Modelling the Survival of Financial and Industrial Enterprises

Advantages, Challenges and Problems with the Internal Ratings-Based (IRB) Method

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Preface

Mathematical models offer opportunities for better management of our company, particularly in the domain of risk control. But they also pose questions that are of interest to us all: How should they be developed, tested and implemented? How their deliverables should be validated in terms of accuracy and usefulness? Are the results they provide useful over a longer period of time or their dependability changes?

These queries are not of an academic nature. They are practical and an answer to them is both important and urgent. Models are an indispensable part of modern finance, which has become so technical that at least theoretically only a small number of specialists are able to master its mathematics. Practically, however, basic ideas about the development and use of models can be understood by everyone. This is the purpose the present book puts to itself.

This book is written for non-mathematicians, commercial bankers, treasurers, investment officers, stock brokers, fund managers, portfolio managers, financial analysts, auditors, actuaries and risk controllers. It requires no deep mathematical background because its goal is not to teach how to write algorithms but to help the reader understand and appreciate what is behind the mathematical model and its usage: What are the opportunities, challenges and pitfalls?

This understanding is at a level above the model's mathematics, and it has its own prerequisites. Foremost is to explain models without complex equations, in a form that people without a degree in science can comprehend. This is what I have tried to do in this book. The reader must judge whether this effort of explaining without cluttering the text with detailed complex equations, algorithms and probability theory has indeed been successful.

There are two reasons for abstaining from complex formulae. One is the readership to which this text addresses itself. This involves business people in finance, banking, treasury operations and other industrial sectors. Till recently business education has not included much mathematical analysis apart from some elementary statistics. This is currently changing.

A second basic reason for keeping complex algorithms out of the confines of this text is that the intention has been to present my experience in the *methodology* of financial analysis rather than the details of its tools. The tools are, of course, most important, but sometimes they are like the trees hiding the forest. Vital in this text is the thesis and the antithesis concerning financial models and their usage.

* * *

The book is divided into five parts and thirteen chapters. Chapter 1 offers a perspective in science and philosophy, by way of discussing why philosophy and science have a common origin, what underpins science and how the scientific method can contribute to the solution of real-life business problems. Based on this background Chapter 2 focuses on the work the analyst is expected to perform, and on whether this work worth the cost and the effort.

The theme of Chapter 3 is what models can and cannot really contribute to modern business; a similar query is posed and answered in connection to experimentation done through models through the implementation of the scientific method. This sets the stage for practical applications presented in Chapter 4, whose central theme is the assessment of creditworthiness: past, present and future.

The assessment of the counterparty's creditworthiness is a challenge as old as banking. The tools, however, are evolving. The latest is the Internal Rating-Based (IRB) method of the New Capital Adequacy Framework of the Basle Committee on Banking Supervision. The position taken by the American Bankers' Association (ABA) in regard to IRB is that:

- every bank should be encouraged to develop its own model; and
- it should definitely test to see if its model works well in real life applications.

But ABA also thinks that smaller and medium-sized banks may find difficulties in adopting IRB, and many might choose the so-called standard method, which is less sophisticated and eventually more onerous in terms of capital requirements. For this reason the introductory text on IRB in Chapter 4 is expanded in Chapter 5. This is done in two ways: through practical examples and by means of showing the vast domain where IRB may be applicable. Credit derivatives have been chosen as a reference.

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Chapter 6 introduces to the reader the basics of actuarial science. The background reason is to impress upon the reader the importance of appreciating the cost of money. I see discounted cash flow as one of the basic tools in connection to IRB. The modelling of cash flow systems is a good exercise, and is also relevant to all financial issues confronting business and industry.

Since it has been a deliberate choice to limit to a bare minimum the mathematical formulae included in this book, emphasis has been placed on scenarios. Chapter 7 looks into scenario analysis and its contribution, taking as an example practical applications with the Delphi Method.

Chapter 8 elaborates on the use of scenarios in forecasting, and it explains why the use of undocumented hypotheses is behind many model failures. Chapter 9 underlines the fact that even the best model will be powerless without reliable financial reporting. If the data that we use is not reliable it would hardly worth our time to look at the output of the model or the scenario.

Since Chapters 4 and 5 have centred on credit risk, Chapters 10 and 11 look into models for market risk. Chapter 10 covers value-at-risk (VAR) and the Monte Carlo Method. Chapter 11 concentrates on limits and brings the reader's attention to the fact that the substitution of limits by VAR (as some banks are recently doing) is a very bad practice.

The subject of the last two chapters is model risk and its management. Chapter 12 explains why errors are made in prognostication, and it suggests ways and means for correcting these errors. Chapter 13 looks at model risk as being part of operational risk. It then presents to the reader a policy centred on internal control and on auditing, which can help to reduce operational risk.

A fundamental understanding of what models are and are not, as well as what they might contribute to the modern enterprise, is essential to all executives and professionals. Today computers, communications and an increasingly more sophisticated software, are the pillars on which rests a great deal of our company's profitability. In the years to come model-illiteracy will be synonymous with lack of professional skills, and therefore will be interpreted as a personal weakness. Yet, as this book demonstrates, it does not take much to become model-literate.

I am indebted to many knowledgeable people, and organisations, for their contribution to the research that made this book feasible – also to several senior executives and experts for constructive criticism during the preparation of the manuscript.

Let me take this opportunity to thank Stephen Rutt, Zelah Pengilley and Caitlin Cornish, for suggesting this project and seeing it all the way

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Valmer and Vitznau DIMITRIS N. CHORAFAS
3 April 2002

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Part One

Understanding the Contribution of Science and of Models

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