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1 CONSUMER

1.1 Optimisation problem

$$\max_{K_t^{\mathrm{m}},K_t^{\mathrm{h}},C_t^{\mathrm{m}},C_t^{\mathrm{h}},N_t^{\mathrm{m}},N_t^{\mathrm{h}},I_t^{\mathrm{m}},I_t^{\mathrm{h}}} U_t = \beta \mathrm{E}_t\left[U_{t+1}\right] + \log\left(1 - N_t^{\mathrm{m}} - N_t^{\mathrm{h}}\right)(1-b) + be^{-1}\log\left(aC_t^{\mathrm{m}^e} + (1-a)\,C_t^{\mathrm{h}^e}\right) \tag{1.1}$$

s.t. :

$$C_t^{\mathrm{m}} + I_t^{\mathrm{m}} + I_t^{\mathrm{h}} = \pi_t + K_{t-1}^{\mathrm{m}} r_t + N_t^{\mathrm{m}} W_t \quad \left(\lambda_t^{\mathrm{CONSUMER}^1}\right) \tag{1.2}$$

$$K_t^{\mathrm{m}} = I_t^{\mathrm{m}} + K_{t-1}^{\mathrm{m}}(1-\delta) \quad \left(\lambda_t^{\mathrm{CONSUMER}^2}\right) \tag{1.3}$$

$$K_t^{\mathrm{h}} = I_t^{\mathrm{h}} + K_{t-1}^{\mathrm{h}}(1-\delta) \quad \left(\lambda_t^{\mathrm{CONSUMER}^3}\right) \tag{1.4}$$

$$C_t^{\mathrm{h}} = \Gamma Z_t^{\mathrm{h}} {K_{t-1}^{\mathrm{h}}}^{\theta} {N_t^{\mathrm{h}}}^{1-\theta} \quad \left(\lambda_t^{\mathrm{CONSUMER}^4}\right) \tag{1.5}$$

1.2 Identities

$$K_t = K_t^{\mathrm{m}} + K_t^{\mathrm{h}} \tag{1.6}$$

$$I_t = I_t^{\mathrm{m}} + I_t^{\mathrm{h}} \tag{1.7}$$

$$N_t = N_t^{\mathrm{m}} + N_t^{\mathrm{h}} \tag{1.8}$$

1.3 First order conditions

$$-\lambda_t^{\mathrm{CONSUMER}^2} + \beta\left((1-\delta)\,\mathrm{E}_t\left[\lambda_{t+1}^{\mathrm{CONSUMER}^2}\right] + \mathrm{E}_t\left[\lambda_{t+1}^{\mathrm{CONSUMER}^1} r_{t+1}\right]\right) = 0 \quad \left(K_t^{\mathrm{m}}\right) \tag{1.9}$$

$$-\lambda_t^{\mathrm{CONSUMER}^3} + \beta\left((1-\delta)\,\mathrm{E}_t\left[\lambda_{t+1}^{\mathrm{CONSUMER}^3}\right] + \theta\Gamma K_t^{\mathrm{h}^{-1+\theta}}\mathrm{E}_t\left[\lambda_{t+1}^{\mathrm{CONSUMER}^4} Z_{t+1}^{\mathrm{h}} {N_{t+1}^{\mathrm{h}}}^{1-\theta}\right]\right) = 0 \quad \left(K_t^{\mathrm{h}}\right) \tag{1.10}$$

$$-\lambda_t^{\mathrm{CONSUMER}^1} + ab\left(aC_t^{\mathrm{m}^e} + (1-a)\,C_t^{\mathrm{h}^e}\right)^{-1} C_t^{\mathrm{m}^{-1+e}} = 0 \quad \left(C_t^{\mathrm{m}}\right) \tag{1.11}$$

$$-\lambda_t^{\mathrm{CONSUMER}^4} + b(1-a)\left(aC_t^{\mathrm{m}^e} + (1-a)\,C_t^{\mathrm{h}^e}\right)^{-1} C_t^{\mathrm{h}^{-1+e}} = 0 \quad \left(C_t^{\mathrm{h}}\right) \tag{1.12}$$

$$\lambda_t^{\mathrm{CONSUMER}^1} W_t - (1-b)\left(1 - N_t^{\mathrm{m}} - N_t^{\mathrm{h}}\right)^{-1} = 0 \quad \left(N_t^{\mathrm{m}}\right) \tag{1.13}$$

$$-(1-b)\left(1 - N_t^{\mathrm{m}} - N_t^{\mathrm{h}}\right)^{-1} + \Gamma\lambda_t^{\mathrm{CONSUMER}^4} Z_t^{\mathrm{h}}(1-\theta)\,{K_{t-1}^{\mathrm{h}}}^{\theta} {N_t^{\mathrm{h}}}^{-\theta} = 0 \quad \left(N_t^{\mathrm{h}}\right) \tag{1.14}$$

$$-\lambda_t^{\text{CONSUMER}^1} + \lambda_t^{\text{CONSUMER}^2} = 0 \quad (I_t^{\text{m}}) \tag{1.15}$$

$$-\lambda_t^{\text{CONSUMER}^1} + \lambda_t^{\text{CONSUMER}^3} = 0 \quad \left(I_t^{\text{h}}\right) \tag{1.16}$$

