EXERCISE USING THE COMPUTER ON A LINEAR RE SYSTEM

Consider the simple "new Keynesian" model

$$\text{aggregate demand :} \qquad y_t = \beta E_t y_{t+1} - \theta(r_t - E_t\pi_{t+1}) + \nu_t \tag{1}$$

$$\text{Phillips curve :} \qquad \pi_t = \delta E_t \pi_{t+1} + \gamma y_t + \varepsilon_t \tag{2}$$

$$\text{Taylor rule :} \qquad r_t = \alpha_1 \pi_t + \alpha_2 y_t + \zeta_t \ . \tag{3}$$

There are no constant terms because all variables are interpreted as deviations from a steady state. Use a computer — `gensys.m` will work fine — to complete the following tasks.

(a) Check existence and uniqueness for the model with $\beta = .95$, $\theta = .5$, $\delta = .8$, $\gamma = .2$; $\alpha_1 = 1.1$, $\alpha_2 = .1$.

(b) For these same parameter values, compute and plot impulse responses of r, π, and y to the three shocks ε, ν, ζ, which are all interpreted as i.i.d.

(c) Determine what range of parameter values for α_1 and α_2 are consistent with existence and uniqueness. Does the "Taylor Principle", that α_1 should exceed 1, provide a necessary and sufficient condition?

Note that, because ε and ν enter with a t subscript earlier than the date on the latest variables to appear in their equations, if you use `gensys` they have to be treated as variables in the system, appearing with a lag, and dummy equations have to be added to the system that set them equal to i.i.d. shocks.