Generated on 2025-04-15 00:08:20 by `gEcon` version 1.2.1 (2023-01-18)
Model name: `NK_RS`

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

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

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

8 ENDOGENOUS REGIME PROB

8.1 Identities

$$\log inflation_t^{\mathrm{gap}} = -\log {perceived_t^{\pi}}^{\mathrm{obj}} + \log \pi_t \tag{8.1}$$

$$pL_t = \left(1 + e^{pLss - \kappa \log inflation_t^{\mathrm{gap}}}\right)^{-1} \tag{8.2}$$

$$pH_t = 1 - pL_t \tag{8.3}$$

$$\log {perceived_t^{\pi}}^{\mathrm{obj}} = pH_t \log \pi^{\mathrm{H}} + pL_t \log \pi_t \tag{8.4}$$

9 GOVERNMENT

9.1 Identities

$$G_t = G^{\mathrm{bar}} \epsilon_t^{\mathrm{G}} \tag{9.1}$$

$$G_t + B_{t-1}{\pi_t}^{-1} = T_t + B_t {R_t}^{-1} \tag{9.2}$$

10 GOVERNMENT SPENDING SHOCK

10.1 Identities

$$\log \epsilon_t^{\mathrm{G}} = \eta_t^{\mathrm{G}} + \rho^{\mathrm{G}} \log \epsilon_{t-1}^{\mathrm{G}} \tag{10.1}$$

11 TECHNOLOGY

11.1 Identities

$$Z_t = e^{\epsilon_t^{\mathrm{Z}} + \rho^{\mathrm{a}} \log Z_{t-1}} \tag{11.1}$$

12 Equilibrium relationships (after reduction)

$$-B_t = 0 \tag{12.1}$$

$$-\lambda_t + q_t = 0 \tag{12.2}$$

$$-\lambda_t + \mu {C_t}^{-1+\mu} (1 - L_t^{\mathrm{s}})^{1-\mu} \left({C_t}^{\mu} (1 - L_t^{\mathrm{s}})^{1-\mu} \right)^{-\eta} = 0 \tag{12.3}$$

$$-pL_t + \left(1 + e^{pLss - \kappa \log inflation_t^{\mathrm{gap}}} \right)^{-1} = 0 \tag{12.4}$$

$$-q_t + \beta \left((1 - \delta) \, \mathrm{E}_t \left[q_{t+1} \right] + \mathrm{E}_t \left[\lambda_{t+1} r_{t+1} \right] \right) = 0 \tag{12.5}$$

$$-r_t + \alpha mc_t Z_t {K_{t-1}^{\mathrm{s}}}^{-1+\alpha} L_t^{\mathrm{s}\,1-\alpha} = 0 \tag{12.6}$$

$$-G_t + G^{\mathrm{bar}} \epsilon_t^{\mathrm{G}} = 0 \tag{12.7}$$

$$-Q_t + {\lambda_t}^{-1} q_t = 0 \tag{12.8}$$

$$-W_t + mc_t Z_t \left(1 - \alpha \right) {K_{t-1}^{\mathrm{s}}}^{\alpha} L_t^{\mathrm{s}\,-\alpha} = 0 \tag{12.9}$$

$$-Y_t^{\mathrm{j}} + Z_t {K_{t-1}^{\mathrm{s}}}^{\alpha} L_t^{\mathrm{s}\,1-\alpha} = 0 \tag{12.10}$$

$$Y_t^{\mathrm{j}} - Y_t^{\mathrm{s}} = 0 \tag{12.11}$$

$$Y_t^{\mathrm{s}} - \nu_t^{\mathrm{p}} Y_t = 0 \tag{12.12}$$

$$-Z_t + e^{\epsilon_t^{\mathrm{Z}} + \rho^{\mathrm{a}} \log Z_{t-1}} = 0 \tag{12.13}$$

$$\beta \mathrm{E}_t \left[{\lambda_{t+1} \pi_{t+1}}^{-1} \right] - \lambda_t {R_t}^{-1} = 0 \tag{12.14}$$

$$\lambda_t W_t + \left(-1 + \mu \right) {C_t}^{\mu} (1 - L_t^{\mathrm{s}})^{-\mu} \left({C_t}^{\mu} (1 - L_t^{\mathrm{s}})^{1-\mu} \right)^{-\eta} = 0 \tag{12.15}$$

$$-1+\xi^{\mathrm{p}}\left({\pi_t}^{-1}{\pi_{t-1}}^{\gamma^{\mathrm{p}}}\right)^{-\lambda^{\mathrm{p}-1}}+\left(1-\xi^{\mathrm{p}}\right)\pi_t^{\star-\lambda^{\mathrm{p}-1}}=0 \tag{12.16}$$

