

The New School for Social Research
Advanced Econometrics 1
Fall 2017
Christian Schoder
Jangho Yang

Assignment 3
Due Oct 9 (Mon) 6:00 pm

1. Multivariate Model: Posterior analysis
 - (a) Load the attached data file **Data_3_1**. Using a multivariate normal distribution with two random variables X and Y given the variance $\sigma_x = 2.5$, $\sigma_y = 1.2$, and the covariance $\sigma_{xy} = 0.7$, estimate two unknown means μ_x and μ_y . Use a non-informative prior on μ . 1) Plot your posterior distribution indicating the maximum posterior value of the parameters $\hat{\mu}$. 2) Plot your data with the fitted line using $\hat{\mu}$ and the given variance-covariance.
 - (b) Load **Data_3_2**. This data contains the firm-level wage per worker in Germany in 2013. Rescale the data by dividing them by 1,000. Come up with a reasonable likelihood function and estimate the unknown parameter(s). 1) Write down your model (likelihood function) and the prior distribution(s) clearly. 2) Visualize your posterior indicating the maximum posterior value. 3) Report the mean and several quantile values of the posterior distribution. In the case of the multivariate estimation, report this summary statistics only for the marginal posterior distributions. 4) Plot your data along with the fitted line using the maximum posterior value of parameters.
*Hint: When selecting a model, pay attention to the domain of data.
 - (c) Try a different model for Question 1-(b). Which model is better and why? Choose your own model selection criterion and explain the rationale behind it.