Generated on 2025-04-15 17:48:01 by `gEcon` version 1.2.1 (2023-01-18)
Model name: `baseline_NK`

1 CONSUMER

1.1 Optimisation problem

$$\max_{C_t, K_t^{\mathrm{s}}, I_t, B_t, L_t^{\mathrm{s}}} U_t = \beta \mathrm{E}_t\left[U_{t+1}\right] + (1-\eta)^{-1}\left(C_t{}^{\mu}(1-L_t^{\mathrm{s}})^{1-\mu}\right)^{1-\eta} \tag{1.1}$$

s.t. :

$$C_t + I_t + B_t R_t{}^{-1} = Dw_t - T_t + B_{t-1}\pi_t{}^{-1} + K_{t-1}^{\mathrm{s}} r_t + L_t^{\mathrm{s}} W_t \quad (\lambda_t) \tag{1.2}$$

$$K_t^{\mathrm{s}} = I_t + K_{t-1}^{\mathrm{s}}(1-\delta) \quad (q_t) \tag{1.3}$$

1.2 Identities

$$Q_t = \lambda_t{}^{-1} q_t \tag{1.4}$$

1.3 First order conditions

$$-\lambda_t + \mu C_t{}^{-1+\mu}(1-L_t^{\mathrm{s}})^{1-\mu}\left(C_t{}^{\mu}(1-L_t^{\mathrm{s}})^{1-\mu}\right)^{-\eta} = 0 \quad (C_t) \tag{1.5}$$

$$-q_t + \beta\left((1-\delta)\,\mathrm{E}_t\left[q_{t+1}\right] + \mathrm{E}_t\left[\lambda_{t+1} r_{t+1}\right]\right) = 0 \quad (K_t^{\mathrm{s}}) \tag{1.6}$$

$$-\lambda_t + q_t = 0 \quad (I_t) \tag{1.7}$$

$$\beta \mathrm{E}_t\left[\lambda_{t+1}\pi_{t+1}{}^{-1}\right] - \lambda_t R_t{}^{-1} = 0 \quad (B_t) \tag{1.8}$$

$$\lambda_t W_t + (-1+\mu)\, C_t{}^{\mu}(1-L_t^{\mathrm{s}})^{-\mu}\left(C_t{}^{\mu}(1-L_t^{\mathrm{s}})^{1-\mu}\right)^{-\eta} = 0 \quad (L_t^{\mathrm{s}}) \tag{1.9}$$

2 FIRM

2.1 Optimisation problem

$$\max_{K_t^{\mathrm{d}}, L_t^{\mathrm{d}}} tc_t^{\mathrm{j}} = -r_t K_t^{\mathrm{d}} - L_t^{\mathrm{d}} W_t \tag{2.1}$$

s.t. :

$$Y_t^{\mathrm{j}} = Z_t K_t^{\mathrm{d}\alpha} L_t^{\mathrm{d}\,1-\alpha} \quad (mc_t) \tag{2.2}$$

2.2 First order conditions

$$-r_t + \alpha mc_t Z_t {K_t^{\mathrm{d}}}^{-1+\alpha} {L_t^{\mathrm{d}}}^{1-\alpha} = 0 \quad \left(K_t^{\mathrm{d}}\right) \tag{2.3}$$

$$-W_t + mc_t Z_t \left(1-\alpha\right) {K_t^{\mathrm{d}}}^{\alpha} {L_t^{\mathrm{d}}}^{-\alpha} = 0 \quad \left(L_t^{\mathrm{d}}\right) \tag{2.4}$$

3 PRICE SETTING PROBLEM

3.1 Identities

$$g_t^1 = \eta_t^{\mathrm{p}} + g_t^2 \left(1+\lambda^{\mathrm{p}}\right) \tag{3.1}$$

$$g_t^1 = \lambda_t \pi_t^{\star} Y_t + \beta \xi^{\mathrm{p}} \pi_t^{\star} \mathrm{E}_t \left[g_{t+1}^1 {\pi_{t+1}^{\star}}^{-1} \left({\pi_{t+1}}^{-1} {\pi_t}^{\gamma^{\mathrm{p}}} \right)^{-\lambda^{\mathrm{p}-1}} \right] \tag{3.2}$$

$$g_t^2 = \beta \xi^{\mathrm{p}} \mathrm{E}_t \left[g_{t+1}^2 \left({\pi_{t+1}}^{-1} {\pi_t}^{\gamma^{\mathrm{p}}} \right)^{-\lambda^{\mathrm{p}-1}\left(1+\lambda^{\mathrm{p}}\right)} \right] + \lambda_t mc_t Y_t \tag{3.3}$$

4 PRICE EVOLUTION

4.1 Identities

$$1 = \xi^{\mathrm{p}} \left({\pi_t}^{-1} {\pi_{t-1}}^{\gamma^{\mathrm{p}}} \right)^{-\lambda^{\mathrm{p}-1}} + \left(1-\xi^{\mathrm{p}}\right) {\pi_t^{\star}}^{-\lambda^{\mathrm{p}-1}} \tag{4.1}$$

5 PRODUCT AGGREGATION

5.1 Identities

$$Y_t^{\mathrm{s}} = Y_t^{\mathrm{j}} \tag{5.1}$$

$$\nu_t^{\mathrm{p}} = \left(1-\xi^{\mathrm{p}}\right) {\pi_t^{\star}}^{-\lambda^{\mathrm{p}-1}\left(1+\lambda^{\mathrm{p}}\right)} + \xi^{\mathrm{p}} \nu_{t-1}^{\mathrm{p}} \left({\pi_t}^{-1} {\pi_{t-1}}^{\gamma^{\mathrm{p}}} \right)^{-\lambda^{\mathrm{p}-1}\left(1+\lambda^{\mathrm{p}}\right)} \tag{5.2}$$

$$\nu_t^{\mathrm{p}} Y_t = Y_t^{\mathrm{s}} \tag{5.3}$$

6 EQUILIBRIUM

6.1 Identities

$$K_t^{\mathrm{d}} = K_{t-1}^{\mathrm{s}} \tag{6.1}$$

$$L_t^{\mathrm{d}} = L_t^{\mathrm{s}} \tag{6.2}$$

$$B_t = 0 \tag{6.3}$$

$$Div_t = Y_t - L_t^{\mathrm{d}} W_t - r_t K_t^{\mathrm{d}} \tag{6.4}$$

7 MONETARY POLICY AUTHORITY

7.1 Identities

$$addr^{\pi} + \log\left({R_{\mathrm{ss}}}^{-1} R_t\right) = \eta_t^{\mathrm{R}} + \rho \log\left({R_{\mathrm{ss}}}^{-1} R_{t-1}\right) + (1-\rho)\left(\log \pi_t^{\mathrm{obj}} + r^{\pi}\left(-\log \pi_t^{\mathrm{obj}} + \log\left({\pi_{\mathrm{ss}}}^{-1}\pi_{t-1}\right)\right) + r^{\mathrm{Y}} \log\left({Y_{\mathrm{ss}}}^{-1} Y_t\right)\right) \tag{7.1}$$

$$\log \pi_t^{\mathrm{obj}} = \eta_t^{\pi} + {\rho^{\pi}}^{\mathrm{bar}} \log \pi_{t-1}^{\mathrm{obj}} + \log addr^{\pi^{\mathrm{obj}}}\left(1 - {\rho^{\pi}}^{\mathrm{bar}}\right) \tag{7.2}$$

8 GOVERNMENT

8.1 Identities

$$G_t = {G}^{\mathrm{bar}} \epsilon_t^{\mathrm{G}} \tag{8.1}$$

$$G_t + B_{t-1}{\pi_t}^{-1} = T_t + B_t {R_t}^{-1} \tag{8.2}$$

9 GOVERNMENT SPENDING SHOCK

9.1 Identities

$$\log \epsilon_t^{\mathrm{G}} = \eta_t^{\mathrm{G}} + \rho^{\mathrm{G}} \log \epsilon_{t-1}^{\mathrm{G}} \tag{9.1}$$