$$1-pH_t-pL_t=0 \tag{12.17}$$

$$\eta_t^{\mathrm{p}}-g_t^1+g_t^2\left(1+\lambda^{\mathrm{p}}\right)=0 \tag{12.18}$$

$$\eta_t^{\mathrm{G}}-\log\epsilon_t^{\mathrm{G}}+\rho^{\mathrm{G}}\log\epsilon_{t-1}^{\mathrm{G}}=0 \tag{12.19}$$

$$-g_t^1+\lambda_t\pi_t^{\star}Y_t+\beta\xi^{\mathrm{p}}\pi_t^{\star}\mathrm{E}_t\left[g_{t+1}^1{\pi_{t+1}^{\star}}^{-1}\left({\pi_{t+1}}^{-1}{\pi_t}^{\gamma^{\mathrm{p}}}\right)^{-\lambda^{\mathrm{p}-1}}\right]=0 \tag{12.20}$$

$$-g_t^2+\beta\xi^{\mathrm{p}}\mathrm{E}_t\left[g_{t+1}^2\left({\pi_{t+1}}^{-1}{\pi_t}^{\gamma^{\mathrm{p}}}\right)^{-\lambda^{\mathrm{p}-1}(1+\lambda^{\mathrm{p}})}\right]+\lambda_t mc_tY_t=0 \tag{12.21}$$

$$-\nu_t^{\mathrm{p}}+\left(1-\xi^{\mathrm{p}}\right)\pi_t^{\star-\lambda^{\mathrm{p}-1}(1+\lambda^{\mathrm{p}})}+\xi^{\mathrm{p}}\nu_{t-1}^{\mathrm{p}}\left({\pi_t}^{-1}{\pi_{t-1}}^{\gamma^{\mathrm{p}}}\right)^{-\lambda^{\mathrm{p}-1}(1+\lambda^{\mathrm{p}})}=0 \tag{12.22}$$

$$I_t-K_t^{\mathrm{s}}+K_{t-1}^{\mathrm{s}}\left(1-\delta\right)=0 \tag{12.23}$$

$$U_t-\beta\mathrm{E}_t\left[U_{t+1}\right]-\left(1-\eta\right)^{-1}\left({C_t}^{\mu}(1-L_t^{\mathrm{s}})^{1-\mu}\right)^{1-\eta}=0 \tag{12.24}$$

$$-\log inflation_t^{\mathrm{gap}}-\log perceived_t^{\pi^{\mathrm{obj}}}+\log\pi_t=0 \tag{12.25}$$

$$-\log perceived_t^{\pi^{\mathrm{obj}}}+pH_t\log\pi^{\mathrm{H}}+pL_t\log\pi_t=0 \tag{12.26}$$

$$\eta_t^{\pi}-\log\pi_t^{\mathrm{obj}}+\rho^{\pi^{\mathrm{bar}}}\log\pi_{t-1}^{\mathrm{obj}}+\log perceived_t^{\pi^{\mathrm{obj}}}\left(1-\rho^{\pi^{\mathrm{bar}}}\right)=0 \tag{12.27}$$

$$-Div_t+Y_t-K_{t-1}^{\mathrm{s}}r_t-L_t^{\mathrm{s}}W_t=0 \tag{12.28}$$

$$-G_t+T_t-B_{t-1}{\pi_t}^{-1}+B_tR_t{}^{-1}=0 \tag{12.29}$$

$$-addr^{\pi}+\eta_t^{\mathrm{R}}-\log\left({R_{\mathrm{ss}}}^{-1}R_t\right)+\rho\log\left({R_{\mathrm{ss}}}^{-1}R_{t-1}\right)+\left(1-\rho\right)\left(\log\pi_t^{\mathrm{obj}}+r^{\pi}\left(-\log\pi_t^{\mathrm{obj}}+\log\left({\pi_{\mathrm{ss}}}^{-1}\pi_{t-1}\right)\right)+r^{\mathrm{Y}}\log\left({Y_{\mathrm{ss}}}^{-1}Y_t\right)\right)=0 \tag{12.30}$$

$$-C_t+Div_t-I_t-T_t+B_{t-1}{\pi_t}^{-1}+K_{t-1}^{\mathrm{s}}r_t-B_tR_t{}^{-1}+L_t^{\mathrm{s}}W_t=0 \tag{12.31}$$

