

## TABLE OF CONTENTS

Preface . . . . .	v
Symbolic dictionary . . . . .	XVII

### PART I

1. FREDERICK S. HILLIER, A basic approach to the evaluation of risky interrelated investments . . . . .	3
1.1. Introduction . . . . .	3
1.2. A model for considering interrelationships. . . . .	7
1.3. A model for considering risk . . . . .	16
1.4. Finding the best combination of investments. . . . .	27
1.5. Computational experience . . . . .	30
1.6. Conclusions. . . . .	43
2. BERTIL NÄSLUND, A model of capital budgeting under risk . . . . .	48
2.1. The capital-budgeting decision. . . . .	49
2.2. Mathematical programming under risk . . . . .	51
2.3. Decision-making under risk . . . . .	52
2.4. Perfect capital market . . . . .	53
2.5. Discussions of the acceptance criteria . . . . .	57
2.5.1. The effect of altering the variance . . . . .	59
2.5.2. The effect of altering the risk level. . . . .	60
2.5.3. The effect of altering the interest rate . . . . .	60
2.6. Imperfect capital market . . . . .	60
2.7. Numerical solutions . . . . .	64
2.8. Summary. . . . .	70

3. R.F. BYRNE, A. CHARNES, W.W. COOPER, and K. KORTANEK, A chance-constrained approach to capital budgeting with portfolio type payback and liquidity constraints and horizon posture controls . . . . .	71
3.1. Introduction . . . . .	72
3.2. Payback and liquidity constraints . . . . .	74
3.3. Horizon postures and objectives . . . . .	80
3.3.1. Postures with a given objective . . . . .	81
3.4. Objective criteria . . . . .	83
3.5. Numerical examples, deterministic equivalents and approximations . . . . .	84
3.5.1. Restatement of the three-period model. . . . .	85
3.5.2. Deterministic equivalents for the constraints . . . . .	86
3.5.3. Approximations for the objective function . . . . .	87
3.5.4. Numerical characteristics of the example. . . . .	88
3.5.5. Numerical results . . . . .	90
4. R.F. BYRNE, A. CHARNES, W.W. COOPER, and K.O. KORTANEK, $C^2$ and $LPU^2$ combinations for treating different risks and uncertainties in capital budgets . . . . .	93
4.1. Introduction . . . . .	94
4.2. Discrete distributions of cash flows . . . . .	96
4.3. Extension to multiple projects . . . . .	101
4.4. Linear programming models under certainty. . . . .	104
4.5. The extension to uncertainty . . . . .	108
4.5.1. The assignment of discrete probabilities and their joint distributions . . . . .	116
4.5.2. Evaluation of the expected value of the absolute value in terms of discrete random variables . . . . .	117
4.5.2.1. Further simplifications: signum random variables. . . . .	118
4.5.3. Primal and dual linear programming problems . . . . .	119
4.6. Risk interpretations and equivalences of the model . . . . .	121
4.7. The integer requirements . . . . .	127
4.8. Implications . . . . .	128
Appendix A: Computation of probabilities . . . . .	129
Appendix B: Duality relations of integer programs . . . . .	135

5. H. MARTIN WEINGARTNER, Some new views on the payback period and capital budgeting decisions . . . . .	138
5.1. Payback as a criterion versus payback as a constraint . . . . .	140
5.2. Payback and liquidity . . . . .	145
5.3. Payback as a break-even concept . . . . .	147
5.4. Stability of the payback measure . . . . .	150
5.5. Payback and the resolution of uncertainty . . . . .	152
5.6. Conclusion . . . . .	156

