

The New School for Social Research
Advanced Econometrics 1
Fall 2017
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Assignment 2

Due Oct 2 (Mon) 6:00 pm

1. Posterior Distribution: Load the attached data file on US income.
 - (a) For the US income, let us suppose that the exponential model is the data generating process with some unknown rate parameter λ . Your task is to infer this unknown parameter using 1) any conventional methods for parameter estimations you are aware of and 2) a Bayesian method with a non-informative prior. In answering 2), write down your likelihood and prior in a clear manner, and plot your posterior distribution.
 - (b) Prove that the gamma prior is the conjugate prior for the exponential model with λ .
 - (c) Repeat 1 and estimate λ now with the conjugate prior. 1) Set up a prior that reflects your initial belief about λ . 2) Plot the posterior and the prior distribution in the same plane. 4) Check if (b) is verified in your example by fitting a Gamma model to the posterior distribution.
2. Binomial Model with Conjugate Prior: Load the second data file
 - (a) The second dataset contains the result of 10 trials of coin tossing. You have heard that the coin is fair. Your task is to figure out if the coin is indeed fair after you have observed the data based on a Bayesian method. In answering this question, express your prior in the form of the beta distribution. Write down your likelihood and prior in a clear manner, and plot your posterior distribution.