FEM21026 Bayesian Econometrics
Computer Assignment
Academic Year 2019-2020
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Instructions

This computer exercise is part of the exam Bayesian Econometrics. The rules for this assignment are given on slide 4 of week 1. It is an individual assignment. Hand in via CANVAS before the deadline:

- The answering sheet with your answers (filled-in pdf file)

- A pdf file of your code.

It is only possible to upload one pdf file at a time. Therefore, we have created two hand-in possibilities. One for the answering sheet and one for the code file.

Exercise

Consider the regression model for log of unit sales of a brand in week t

$$\log(\text{sales}_t) = \beta_0 + \beta_1 \log(\text{price})_t + \beta_2 \text{display}_t + \beta_3(\text{coupon}_t) + \varepsilon_t$$

with $\varepsilon_t \sim NID(0, \sigma^2)$, where price_t denotes the price in week t and display_t and coupon_t are 0/1 dummy variables indicating whether there is a display or coupon promotion in week t, respectively for $t = 1, \ldots, T$. The σ^2 and β_i parameters for $i = 0, 1, 2, 3$ are unknown and have to be estimated using a Bayesian approach. Take the following prior specification

$$\beta|\sigma^2 \sim N(0, \sigma^2 I_4) \text{ and } p(\sigma^2) \propto \sigma^{-2}.$$

Perform a Bayesian analysis on the log sales regression model using the data available in the files `sales.xls`, `price.xls`, `coupon.xls`, and `display.xls`, see `readme.doc` for a description of the data. The file contains sales, price, coupon and feature data of 100 different brands. Select the brand which correspond to the last 2 digits of your student number.

Code yourself (do not use a standard package) in any language your like (e.g. Matlab or R), the Gibbs sampler for this problem. Use as starting values for the Gibbs sampler the prior mean of β given σ^2 (This means that you have to sample σ^2 in the first step of the Gibbs sampler.) Answers the questions on the answering sheet available on CANVAS (pdf form which you can fill in using e.g. Acrobat reader)