

$$a_t = \rho_a a_{t-1} + \epsilon_{a_t} \quad (1)$$

$$(z - \beta \gamma) (z - \gamma) \lambda_t = z \gamma y_{t-1} - \left(z^2 + \beta \gamma^2 \right) y_t + z \beta \gamma y_{t+1} + a_t (z - \gamma) (z - \rho_a \beta \gamma) - z \gamma z_t^{hat} \quad (2)$$

$$\lambda_t = r_t + \lambda_{t+1} - \pi_{t+1} \quad (3)$$

$$e_t = \rho_e e_{t-1} + \epsilon_{e_t} \quad (4)$$

$$z = \epsilon_{z_t} \quad (5)$$

$$(1 + \beta \alpha) \pi_t = e_t + \alpha \pi_{t-1} + \beta \pi_{t+1} - \lambda_t \psi + a_t \psi \quad (6)$$

$$r_t - r_{t-1} = \pi_t \rho_\pi + \rho_g g_t + \epsilon_{r_t} \quad (7)$$

$$g_t = z_t^{hat} + y_t - y_{t-1} \quad (8)$$

$$0 = z \gamma q_{t-1} - \left(z^2 + \beta \gamma^2 \right) q_t + z \beta \gamma q_{t+1} + a_t \beta \gamma (z - \gamma) (1 - \rho_a) - z \gamma z_t^{hat} \quad (9)$$

$$x_t = y_t - q_t \quad (10)$$