

Contents

Figures	xi
Tables	xiii
Series Editors' Introduction	xv
Preface	xvii
I Introduction to DSGE Modeling and Bayesian Inference	1
1 DSGE Modeling	3
1.1 A Small-Scale New Keynesian DSGE Model	4
1.2 Other DSGE Models Considered in This Book	11
2 Turning a DSGE Model into a Bayesian Model	14
2.1 Solving a (Linearized) DSGE Model	16
2.2 The Likelihood Function	19
2.3 Priors	22
3 A Crash Course in Bayesian Inference	29
3.1 The Posterior of a Linear Gaussian Model	31
3.2 Bayesian Inference and Decision Making	35
3.3 A Non-Gaussian Posterior	43
3.4 Importance Sampling	46
3.5 Metropolis-Hastings Algorithms	52

II	Estimation of Linearized DSGE Models	63
4	Metropolis-Hastings Algorithms for DSGE Models	65
4.1	A Benchmark Algorithm	67
4.2	The RWMH-V Algorithm at Work	69
4.3	Challenges Due to Irregular Posteriors	77
4.4	Alternative MH Samplers	81
4.5	Comparing the Accuracy of MH Algorithms	87
4.6	Evaluation of the Marginal Data Density	93
5	Sequential Monte Carlo Methods	100
5.1	A Generic SMC Algorithm	101
5.2	Further Details of the SMC Algorithm	109
5.3	SMC for the Small-Scale DSGE Model	125
6	Three Applications	130
6.1	A Model with Correlated Shocks	131
6.2	The Smets-Wouters Model with a Diffuse Prior	141
6.3	The Leeper-Plante-Traum Fiscal Policy Model	150
III	Estimation of Nonlinear DSGE Models	161
7	From Linear to Nonlinear DSGE Models	163
7.1	Nonlinear DSGE Model Solutions	164
7.2	Adding Nonlinear Features to DSGE Models	167
8	Particle Filters	171
8.1	The Bootstrap Particle Filter	173
8.2	A Generic Particle Filter	182
8.3	Adapting the Generic Filter	185
8.4	Additional Implementation Issues	191
8.5	Adapting s_{t-1} Draws	198
8.6	Application to the Small-Scale DSGE Model	204
8.7	Application to the SW Model	212
8.8	Computational Considerations	216
9	Combining Particle Filters with MH Samplers	218
9.1	The PFMH Algorithm	218
9.2	Application to the Small-Scale DSGE Model	222
9.3	Application to the SW Model	224

9.4 Computational Considerations	229
10 Combining Particle Filters with SMC Samplers	231
10.1 An <i>SMC</i> ² Algorithm	231
10.2 Application to the Small-Scale DSGE Model	237
10.3 Computational Considerations	239
Appendix	241
A Model Descriptions	241
A.1 Smets-Wouters Model	241
A.2 Leeper-Plante-Traum Fiscal Policy Model	247
B Data Sources	249
B.1 Small-Scale New Keynesian DSGE Model	249
B.2 Smets-Wouters Model	249
B.3 Leeper-Plante-Traum Fiscal Policy Model	251
Bibliography	257
Index	271