The Econometrics of DSGE models
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Problem Set #2

Due back on Friday, May 15th

A robust linear model

Consider the following linear model

$$y_t = x_t\beta + u_t,$$

where the error is assumed to have a fat tailed distribution,

$$u_t \sim iii\, T(\nu),$$

i.e., u_t are independently and identically distributed as a t-student with ν degrees of freedom. In this case the likelihood function is given

$$p(\beta, \sigma^2|y) \propto \prod_{t=1}^{T} \left\{ \Gamma\left(\frac{1}{2}\right) \Gamma\left(\frac{\nu}{2}\right) \sigma \right\}^{-1} \left[1 + \frac{(y_t - x_t\beta)^2}{\nu\sigma^2} \right]^{-(\nu+1)/2}.$$

You are asked to estimate Koop's (2003) version of Anglin and Gençay's (1996) hedonic regression of house prices in Windsor, Canada using a robust standard errors. (The data can be downloaded here.) The model links houses prices with houses characteristic: lot size (sq. feet), the number of bedrooms, the number of bathrooms, and the number of stories in the house

$$hprice_t = \beta_0 + \beta_1 lotsize_t + \beta_2 bedrooms_t + \beta_3 nbathroom_t + \beta_4 nstories_t + u_t.$$

After finding the ordinary least squares estimates of β, find the posterior distributions of β by assuming:

1. A flat improper prior on β and σ, i.e., $\beta \propto 1$ and $\sigma \propto \sigma^{-1}$
2. A proper prior on β and σ of your choice (try to motivate your choice).

You are required to use find the posterior distribution by using an acceptance/rejection sampler (in which case your target is the posterior mean) and a Metropolis Hastings algorithm.