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Foundations of Modern Finance Theory

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Preface

The field of finance is broad and dynamic. It has always encompassed three key areas – financial management, financial markets, and investments. The main objective of *Foundations of Modern Finance Theory* is to provide students with a balance of theoretical and practical understanding of how financial marketplace functions to allow firms (financial managers) and investors to achieve their investment and financing goals efficiently. An understanding of theory is absolutely essential if one is to develop and implement effective financial strategies. Similarly, it is essential to have some working knowledge of the financial environment. Therefore, this text begins with basic concepts, including financial statement analysis and risk analysis. With this background, readers are then introduced with the theory of investment decisions, theory of portfolio choice, asset valuation, derivative pricing, and corporate financial policy.

Foundations of Modern Finance Theory is aimed for upper-level undergraduate or introductory graduate courses in financial management, investment, theory of finance, and similar titles. It can also be used in executive education courses. A prerequisite in fundamental investment, corporate finance or financial management would be ideal. However, this text reviews the basic finance concepts before it extends them to financial modelling and applications. Although most business schools require students to take basic courses in calculus, statistics, and probability, this text reviews everything that relates to these subjects necessary for understanding the materials. Emphasis has been given to the theoretical foundations of finance, and the models that flow from them, which provide students with the tools to understand, analyze and solve problems so that they will be well-prepared for more advanced courses in finance.

In order to make *Foundations of Modern Finance Theory* as student-friendly as possible, the following proven pedagogical tools have been used:

1. Materials are presented with a structured framework, beginning with learning objectives for each chapter and ending with a summary of how those learning objectives have been realized.

2. Illustrations and exhibits are generously used to provide a visual parallel to the more difficult concepts and propositions, making financial modelling methodology easier to comprehend.

3. A number of mini-cases are discussed throughout the text, illuminating the theory with accounts of actual business practices. These applications ensure that readers obtain knowledge enabling them to extend financial concepts to situations not addressed in this text.

4. Many exercises are provided at the end of each chapter. Some are quite closely based on the text, while others, particularly in the later chapters, identify more complex techniques in financial applications.

5. The power and resources of the Internet are leveraged throughout the text. Students may go to http://202.116.15.22/苏冬蔚/ to access Powerpoint lecture notes, class experiments and other information useful in mastering the materials.

This text has benefited from the comments and insights of a large number of people, particularly my previous colleagues and students at the Ohio State University and University of Akron. In addition, I owe special thanks to all students of Class 1999 in the Department of Finance at Jinan University, who used an earlier version of this text in the Fall 2002 semester and provided many helpful suggestions. I also need to point out that this text heavily draws on materials in Fama (1976), Bodie, Kane, and Marcus (1999), Copeland and Weston (1992) and Damodaran (2002) that requires this special reference. Finally, I would like to thank my parents – Su Jinyu and Lin Yuande – for their continuous support and Chen Shiying for putting up with me while I prepare for the text.

The experience of transforming a manuscript into final book form is due in large part to the dedication, thoroughness, and highest professional standards of the publishing team at Jinan University. In particular, it is a pleasure for me to thank my editor, Chen Tao, for her meticulous work and great professionalism.

Su Dongwei
Jinan University
July 2003

Contents

Chapter 1

Understanding Financial Statements

1.1 Introduction

This chapter explores the nature and environment of financial statement analysis, with special emphasis on the use of basic financial accounting information. It introduces the three basic financial statements, the concept of accounting measurement, the effects of business transactions on financial position, and the way accountants perceive financial risks.

Financial statements report assets, liabilities, and equity of a firm at a point in time, typically at the end of a fiscal quarter or fiscal year. They are necessary sources of information about companies for a wide variety of users. Those who use financial statement information include company management teams, investors, creditors, governmental oversight agencies and the tax authority. To utilize information contained in the basic accounting statements, a financial analyst does not necessarily need to know everything about accounting. However, it will be helpful to understand some fundamental characteristics of the basic financial statements.

We are particularly interested in examining the following four questions:

- How valuable are the assets of a firm? The assets of a firm can come in several forms – assets with long lives such as land, plants and equipments, assets with shorter lives such as government securities and inventory, and intangible assets that still generate revenues for the firm including patents and trademarks.

- How does the firm raise funds to finance all its assets? In acquiring those assets, firms can use the funds of the owners (equity) or borrow money (debt), and the mix is likely to change as the firm's operation and investment plans change over time.

- How profitable are these assets? A good investment, we argued, is one that makes a return greater than the hurdle rate (or benchmark return). To evaluate whether the investments that a firm has already made are good investments, we need to estimate the returns on these investments.

