Econ 226, Spring 2015

Answers to midterm exam

1a.) \( x_{t-1} = (y'_{t-1}, y'_{t-2}, \ldots, y'_{t-p}, 1)' \), \( k = np + 1 \)

b.) \( \Omega \) is \( (n \times n) \). \( \epsilon_{1t} \) is the error we would make in forecasting \( y_{1t} \) on the basis of a linear function of \( x_{t-1} \) and the (1,1) element of \( \Omega \) is the variance of this forecast error.

c.) The prior for the first element of \( b \) has variance \( \omega_{11}m_{11} \). Bigger values of \( m_{11} \) correspond to less confidence in this prior. If we had an earlier sample \( m_{11} \) would represent the (1,1) element of \( \left( \sum_{\tau=1}^{T} x_{\tau-1}'x_{\tau-1} \right)^{-1} \) for this sample.

d.) \( m_1 = (1, 0, 0, \ldots, 0)' \)

e.) Advantages: (1) if based on an earlier sample would have this form; (2) if prior is in this class, then so is the posterior; (3) if prior is in this class, then posterior is known analytically. Disadvantages: Assumes that the ratio of the variance of my priors for the first to the second elements of \( b_1 \) is proportional to the ratio of the variance for the first and second elements of \( b_2 \). This rules out for example the variances recommended by the Minnesota prior.

2a.) \( h(\theta) = p(Y|\theta)p(\theta) \)

b.)

\[
\hat{E}(\theta|Y) = \frac{\sum_{m=1}^{M} \theta^{(m)}\omega^{(m)}}{\sum_{m=1}^{M} \omega^{(m)}}
\]

\[
\omega^{(m)} = \frac{h(\theta^{(m)})}{g(\theta^{(m)})}
\]

c.) \( E(\theta|Y) = \int_{\mathbb{R}} \theta p(\theta|Y)d\theta \) exists, \( p(\theta|Y) = kp(Y|\theta)p(\theta) \), and support of \( g(\theta) \) includes \( \mathbb{R} \)

d.) No, there are no initial conditions or serial dependence of this procedure

e.) (1) Make sure get the same answer when \( M \) increases; (2) make sure get the same answer when use different \( g(.) \); (3) Try on special case where answer is known analytically.