MGTECON 300, Spring 2021

Stanford Graduate School of Business

Professor Chad Jones

Assignment #2

Due on Canvas on
Sunday, April 25 at 11:59pm (pdf only)

You are welcome to work in groups (of up to 4 people) on the homework assignments in this course; all group members must be in the same professors sections (so that the groups can be formed in Canvas). Each group turns in *one PDF* file via Canvas. Please put all group members' names on the top of the first page of your submission.

– Unless submitting individually, you will need to join a Canvas group *before* submitting your solution.

– To allow you maximum flexibility in changing groups, you will need to sign up for groups again at the start of each assignment. (It is fine to have the same group or to change groups).

– If you have any questions about groups, please email Rachel Schuh, at schuhr@stanford.edu.

1. **Technology Transfer in the Solow Model.** One explanation for Ireland's rapid economic growth during the last several decades is its expansion of policies that encourage "technology transfer." By this, we mean policies — such as opening up to international trade and attracting multinational corporations through various incentives — that encourage the use and adoption in Ireland of new ideas and new technologies. This question asks you to use the Solow model to study this scenario.

   Suppose Ireland begins in steady state. To keep the problem simple, let's assume the sole result of these technology transfer policies is to increase $\bar{A}$ by a large and permanent amount, one time. Answer the following questions:

   (a) Analyze this change using a Solow diagram. (Hint: Past experience suggests that drawing these graphs by hand instead of in a computer program is much easier and faster and leads to better answers. Just include a picture of your hand-drawn graph.)

   (b) What happens to output per person in Ireland in the long run?

   (c) Show graphically what happens to the growth rate of per capita GDP in Ireland over time.

   (d) Discuss in a couple of sentences what your results imply about the effect of technology transfer on economic growth.

2. **Growth Rates in the Solow Framework.** By manipulating the equations of the Solow model mathematically, it is possible to make more precise quantitative statements about the behavior of growth rates over time. For example, one way of quantifying the "Principle of Transition Dynamics" is with the following equation:

$$g = 3 \times (\ln y^* - \ln y_0) + 2$$

where g denotes the growth rate of a country over the next 10 years (in percentage points), $\ln$ denotes the "natural logarithm," y_0 is the per capita GDP of a country today (relative to the U.S.) and y^* is the per capita GDP of a country in steady state (relative to the U.S.). For example, a country that is today at 10% of the U.S. level and is projected to have a per capita GDP relative to the U.S. of 20% in steady state would be predicted to grow at an average annual rate of

$$3 \times (\ln(20) - \ln(10)) + 2 = 3 \times .69 + 2 \approx 4.1$$

That is, we'd expect such a country to grow at 4.1% per year over the next decade.

Of course, we don't usually know a country's steady state position vis-a-vis the United States. However, we *do* observe its growth rate.

(a) Using those facts and the equation above, fill in the last column of the table at the top of the next page. That is, offer a projection of where countries are headed in the long run. (HINT: It is easiest if you solve first for $\ln y^*$ and then exponentiate the result using a calculator or spreadsheet.)

(b) Provide a one-paragraph discussion of your results.

Table 1: Exercise 2

Country	Per capita GDP (US=100) 2007	Growth rate during 2007–2017	Per capita GDP (US=100) Steady State
U.S.	100	2.0%	??
Italy	70	1.0%	??
Mexico	30	2.5%	??
Brazil	20	3.0%	??
China	15	8.0%	??
India	8	7.0%	??
Vietnam	7	6.0%	??
Zimbabwe	2	6.0%	??

Note: Growth rates are rough, stylized estimates, excluding the impact of the financial crisis.

3. **Multinationals and Vietnam's Future Growth.** A consulting firm hires you to write a report on the potential contribution of multinational corporations to the future economic growth prospects of Vietnam. This exercise asks you to use some of the tools you have learned in this course to start thinking about this project. Answer the following questions:

   (a) Using some of the resources from the previous assignment, write a paragraph providing an overview of Vietnam's economy. How large is the economy (both population and per capita GDP)? How fast has it been growing in recent years?

   (b) In light of the Solow model, discuss briefly why Vietnam has been growing so rapidly. Is it plausible that this growth could be sustained for another decade? Why or why not?

   (c) Suppose multinationals were to immediately bring in additional capital amounting to 40% of the capital stock. By how much would you predict GDP per person would rise as a result of this capital inflow? Over the 5-year period following the large capital inflow, would you expect Vietnam to grow more slowly or more rapidly than before? Why?

   (d) What else might multinationals bring to Vietnam? Would you expect this to be more or less important than the capital they bring? Why?

4. **Nonrivalry in the Business World.** Choose an example of nonrivalry that is familiar to your group from your prior work experience. In a brief essay (~1/2 page), describe the example you have in mind. Be sure to answer the following questions: How does nonrivalry apply in your example? How important is this nonrivalry to firms in your industry? What are the consequences of this nonrivalry for management and business?