

# Contents

<i>List of Figures</i>	xii
<i>List of Tables</i>	xiv
<i>Preface</i>	xv
<b>PART ONE THE PRACTICE OF FINANCIAL MODELING</b>	<b>1</b>
<b>1 The Leading Edge of Financial Analysis</b>	<b>3</b>
Introduction	3
The Effort to Simplify a World of Complexity	4
The New Wave of Financial Accountability	5
Overcoming the Problem of Innumeracy	7
Basic Concepts Underpinning Accounting Procedures	9
The Contribution of Luca Paciolo	10
Posting, Accumulation and Communication of Financial Data	13
How the Financial Accounting Standards Board Looks at Accounting Practice	15
Principles Underpinning Management Accounting	17
Management Accounting and Financial Standards	18
<b>2 Introducing Modeling Concepts in Finance and Accounting</b>	<b>22</b>
Introduction	22
Bridging the Gap Between Finance and Mathematics	23
The Need for Interdisciplinary Approaches	25
The Mission of Developing and Providing Financial Information	27
Basic Notions Behind Financial Modeling	29
Financial Analysis and Knowledge Engineering	31
Capitalizing on Interactive Computational Finance	32
Concepts Underpinning Modern Approaches	35
The Flexibility Required for Financial Modeling	37
The Role Played by Fuzzy Engineering	39
Cross-fertilization Provided by Rocket Scientists	41
<b>3 Defining the Modeling Domain</b>	<b>43</b>
Introduction	43
Can we Define the Domain we are Modeling?	44

Developing Optimistic and Pessimistic Scenarios	46
Accounting for Valuation Errors	48
Behavioral Aspects of Investors and Lenders	50
Are the Best Models of a General or a Specific Nature?	51
Domain Modeling, Macroeconomics and Microeconomics	54
Accounting or Non-accounting for Inflation?	56
Pitfalls with Economic Replacement Costs	57
The Challenge Confronting Financial Analysis	59
<b>4 Organizational Prerequisites for Financial Models</b>	<b>62</b>
Introduction	62
Practical Objectives with Financial Models	63
Organizational Advantages of Having a Financial Model	65
The Need for Interactive Model Handling	67
Objectives to be Reached Through Concurrent Banking	69
Providing the Appropriate Testing Procedures	72
Establishing an Acceptable Error Level in Management Accounting	73
Ensuring Accuracy and Quality of Inputs	76
The Concepts of Data Smoothing and Data Filtering	79
How Can we Filter the Information we Receive?	81
Using the Input for Internal and External Evaluation	84
<b>PART TWO MODELS FOR BUDGETING AND BUDGETARY CONTROL</b>	
<b>5 Financial Planning and Budgeting Procedures</b>	<b>89</b>
Introduction	89
The Budget as a Planning Model	90
The Integration of Financial Information and its Analysis	92
Interest Budget and Noninterest Budget	94
Detailed Procedures for the Elaboration of Budgets	95
A Short-term Budget for Sales and Production	98
Cash Forecasts and Cash Outlays	100
The Master Budget and Financial Responsibility	102
Financial Aftermaths of Budgetary Processes	103
Flexible and Multiple Budgets	106
The General Electric Experience in Setting a Budget	107
<b>6 Developing and Using a Budget Analyzer</b>	<b>110</b>
Introduction	110
Quantification is a Form of Protection	110

Improvements Through the Introduction of Knowledge Engineering	112
The Use of Graphs in Financial Analysis and Accounting	114
Prerequisites for the Use of a Budgetary Model	117
The Budget Expressed in Algorithmic Form	119
Benefits From a Parametric Design	121
Accounting for Labor and Material Costs	123
The Concept and Practice of Breakeven	126
Paying Attention to Direct Labor and Direct Material	128
<b>7 Building Models to Control Costs</b>	<b>132</b>
Introduction	132
Cost Control as Management Strategy	133
The Principle of the Lean Organization	135
Controlling Direct and Indirect Costs	137
Overhead Expenses and Bureaucracy	139
The Process of Establishing Standard Costs	142
What is Meant by Prospective Cost Standards?	143
Profit Centers and the Concept of Actual Costing	145
Methods of Accounting for Deferred Costs	148
Current Assets, Short- and Long-term Costs	149
<b>8 Methods and Procedures for Better Control over Costs and Budgets</b>	<b>152</b>
Introduction	152
Qualitative and Quantitative Management Reports	153
Using Breakeven Analysis in the Financial Industry	155
The Impact of the Bank's Deposit Mix	158
Are Some Assumptions Made by the Financial Industry Really Sound?	160
How to Develop Cost Accounting Models	162
The Importance of Getting Acceptance	165
Improving and Refining the Cost System	166
The Nature of the Modeling Effort	168
Sizing up the Job Which Needs to be Done	169
Ways and Means for Budgetary Enforcement	171
<b>PART THREE MODELING BALANCE SHEET AND OFF-BALANCE SHEET OPERATIONS</b>	
<b>9 Models for Balance Sheet Reporting</b>	<b>177</b>
Introduction	177

