the Usefulness of Four Financial Ratios'. *Journal of Accounting Research* (Spring), pp. 97–116.

Kieso, D. and Weygandt, J. (1989). *Intermediate Accounting.* John Wiley and Sons: New York.

Kim, II-Woon and Kwak, Wilkil (1994). 'An Application of Information Economics Theory to Designing Management Accounting Systems'. *The Management Accountant* (February), pp. 27–35.

Konings, J. and Roodhoft, F. (1997). 'Financial ratio cross-section dynamics: A non-parametric approach'. *Journal of Business Finance &Accounting,* 24(9–10), pp. 1331–1342.

Kothari, S.P. (2001). 'Capital markets research in accounting'. *Journal of Accounting and Economics*, Volume 31, pp. 105–231.

Laitinen, E.K. (1983). 'A multivariate model of the financial relationship in the firm'. *Finnish Journal of Business Economics,* 32(4), pp. 317–333.

Lancaster, T. (1990). *The Econometric Analysis of Transition Data,* Cambridge University Press, New York.

Lau, H-S.; Lau, H-L, A. and Gribbon, D.W. (1995). 'On modelling cross sectional distributions of financial ratios'. *Journal of Business Finance & Accounting*, 22(4), pp. 521–549.

Lee, C.W.J. (1985). 'Stochastic Properties of Cross-Sectional Financial Data'. *Journal of Accounting Research* (Summer), pp. 213–227.

Lev, B. and Sunder, S. (1979). 'Methodological Issues in the Use of Financial Ratios'. *Journal of Accounting and Economics* (December), pp. 187–210.

Lev, Baruch (1969). *Accounting and Information Theory: Studies in Accounting Research.* American Accounting Association: Sarasota, FL.

Levy, Robert, A. (1966). 'Conceptual foundations of technical analysis', *Financial Analysts Journal*, 22(4), pp. 83–89.

Libby, Robert (1975). 'Accounting Ratios and the Prediction of Failure: Some Behavioural Evidence'. *Journal of Accounting Research* (Spring), pp. 150–151.

Lin, H.; McNichols, M. and O'Brien, P. (2003). 'Analyst impartiality and investment banking relationship' Working paper, Graduate school of Business, Stanford University.

Lincoln, Edmond E. (1925). *Applied Business Finance* (Third Edition). A. Shaw Company: London.

Lough, William H. (1917). *Business Finance.* The Ronald Press Company: New York.

Madan, B.K. (1978). *Report on a Study of the Debt-Equity Ratio Norms.* Management Development Institute: New Delhi.

Marais, M.L.; Patell, J.M. and Wolfson, M.A. (1984). 'The Experimental Design of Classification Models: An Application of Recursive Partitioning and Bootstrapping to Commercial Banks Loan Classification'. *Journal of Accounting Research* (Vol. 22, Supplements), pp. 87–114.

Martikainen, T. (1991). 'A note on the cross-sectional properties of financial ratio distributions'. *Omega,* 19(5) pp. 498–501.

———. (1992). 'Time-series distributional properties of financial ratios: Empirical evidence from Finnish listed firms'. *European Journal of Operations Research,* 58(3), pp. 344–355.

———. (1993). 'Stock returns and classification pattern of firm-specific financial variables: Empirical evidence with Finnish data'. *Journal of Business Finance & Accounting*, 20(4), pp. 537–557.

Martikainen, T.; Perttunen, J.; Olli-Yli, P. and Gunasekaran, A. (1995). 'Financial ratio distribution irregularities: Implications for ratio classification.' *European Journal of Operations Research*, 80(1), pp. 34–44.

Martikainen, T.; Puhalainen, K. and Yli-Olli, P. (1994). 'On the industry effects on the classification patterns of financial ratios'. *Scandinavian Journal of Management,* 10(1), pp. 59–68.

Martin, H.W. (1964). 'Productivity Costing and Control'. *Productivity Measurement Review* (May), quoted in Chakraborty S.K. (1972). ibid, p. 269.

McDonald, B. and Morris, M.H. (1984). 'The Statistical Validity of the Ratio Method in Financial Analysis: An Empirical Examination'. *Journal of Business Finance and Accounting* (Spring), pp. 89–97.

