Midterm take-home exam

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Deadline: 2018/1/11 18:00'

Overview

Instructions

In this exam, you will

- clone the assignment repository and make a working branch (eg. `solution` branch);
- solve all the problems in Sections 1, 2 and 3;
- write the solutions in `solution.Rmd`;
- commit `solution.Rmd` and `solution.pdf`; and
- open a Pull Request by the deadline.

You may work with classmates, but:

1. You must try the problems on your own first;
2. You must write up your answers yourself, in your own words.;
3. If you work with others, you should thank them in an acknowledgment footnote or section at the start of your document.

1 Problem: Solow

Consider the Solow model and assume that the economy is on the balanced growth path at $t = 0$.

There is a temporary increase in g, starting at $t_0 > 0$, probably due to a big event in science and technology. This boom ends at $t_1 > t_0$.

1. Describe the dynamics of $k = K/AL$ from $t = 0$ on.
2. Describe the transition dynamics of major macroeconomic variables.
3. Describe the long-run dynamics, i.e., the dynamics in the final steady state.

Make sure to show me that you understand

- the mathematical logic;
- the economic idea behind the math; and
- how to explain those things in words and with graphs (similar to Figures 1.4, 1.5 in Romer's textbook).

2 Problem: Convergence

The Solow model predicts a negative correlation between average growth rate during a period of time and initial income per capita. See Figures 1.7, 1.8 in Romer's textbook. Reproduce these figures but with the Penn World Table v9.0 dataset, and observe whether his discussion in the textbook is valid for the updated data.

Produce graphs and report on what you observe for the following cases.

1. Include all the available countries in your analysis.
2. Restrict your sample to OECD countries.

Optional problem: Perform a simple linear regression for 1 and 2 to check that the negative correlation is statistically significant. (You'll get bonus points.)

3 Problem: MRW

Conduct two regression analyses similar to those discussed in the slides for Day 5:

- non-restricted, bivariate OLS
- restricted, simple OLS

Use PWT v9.0 dataset restricted to the subset containing the countries the populations of which in 1960 are more than 1 million. Compare the results with the MRW paper.