10 TECHNOLOGY

10.1 Identities

$$Z_t = e^{\epsilon_t^{\mathrm{Z}} + \rho^{\mathrm{a}} \log Z_{t-1}} \tag{10.1}$$

11 Equilibrium relationships (after reduction)

$$-B_t = 0 \tag{11.1}$$

$$-\lambda_t + q_t = 0 \tag{11.2}$$

$$-\lambda_t + \mu {C_t}^{-1+\mu} (1 - L_t^{\mathrm{s}})^{1-\mu} \left({C_t}^{\mu} (1 - L_t^{\mathrm{s}})^{1-\mu} \right)^{-\eta} = 0 \tag{11.3}$$

$$-q_t + \beta \left((1-\delta) \, \mathrm{E}_t \left[q_{t+1} \right] + \mathrm{E}_t \left[\lambda_{t+1} r_{t+1} \right] \right) = 0 \tag{11.4}$$

$$-r_t + \alpha mc_t Z_t {K_{t-1}^{\mathrm{s}}}^{-1+\alpha} L_t^{\mathrm{s}\,1-\alpha} = 0 \tag{11.5}$$

$$-G_t + G^{\mathrm{bar}} \epsilon_t^{\mathrm{G}} = 0 \tag{11.6}$$

$$-Q_t + {\lambda_t}^{-1} q_t = 0 \tag{11.7}$$

$$-W_t + mc_t Z_t \left(1 - \alpha \right) {K_{t-1}^{\mathrm{s}}}^{\alpha} L_t^{\mathrm{s}\,-\alpha} = 0 \tag{11.8}$$

$$-Y_t^{\mathrm{j}} + Z_t {K_{t-1}^{\mathrm{s}}}^{\alpha} L_t^{\mathrm{s}\,1-\alpha} = 0 \tag{11.9}$$

$$Y_t^{\mathrm{j}} - Y_t^{\mathrm{s}} = 0 \tag{11.10}$$

$$Y_t^{\mathrm{s}} - \nu_t^{\mathrm{p}} Y_t = 0 \tag{11.11}$$

$$-Z_t + e^{\epsilon_t^{\mathrm{Z}} + \rho^{\mathrm{a}} \log Z_{t-1}} = 0 \tag{11.12}$$

$$\beta \mathrm{E}_t \left[\lambda_{t+1} {\pi_{t+1}}^{-1} \right] - \lambda_t {R_t}^{-1} = 0 \tag{11.13}$$

$$\lambda_t W_t + \left(-1 + \mu \right) {C_t}^{\mu} (1 - L_t^{\mathrm{s}})^{-\mu} \left({C_t}^{\mu} (1 - L_t^{\mathrm{s}})^{1-\mu} \right)^{-\eta} = 0 \tag{11.14}$$

$$-1 + \xi^{\mathrm{p}} \left({\pi_t}^{-1} {\pi_{t-1}}^{\gamma^{\mathrm{p}}} \right)^{-\lambda^{\mathrm{p}}-1} + \left(1 - \xi^{\mathrm{p}} \right) {\pi_t^{\star}}^{-\lambda^{\mathrm{p}}-1} = 0 \tag{11.15}$$

$$\eta_t^{\mathrm{p}} - g_t^1 + g_t^2 \left(1 + \lambda^{\mathrm{p}} \right) = 0 \tag{11.16}$$

$$\eta_t^{\mathrm{G}} - \log \epsilon_t^{\mathrm{G}} + \rho^{\mathrm{G}} \log \epsilon_{t-1}^{\mathrm{G}} = 0 \tag{11.17}$$

$$-g_t^1 + \lambda_t \pi_t^{\star} Y_t + \beta \xi^{\mathrm{p}} \pi_t^{\star} \mathrm{E}_t \left[g_{t+1}^1 {\pi_{t+1}^{\star}}^{-1} \left({\pi_{t+1}}^{-1} {\pi_t}^{\gamma^{\mathrm{p}}} \right)^{-\lambda^{\mathrm{p}}-1} \right] = 0 \tag{11.18}$$

$$-g_t^2 + \beta \xi^{\mathrm{p}} \mathrm{E}_t \left[g_{t+1}^2 \left({\pi_{t+1}}^{-1} {\pi_t}^{\gamma^{\mathrm{p}}} \right)^{-\lambda^{\mathrm{p}}-1(1+\lambda^{\mathrm{p}})} \right] + \lambda_t mc_t Y_t = 0 \tag{11.19}$$

$$-\nu_t^{\mathrm{p}} + \left(1 - \xi^{\mathrm{p}} \right) {\pi_t^{\star}}^{-\lambda^{\mathrm{p}}-1(1+\lambda^{\mathrm{p}})} + \xi^{\mathrm{p}} \nu_{t-1}^{\mathrm{p}} \left({\pi_t}^{-1} {\pi_{t-1}}^{\gamma^{\mathrm{p}}} \right)^{-\lambda^{\mathrm{p}}-1(1+\lambda^{\mathrm{p}})} = 0 \tag{11.20}$$

$$I_t - K_t^{\mathrm{s}} + K_{t-1}^{\mathrm{s}} \left(1 - \delta \right) = 0 \tag{11.21}$$

$$U_t - \beta \mathrm{E}_t \left[U_{t+1} \right] - \left(1 - \eta \right)^{-1} \left({C_t}^{\mu} (1 - L_t^{\mathrm{s}})^{1-\mu} \right)^{1-\eta} = 0 \tag{11.22}$$

$$\eta_t^{\pi} - \log \pi_t^{\mathrm{obj}} + \rho^{\pi^{\mathrm{bar}}} \log \pi_{t-1}^{\mathrm{obj}} + \log \mathit{add}r^{\pi^{\mathrm{obj}}} \left(1 - \rho^{\pi^{\mathrm{bar}}}\right) = 0 \tag{11.23}$$

$$-\mathit{Div}_t + Y_t - K_{t-1}^{\mathrm{s}} r_t - L_t^{\mathrm{s}} W_t = 0 \tag{11.24}$$

$$-G_t + T_t - B_{t-1} {\pi_t}^{-1} + B_t {R_t}^{-1} = 0 \tag{11.25}$$

$$-\mathit{add}r^{\pi} + \eta_t^{\mathrm{R}} - \log\left({R_{\mathrm{ss}}}^{-1} R_t\right) + \rho \log\left({R_{\mathrm{ss}}}^{-1} R_{t-1}\right) + (1-\rho)\left(\log \pi_t^{\mathrm{obj}} + r^{\pi}\left(-\log \pi_t^{\mathrm{obj}} + \log\left({\pi_{\mathrm{ss}}}^{-1}\pi_{t-1}\right)\right) + r^{\mathrm{Y}} \log\left({Y_{\mathrm{ss}}}^{-1} Y_t\right)\right) = 0 \tag{11.26}$$

$$-C_t + \mathit{Div}_t - I_t - T_t + B_{t-1} {\pi_t}^{-1} + K_{t-1}^{\mathrm{s}} r_t - B_t {R_t}^{-1} + L_t^{\mathrm{s}} W_t = 0 \tag{11.27}$$