2 FIRM

2.1 Optimisation problem

$$\max_{K_t^{\text{m}^{\text{d}}}, N_t^{\text{m}^{\text{d}}}, Y_t, \pi_t} \Pi_t = \pi_t \tag{2.1}$$

s.t. :

$$\pi_t = Y_t - N_t^{\text{m}^{\text{d}}} W_t - r_t K_t^{\text{m}^{\text{d}}} \quad \left(\lambda_t^{\text{FIRM}^1}\right) \tag{2.2}$$

$$Y_t = \Gamma Z_t^{\text{m}} K_t^{\text{m}^{\text{d}}\,\alpha} N_t^{\text{m}^{\text{d}}\,1-\alpha} \quad \left(\lambda_t^{\text{FIRM}^2}\right) \tag{2.3}$$

2.2 First order conditions

$$-\lambda_t^{\text{FIRM}^1} r_t + \alpha\Gamma\lambda_t^{\text{FIRM}^2} Z_t^{\text{m}} K_t^{\text{m}^{\text{d}}\,-1+\alpha} N_t^{\text{m}^{\text{d}}\,1-\alpha} = 0 \quad \left(K_t^{\text{m}^{\text{d}}}\right) \tag{2.4}$$

$$-\lambda_t^{\text{FIRM}^1} W_t + \Gamma\lambda_t^{\text{FIRM}^2} Z_t^{\text{m}} (1-\alpha) K_t^{\text{m}^{\text{d}}\,\alpha} N_t^{\text{m}^{\text{d}}\,-\alpha} = 0 \quad \left(N_t^{\text{m}^{\text{d}}}\right) \tag{2.5}$$

$$\lambda_t^{\text{FIRM}^1} - \lambda_t^{\text{FIRM}^2} = 0 \quad (Y_t) \tag{2.6}$$

$$1 - \lambda_t^{\text{FIRM}^1} = 0 \quad (\pi_t) \tag{2.7}$$

2.3 First order conditions after reduction

$$-r_t + \alpha\Gamma Z_t^{\text{m}} K_t^{\text{m}^{\text{d}}\,-1+\alpha} N_t^{\text{m}^{\text{d}}\,1-\alpha} = 0 \quad \left(K_t^{\text{m}^{\text{d}}}\right) \tag{2.8}$$

$$-W_t + \Gamma Z_t^{\text{m}} (1-\alpha) K_t^{\text{m}^{\text{d}}\,\alpha} N_t^{\text{m}^{\text{d}}\,-\alpha} = 0 \quad \left(N_t^{\text{m}^{\text{d}}}\right) \tag{2.9}$$

3 EQUILIBRIUM

3.1 Identities

$$K_t^{\text{m}^{\text{d}}} = K_{t-1}^{\text{m}} \tag{3.1}$$

$$N_t^{\text{m}^{\text{d}}} = N_t^{\text{m}} \tag{3.2}$$

4 EXOG

4.1 Identities

$$Z_t^{\mathrm{h}} = e^{\epsilon_t^{\mathrm{h}} + \psi \log Z_{t-1}^{\mathrm{h}}} \tag{4.1}$$

$$Z_t^{\mathrm{m}} = e^{\epsilon_t^{\mathrm{m}} + \phi \log Z_{t-1}^{\mathrm{m}}} \tag{4.2}$$

5 Equilibrium relationships (after reduction)

$$-r_t + \alpha \Gamma Z_t^{\mathrm{m}} {K_{t-1}^{\mathrm{m}}}^{-1+\alpha} {N_t^{\mathrm{m}}}^{1-\alpha} = 0 \tag{5.1}$$

$$-C_t^{\mathrm{h}} + \Gamma Z_t^{\mathrm{h}} {K_{t-1}^{\mathrm{h}}}^{\theta} {N_t^{\mathrm{h}}}^{1-\theta} = 0 \tag{5.2}$$

$$-W_t + \Gamma Z_t^{\mathrm{m}} (1-\alpha) {K_{t-1}^{\mathrm{m}}}^{\alpha} {N_t^{\mathrm{m}}}^{-\alpha} = 0 \tag{5.3}$$

$$-Y_t + \Gamma Z_t^{\mathrm{m}} {K_{t-1}^{\mathrm{m}}}^{\alpha} {N_t^{\mathrm{m}}}^{1-\alpha} = 0 \tag{5.4}$$

$$Z_t^{\mathrm{h}} - e^{\epsilon_t^{\mathrm{h}} + \psi \log Z_{t-1}^{\mathrm{h}}} = 0 \tag{5.5}$$