- How much uncertainty (or risk) is embedded in these assets? While we have not directly confronted the issue of risk yet, estimating how much uncertainty there is in existing investments and the implications for a firm is clearly a first step.

We will first look at the way accountants answer the above questions. Then we will examine why accountants' answers might be different from financial analysts. Some of these differences can be traced to the differences in objectives – accountants may attempt to measure the current and immediate past performance of a firm, whereas financial analysts are much more forward looking in terms of the prospects of the firm.

1.2 The Basic Accounting Statements

By issuing stocks and bonds that are traded in financial markets, firms can raise capital for production and marketing activities. Investors are interested mainly in returns from dividends and increases in the market value of their investment. Creditors want to know if the firm can repay a loan plus interest in accordance with required terms. Thus, investors and creditors both need to know if a company can generate adequate cash flows. Financial statements are important to both groups in making that judgment. Using financial statements, investors and managers can measure the performance of the firm relative to its peers. Then, investors can set specific performance targets, using accounting information that managers must meet.

There are three basic accounting statements that summarize information about a firm. Since these statements are standardized, the information communicated can be compared, and can be used as basis for future planning. The first is the *balance sheet*, shown in Figure 1.1, which details what

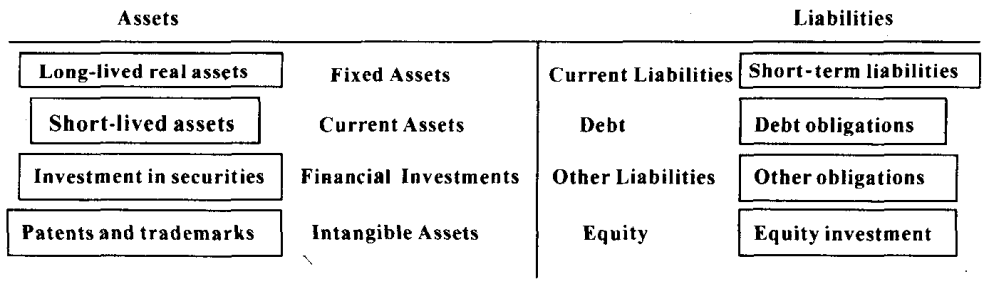

Figure 1.1: Balance Sheet

a company owns (assets) and claims against the company (liabilities and owners' equity) on a particular date. Some analysts describe the balance sheet as a snapshot illustrating a company's financial health.

The next is the *income statement*, shown in Figure 1.2, which lists and categorizes the various revenues and expenses that result from business operations during a given period – a year, a quarter or a month. The difference between revenues and expenses represents a company's net income or net loss.

Finally, there is the *statement of cash flows*, shown in Figure 1.3, which shows all sources and uses of a company's money during the accounting period and can be categorized by operations, investment activities, and financing activities.

The statement of cash flows can be viewed as an attempt to explain how much the cash flows during a period were, and why the cash balance changed during the period. Cash flow from operations gives the sources and uses of cash flow from the firm's ordinary business operations. It is calculated by adjusting to the firm's net income to reflect non-cash expenses, such as depreciation, and changes in the working capital accounts. Cash flow from investments gives the sources and uses of cash flow from investing activities: investments in real assets, patents and trademarks. Costs of these investments cannot be expensed, and they are usually depreciated, so that the purchase price is allocated over a long period of time. Cash flow from financing gives the sources and uses of cash flow from firm's financing activities, e.g., issuance of new debt or equity, payment of dividends, repayment of debt, and repurchase of equity.