12 Steady state relationships (after reduction)

$$-B_{\mathrm{ss}} = 0 \tag{12.1}$$

$$-\lambda_{\mathrm{ss}} + q_{\mathrm{ss}} = 0 \tag{12.2}$$

$$-\lambda_{\mathrm{ss}} + \mu {C_{\mathrm{ss}}}^{-1+\mu} (1 - L_{\mathrm{ss}}^{\mathrm{s}})^{1-\mu} \left({C_{\mathrm{ss}}}^{\mu} (1 - L_{\mathrm{ss}}^{\mathrm{s}})^{1-\mu}\right)^{-\eta} = 0 \tag{12.3}$$

$$-q_{\mathrm{ss}} + \beta\left(\lambda_{\mathrm{ss}} r_{\mathrm{ss}} + q_{\mathrm{ss}}\left(1-\delta\right)\right) = 0 \tag{12.4}$$

$$-r_{\mathrm{ss}} + \alpha \mathit{mc}_{\mathrm{ss}} Z_{\mathrm{ss}} {K_{\mathrm{ss}}^{\mathrm{s}}}^{-1+\alpha} {L_{\mathrm{ss}}^{\mathrm{s}}}^{1-\alpha} = 0 \tag{12.5}$$

$$-G_{\mathrm{ss}} + G^{\mathrm{bar}} \epsilon_{\mathrm{ss}}^{\mathrm{G}} = 0 \tag{12.6}$$

$$-Q_{\mathrm{ss}} + {\lambda_{\mathrm{ss}}}^{-1} q_{\mathrm{ss}} = 0 \tag{12.7}$$

$$-W_{\mathrm{ss}} + \mathit{mc}_{\mathrm{ss}} Z_{\mathrm{ss}} \left(1-\alpha\right) {K_{\mathrm{ss}}^{\mathrm{s}}}^{\alpha} {L_{\mathrm{ss}}^{\mathrm{s}}}^{-\alpha} = 0 \tag{12.8}$$

$$-Y_{\mathrm{ss}}^{\mathrm{j}} + Z_{\mathrm{ss}} {K_{\mathrm{ss}}^{\mathrm{s}}}^{\alpha} {L_{\mathrm{ss}}^{\mathrm{s}}}^{1-\alpha} = 0 \tag{12.9}$$

$$Y_{\mathrm{ss}}^{\mathrm{j}} - Y_{\mathrm{ss}}^{\mathrm{s}} = 0 \tag{12.10}$$

$$Y_{\mathrm{ss}}^{\mathrm{s}} - \nu_{\mathrm{ss}}^{\mathrm{p}} Y_{\mathrm{ss}} = 0 \tag{12.11}$$

$$-Z_{\mathrm{ss}} + e^{\rho^{\mathrm{a}} \log Z_{\mathrm{ss}}} = 0 \tag{12.12}$$

$$-\lambda_{\mathrm{ss}} {R_{\mathrm{ss}}}^{-1} + \beta \lambda_{\mathrm{ss}} {\pi_{\mathrm{ss}}}^{-1} = 0 \tag{12.13}$$

$$\lambda_{\mathrm{ss}} W_{\mathrm{ss}} + \left(-1+\mu\right) {C_{\mathrm{ss}}}^{\mu} (1 - L_{\mathrm{ss}}^{\mathrm{s}})^{-\mu} \left({C_{\mathrm{ss}}}^{\mu} (1 - L_{\mathrm{ss}}^{\mathrm{s}})^{1-\mu}\right)^{-\eta} = 0 \tag{12.14}$$

$$-1 + \xi^{\mathrm{p}} \left({\pi_{\mathrm{ss}}}^{-1} {\pi_{\mathrm{ss}}}^{\gamma^{\mathrm{p}}}\right)^{-\lambda^{\mathrm{p}-1}} + \left(1-\xi^{\mathrm{p}}\right) {\pi_{\mathrm{ss}}^{\star}}^{-\lambda^{\mathrm{p}-1}} = 0 \tag{12.15}$$

$$-g_{\mathrm{ss}}^{1} + g_{\mathrm{ss}}^{2} \left(1 + \lambda^{\mathrm{p}}\right) = 0 \tag{12.16}$$

$$-\log \epsilon_{\mathrm{ss}}^{\mathrm{G}} + \rho^{\mathrm{G}} \log \epsilon_{\mathrm{ss}}^{\mathrm{G}} = 0 \tag{12.17}$$

$$-g_{\mathrm{ss}}^{1} + \lambda_{\mathrm{ss}} \pi_{\mathrm{ss}}^{\star} Y_{\mathrm{ss}} + \beta \xi^{\mathrm{p}} g_{\mathrm{ss}}^{1} \left({\pi_{\mathrm{ss}}}^{-1} {\pi_{\mathrm{ss}}}^{\gamma^{\mathrm{p}}}\right)^{-\lambda^{\mathrm{p}-1}} = 0 \tag{12.18}$$

$$-g_{\mathrm{ss}}^{2}+\lambda_{\mathrm{ss}} mc_{\mathrm{ss}} Y_{\mathrm{ss}}+\beta\xi^{\mathrm{p}} g_{\mathrm{ss}}^{2}\left(\pi_{\mathrm{ss}}{}^{-1}\pi_{\mathrm{ss}}{}^{\gamma^{\mathrm{p}}}\right)^{-\lambda^{\mathrm{p}-1}(1+\lambda^{\mathrm{p}})}=0 \tag{12.19}$$

$$-\nu_{\mathrm{ss}}^{\mathrm{p}}+\left(1-\xi^{\mathrm{p}}\right)\pi_{\mathrm{ss}}^{\star}{}^{-\lambda^{\mathrm{p}-1}(1+\lambda^{\mathrm{p}})}+\xi^{\mathrm{p}}\nu_{\mathrm{ss}}^{\mathrm{p}}\left(\pi_{\mathrm{ss}}{}^{-1}\pi_{\mathrm{ss}}{}^{\gamma^{\mathrm{p}}}\right)^{-\lambda^{\mathrm{p}-1}(1+\lambda^{\mathrm{p}})}=0 \tag{12.20}$$

$$I_{\mathrm{ss}}-K_{\mathrm{ss}}^{\mathrm{s}}+K_{\mathrm{ss}}^{\mathrm{s}}\left(1-\delta\right)=0 \tag{12.21}$$

$$U_{\mathrm{ss}}-\beta U_{\mathrm{ss}}-\left(1-\eta\right)^{-1}\left(C_{\mathrm{ss}}{}^{\mu}(1-L_{\mathrm{ss}}^{\mathrm{s}})^{1-\mu}\right)^{1-\eta}=0 \tag{12.22}$$

$$-\log\pi_{\mathrm{ss}}^{\mathrm{obj}}+\rho^{\pi^{\mathrm{bar}}}\log\pi_{\mathrm{ss}}^{\mathrm{obj}}+\log addr^{\pi^{\mathrm{obj}}}\left(1-\rho^{\pi^{\mathrm{bar}}}\right)=0 \tag{12.23}$$

$$-Div_{\mathrm{ss}}+Y_{\mathrm{ss}}-r_{\mathrm{ss}}K_{\mathrm{ss}}^{\mathrm{s}}-L_{\mathrm{ss}}^{\mathrm{s}}W_{\mathrm{ss}}=0 \tag{12.24}$$

$$-G_{\mathrm{ss}}+T_{\mathrm{ss}}-\pi_{\mathrm{ss}}{}^{-1}B_{\mathrm{ss}}+B_{\mathrm{ss}}R_{\mathrm{ss}}{}^{-1}=0 \tag{12.25}$$

$$-addr^{\pi}+\left(1-\rho\right)\left(\log\pi_{\mathrm{ss}}^{\mathrm{obj}}-r^{\pi}\log\pi_{\mathrm{ss}}^{\mathrm{obj}}\right)=0 \tag{12.26}$$

$$-C_{\mathrm{ss}}+Div_{\mathrm{ss}}-I_{\mathrm{ss}}-T_{\mathrm{ss}}+\pi_{\mathrm{ss}}{}^{-1}B_{\mathrm{ss}}+r_{\mathrm{ss}}K_{\mathrm{ss}}^{\mathrm{s}}-B_{\mathrm{ss}}R_{\mathrm{ss}}{}^{-1}+L_{\mathrm{ss}}^{\mathrm{s}}W_{\mathrm{ss}}=0 \tag{12.27}$$

