$$U'(C_t) = C_t^{(-\phi_c)}$$

$$U'(C_{t+1}) = C_{t+1}^{(-\phi_c)}$$

$$U''(C_t) = (-\phi_c)\ C_t^{(-\phi_c)-1}$$

$$U''(C_{t+1}) = (-\phi_c)\ C_{t+1}^{(-\phi_c)-1}$$

$$f(k_t) = K_{t-1}^{\alpha}$$

$$f(k_{t-1}) = K_{t-2}^{\alpha}$$

$$f'(k_t) = \alpha\, K_{t-1}^{\alpha-1}$$

$$f'(k_{t-1}) = \alpha\, K_{t-2}^{\alpha-1}$$

$$g(\mu) = \theta_1\, \mu_t^{\theta_2}$$

$$g'(\mu) = \theta_1\, \theta_2\, \mu_t^{\theta_2-1}$$

$$h(Y) = Y_t^{1-\gamma}$$

$$h'(Y) = (1-\gamma)\ Y_t^{(-\gamma)}$$

$$d(X_t) = d_2\, X_{t-1}^2 + X_{t-1}\, d_1 + d_0$$

$$d(X_{t+1}) = d_0 + d_2\, X_t^2 + d_1\, X_t$$

$$d'(X_T) = d_1 + X_{t-1}\, 2\, d_2$$

$$Z_\tau = \frac{\frac{\theta_2}{\theta_2-1}\, Z_t}{\tau_t}$$

$$Z_Y = \frac{Z_t\, \frac{\theta_2\, (1-\gamma)-1}{\theta_2-1}}{Y_t}$$

$$E_\tau = \frac{Y_t^{1-\gamma}\, \mu_t\, \frac{(-1)}{\theta_2-1}}{\tau_t}$$

$$E_y = (1-\gamma)\; Y_t^{(-\gamma)} - Y_t^{(-\gamma)}\, \mu_t\, \left(1 + \frac{(-\gamma)}{\theta_2 - 1} - \gamma\right)$$

$$R_\tau = Y_t^{1-\gamma}\; (1-\gamma)\; (-\alpha)\; K_{t-2}^{(-1)} + \alpha\; (1-\gamma) + K_{t-2}^{(-1)}\, Y_t^{1-\gamma}\, \mu_t\, \left(1 + \frac{1}{\theta_2 - 1}\right) - \mu_t^{\theta_2}\, K_{t-2}^{(-1)}\, Y_t\, \frac{\theta_2\, \alpha\, \theta_1}{\theta_2 - 1}\, \tau_t^{(-1)}$$

$$R_Y = \alpha\, K_{t-2}^{(-1)} - K_{t-2}^{(-1)}\, Y_t^{(-\gamma)}\, \tau_t\, \alpha\; (1-\gamma)^2 + K_{t-2}^{(-1)}\, Y_t^{(-\gamma)}\, \mu_t\, \tau_t\, \alpha\; (1-\gamma)\; \left(1 - \gamma - \frac{\gamma}{\theta_2 - 1}\right) - \mu_t^{\theta_2}\, K_{t-2}^{(-1)}\, \alpha\, \theta_1\; \left(1 - \frac{\theta_2\, \gamma}{\theta_2 - 1}\right)$$

$$R_K(\tau_t, y_t, k_{t-1}) = Y_t\; (-\alpha)\; K_{t-2}^{(-2)} + K_{t-2}^{(-2)}\, Y_t^{1-\gamma}\, \tau_t\, \alpha\; (1-\gamma) - K_{t-2}^{(-2)}\, Y_t^{1-\gamma}\, \mu_t\, \tau_t\, \alpha\; (1-\gamma) + \mu_t^{\theta_2}\, K_{t-2}^{(-2)}\, Y_t\, \alpha\, \theta_1$$

