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

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

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

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

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

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

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

$$Y_{Dt} = {Y_D^W}_t \tag{8}$$

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

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

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

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

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

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

$$\Gamma_{Dt} = {C_D}_t^{\gamma}\ \left(\frac{\Gamma_{Dt-1}}{g_{t-1}}\right)^{1-\gamma} \tag{15}$$

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

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

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

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

$$f(\cdot)|_t = \frac{\psi_N}{2}\left(\frac{g_{t-1}\, N_{Dt}}{N_{Dt-1}} - g^{BGP}\right)^2 \tag{20}$$

$$f\prime(\cdot)|_t = \psi_N\left(\frac{g_{t-1}\, N_{Dt}}{N_{Dt-1}} - g^{BGP}\right) \tag{21}$$

$$g(\cdot)|_t = \frac{\psi_I}{2}\left(\frac{g_{t-1}\, I_{Dt}}{I_{Dt-1}} - g^{BGP}\right)^2 \tag{22}$$

$$g\prime(\cdot)|_t = \psi_I\left(\frac{g_{t-1}\, I_{Dt}}{I_{Dt-1}} - g^{BGP}\right) \tag{23}$$