Problem Set 1

ECON 30020, Intermediate Macroeconomics, Fall 2024
The University of Notre Dame
Professor Sims

Instructions: You may work on this problem set in groups of up to four people. Should you choose to do so, you may turn in one problem set, but make sure that the names of all group members are clearly legible at the top of your assignment. Problem sets should be handed in during class and stapled in the upper left corner. Please show your work, box or circle final answers, and clearly label any graphs. If the problem set requires work in Excel, you may just report final answers / figures from Excel – you need not turn in Excel code. This problem set is due at the beginning of class on September 11.

1. GLS, Chapter 1, Exercise 1.
2. GLS, Chapter 1, Exercise 3.
3. **The Rule of 70** Suppose that you have a variable, X_t, growing at a constant rate of g. Relative to period t, in period $t+h$ that variable will therefore be:

$$X_{t+h} = (1+g)^h X_t$$

   (a) Create an Excel file. Create a column labeled "Period" and have periods run from 0 (the first period) to 100 (the last period). Normalize the period 0 value, X_0, to 1. Consider different growth rates: 2, 5, 7, 10, and 20 percent. For each growth rate, approximately how many periods does it take for the variable X to double?

   (b) The "Rule of 70" provides a quick approximation to calculate how many periods it will take a variable to grow. In particular, if a variable is growing at rate $G = g \times 100$, the Rule of 70 says that variable out to double approximately every $70/G$ periods. According to the Rule of 70, approximately how many period should it take X to double for growth rates of 2, 5, 7, 10, and 20 percent?

   (c) Compare your answers from (b) (the approximation based on the rule of 70) and (a) (the actual number of periods to double).

4. GLS, Chapter 4, Exercise 1. Note that you should download data through 2023 (not through 2016, as it states in the end-of-chapter problem), and compute average growth rates by decade for the 1950s, 1960s, 1970s, 1980s, 1990s, 2000s, and 2010s (all of the 2010s, running up through the final quarter of 2019).
5. GLS, Chapter 5, Exercise 1.
6. GLS, Chapter 5, Exercise 2.
7. GLS, Chapter 5, Exercise 3.