13 Calibrating equations

$$-1+\pi_{\mathrm{ss}}^{\mathrm{obj}}=0 \tag{13.1}$$

$$-0.18+G_{\mathrm{ss}}Y_{\mathrm{ss}}{}^{-1}=0 \tag{13.2}$$

$$\pi_{\mathrm{ss}}-\pi_{\mathrm{ss}}^{\mathrm{obj}}=0 \tag{13.3}$$

14 Parameter settings

$$\alpha=0.3 \tag{14.1}$$

$$\beta=0.99 \tag{14.2}$$

$$\delta=0.025 \tag{14.3}$$

$$\eta=2 \tag{14.4}$$

$$\gamma^{\mathrm{p}}=0.469 \tag{14.5}$$

$$\lambda^{\mathrm{p}}=0.5 \tag{14.6}$$

$$\mu=0.3 \tag{14.7}$$

$$r^{\pi}=1.684 \tag{14.8}$$

$$r^{\mathrm{Y}}=0.099 \tag{14.9}$$

$$\rho = 0.961 \tag{14.10}$$

$$\rho^{\pi^{\mathrm{bar}}} = 0.924 \tag{14.11}$$

$$\rho^{\mathrm{G}} = 0.949 \tag{14.12}$$

$$\rho^{\mathrm{a}} = 0.823 \tag{14.13}$$

$$\xi^{\mathrm{p}} = 0.908 \tag{14.14}$$

15 Steady-state values

	Steady-state value
ϵ^{G}	1
g^1	7.3514
g^2	4.9009
λ	1.5467
mc	0.6667
ν^{p}	1
π	1
$\pi^\star$	1
π^{obj}	1
q	1.5467
r	0.0351
B	0
C	0.3255
Div	0.1601
G	0.0865
I	0.0684
K^{s}	2.7374
L^{s}	0.2279
Q	1
R	1.0101
T	0.0865
U	-167.8256
W	0.9837
Y	0.4804
Y^{j}	0.4804
Y^{s}	0.4804
Z	1

16 The solution of the 1st order perturbation

Matrix P

	$\epsilon^{\mathrm{G}}_{t-1}$	ν^{p}_{t-1}	π_{t-1}	π^{obj}_{t-1}	B_{t-1}	K^{s}_{t-1}	R_{t-1}	Z_{t-1}
ϵ^{G}_t	0.949	0	0	0	0	0	0	0
ν^{p}_t	0	0.908	0	0	0	0	0	0
π_t	−0.0001	0.0549	0.3347	0.3431	0	−0.0399	−1.1151	−0.0644
π^{obj}_t	0	0	0	0.924	0	0	0	0
B_t	0	0	0	0	0	0	0	0
K^{s}_t	0.0052	0.5527	−1.2493	3.5068	0	0.4384	−15.1013	−0.4031
R_t	0.0006	0.0147	0.0313	0.0717	0	−0.0135	0.5465	−0.011
Z_t	0	0	0	0	0	0	0	0.823

Matrix Q

	ϵ^{Z}	η^{p}	η^{R}	η^{π}	η^{G}
ϵ^{G}	0	0	0	0	1
ν^{p}	0	0	0	0	0
π	−0.0783	0.0121	−1.1604	0.3714	−0.0001
π^{obj}	0	0	0	1	0
B	0	0	0	0	0
K^{s}	−0.4898	−0.0064	−15.7141	3.7952	0.0055
R	−0.0133	−0.0002	0.5687	0.0776	0.0007
Z	1	0	0	0	0

Matrix R

	$\epsilon^{\mathrm{G}}_{t-1}$	ν^{p}_{t-1}	π_{t-1}	π^{obj}_{t-1}	B_{t-1}	K^{s}_{t-1}	R_{t-1}	Z_{t-1}
g^1_t	0.1474	0.9164	−1.9772	5.4585	0	−0.8826	−15.6826	−0.8627
g^2_t	0.1474	0.9164	−1.9772	5.4585	0	−0.8826	−15.6826	−0.8627
λ_t	0.1179	0.1359	0.8044	−2.1906	0	−0.2745	9.2056	−0.0385
mc_t	0.0862	4.9707	−10.2156	28.5786	0	−4.181	−122.7414	−4.7402
$\pi^\star_t$	−0.0012	0.5419	−1.3251	3.3865	0	−0.3941	−11.0059	−0.636
q_t	0.1179	0.1359	0.8044	−2.1906	0	−0.2745	9.2056	−0.0385
r_t	0.2504	9.6818	−19.1237	53.542	0	−8.6795	−230.1009	−7.5809
C_t	−0.0534	0.9651	−2.6415	7.3533	0	−0.6513	−31.4584	−0.8022
Div_t	−0.0082	−7.9544	11.5232	−32.1937	0	4.8635	138.1234	6.6399
G_t	0.949	0	0	0	0	0	0	0
I_t	0.2078	22.1074	−49.9721	140.272	0	−21.4622	−604.0515	−16.1258
L^{s}_t	0.2346	6.7301	−12.7258	35.662	0	−5.4264	−153.3707	−5.2337
Q_t	0	0	0	0	0	0	0	0
T_t	0.949	0	0	0	11.5637	0	0	0
U_t	−0.0107	−0.0272	−0.0234	0.0592	0	0.0226	−0.1954	0.0162
W_t	0.0158	2.9517	−6.3979	17.88	0	−2.2531	−76.7302	−2.3471
Y_t	0.1642	3.803	−8.9081	24.9634	0	−3.4985	−107.3595	−2.8406
Y^{j}_t	0.1642	4.711	−8.9081	24.9634	0	−3.4985	−107.3595	−2.8406
Y^{s}_t	0.1642	4.711	−8.9081	24.9634	0	−3.4985	−107.3595	−2.8406

Matrix S

	ϵ^{Z}	η^{p}	η^{R}	η^{π}	η^{G}
g^1	−1.0482	0.1094	−16.319	5.9075	0.1553
g^2	−1.0482	−0.0266	−16.319	5.9075	0.1553
λ	−0.0468	0.0052	9.5791	−2.3707	0.1243
mc	−5.7597	−0.0537	−127.7226	30.9292	0.0908
$\pi^\star$	−0.7728	0.1192	−11.4526	3.6651	−0.0012
q	−0.0468	0.0052	9.5791	−2.3707	0.1243
r	−9.2112	−0.0999	−239.439	57.9459	0.2638
C	−0.9748	−0.0144	−32.735	7.9581	−0.0563
Div	8.0679	0.0612	143.7288	−34.8417	−0.0086
G	0	0	0	0	1
I	−19.5939	−0.2554	−628.5656	151.8096	0.2189
L^{s}	−6.3593	−0.066	−159.5949	38.5953	0.2472
Q	0	0	0	0	0
T	0	0	0	0	1
U	0.0197	−0.0003	−0.2033	0.0641	−0.0113
W	−2.8519	−0.0339	−79.8442	19.3506	0.0167
Y	−3.4515	−0.0462	−111.7164	27.0167	0.173
Y^{j}	−3.4515	−0.0462	−111.7164	27.0167	0.173
Y^{s}	−3.4515	−0.0462	−111.7164	27.0167	0.173

17 Model statistics

17.1 Basic statistics

	Steady-state value	Std. dev.	Variance	Loglin
ϵ^{G}	1	1.3033	1.6986	Y
g^1	7.3514	20.4264	417.2364	Y
g^2	4.9009	20.4261	417.2261	Y
λ	1.5467	12.2819	150.8456	Y
mc	0.6667	127.9129	16361.6994	Y
ν^{p}	1	0	0	Y
π	1	1.2289	1.5103	Y
$\pi^\star$	1	11.8863	141.285	Y
π^{obj}	1	1.2958	1.6792	Y
q	1.5467	12.2819	150.8456	Y
r	0.0351	246.1531	60591.3569	Y
B	0	0	0	N
C	0.3255	30.8464	951.4999	Y
Dw	0.1601	145.1625	21072.1497	Y
G	0.0865	1.3033	1.6986	Y
I	0.0684	635.6189	404011.446	Y
K^{s}	2.7374	20.0049	400.1958	Y
L^{s}	0.2279	161.2555	26003.3342	Y
Q	1	0	0	Y
R	1.0101	0.6891	0.4749	Y
T	0.0865	1.3033	1.6986	Y
U	-167.8256	0.5474	0.2997	Y
W	0.9837	77.7077	6038.4897	Y
Y	0.4804	110.761	12268.0006	Y
Y^{j}	0.4804	110.761	12268.0006	Y
Y^{s}	0.4804	110.761	12268.0006	Y
Z	1	1.227	1.5056	Y

