

Week3_ECON_PS1

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Exercise 3

$$\begin{aligned} E_t\{F\tilde{X}_{t+1} + G\tilde{X}_t + H\tilde{X}_{t-1} + L\tilde{Z}_{t+1} + M\tilde{Z}_t\} &= 0 \\ E_t\{F(P\tilde{X}_t + Q\tilde{Z}_{t+1}) + G(P\tilde{X}_{t-1} + Q\tilde{Z}_t) + H\tilde{X}_{t-1} + L(N\tilde{Z}_{t-1} + \varepsilon_t) + M\tilde{Z}_t\} &= 0 \\ E_t\{F(P(P\tilde{X}_{t-1} + Q\tilde{Z}_t) + Q(N\tilde{Z}_t + \varepsilon_t)) + G(P\tilde{X}_{t-1} + Q\tilde{Z}_t) + \\ &\quad H\tilde{X}_{t-1} + L(N\tilde{Z}_t + \varepsilon_t) + M\tilde{Z}_t\} = 0 \end{aligned}$$

Take the expectation in, and as $E\varepsilon_t = 0$, we have:

$$\begin{aligned} FPP\tilde{X}_{t-1} + FPQ\tilde{Z}_t + PQN\tilde{Z}_t + GP\tilde{X}_{t-1} + GQ\tilde{Z}_t + \\ H\tilde{X}_{t-1} + LN\tilde{Z}_t + NM\tilde{Z}_t = 0 \end{aligned}$$

Hence we have

$$[(FP + G)P + H] \tilde{X}_{t-1} + [(FQ + L)N + (FP + G)Q + M] \tilde{Z}_t = 0$$

as desired