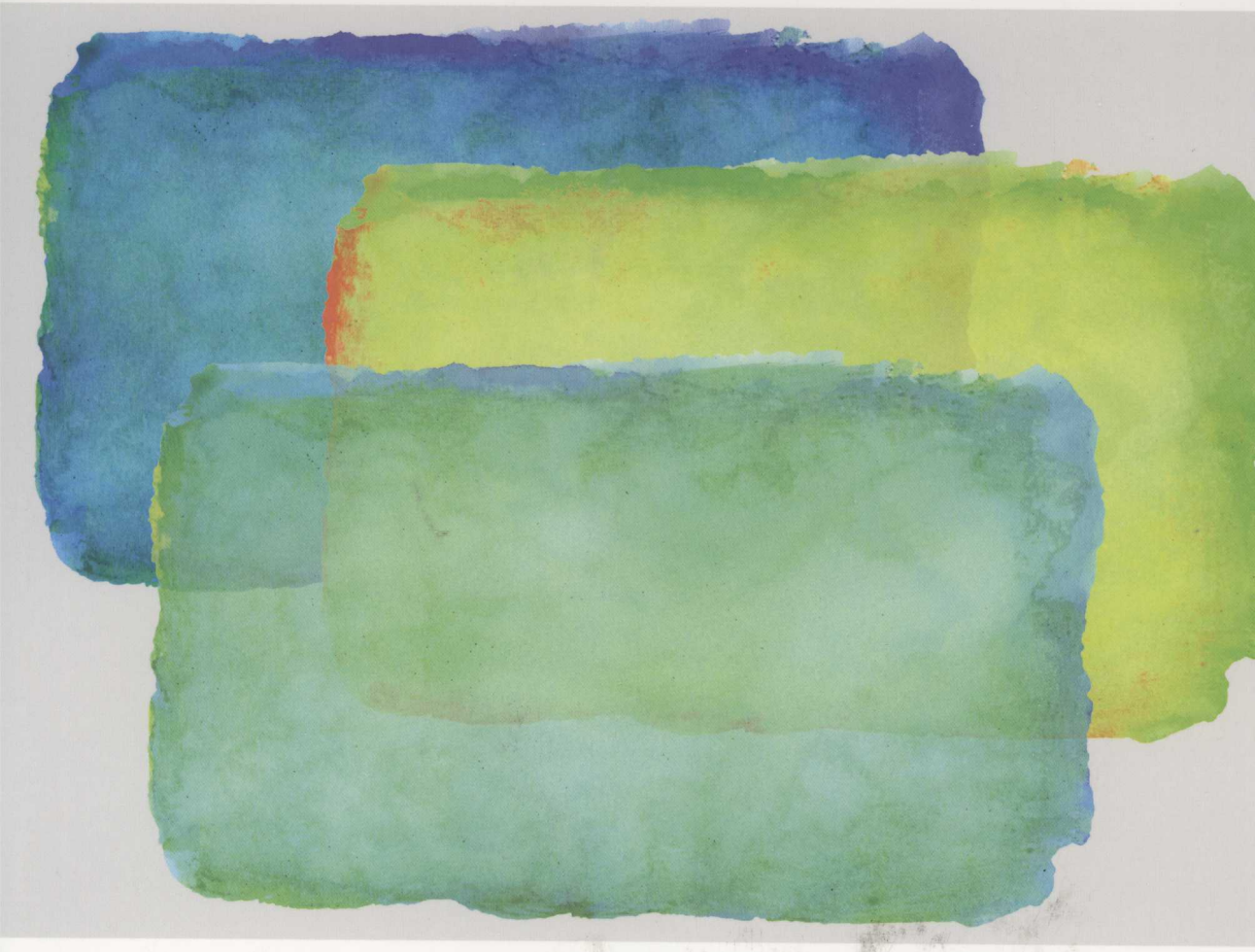
CAPITAL BUDGETING VALUATION

Financial Analysis for Today's Investment Projects



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KOLB SERIES IN FINANCE
Essential Perspectives

Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
Published simultaneously in Canada.