$$R_K(\tau_{t+1}, y_{t+1}, k_t) = (-\alpha)\; Y_{t+1}\, K_{t-1}^{(-2)} + K_{t-1}^{(-2)}\, \alpha\; (1-\gamma)\; \tau_{t+1}\, Y_{t+1}^{1-\gamma} - K_{t-1}^{(-2)}\, Y_{t+1}^{1-\gamma}\, \alpha\; (1-\gamma)\; \tau_{t+1}\, \mu_{t+1} + K_{t-1}^{(-2)}\, \alpha\, \theta_1\, Y_{t+1}\, \mu_{t+1}^{\theta_2}$$

$$\log(A_t) = \rho\, \log(A_{t-1}) + \epsilon_t \tag{1}$$

$$R_t = \frac{\alpha\, K_{t-1}^{\alpha-1}\, Y_t}{K_{t-1}^{\alpha}}\; \left(1 - (1-\gamma)\; Y_t^{(-\gamma)}\, \tau_t\; (1-\mu_t) - \theta_1\, \mu_t^{\theta_2}\right) \tag{2}$$

$$Y_t^{1-\gamma}\, \tau_t = \theta_1\, \theta_2\, \mu_t^{\theta_2 - 1}\, Y_t \tag{3}$$

$$C_t^{(-\phi_c)} = (R_{t+1} + 1 - \delta)\; C_{t+1}^{(-\phi_c)}\, \beta \tag{4}$$

$$C_t = Y_t - K_{t-1} + (1-\delta)\; AUX\_ENDO\_LAG\_2\_1_{t-1} - Z_t \tag{5}$$

$$X_t = X_{t-1}\, \eta + (1+\nu)\; E_t \tag{6}$$

$$Y_t = A_t\; \left(1 - \left(d_2\, X_{t-1}^2 + X_{t-1}\, d_1 + d_0\right)\right)\; AUX\_ENDO\_LAG\_2\_1_{t-1}^{\alpha} \tag{7}$$

$$E_t = Y_t^{1-\gamma}\; (1-\mu_t) \tag{8}$$

$$Z_t = \theta_1\, \mu_t^{\theta_2}\, Y_t \tag{9}$$

$$\begin{aligned} C_t^{(-\phi_c)}\, \frac{\frac{\theta_2}{\theta_2-1}\, Z_t}{\tau_t} &= \zeta_t\; \left(-\left(\frac{Y_t^{1-\gamma}\, \mu_t\, \frac{(-1)}{\theta_2-1}}{\tau_t}\right)\right) + \frac{\frac{\theta_2}{\theta_2-1}\, Z_t}{\tau_t}\; (-\phi_c)\; C_t^{(-\phi_c)-1}\, \lambda_t + \lambda_{t-1}\; \Bigg((1 + R_t - \delta)\; (-\phi_c)\; C_t^{(-\phi_c)-1}\; \left(-\left(\frac{\frac{\theta_2}{\theta_2-1}\, Z_t}{\tau_t}\right)\right) + C_t^{(-\phi_c)}\; \Big(\alpha\; (1-\gamma) \\ &\quad + Y_t^{1-\gamma}\; (1-\gamma)\; (-\alpha)\; AUX\_ENDO\_LAG\_2\_1_{t-1}^{(-1)} + Y_t^{1-\gamma}\, \mu_t\; \left(1 + \frac{1}{\theta_2 - 1}\right)\; AUX\_ENDO\_LAG\_2\_1_{t-1}^{(-1)} - \tau_t^{(-1)}\, \mu_t^{\theta_2}\, Y_t\, \frac{\theta_2\, \alpha\, \theta_1}{\theta_2 - 1}\, AUX\_ENDO\_LAG\_2\_1_{t-1}^{(-1)}\Big)\Bigg) \end{aligned} \tag{10}$$

$$\beta\, \eta\, \zeta_{t+1} = \zeta_t + (d_1 + X_{t-1}\, 2\, d_2)\; A_t\, \omega_t\, \alpha\, AUX\_ENDO\_LAG\_2\_1_{t-1}^{\alpha-1} \tag{11}$$