17.2 Correlation matrix

	ϵ^{G}	g^1	g^2	λ	mc	π	$\pi^\star$	π^{obj}	q	r	C	Diw	G	I
ϵ^{G}	1	0.009	0.009	0.013	0	-0.001	-0.001	0	0.013	0.001	-0.003	0.001	1	0
g^1		1	1	-0.134	0.94	0.771	0.958	0.148	-0.134	0.959	0.828	-0.947	0.009	0.948
g^2			1	-0.134	0.94	0.771	0.958	0.148	-0.134	0.959	0.828	-0.947	0.009	0.948
λ				1	-0.445	-0.626	-0.411	-0.243	1	-0.387	-0.659	0.426	0.013	-0.422
mc					1	0.899	0.994	0.109	-0.445	0.998	0.967	-1	0	1
π						1	0.888	0.283	-0.626	0.881	0.933	-0.894	-0.001	0.891
$\pi^\star$							1	0.189	-0.411	0.994	0.952	-0.995	-0.001	0.994
π^{obj}								1	-0.243	0.095	0.161	-0.105	0	0.103
q									1	-0.387	-0.659	0.426	0.013	-0.422
r										1	0.949	-0.999	0.001	0.999
C											1	-0.961	-0.003	0.96
Diw												1	0.001	-1
G													1	0
I														1
K^{s}														
L^{s}														
R														
T														
U														
W														
Y														
Y^{j}														
Y^{s}														
Z														

17.3 Cross correlations with the reference variable (π)

	$\sigma[\cdot]$ rel. to $\sigma[\pi]$	π_{t-5}	π_{t-4}	π_{t-3}	π_{t-2}	π_{t-1}	π_t	π_{t+1}	π_{t+2}	π_{t+3}	π_{t+4}	π_{t+5}
ϵ_t^{G}	1.061	0	-0.001	-0.001	-0.001	-0.002	-0.001	-0.001	0	0	0	0
g_t^1	16.621	0.015	0.037	0.075	0.152	0.329	0.771	-0.358	-0.245	-0.186	-0.146	-0.116
g_t^2	16.621	0.015	0.037	0.075	0.152	0.328	0.771	-0.358	-0.245	-0.186	-0.146	-0.116
λ_t	9.994	0.276	0.32	0.342	0.301	0.081	-0.626	-0.476	-0.367	-0.278	-0.204	-0.142
mc_t	104.084	-0.076	-0.072	-0.047	0.034	0.265	0.899	-0.161	-0.113	-0.091	-0.077	-0.067
π_t	1	-0.116	-0.113	-0.083	0.011	0.277	1	0.277	0.011	-0.083	-0.113	-0.116
$\pi_t^\star$	9.672	-0.066	-0.059	-0.031	0.051	0.277	0.888	-0.196	-0.121	-0.09	-0.075	-0.065
π_t^{obj}	1.054	-0.051	-0.035	-0.009	0.035	0.116	0.283	0.21	0.147	0.095	0.052	0.018
q_t	9.994	0.276	0.32	0.342	0.301	0.081	-0.626	-0.476	-0.367	-0.278	-0.204	-0.142
r_t	200.298	-0.058	-0.051	-0.024	0.056	0.278	0.881	-0.2	-0.143	-0.113	-0.094	-0.079
C_t	25.1	-0.142	-0.151	-0.137	-0.057	0.199	0.933	0	0.009	0.003	-0.007	-0.016
Diw_t	118.121	0.07	0.065	0.04	-0.041	-0.27	-0.894	0.173	0.122	0.098	0.083	0.071
G_t	1.061	0	-0.001	-0.001	-0.001	-0.002	-0.001	-0.001	0	0	0	0
I_t	517.212	-0.068	-0.064	-0.038	0.043	0.27	0.891	-0.177	-0.126	-0.1	-0.084	-0.072
K_t^{s}	16.278	-0.275	-0.319	-0.341	-0.299	-0.077	0.633	0.476	0.365	0.276	0.202	0.14
L_t^{s}	131.216	-0.069	-0.064	-0.039	0.042	0.27	0.893	-0.175	-0.124	-0.099	-0.084	-0.072
R_t	0.561	0.256	0.305	0.336	0.308	0.109	-0.559	-0.395	-0.297	-0.226	-0.17	-0.123
T_t	1.061	0	-0.001	-0.001	-0.001	-0.002	-0.001	-0.001	0	0	0	0
U_t	0.445	-0.27	-0.321	-0.358	-0.351	-0.22	0.253	0.606	0.467	0.359	0.269	0.194
W_t	63.232	-0.099	-0.1	-0.078	0.003	0.244	0.917	-0.107	-0.072	-0.06	-0.054	-0.05
Y_t	90.128	-0.083	-0.081	-0.057	0.024	0.258	0.905	-0.145	-0.101	-0.081	-0.07	-0.062
Y_t^{j}	90.128	-0.083	-0.081	-0.057	0.024	0.258	0.905	-0.145	-0.101	-0.081	-0.07	-0.062
Y_t^{s}	90.128	-0.083	-0.081	-0.057	0.024	0.258	0.905	-0.145	-0.101	-0.081	-0.07	-0.062
Z_t	0.998	0.009	0.003	-0.006	-0.02	-0.04	-0.071	-0.047	-0.027	-0.013	-0.002	0.006

17.4 Autocorrelations

	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5
ϵ^{G}	0.713	0.471	0.271	0.109	-0.017
g^1	-0.071	-0.04	-0.035	-0.037	-0.04
g^2	-0.071	-0.04	-0.035	-0.037	-0.04
λ	0.681	0.438	0.246	0.095	-0.022
mc	-0.121	-0.08	-0.062	-0.052	-0.045
π	0.277	0.011	-0.083	-0.113	-0.116
$\pi^\star$	-0.142	-0.08	-0.056	-0.045	-0.039
π^{obj}	0.703	0.456	0.253	0.092	-0.032
q	0.681	0.438	0.246	0.095	-0.022
r	-0.124	-0.082	-0.063	-0.053	-0.045
C	-0.034	-0.024	-0.028	-0.036	-0.042
Dw	-0.122	-0.081	-0.063	-0.052	-0.045
G	0.713	0.471	0.271	0.109	-0.017
I	-0.122	-0.081	-0.063	-0.053	-0.045
K^{s}	0.677	0.433	0.242	0.093	-0.023
L^{s}	-0.123	-0.081	-0.063	-0.052	-0.045
R	0.651	0.406	0.221	0.078	-0.031
T	0.713	0.471	0.271	0.109	-0.017
U	0.832	0.539	0.308	0.125	-0.016
W	-0.105	-0.07	-0.056	-0.049	-0.045
Y	-0.117	-0.078	-0.061	-0.052	-0.045
Y^{j}	-0.117	-0.078	-0.061	-0.052	-0.045
Y^{s}	-0.117	-0.078	-0.061	-0.052	-0.045
Z	0.644	0.368	0.159	0.006	-0.102