Library of Congress Cataloging-in-Publication Data:

Baker, H. Kent (Harold Kent), 1944-
Capital budgeting valuation : financial analysis for today's investment projects / H. Kent Baker and Philip English.
p. cm. – (The Robert W. Kolb series in finance)
Includes index.
ISBN 978-0-470-56950-4 (cloth); ISBN 978-1-118-04456-8 (ebk); ISBN 978-1-118-04454-4 (ebk); ISBN 978-1-118-04455-1 (ebk)
1. Capital budget. 2. Capital investments. 3. Value added. I. English, Philip. II. Title.
HG4028.C4B285 2011
658.15'4–dc22

2010049527

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

Acknowledgments

Capital Budgeting Valuation—Financial Analysis for Today's Investment Projects reflects the involvement both directly and indirectly of many people. A distinguished group of academics and practitioners contributed their substantial talents to writing highly informative and useful chapters. Much of their work, however, relies upon numerous individuals who have contributed to the field of capital budgeting during the past five decades, many of whom are referenced specifically in each chapter. Special thanks go to Meghan Nesmith from American University, who edited the chapters and provided many helpful suggestions. The publishing team at John Wiley & Sons, Inc., including Evan Burton, Claire Wesley, Emilie Herman and many others, did a first-class job in bringing the book to final production. We also thank Bob Kolb for including this book in the Robert W. Kolb Series in Finance and the Kogod School of Business Administration at American University for providing support. Finally, we thank Linda Baker who provided not only encouragement but also reviewed parts of the manuscript.

Contents

CHAPTER 1

Capital Budgeting: An Overview

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INTRODUCTION

Capital budgeting refers to the process that managers use to make decisions about whether long-term investments or capital expenditures are worth pursuing by their organizations. In other words, capital budgeting is the process of planning, analyzing, selecting, and managing capital investments. The basic notion is that managers use the capital, usually long-term funds, raised by their firms to invest in assets (also called *capital goods*) that will enable the firm to generate cash flows for at least several years into the future. Typical investments include replacements of existing assets and expansion of existing or new product lines. Capital budgeting is one of the most challenging tasks facing management because it concerns the *investment decision*, which deals with allocating funds over time in order to achieve a firm's objectives. For most companies, the investment decision has a greater impact on value than does the *financing decision*, which deals with acquiring needed funds. However, both investment and financing decisions are intertwined and at the heart of financial management.

Capital budgeting has a long-term focus that provides a link to an organization's *strategic plan*, which specifies how an organization expects to accomplish long-term strategic goals. Many capital investments require a substantial commitment of a firm's resources that directly affect firm performance, competitive position, and future direction. Because capital investments often commit a large amount of funds for lengthy periods, they are not only difficult or costly to reverse but also difficult to convert to more liquid assets (Migliore and McCracken, 2001). Also, errors in capital budgeting can affect the firm over a long horizon.

Capital Budgeting Process

The *capital budgeting process* is a system of interrelated steps for generating long-term investment proposals; reviewing, analyzing, and selecting them; and implementing and following up on those selected. This process is dynamic because changing factors in an organization's environment may influence the attractiveness of current or proposed projects. Although no universal consensus exists on the process, Baker and Powell (2005, p. 196) view capital budgeting as a six-stage process:

1. *Identify project proposals.* Develop and provide preliminary screening of project proposals.
2. *Estimate project cash flows.* Identify and estimate the incremental, after-tax cash flows for a proposed project.
3. *Evaluate projects.* Determine the financial viability of a project by evaluating the project's incremental after-tax cash flows.
4. *Select projects.* Choose the projects that best meet the selection criteria.
5. *Implement projects.* Determine the order of implementation, initiate, and track the selected projects.
6. *Perform a postcompletion audit.* Periodically compare the actual cash flows for the project to the prior estimates in the capital budgeting proposal.

