

THIRD EDITION

Valuation

THE ART AND SCIENCE OF
CORPORATE INVESTMENT
DECISIONS

Sheridan Titman ■ John D. Martin

VALUATION

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VALUATION

The Art and Science of
Corporate Investment Decisions

Third Edition

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To my parents, wife (Meg), and sons (Trevor, Elliot, and Gordon)
—S.T.

*To the Martin women (Sally and Mel), men (sons David and Jess),
and boys (grandsons Luke and Burke)*
—J.D.M.

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About the Authors

SHERIDAN TITMAN holds the McAllister Centennial Chair in Financial Services at the University of Texas. He has a B.S. from the University of Colorado and an M.S. and Ph.D. from Carnegie Mellon University. Prior to joining the faculty at the University of Texas, Professor Titman was a Professor at UCLA, the Hong Kong University of Science and Technology, and Boston College and spent the 1988–89 academic year in Washington, D.C., as the special assistant to the Assistant Secretary of the Treasury for Economic Policy. In addition, he has consulted for a variety of financial institutions and corporations. He has served on the editorial boards of the leading academic finance and real estate journals, was an editor of the *Review of Financial Studies*, and was the founding editor of the *International Review of Finance*. He has served as President of the American Finance Association and the Western Finance Association, and as a director of the American Finance Association, the Asia Pacific Finance Association, the Western Finance Association, and the Financial Management Association and as the President of the Western Finance Association. Professor Titman has published more than 50 articles in both academic and professional journals and a book entitled *Financial Markets and Corporate Strategy*. He has received a number of awards for his research excellence and is a Fellow of the Financial Management Association and a Research Associate of the National Bureau of Economic Research.

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John and Sally have two wonderful sons, the world's finest daughter-in-law (their youngest son isn't married), and two beautiful grandsons who visit them often on their ranch outside of Crawford, Texas, where they raise hay and enjoy life with their chickens, dogs (Jack, Minnie and Pearl) and miniature donkeys (Lottie, Dottie, Wavy, Gravy, and Biscuit).

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Preface

PROJECT AND ENTERPRISE VALUATION

Most valuation books focus on the valuation of entire businesses, or *enterprise* valuation. But by far, the greatest application of valuation methods today is aimed at individual investment projects. With this in mind, we have developed a book that is designed for readers interested in *project* as well as *enterprise valuation*. This broader focus better fits the economic realities of the modern corporation, which acquires productive capacity in one of two basic ways—through internal growth, which requires the evaluation of project value, and through acquisitions of operating business units, which require the evaluation of business or enterprise value.

We see our potential audience comprised of two key groups:

- **Business professionals** who, because of their business needs, want a state-of-the-art book on the practical implementation of advanced valuation methods.
- **Students** in MBA and upper-division undergraduate finance elective courses that focus on the valuation and analysis of investment opportunities. Such courses may be lecture/problem or case based. Our book would be appropriate as the primary information source for the former and as a supplement for the latter.

WHAT'S NEW IN THE THIRD EDITION?

The first edition of this book was published in 2007, and since its publication, we have been very gratified and encouraged by the book's acceptance around the world. From conversations with adopters, we have learned a great deal that has helped us improve the book's content and pedagogy. In the second edition we made major changes to the book's focus, increasing the emphasis on enterprise valuation and adding a chapter on financial statement analysis and forecasting. Our focus in this third edition is on pedagogy. Overarching enhancements include the following:

Updated Examples and Exercises

With the dedicated assistance of Lynda Livingston, John Butler, and Joe Hahn, we worked through every example and end-of-chapter exercise and made significant changes that both clarified and simplified them. A sample of enhanced examples include:

- Lecion Electronics Corporation and JC Crawford Enterprises in Chapter 2
- The Earthillizer Proposal in Chapter 3
- Better Buys in Chapter 6
- Adjusted Present Value (APV) in Chapter 9
- Bear-Builders.com in Chapter 10

New End-of-Chapter Questions and Problems

We've added a number of new problems, including a set of "starter" problems we designate as Exercises. The exercises are designed to be used in conjunction with a student's

first reading of the chapter. Following these exercises are end-of-chapter Problems that are more challenging.



Videos

New to this edition, we've created lecture capture videos for each chapter to focus on key examples. These videos are short (five to 10 minutes) and give us the opportunity to personally walk the students through the examples. It is our hope that students will come to rely on these recorded videos as a guide to better understanding the text examples. These videos are identified in the textbook with a marginal icon and can be accessed at http://www.pearsonhighered.com/titman_martin/.