$$Z_t^{\mathrm{m}} - e^{\epsilon_t^{\mathrm{m}} + \phi \log Z_{t-1}^{\mathrm{m}}} = 0 \tag{5.6}$$

$$\beta \left(ab \mathrm{E}_t \left[r_{t+1} \left(a {C_{t+1}^{\mathrm{m}}}^{e} + (1-a) {C_{t+1}^{\mathrm{h}}}^{e} \right)^{-1} {C_{t+1}^{\mathrm{m}}}^{-1+e} \right] + ab(1-\delta) \mathrm{E}_t \left[\left(a {C_{t+1}^{\mathrm{m}}}^{e} + (1-a) {C_{t+1}^{\mathrm{h}}}^{e} \right)^{-1} {C_{t+1}^{\mathrm{m}}}^{-1+e} \right] \right) - ab \left(a {C_t^{\mathrm{m}}}^{e} + (1-a) {C_t^{\mathrm{h}}}^{e} \right)^{-1} {C_t^{\mathrm{m}}}^{-1+e} = 0 \tag{5.7}$$

$$\beta \left(ab(1-\delta) \mathrm{E}_t \left[\left(a {C_{t+1}^{\mathrm{m}}}^{e} + (1-a) {C_{t+1}^{\mathrm{h}}}^{e} \right)^{-1} {C_{t+1}^{\mathrm{m}}}^{-1+e} \right] + b\theta\Gamma(1-a) {K_t^{\mathrm{h}}}^{-1+\theta} \mathrm{E}_t \left[Z_{t+1}^{\mathrm{h}} \left(a {C_{t+1}^{\mathrm{m}}}^{e} + (1-a) {C_{t+1}^{\mathrm{h}}}^{e} \right)^{-1} {C_{t+1}^{\mathrm{h}}}^{-1+e} {N_{t+1}^{\mathrm{h}}}^{1-\theta} \right] \right) - ab \left(a {C_t^{\mathrm{m}}}^{e} + (1-a) {C_t^{\mathrm{h}}}^{e} \right)^{-1} {C_t^{\mathrm{m}}}^{-1+e} = \tag{5.8}$$

$$-(1-b) \left(1 - N_t^{\mathrm{m}} - N_t^{\mathrm{h}} \right)^{-1} + abW_t \left(a {C_t^{\mathrm{m}}}^{e} + (1-a) {C_t^{\mathrm{h}}}^{e} \right)^{-1} {C_t^{\mathrm{m}}}^{-1+e} = 0 \tag{5.9}$$

$$-(1-b) \left(1 - N_t^{\mathrm{m}} - N_t^{\mathrm{h}} \right)^{-1} + b\Gamma Z_t^{\mathrm{h}} (1-a)(1-\theta) \left(a {C_t^{\mathrm{m}}}^{e} + (1-a) {C_t^{\mathrm{h}}}^{e} \right)^{-1} {K_{t-1}^{\mathrm{h}}}^{\theta} {C_t^{\mathrm{h}}}^{-1+e} {N_t^{\mathrm{h}}}^{-\theta} = 0 \tag{5.10}$$

$$I_t - I_t^{\mathrm{m}} - I_t^{\mathrm{h}} = 0 \tag{5.11}$$

$$I_t^{\mathrm{m}} - K_t^{\mathrm{m}} + K_{t-1}^{\mathrm{m}} (1-\delta) = 0 \tag{5.12}$$

$$I_t^{\mathrm{h}} - K_t^{\mathrm{h}} + K_{t-1}^{\mathrm{h}} (1-\delta) = 0 \tag{5.13}$$

$$K_t - K_t^{\mathrm{m}} - K_t^{\mathrm{h}} = 0 \tag{5.14}$$

$$N_t - N_t^{\mathrm{m}} - N_t^{\mathrm{h}} = 0 \tag{5.15}$$

$$-C_t^{\mathrm{m}} - I_t^{\mathrm{m}} - I_t^{\mathrm{h}} + Y_t = 0 \tag{5.16}$$

$$U_t - \beta \mathrm{E}_t [U_{t+1}] - \log \left(1 - N_t^{\mathrm{m}} - N_t^{\mathrm{h}} \right) (1-b) - be^{-1} \log \left(a {C_t^{\mathrm{m}}}^{e} + (1-a) {C_t^{\mathrm{h}}}^{e} \right) = 0 \tag{5.17}$$

