FINANCIAL MANAGEMENT

A Modelling Approach Using Spreadsheets

George P. Diacogiannis

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Financial Management

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To Ruth
Pantoleon Markos and
my parents

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Preface

Before the advent of the microcomputer and the 'spreadsheet', skilled programmers were employed to provide the vital information that management required. Also, firms had to use up their scarce financial resources in acquiring the expensive mainframe computers.

The development of powerful and low-cost microcomputers has caused a revolution in the application of financial management techniques. With the advent of financial spreadsheet software, it is possible for managers to analyse financial management problems without extensive training in programming and without the need to rely on scarce computer personnel. The marriage of financial management with a spreadsheet provides a powerful tool which can be utilized to quantify, model, understand and interpret the results and to use them when making a decision.

Objectives and features of this book

This book is intended for people wanting to learn the essential approaches and concepts of modern financial management and the basic techniques of financial modelling with a spreadsheet. *Financial Management: A Modelling Approach Using Spreadsheets* pays considerable attention to the analysis of financial management problems and illustrates how to utilize the powerful features of a spreadsheet in order to enhance the benefits from such an analysis.

The unusual feature of the book is that it contains the following two units each of which could on its own stand as a book:

1 Approaches and concepts of financial management. Examples of financial management problems solved using Lotus 1-2-3.
2 A series of statistical approaches and concepts used in financial management.

The Contents illustrate the broad range of concepts and applications in this book. It is used extensively to show the potential of Lotus 1-2-3, including display facilities, sensitivity analysis, graphical representations (two-dimension and three-dimension—the latter performed with the aid of the Lotus add-on 3-D Graphics), statistical procedures, using 1-2-3 for risk analysis (for example, simulation analysis), use of various spreadsheet functions, database facilities and macros.

The book also presents and discusses various forecasting tools for financial analysis, mathematical proofs of financial models and the basic concepts of linear programming (mathematical proofs and a solution of the linear program model are included in the appendices).

Additionally, the book includes various figures which are used to summarize

financial management concepts. Each of these figures is comprised of three parts: definition, calculation and interpretation. Also, summary figures of empirical results are presented in most of the 19 chapters. With the exception of Chapter 1, the chapters contain a complete set of questions related to the most important issues and methods in that chapter. Finally, when possible, real data is used.

Who can use this book?

This book is written to satisfy the needs of two particular groups of people:

- Finance and management undergraduate and postgraduate students who wish to learn the basic tools of financial analysis and techniques of financial modelling.
- Business executives who want to learn new skills, or refresh their skills, about the relevant methods of financial management and analyse problems by building and interpreting spreadsheet models.

What spreadsheet?

The solutions of the financial management problems are provided by using Lotus 1-2-3 (the models in this book can be used with both releases 2.1 and 2.2). These solutions can be easily adopted for other spreadsheets (for example, Excel, Quatro, etc.). Appendix A, at the end of the book, presents and compares the main features of four popular spreadsheets: Lotus 1-2-3, Excel, Supercalc 5 and Quatro. The book does assume a prior knowledge of Lotus 1-2-3, but you do not have to be an expert in the program. In each case, an explanation will show you how to create each spreadsheet.

How to use this book?

This book helps you to learn relevant concepts of modern financial management. Each concept is presented in a straightforward manner and it is illustrated by an example solved using Lotus 1-2-3. It will be very beneficial if you follow the steps below:

- Read a chosen concept thoroughly.
- Try to work through the solution of the example associated with the chosen concept and compare it with the one given in the book.
- Try to examine the impact of the various assumptions on the solution of your problem.

By using the various examples, you may find new financial applications for Lotus 1-2-3 (or another spreadsheet) and ways to speed quickly through the utilization of real-life complex spreadsheet financial applications.

Organization of this book

This book is organized into 19 chapters, and 5 general appendices. Most of the chapters have the following structure:

- A brief introduction

- Basic concepts, definitions and examples
- Discussion, examples and problems related to various approaches and concepts
- Empirical results
- Summary
- Questions for discussion
- References
- Appendix/appendices.

The general appendices are:

- A history of spreadsheets and general comparisons between four popular spreadsheets
- UK–USA equivalent terms
- Glossary
- Financial and statistical tables
- Statistical references.

Conventions used in this book

1 The first letter of each word in a spreadsheet command is capitalized (for example, `/Data Table 1`).
2 The names of spreadsheet functions always appear in capital letters (for example, `@SUM`).
3 Usually the contents of cells are displayed formatted.
4 Names of standard keyboard keys are enclosed in ⟨ ⟩, for example the Enter/return key is represented by ⟨Enter⟩.

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1 Introduction: models and financial management

A model is a simplified representation of a real object or situation that facilitates the understanding and manipulation of the real thing. Models can be classified into three categories.

1 An iconic model is a physical replica of the real thing; a scale model for a shopping centre or an airport, or an aircraft simulator are examples of iconic models.
2 An analog model is a physical representation of objects or situations but it does not look like the real thing; for example, maps, a diagram showing the relationship between the financing decisions and objectives of a firm, profitability charts, and so on are analog models.
3 A mathematical model is a set of symbols and mathematical relationships that represent a real situation; for example, break-even analysis, maximizing the earnings per share of a firm, optimizing the use of financial resources, and so on can all be represented as mathematical models.

Financial management uses analog and mathematical models.

Analog models and financial management

Analog models such as graphs and charts can be used to:

1 Summarize large amounts of information. In many cases a graph can be used to illustrate numerical data from a large table of data or a data base. For example, a line graph can illustrate the daily changes of a share price over a period of two years, a bar graph can present the earnings per share of 100 firms, and so on. Likewise, a chart can be used to provide a visual image of information from a lengthy report. For example, a chart can illustrate the finance function within a firm or the capital budgeting process of a firm, and so on.
2 Enhance the understanding of complex situations. Building and studying a chart or a graph from a complex situation provides us with further understanding of the situation. For example, the environment of financial decision making is extremely complex (it contains taxes, regulations, financial institutions and highly competitive financial markets); a chart illustrating how the financial system fits together facilitates our understanding of the situation.
3 Make comparisons among financial items. A graph can be used to compare numerical financial data over time, or to facilitate comparisons among numerical financial items. For example, a graph can be used to illustrate the changes of profit after tax over time, or to compare the 1990 profit after tax and sales among the branches of an electrical firm, and so on.

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