13 Steady state relationships (after reduction)

$$-B_{\rm ss} = 0 \tag{13.1}$$

$$-\lambda_{\rm ss} + q_{\rm ss} = 0 \tag{13.2}$$

$$-\lambda_{\rm ss} + \mu {C_{\rm ss}}^{-1+\mu} (1 - L^{\rm s}_{\rm ss})^{1-\mu} \left({C_{\rm ss}}^{\mu} (1 - L^{\rm s}_{\rm ss})^{1-\mu} \right)^{-\eta} = 0 \tag{13.3}$$

$$-pL_{\rm ss} + \left(1 + e^{pLss - \kappa \log inflation^{\rm gap}_{\rm ss}} \right)^{-1} = 0 \tag{13.4}$$

$$-q_{\rm ss} + \beta \left(\lambda_{\rm ss} r_{\rm ss} + q_{\rm ss} \left(1 - \delta \right) \right) = 0 \tag{13.5}$$

$$-r_{\rm ss} + \alpha mc_{\rm ss} Z_{\rm ss} {K^{\rm s}_{\rm ss}}^{-1+\alpha} {L^{\rm s}_{\rm ss}}^{1-\alpha} = 0 \tag{13.6}$$

$$-G_{\rm ss} + G^{\rm bar} \epsilon^{\rm G}_{\rm ss} = 0 \tag{13.7}$$

$$-Q_{\rm ss} + {\lambda_{\rm ss}}^{-1} q_{\rm ss} = 0 \tag{13.8}$$

$$-W_{\rm ss} + mc_{\rm ss} Z_{\rm ss} \left(1 - \alpha \right) {K^{\rm s}_{\rm ss}}^{\alpha} {L^{\rm s}_{\rm ss}}^{-\alpha} = 0 \tag{13.9}$$

$$-Y^{\rm j}_{\rm ss} + Z_{\rm ss} {K^{\rm s}_{\rm ss}}^{\alpha} {L^{\rm s}_{\rm ss}}^{1-\alpha} = 0 \tag{13.10}$$

$$Y^{\rm j}_{\rm ss} - Y^{\rm s}_{\rm ss} = 0 \tag{13.11}$$

$$Y^{\rm s}_{\rm ss} - \nu^{\rm p}_{\rm ss} Y_{\rm ss} = 0 \tag{13.12}$$

$$-Z_{\rm ss} + e^{\rho^{\rm a} \log Z_{\rm ss}} = 0 \tag{13.13}$$

$$-\lambda_{\rm ss} {R_{\rm ss}}^{-1} + \beta \lambda_{\rm ss} {\pi_{\rm ss}}^{-1} = 0 \tag{13.14}$$

$$\lambda_{\rm ss} W_{\rm ss} + \left(-1 + \mu \right) {C_{\rm ss}}^{\mu} (1 - L^{\rm s}_{\rm ss})^{-\mu} \left({C_{\rm ss}}^{\mu} (1 - L^{\rm s}_{\rm ss})^{1-\mu} \right)^{-\eta} = 0 \tag{13.15}$$

$$-1 + \xi^{\rm p} \left({\pi_{\rm ss}}^{-1} {\pi_{\rm ss}}^{\gamma^{\rm p}} \right)^{-\lambda^{\rm p}{}^{-1}} + \left(1 - \xi^{\rm p} \right) {\pi^{\star}_{\rm ss}}^{-\lambda^{\rm p}{}^{-1}} = 0 \tag{13.16}$$

$$1 - pH_{\rm ss} - pL_{\rm ss} = 0 \tag{13.17}$$

$$-g^1_{\rm ss} + g^2_{\rm ss} \left(1 + \lambda^{\rm p} \right) = 0 \tag{13.18}$$

$$-\log \epsilon^{\rm G}_{\rm ss} + \rho^{\rm G} \log \epsilon^{\rm G}_{\rm ss} = 0 \tag{13.19}$$

$$-g^1_{\rm ss} + \lambda_{\rm ss} \pi^{\star}_{\rm ss} Y_{\rm ss} + \beta \xi^{\rm p} g^1_{\rm ss} \left({\pi_{\rm ss}}^{-1} {\pi_{\rm ss}}^{\gamma^{\rm p}} \right)^{-\lambda^{\rm p}{}^{-1}} = 0 \tag{13.20}$$

$$-g^2_{\rm ss} + \lambda_{\rm ss} mc_{\rm ss} Y_{\rm ss} + \beta \xi^{\rm p} g^2_{\rm ss} \left({\pi_{\rm ss}}^{-1} {\pi_{\rm ss}}^{\gamma^{\rm p}} \right)^{-\lambda^{\rm p}{}^{-1}(1+\lambda^{\rm p})} = 0 \tag{13.21}$$

$$-\nu^{\rm p}_{\rm ss} + \left(1 - \xi^{\rm p} \right) {\pi^{\star}_{\rm ss}}^{-\lambda^{\rm p}{}^{-1}(1+\lambda^{\rm p})} + \xi^{\rm p} \nu^{\rm p}_{\rm ss} \left({\pi_{\rm ss}}^{-1} {\pi_{\rm ss}}^{\gamma^{\rm p}} \right)^{-\lambda^{\rm p}{}^{-1}(1+\lambda^{\rm p})} = 0 \tag{13.22}$$

