Capital Budgeting

This book explains the financial appraisal of capital budgeting projects. The coverage extends from the development of basic concepts, principles and techniques to the application of them in increasingly complex and real-world situations. Identification and estimation (including forecasting) of cash flows, project appraisal formulae and the application of net present value (NPV), internal rate of return (IRR) and other project evaluation criteria are illustrated with a variety of calculation examples. Risk analysis is extensively covered by the use of the risk-adjusted discount rate, the certainty equivalent, sensitivity analysis, simulation and Monte Carlo analysis.

The NPV and IRR models are further applied to forestry, property and international investments. Resource constraints are introduced in capital budgeting decisions with a variety of worked examples using the linear programming technique.

All calculations are extensively supported by Excel workbooks on the Web, and each chapter is well reviewed by end-of-chapter questions.

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Financial Appraisal of Investment Projects

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Preface

Capital budgeting is primarily concerned with how a firm makes decisions on *sizable* investments in *long-lived* projects to achieve the firm's overall goal. This is the decision area of financial management that establishes criteria for investing resources in *long-term* real assets.

Investment decisions (on *sizable long-term* projects) today will determine the firm's strategic position many years hence, and fix the future course of the firm. These investments will have a considerable impact on the firm's future cash flows and the risk associated with those cash flows. Capital budgeting decisions have a long-range impact on the firm's performance and they are critical to the firm's success or failure.

One of the most crucial and complex stages in the capital budgeting decision process is the financial or economic evaluation of the investment proposals. This 'project analysis' is the focus of this book. Project analysis usually involves the identification of relevant cash flows, their forecasting, risk analysis, and the application of project evaluation concepts, techniques and criteria to assess whether the proposed projects are likely to add value to the firm. When the project choice is subject to resource constraints, mathematical programming techniques such as linear programming are employed to select the feasible optimal combination of projects.

Motivation for the book

The writing of this book was motivated by the lack of a suitable capital budgeting textbook with the following desirable features and coverage:

- Analysis and applications based on sound conceptual and theoretical foundations with pedagogical tools appropriate for capital budgeting
- Cash flow forecasting
- Project choice under resource constraints
- Comprehensive illustrations of concepts, methods and approaches for project analysis under uncertainty (or risk), with applications to different industries
- Preparing the reader for actual project analysis in the real world which involves voluminous, tedious, complex and repetitive computations and relies heavily on computer packages.

The book bridges this gap in the market by including these features and areas of coverage.

Distinctive features and areas of coverage

Distinctive features include:

- Practical approach with applications based on sound and appropriate concepts and theory
- Concepts, techniques and applications are illustrated by worked examples, tables and charts
- Worked examples are extensively supported with live Excel workbooks easily accessible on the Web
- Use of pedagogical tools – such as Excel spreadsheet calculations accessible on the World Wide Web – to help the users of the book grasp important and difficult concepts and calculations, and make them clear, useful, attractive and sometimes fun by the use of technology (computer packages)
- Complex and difficult topics are explained intuitively with tableaux rather than in terms of algebra.

Areas of coverage include:

- Quantitative and qualitative techniques for cash flow forecasting
- Application of mathematical programming techniques such as linear programming for decision support when the project choice is subject to resource constraints
- Sensitivity and break-even analysis and simulation – with applications to various industries such as the computer, airline, forestry and property industries, each of which has its unique characteristics
- As well as the standard industrial investment examples, the exotic and environmentally sensitive area of forestry investment and the increasingly demanding area of property investment are analysed with examples and case studies. The intricacies of investment across international borders are also discussed.

All of this material is reinforced with some challenging end-of-chapter review questions. Solutions to all the calculation questions are fully worked on Excel spreadsheets and are available on the Web.

Organization of the book

This book follows a natural progression from the development of basic concepts, principles and techniques to the application of them in increasingly complex and real-world situations. Identification and estimation of cash flows are important initial steps in project analysis and are dealt with in Chapters 2 to 4. Once the cash flows have been estimated, investment proposals are subjected to project evaluation techniques. The application of these techniques involves financial mathematics (Chapter 5). Chapter 6 uses the cash flow concepts and

the formulae (from Chapters 2 and 5) to evaluate case study projects using several project evaluation criteria such as net present value (NPV), internal rate of return (IRR) and payback period, and demonstrates the versatility of the NPV criterion. This basic model is then expanded to deal with risk (or uncertainty of cash flows) through the use of the risk-adjusted discount rate and certainty equivalent methods (Chapter 7), sensitivity and break-even analyses (Chapter 8) and risk simulation methods (Chapter 9). These concepts and methods are then applied in a case study involving the evaluation of a forestry investment in Chapter 10. Resource constraints on the capital budgeting decision are considered in Chapters 11 and 12 by introducing the basics of linear programming (LP), applying the LP technique for selection of the optimal project portfolios and presenting extensions to the LP technique which make the approach more versatile. A number of special topics in capital budgeting are covered towards the end of the book. They include forestry investment analysis (Chapter 13), property investment analysis (Chapters 14 and 15) and evaluation of international investments (Chapter 16).

Joint authorship

The positive side of joint authorship has been the rich interplay of ideas and lively debate on both conceptual and applied matters. The book has certainly benefited from this spirited interplay of ideas. Keeping five academics working, and working towards a common goal, an integrated exposition, has been a challenging management task. We have all benefited from the discipline of a common goal and pressing deadlines.

Intended audience

We have endeavoured in this text to make the capital budgeting concepts, theory, techniques and applications accessible to the interested reader, and trust that the reader will garner a better understanding of this important topic from our treatment. This book should suit both advanced undergraduate and postgraduate students, investment practitioners, financial modellers and practising managers. Although the book relies on material that is covered in corporate finance, economics, accounting and statistics courses, it is self-contained in that prior knowledge of those areas, while useful, is not essential.

Teaching and learning aids

Excel workbooks referred to in the text are accessible on the Web (at http://publishing.cambridge.org/resources/052181782x/). They provide details relating to calculations and the student can use the examples provided to practise various computations. Estimating regression equations, performing sensitivity and break-even analyses, conducting simulation experiments and solving linear programming problems are all done using Excel and they are all provided on the Web for the readers of this book to experiment with.

An *Instructor's Manual* includes answers to end-of-chapter review questions.

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A final word

We have significant combined research, teaching and industry experience behind us, and trust that this understanding of the learning process shines through in the text. Corporate financial management is not a process to be lightly embarked upon, but we hope your journey can be made more rewarding by the way in which this book has been presented.