Stacking 2 equations for joint estimation

$$\underbrace{\begin{pmatrix} r^e_{1,1} \\ \vdots \\ r^e_{T,1} \\ r^e_{1,2} \\ \vdots \\ r^e_{T,2} \end{pmatrix}}_{Y} = \underbrace{\begin{pmatrix} 1 & r^e_{1,m} & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots \\ 1 & r^e_{T,m} & 0 & 0 \\ 0 & 0 & 1 & r^e_{1,m} \\ \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & 1 & r^e_{T,m} \end{pmatrix}}_{X} \underbrace{\begin{pmatrix} \alpha_1 \\ \beta_1 \\ \alpha_2 \\ \beta_2 \end{pmatrix}}_{b} + \underbrace{\begin{pmatrix} \epsilon_{1,1} \\ \vdots \\ \epsilon_{T,1} \\ \epsilon_{1,2} \\ \vdots \\ \epsilon_{T,2} \end{pmatrix}}_{\epsilon}$$

$$Y = Xb + \epsilon$$

Eveiws forecast (from midterm) Explanation. Illustrate with ARMA(1,1) We said,

$$\begin{aligned} r_t &= c + \rho r_{t-1} + \epsilon_t + \theta \epsilon_{t-1} \\ \mu &= E(r) = c + \rho E(r) \rightarrow c = \mu(1-\rho) \end{aligned}$$

Eviews sets up the ARMA(1,1) like this

$$\begin{aligned} r_t &= \mu + z_t \\ z_t &= \rho z_{t-1} + \epsilon_t + \theta \epsilon_{t-1} \end{aligned}$$

$$\begin{aligned} \rho r_{t-1} &= \rho\mu + \rho z_{t-1} \\ r_t - \rho r_{t-1} &= \mu(1-\rho) + z_t - \rho z_{t-1} \\ r_t &= \mu(1-\rho) + \rho r_{t-1} + \epsilon_t + \theta \epsilon_{t-1} \end{aligned}$$

So in Eviews estimation, the constant is μ.Eview forecast is

$$E_t(r_{t+1}) = \mu + E_t z_{t+1} = \mu + \rho z_t + \theta \epsilon_t$$

But when I did it by hand, I thought the constant was $c = \mu(1-\rho)$.

Let's quickly review what we been doing.