HOMEWORK 7. THE PARTICLE FILTER – REPORT

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Q1. Clarification of the question

The state is $S_t = [X_t, X_{t-1}]^T$, the shock to state variables is $W_t = \epsilon_t$ and the shocks to observables are$V_t = \left[v_t^A, v_t^B\right]^T$ .The observables are $Y_t = [A_t, B_t]^T$. The parameters

$$\Theta = \left[\rho_1, \rho_2, \phi_1, \phi_2, \beta, \sigma_\epsilon^2, \sigma_1, \sigma_2\right]'$$

The transition function $S_t = g\left(S_{t-1}, W_t; \Theta\right)$ is

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

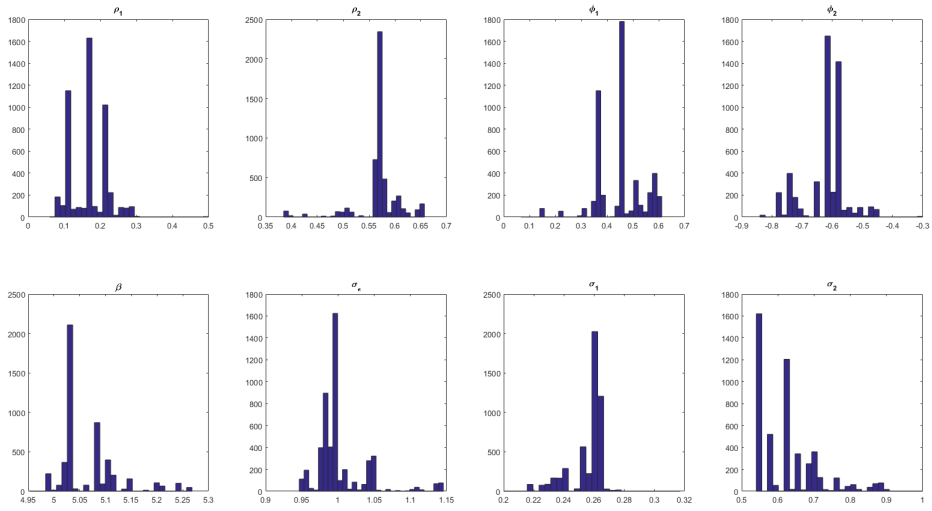
The observation function $Y_t = h\left(S_t, V_t; \Theta\right)$ is

$$\begin{bmatrix} A_t \\ B_t \end{bmatrix} = \begin{bmatrix} exp\left(X_t + v_t^A\right) \\ \beta X_t^2 + v_t^B \end{bmatrix}$$

Q2 & Q3 Results

The posterior distribution for Θ are plotted in Figure 1. My acceptance rate is around 0.84%.

Figure 1. Posterior Distribution of Θ



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