

Contents

<i>List of Figures</i>	page ix
<i>List of Tables</i>	xi
<i>Preface</i>	xiii
Part I Fundamentals of Bayesian Inference	
1 Introduction	3
1.1 Econometrics	3
1.2 Plan of the Book	4
1.3 Historical Note and Further Reading	5
2 Basic Concepts of Probability and Inference	7
2.1 Probability	7
2.1.1 Frequentist Probabilities	8
2.1.2 Subjective Probabilities	9
2.2 Prior, Likelihood, and Posterior	12
2.3 Summary	18
2.4 Further Reading and References	19
2.5 Exercises	19
3 Posterior Distributions and Inference	20
3.1 Properties of Posterior Distributions	20
3.1.1 The Likelihood Function	20
3.1.2 Vectors of Parameters	22
3.1.3 Bayesian Updating	24
3.1.4 Large Samples	25
3.1.5 Identification	28
3.2 Inference	29
3.2.1 Point Estimates	29

3.2.2	Interval Estimates	31
3.2.3	Prediction	32
3.2.4	Model Comparison	33
3.3	Summary	38
3.4	Further Reading and References	38
3.5	Exercises	39
4	Prior Distributions	41
4.1	Normal Linear Regression Model	41
4.2	Proper and Improper Priors	43
4.3	Conjugate Priors	44
4.4	Subject-Matter Considerations	47
4.5	Exchangeability	50
4.6	Hierarchical Models	52
4.7	Training Sample Priors	53
4.8	Sensitivity and Robustness	54
4.9	Conditionally Conjugate Priors	54
4.10	A Look Ahead	56
4.11	Further Reading and References	57
4.12	Exercises	58
Part II	Simulation	
5	Classical Simulation	63
5.1	Probability Integral Transformation Method	63
5.2	Method of Composition	65
5.3	Accept–Reject Algorithm	66
5.4	Importance Sampling	70
5.5	Multivariate Simulation	72
5.6	Using Simulated Output	72
5.7	Further Reading and References	74
5.8	Exercises	75
6	Basics of Markov Chains	76
6.1	Finite State Spaces	76
6.2	Countable State Spaces	81
6.3	Continuous State Spaces	85
6.4	Further Reading and References	87
6.5	Exercises	87
7	Simulation by MCMC Methods	90
7.1	Gibbs Algorithm	91

7.1.1	Basic Algorithm	91
7.1.2	Calculation of Marginal Likelihood	95
7.2	Metropolis–Hastings Algorithm	96
7.2.1	Basic Algorithm	96
7.2.2	Calculation of Marginal Likelihood	101
7.3	Numerical Standard Errors and Convergence	102
7.4	Further Reading and References	103
7.5	Exercises	105

Part III Applications

8	Linear Regression and Extensions	111
8.1	Continuous Dependent Variables	111
8.1.1	Normally Distributed Errors	111
8.1.2	Student- t Distributed Errors	114
8.2	Limited Dependent Variables	117
8.2.1	Tobit Model for Censored Data	117
8.2.2	Binary Probit Model	122
8.2.3	Binary Logit Model	126
8.3	Further Reading and References	129
8.4	Exercises	132
9	Multivariate Responses	134
9.1	SUR Model	134
9.2	Multivariate Probit Model	139
9.3	Panel Data	144
9.4	Further Reading and References	149
9.5	Exercises	151
10	Time Series	153
10.1	Autoregressive Models	153
10.2	Regime-Switching Models	158
10.3	Time-Varying Parameters	161
10.4	Time Series Properties of Models for Panel Data	165
10.5	Further Reading and References	166
10.6	Exercises	167
11	Endogenous Covariates and Sample Selection	168
11.1	Treatment Models	168
11.2	Endogenous Covariates	173
11.3	Incidental Truncation	175

11.4 Further Reading and References	179
11.5 Exercises	180
A Probability Distributions and Matrix Theorems	183
A.1 Probability Distributions	183
A.1.1 Bernoulli	183
A.1.2 Binomial	183
A.1.3 Negative Binomial	184
A.1.4 Multinomial	184
A.1.5 Poisson	184
A.1.6 Uniform	184
A.1.7 Gamma	185
A.1.8 Inverted or Inverse Gamma	185
A.1.9 Beta	186
A.1.10 Dirichlet	186
A.1.11 Normal or Gaussian	187
A.1.12 Multivariate and Matricvariate Normal or Gaussian	187
A.1.13 Truncated Normal	189
A.1.14 Univariate Student- t	189
A.1.15 Multivariate t	189
A.1.16 Wishart	190
A.1.17 Inverted or Inverse Wishart	191
A.1.18 Multiplication Rule of Probability	191
A.2 Matrix Theorems	192
B Computer Programs for MCMC Calculations	193
<i>Bibliography</i>	195
<i>Author Index</i>	201
<i>Subject Index</i>	203