Information Technology and the General Ledger	178
Balance Sheet Impact of Organization and Technology	181
Analyzing the Income and Expense Statement	182
'What-if' Experimentation with the Balance Sheet	184
Role and Functions of a Descriptive Model and of an Optimizer	187
Models, Balance Sheets and Exception Reporting	189
Multidimensional Analysis and the Acid Test	192
Managerial Responsibilities and the Balance Sheet	194
An Exercise in Financial Engineering	198
<b>10 New Financial Instruments and Off-Balance Sheet Transactions</b>	<b>202</b>
Introduction	202
Using Derivative Financial Instruments	203
Credit Risk and Market Risk	206
Notional Principal Amount	209
The Concept of Fair Value	210
What is Meant by Options?	213
Futures Contracts and Forwards	215
Swaps Agreements and Spreads	216
The Role of Prediction in Financial Analysis	218
Models, Volatility and Hedging	220
Marking-to-market and Marking-to-model for Option Pricing?	221
<b>11 Cash Flow and its Management</b>	<b>224</b>
Introduction	224
Defining the Meaning of Cash Flow	225
Looking at Cash Flow as a Critical Resource	227
Focusing on Cash Flows and Other Assets	229
Developing Effective Means for Cash Management	231
Net Present Value, Net Worth and Heuristics	232
Prerequisites for a Dynamic Financial Analysis	235
Research Focused on Cash-flow Problems	239
The Focal Point of Analytical Exercises	242
Implementation of Non-traditional Financial Research	244
<b>12 Ways and Means for Judging Profitability</b>	<b>247</b>
Introduction	247
Judging Profitability Through the Customer Mirror	248

Enhancing Relationship Management by Means of Customer Profiling	250
The Classification and Use of Database Elements	252
Overcoming the Deficiencies Embedded in Legacy Systems	256
Accounting for Profit Centers and Cost Centers	258
Paying Attention to the Development of Profitability Models	261
Refining the Costing Structure	264
The Marginal Cost of Funds	266
Cost of Funds and Corporate Reporting Practices	268
The Old and New Frameworks for Management Reporting	270

**PART FOUR THE BOARD WANTS ANSWERS WHICH  
ARE NORMALIZED AND COMPREHENSIBLE**

<b>13 How to Monitor Performance Through Critical Financial Ratios</b>	<b>275</b>
Introduction	275
The Role Given to Ratio Analysis	276
Ratios as a Mirror of Financial Performance	277
The Most Revealing Financial Ratios	279
Evaluating Sales and Inventories Through Ratios	281
Milestones in a Financial Analysis for Investment Reasons	284
The Contribution of Financial Analysis in Discovering Anomalies in the Market	285
An Integrative Approach to Investment Criteria	287
Ratio Analysis in the Banking Industry	291
Appreciating the More Classical Metrics	295
Can we Estimate Yield to Breakeven?	297
<b>14 The Creative Use of Algorithmic Solutions</b>	<b>299</b>
Introduction	299
Benefits Derived from Simple Algorithms: An Example With Interest Income	300
Algorithms for Personal Loans and for Yield Calculation	303
Evaluating the Returns from Bond Issues	304
A Methodology for Sophisticated Investors	306
Algorithms and Heuristics for Loans and Investments	308
Earnings per Share and Payout	310
Taking into Account the Event Risk	313
Warrants and Bills of Exchange	315

Exchange Rates and Swaps	318
The Use of Indexed Futures	319
<b>15 The Role of Visualization with Analytical Approaches and Quantitative Methods</b>	<b>322</b>
Introduction	322
Going beyond the Contribution of Ratios	323
Charts, Statistics and Management	325
Improving Visualization through Interactive Graphics	328
Human Windows: From Graphical Presentation to Virtual Reality	331
Organization and Methodology to Support Interactive Applications	333
Developing Increasingly Competitive Management Tools	335
Capitalizing on the Polyvalence of Financial Models	339
Implementing Sensitivity Analysis and Worst-Case Scenarios	341
Ensuring That Sensitivity Analysis Becomes Part of the Culture	343
A Policy Decision That All Results are Comprehensible	344
<i>Acknowledgments</i>	348
<i>Bibliography</i>	352
<i>Index</i>	353