18 Impulse response functions

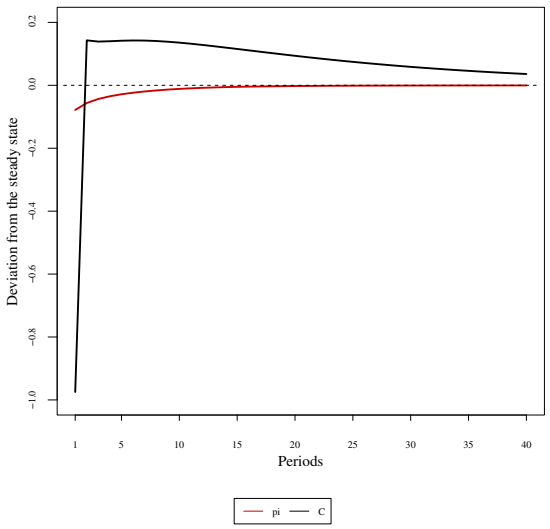

Figure 1: Impulse responses (π, C) to ϵ^{Z} shock

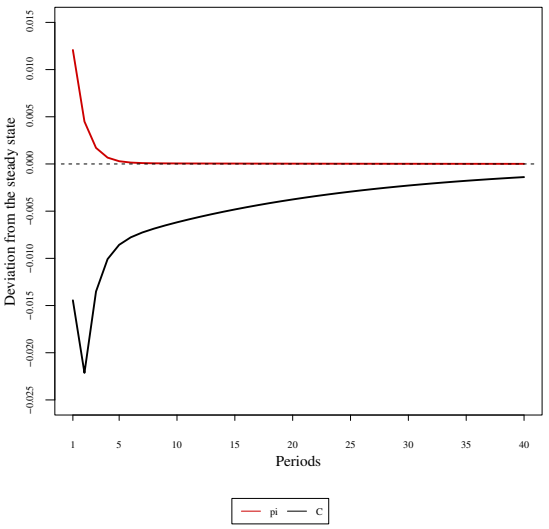

Figure 2: Impulse responses (π, C) to η^{P} shock

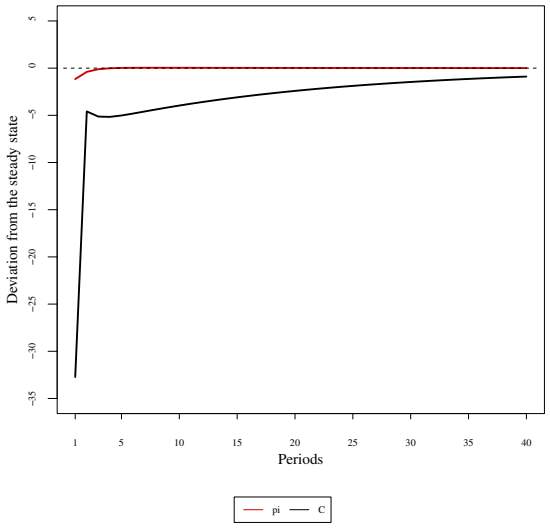

Figure 3: Impulse responses (π, C) to η^{R} shock

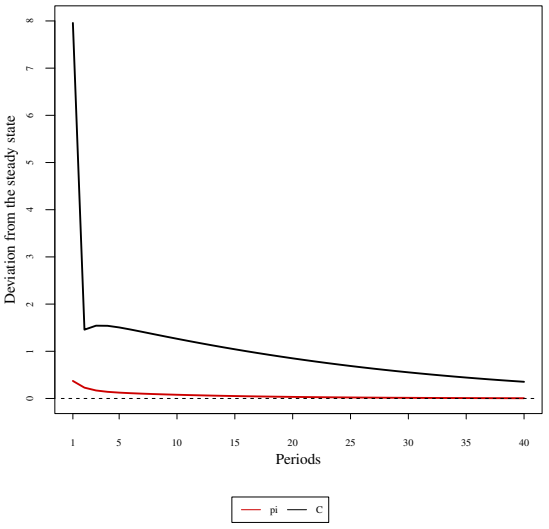

Figure 4: Impulse responses (π, C) to η^{π} shock

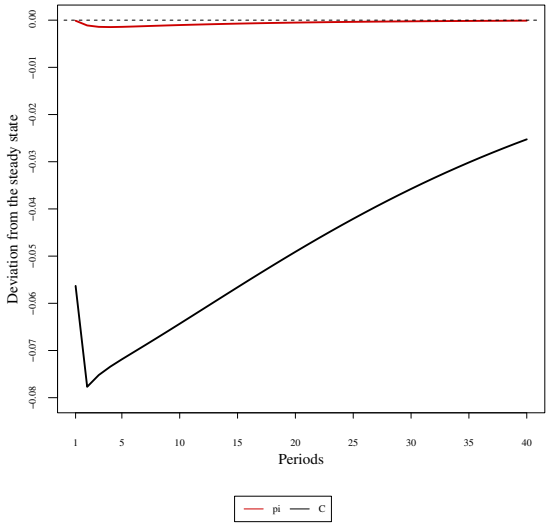

Figure 5: Impulse responses (π, C) to η^{G} shock

19 Impulse response functions

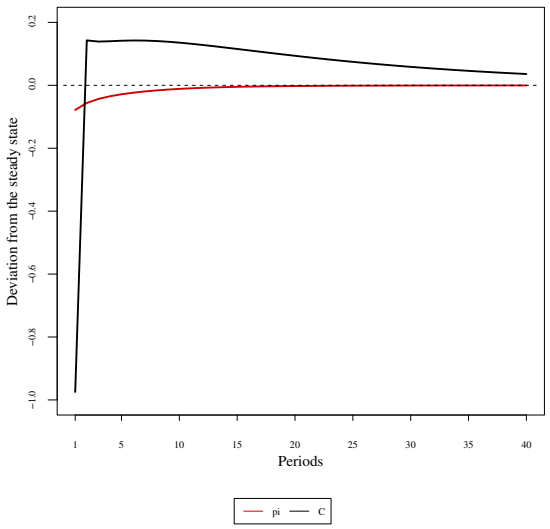

Figure 6: Impulse responses (π, C) to ϵ^{Z} shock

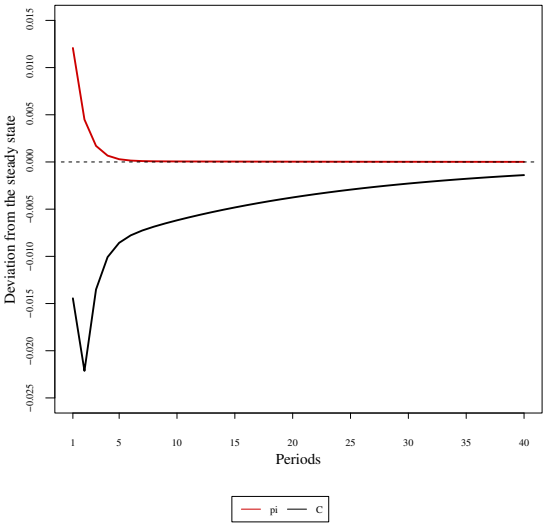

Figure 7: Impulse responses (π, C) to η^{p} shock

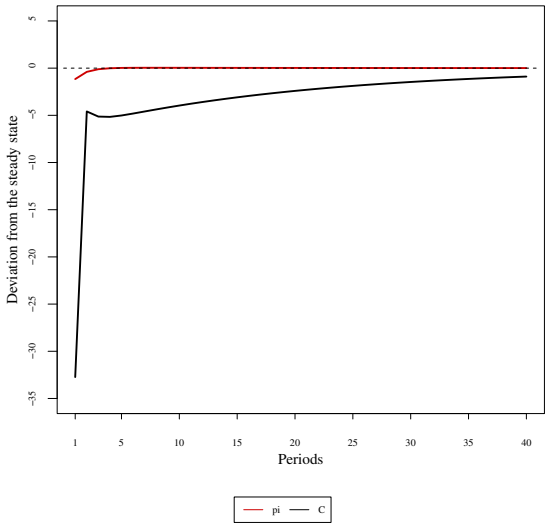

Figure 8: Impulse responses (π, C) to η^{R} shock

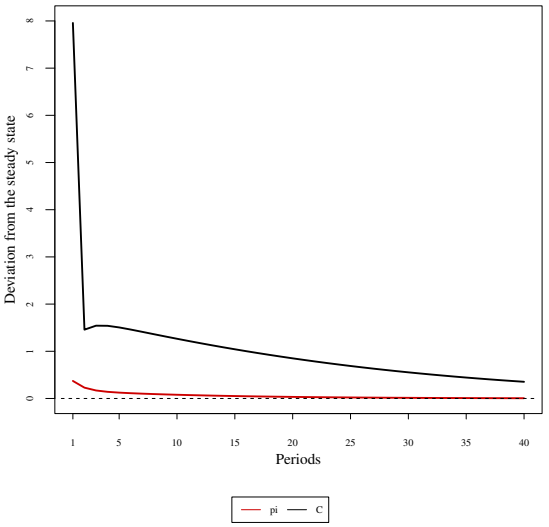