———. (1986). 'The Statistical Validity of the Ratio Method in Financial Analysis: An Empirical Examination: A Reply'. *Journal of Business Finance and Accounting* (Winter), pp. 633–635.

McGrath, M.E. and Hoole, R.W. (1992). 'Manufacturing's New Economics of Scale'. *Harvard Business Review* (May–June), pp. 94–102.

Mcleay, S. (1997). 'Boundary conditions for ratios with positively distributed components'. *Journal of Business Finance & Accounting*, 24(1), pp. 67–84.

McLeay, S.J. and Fieldsend, S. (1987). 'Sector and Size Effects in Ratio Analysis: An Indirect Test of Ratio Proportionality'. *Accounting and Business Research* (Spring), pp. 133–140.

Melnyk, Z.L. and Mathur, Iqbal (1972). *Business Risk Homogeneity: A Multivariate Application and Evaluation*. Proceedings of the 1972 Midwest AIDS Conference (April).

Mensah, Y.M. (1984). 'The Differential Bankruptcy Predictive Ability of Specific Price Level Adjustments: Some Empirical Evidence'. *The Accounting Review* (April), pp. 228–246.

Merwin, Charles L. (1940). *Financial Characteristics of American Manufacturing Corporation.* U.S. Govt. Printing Office: Washington DC.

———. (1942). *Financing Small Corporations: In Five Manufacturing Industries, 1926–36.* National Bureau of Economic Research: Cambridge, MA.

Mockler, R.J. (1967). 'Developing the Science of Management Control'. *Financial Executive* (December), pp. 80–93.

Modigliani, Franco. and Miller Merton H. (1958). 'The Cost of Capital Corporation Finance and the Theory of Investment'. *American Economic Review* (June), pp. 261–297.

———. (1963). 'Corporate Income Taxes and the Cost of Capital: A Correction' *American Economic Review* (June), pp. 433–442.

———. (1969). 'Reply to Heins and Sprinkle'. *American Economic Review* (September), pp. 592–595.

Moller, George (1958). 'The Budgeting for Return on Capital Employed'. *The Controller* (March), pp. 107–112; 128–36.

Moore, G.H. (1957). *The Quality of Credit in Booms and Depressions.* Thirty-Seventh Annual Report. National Bureau of Economic Research: Cambridge, MA. p. 44.

Mossman, Frank H.; Crissy, W.J.E. and Fischer, Paul M. (1978). *Financial Dimensions of Marketing Management.* John Wiley and Sons Inc.: New York.

Mover, R.C. (1977). 'Forecasting Financial Failure: A Re-examination'. *Financial Management* (Spring), pp. 11–17.

Nanni, A. (1991). 'Automation and Management Accounting in Japan'. *Accounting* (January), pp. 1–5.

Nelson, A.T. (1963). 'Capitalizing Leases: The Effect on Financial Ratios'. *The Journal of Accountancy* (June), pp. 49–58.

Neophytou, E. and Moliero, C.M. (2004). 'Predicting corporate failure in the UK: A multidimensional scaling approach'. *Journal of Business Finance & Accounting*, 31(5–6), pp. 677–710.

Newman, Mauric S. (1966). 'Return on Investment: An Analysis of the Concept'. *Management Services* (July–August), pp. 15–23.

Nikkinen, J. and Sahlstorm, P. (2004). 'Distributional properties and transformation of financial ratios: The impact of accounting environment'. *Advances in International Accounting,* Volume 17, pp. 85–101.

Norton, C.L. and Smith, R.E. (1979). 'A Comparison of General Price Level and Historical Cost of Financial Statements in the Prediction of Bankruptcy'. *The Accounting Review* (January), pp. 72–87.

O'Connor, M.C. (1973). 'On the Usefulness of Financial Ratios to Investors in Common Stock'. *The Accounting Review* (April), pp. 339–352.

Ohlson, J.A. (1980). 'Financial ratios and the probabilistic prediction of bankruptcy'. *Journal of Accounting Research,* Volume 19, pp. 109–131.

Pagano, M.; Panetta, F. and Zingales, L. (1998). 'Why do companies go public? An empirical analysis'. *Journal of Finance,* Volume 23, pp. 27–64.

Palepu, K.G. (1986). 'Predicting takeover targets: A methodological and empirical analysis'. *Journal of Accounting and Economics,* Volume 8, pp. 3–35.