$$I_{\mathrm{ss}} - K^{\mathrm{s}}_{\mathrm{ss}} + K^{\mathrm{s}}_{\mathrm{ss}}\,(1-\delta) = 0 \tag{13.23}$$

$$U_{\mathrm{ss}} - \beta U_{\mathrm{ss}} - (1-\eta)^{-1}\left({C_{\mathrm{ss}}}^{\mu}(1-L^{\mathrm{s}}_{\mathrm{ss}})^{1-\mu}\right)^{1-\eta} = 0 \tag{13.24}$$

$$-\log \mathit{inflation}^{\mathrm{gap}}_{\mathrm{ss}} - \log \mathit{perceived}^{\pi^{\mathrm{obj}}}_{\mathrm{ss}} + \log \pi_{\mathrm{ss}} = 0 \tag{13.25}$$

$$-\log \mathit{perceived}^{\pi^{\mathrm{obj}}}_{\mathrm{ss}} + \mathit{pH}_{\mathrm{ss}} \log \pi^{\mathrm{H}} + \mathit{pL}_{\mathrm{ss}} \log \pi_{\mathrm{ss}} = 0 \tag{13.26}$$

$$-\log \pi^{\mathrm{obj}}_{\mathrm{ss}} + {\rho^{\pi}}^{\mathrm{bar}} \log \pi^{\mathrm{obj}}_{\mathrm{ss}} + \log \mathit{perceived}^{\pi^{\mathrm{obj}}}_{\mathrm{ss}}\left(1-{\rho^{\pi}}^{\mathrm{bar}}\right) = 0 \tag{13.27}$$

$$-\mathit{Div}_{\mathrm{ss}} + Y_{\mathrm{ss}} - r_{\mathrm{ss}} K^{\mathrm{s}}_{\mathrm{ss}} - L^{\mathrm{s}}_{\mathrm{ss}} W_{\mathrm{ss}} = 0 \tag{13.28}$$

$$-G_{\mathrm{ss}} + T_{\mathrm{ss}} - {\pi_{\mathrm{ss}}}^{-1} B_{\mathrm{ss}} + B_{\mathrm{ss}} {R_{\mathrm{ss}}}^{-1} = 0 \tag{13.29}$$

$$-\mathit{add}r^{\pi} + (1-\rho)\left(\log \pi^{\mathrm{obj}}_{\mathrm{ss}} - r^{\pi} \log \pi^{\mathrm{obj}}_{\mathrm{ss}}\right) = 0 \tag{13.30}$$

$$-C_{\mathrm{ss}} + \mathit{Div}_{\mathrm{ss}} - I_{\mathrm{ss}} - T_{\mathrm{ss}} + {\pi_{\mathrm{ss}}}^{-1} B_{\mathrm{ss}} + r_{\mathrm{ss}} K^{\mathrm{s}}_{\mathrm{ss}} - B_{\mathrm{ss}} {R_{\mathrm{ss}}}^{-1} + L^{\mathrm{s}}_{\mathrm{ss}} W_{\mathrm{ss}} = 0 \tag{13.31}$$

14 Calibrating equations

$$-0.18 + G_{\mathrm{ss}} {Y_{\mathrm{ss}}}^{-1} = 0 \tag{14.1}$$

$$-0.05 + \mathit{pL}_{\mathrm{ss}} = 0 \tag{14.2}$$

$$\pi_{\mathrm{ss}} - \pi^{\mathrm{obj}}_{\mathrm{ss}} = 0 \tag{14.3}$$

15 Parameter settings

$$\alpha = 0.3 \tag{15.1}$$

$$\beta = 0.99 \tag{15.2}$$

$$\delta = 0.025 \tag{15.3}$$

$$\eta = 2 \tag{15.4}$$

$$\gamma^{\mathrm{p}} = 0.469 \tag{15.5}$$

$$\kappa = 0.001 \tag{15.6}$$

$$\lambda^{\mathrm{p}} = 0.5 \tag{15.7}$$

$$\mu = 0.3 \tag{15.8}$$

$$\pi^{\mathrm{H}} = 1 \tag{15.9}$$

$$r^{\pi} = 1.684 \tag{15.10}$$

$$r^{\mathrm{Y}} = 0.099 \tag{15.11}$$

$$\rho = 0.961 \tag{15.12}$$

$$\rho^{\pi^{\mathrm{bar}}} = 0.99999 \tag{15.13}$$

$$\rho^{\mathrm{G}} = 0.949 \tag{15.14}$$

$$\rho^{\mathrm{a}} = 0.823 \tag{15.15}$$

$$\xi^{\mathrm{p}} = 0.908 \tag{15.16}$$

∞

16 Steady-state values

	Steady-state value
ϵ^{G}	1
g^1	7.3514
g^2	4.9009
$inflation^{\mathrm{gap}}$	1
λ	1.5467
mc	0.6667
ν^{p}	1
$perceived^{\pi^{\mathrm{obj}}}$	1
π	1
$\pi^{\star}$	1
π^{obj}	1
pH	0.95
pL	0.05
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

