In the Name of God

Sharif University of Technology

Graduate School of Management and Economics

Macroeconomics 2 - 2024

Problem Set 2

1 A Neoclassical Growth Model with External Finance

Consider a simple neoclassical growth model. Suppose the economy has access to foreign finance at a fixed real interest rate $\bar{r}$.

1. Setup the problem. Be careful about the setup.
2. Find the steady state allocation and discuss your results. Does the economy borrow a positive value in the long run?
3. Think deeply on how does the transition occurs. You may find it counter-intuitive at the beginning.

2 A Neoclassical Growth Model with Foreign Direct Investment (FDI)

Consider a simple neoclassical growth model. Suppose you can have foreign direct investment but the return is at the marginal rate for capital.

1. Setup the problem. Be careful about the setup.
2. Find the steady state allocation and discuss your results. Does the economy receive a positive value of FDI in the long run?
3. Think deeply on how does the transition occurs.

3 Representative Agent model Analysis by Simulation

Consider the standard representative agent model with labor supply decision. There is a representative household who solves an infinite-period consumption, labor and investment choices such that

$$\max_{\{c_t,k_{t+1}\}} \sum_{t=0}^{\infty} \beta^t \left(\frac{c_t^{1-\sigma}-1}{1-\sigma} - \gamma \frac{l^{1+\phi}}{1+\phi} \right)$$

subject to

$$\begin{aligned} c_t + i_t &= w_t l + v_t k_t + \Pi_t \\ k_{t+1} &= (1-\delta) k_t + i_t \end{aligned}$$

for all $t = 0, 1, 2, ...$and $\beta < 1$.

There is a representative firm which rents capital and employs workers to maximize its profit:

$$\max_{k_t, l_t} \Pi_t = A k_t^{\alpha} l_t^{1-\alpha} - w_t l_t - v_t k_t$$

Markets clear such that $l_t^d = l_t^s$ and $k_t^d = k_t^s$. The final good is the numéraire good with price one. (If needed, you can take $\sigma = 1$ (i.e. log utility))

1. Write down the FOCs and the Euler equation. Solve for the steady state equilibrium.

2. Explain how does your S.S. results (all important macro variables like y, c, k, i) depend on A, β, δ and k_0.

3. Suppose the economy is in the steady state at $t = 0$. Analyze the the effect of a positive permanent productivity shock using Dynare. Plot the time series for y, k, c, i, w, v. Specifically explain what would happen to each variable over time using supply-demand analysis in different markets. You can take $\beta = 0.96, \delta = 0.05$. For σ trys $\sigma = 0.6, 1, 1.5$.