The Econometrics of DSGE models
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# Problem Set #2

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The file MY.csv contains data generated from the following state space models:

$$x_{t+1} = G_0 + G_1 x_t + \varepsilon_{t+1}, \quad \varepsilon_t \sim N(0, \Omega), \quad \Omega = \begin{pmatrix} \sigma_{x_1}^2 & 0 \\ 0 & \sigma_{x_2}^2 \end{pmatrix}$$

$$y_t = H_0 + H_1 x_t + \eta_t, \quad \eta_t \sim N(0, \Lambda), \quad \Lambda = \begin{pmatrix} \sigma_{y_1}^2 & \sigma_{y_1 y_2} \\ \sigma_{y_2 y_1} & \sigma_{y2}^2 \end{pmatrix}$$

where $G_1$ is diagonal. Let $\theta = \{G_0', diag(G_1)', \sigma_{x_1}^2, \sigma_{x_2}^2, H_0', vec(H_1)', \sigma_{y_1}^2, \sigma_{y_2}^2, \sigma_{y_1 y_2}\}$. Estimate $\theta$ under these two scenarios:

1. Flat prior on $\theta$, that is, $p(\theta) \propto 1$. For this scenario report the MLE and the asymptotic standard errors.
2. An informative prior that set the diagonal entries of $H_1$

$$p(G_0) \sim N(0, 5 \times I_2), \; p(G_{1,ii}) \sim Beta(7, 1.5) \quad i = 1, 2$$

and

$$\Lambda \sim IW(I_2, 5), \quad \Omega \sim IW(I_2, 10).$$

For each scenario report evidence that the MH algorithm has converged and report the 95% credible interval.

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The file MY.csv can be read by `Y = readcsv("MY.csv")`.