All stages of the capital budgeting process are important. The failure to properly complete any stage of the capital budgeting process could have detrimental results. The process starts with the identification of investment opportunities and the preliminary screening of project proposals. Without having potentially viable projects that meet the firm's strategic concerns, the remainder of the capital budgeting process would be meaningless.

Arguably, the most challenging phase of this process is estimating project cash flows because no later stage in the process can fully overcome the inevitable forecasting errors resulting from managers dealing with an uncertain future. Miller (2000, p. 128) notes that "In the real world, virtually all numbers are estimates. The problem with estimates, of course, is that they are frequently wrong."

Despite the importance of estimating project cash flows, the financial literature tends to emphasize the evaluation and selection stages. Improper valuation can lead to incorrect decisions despite the identification of potentially viable projects and accurate estimation of their cash flows. Although many capital budgeting techniques are available for evaluating capital budgeting projects, the best methods typically recognize the amount, the time value, and the riskiness of a project's cash flows.

Selecting capital investments involves a unique set of challenges. Allocating funds among alternative investment opportunities is crucial to a firm's success and is especially important in terms of financial consequences. Capital assets represent a major portion of the total assets of many firms. The selection stage is particularly important in the face of limited investment funds, an area of capital budgeting known as *capital rationing*. While some organizations have sufficient resources available to fund all desirable projects, most face a scarcity of capital that enables them to fund some projects but not others. Capital rationing, whether internally

or externally imposed, makes investment choices more difficult because the firm must reject some investments. However, capital rationing can also reduce and control agency costs. Capital rationing can avoid both overinvestment in low-return projects that occurs when managers have private information and incentives for controlling more assets and managerial understatement of current performance in order to lower their future performance targets.

After approving a capital investment, managers must implement and closely monitor the project. This stage involves raising capital to finance the project, authorizing expenditures, and monitoring projects in progress.

The final stage in the capital budgeting process is to conduct a postcompletion audit. Managers, however, do not engage in postcompletion auditing of all projects because doing so could be costly or impractical. Consequently, large capital budgeting projects tend to be the primary targets for such audits. The most important perceived benefits relate to the enhancement of organizational learning. Conducting postcompletion audits can provide important feedback for current and future investments, and consequently make capital investments more effective (Neale, 1991; Pierce and Tsay, 1992). For example, these audits may identify systematic biases in making cash flow estimates, which may lead to improved cash flow estimates and to better decision making in the future. Thus, postcompletion audits provide a means for holding managers accountable for their estimates and decisions involving capital investments.

Financial Objective of the Firm

Before carrying out the capital budgeting process, management should first define the organization's financial objective. The conventionally advocated capital investment objective, especially in large, listed corporations, is to make long-term investment decisions that will maximize owners' wealth. That is, senior managers of publicly held companies should select those projects that they believe will maximize the firm's value for its shareholders. As Jensen (2001, p. 8) notes, "This Value Maximization proposition has its roots in 200 years of research in economics and finance." Yet, this financial objective seems to be inconsistent with some empirical observations such those in Francis (1980).

The main contender to shareholder wealth maximization is *stakeholder theory*, which asserts that management decisions should consider stakeholder interests wider than those of the stockholders alone. This view contends that firms should pay attention to all their constituencies because many different classes of stakeholders contribute to their success. Beyond financial claimholders, stakeholders may include managers, employers, customers, suppliers, local communities, and the government. Survey evidence by Grinyer, Sinclair, and Ibrahim (1999) is consistent with the notion that some managers do not prefer maximization of stockholders' wealth as the main objective of the firm. Cloninger (1995) proposes the formal abandonment of a stockholder wealth maximizing criterion.

While stakeholder theory has intuitive appeal, recognizing a wide range of stakeholders introduces possible difficulties associated with multiple objectives. Trying to maximize multiple objectives, some of which may conflict, would leave the managers in a quandary about whose interests should take priority—stockholders or other stakeholders.