$$
\begin{split}
&\omega_t + \zeta_t \left(-\left(\left(1-\gamma\right) Y_t^{(-\gamma)} - Y_t^{(-\gamma)} \mu_t \left(1+\frac{(-\gamma)}{\theta_2-1}-\gamma\right)\right)\right) + C_t^{(-\phi_c)} \left(1-\frac{Z_t^{\frac{\theta_2\,(1-\gamma)-1}{\theta_2-1}}}{Y_t}\right) + \left(1-\frac{Z_t^{\frac{\theta_2\,(1-\gamma)-1}{\theta_2-1}}}{Y_t}\right) \lambda_t \left(-\left(\left(-\phi_c\right) C_t^{(-\phi_c)-1}\right)\right) \\
&+ \lambda_{t-1} \left(\left(1+R_t-\delta\right) \left(-\phi_c\right) C_t^{(-\phi_c)-1} \left(1-\frac{Z_t^{\frac{\theta_2\,(1-\gamma)-1}{\theta_2-1}}}{Y_t}\right) + C_t^{(-\phi_c)} \left(\alpha\, AUX\_ENDO\_LAG\_2\_1_{t-1}^{(-1)} - Y_t^{(-\gamma)} \tau_t\, \alpha \left(1-\gamma\right)^2 AUX\_ENDO\_LAG\_2\_1_{t-1}^{(-1)}\right.\right. \\
&\left.\left. + Y_t^{(-\gamma)} \mu_t\, \tau_t\, \alpha \left(1-\gamma\right) \left(1-\gamma-\frac{\gamma}{\theta_2-1}\right) AUX\_ENDO\_LAG\_2\_1_{t-1}^{(-1)} - \mu_t^{\theta_2}\, \alpha\, \theta_1 \left(1-\frac{\theta_2\,\gamma}{\theta_2-1}\right) AUX\_ENDO\_LAG\_2\_1_{t-1}^{(-1)}\right)\right) = 0
\end{split}
\tag{12}
$$

$$
\begin{split}
C_t^{(-\phi_c)} = {} & \lambda_{t-1} + \left(1-\delta\right) C_{t+1}^{(-\phi_c)} \beta + \lambda_{t+1} \beta \left(1-\delta\right) \left(-\left(\left(-\phi_c\right) C_{t+1}^{(-\phi_c)-1}\right)\right) + \lambda_t \left(\left(-\phi_c\right) C_t^{(-\phi_c)-1} + \left(1+R_{t+1}-\delta\right) \left(1-\delta\right) \left(-\phi_c\right) C_{t+1}^{(-\phi_c)-1} \beta\right. \\
&\left. + \left(\left(-\alpha\right) Y_{t+1} K_{t-1}^{(-2)} + K_{t-1}^{(-2)} \alpha \left(1-\gamma\right) \tau_{t+1} Y_{t+1}^{1-\gamma} - K_{t-1}^{(-2)} Y_{t+1}^{1-\gamma} \alpha \left(1-\gamma\right) \tau_{t+1} \mu_{t+1} + K_{t-1}^{(-2)} \alpha\, \theta_1\, Y_{t+1}\, \mu_{t+1}^{\theta_2}\right) C_{t+1}^{(-\phi_c)} \beta\right) \\
& + \left(1+R_t-\delta\right) \left(-\left(\left(-\phi_c\right) C_t^{(-\phi_c)-1}\right)\right) - \alpha\, K_{t-1}^{\alpha-1} A_{t+1}\, \beta\, \omega_{t+1} \left(1-\left(d_0+d_2\, X_t^2+d_1\, X_t\right)\right)
\end{split}
\tag{13}
$$

$$
AUX\_ENDO\_LAG\_2\_1_t = K_{t-1} \tag{14}
$$