Figure 9: Impulse responses (π, C) to η^{π} shock

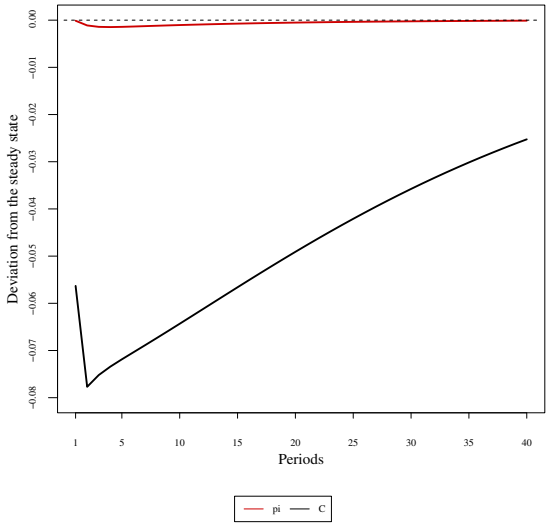

Figure 10: Impulse responses (π, C) to η^{G} shock

20 Impulse response functions

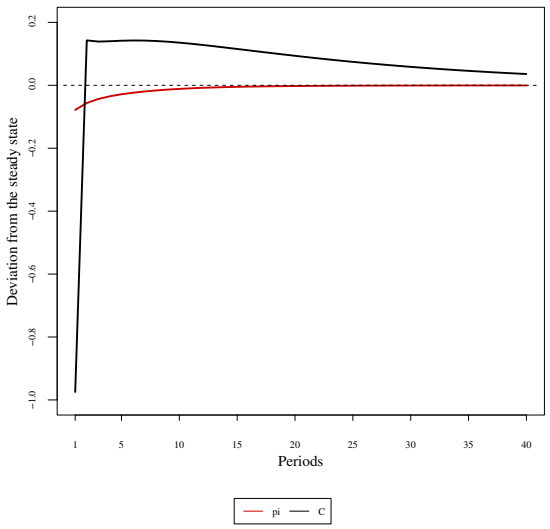

Figure 11: Impulse responses (π, C) to ϵ^{Z} shock

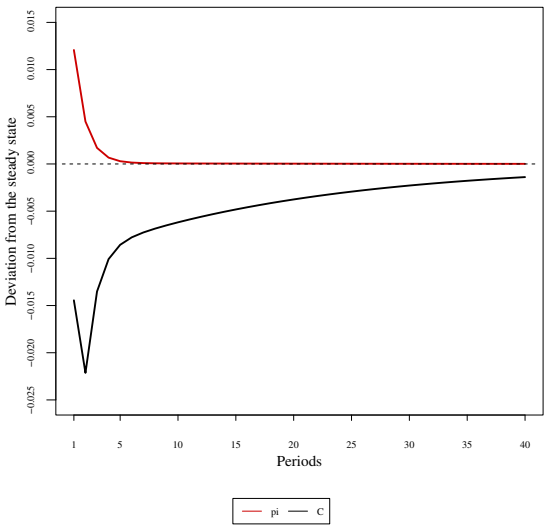

Figure 12: Impulse responses (π, C) to η^{P} shock

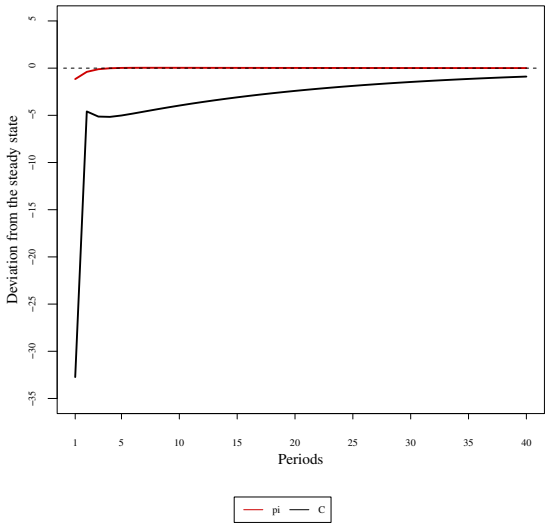

Figure 13: Impulse responses (π, C) to η^{R} shock

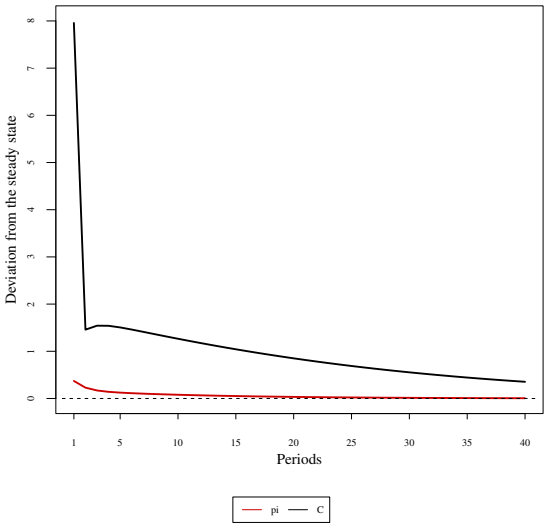

Figure 14: Impulse responses (π, C) to η^{π} shock

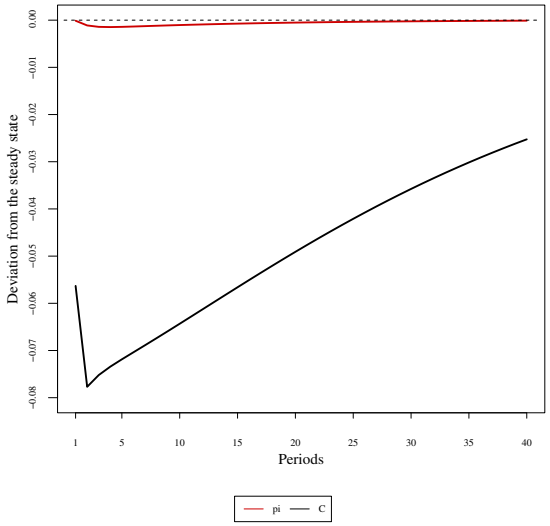

Figure 15: Impulse responses (π, C) to η^{G} shock

21 Impulse response functions

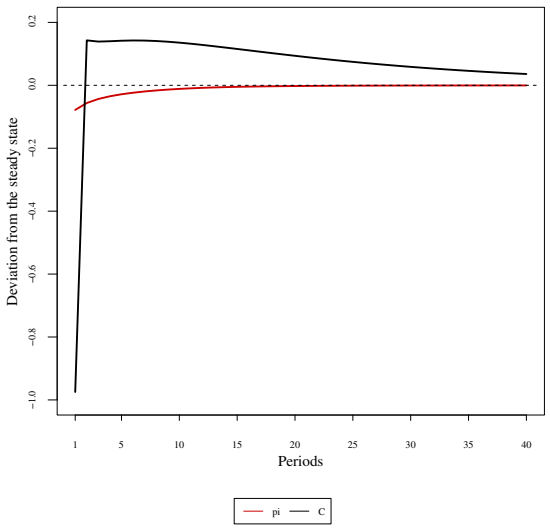

Figure 16: Impulse responses (π, C) to ϵ^{Z} shock

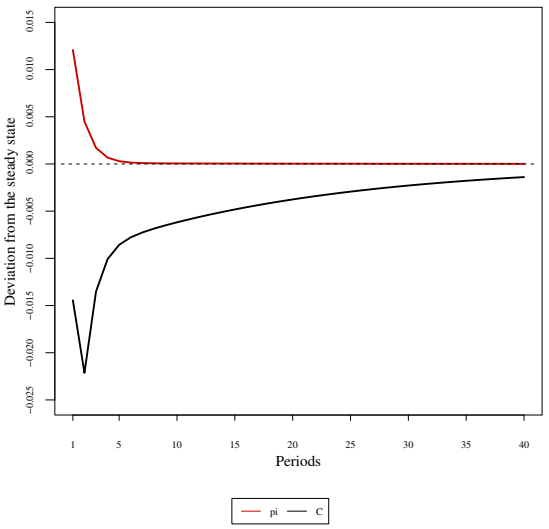