In theory, capital projects should be analyzed in terms of shareholder wealth maximization. Based on this assumption, managers should undertake all investment projects with a positive net present value (NPV) or an internal rate of return (IRR) higher than the prescribed hurdle rate. By so doing, managers should enhance firm market value and consequently increase owners' wealth. In practice, management should not necessarily accept a project just because it appears financially attractive. Achieving the financial objective of shareholder wealth maximization entails developing a business strategy. Success in capital investment affects the extent to which a company can achieve its strategic objectives. Investment decisions do not occur in a vacuum but are embedded in a company's strategy. Thus, strategy limits the set of investment projects available to managers. As Rumelt, Schendel, and Teece (1991) note, "There is no rule for riches." That is, no general rules in strategy exist that are guaranteed to create value.

According to Jensen and Meckling (1976), firms may experience conflicts of interest between owners and managers. What may be best for a firm's managers may not be in the best interests of its shareholders. Managers may desire to maximize their own wealth, which leads to various investment distortions. Further, some managers may want to build empires, maximize their compensation, secure their career, or shirk their responsibilities. Managerial overconfidence may lead them to pass up profitable projects, to undertake unprofitable ones, or to choose an investment with a suboptimal risk level. Thus, managers may not make suitable investment decisions. Corporate governance mechanisms such as managerial compensation contracts, the structure of the board of directors, and ownership structure can play an important role in reducing or eliminating such investment distortions.

Capital Investment Choice

As previously mentioned, the finance literature emphasizes the evaluation and selection stages of the capital budgeting process. Not surprisingly, many tools, techniques, methods, and mechanisms are available for making capital investment choices. Payne, Heath, and Gale (1999, p. 16) make the following observation: "According to theory, firms should use discounted cash flow methods to analyze capital budgeting alternatives. Within this theoretical frame, however, firms might evaluate somewhat similar projects differently." Survey research such as Graham and Harvey (2001) suggests that firms, especially large, listed firms, tend to evaluate projects using discounted cash flow (DCF) tools as the primary criterion and to compute weighted average cost of capital in the manner suggested by theory. Research also shows that the gap between traditional theory and capital budgeting practices has narrowed substantially. Managers are also placing increasing emphasis on the risk characteristics of projects. According to Stulz (1999, p. 8), "The reason why corporations do not enter gambles with volatile payoffs and small positive expected returns is that managers know that generally volatility matters."

When using DCF techniques, a major challenge of capital budgeting is correctly estimating the appropriate rate to use when discounting a project's cash flows. Although managers have a variety of sophisticated techniques at their disposal to estimate a firm's or project's cost of capital, each method involves potential complications. Although the capital asset pricing model (CAPM) and its competitor,

the arbitrage pricing theory (APT), have come to dominate the asset pricing literature, much debate remains about the validity of either model to estimate the cost of equity capital and determining the appropriate inputs for each. Estimating the cost of capital in an international context creates additional complexities. No agreement exists between academics and practitioners on the best approach to pursue.

Despite the abundance of capital budgeting techniques available, many scholars question the adequacy of DCF analysis in helping practitioners make decisions in a realistic business environment. Some, such as Myers (1977), who coined the term *real options*, suggest augmenting DCF analysis with real options analysis. For example, Trigeorgis (1988, 1993) and Van Putten and MacMillan (2004), among others, point out that traditional DCF methods may fail to consider the flexibility to revise decisions after a project begins. That is, the traditional DCF approach does not capture the realistic valuation of an investment because it does not explicitly account for the value of real options inherent in capital budgeting. Consequently, DCF techniques often fail to provide sound valuation when the business environment is uncertain and forgo the value created by flexibility in management decisions. According to Stout, Xie, and Qi (2008), managers should use real options when making long-term investment decisions because such utilization can help optimize the capital budgeting process.