Updated Chapter Content

Additional enhancements specific to chapters include the following:

- Chapter 2: New discussions of relevant cash flows; calculation of free cash flows; forecasting of future free cash flows; the use of financial statements to derive cash flow estimates; and key learning points from the analysis of free cash flow and pro forma financial statements
- Chapter 4: New material addressing capital structure weights, decomposition of risk and required returns, leveraging and unlevering beta, and geometric versus arithmetic mean
- Chapter 9: Further distinctions regarding valuing a project and firm; new Technical Insight on short versus long planning periods; revised GRC growth strategy valuation analysis
- Chapter 10: Industry Insight on the biggest buyout deals of all time
- Chapter 12: New discussion of hedging the price of the risk of delaying the decision to invest; more complicated options and the incentive to wait to invest; hedging oil price risk; and changes in model parameters and real option values.

A HOLISTIC APPROACH TO VALUATION

Our vision for this book is to provide an up-to-date, integrated treatment of the valuation of investment opportunities that seriously considers industry practice as well as recent advances in valuation methods. We understand that investments cannot be valued in a vacuum, and wise investment decisions must thus account for how the investments relate to the firm's current and future strategies along a number of dimensions:

- What are the relevant risks of the project, and can the firm hedge these risks?
- How can the investment be financed, and how does financing contribute to its value?
- How does the investment affect the firm's financial statements?
- Will the investment initially improve the firm's earnings per share, or will it lead to a short-term reduction in earnings?
- Is there flexibility in the way in which the project can be implemented, and how does this flexibility contribute to value?
- If we choose to delay the initiation of the investment, will the opportunity still be available in the future?
- Do they exploit the firm's existing comparative advantages, and do they create new comparative advantages that will generate valuable projects in the future?

In addition to these dimensions, we offer a broad spectrum of valuation approaches. Although financial economists and business practitioners recognize that evaluating investment opportunities requires much more than just discounting cash flows, they often pay little attention to other elements of the valuation process. Our focus is multifaceted in that we amplify important areas that often receive short shrift in the valuation process.

PEDAGOGICAL FEATURES

Our goal in this book is to provide our readers with the very latest valuation tools that are used in industry. After having taught valuation to hundreds of students and been involved in their job placement, we are convinced of two things. First, a successful financial analyst must have a thorough understanding of valuation theory. Second, students must be able to apply their knowledge of that theory in a practical setting. This means that they must be able to deal with information from a variety of sources, construct models that utilize that information, and then summarize their analysis in a meaningful way. This makes it essential that they develop the necessary skills to manipulate data and develop spreadsheet models.

To accomplish this goal, the book incorporates a number of pedagogical features that should help the seasoned financial analyst as well as the student develop a framework for evaluating the simplest to the most complex valuation problems.

Realistic Assumptions

Valuation principles are best illustrated and learned in the context of realistic situations in which decisions are actually made. Thus, we place our examples in practical settings to give a sense of the context in which decision making takes place. Without delving into theoretical arguments, we apply the recent work of financial economists to the practice of finance in a “messy” world where conditions often deviate from the idealized world of academic finance. In doing so, we acknowledge the limitations of our models and give recommendations on how they can be applied in practice.

Extensions and Insights

A number of special features enrich the text presentation.

- *Industry Insights* delve more deeply into how the tools developed in the book are used in practice.
- *Technical Insights* provide further explanations of mathematics, methodologies, and analytical tools.
- *Behavioral Insights* focus on irrational choices and biases that affect how investment choices are made in practice.
- *Practitioner Insights* provide perspectives from a broad spectrum of professionals who use the various valuation methodologies discussed in the text.
- *Did you know?* side comments provide little slices of interesting financial lore.

End-of-Chapter Exercises/Problems and Mini-Cases

Each chapter contains a generous number of exercises and problems designed to review the materials discussed in the chapter and to allow readers to solidify their

understanding of key concepts. The material is practical and ranges in difficulty from introductory exercises and more advanced problems designed to illustrate a single point, to mini-cases in selected chapters, to moderate-length case studies with multiple parts designed to delve more deeply into issues.

