$$g_t = \phi\ (1 + \lambda\ (Z_{D\,t} + V_{D\,t} - 1)) \tag{1}$$

$$Z_{D\,t}\, g_{t-1} = \phi\ \left(Z_{D\,t-1} + (1-\lambda)\ V_{D\,t-1}\right) \tag{2}$$

$$V_{D\,t} = \zeta_t\, {Z_D}_t^{1-\eta}\, {N_D}_t^{\eta} \tag{3}$$

$$J_t = \lambda\, H_t + \phi\ (1-\lambda)\ \Lambda_{t+1}\, J_{t+1} \tag{4}$$

$$H_t = \Pi_t + \phi\, \Lambda_{t+1}\, H_{t+1} \tag{5}$$

$$\Pi_t = \frac{1}{\vartheta}\, \frac{1}{\mathcal{M}}\, {Y_D^W}_t \tag{6}$$

$$\zeta_t\, \eta\, J_t\, \left(\frac{Z_{D\,t}}{N_{D\,t}}\right)^{1-\eta} = 1 + log\left(f\prime\,(\cdot)|_t\right)\ \frac{g_{t-1}\, N_{D\,t}}{N_{D\,t-1}} + log\left(f\,(\cdot)|_t\right) - \Lambda_{t+1}\, log\left(f\prime\,(\cdot)|_{t+1}\right)\ \left(\frac{g_t\, N_{D\,t+1}}{N_{D\,t}}\right)^2 \tag{7}$$

$$Y_{D\,t} = {Y_D^W}_t \tag{8}$$

$${Y_D^W}_t = \left(\frac{K_{D\,t-1}}{g_{t-1}}\right)^{\alpha}\ L_t^{1-\alpha} \tag{9}$$

$$Y_{D\,t} = N_{D\,t} + C_{D\,t} + \left(1 + log\left(g\,(\cdot)|_t\right)\right)\ I_{D\,t} \tag{10}$$

$$\Lambda_t = \frac{\beta\, U_{CD\,t}}{U_{CD\,t-1}}\, g_{t-1}^{(-\rho)} \tag{11}$$

$$U_{CD\,t} = \left(C_{D\,t} - \Gamma_{D\,t}\, \frac{\chi}{1+\epsilon}\, L_t^{1+\epsilon}\right)^{(-\rho)} + (-\mu_{D\,t})\ \gamma\ \left(\frac{\Gamma_{D\,t-1}}{g_{t-1}\, C_{D\,t}}\right)^{1-\gamma} \tag{12}$$

$$\mu_{D\,t} = \beta\ (1-\gamma)\ g_t^{(-\rho)}\, \mu_{D\,t+1}\ \left(\frac{g_t\, C_{D\,t+1}}{\Gamma_{D\,t}}\right)^{\gamma} + L_t^{1+\epsilon}\, \frac{\chi}{1+\epsilon}\ \left(C_{D\,t} - \Gamma_{D\,t}\, \frac{\chi}{1+\epsilon}\, L_t^{1+\epsilon}\right)^{(-\rho)} \tag{13}$$

$$\left(C_{D\,t} - \Gamma_{D\,t}\, \frac{\chi}{1+\epsilon}\, L_t^{1+\epsilon}\right)^{(-\rho)}\ \Gamma_{D\,t}\, \chi\, L_t^{\epsilon}\, \frac{1}{U_{CD\,t}} = (1-\alpha)\ \frac{1}{\mathcal{M}}\, \frac{\vartheta - 1}{\vartheta}\, \frac{Y_{D\,t}}{L_t} \tag{14}$$

$$\Gamma_{D\,t} = C_{D\,t}^{\gamma}\ \left(\frac{\Gamma_{D\,t-1}}{g_{t-1}}\right)^{1-\gamma} \tag{15}$$

$$K_{D\,t} = I_{D\,t} + \frac{K_{D\,t-1}}{g_{t-1}}\ (1-\delta) \tag{16}$$

$$Q_t = 1 + log\left(g\left(\cdot\right)|_t\right) + \frac{g_{t-1}\, I_{Dt}}{I_{Dt-1}}\, log\left(g\prime\left(\cdot\right)|_t\right) - \Lambda_{t+1}\, \left(\frac{g_t\, I_{Dt+1}}{I_{Dt}}\right)^2\, log\left(g\prime\left(\cdot\right)|_{t+1}\right) \tag{17}$$

$$Q_t = \Lambda_{t+1}\, \left(\frac{\alpha\, g_t\, \left(\vartheta - 1\right)\, Y^W_{D\ t+1}}{\vartheta\, \mathcal{M}\, K_{Dt}} + \left(1 - \delta\right)\, Q_{t+1}\right) \tag{18}$$

$$log\left(\zeta_t\right) = \rho_\zeta\, log\left(\zeta_{t-1}\right) + 0.1\, \epsilon^{\chi}_t \tag{19}$$

$$\mathcal{S}_{Dt} = H_t + K_{Dt}\, Q_t + \left(Z_{Dt} + V_{Dt} - 1\right)\, J_t + X_{Dt} \tag{20}$$

$$X_{Dt} = g_t\, \Lambda_{t+1}\, \left(J_{t+1}\, V_{Dt+1} + X_{Dt+1}\right) \tag{21}$$

$$\mathcal{R}_{Dt} = V_{Dt}\, J_t \tag{22}$$

$$f\left(\cdot\right)|_t = exp\left(\frac{\psi_N}{2}\, \left(\frac{g_{t-1}\, N_{Dt}}{N_{Dt-1}} - g^{BGP}\right)^2\right) \tag{23}$$

$$f\prime\left(\cdot\right)|_t = exp\left(\psi_N\, \left(\frac{g_{t-1}\, N_{Dt}}{N_{Dt-1}} - g^{BGP}\right)\right) \tag{24}$$

$$g\left(\cdot\right)|_t = exp\left(\frac{\psi_I}{2}\, \left(\frac{g_{t-1}\, I_{Dt}}{I_{Dt-1}} - g^{BGP}\right)^2\right) \tag{25}$$

$$g\prime\left(\cdot\right)|_t = exp\left(\psi_I\, \left(\frac{g_{t-1}\, I_{Dt}}{I_{Dt-1}} - g^{BGP}\right)\right) \tag{26}$$