6 Steady state relationships (after reduction)

$$-r_{\mathrm{ss}}+\alpha\Gamma Z_{\mathrm{ss}}^{\mathrm{m}}K_{\mathrm{ss}}^{\mathrm{m}\,-1+\alpha}N_{\mathrm{ss}}^{\mathrm{m}\,1-\alpha}=0 \tag{6.1}$$

$$-C_{\mathrm{ss}}^{\mathrm{h}}+\Gamma Z_{\mathrm{ss}}^{\mathrm{h}}K_{\mathrm{ss}}^{\mathrm{h}\,\theta}N_{\mathrm{ss}}^{\mathrm{h}\,1-\theta}=0 \tag{6.2}$$

$$-W_{\mathrm{ss}}+\Gamma Z_{\mathrm{ss}}^{\mathrm{m}}\left(1-\alpha\right)K_{\mathrm{ss}}^{\mathrm{m}\alpha}N_{\mathrm{ss}}^{\mathrm{m}-\alpha}=0 \tag{6.3}$$

$$-Y_{\mathrm{ss}}+\Gamma Z_{\mathrm{ss}}^{\mathrm{m}}K_{\mathrm{ss}}^{\mathrm{m}\alpha}N_{\mathrm{ss}}^{\mathrm{m}\,1-\alpha}=0 \tag{6.4}$$

$$Z_{\mathrm{ss}}^{\mathrm{h}}-e^{\psi\log Z_{\mathrm{ss}}^{\mathrm{h}}}=0 \tag{6.5}$$

$$Z_{\mathrm{ss}}^{\mathrm{m}}-e^{\phi\log Z_{\mathrm{ss}}^{\mathrm{m}}}=0 \tag{6.6}$$

$$\beta\left(abr_{\mathrm{ss}}\left(aC_{\mathrm{ss}}^{\mathrm{m}\,e}+\left(1-a\right)C_{\mathrm{ss}}^{\mathrm{h}\,e}\right)^{-1}C_{\mathrm{ss}}^{\mathrm{m}-1+e}+ab\left(1-\delta\right)\left(aC_{\mathrm{ss}}^{\mathrm{m}\,e}+\left(1-a\right)C_{\mathrm{ss}}^{\mathrm{h}\,e}\right)^{-1}C_{\mathrm{ss}}^{\mathrm{m}-1+e}\right)-ab\left(aC_{\mathrm{ss}}^{\mathrm{m}\,e}+\left(1-a\right)C_{\mathrm{ss}}^{\mathrm{h}\,e}\right)^{-1}C_{\mathrm{ss}}^{\mathrm{m}-1+e}=0 \tag{6.7}$$

$$\beta\left(ab\left(1-\delta\right)\left(aC_{\mathrm{ss}}^{\mathrm{m}\,e}+\left(1-a\right)C_{\mathrm{ss}}^{\mathrm{h}\,e}\right)^{-1}C_{\mathrm{ss}}^{\mathrm{m}-1+e}+b\theta\Gamma Z_{\mathrm{ss}}^{\mathrm{h}}\left(1-a\right)\left(aC_{\mathrm{ss}}^{\mathrm{m}\,e}+\left(1-a\right)C_{\mathrm{ss}}^{\mathrm{h}\,e}\right)^{-1}C_{\mathrm{ss}}^{\mathrm{h}\,-1+e}K_{\mathrm{ss}}^{\mathrm{h}\,-1+\theta}N_{\mathrm{ss}}^{\mathrm{h}\,1-\theta}\right)-ab\left(aC_{\mathrm{ss}}^{\mathrm{m}\,e}+\left(1-a\right)C_{\mathrm{ss}}^{\mathrm{h}\,e}\right)^{-1}C_{\mathrm{ss}}^{\mathrm{m}-1+e}=0 \tag{6.8}$$

$$-\left(1-b\right)\left(1-N_{\mathrm{ss}}^{\mathrm{m}}-N_{\mathrm{ss}}^{\mathrm{h}}\right)^{-1}+abW_{\mathrm{ss}}\left(aC_{\mathrm{ss}}^{\mathrm{m}\,e}+\left(1-a\right)C_{\mathrm{ss}}^{\mathrm{h}\,e}\right)^{-1}C_{\mathrm{ss}}^{\mathrm{m}-1+e}=0 \tag{6.9}$$

$$-\left(1-b\right)\left(1-N_{\mathrm{ss}}^{\mathrm{m}}-N_{\mathrm{ss}}^{\mathrm{h}}\right)^{-1}+b\Gamma Z_{\mathrm{ss}}^{\mathrm{h}}\left(1-a\right)\left(1-\theta\right)\left(aC_{\mathrm{ss}}^{\mathrm{m}\,e}+\left(1-a\right)C_{\mathrm{ss}}^{\mathrm{h}\,e}\right)^{-1}C_{\mathrm{ss}}^{\mathrm{h}\,-1+e}K_{\mathrm{ss}}^{\mathrm{h}\,\theta}N_{\mathrm{ss}}^{\mathrm{h}\,-\theta}=0 \tag{6.10}$$

$$I_{\mathrm{ss}}-I_{\mathrm{ss}}^{\mathrm{m}}-I_{\mathrm{ss}}^{\mathrm{h}}=0 \tag{6.11}$$

$$I_{\mathrm{ss}}^{\mathrm{m}}-K_{\mathrm{ss}}^{\mathrm{m}}+K_{\mathrm{ss}}^{\mathrm{m}}\left(1-\delta\right)=0 \tag{6.12}$$