Spreadsheet Usage and Support

The majority of the end-of-chapter problems require the use of spreadsheet software. We provide templates for use in solving these problems on the Web site accompanying this book at http://www.pearsonhighered.com/titman_martin.

Use of Simulation Software

Where applicable, we use Monte Carlo simulation. Although the book can be used without this feature, the value of the learning experience will be greatly enriched if the reader works directly with this tool. To facilitate the use of Monte Carlo simulation, an access code to Crystal Ball software has been included with this text. Crystal Ball is an add-in to spreadsheet software that allows you to perform Monte Carlo simulations by automatically calculating thousands of different “what if” cases, saving the inputs and results of each calculation as individual scenarios. Analysis of these scenarios reveals to you the range of possible outcomes, their probability of occurring, which input has the most effect on your model, and where you should focus your efforts. Alternatively, readers already familiar with other simulation packages (e.g., @Risk) may use those instead.

Videos



We created these videos for this edition as a way to further students’ understanding of key topics in the text. In the five- to 10-minute videos, we walk students through one example for each chapter, which include discussions on the project valuation process, forecasting project cash flows and valuation, estimating a firm’s WACC, estimating enterprise value, and valuing a strategy with staged investments. The videos are identified in the text with an icon and can be accessed at http://www.pearsonhighered.com/titman_martin.

SUPPLEMENTS

We provide a number of ancillary materials for the instructor, student, and practitioner.

Excel solutions are available to instructors online for end-of-chapter exercises, in addition to the spreadsheet models that are used. Online PowerPoint® Lecture Outlines set out major points for the entire text, along with slides of figures and tables in the book. A dedicated Web site, http://www.pearsonhighered.com/titman_martin, contains spreadsheet templates for end-of-chapter problems, plus recommendations for case studies.

STRUCTURE OF THE BOOK

Chapter 1 provides an aerial view of project evaluation and sets out a road map for the remaining chapters. We use Chapter 1 to launch a discussion of our view of the art and science of valuation in general, with an emphasis on the need for a rigorous decision process.

Chapters 2 through 13 are divided into five parts. Part I (*Project Analysis Using Discounted Cash Flow*) is comprised of Chapters 2 and 3. In Chapter 2 we set out the basic tool of discounted cash flow analysis and extend the analysis to other models in Chapter 3. Discounted cash flow (DCF) analysis has been the mainstay of financial analysis since the 1950s and continues to be what most financial analysts think of when they think about project or enterprise (business) valuation. However, DCF analysis is often oversimplified in classroom presentations, so that when the various nuances of practical applications are encountered in the real world, the proper application of DCF is often confusing—even for seasoned professionals. We focus on a three-step approach to DCF analysis that entails carefully defining cash flow estimation, matching cash flows with the proper discount rate, and using the right mechanics to estimate present value.

Part II (*Cost of Capital*), consisting of Chapters 4 and 5, discusses how to estimate the cost of capital, which is an essential building block in the valuation process. The cost of capital can be viewed as the opportunity cost of financing the investment, which, in turn, is the appropriate discount rate for valuation analysis. We evaluate the cost of capital for the firm as a whole and for individual investment proposals or projects. The former is the discount rate used to value an entire business enterprise, while the latter is the discount rate for valuing an individual investment.

Chapters 6 and 7 form a section titled *Financial Statements and Valuation*. In Chapter 6, we review the firm's basic financial statements and discuss the use of pro forma financial statements in forecasting future cash flows. Chapter 7 (Chapter 9 in the first edition) is included in this new section to complete our analysis of accounting information and valuation. Specifically, Chapter 7 focuses on the problem of evaluating financial performance and the role that reported earnings have on financial decision making.

In Chapters 8 through 10, Part IV (*Enterprise Valuation*), we examine the challenging task of estimating the value of a business enterprise. These chapters combine the DCF methodology developed in earlier chapters with the analysis of various accounting ratios. We consider the value of an ongoing business from the perspective of the firm's stockholders as well as from the perspective of the acquiring firm. In addition, we look at the value of the firm through the eyes of the private equity investor, including both the venture capitalist and the LBO firm.

