

Adv econometrics homework 4

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1 Part a

We note that

$$E[Y_i|x_i, \theta] = E[E[Y_i|x_i]|\theta] = E[Hx_i|\theta] = HE[x_i|\theta] \quad (1)$$

$$E[x_i|y_{1:i-1}] = m_i^- \quad (2)$$

$$m_i^- = Am_{i-1} \quad (3)$$

We note that in Equation 1 $E[x_i|\theta]$ is the prediction of x_i , conditional on some parameters θ ; thus it is really equivalent to $E[x_i|y_{1:i-1}]$, the prior mean of the hidden state.

The code and estimated results are provided in the attached notebook file.

2 Part b

We see that the second hidden state variable x_2 is not driving the observation y because the array H is $H = (1, 0)$. However, x_2 is indeed driving x_1 via matrix A, and x_1 in turn drives y . We can interpret that y , the observed analyst price target, is driven by x_1 , the reported financial situation of Apple. And x_1 , the reported financial condition, is in turn driven by some hidden factor x_2 that is a combination of global macroeconomics, industry competition, etc.

3 Part c

Please see the attached notebook for the code and plot