$$I_{\mathrm{ss}}^{\mathrm{h}}-K_{\mathrm{ss}}^{\mathrm{h}}+K_{\mathrm{ss}}^{\mathrm{h}}\left(1-\delta\right)=0 \tag{6.13}$$

$$K_{\mathrm{ss}}-K_{\mathrm{ss}}^{\mathrm{m}}-K_{\mathrm{ss}}^{\mathrm{h}}=0 \tag{6.14}$$

$$N_{\mathrm{ss}}-N_{\mathrm{ss}}^{\mathrm{m}}-N_{\mathrm{ss}}^{\mathrm{h}}=0 \tag{6.15}$$

$$-C_{\mathrm{ss}}^{\mathrm{m}}-I_{\mathrm{ss}}^{\mathrm{m}}-I_{\mathrm{ss}}^{\mathrm{h}}+Y_{\mathrm{ss}}=0 \tag{6.16}$$

$$U_{\mathrm{ss}}-\beta U_{\mathrm{ss}}-\log\left(1-N_{\mathrm{ss}}^{\mathrm{m}}-N_{\mathrm{ss}}^{\mathrm{h}}\right)\left(1-b\right)-be^{-1}\log\left(aC_{\mathrm{ss}}^{\mathrm{m}\,e}+\left(1-a\right)C_{\mathrm{ss}}^{\mathrm{h}\,e}\right)=0 \tag{6.17}$$

7 Parameter settings

$$a = 0.337 \tag{7.1}$$

$$\alpha = 0.36 \tag{7.2}$$

$$b = 0.63 \tag{7.3}$$

$$\beta = 0.99 \tag{7.4}$$

$$\delta = 0.025 \tag{7.5}$$

$$e = 0.8 \tag{7.6}$$

$$\phi = 0.95 \tag{7.7}$$

$$\psi = 0.95 \tag{7.8}$$

$$\theta = 0.08 \tag{7.9}$$

$$\Gamma = 1 \tag{7.10}$$

8 Steady-state values

	Steady-state values
r	0.0351
C^{m}	0.7224
C^{h}	0.3805
I	0.3143
I^{m}	0.2658
I^{h}	0.0485
K	12.5726
K^{m}	10.6329
K^{h}	1.9397
N	0.6102
N^{m}	0.2799
N^{h}	0.3303
U	-79.6929
W	2.3706
Y	1.0367
Z^{h}	1
Z^{m}	1

9 The solution of the perturbation

9.1 P

$$\begin{array}{c} \\ K^{\mathrm{m}} \\ K^{\mathrm{h}} \\ Z^{\mathrm{h}} \\ Z^{\mathrm{m}} \end{array} \begin{array}{c} \begin{array}{cccc} K^{\mathrm{m}}_{t-1} & K^{\mathrm{h}}_{t-1} & Z^{\mathrm{h}}_{t-1} & Z^{\mathrm{m}}_{t-1} \end{array} \\ \begin{pmatrix} 0.8762 & 0.1545 & -0.3729 & 0.6255 \\ 0.4683 & 0.0826 & 2.0323 & -2.6403 \\ 0 & 0 & 0.95 & 0 \\ 0 & 0 & 0 & 0.95 \end{pmatrix} \end{array}$$

9.2 Q

$$\begin{array}{c} \\ K^{\mathrm{m}} \\ K^{\mathrm{h}} \\ Z^{\mathrm{h}} \\ Z^{\mathrm{m}} \end{array} \begin{array}{c} \begin{array}{cc} \epsilon^{\mathrm{h}} & \epsilon^{\mathrm{m}} \end{array} \\ \begin{pmatrix} -0.3926 & 0.6584 \\ 2.1393 & -2.7792 \\ 1 & 0 \\ 0 & 1 \end{pmatrix} \end{array}$$

9.3 R

$$\begin{array}{c} \\ r \\ C^{\mathrm{m}} \\ C^{\mathrm{h}} \\ I \\ I^{\mathrm{m}} \\ I^{\mathrm{h}} \\ K \\ N \\ N^{\mathrm{m}} \\ N^{\mathrm{h}} \\ U \\ W \\ Y \end{array} \begin{array}{c} \begin{array}{cccc} K^{\mathrm{m}}_{t-1} & K^{\mathrm{h}}_{t-1} & Z^{\mathrm{h}}_{t-1} & Z^{\mathrm{m}}_{t-1} \end{array} \\ \begin{pmatrix} -0.4894 & -0.08 & -0.6218 & 1.96 \\ 0.93 & 0.0069 & -0.8599 & 0.6952 \\ -0.3112 & 0.1511 & 1.7804 & -0.8463 \\ -0.4533 & -0.2798 & -0.0746 & 4.867 \\ -3.9534 & 6.1809 & -14.918 & 25.0205 \\ 18.734 & -35.696 & 81.2939 & -105.6101 \\ 0.8132 & 0.1434 & -0.0019 & 0.1217 \\ -0.0751 & -0.0155 & 0.0429 & 0.226 \\ 0.2353 & -0.125 & -0.9715 & 1.5781 \\ -0.3382 & 0.0772 & 0.9026 & -0.9199 \\ -0.054 & -0.0098 & -0.0683 & -0.0832 \\ 0.2753 & 0.045 & 0.3497 & 0.3819 \\ 0.5106 & -0.08 & -0.6218 & 1.96 \end{pmatrix} \end{array}$$