Part V (*Futures, Options, and the Valuation of Real Investments*) features a three-part treatment (Chapters 11–13) of real options. In these chapters, we demonstrate how options are used both at the nitty-gritty level where the value of project cash flows is estimated and at the strategic level where new businesses are evaluated. In Chapter 11, we note that the rapid development of markets for financial derivative products related to basic commodities, foreign exchange, and interest rates has opened the possibility for firms to “lay off” significant risk exposures through hedging transactions and that this opportunity has changed the way we think about valuation. Chapter 12 covers the central issue in real option analysis: the valuation of investments when management has flexibility in how the investment is implemented. In Chapter 13, we use the concepts developed in Chapters 11 and 12 to analyze the value of business strategies.

We also include an Epilogue that discusses the disconnects we have observed between valuation theory and industry practice, and we make a few predictions about the extent to which such gaps may be reduced in the future.

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S.T.
J.D.M.

Introduction to Valuation

Chapter Overview

Chapter 1 focuses on the inherent challenges that arise in the valuation of investments. These investments include routine acquisitions to replace worn or outdated equipment and the acquisition of stand-alone businesses. Whether we are valuing a small investment project or valuing an entire stand-alone business, we need a process to make rational investment decisions.

Chapter 1 is organized as follows: First, we review the notion of project valuation in terms of its anticipated impact on the wealth of the firm's owners. Second, we highlight five key challenges that can arise in valuing a major investment proposal by using a case study involving a large investment made by a group of multinational oil companies.

To deal effectively with the challenges involved in valuing major investments, firms must have a disciplined approach, founded on a sound evaluation process. We present a three-phase investment evaluation process to address this need. This process begins with the identification of an investment idea and ends with the final approval. The process does not eliminate all bad investments because investing is inherently risky; however, it does help to ensure that the firm does not fall victim to decision errors based on flawed analysis.

1.1 INTRODUCTION

Valuation is central to most of what we do in financial analysis. When firms evaluate either an internally generated investment project or an external acquisition, one of the first steps in the process is a valuation of the opportunity. Moreover, when firms consider either share issuances or share repurchases, an initial step in the evaluation process is the valuation of the firm's own shares.

To illustrate the key role played by valuation in financial decisions, let's first consider Starbucks' (SBUX) acquisition of Seattle's Best Coffee in 2006. As part of the acquisition process, Starbucks' financial analysts estimated the intrinsic value of the shares of Seattle's Best in order to determine how much they would be willing to pay for the company. Starbucks' management probably also did a valuation of their own shares to gauge whether their stock was under- or overvalued because this would influence whether they would want to make an all-cash offer for Seattle's Best or offer Starbucks shares in exchange for Seattle's Best shares.

If you were a security analyst responsible for advising investors on whether to buy or sell Starbucks common stock, you would also be keenly interested in this acquisition. Your job would require you not only to value each of the companies but also to assess whether their combination would generate new sources of value (i.e., synergies) or be an enormous waste of resources.

Corporate financial analysts also spend considerable amounts of time valuing investment projects. For example, before introducing its new Via[®] product line of instant coffees, Starbucks' financial analysts performed a valuation of the new product line that included an analysis of the demand for the product as well as the costs of developing, marketing, and producing the new product line. The final go–no go decision on Via[®] boiled down to a comparison of the value of the investment's future cash flows with the cost of launching the investment.

Whether you are valuing an ongoing business or an investment project, the procedure you follow is essentially the same. In each case, you will need lots of information. Specifically, you will need to

1. make estimates of the cash flows generated by the investment,
2. assess the riskiness of those cash flows and determine the appropriate discount rate to use in valuing the estimated cash flows, and
3. identify comparable investments that are either publicly traded or have recently been bought or sold to serve as a reality check on your analysis of items 1 and 2.

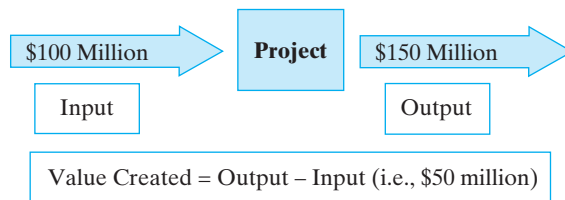
If you are valuing the shares of a publicly traded firm, the process is relatively straightforward. The company has a history that includes past cash flows and stock returns, and in most cases, you will have access to information about other comparable, publicly traded firms. The information about comparable firms will prove to be very helpful in estimating the value of the firm of interest. The valuation of an investment project can be more challenging because you do not typically have the benefit of historical data and are likely to have fewer comparable transactions that you can use to help gauge how other market participants have evaluated similar investments. However, the valuation process in each case is very much the same.