Figure 17: Impulse responses (π, C) to η^{P} shock

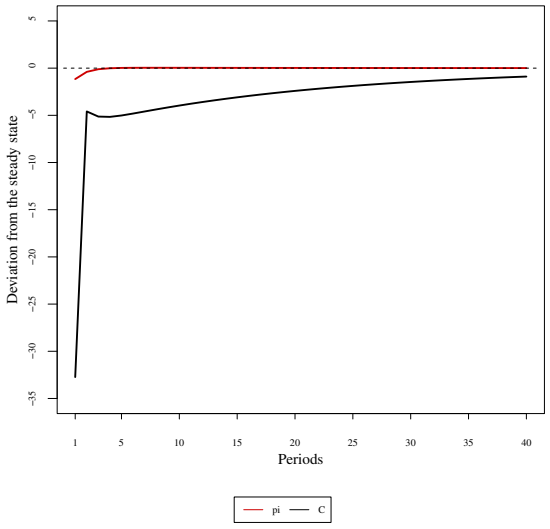

Figure 18: Impulse responses (π, C) to η^{R} shock

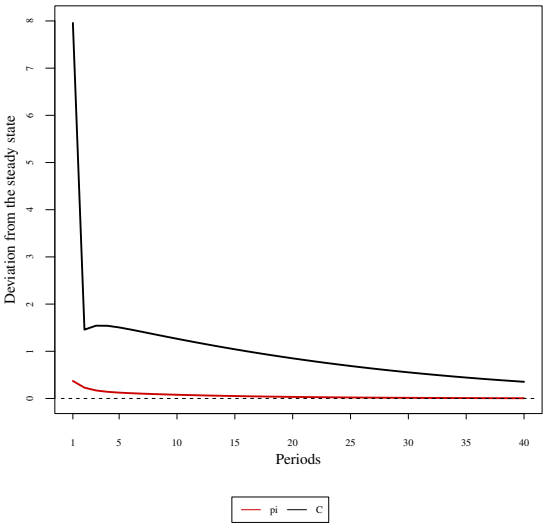

Figure 19: Impulse responses (π, C) to η^{π} shock

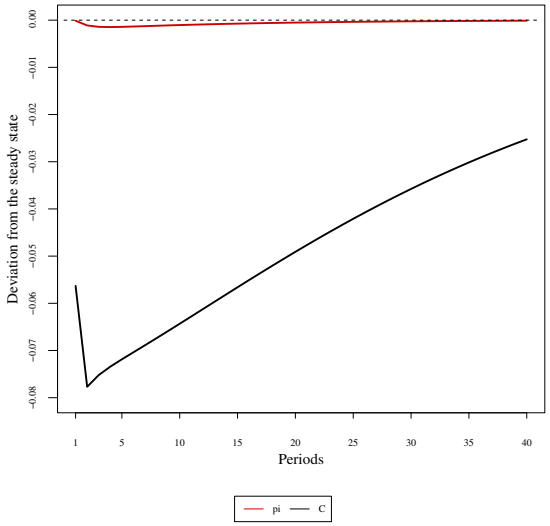

Figure 20: Impulse responses (π, C) to η^{G} shock

22 Impulse response functions

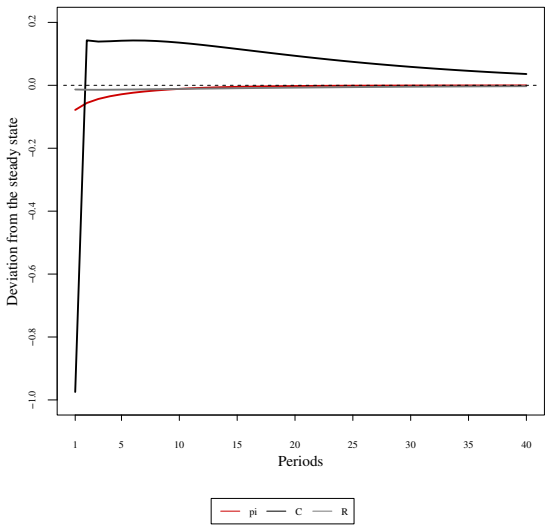

Figure 21: Impulse responses (π, C, R) to ϵ^{Z} shock

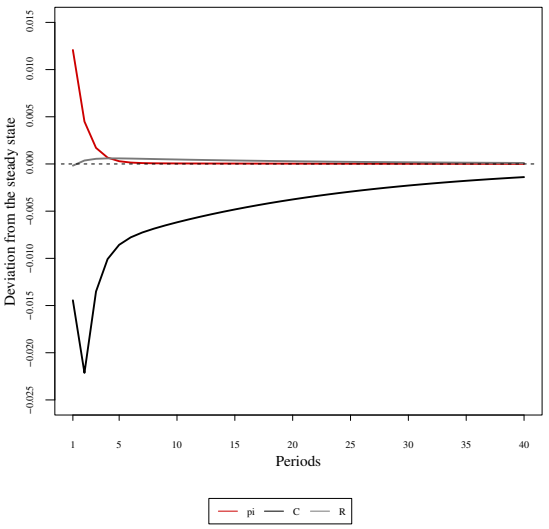

Figure 22: Impulse responses (π, C, R) to η^{P} shock

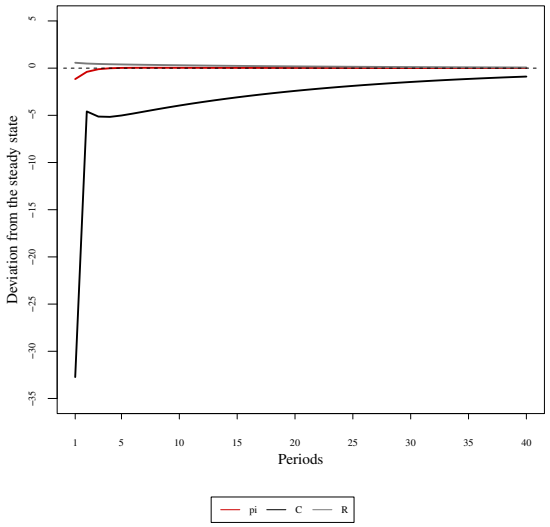

Figure 23: Impulse responses (π, C, R) to η^{R} shock

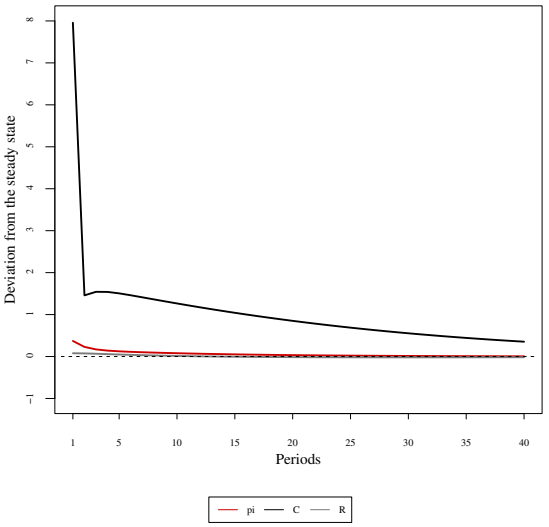

Figure 24: Impulse responses (π, C, R) to η^{π} shock

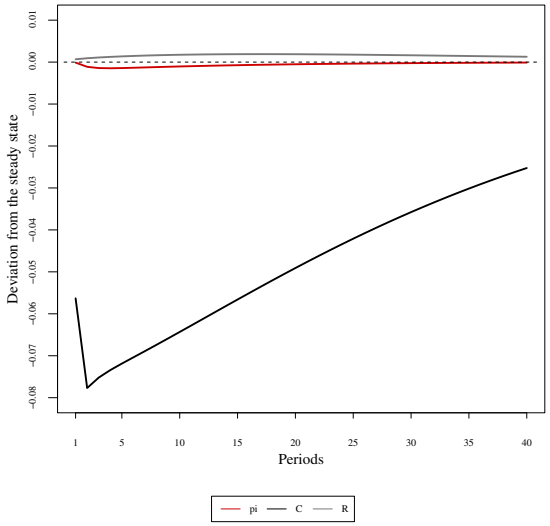

Figure 25: Impulse responses (π, C, R) to η^{G} shock