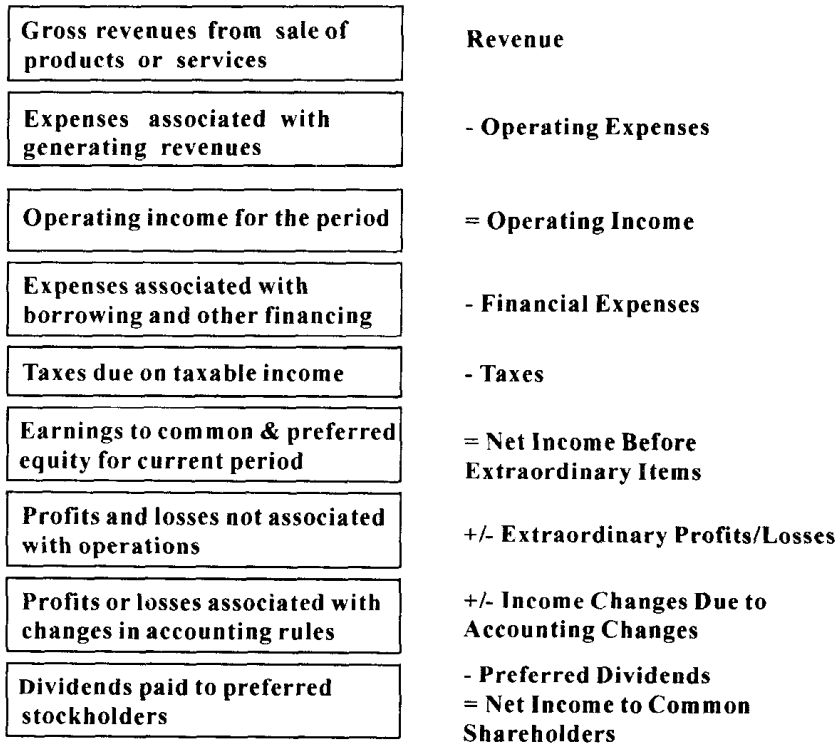

Figure 1.2: Income Statement

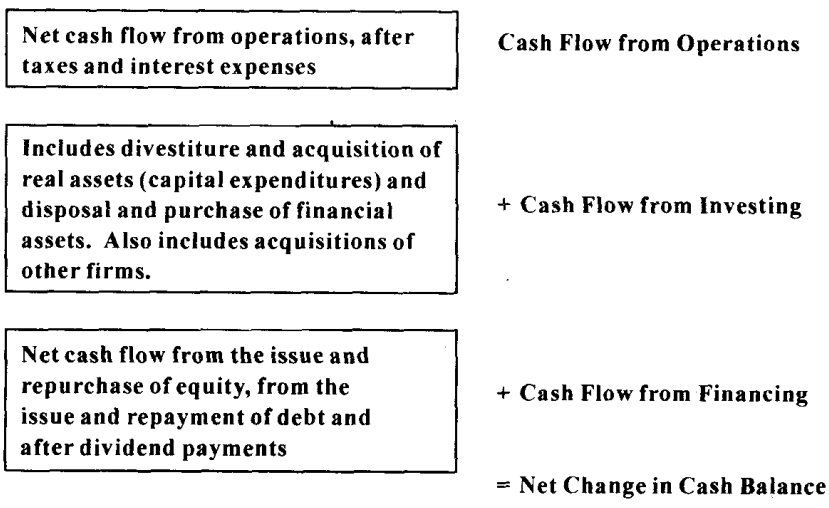

Figure 1.3: Cash Flows Statement

1.3 Measuring Asset Value

In the process of conducting financial analysis, we are interested in finding out the kinds of assets that a firm owns, the values of those assets and how uncertain the values of those assets are. Accounting statements do a reasonably good job of categorizing the assets owned by a firm, a partial good job of estimating the values of these assets but a poor job of evaluating uncertainty about asset values. In this section, we study accounting principles underlying asset categorization and measurement, and analyze the limitations of financial statements in providing crucial information about firm's assets.

1.3.1 Accounting Principles on Asset Measurement

An asset is a type of resource that could either generate future cash inflows or reduce future cash outflows for the firm. While this is a general definition broad enough to cover almost any kind of asset, accountants add a caveat that for a resource to be an asset, a firm has to have acquired it in a prior transaction and be able to quantify future benefits with reasonable precision. To a great extent, this accounting view of asset value is based on the notion of historical cost, which is the original cost of the asset, adjusted upwards for improvements made to the asset since purchase and downwards for the loss in value associated with the aging of the asset. This historical cost is usually called the book value.[1] While the Generally Accepted Accounting Principles (GAAP) for valuing an asset vary across different kinds of assets, three principles underlie the way assets are valued in accounting statements.[2]

- An abiding belief in book value as the best estimate of value: Accounting estimates of asset value begin with the book value. Unless a substantial reason is given to do otherwise, accountants view the historical cost as the best estimate of the value of an asset.

[1] Most financial managers and analysts, however, concentrate on market value, which reflects current values. One of the important distinctions between accounting and finance is their different focus: the historical perspective of accounting and the forward looking focus of finance.

[2] To ensure that financial statements are understandable to their users, a set of practices, called GAAP, has been developed to provide guidelines for financial accounting. These "principles" are not like the unchangeable laws of nature found in chemistry and physics. They are developed by accountants and businesses to serve the needs of decision makers, and they can be altered as better methods evolve or as circumstances change.

- A distrust of market or estimated value: When a current market value exists for an asset that is different from the book value, accounting convention seems to view this market value with suspicion. The market price of an asset is often viewed as both much too volatile and too easily manipulated to be used as an estimate of value for an asset. This suspicion runs even deeper when values are estimated for an asset based upon expected future cash flows.

- A preference for underestimating value rather than overestimating it: When there is more than one approach to valuing an asset, accounting convention takes the view that the more conservative (lower) estimate of value should be used rather than the less conservative (higher) estimate of value. Thus, when both market and book value are available for an asset, accounting rules often require that you use the lesser of the two numbers.

