

Problem Set 4

ECON 30020: Intermediate Macroeconomics
Professor Sims
University of Notre Dame, Spring 2018

Instructions: You may work on this problem set in groups of up to four people. Should you choose to do so, please make sure to legibly write each group member's name on the first page of your solutions. This problem set is due in class on Thursday February 15.

1. GLS, Chapter 8, Questions 1, 2, 4, and 5.
2. GLS, Chapter 8, Exercise 3.
3. Suppose that you have a standard two period consumption-saving problem. The household's objective is to maximize:

$$\begin{aligned} \max_{C_t, C_{t+1}} \quad & \ln C_t + \beta \ln C_{t+1} \\ \text{s.t.} \quad & \\ & C_t + \frac{C_{t+1}}{1+r_t} = Y_t + \frac{Y_{t+1}}{1+r_t} \end{aligned}$$

- (a) Use calculus to derive the Euler equation for this problem. Briefly provide some economic intuition for the Euler equation.
- (b) Combine the Euler equation from (a) with the intertemporal budget constraint to derive the consumption function (i.e. an expression for C_t as a function of parameters and variables which the household takes as given). What is the marginal propensity to consume?
- (c) Since saving is $S_t = Y_t - C_t$, use your answer from (b) to derive an expression for the saving function (i.e. an expression for S_t as a function of parameters and variables which the household takes as given).
- (d) We can define the saving *rate* as $s_t = \frac{S_t}{Y_t}$. Note that there is a time subscript on this, as, unlike the Solow model, the saving rate will not necessarily be constant. Derive an expression for the saving rate in this model. How does the saving rate move with the interest rate? What would have to be true about Y_{t+1} for the saving rate to be constant in this problem?
- (e) Take your answer from (d). Suppose that $Y_{t+1} = \frac{1}{2}Y_t$ and that $\beta = 0.95$. Suppose that r_t fluctuates between 0.00 and 0.10. What would be the maximum and minimum values of the saving rate? Given your answer, comment on whether the assumption of a constant saving rate in the Solow model is a bad assumption (there is no right or wrong answer here to what is "bad" – just discuss the question intelligently).