Applied Econometric Techniques

Keith Cuthbertson Stephen G. Hall Mark P. Taylor



Philip Allan

Contents

In	Introduction		
1	Review of the general linear model		
	1.1	•	1
	1.2	Time series and stochastic processes	2
		Properties of stochastic processes	2
		Properties of estimators	
		The general linear model	11
		Departures from the classical assumptions	20
	1.7	Conclusion	45
		Notes	45
2	Maximum likelihood estimation		46
	2.1	The conceptual approach	46
	2.2	Non-linear optimisation procedures	58
	2.3	Special forms of likelihood functions	6
	2.4	Empirical applications using maximum likelihood	72
	2.5	Summary	82
3	Time series modelling		83
	3.1	Autoregressive time series models	83
	3.2	Moving average time series models	84
	3.3	ARMA and ARIMA process	86
	3.4	Wold's decomposition	8
	3.5	Autocovariance and autocorrelation functions	88
	3.6	The correlogram	9:
	3.7	The partial autocorrelation function	92

vi Contents

	3.8	Common factors	92	
	3.9	Model selection: the Box-Jenkins approach	93	
	3.10	Model identification	95	
		Estimation	96	
	3.12	Conclusion	97	
4	Dyna	amic modelling – the general to specific methodology	98	
	4.1	The conceptual approach	98	
	4.2	Testing the dynamic model	106	
	4.3	An application to the demand for M2 in three		
		European countries	120	
	4.4	Conclusion	127	
		Notes	128	
5	Non-	stationarity and cointegration	129	
	5.1	Stationarity	129	
	5.2	Unit roots and orders of integration	130	
	5.3	Cointegration	132	
	5.4	The Granger representation theorem	133	
	5.5	Estimating the cointegrating vector	134	
	5.6	Testing for cointegration and drawing inference	135	
	5.7	Inference on parameter values	138	
	5.8	Exogeneity and cointegration	139	
	5.9	Three-step estimation	140	
	5.10	Long-run purchasing power parity in the 1920s	141	
	5.11	A maximum likelihood approach to cointegration	143	
	5.12	Testing linear restrictions on the cointegrating		
		parameters	148	
	5.13	Example: The demand for broad money during the		
		Gold Standard	150	
	5.14	Summary	152	
		Appendix: The Johansen procedure	152	
6	Rational expectations			
	6.1 The economics of expectations models and the RE			
	_	hypothesis	157	
	6.2	The EVM and extrapolative predictors	161	
	6.3	Serially correlated errors and expectations variables	167	
	6.4	Empirical work on expectations models	172	
	6.5	Rational expectations: cross-equation restrictions	183	
	66	•	190	

		Content	s vii
7	State-space models and the Kalman filter		191
	7.1	Expectations and learning and the state-space form	192
	7.2	The econometrics of the Kalman filter	199
	7.3	Maximum likelihood and the Kalman filter	213
	7.4	Applied work using the Kalman filter	217
	7.5	Summary	222
		Notes	223
		Appendix	223
8	Using large non-linear models		226
	8.1	Model solution procedures	227
	8.2	Types of deterministic model solution	231
	8.3	Rational expectations and non-linear models	233
	8.4	The analysis of stochastic models	239
	8.5	Optimal control of non-linear models	251
	8.6	Summary	256
Re	feren	ices	257
Ind	270		