As a financial analyst evaluating a potential acquisition, you are faced with additional challenges. In addition to assessing the cash flows of the acquisition candidate as a stand-alone company, you must identify any synergies with the acquiring firm that make the value of the combined firms greater than the sum of the values of the two individual companies.

1.2 THE NATURE OF MAJOR INVESTMENT DECISIONS

As the discussion in this chapter indicates, firms grow and expand their operations in one of two ways: They acquire productive capacity by assembling the necessary assets, or they acquire existing businesses. In the first case, we refer to the valuation problem as **project valuation**; in the second case, we refer to the valuation problem as **enterprise valuation**. Throughout this text, we will consider examples of both project and enterprise valuation and provide a common set of tools and underlying principles that can be used for both types of analysis.

Throughout most of the text, we assume that the firm's objective is to create wealth by initiating and managing investments that generate future cash flows that are worth more (i.e., have a higher monetary value) than the costs of the investment. On the

Figure 1-1 Investment Evaluation

surface, the process appears quite simple. Consider the illustration in Figure 1-1: A firm has the opportunity to invest \$100 million in a project that generates a stream of cash flows that are valued at \$150 million. By making the investment, the firm generates an incremental \$50 million in wealth for its shareholders; that is, it expects the project to be worth \$50 million more than it costs (in today's dollars). In the jargon of finance, the project has an expected **net present value (NPV)** of \$50 million.

It is an unfortunate fact of life, however, that over half of all large investment projects fail to achieve their hoped-for results.¹ The record of merger and acquisition performance is even more problematic, as exemplified by Daimler-Benz's purchase of Chrysler for \$35 billion in 1998. Chrysler was later sold in 2007 for only \$7.4 billion; it then went bankrupt and was taken over by Fiat in 2009. If project evaluation is as straightforward as depicted in Figure 1-1, then why do so many big investments fail?

One explanation for failed investments is simply that firms invest in risky projects, and we should not expect them to be right all the time. Using a sports analogy, when you swing for the fences, you can expect to strike out a lot. We contend throughout this text, however, that there is more than investment risk and bad luck at work here. The fact is that analyzing capital expenditure choices can be both complex and tedious, and managers must make their investment decisions on the basis of incomplete information about uncertain future events. In the face of this complexity and uncertainty, managers often just "go with their gut" and initiate the investments that feel right.

We agree that managers with reliable intuition (that is, a discriminating gut) and the experience to make sound judgments will—and should—ultimately make the major corporate investment choices. However, analytical tools, as well as sophisticated yet inexpensive and user-friendly computer software, can help managers see through the complexity and work through the tedium inherent in the evaluation of a major investment. It is our belief that, by using these tools and taking a more disciplined approach to valuation, managers' judgment will be enhanced and they will make better investment choices.

¹ Matta and Ashkenas (2003) arrive at this conclusion by analyzing a set of project initiatives that include major technology installations, postmerger integrations, and new-growth strategies (Nadim F. Matta and Ronald N. Ashkenas, "Why Good Projects Fail Anyway," *Harvard Business Review* [September 2003]: 109–114).

1.3 VALUING PROJECTS AND BUSINESSES

To provide a brief overview of the kinds of issues that we will be exploring in this text, this section describes two major investments. The first is a project that resulted in the development of the Caspian Sea oil fields, which are currently a major source of oil. The second is the acquisition of Linksys Group by Cisco Systems (CSCO).

Project Valuation—Investing in the Caspian Sea Oil Fields

To illustrate the challenges associated with valuing a large investment opportunity, we begin by describing a major oil investment in the Caspian Sea.² Although this investment can be thought of as an investment project, it was in fact the creation of a new firm that was jointly held by lots of oil companies in the early 1990s. Imagine that you are sitting at the table when the analysis began and are trying to get a handle on the risks and potential rewards that might accrue to your firm if it undertakes the investment.

To be more specific, the investment consists of part ownership of a joint-venture consortium comprised of eleven oil companies. The consortium, known as the Azerbaijani International Oil Consortium, includes the state oil company of Azerbaijan, British Petroleum, Amoco, the national oil companies of Russia and Turkey, and several other foreign oil companies. The eleven oil companies jointly have the right to develop three oil fields in the western part of the Caspian Sea that were estimated to contain 4.5 to 5 billion barrels of oil.³

The right to develop the three fields would be subject to certain conditions. The consortium will complete a seismic survey, an environmental impact study, and the drilling of a series of test wells. It will then have to submit a development plan to the state oil company of Azerbaijan, outlining the development of the fields based on its preliminary findings. Following the initial work, the consortium will eventually submit a plan involving four stages, which are summarized in Figure 1-2. Both the state oil company of Azerbaijan and the consortium have the right to approve each step in the process based on the results of the prior stage. A production-sharing agreement will define the revenue-sharing agreement for the output from the investment, if it is successful.