Survey evidence suggests that most companies have been slow to adopt real options (Graham and Harvey, 2001; Ryan and Ryan, 2002; Brounen, de Jong, and Koedijk, 2004). Based on their survey evidence, Baker, Dutta, and Saadi (2011) find a lack of expertise and knowledge is the primary reason preventing managers from using real options. Their evidence suggests that contrary to optimistic predictions, the use of real options appears disproportionate to their potential as a capital budgeting tool.

Purpose of the Book

The purpose of this book is to examine selected topics in capital budgeting in a clear and straightforward manner. Given the sheer volume of work written about capital budgeting, the book cannot cover every possible topic. However, it does provide a synthesis of the current state of capital budgeting. The coverage extends from discussing basic concepts, principles, and techniques to their application to increasingly complex and real-world situations. Throughout, the book emphasizes how financially sound capital budgeting facilitates the process of value creation.

Numerous books focus solely on capital budgeting. Additionally, corporate finance textbooks universally provide material on capital budgeting. Yet, few offer the scope of coverage and breadth of viewpoints contained in this volume. The book differs from its competition in several major ways. Perhaps the main feature distinguishing this book from others is its synthesis and discussion of empirical results from hundreds of studies. Although a single book cannot provide a detailed discussion of every paper written on capital budgeting, this book highlights what is known to date about important topics. An old adage is that there is nothing quite as practical as a good theory, that is, one that works in practice as well as on paper. The book takes a practical approach to capital budgeting by discussing why various theories make sense, the empirical support for them, and how firms use these theories to solve problems and to create wealth. The book also reports the

results of numerous capital budgeting surveys that reveal the link between theory and practice.

Features of the Book

The book has four other distinguishing features.

1. It contains contributions from more than 30 different authors. Thus, the breadth of contributors assures a wide variety of viewpoints and a rich interplay of ideas.
2. The book offers a strategic focus so that readers can understand how the application of various techniques and approaches relates to a firm's overall strategy. This is because investment decisions help determine the firm's strategic position many years into the future.
3. The volume provides coverage of international topics on the premise that managers should view business from a global perspective.
4. The book discusses the potential benefits of using real options. Real options analysis has become important since the 1970s as option pricing models became more sophisticated. DCF methods essentially value projects as if they were risky bonds, with the promised cash flows known. Yet, managers still have many choices of how to increase future cash inflows or to decrease future cash outflows. That is, managers get to manage the projects, not simply accept or reject them. Further, capital budgeting is a dynamic process that unfolds as the project develops revealing new information as time elapses. Managerial flexibility is at the root of the real options approach, which enables traditional capital budgeting techniques to incorporate managerial flexibility and information revelation. In short, real options analysis tries to value the choices—the option value—that the managers will have in the future and adds these values to the net present value.

Intended Audience

The intended audience for this book includes academics, practitioners, students, and others interested in capital budgeting. For example, the book should suit researchers and financial managers given its scope of coverage. Nonfinancial executives should also find this volume relevant because capital budgeting theory has broad application to general management. This volume should also be appropriate as a stand-alone or supplementary text for advanced undergraduate and graduate students as well as for management training programs in capital budgeting. It should be especially useful in helping students develop the critical analytical skills required to assess potential investments. Finally, libraries should find this work to be suitable for reference purposes.

STRUCTURE OF THE BOOK

The remaining 23 chapters of this book are organized into seven parts. A brief synopsis of each chapter follows.

Part I. Foundation and Key Concepts

Chapters 2 and 3 discuss the role that corporate strategy and corporate governance can have in investment decisions.

Chapter 2 Corporate Strategy and Investment Decisions (Daniel Ferreira)
This chapter reviews the literature on business strategy and its relation to corporate investment decisions. It provides an overview of some important concepts and briefly discusses their practical implications. A selective review of empirical evidence is used to illustrate a few key ideas. The chapter offers an introductory discussion of topics such as competitive advantage, added value, industry analysis, the industry life cycle, firm scope, firm resources, and the trade-off between commitment and adaptation. Specific applications to the issue of corporate investment include corporate diversification, strategic investments, identifying and valuing synergies, mergers and acquisitions, cash flow forecasting, and interactions between investment and financing decisions.