17 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	1.6811	0	−0.0399	−1.1151	−0.0644
π^{obj}_t	0	0	0	1	0	0	0	0
B_t	0	0	0	0	0	0	0	0
K^{s}_t	0.0052	0.5527	−1.2493	15.6369	0	0.4384	−15.1013	−0.4031
R_t	0.0006	0.0147	0.0313	0.4028	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	1.6811	−0.0001
π^{obj}	0	0	0	1	0
B	0	0	0	0	0
K^{s}	−0.4898	−0.0064	−15.7141	15.637	0.0055
R	−0.0133	−0.0002	0.5687	0.4028	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	30.5507	0	−0.8826	−15.6826	−0.8627
g^2_t	0.1474	0.9164	−1.9772	30.5507	0	−0.8826	−15.6826	−0.8627
$inflation^{\mathrm{gap}}_t$	−0.0001	0.0522	0.318	1.597	0	−0.0379	−1.0594	−0.0612
λ_t	0.1179	0.1359	0.8044	−9.6327	0	−0.2745	9.2056	−0.0385
mc_t	0.0862	4.9708	−10.2156	127.2389	0	−4.181	−122.7415	−4.7403
$perceived^{\pi^{\mathrm{obj}}}_t$	0	0.0027	0.0167	0.0841	0	−0.002	−0.0558	−0.0032
$\pi^{\star}_t$	−0.0012	0.5419	−1.3251	16.5914	0	−0.3941	−11.006	−0.636
pH_t	0	0	0	−0.0001	0	0	0.0001	0
pL_t	0	0	0.0003	0.0015	0	0	−0.001	−0.0001
q_t	0.1179	0.1359	0.8044	−9.6327	0	−0.2745	9.2056	−0.0385
r_t	0.2504	9.6818	−19.1237	238.4682	0	−8.6795	−230.1011	−7.5809
C_t	−0.0534	0.9652	−2.6415	32.6656	0	−0.6513	−31.4584	−0.8022
Div_t	−0.0082	−7.9545	11.5232	−143.2487	0	4.8635	138.1234	6.6399
G_t	0.949	0	0	0	0	0	0	0
I_t	0.2078	22.1074	−49.972	625.4753	0	−21.4623	−604.0519	−16.1259
L^{s}_t	0.2346	6.7301	−12.7258	158.8988	0	−5.4265	−153.3708	−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	0.2842	0	0.0226	−0.1954	0.0162
W_t	0.0158	2.9517	−6.3979	79.5693	0	−2.2531	−76.7303	−2.3471
Y_t	0.1642	3.8031	−8.908	111.2292	0	−3.4985	−107.3595	−2.8406
Y^{j}_t	0.1642	4.7111	−8.908	111.2292	0	−3.4985	−107.3595	−2.8406
Y^{s}_t	0.1642	4.7111	−8.908	111.2292	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	30.551	0.1553
g^2	−1.0482	−0.0266	−16.319	30.551	0.1553
$inflation^{\mathrm{gap}}$	−0.0744	0.0115	−1.1024	1.597	−0.0001
λ	−0.0468	0.0052	9.5791	−9.6328	0.1243
mc	−5.7597	−0.0537	−127.7227	127.2402	0.0908
$perceived^{\pi^{\mathrm{obj}}}$	−0.0039	0.0006	−0.058	0.0841	0
$\pi^{\star}$	−0.7728	0.1192	−11.4526	16.5916	−0.0012
pH	0	0	0.0001	−0.0001	0
pL	−0.0001	0	−0.001	0.0015	0
q	−0.0468	0.0052	9.5791	−9.6328	0.1243
r	−9.2113	−0.0999	−239.4392	238.4705	0.2638
C	−0.9748	−0.0144	−32.735	32.6659	−0.0563
Div	8.0679	0.0612	143.7289	−143.2501	−0.0086
G	0	0	0	0	1
I	−19.594	−0.2554	−628.566	625.4816	0.2189
L^{s}	−6.3594	−0.066	−159.595	158.9004	0.2472
Q	0	0	0	0	0
T	0	0	0	0	1
U	0.0197	−0.0003	−0.2033	0.2842	−0.0113
W	−2.8519	−0.0339	−79.8442	79.5701	0.0167
Y	−3.4515	−0.0462	−111.7165	111.2303	0.173
Y^{j}	−3.4515	−0.0462	−111.7165	111.2303	0.173
Y^{s}	−3.4515	−0.0462	−111.7165	111.2303	0.173

