1 Simulating an Infinite-Period Model

Consider the infinite-period model of consumption choice, where the social planner solves:

$$\max_{\{c_t, k_{t+1}\}} \sum_{t=0}^{\infty} \beta^t \log c_t$$

subject to

$$c_t + k_{t+1} = Ak_t^\alpha + (1 - \delta) k_t$$

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

1. Write down the Euler Equation.
2. Solve for the steady state allocation.
3. Write a Matlab code to find the optimum $c_0^*$ for a given $k_0$.

2 Simulating a Representative Agent model with No Labor-Leisure Decision

Consider the infinite-period model of consumption choice, where the social planner solves:

$$\max_{\{c_t, k_{t+1}\}} \sum_{t=0}^{\infty} \beta^t \log c_t$$

subject to

$$c_t + k_{t+1} = Ak_t^\alpha + (1 - \delta) k_t$$

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

In this problem we’d like to do the comparative statics using Dynare.

1. Calibrate your model: Replace the parameters of the model with some sensible numbers.

2. Setup the Dynare code to solve for the steady state of the problem.

3. Suppose the parameter $A$ rises by 10%. Determine the new steady state and plot the transition paths for $y_t, k_t, i_t, c_t, v_t$. Explain how the results make sense.

4. Now suppose the initial capital rises by 10%. Redo the previous part.

3 A Neoclassical Growth Model with External Finance

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

1. Setup the problem. (You should think deeply here on how to incorporate the oil in to your model. There is not necessarily one way to do it.)

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.

4. Now suppose you can have foreign direct investment but the return is at the marginal rate for capital. Now resolve the problem.