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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

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

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

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

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

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

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

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

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

2 FIRM

2.1 Optimisation problem

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

s.t. :

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

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

2.2 First order conditions

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

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

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

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

2.3 First order conditions after reduction

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

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

3 EQUILIBRIUM

3.1 Identities

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

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

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)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 value
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 1st order perturbation

Matrix P

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

Matrix Q

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

Matrix R

$$\begin{array}{c} \\ r_t \\ C_t^{\mathrm{m}} \\ C_t^{\mathrm{h}} \\ I_t \\ I_t^{\mathrm{m}} \\ I_t^{\mathrm{h}} \\ K_t \\ N_t \\ N_t^{\mathrm{m}} \\ N_t^{\mathrm{h}} \\ U_t \\ W_t \\ Y_t \end{array} \begin{array}{c} \begin{array}{cccc} K_{t-1}^{\mathrm{m}} & K_{t-1}^{\mathrm{h}} & Z_{t-1}^{\mathrm{h}} & Z_{t-1}^{\mathrm{m}} \end{array} \\ \begin{pmatrix} -0.4894 & -0.08 & -0.6218 & 1.96 \\ 0.93 & 0.0069 & -0.8599 & 0.6952 \\ -0.3112 & 0.1511 & 1.7804 & -0.8463 \\ -0.4533 & -0.2798 & -0.0746 & 4.867 \\ -3.9534 & 6.1809 & -14.918 & 25.0205 \\ 18.734 & -35.696 & 81.2939 & -105.6101 \\ 0.8132 & 0.1434 & -0.0019 & 0.1217 \\ -0.0751 & -0.0155 & 0.0429 & 0.226 \\ 0.2353 & -0.125 & -0.9715 & 1.5781 \\ -0.3382 & 0.0772 & 0.9026 & -0.9199 \\ 0.054 & 0.0098 & 0.0683 & 0.0832 \\ 0.2753 & 0.045 & 0.3497 & 0.3819 \\ 0.5106 & -0.08 & -0.6218 & 1.96 \end{pmatrix} \end{array}$$

Matrix S

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

10 Model statistics

10.1 Basic statistics

	Steady-state value	Std. dev.	Variance	Loglin
C^{m}	0.7224	0.9767	0.954	Y
C^{h}	0.3805	1.52	2.3104	Y
Y	1.0367	1.7868	3.1926	Y
I^{m}	0.2658	12.888	166.0993	Y
I^{h}	0.0485	57.2629	3279.0405	Y
K^{m}	10.6329	0.6337	0.4016	Y
K^{h}	1.9397	1.9051	3.6295	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

10.2 Correlation matrix

	C^{m}	C^{h}	I^{m}	I^{h}	K^{m}	K^{h}	N^{m}	N^{h}	W	Y
C^{m}	1	-0.843	0.114	0.021	0.842	-0.704	0.781	-0.933	0.056	0.622
C^{h}		1	-0.05	0.084	-0.438	0.657	-0.575	0.833	0.421	-0.288
I^{m}			1	-0.901	0.303	-0.634	0.508	-0.332	0.409	0.542
I^{h}				1	-0.068	0.409	-0.194	0.135	-0.028	-0.16
K^{m}					1	-0.592	0.766	-0.76	0.511	0.779
K^{h}						1	-0.946	0.906	-0.271	-0.829
N^{m}							1	-0.927	0.475	0.946
N^{h}								1	-0.148	-0.768
W									1	0.735
Y										1

10.3 Cross correlations with the reference variable (Y)

	$\sigma[\cdot]$ rel. to $\sigma[Y]$	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}
C_t^{m}	0.547	-0.194	-0.098	0.033	0.204	0.42	0.622	0.68	0.584	0.483	0.383	0.287
C_t^{h}	0.851	0.044	-0.001	-0.06	-0.136	-0.229	-0.288	-0.318	-0.238	-0.168	-0.108	-0.057
I_t^{m}	7.213	0.145	0.226	0.322	0.433	0.558	0.542	-0.016	-0.08	-0.126	-0.155	-0.172
I_t^{h}	32.048	-0.124	-0.156	-0.192	-0.23	-0.27	-0.16	0.372	0.307	0.246	0.192	0.144
K_t^{m}	0.355	-0.27	-0.149	0.019	0.238	0.516	0.779	0.751	0.692	0.61	0.516	0.416
K_t^{h}	1.066	-0.12	-0.235	-0.373	-0.537	-0.727	-0.829	-0.528	-0.284	-0.092	0.054	0.161
N_t^{m}	0.77	0.026	0.157	0.322	0.522	0.76	0.946	0.75	0.493	0.281	0.11	-0.024
N_t^{h}	0.52	0.04	-0.07	-0.212	-0.387	-0.6	-0.768	-0.677	-0.484	-0.318	-0.179	-0.065
W_t	0.369	-0.032	0.068	0.197	0.356	0.547	0.735	0.568	0.415	0.281	0.166	0.071
Y_t	1	0.008	0.146	0.32	0.533	0.787	1	0.787	0.533	0.32	0.146	0.008

10.4 Autocorrelations

	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5
C^{m}	0.852	0.622	0.418	0.241	0.092
C^{h}	0.771	0.512	0.298	0.124	-0.011
I^{m}	0.076	0.032	-0.003	-0.029	-0.048
I^{h}	-0.078	-0.074	-0.068	-0.061	-0.054
K^{m}	0.868	0.716	0.556	0.398	0.247
K^{h}	0.711	0.467	0.266	0.105	-0.021
N^{m}	0.803	0.537	0.316	0.136	-0.005
N^{h}	0.82	0.555	0.333	0.152	0.008
W	0.74	0.511	0.317	0.156	0.026
Y	0.787	0.533	0.32	0.146	0.008