## PART II

6. TIMOTHY W. RUEFLI, PPBS—an analytic approach . . . . .	161
6.1. Introduction . . . . .	161
6.2. Introduction to PPBS . . . . .	162
6.2.1. DoD organization . . . . .	163
6.2.2. Program budgeting . . . . .	166
6.2.3. Program budgeting motivation . . . . .	166
6.3. PPBS . . . . .	169
6.3.1. The budget process . . . . .	170
6.4. An analytic model of PPBS . . . . .	172
6.4.1. The need for analytic models . . . . .	172
6.4.2. The generalized goal decomposition model . . . . .	173
6.4.3. Solution procedure . . . . .	177
6.4.4. Evaluation . . . . .	179
6.5. Generalized goal decomposition (GGD) model analysis of PPBS . . . . .	181
6.5.1. PPBS structure . . . . .	181
6.5.2. Program structure . . . . .	183
6.5.3. Office of the secretary of defense . . . . .	189
6.5.4. Organization structure . . . . .	191
6.5.5. Organization design . . . . .	192
6.5.6. Dual structures . . . . .	194
6.5.7. Bureaucratic model . . . . .	197
6.5.8. OSD . . . . .	198
6.5.9. Implications . . . . .	199
6.6. Effects of PPBS . . . . .	205
6.6.1. Centralization vs. decentralization . . . . .	205

7. JOHN P. CRECINE, Defense budgeting: organizational adaptation to environmental constraints . . . . .	210
7.1. Introduction . . . . .	210
7.1.1. What the paper is not about . . . . .	213
7.1.2. Organization of paper. . . . .	214
7.1.3. A partial theory of public expenditures . . . . .	215
7.2. Budget totals and their importance: aggregate considerations . . . . .	218
7.2.1. Implications of the identity . . . . .	221
7.2.2. Historical perspectives on the fixing of the DoD total . . . . .	222
7.2.3. Truman-Eisenhower DoD ceilings . . . . .	224
7.2.4. McNamara blank check for defense . . . . .	225
7.2.5. A model of the process of determining budget totals . . . . .	227
7.2.6. Summary . . . . .	230
7.3. The approximate decomposability of the defense budget: aggregation issues . . . . .	231
7.3.1. On the causes of approximate decomposability . . . . .	232
7.3.2. Decomposition of the defense total . . . . .	235
7.3.3. The uniqueness of wartime. . . . .	237
7.4. PPBS, a normative model of budgeting: an aggregation process. . . . .	237
7.4.1. PPB: theory . . . . .	238
7.4.2. PPBS in practice: some reasons for the difficulties . . . . .	242
7.5. A positive model of the allocation of DoD total: a process of disaggregation . . . . .	244
7.5.1. Service submissions. . . . .	245
7.5.2. OSD budget review: October–December budget crunch . . . . .	250
7.5.2.1. Converging on appropriation line items. . . . .	251
7.5.3. A model of the budget review process . . . . .	252
7.5.4. Considerations in the planning forecast . . . . .	254
7.6. Conclusions . . . . .	256
7.6.1. Normative implications of findings . . . . .	257
7.6.2. Caveats . . . . .	258
7.6.3. Future research plans . . . . .	260
7.6.4. Conclusion . . . . .	261

8. DONALD GERWIN, Towards a theory of public budgetary decision making . . . . .	262
8.1. Basic assumptions . . . . .	263
8.1.1. Participants . . . . .	263
8.1.2. The budget . . . . .	264
8.1.3. Structure of the budgetary process . . . . .	265
8.1.4. Decision making . . . . .	266
8.2. Towards a process oriented theory . . . . .	267
8.2.1. Preliminary revenue forecasts . . . . .	267
8.2.2. Determination of the base . . . . .	269
8.2.3. Preliminary decisions on materials and personnel . . . . .	270
8.2.4. Salary increases . . . . .	281
8.2.5. New debt service . . . . .	283
8.2.6. Balancing the budget: deficits . . . . .	284
8.2.7. Balancing the budget: surpluses . . . . .	288
8.3. Summary . . . . .	289
9. OTTO A. DAVIS, M. A. H. DEMPSTER, and AARON WILDAVSKY, On the process of budgeting II: an empirical study of Congressional appropriations . . . . .	292
9.1. Introduction . . . . .	292
9.2. The behavioral models . . . . .	295
9.3. Methodology and purpose . . . . .	297
9.4. A summary of empirical results . . . . .	303
9.5. Analysis of changes in behavior . . . . .	310
9.6. Concluding observations . . . . .	320
Bibliography . . . . .	377