18 Model statistics

18.1 Basic statistics

	Steady-state value	Std. dev.	Variance	Loglin
ϵ^{G}	1	1.3033	1.6986	Y
g^1	7.3514	33.358	1112.7559	Y
g^2	4.9009	33.3578	1112.7456	Y
$inflation^{\mathrm{gap}}$	1	1.951	3.8063	Y
λ	1.5467	17.0028	289.0956	Y
mc	0.6667	175.0727	30650.4669	Y
ν^{p}	1	0	0	Y
$perceived^{\pi^{\mathrm{obj}}}$	1	0.1027	0.0105	Y
π	1	2.0537	4.2176	Y
$\pi^{\star}$	1	18.6619	348.2657	Y
π^{obj}	1	1.2916	1.6683	Y
pH	0.95	0	0	Y
pL	0.05	0.0019	0	Y
q	1.5467	17.0028	289.0956	Y
r	0.0351	336.9019	113502.8692	Y
B	0	0	0	N
C	0.3255	42.2915	1788.5712	Y
Div	0.1601	198.6561	39464.2397	Y
G	0.0865	1.3033	1.6986	Y
I	0.0684	869.8479	756635.3236	Y
K^{s}	2.7374	27.6048	762.0272	Y
L^{s}	0.2279	220.6902	48704.1627	Y
Q	1	0	0	Y
R	1.0101	0.8993	0.8087	Y
T	0.0865	1.3033	1.6986	Y
U	-167.8256	0.8196	0.6718	Y
W	0.9837	106.4011	11321.1878	Y
Y	0.4804	151.6066	22984.5699	Y
Y^{j}	0.4804	151.6066	22984.5699	Y
Y^{s}	0.4804	151.6066	22984.5699	Y
Z	1	1.227	1.5056	Y

18.2 Correlation matrix

	ϵ^{G}	g^1	g^2	$inflation^{\mathrm{gap}}$	λ	mc	$percieved^{\pi^{\mathrm{obj}}}$	π	$\pi^\star$	π^{obj}	pL	q	
ϵ^{G}	1	0.006	0.006	-0.001	0.01	0	-0.001	-0.001	-0.001	0	-0.001	0.01	
g^1		1	1	0.845	-0.464	0.92	0.845	0.845	0.983	0.546	0.845	-0.464	0.
g^2			1	0.845	-0.464	0.92	0.845	0.845	0.983	0.546	0.845	-0.464	0.
$inflation^{\mathrm{gap}}$				1	-0.8	0.758	1	1	0.884	0.753	1	-0.8	0.
λ					1	-0.443	-0.8	-0.8	-0.58	-0.702	-0.8	1	-0.
mc						1	0.758	0.758	0.953	0.251	0.758	-0.443	0.
$percieved^{\pi^{\mathrm{obj}}}$							1	1	0.884	0.753	1	-0.8	0.
π								1	0.884	0.753	1	-0.8	0.
$\pi^\star$									1	0.529	0.884	-0.58	0.
π^{obj}										1	0.753	-0.702	0.
pL											1	-0.8	0.
q												1	-0.
r													
C													
Div													
G													
I													
K^{s}													
L^{s}													
R													
T													
U													
W													
Y													
Y^{j}													
Y^{s}													
Z													