9.4 S

$$\begin{array}{c} \\ r \\ C^{\mathrm{m}} \\ C^{\mathrm{h}} \\ I \\ I^{\mathrm{m}} \\ I^{\mathrm{h}} \\ K \\ N \\ N^{\mathrm{m}} \\ N^{\mathrm{h}} \\ U \\ W \\ Y \end{array} \begin{array}{c} \begin{array}{cc} \epsilon^{\mathrm{h}} & \epsilon^{\mathrm{m}} \end{array} \\ \begin{pmatrix} -0.6545 & 2.0631 \\ -0.9051 & 0.7318 \\ 1.8741 & -0.8908 \\ -0.0785 & 5.1231 \\ -15.7031 & 26.3373 \\ 85.5725 & -111.1686 \\ -0.002 & 0.1281 \\ 0.0452 & 0.2379 \\ -1.0227 & 1.6612 \\ 0.9501 & -0.9683 \\ -0.0719 & -0.0875 \\ 0.3682 & 0.402 \\ -0.6545 & 2.0631 \end{pmatrix} \end{array}$$

10 Statistics of the model

10.1 Moments

	Steady-state value	Std. dev.	Variance	Loglinear
r	0.0351	1.5572	2.4248	Y
C^{m}	0.7224	0.9767	0.954	Y
I	0.3143	4.828	23.3092	Y
I^{m}	0.2658	12.888	166.0993	Y
I^{h}	0.0485	57.2629	3279.0405	Y
K	12.5726	0.4326	0.1871	Y
N	0.6102	0.2513	0.0632	Y
N^{m}	0.2799	1.3761	1.8936	Y
N^{h}	0.3303	0.9286	0.8623	Y
W	2.3706	0.6601	0.4358	Y
Y	1.0367	1.7868	3.1926	Y

10.2 Correlation matrix

	r	C^{m}	I	I^{m}	I^{h}	K	N	N^{m}	N^{h}	W	Y
r	1	0.3865	0.9644	0.7077	-0.3461	0.1003	0.9227	0.873	-0.635	0.7172	0.9373
C^{m}	0.3865	1	0.2945	0.1137	0.0207	0.5653	0.0949	0.7811	-0.9335	0.0558	0.6222
C^{h}	-0.1576	-0.8433	0.0411	-0.0502	0.0844	-0.0964	0.2217	-0.5751	0.8331	0.4206	-0.2875
I	0.9644	0.2945	1	0.6087	-0.2045	0.228	0.9793	0.7912	-0.5039	0.8717	0.9314
I^{m}	0.7077	0.1137	0.6087	1	-0.9011	-0.0558	0.6099	0.5076	-0.3325	0.4088	0.542
I^{h}	-0.3461	0.0207	-0.2045	-0.9011	1	0.1935	-0.2173	-0.1939	0.1348	-0.028	-0.1597
K	0.1003	0.5653	0.228	-0.0558	0.1935	1	0.118	0.3068	-0.3263	0.4488	0.4021
K^{m}	0.5408	0.8422	0.5593	0.3028	-0.0679	0.8367	0.4043	0.7663	-0.7602	0.5111	0.779
K^{h}	-0.8383	-0.7036	-0.6843	-0.6343	0.4086	-0.0538	-0.5635	-0.9457	0.9058	-0.2714	-0.8286
N	0.9227	0.0949	0.9793	0.6099	-0.2173	0.118	1	0.6585	-0.327	0.8964	0.8384
N^{m}	0.873	0.7811	0.7912	0.5076	-0.1939	0.3068	0.6585	1	-0.9265	0.4751	0.9457
N^{h}	-0.635	-0.9335	-0.5039	-0.3325	0.1348	-0.3263	-0.327	-0.9265	1	-0.1484	-0.7684
U	-0.7291	-0.0588	-0.8795	-0.4261	0.0451	-0.4398	-0.9038	-0.4849	0.157	-0.9998	-0.7428
W	0.7172	0.0558	0.8717	0.4088	-0.028	0.4488	0.8964	0.4751	-0.1484	1	0.7353
Y	0.9373	0.6222	0.9314	0.542	-0.1597	0.4021	0.8384	0.9457	-0.7684	0.7353	1
Z^{h}	0.431	-0.4075	0.6312	0.2203	0.0732	0.1791	0.7441	0.0465	0.3136	0.8825	0.3619
Z^{m}	0.9465	0.2633	0.9962	0.6241	-0.2256	0.2694	0.982	0.7563	-0.4588	0.9037	0.9164

