

Instructor: *Professor Griffy*

Due: *Apr. 11th, 2024*

AECO 701

Problem Set 5: The RBC Model

Problem 1. RBC Model with Labor-Leisure Choice. The RBC model with an intensive margin is given by the following:

$$\max_{C_t, K_{t+1}} \sum_{t=0}^{\infty} \beta^t U(C_t, 1 - L_t) \quad (1)$$

subject to

$$C_t + K_{t+1} = z_t F(K_t, L_t) + (1 - \delta)K_t \quad (2)$$

$$z_t \sim \text{Markov} \quad (3)$$

a Write the recursive formulation of this problem.

b Assume the following calibration:

Parameter	Value
$U(C, 1 - L)$	$\ln(C) + \theta \ln(1 - L)$
$zF(K, L)$	$zK^\alpha L^{1-\alpha}$
β	0.99
ρ	0.9
δ	0.04
α	0.3
θ	2
K Grid	[0, ???]

$$\pi_t = \begin{bmatrix} 0.9 & 0.1 \\ 0.7 & 0.3 \end{bmatrix} \quad (4)$$

$$z_t = \begin{bmatrix} 1.2 \\ 0.8 \end{bmatrix} \quad (5)$$

Start by finding the steady-state level of capital. Set up the capital grid to range from $[0, 2 \times k^*]$. Solve the model using grid search. Note that you will need to solve the model each time for each possible state. If you run into problems, check to ensure that the grid point $k = 0$ (the first node) is solving appropriately.

c Start the model in the “high state,” and run the model forward for 100 periods. In period 101, a highly persistent recession starts (10 periods); simulate the response of labor to this recession. Discuss the response of hours as a result of this shock.