18.3 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}	0.635	0	0	-0.001	-0.001	-0.001	-0.001	0	0	0	0	0
g_t^1	16.243	-0.018	0.017	0.073	0.173	0.376	0.845	-0.13	-0.084	-0.073	-0.072	-0.07
g_t^2	16.243	-0.018	0.017	0.073	0.173	0.376	0.845	-0.13	-0.084	-0.073	-0.072	-0.07
$inflation_t^{\mathrm{gap}}$	0.95	-0.084	-0.047	0.017	0.139	0.397	1	0.397	0.139	0.017	-0.047	-0.08
λ_t	8.279	0.154	0.14	0.101	0.007	-0.222	-0.8	-0.568	-0.392	-0.251	-0.139	-0.04
mc_t	85.249	-0.007	0.009	0.042	0.115	0.294	0.758	-0.255	-0.193	-0.156	-0.128	-0.10
$perceived_t^{\pi^{\mathrm{obj}}}$	0.05	-0.084	-0.047	0.017	0.139	0.397	1	0.397	0.139	0.017	-0.047	-0.08
π_t	1	-0.084	-0.047	0.017	0.139	0.397	1	0.397	0.139	0.017	-0.047	-0.08
$\pi_t^\star$	9.087	-0.038	-0.008	0.043	0.142	0.36	0.884	-0.078	-0.051	-0.052	-0.06	-0.06
π_t^{obj}	0.629	-0.114	-0.067	0.005	0.121	0.329	0.753	0.567	0.406	0.269	0.155	0.06
pL_t	0.001	-0.084	-0.047	0.017	0.139	0.397	1	0.397	0.139	0.017	-0.047	-0.08
q_t	8.279	0.154	0.14	0.101	0.007	-0.222	-0.8	-0.568	-0.392	-0.251	-0.139	-0.04
r_t	164.049	0.004	0.019	0.05	0.119	0.287	0.722	-0.304	-0.228	-0.179	-0.142	-0.11
C_t	20.593	-0.05	-0.033	0.006	0.094	0.311	0.865	-0.051	-0.05	-0.059	-0.068	-0.07
Div_t	96.732	0.004	-0.012	-0.044	-0.116	-0.292	-0.747	0.27	0.204	0.163	0.133	0.10
G_t	0.635	0	0	-0.001	-0.001	-0.001	-0.001	0	0	0	0	0
I_t	423.558	-0.002	0.013	0.045	0.116	0.291	0.743	-0.275	-0.208	-0.166	-0.134	-0.10
K_t^{s}	13.442	-0.154	-0.139	-0.1	-0.006	0.223	0.803	0.566	0.388	0.248	0.136	0.04
L_t^{s}	107.461	-0.003	0.013	0.045	0.116	0.292	0.745	-0.273	-0.206	-0.165	-0.134	-0.10
R_t	0.438	0.004	0.053	0.11	0.169	0.206	0.161	0.188	0.163	0.123	0.083	0.04
T_t	0.635	0	0	-0.001	-0.001	-0.001	-0.001	0	0	0	0	0
U_t	0.399	-0.168	-0.155	-0.122	-0.045	0.133	0.566	0.759	0.537	0.361	0.22	0.10
W_t	51.81	-0.022	-0.005	0.03	0.109	0.302	0.8	-0.187	-0.146	-0.124	-0.109	-0.09
Y_t	73.822	-0.011	0.005	0.038	0.113	0.297	0.771	-0.235	-0.179	-0.147	-0.123	-0.10
Y_t^{j}	73.822	-0.011	0.005	0.038	0.113	0.297	0.771	-0.235	-0.179	-0.147	-0.123	-0.10
Y_t^{s}	73.822	-0.011	0.005	0.038	0.113	0.297	0.771	-0.235	-0.179	-0.147	-0.123	-0.10
Z_t	0.597	0.005	0.002	-0.004	-0.012	-0.024	-0.043	-0.028	-0.016	-0.008	-0.001	0.00

18.4 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	-0.035	-0.013	-0.016	-0.025	-0.034
g^2	-0.035	-0.013	-0.016	-0.025	-0.034
$inflation^{\mathrm{gap}}$	0.397	0.139	0.017	-0.047	-0.084
λ	0.686	0.443	0.25	0.097	-0.022
mc	-0.114	-0.079	-0.063	-0.053	-0.046
$perceived\pi^{\mathrm{obj}}$	0.397	0.139	0.017	-0.047	-0.084
π	0.397	0.139	0.017	-0.047	-0.084
$\pi^{\star}$	-0.059	-0.029	-0.026	-0.031	-0.037
π^{obj}	0.721	0.484	0.286	0.125	-0.002
pL	0.397	0	0	0	0
q	0.686	0.443	0.25	0.097	-0.022
r	-0.117	-0.081	-0.064	-0.054	-0.046
C	-0.026	-0.021	-0.028	-0.037	-0.044
Div	-0.116	-0.08	-0.063	-0.054	-0.046
G	0.713	0.471	0.271	0.109	-0.017
I	-0.116	-0.08	-0.064	-0.054	-0.046
K^{s}	0.682	0.439	0.246	0.095	-0.023
L^{s}	-0.116	-0.08	-0.063	-0.054	-0.046
R	0.71	0.475	0.283	0.127	0.004
T	0.713	0.471	0.271	0.109	-0.017
U	0.836	0.544	0.312	0.128	-0.015
W	-0.098	-0.068	-0.056	-0.05	-0.046
Y	-0.111	-0.076	-0.061	-0.053	-0.046
Y^{j}	-0.111	-0.076	-0.061	-0.053	-0.046
Y^{s}	-0.111	-0.076	-0.061	-0.053	-0.046
Z	0.644	0.368	0.159	0.006	-0.102

