Computable Foundations for Economics

K. Vela Velupillai
Contents

Preface x

General introduction 1

PART I Foundations

1 The uncomputable, the nonconstructive and the undecidable in mathematical economics 27

2 Advanced computational complexity theory from an elementary standpoint 73

3 Economic dynamics and computation – recursion theoretic foundations for the Icarus tradition 127

4 Let’s take the con out of mathematical economics 152

PART II General equilibrium theory 189

5 Effectivity and constructivity in economic theory 191

6 Algorithmic foundations of computable general equilibrium theory 214

7 Uncomputability and undecidability in economic theory 228
PART III
Methodology

8 The unreasonable ineffectivity of mathematics in economics 255

9 A constructive interpretation of Sraffa's mathematical economics 285

10 The computable alternative in the formalization of economics: a counterfactual essay 309

PART IV
Simon's behavioural economics: a computable vision 331

11 Computable rationality, computation universality and adaptive behaviour 333

12 Boundedly rational choice and satisficing decisions 358

13 Arithmetic games, beavers and behavioural economics 371

Appendix 1 Artificing a rationally unbounded life 388

Appendix 2 The logic of discovery, problem solving and retrodution 395

Appendix 3 Herbert Simon's letters regarding Computable Economics 407

PART V
Inductive reflections 411

14 De-mystifying induction, falsification and other Popperian extravaganzas 413

15 Re-reading Jevons's Principles of Science - induction redux 435

16 Impossibility of effectively computable inductive policies in a complex dynamic economy 448