As the results of each stage of the project become known, the management of the state oil company of Azerbaijan and the consortium are faced with the decision of whether they should enter the next phase of the project. In essence, if the decision is made to proceed with the early-stage investment, the consortium acquires the *option* to make successive investments in each of the three subsequent stages of the development process. Assuming that all stages of the investment are executed successfully, the fact that the consortium has developed expertise in the region makes it possible for each member of the consortium to compete on favorable terms with would-be competitors for future investment opportunities.

² For more information, see Benjamin Esty and Michael Kane, BP Amoco (B): Financing Development of the Caspian Oil Fields, *Harvard Business School Press*, Case #9-201-067, 2001.

³ “Azerbaijan-Pipeline Knocked Back,” *Project Finance International* (March 24, 1999): 45.

Figure 1-2 Stages of Investment in the Caspian Sea Oil Development Investment

1998–1999	Early Oil Project
	<ul style="list-style-type: none"> ■ Develop Chirag field by refurbishing offshore drilling platform and drilling new wells. ■ Construct undersea oil pipeline to terminal (105 miles). ■ Rebuild two export pipelines (total of 1,300 miles). ■ Estimated cost = \$1 billion.
Beginning in 2000	First-Stage Development
	<ul style="list-style-type: none"> ■ Develop the Azeri field. ■ Estimated cost = between \$2.6 and \$3.1 billion.
Beginning in 2002	Second-Stage Development
	<ul style="list-style-type: none"> ■ Develop the deepwater Gunashli field. ■ Estimated cost = \$3 billion.
Beginning in 2003–2004	Third-Stage Development
	<ul style="list-style-type: none"> ■ Additional development of the Azeri field. ■ Estimated cost = \$2 billion.

Issues to Consider When Valuing an Investment

The Caspian Sea oil-field development project illustrates the complexities of the environment in which companies make investment decisions. In any situation in which a company must value a major new investment, five key issues arise. Figure 1-3 highlights these issues, which we discuss below.

Issue #1: Does the “Story” Make Sense?

Before the firm makes any investment, the investment story, or strategy, must be plausible to decision makers. By “make sense,” we mean that management must be convinced that the potential gains from the investment are large enough to warrant initial investigation. Also, management must believe that the firm’s management team

Figure 1-3 Important Issues to Think About When Making a Major Investment

1. Does the “story” make sense?
2. What are the risks involved in undertaking the investment?
3. How can the investment be financed?
4. How does the investment affect near-term earnings?
5. Does the investment have inherent flexibilities?

possesses (or can acquire) the expertise required to reap the rewards of investing. Specifically, does the firm have a *competitive advantage* due to specialized knowledge or circumstance that allows it to capture the benefits of the investment?

The ultimate success or failure of an investment is largely driven by the capabilities of the firm that undertakes the investment and how these capabilities compare with the capabilities of possible competitors. This notion is captured by the concept of *comparative advantage*. Therefore, a complete analysis of an investment must address the following strategic issues as part of its “story”: Does the firm, and does this project, provide any comparative advantage(s) relative to those of other firms and existing projects? Are the firm’s comparative advantages sufficient to deter competitors from making similar investments?

Issue #2: What Are the Risks Entailed in the Investment, and How Can They Be Assessed and Dealt with in the Analysis?

The old adage “Look before you leap” is good advice when evaluating investment opportunities. Specifically, a careful assessment of *what might go wrong* is perhaps even more important than an analysis of what we hope will go right. For example, international investment projects that are made in emerging markets expose the investing company to a myriad of risks.

The financial analyst must then ask, “What are the underlying risks associated with the investment?” “How should these risks be incorporated into the project analysis?” “Do the investment risks affect the rate of return that should be used to evaluate whether to undertake the investment?” “Are there governmental programs (domestic or foreign) that can insure the investment in the event of political instability?” “How does the ability of the firm to transfer investment risk affect the financing of the project and the project’s valuation?”