19 Impulse response functions

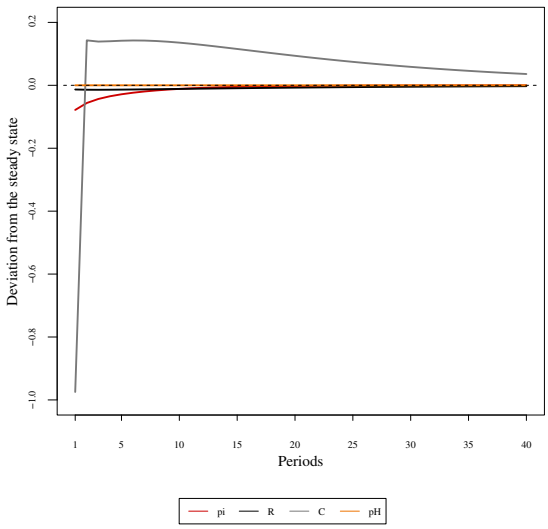

Figure 1: Impulse responses (π, R, C, pH) to ϵ^{Z} shock

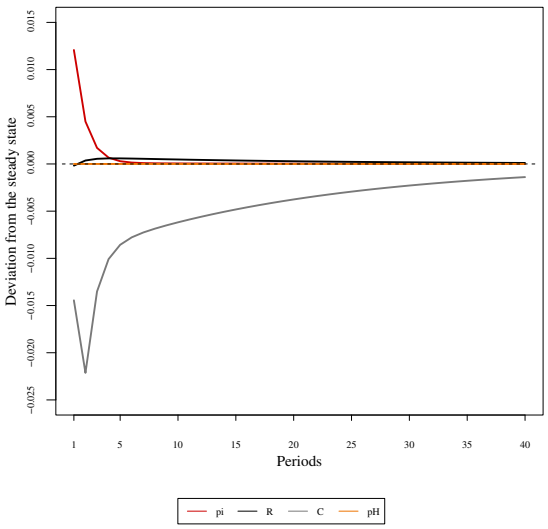

Figure 2: Impulse responses (π, R, C, pH) to η^{P} shock

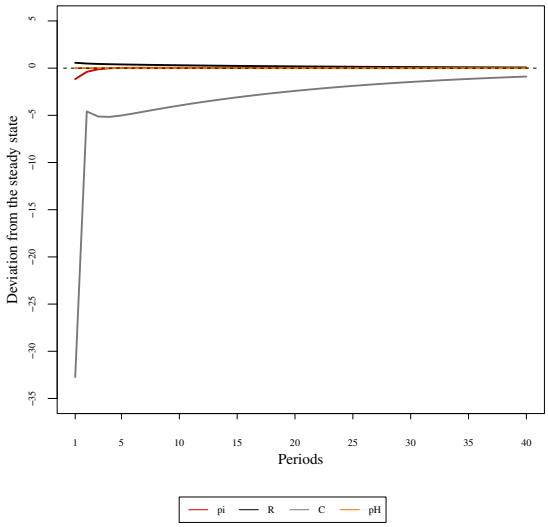

Figure 3: Impulse responses (π, R, C, pH) to η^{R} shock

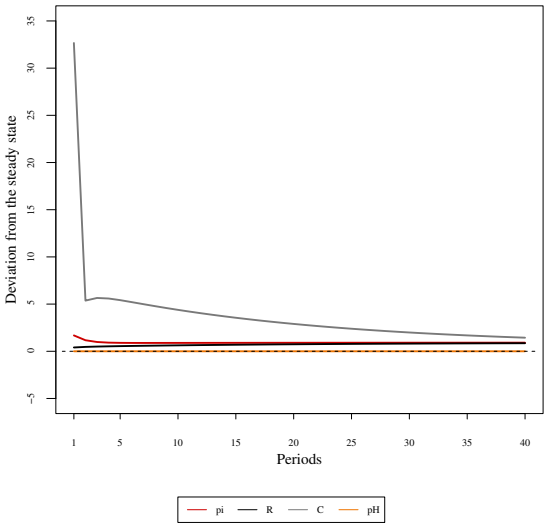

Figure 4: Impulse responses (π, R, C, pH) to η^{π} shock

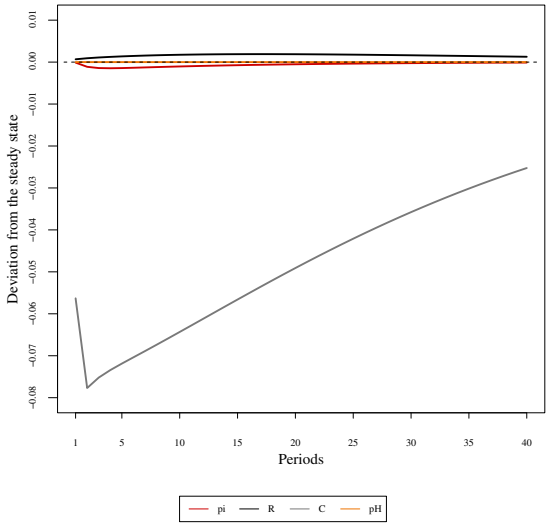

Figure 5: Impulse responses (π, R, C, pH) to η^{G} shock