1.3.2 Asset Valuation

To examine how asset value is measured, we will begin with the way assets are categorized in the balance sheet. First, we have the short-term assets of the firm, including inventory (including raw materials, work-in-progress and finished goods), receivables (summarizing moneys owed to the firm) and cash, which are categorized as current assets. Next, we have investments in the assets and securities of other firms, which are generally categorized as financial investments. Then, we have long-term assets, which include the long-term properties of the firm, such as plant, equipment, land and buildings. Finally, we have what is loosely categorized as intangible assets. These include assets, such as patents and trademarks that presumably will create future earnings and cash flows, and also uniquely accounting assets such as goodwill that arise because of acquisitions made by the firm. These categories are listed in the order of their presumed ease of conversion into cash. For example, current assets are usually more easily converted to cash than are property, plant and equipment.

Current Assets

Current assets are cash, account receivable, and other assets that are reasonably expected to be converted to cash, sold or consumed within one year or within the normal operating cycle of the firm, whichever is longer.

- Accounts Receivable: Companies can sell on credit to be competitive and to increase sales. Accounts receivable are short-term liquid assets that arise from sales on credit to customers. This type of credit is often called trade credit. When Home Depot, Inc. sells products to building contractors and gives them a few weeks to make the payment, it is creating accounts receivable. It can raise funds by selling or transferring accounts receivable to another entity. The accounting convention is for accounts receivable to be recorded as the amount owed to the firm, based upon the billing at the time of the credit sale. The only major valuation and accounting issue is when the firm has to recognize accounts receivable that are not collectible. A firm will always have some customers who cannot or will not pay their debts. The accounts owed by such customers are called uncollectible accounts or bad debts, and are losses or expenses of selling on credit. Some firms recognize the loss from an uncollectible account receivable at the time it actually occurs. However, firms that follow GAAP closely do not use the direct charge-off method and prefer the allowance method, which estimates losses from uncollectible accounts and the estimate becomes an expense in the fiscal year in which the sales are made.

- Cash: Cash is the most liquid of all assets and the most readily available to pay debts. It is one of the few assets for which accountants and financial analysts should agree on value. The value of a cash balance should not be open to estimation error. Having said this, we should note that fewer and fewer companies actually hold cash in the conventional sense (as currency or as demand deposits in banks). Firms often invest the cash in interest-bearing accounts or in treasuries, so as to earn a return on their investments. In either case, market value can deviate from book value, especially if the investments are long-term. While there is no real default risk in either of these investments, interest rate movements can affect their value. We will examine the valuation of marketable securities later in this section.

- Inventory: Inventory is considered a current asset because it will normally be sold within a year's time or within a firm's operating cycle. There are three basic approaches to valuing inventory. In effect, the value assigned to the ending inventory determines what portion of the cost of goods available for sale is assigned to cost of goods sold

and what portion is assigned to the balance sheet as inventory to be carried over into the next accounting period.

1. First-in, First-out (FIFO): The FIFO method is based on the assumption that the costs of the first items acquired should be assigned to the first items sold. The costs of the goods on hand at the end of a period are assumed to be from the most recent purchases, and the costs assigned to goods that have been sold are assumed to be from the earliest purchases. The effect is to value the ending inventory at the most recent costs and include earlier costs in costs of goods sold. During periods of inflation, the use of FIFO will result in the lowest estimate of cost of goods sold among the three valuation approaches, and the highest net income.
2. Last-in, First-out (LIFO): The LIFO method is based on the assumption that the costs of the last items purchased should be assigned to the first items sold and that the cost of ending inventory reflects the cost of the merchandise purchased earliest. The effect of LIFO is to value inventory at the earliest prices and to include in the cost of goods sold the cost of the most recently purchased goods. During periods of inflation, the use of LIFO will result in the highest estimate of cost of goods sold among the three valuation approaches, and the lowest net income.
3. Weighted Average: Under the weighted average method, inventory is priced at the average cost of the goods available for sale during the period. Average cost is computed by dividing the total cost of goods available for sale by the total units available. This gives an average unit cost that is applied to the units in ending inventory. When inventory turns over rapidly, the weighted average method will more closely resemble FIFO than LIFO.

Firms often adopt the LIFO approach for its tax benefits during periods of high inflation. The cost of goods sold is then higher because it is based upon prices paid towards to the end of the accounting period. This, in turn, will reduce the reported taxable income and net income, while increasing cash flows. Studies indicate that larger firms with rising prices for raw materials and labor, more variable inventory growth and an absence of other tax loss carrying forwards are much more likely to adopt the LIFO approach. Given the income and