# List of Figures

1.1	A common ground in DP, DSS and AI	8
1.2	Delivery versus payment means that we do the operation simultaneously on four books which are databased	12
1.3	Normalized accounting procedures may be used not only with money but also with goods, such as the Bill of Materials (BOM)	14
1.4	A common distributed database serves both general accounting and management accounting	19
2.1	Pareto's law suggests that a small part of variable <i>A</i> controls a big part of variable <i>B</i>	25
2.2	A systems methodology is not necessarily straightforward, as it includes loopbacks	27
2.3	Applications domains of artificial intelligence in finance	34
2.4	Data processing is not answering top management's requirements, knowledge engineering should do better	38
2.5	A typical budgetary problem presented in a fuzzy engineering graph	40
3.1	Knowledge-based systems and the enhancement of basic technologies	46
3.2	Domain modeling goes beyond the mathematical frame and involves several important behavioral issues	48
3.3	Investment decisions are usually situated within the framework of an all-embracing system	53
3.4	The internal accounting management information system and its components	60
4.1	Forecasting the financial performance of the company	65
4.2	General ledger reporting in a flexible, interactive manner	69
4.3	An integrative approach to financial modeling	71
4.4	A graph analysis system using knowledge engineering	74
4.5	Basic steps in market data filtering	78
4.6	Block diagram of an expert system for filtering purposes	82
5.1	Profit and loss analysis in function of budgetary allocations	91
5.2	A frame of reference is very helpful both for financial planning and for control	93
5.3	The elaboration of budgets and analytical studies have many issues in common	97
5.4	Conceptual view of how to derive added value from data	104
6.1	Graphical presentation of a balance sheet	115

6.2	A disciplined financial planning process	118
6.3	Fixed, variable and semi-variable costs in a breakeven chart	126
6.4	Production needed to breakeven: production level <i>A</i> is less than <i>B</i> because fixed costs are lower	129
6.5	A chart for sales expenses needed with breakeven studies	130
7.1	A cost allocation scheme from origin to destination	136
7.2	All personnel expenditures must be watched very carefully, with metrics able to calculate efficiency and labor content	139
7.3	The need to cut the fat in overhead can be facilitated by proper analysis	147
8.1	Performance measurements can be effective only when there is a formal system of control	154
8.2	A strategy to control information technology expenses	156
8.3	Developing the overall financial plan	159
8.4	Design approach to the information system goals and priorities	163
9.1	Reporting structure in a layered organization pyramid	178
9.2	The general ledger is the storehouse of the company's accounting information elements	179
9.3	'What-if' experimentation requires online access to databases and artifacts which simulate or optimize business conditions	186
9.4	The balance sheet of a manufacturing firm	190
9.5	A bank's balance sheet	191
9.6	A step-by-step approach to evaluation of financial data, judgment and action	192
9.7	XYZ: balance sheet	196
9.8	XYZ: profit and loss statement	196
9.9	A profit and loss planning and evaluation model	197
9.10	Assignment of accounts	200
10.1	Risk calculation is a steady business to be done 24 hours per day, targetting the longer term	205
10.2	A solution space for successful operations with off-balance sheet instruments	208
10.3	The reporting of financial exposure by commercial and investment banks can be made along a 3-dimensional frame of reference	211
11.1	Estimating the operating costs and cash flow balances	234
11.2	A bank's income and expense statement	235
11.3	A critical analysis of income statements	236
11.4	Expert systems interfacing to a decision support infrastructure	237



11.5	Statement of profit and loss: first quarter of an operation year based on analytics	238
11.6	Model of financial and market performance	241
11.7	From original goals to necessary infrastructure	244
12.1	Reconciliation of float and reserves required versus available	248
12.2	Fifteen years ago the use of XTRACT was a solution, today it is an aberration	253
12.3	A layered structure and expert systems for online handling of heterogeneous protocols	254
12.4	Format for profit center reporting	260
12.5	Charges for account handling	263
12.6	Developing an overall business concept and detecting trends	271
13.1	Follow-up on critical ratios characterizing the operations of a leading bank over a five-year period	278
14.1	Developing a menu-base enduser interface	302
14.2	A radar chart for loan evaluation	309
14.3	A trend line helps to identify a situation getting out of control	314
15.1	Danger signals in March 1994 by the CIBCR early indicator on inflation	326
15.2	Operating margin of computer and business equipment firms over a thirty-year timeframe	328
15.3	The Adelaide Steamship Company: straight and parabolic trend lines	329
15.4	A 3-D presentation of analysis for Nav-Atlas Navigation Systems	333
15.5	Critical management ratios for comparative reasons	336
15.6	Analysis of income statement	338
15.7	A radar chart can help in the effective visualization of key decision factors and their variation	339
15.8	The grading of bonds is by its nature fuzzy, but possibility theory permits us to limit the area of variation	345

# List of Tables

6.1	Variance analysis for budgetary control	113
6.2	Developing the production budget	120
9.1	XYZ: critical ratings in evaluating performance	196
10.1	Ten crucial differences characterizing futures and forward contracts	215
10.2	Key factors entering an options pricing model	223
13.1	Metrics from America's big financial institutions in 1984 and 1988	288
13.2	Key ratios for a sample of American banks	292
14.1	Compound interest over fifteen years	301
15.1	Two years of operations: computer company ABC	327