

Contents

Preface to the Second Edition vii

Preface ix

List of Tables xv

List of Figures xvii

List of R Code xix

Part I Theoretical Concepts

1 Univariate Analysis of Stationary Time Series 3

1.1 Characteristics of Time Series 3

1.2 AR(p) Time Series Process 6

1.3 MA(q) Time Series Process 10

1.4 ARMA(p, q) Time Series Process 14

Summary 20

Exercises 21

2 Multivariate Analysis of Stationary Time Series 23

2.1 Overview 23

2.2 Vector Autoregressive Models 23

2.2.1 Specification, Assumptions, and Estimation 23

2.2.2 Diagnostic Tests 28

2.2.3 Causality Analysis 34

2.2.4 Forecasting 36

2.2.5 Impulse Response Functions 37

2.2.6 Forecast Error Variance Decomposition 41

2.3 Structural Vector Autoregressive Models 43

2.3.1 Specification and Assumptions 43

2.3.2	Estimation	44
2.3.3	Impulse Response Functions	47
2.3.4	Forecast Error Variance Decomposition	48
	Summary	49
	Exercises	50
3	Non-stationary Time Series	53
3.1	Trend- versus Difference-Stationary Series	53
3.2	Unit Root Processes	55
3.3	Long-Memory Processes	62
	Summary	70
	Exercises	71
4	Cointegration	73
4.1	Spurious Regression	73
4.2	Concept of Cointegration and Error-Correction Models	75
4.3	Systems of Cointegrated Variables	78
	Summary	86
	Exercises	86

Part II Unit Root Tests

5	Testing for the Order of Integration	91
5.1	Dickey-Fuller Test	91
5.2	Phillips-Perron Test	94
5.3	Elliott-Rothenberg-Stock Test	98
5.4	Schmidt-Phillips Test	100
5.5	Kwiatkowski-Phillips-Schmidt-Shin Test	103
	Summary	104
	Exercises	105
6	Further Considerations	107
6.1	Stable Autoregressive Processes with Structural Breaks	107
6.2	Seasonal Unit Roots	112
	Summary	118
	Exercises	118

Part III Cointegration

7	Single-Equation Methods	121
7.1	Engle-Granger Two-Step Procedure	121
7.2	Phillips-Ouliaris Method	123
	Summary	126
	Exercises	127

8 Multiple-Equation Methods	129
8.1 The Vector Error-Correction Model	129
8.1.1 Specification and Assumptions	129
8.1.2 Determining the Cointegration Rank	130
8.1.3 Testing for Weak Exogeneity	134
8.1.4 Testing Restrictions on β	136
8.2 VECM and Structural Shift	143
8.3 The Structural Vector Error-Correction Model	145
Summary	158
Exercises	158
9 Appendix	161
9.1 Time Series Data	161
9.2 Technicalities	162
9.3 CRAN Packages Used	163
10 Abbreviations, Nomenclature, and Symbols	165
References	169
Name Index	177
Function Index	181
Subject Index	185