System of Equations for Economic Model

Equations

Here are the detailed system of equations for the economic model:

Define the steady state variables and constants:

$$
\begin{aligned}
c_{ss} &= \text{Consumption at steady state,} \\
\nu &= \text{Utility parameter,} \\
k_{ss} &= \text{Capital stock at steady state,} \\
i_{ss} &= \text{Investment at steady state,} \\
w_{ss} &= \text{Wage at steady state,} \\
rk_{ss} &= \text{Return on capital at steady state,} \\
rd_{ss} &= \text{Depreciation rate at steady state,} \\
s_{ss} &= \text{Savings at steady state,} \\
n_{ss} &= \text{Net savings at steady state,} \\
y_{ss} &= \text{Output at steady state,} \\
\nu_{ss} &= \text{Adjustment cost parameter at steady state,} \\
\eta_{ss} &= \text{Elasticity parameter at steady state,} \\
u_{ss} &= \text{Utilization rate at steady state,} \\
delta_{ss} &= \text{Depreciation at steady state,} \\
RK_{ss} &= \text{Real return on capital at steady state,} \\
RD_{ss} &= \text{Discount rate at steady state,} \\
RB_{ss} &= \text{Bond return at steady state,} \\
rb_{ss} &= \text{Private bond return at steady state,} \\
PI_{ss} &= \text{Price inflation at steady state,} \\
RM_{ss} &= \text{Money market return at steady state,} \\
m_{ss} &= \text{Money supply at steady state,} \\
B_{ss} &= \text{Government bonds at steady state,} \\
ms_{ss} &= \text{Money supply growth at steady state,} \\
g_{ss} &= \text{Government spending at steady state.}
\end{aligned}
$$

System of equations:

$$\frac{\nu \times (L^{\text{Fri}})}{(1-\beta h)((1-h)c_{ss})^{-\sigma}} - w_{ss} = 0, \quad (1)$$

$$1 - \beta \frac{1+RD_{ss}}{1+PI_{ss}} = 0, \quad (2)$$

$$(1+rd_{ss}) - \frac{1+RD_{ss}}{1+PI_{ss}} = 0, \quad (3)$$

$$1 - \beta \frac{1+RB_{ss}}{1+PI_{ss}} = 0, \quad (4)$$

$$(1+rb_{ss}) - \frac{1+RB_{ss}}{1+PI_{ss}} = 0, \quad (5)$$

$$(1+RK_{ss}) - \left(\alpha \left(u_{ss}k_{ss}\right)^{\alpha-1} \left(L^{\text{star}}\right)^{1-\alpha} + (1-\delta_{ss})\right)(1+PI_{ss}) = 0, \quad (6)$$

$$(1+rk_{ss}) - \frac{1+RK_{ss}}{1+PI_{ss}} = 0, \quad (7)$$

$$(1+RM_{ss}) - \frac{1}{1+PI_{ss}} = 0, \quad (8)$$

$$B_{ss} - B_{ss}(1+rb_{ss}) = 0, \quad (9)$$

$$m_{ss} - \frac{m_{ss}}{1+PI_{ss}} = 0, \quad (10)$$

$$ms_{ss} - \frac{m_{ss} \times PI_{ss}}{1+PI_{ss}} = 0, \quad (11)$$

$$w_{ss} - (1-\alpha)\left(u_{ss}k_{ss}\right)^{\alpha}\left(L^{\text{star}}\right)^{-\alpha} = 0, \quad (12)$$

$$s_{ss} - \frac{\eta_{ss}}{\lambda - \nu_{ss}} n_{ss} = 0, \quad (13)$$

$$\nu_{ss} - ((1-\gamma)\beta(rk_{ss} - rd_{ss}) + \beta\gamma\nu_{ss}) = 0, \quad (14)$$

$$\eta_{ss} - ((1-\gamma)\beta(1+rd_{ss}) + \beta\gamma\eta_{ss}) = 0, \quad (15)$$

$$n_{ss} - \gamma((rk_{ss} - rd_{ss})(s_{ss}/n_{ss}) + (1+rd_{ss}))n_{ss} - \epsilon s_{ss} = 0, \quad (16)$$

$$s_{ss} - k_{ss} = 0, \quad (17)$$

$$i_{ss} - \delta k_{ss} = 0, \quad (18)$$

$$y_{ss} - \left(u_{ss}k_{ss}\right)^{\alpha}\left(L^{\text{star}}\right)^{1-\alpha} = 0, \quad (19)$$

$$c_{ss} + i_{ss} + g_{ss} - y_{ss} = 0, \quad (20)$$

$$g_{ss} - g_y \times y_{ss} = 0, \quad (21)$$

$$\alpha \frac{y_{ss}}{u_{ss}} - b u_{ss}^{\zeta} k_{ss} = 0, \quad (22)$$

$$\delta_{ss} - \delta - \frac{b}{1+\zeta} u_{ss}^{1+\zeta} = 0, \quad (23)$$

$$Z \times m_{ss}^{-\phi} - \left(\frac{RB_{ss}}{1+RB_{ss}}\right)\left(\frac{1-\beta h}{((1-h)c_{ss})^{-\sigma}}\right) = 0. \quad (24)$$