4.1 Simulation of the Nash equilibrium

The model's equilibrium is described by ten equations, being five endogenous and five exogenous processes. The endogenous variables are $(\hat{x}_t, \pi_t, \hat{b}_t, \hat{i}_t, \hat{g}_t)$ while the exogenous ones are $(\hat{r}^n_t, \nu_t, \eta_t, \Xi_t, O_t)$. Following the definitions from previous sections, the set of equations characterizing the equilibrium can be represented as:

IS curve: $\hat{x}_t = E_t\hat{x}_{t+1} - \sigma(\hat{i}_t - E_t\pi_{t+1}) + \alpha\hat{b}_t + \hat{r}^n_t$
Phillips curve: $\pi_t = \kappa\hat{x}_t + \beta E_t\pi_{t+1} + \nu_t$
Public debt: $\hat{b}_t = (1+i^*)\hat{b}_{t-1} + \overline{bi}_t + \hat{g}_t - \varpi\hat{x}_t + \eta_t$
Monetary rule: $\hat{i}_t = -\Gamma_0 i^* + \Gamma_{i,1}\hat{i}_{t-1} - \Gamma_{i,2}\hat{i}_{t-2} + \Gamma_{\pi,0}\pi_t + \Gamma_{x,0}\hat{x}_t - \Gamma_{x,1}\hat{x}_{t-1} + \Xi_t$
Fiscal rule: $\hat{g}_t = -\Theta_{\pi,0}\pi_t + \Theta_{g,1}\hat{g}_{t-1} - \Theta_{g,2}\hat{g}_{t-2} + \Theta_{g,+1}E_t\hat{g}_{t+1} - \Theta_{x,0}\hat{x}_t + \Theta_{x,1}\hat{x}_{t-1} + O_t$
Demand shock: $\hat{r}^n_t = \chi_r\hat{r}^n_{t-1} + \varepsilon_r$
Supply shock: $\nu_t = \chi_\nu\nu_{t-1} + \varepsilon_\nu$
Debt shock: $\eta_t = \chi_\eta\eta_{t-1} + \varepsilon_\eta$
Monetary policy shock: $\Xi_t = \chi_\Xi\Xi_{t-1} + \varepsilon_\Xi$
Fiscal policy shock: $O_t = \chi_O O_{t-1} + \varepsilon_O$

As usual, the exogenous processes are assumed to follow $AR(1)$ stationary processes. The $AR(1)$ process reflects, relatively well, the persistence that exists in many macroeconomic time series. Moreover, each ε_i is independent and identically distributed with zero