Chapter 3 Corporate Governance and Investment Decisions (Fodil Adjaoud, Dorra Charfi, and Lamia Chourou)
The asymmetric information between managers and external financiers, the conflicts of interest between owners and managers, and the managerial overconfidence bias may lead managers to pass up profitable projects (underinvest), to undertake unprofitable ones (overinvest), or to choose an investment with a suboptimal risk level. Theoretically, corporate governance mechanisms such as the choice of capital structure, managerial compensation contracts, structure of the board of directors, and ownership structure play an important role in reducing or eliminating such investment distortions. However, the empirical literature is inconclusive as to whether managers of well-governed firms make better investment decisions than those of poorly governed firms.

Part II. Capital Investment Choice

The section contains six chapters involving capital investment choice. Chapters 4 and 5 examine various methods of evaluating capital investments. Chapter 6 explores the topic of capital budgeting under capital rationing while Chapter 7 provides a discussion of foreign investments. Chapter 8 focuses on the final stage of the capital budgeting process—postcompletion. Chapter 9 reviews some survey evidence involving both U.S. and non-U.S. firms about their reported use of capital budgeting techniques.

Chapter 4 Measuring Investment Value: Free Cash Flow, Net Present Value, and Economic Value Added (Tom Arnold and Terry Nixon)
This chapter focuses on issues involving the calculation of net present value (NPV) and closely related variants. Although relatively easy to understand conceptually, issues concerning the calculation of cash flow, assessment of risk, and project return relative to the cost of raising funds are not as clear. Two definitions of cash flow emerge in the literature: free cash flow (FCF) and cash flow from assets (CFA). These definitions differ due to the tax savings associated with interest. Although

the numerical difference can be minimal, a clear impact exists on selecting the appropriate discount rate and assessing hurdle rates for comparison with internal rate of return (IRR). Economic value added (EVA) presents another measure of cash flow. Although EVA does not appear to produce project valuations that work well empirically, it provides a workable short-term metric for assessing management.

Chapter 5 Alternative Methods of Evaluating Capital Investments (Tom Arnold and Terry Nixon)

The primary focus of this chapter is to examine two metrics, payback period (PB) and the internal rate of return (IRR), including variations of each method. The PB is a simple metric that focuses on the time needed for short-term cash flows to recover the initial investment. Although the measure does not have any discounting element, its usage is still widespread and may potentially be the result of managers focusing on the short-term rather than on more valuable longer-term projects. Variations of PB include the discounted payback period (DPB) and the project balance method (PBL). The IRR is a rate of return metric that does not have an easy interpretation and, consequently, is often misinterpreted. The main difficulty in considering IRR is that intermediate cash flows do not typically appreciate at the IRR as the project continues through time. Related metrics are the modified internal rate of return (MIRR) and the profitability index (PI).

Chapter 6 Capital Rationing for Capital Budgeting (Alexander Brüggen)

This chapter describes the mechanism of capital rationing for capital budgeting. Capital rationing is the limitation of funds that are available for investments in an organization. With only limited funds available, different investment projects compete for capital. Managers can allocate these funds based on either a hurdle rate (every project beyond a certain threshold gets capital) or on a winner-picking method (the best ranked projects receive capital). This competition helps to control and reduce agency costs that occur due to overinvestment by managers or because managers understate their performance to lower their future performance targets. Negative side effects of capital rationing include competition that can put managers under pressure, which in turn can lead to misreporting. Research evidence on the effects of capital rationing is still mixed and depends on whether and how individuals derive a disutility from misreporting.