10.5 Variance decomposition

	ϵ^{h}	ϵ^{m}
C^{m}	0.238	0.762
C^{h}	0.616	0.384
I^{m}	0.053	0.947
I^{h}	0.015	0.985
K^{m}	0.198	0.802
K^{h}	0.023	0.977
N^{m}	0.003	0.997
N^{h}	0.106	0.894
W	0.796	0.204
Y	0.136	0.864

11 Impulse response functions

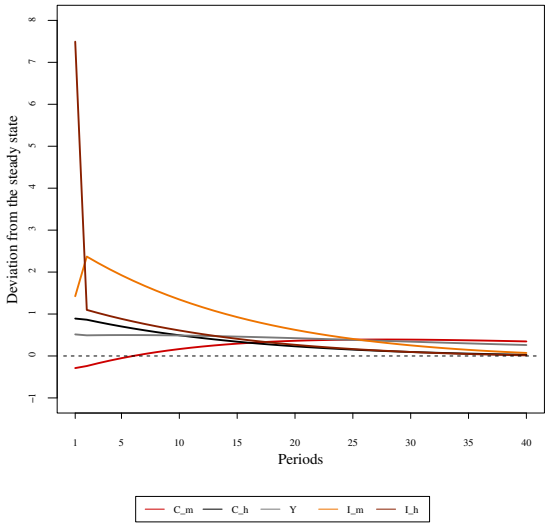

Figure 1: Impulse responses $(C^{\mathrm{m}}, C^{\mathrm{h}}, Y, I^{\mathrm{m}}, I^{\mathrm{h}})$ to ϵ^{h} shock

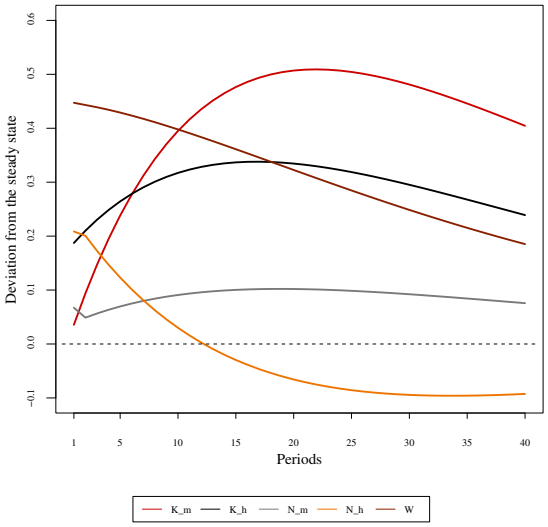

Figure 2: Impulse responses $(K^{\mathrm{m}}, K^{\mathrm{h}}, N^{\mathrm{m}}, N^{\mathrm{h}}, W)$ to ϵ^{h} shock

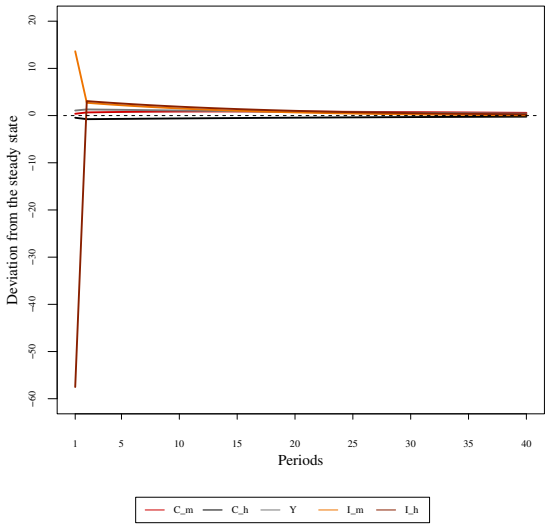

Figure 3: Impulse responses $(C^{\mathrm{m}}, C^{\mathrm{h}}, Y, I^{\mathrm{m}}, I^{\mathrm{h}})$ to ϵ^{m} shock

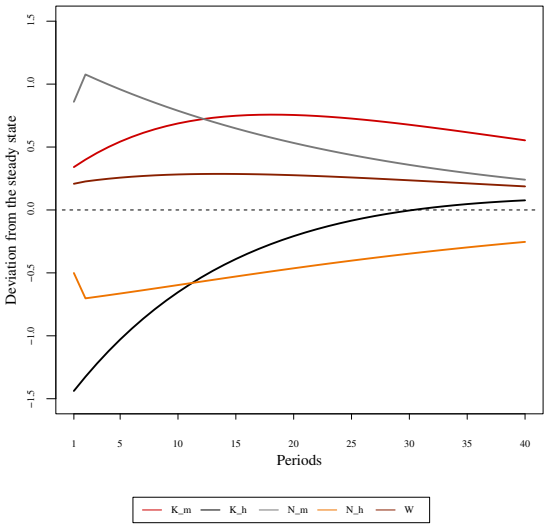

Figure 4: Impulse responses $(K^{\mathrm{m}}, K^{\mathrm{h}}, N^{\mathrm{m}}, N^{\mathrm{h}}, W)$ to ϵ^{m} shock