Issue #3: How Can the Investment Be Financed?

The ability to secure attractive financing can be a key determinant of the value of the investment. For example, firms can sometimes obtain debt subsidies in the form of government guarantees or credit enhancements, especially when international investments are involved. In other cases, firms might raise private equity (discussed in Chapter 10) and new debt financing to fund off-balance-sheet investments known as special-purpose entities (SPEs).⁴

The evaluation of financing opportunities addresses issues such as the following: How do the characteristics of the firm and the project (e.g., the extent that the risks of the project can be managed by transferring the risk to another party via a financial contract) affect how it is financed? How does the financing of the project affect how the project can be valued? We will have more to say about the relation between financing and value in Chapter 4.

In addition to asking how much debt to use, the firm should also discuss the type of debt to use. Should the project be financed on the firm’s balance sheet, or should it be financed off the balance sheet with nonrecourse debt (i.e., project financing)?⁵

⁴ Although SPEs were made famous by Enron, they have been and continue to be useful vehicles for raising financing for firm investments.

⁵ *Nonrecourse debt* or project financing refers to debt for which the lender’s only recourse in the event of default is to use the assets of the investment or project. That is, the debt is to be repaid out of the cash flows generated by the project, and there is no recourse to the company sponsoring the investment in the event that the project’s cash flows are insufficient to meet the project’s financial obligations.

Issue #4: How Does the Investment Affect Near-Term Earnings?

Investors and equity analysts use the firm's reported earnings as an indicator of the firm's success or failure. When considering a large investment, managers are keenly aware of its effect on earnings. They ask whether a project is likely to *dilute* (reduce) or *accrete* (increase) the firm's earnings per share. For example, a major oil project like the one in the Caspian Sea can often dilute the firm's earnings in the early years because of the considerable upfront expenses and deferred cash flows. However, earnings should increase over time as the future benefits from the project materialize.

A project's effect on earnings can influence investment decisions for a variety of reasons. For example, if company executives are paid on earnings-based performance measures, or if they believe that investors focus on earnings per share, then they may be reluctant to invest in a project that affects the firm's earnings negatively. Thus, accounting and the design of pay-for-performance policies often influence a firm's investment decisions. Chapter 7 delves into the potential importance of earnings on a firm's investment decisions, as well as on how residual income (or Economic Value Added™)⁶ can be used to help resolve the problems associated with earnings as a performance metric.

Issue #5: Does the Investment Have Inherent Flexibilities That Allow the Firm to Respond to Changing Circumstances?

Firms typically have a specific plan that guides the implementation of their investment projects. However, uncertain future events make it particularly important that the project provide opportunities to react and adapt the implementation plans to changing circumstances. Specifically, these opportunities include the following.

Can the investment be staged? Often, as in the Caspian Sea oil-field case, firms undertake very large investments in stages. Staging allows the firm to manage its risk exposure by making a series of successively larger commitments based on the success of the prior investment. This is clearly the case with large oil-development projects: They typically include an early stage that provides information about the size of the oil reserves before the firm initiates later development stages. This is also true for many new products or services for which the test-marketing phase reveals important information about their sales potential.

When the firm invests in the initial stages, it essentially acquires the option to invest in later stages of the project (if the intermediate investments prove fruitful). The flexibility to delay implementation of a project, to cut one's losses and abandon a project or to expand a successful investment, are examples of options that can add considerable value to a project. We will have more to say in Chapter 12 about the evaluation of such options.

Decision makers should be aware that, in some instances, what appears to be an option turns out to be an obligation. Specifically, if there is no real possibility that an option will *not* be exercised, then it's not an option at all. In the Caspian Sea case, for example, it may turn out to be very difficult for the consortium members to back out after stage 1.

Does the investment offer the opportunity for follow-on investments? The opportunity to invest in a new product, market, or technology can provide valuable follow-on investment opportunities. Most new investment opportunities arise out of previous investments

⁶ Economic Value Added™ (EVA™) is a registered trademark of Stern Stewart and Company.

that the firm has made. The Caspian Sea investment may generate additional oil and gas deals or even the opportunity to enter the petrochemical business in central Asia. Consequently, the valuation of investments with follow-on opportunities requires consideration of *two sets* of cash flows: the cash flows provided by the immediate opportunity as well as those from the possible subsequent projects. The fundamental issue is this: How should the company value these follow-on opportunities and incorporate them into the analysis of the initial decision to invest? We will have more to say about this topic in Chapter 13.