Chapter 7 Analyzing Foreign Investments (Wim Westerman and John Henry Hall)

Foreign investment can be very different from its domestic counterpart. Because the necessary analysis may have to be broader than for domestic investment, the financial valuation process is less straightforward, making the financial modeling of the investment generally more complex. This chapter demonstrates a phasing framework that outlines the investment process and discusses the design of a financial model. Complications in financial modeling tend to occur mainly due to asset and liability valuation differences, intracompany transfer pricing, different tax systems in different jurisdictions, incomplete transfer of results, exchange rate changes over time, political risks abroad, foreign financing conditions, and the parent versus subsidiary perspective. These problems are illustrated by applying a spreadsheet format with realistic numerical data to a specific case.

Chapter 8 Postcompletion Auditing of Capital Investments (Jari Huikku)
Postcompletion auditing (PCA) is a formal process that checks the outcomes of individual capital investment projects after the initial investment is completed and when the project is operational. The major reason for PCA and its most important perceived benefits are related to the enhancement of organizational learning. The appropriate design of a PCA system is crucial for such learning to take place. More specifically, communication-related issues such as appropriate filing and convenient access to PCA reports, improvement proposals and their systematic follow-up, and interactive forums for interpretation of results may enhance the effective conveyance of investment experiences to new investment projects. Alternative existing control mechanisms to achieve PCA benefits may discourage companies from adopting PCA or developing their PCA systems.

Chapter 9 Capital Budgeting Techniques in Practice: U.S. Survey Evidence (Tarun K. Mukherjee and Naseem M. Al Rahahleh)
Numerous surveys over the last five decades have dealt with the capital budgeting practices of large U.S. firms. This chapter reviews the survey results with respect to the four stages of the capital budgeting process. The evidence shows that capital budgeting practices for the most part conform to traditional capital budgeting theory. Firms use cash flows as cost-benefit data and estimate them in a theoretically consistent manner. They use discounted cash flow (DCF) tools as the primary criteria with which to evaluate projects and compute weighted average cost of capital based on what theory suggests. Although the gap between conventional theory and capital budgeting practices has substantially narrowed, many scholars have challenged the adequacy of DCF analysis in helping practitioners make decisions in a realistic business environment and have suggested augmenting DCF analysis with real options analysis.

Part III. Project Cash Flows and Inflation

This section consists of two chapters. Chapter 10 discusses estimating project cash flows, which is perhaps the most important stage of the capital budgeting process. Chapter 11 examines how to adjust for inflation when evaluating capital budgeting projects.

Chapter 10 Estimating Project Cash Flows (Kyle Meyer and Halil Kiymaz)
Companies evaluate investment opportunities on a recurring basis. This process has various facets such as estimating the initial investment, forecasting future cash flows, and, when using discounted cash flow (DCF) methods, selecting the appropriate discount rate. This chapter discusses issues that firms should consider when estimating project cash flows and evaluating investment opportunities. In particular, this chapter examines factors related to estimating the initial investment and future cash flows during the project's life. Relatively little research has specifically addressed the methods used by firms to estimate project cash flows. Surveys of firm managers in various industries indicate that the use of DCF methods has increased over time. Additionally, many such surveys examine how firms impound project risk into the capital budgeting process. Results indicate that most firms adjust for risk by increasing the project's discount rate or through sensitivity analysis.

Chapter 11 Capital Budgeting and Inflation (Ignacio Vélez-Pareja and Joseph Tham)
The purpose of this chapter is to discuss and show that conducting capital budgeting and investment appraisal based on financial statements with real or constant prices is potentially misleading. Under certain circumstances, the adverse effects of inflation could result in the selection of "bad" projects. The chapter also shows that modeling with nominal prices is feasible and is a relatively simple task with a spreadsheet program on a personal computer. Using a simple example, the chapter shows that using constant or real prices results in a bias because the real and constant approaches overvalue cash flows. Thus, analysts should carry out capital budgeting analysis using nominal prices.