10.3 Autocorrelations

	$t-1$	$t-2$	$t-3$	$t-4$	$t-5$
r	0.7052	0.4611	0.2605	0.0998	-0.025
C^{m}	0.8516	0.6216	0.4176	0.2412	0.0924
I	0.7333	0.4818	0.2747	0.1084	-0.0212
I^{m}	0.0756	0.0316	-0.0029	-0.0291	-0.048
I^{h}	-0.078	-0.0735	-0.0678	-0.0612	-0.0543
K	0.9604	0.8629	0.7274	0.5705	0.4053
N	0.7125	0.466	0.2634	0.1011	-0.025
N^{m}	0.8032	0.5369	0.3157	0.1364	-0.0048
N^{h}	0.8197	0.555	0.3334	0.1522	0.0083
W	0.7395	0.5114	0.3175	0.1563	0.026
Y	0.7874	0.5333	0.3205	0.1464	0.0079

10.4 Variance decomposition

	ϵ^{h}	ϵ^{m}
r	0.1955	0.8045
C^{m}	0.2383	0.7617
I	0.3999	0.6001
I^{m}	0.0535	0.9465
I^{h}	0.0146	0.9854
K	0.3874	0.6126
N	0.563	0.437
N^{m}	0.0032	0.9968
N^{h}	0.1058	0.8942
W	0.796	0.204
Y	0.1361	0.8639

11 Statistics of the model

11.1 Moments relative to moments of the reference variable

	Steady-state value relative to Y	Std. dev. relative to Y	Variance relative to Y	Loglinear
r	0.0339	0.8715	0.7595	Y
C^{m}	0.6968	0.5466	0.2988	Y
C^{h}	0.3671	0.8507	0.7237	Y
I	0.3032	2.7021	7.3011	Y
I^{m}	0.2564	7.213	52.027	Y
I^{h}	0.0468	32.0482	1027.0892	Y
K	12.1271	0.2421	0.0586	Y
K^{m}	10.2561	0.3547	0.1258	Y
K^{h}	1.8709	1.0662	1.1369	Y
N	0.5886	0.1407	0.0198	Y
N^{m}	0.27	0.7702	0.5931	Y
N^{h}	0.3186	0.5197	0.2701	Y
U	-76.8688	0.0761	0.0058	Y
W	2.2866	0.3695	0.1365	Y
Y	1	1	1	Y
Z^{h}	0.9646	0.5106	0.2608	Y
Z^{m}	0.9646	0.5106	0.2608	Y

11.2 Correlations with the reference variable

	Y_{t-5}	Y_{t-4}	Y_{t-3}	Y_{t-2}	Y_{t-1}	Y_t	Y_{t+1}	Y_{t+2}	Y_{t+3}	Y_{t+4}	Y_{t+5}
r	0.1526	0.278	0.4282	0.6043	0.8064	0.9373	0.5864	0.3062	0.0862	-0.0805	-0.2011
C^{m}	-0.1938	-0.0979	0.0332	0.2043	0.4199	0.6222	0.6796	0.5837	0.4832	0.383	0.2869
C^{h}	0.0441	-0.0009	-0.0602	-0.1357	-0.229	-0.2875	-0.318	-0.238	-0.1678	-0.1076	-0.057
I	0.0997	0.2242	0.3758	0.556	0.7659	0.9314	0.6451	0.3796	0.1665	0.0006	-0.1238
I^{m}	0.1445	0.2261	0.3222	0.433	0.5582	0.542	-0.0161	-0.0804	-0.1258	-0.1553	-0.1716
I^{h}	-0.1238	-0.1565	-0.1921	-0.2303	-0.2702	-0.1597	0.3725	0.3066	0.2462	0.1919	0.144
K	-0.4168	-0.3439	-0.2304	-0.0695	0.1459	0.4021	0.5721	0.6637	0.6935	0.6763	0.6249
K^{m}	-0.2704	-0.1487	0.0188	0.2385	0.5164	0.779	0.7513	0.6917	0.6104	0.5162	0.4161
K^{h}	-0.1204	-0.2349	-0.3735	-0.5372	-0.7268	-0.8286	-0.528	-0.2844	-0.0923	0.0542	0.1611
N	0.1448	0.2541	0.3843	0.5358	0.7088	0.8384	0.5281	0.2718	0.0712	-0.0804	-0.1896
N^{m}	0.0258	0.1572	0.3216	0.5219	0.7601	0.9457	0.7497	0.4934	0.2814	0.1102	-0.0239
N^{h}	0.04	-0.0704	-0.2118	-0.3875	-0.6001	-0.7684	-0.6774	-0.4837	-0.3177	-0.1786	-0.0648
U	0.0268	-0.0751	-0.2046	-0.3643	-0.5562	-0.7428	-0.5653	-0.4095	-0.274	-0.1588	-0.0632
W	-0.0324	0.0684	0.1969	0.3556	0.5466	0.7353	0.5683	0.4149	0.2809	0.1664	0.071
Y	0.0079	0.1464	0.3205	0.5333	0.7874	1	0.7874	0.5333	0.3205	0.1464	0.0079
Z^{h}	0.0406	0.0846	0.1373	0.1992	0.2702	0.3619	0.243	0.1447	0.0655	0.0035	-0.0434
Z^{m}	0.0787	0.2025	0.3543	0.5359	0.7486	0.9164	0.6234	0.3802	0.183	0.0276	-0.0906