Does the investment provide production or marketing synergies with existing products? To the extent that the new investment shares existing production and/or marketing resources, the opportunity exists to gain a comparative advantage over the firm's competitors.

Enterprise Valuation—Mergers and Acquisitions

The five basic issues encountered in analyzing the Caspian Sea investment project also apply to *enterprise valuation*—the valuation of an entire firm. From the financial analyst's perspective, the fundamental question is the same: What is the investment worth, and how does this compare to its cost?

Cisco Systems (CSCO) is noted for its policy of acquiring existing firms. This strategy of expansion through acquisitions entails the same problems that we encountered in the Caspian Sea project valuation. For example, on March 20, 2003, Cisco announced plans to acquire The Linksys Group Inc. of Irvine, California, for a total purchase price of approximately \$500 million. Although we do not have detailed information concerning Cisco's analysis of the acquisition, the following discussion (based on a company press release)⁷ highlights how Cisco described its assessment of the five basic issues identified earlier.

Issue #1: Does the “story” make sense?

“Fueled by consumer broadband adoption, the home networking space has experienced mass market acceptance. Linksys has captured a strong position in this growing market by developing an extensive, easy-to-use product line for the home and small office.”⁸ The acquisition is an example of Cisco's strategy to broaden its end-to-end portfolio of network solutions into high-growth markets such as wireless, voice over IP, and storage-area networking.

Issue #2: What are the risks entailed in the investment, and how can they be assessed and dealt with in the analysis?

An important source of risk in the investment relates to technological risks. For example, are there wireless technologies that might be developed that would render Linksys' products noncompetitive? This risk is very real for technology-based companies; however, Cisco has partially mitigated this risk by acquiring the recognized industry leader. The challenge facing Cisco in the future will be to maintain Linksys' competitive edge while operating the company as a division of a much larger firm.

⁷ Cisco Systems press release, March 20, 2003, http://newsroom.cisco.com/dlls/corp_032003.html.

⁸ “Cisco Systems Announces Agreement to Acquire the Linksys Group, Inc.,” news release, March 20, 2003.

Issue #3: How can the investment be financed?

“Under the terms of the agreement, Cisco will issue common stock with an aggregate value of approximately \$500 million to acquire the Linksys business and to assume all outstanding employee stock options.”

Issue #4: How does the investment affect near-term earnings?

“Exclusive of acquisition charges, Cisco anticipates this transaction will add approximately \$0.01 to its FY2004 pro forma EPS. The transaction will be accretive to both GAAP and pro-forma earnings thereafter.”

Issue #5: Does the investment have inherent flexibilities that allow the firm to modify the investment in response to changing circumstances?

In particular, can the investment be undertaken in stages?

- Cisco’s acquisition of Linksys is another step in a broad strategy to expand its home and small office product line aimed at developing a dominant position in the home and small office networking market.

Does the investment offer the opportunity for follow-on investments?

- “This acquisition represents Cisco’s entry into the high-growth consumer/SOHO [small office, home office] networking market. Home networks allow consumers to share broadband Internet connections, files, printers, digital music, photos, and gaming, all over a wired or wireless LAN (local area network).”

Does the acquisition offer production and/or marketing synergies with existing products?

- Clearly, Linksys offers products that can be marketed using channels of distribution similar to those already in place at Cisco. In addition, similarities between small business and home applications should provide synergies with Cisco’s existing marketing assets.

1.4 DEALING WITH COMPLEXITY—PROCESS AND DISCIPLINE

Whether making an investment like the one in the Caspian Sea oil fields or Cisco’s acquisition of The Linksys Group, the evaluation can become very complex. To address this complexity in a disciplined way, firms develop policies and procedures that prescribe how to evaluate new investment opportunities. The purpose of these procedures is to ensure that projects receive a thorough analysis and that the project selection process is not subverted by the special interests of one or more managers.

The Investment Evaluation Process

Figure 1-4 summarizes an **investment evaluation process**. This three-phase process captures the critical elements of valuation, beginning with idea generation and ending with a final go–no go investment decision. The process is very general and illustrates how investments are evaluated across a wide variety of industry settings and sizes of firms. Note that these phases are broad enough to cover enterprise evaluation and narrow enough to cover project valuation.