Parkar, R.H. (1984). *Macmillan Dictionary of Accounting.* Macmillan Press: London.

Parkinson, B.B. (1951). *Accounting Ratios in Theory and Practice.* Gee and Company (Publishers) Ltd: London.

Parsons, T. (1960). *Structure and Process in Modern Societies.* Free Press: New York.

Peel, D.A.; Peel M.J. and Venetis, J.A. (2004). 'Further empirical analysis of the time series properties of financial ratios based on a panel data approach'. *Applied Financial Economics,* 14(3), pp. 155–163.

Peel, M.J. (1987). 'Timeliness of Private Company Accounts and Predicting Corporate Failure'. *Investment Analyst* (December), pp. 23–27.

Peel, M.J. and Peel, D.A. (1987). 'Some Further Empirical Evidence on Predicting Private Company Failure'. *Accounting and Business Research* (Winter), pp. 57–66.

Pertumen, J. and Martikainen, T. (1989). 'On the proportionality assumption of financial ratios'. *Finnish Journal of Business Economics,* 38(4), pp. 343–359.

Pohlman, R.A. and Hollinger, R.D. (1981). 'Information Redundancy in Sets of Financial Ratios'. *Journal of Business Finance and Accounting* (Winter), pp. 511–528.

Ramamoorthy, V.E. (1976). *Working Capital Management.* IFMR: Madras.

Ramser, J.R. and Foster, Louis O. (1931). *A Demonstration of Ratio Analysis.* Bulletin No. 40. Bureau of Business Research. University of Illinois: Urbana.

Ratnatunga, J.; Pike, R. and Hooley, G.J. (1988). 'The Application of Management Accounting Techniques to Marketing'. *Accounting and Business Research* (Autumn), pp. 363–370.

Reilly, Frank, K. (1979), *Investment Analysis and Portfolio Management*. The Dryden Press: Illinois.

Reserve Bank of India. (1975). *Report of the Study Group to Frame Guidelines for follow-up of Bank Credit.* Reserve Bank of India: Bombay.

———. (1979). *Report of the Working Group to Review the System of Cash Credit.* Reserve Bank of India: Bombay.

———. (1991). *Report of the Committee on the Financial System*. Reserve Bank of India: Bombay.

Rickey, Kenneth R. (1963). 'How Accountants Can Help Management Manage'. *NAA Bulletin* (July), pp. 25–36.

Ross, Gerald H.B. (1990). 'Revolution in Management Control'. *Management Accounting* (November), pp. 23–27.

Salmi, T. and Martikainen, T. (1994). 'A review of the theoretical and empirical basis of financial ratio analysis'. The Finnish Journal of Business Economics, 43(4), pp. 426–448.

Sanzo, Richard (1960). *Ratio Analysis for Small Business.* Small Business Management Series, No. 20. The Small Business Administration: Washington.

Saulnier, Raymond J.; Halcrow, H.G. and Jacoby, N.H. (1958). *Federal Lending and Loan Insurance.* Princeton University Press: Princeton, NJ.

Scapens, Robert W.; Ryan, Robert J. and Fletcher, Leslie (1981). 'Explaining Corporate Failure: A Catastrophe Theory Approach'. *Journal of Business Finance and Accounting* (Spring), pp. 1–26.

Sharpe, William F. (1966), 'Mutual Fund Performance'. *Journal of Business*, 39(1), pp. 119–138.

Sharpe, William F.; Alexander, Gordon J. and Bailey, Jeffery V. (1995). *Investments*, (Fifth Edition), Prentice-Hall of India(P) Ltd.: New Delhi.

Shumway, T. (2001). 'Forecasting Bankruptcy More Accurately: A Simple Hazard Model'. *Journal of Business*, 74(1), pp. 101–124.

Smith, M.R. (1981). *Manufacturing Controls.* Van Nostrand Reinhold Company: New York.

Smith, Raymond F. and Winakor, Arthur H. (1930). *Test Analysis of Unsuccessful Industrial Companies*. Bulletin No. 31. Bureau of Business Research. University of Illinois: Urbana.

———. (1935). *Structure of Unsuccessful Industrial Corporations*. Bulletin No. 51. Ibid.

Sorter, George and Becker, Selwyn (1964). 'Accounting, Financial Decisions and 'Corporate Personality'—Some Preliminary Findings'. *Journal of Accounting Research* (Autumn), pp. 183–196.