12 Impulse response functions

12.1 Shock ϵ^{h}

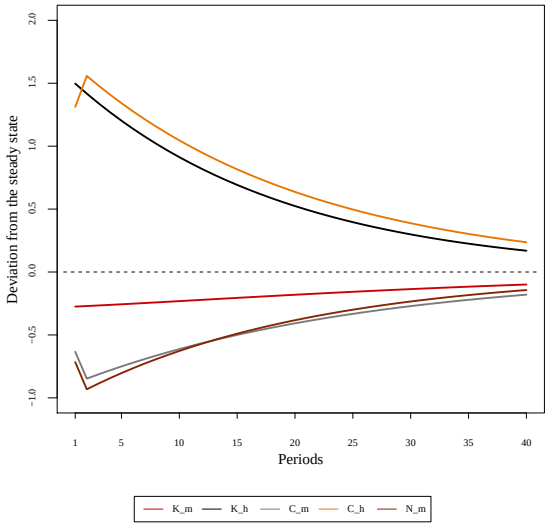

Figure 1: Impulse response function for ϵ^{h} shock

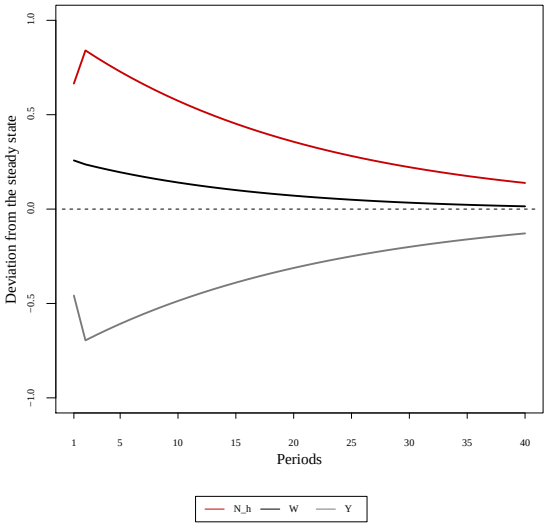

Figure 2: Impulse response function for ϵ^{h} shock

12.2 Shock ϵ^{m}

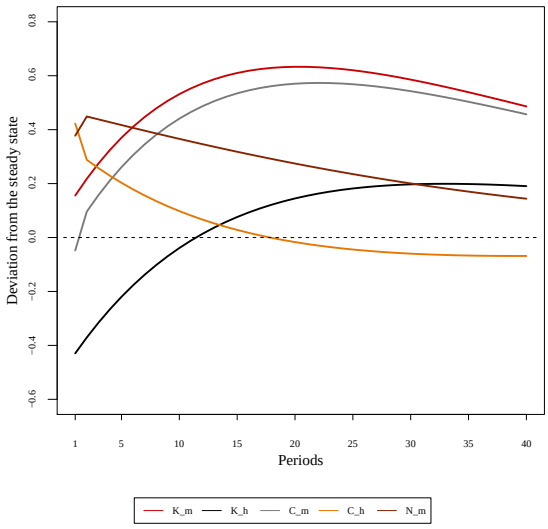

Figure 3: Impulse response function for ϵ^{m} shock

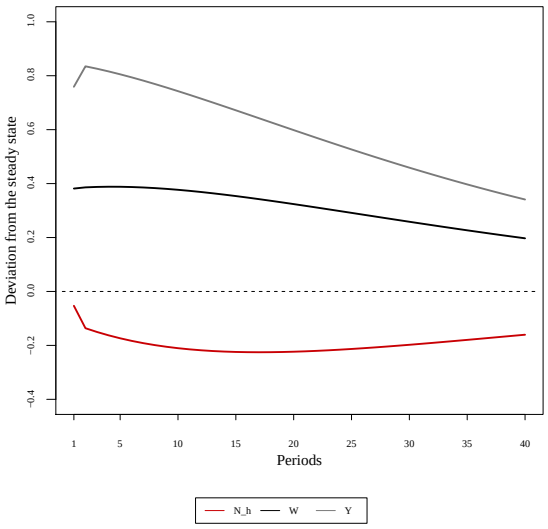

Figure 4: Impulse response function for ϵ^{m} shock