

## Econ 633 Advanced Macroeconomic Theory

### Assignment 3: Solving DSGE Models

1. Consider the King, Rebelo and Plosser model:

$$\begin{aligned} \max E_t \sum_{t=0}^{\infty} \beta^t [\log c_t + \theta \log(1 - n_t)] \\ c_t + k_{t+1} - (1 - \delta)k_t = y_t, \\ y_t = A_t k_t^a n_t^b, \quad (a + b = 1). \end{aligned}$$

- (a) Read the notes on how to compute dynamic general equilibrium models.
- (b) Write Python or Matlab code to simulate this model. Follow the following steps:
  - i. Derive all first order conditions.
  - ii. Calculate steady state values.
  - iii. Define all the matrices for dynamic and non-dynamic equations.
  - iv. Solve the model to obtain the matrices  $m$  and  $r$ .
  - v. Simulate the model and calculate sample moments as you did in the first homework for actual data.
  - vi. Obtain the impulse response of  $c$ ,  $n$ ,  $y$  and  $i$  to a one unit productivity shock, and graph them.
- (c) Extra credit: violate the  $a+b=1$  condition, and see if you can find combinations of  $a$  and  $b$  that will yield indeterminate REEs. Shut down the productivity shocks, and simulate the indeterminate model with forecast errors being the only driving force of business cycles. Calibrate the forecast errors any way you want. Explain how you did it.