Stancill, J.M. (1987). 'When is there Cash in Cash Flow'. *Harvard Business Review* (March–April), pp. 38–52.

Strain, Myron M. (1929). *Industrial Balance Sheets*. Harper and Brothers: New York.

Taffler, R.J. (1984). 'Empirical Models for Monitoring of UK Corporations'. *Journal of Banking Finance* (June), pp. 197–227.

Taylor, F.W. (1911). *The Principles of Scientific Management.* Harper and Brothers: New York.

Theil, H. (1967). *Economics and Information Theory.* Rand McNally and Co.: Chicago.

———. (1969). 'On the use of Information Theory Concepts in the Analysis of Financial Statements'. *Management Science* (May), pp. 459–480.

Theodossiou, P. and Kahya, E. (1999). 'Predicting corporate financial distress: A time series CUSM model'. *Review of Quantitative &Finance Accounting*, 13(4), pp. 323–345.

Theodossiou, P.T. (1993). 'Predicting shifts in the mean of a multivariate time series process: An application in predicting business failures.' *Journal of the American Statistical Association*, Volume 88, pp. 441–449.

Tippett, Mark (1990). 'An Induced Theory of Financial Ratios'. *Accounting and Business Research* (Winter), pp. 77–85.

Treynor, Jack L. (1965), 'How to Rate Managemnet of Investment Funds', *Harvard Business Review*, 43(1), (Jan–Feb), pp. 63–75.

Treynor, Jack L. and Fischer Black (1973). 'How to use security analysis to improve portfolio selection', Journal of Business, 46(1), pp. 66–86.

Trigueiros, D. (1997). 'Non-proportionality in ratios: An alternative approach'. *The British Accounting Review,* 29(3), pp. 213–230.

Van Horne, James C. (1986). *Financial Management and Policy* (Seventh Edition). Englewood Cliffs, NJ: Prentice-Hall Inc.

———. (1994), Financial management and Policy, (Ninth Edition). Prentice-Hall of India (P) Ltd: New Delhi.

Wall, Alexander (1919). 'Study of Credit Barometerics'. *Federal Reserve Bulletin* (March), pp. 229–243.

Wall, Alexander and Duning, Raymond W. (1928). *Ratio Analysis of Financial Statements.* Harper and Brothers: New York.

Walter, James E. (1957). 'Determination of Technical Solvency'. *The Journal of Business* (January), pp. 30–43.

Watson, Collin J. (1990). 'Multivariate Distributional Properties, Outliers, and Transformation of Financial Ratios'. *The Accounting Review* (July), pp. 682–695.

Whittington, Geoffrey (1980). 'Some Basic Properties of Accounting Ratios'. *Journal of Business Finance and Accounting* (Summer), pp. 219–232.

Wilcox, J.W. (1971). 'A Simple Theory of Financial Ratios as Predictors of Failure'. *Journal of Accounting Research* (Autumn), pp. 389–395.

Williams, J.B. (1938), *The Theory of Investment Value.* Harvard University Press: Cambridge, Mass.

Wilson, R.M.S. and Bancroft, A.L. (1983). *The Application of Management Accounting Techniques to the Planning and Control of Marketing Consumer Non-Durables.* Occasional Paper Series. Institute of Cost and Management Accountants: London.

Zmijewski, M.E. (1984). 'Methodological Issues Related to the Estimation of Financial Distress Prediction Models'. *Journal of Accounting Research*, Vol. 22, pp. 59–82.

Index

About the Author

Hrishikes Bhattacharya is a consultant and board-level advisor to many companies and government organisations including the Reserve Bank of India. He has also, in the past, been on the board of United Bank of India. He was, formerly, Professor of Finance and Control at the Indian Institute of Management, Calcutta.

Professor Bhattacharya has been the UNDP fellow in International Financial Management at the Wharton School, University of Pennsylvania. He was a member of the task force appointed by Government of India for assessment of the movement of credit-deposit ratio in the states of India and suggest measures to improve the ratio in states, which lagged behind the national average.

Besides having contributed over 80 articles to national and international journals and financial dailies, he has previously written several books including *Immanent Theory of Production*, *Some Aspects of Entropy in Economic Process* (co-author) and *Commercial Exploitation of Fisheries*.