Part IV. Risk and Investment Choice

This section of risk and investment choice contains four chapters. Chapter 12 highlights basic risk analysis techniques used in capital budgeting. Chapter 13 focuses on several techniques for assessing political/country risk. In Chapter 14, attention focuses on risk management in project finance. Chapter 15 examines simulation concepts and methods.

Chapter 12 Basic Risk Adjustment Techniques in Capital Budgeting (John H. Hall and Wim Westerman)
Firms can use various techniques to quantify the risk of capital investment projects in order to improve their evaluation process. This chapter examines basic risk analysis techniques in capital budgeting, starting with judgment and shortening the payback period. Both methods have merit and can be applied in certain circumstances. The overall principle of adjusting for a project's risk requires modifying the cash flows or the discount rate. Adjusting the cash flows based on certainty equivalents requires various assumptions, but may yield results useful in making informed decisions. The risk-adjusted discount rate can be calculated using the capital asset pricing model. Although this controversial method is problematic due to certain assumptions, it arguably gives the best results in addressing the risk of a project.

Chapter 13 Capital Budgeting with Political/Country Risk (Yacine Belghitar and Ephraim Clark)
Political risk has a long and noble history in the theory and practice of foreign direct investment. A review of the literature indicates that no general consensus exists about what constitutes political risk because of the multiplicity of the sources of risk, the complexity of their interactions, and the variety of social sciences involved. As such, several techniques or methods have been considered to assess political risk. Accounting for political risk in the capital budgeting process can be summarized in three steps: (1) identify the risk, (2) assess the risk, and (3) translate the assessment into consistent, concrete parameters compatible in theory and in practice with the discounted cash flow format of the modern capital budgeting process.

Chapter 14 Risk Management in Project Finance (Stefano Gatti and Stefano Caselli)
This chapter analyzes the characteristics of project finance transactions in terms of a nexus of contracts and risk management tools. The capital budgeting of the special-purpose vehicle (SPV) created to design, build, operate, and finance the deal requires a preliminary assessment of the parties involved in the transaction and of the content of the contracts they sign with the vehicle. This step is necessary to highlight the main differences in capital budgeting for ongoing corporate entities compared to newly created vehicles. It is also crucial because contracts are the most effective risk management tool in such deals, enabling the SPV to carry out the risk pass-through and to limit the volatility and risk of project cash flows. An additional complication in capital budgeting for project finance is that the valuation of deal sustainability requires a joint satisfaction of standard profitability criteria such as net present value or internal rate of return along with financial covenants involving cover ratios.

Chapter 15 Risk Simulation Concepts and Methods (Tom Arnold and David North)
This chapter presents Monte Carlo simulation as a means to demonstrate numerically and visually the risk within the cash flows generated by a project. By allowing cash flow inputs to follow probability distributions rather than being static, trials or iterations can be generated by randomly drawing outcomes from the probability distributions of the input variables. After many iterations/trials, a probability distribution can be created for the project cash flows. The chapter also introduces the "compact" pro forma model as another potential means for performing Monte Carlo analysis to assess project cash flows. Further, other non-pro forma–related applications of Monte Carlo analysis are discussed.

Part V. Real Options and Project Analysis

Real options analysis is one of the newest and most rapidly growing areas of capital budgeting. It focuses on including managerial discretion and the impact of the evolution of information across time in the capital budgeting process. Chapter 16 introduces the concept of a real option and provides an extended numerical example of how including real options analysis affects decision making. Chapter 17 provides a description of the most commonly examined real options and their applications in capital budgeting.

Chapter 16 Real Options Analysis: An Introduction (Tom Arnold and Bonnie Buchanan)
The primary focus of this chapter is to provide an overview of how real options analysis considers the dynamic environment within a project rather than solely using forecasted expected values for future cash flows. The value of management interaction throughout the life of the project can be missed using static net present value techniques because these methods do not fully consider actions that can be taken to increase profits or cut losses. A numerical example demonstrates the value of recognizing a real option and the value of creating more real options within the example. Having demonstrated the benefit of real options analysis, the