SUNY at Binghamton

Econ 634 Advanced Macroeconomics

Homework 7

Thanh Pham

Dec 9th 2017

1 Model Setup

The variable X_t evolves according to an $ARMA(2,2)$ process, which is also the transition function:

$$X_t = \rho_1 X_{t-1} + \rho_2 X_{t-2} + \phi_1 \epsilon_{t-1} + \phi_2 \epsilon_{t-2} + \epsilon_t$$

$W_t = \epsilon_t$ is the shock to X_t We observed the simulated data series $\{(A_t, B_t)\}_{t=1}^{400}$ and (A_t, B_t) is related to X_t as follow:

$$A_t = exp(X_t + \nu_t^A)$$
$$B_t = \beta X_t^2 + \nu_t^B$$

ν_t^A and ν_t^B are shocks to observable variables A_t and B_t
The parameter vector Θ contains: $(\rho_1, \rho_2, \phi_1, \phi_2, \sigma_x, \sigma_A, \sigma_B)$
• Our goal is to use the particle filter to approximate the likelihood function $\rho((A_t, B_t) \mid \theta)$ for a given set of parameters θ and then incorporate that into a Metropolis-Hastings algorithm to find posterior distributions for all parameters.

2 Results

The acceptance rate is 1.5
The posterior distributions of the parameters are as follow: