

# CONTENTS

1	Introduction and Motivation	1
1.1	Capital Theory: A First Characterization	1
1.2	A Theory of Allocation and Distribution over Time	3
1.3	Markets and Capital Theory	6
1.4	Neo-Austrian Capital Theory: A Theory of Time	8
1.5	Outlook and Contents of the Book	9
PART I. Finite Horizon Economies: The Pure Role of Time		
2	Basic Concepts	19
2.1	Prices, Interest Rates and Forward Markets	20
2.1.1	The Pure Role of Time	20
2.1.2	Some Conventions	23
2.1.3	Own Rates of Interest	24
2.2	Intertemporal Efficiency and the Invisible Hand	26
2.2.1	Intertemporal Production Programs	26
2.2.2	Intertemporal Efficiency	32
2.2.3	Decentralization and Efficiency	36
2.3	Intertemporal and Intra-temporal Completeness	41
3	A Neo-Austrian Approach: Basic Concepts	49
3.1	Preliminary Considerations	51
3.2	Superiority of Roundaboutness	53
3.2.1	Roundaboutness and Superiority	54
3.2.2	Innovation and Superiority of Roundaboutness	57
3.3	Positive Own Rates of Interest	65
3.3.1	Innovation and Positive Interest Rates	66
3.3.2	Time Preference and Positive Interest Rates	69
3.4	Appendix: A Non-Substitution Theorem	75

4	Neo-Austrian Concepts in a Multisector-Multiperiod Framework	79
4.1	Preliminary Considerations	80
4.2	Impatience to Consume and Own Rates of Interest	85
4.2.1	Impatience to Consume: A Simple Definition	85
4.2.2	The Koopmans-Diamond Definition	89
4.3	Superiority of Roundaboutness and Own Interest Rates	94
4.3.1	A Straight-forward Generalization	94
4.3.2	Short-run Superiority of Roundaboutness	97
4.4	Concluding Remarks	99

## PART II. Infinite Horizon Economies: Efficient Allocations and Prices

5	The Open-Endedness of the Future: Motivation, Arguments, Framework	105
5.1	Motivation	105
5.2	Arguments	107
5.2.1	The Open-Endedness of the Future	107
5.2.2	Problems of Determining the End-of-Horizon Stocks	108
5.2.3	Modeling of the Directedness of Time	109
5.3	An Infinite Horizon Framework	111
5.4	Appendix: Boundedness of Feasible Intertemporal Consumption Bundles	115
6	Steady State Economies	119
6.1	Definition and Preliminary Considerations	120
6.2	Steady State Analysis in a One-Sector Economy	124
6.2.1	The Golden Rule and Capital Accumulation	126
6.2.2	An Interest Rate Characterization of Steady States	130
6.3	The Malinvaud-Starrett Theory: A neo-Austrian Perspective	133
6.3.1	Steady State and Superiority of Roundaboutness	136
6.3.2	Price Characterization of Non-Golden Rules	141

7	Prices in an Open-ended World	145
7.1	Efficiency Prices: Preliminary Considerations	147
7.2	Infinite Horizon Price Concepts	150
7.2.1	The Linear Functional Approach	150
7.2.2	The MALINVAUD Approach	153
7.3	The Infinite Horizon Price Paradox: Reasons	156
7.4	Neo-Austrian Theory and the Open-ended Future	162
7.4.1	Non-Tightness and Reachability	163
7.4.2	Roundaboutness and Superiority	167
7.4.3	Relationship	169
8	The Open-Endedness of Time and Efficiency Prices: Sufficient and Necessary Conditions	175
8.1	A Complete Characterization of Efficiency Prices	176
8.2	Interpretation and Examples	182
8.2.1	Superiority of Roundaboutness	182
8.2.2	Impatience to Consume	185
8.3	Appendix: The Existence of MALINVAUD Prices	193
<b>PART III. Incomplete Markets: Overlapping Generations and Computable General Equilibria</b>		
9	Overlapping Generations, Superiority of Roundaboutness and Pareto-Efficiency	201
9.1	The Failure of the First Theorem of Welfare	203
9.2	An Overlapping Generations Model with Production	206
9.3	Competitive Equilibria, Present Value and the Transversality Condition	212
9.4	Competitive Equilibria, Pareto-Efficiency and Valuation Equilibria	219
9.5	Appendix: Existence of Competitive Equilibria and the Capital Value Property	222

10	Incomplete Markets: A Neo-Austrian Theory of Computable General Equilibrium Models	229
10.1	Time in Computable Equilibrium Models	231
10.2	Innovation and Production: Conventional and Neo-Austrian Approach	233
10.3	A Formalization	242
10.3.1	Production Technique	243
10.3.2	Equilibrium	246
11	Incomplete Markets and Computable Equilibria: A Numerical Illustration	253
11.1	Introductory Remarks	254
11.2	Innovation, Effluent Charges and Standards	255
11.3	Inputs into Numerical Illustrations	257
11.4	Outputs of the Numerical Illustration	259
11.5	Appendix: Equations of the Computational Model	266
11.5.1	Consumers' Decision	267
11.5.2	Producers' Decision	268
11.5.3	End-of-the-Pipe Pollution Control	270
	References	273
	Author Index	283
	Subject Index	287