JEM004 Macroeconomics
IES, Fall 2012
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Macroeconomics - Problem Set #1

1. Econometric part:

a) Economic growth and convergence - descriptive statistics:

DatasetA contains levels of GDP per capita for many countries of the world for the years 1975, 1985, 1995 and 2005.

1. Plot histograms of GDP for all the four years and describe how the distribution of income evolves.
   (Notes: Use natural logarithm. Choose appropriate number of bars (there shouldn't be gaps in histogram and also it should be relatively smooth). If there are any outliers, omit them. Don't forget to explain what is the economic intuition for evaluating these countries as outliers. Try to put all histograms on just one page.)

2. Split the data into two groups. The split should be done according to the median income in 1975. Then show boxplots of incomes for both groups since 1985 onwards. What happened? Is there any evidence for convergence?
   (Hint.: Use logs instead of levels again. Start with splitting the sample and creating six variables: poor in 1985, 1995 and 2005, then same for the rich. Plot boxplots for each variable. Again, try to put all pictures on one page.)

b) The Solow model:

We've estimated parameters of the Solow model based on cross-country regression. Attached you will find DatasetB. Some countries are different, also the time range is a bit smaller. Try to replicate the estimation from the class:

$$\log y_i = \beta_1 + \beta_2 \log s_i + \beta_3 \log(n_i + g + \delta) + u_i$$

1. However, if the specification is correct then $\beta_1 = -\beta_2$ must hold. Test this hypothesis and reestimate the original model with this restriction.(Hint: Use Wald test.) What can you conclude?

2. Have a look at the countries you have chosen for our project. What are their residuals? Can you sa they fit with the prediction of the Solow model?

Note: The datasets for this assignment will be available on Moodle. The description of variables is on a separate sheet including their transformations. In case your countries are not in a dataset to example 1 or 2 in the dataset, here are the possibilities what to do: 1) use country that is similar to yours, 2) or try country of your origin, 3) if it still does not help, try to pick up a country with a name that begins with the same letter as your surname or first name does :-).

2. Mathematical part - Solow model:

Take the Solow model with exogenous savings rate s, population growth rate n, depreciation rate δ, and labour augmenting exogenous technological progress x. The production function is $Y = K^{\alpha}(AL)^{1-\alpha}$.

1. Assume the factors of production are paid their marginal product. What is the expression for the wage and the return on capital, in terms of the intensive form production function $(y = k^{\alpha})$
2. Show that along the stead state the return to capital will be constant but the wage will be growing. At what rate does the wage grow?
3. Assume the economy starts off below the stead state K/AL ratio (AL is effective labor). Show that the return to capital will be falling over tie, but the wage will be growing at a faster rate than in steady state.
4. Compute the savings rate that is necessary so that the economy is below the golden rule level for the capital stock.
5. Assume now that there is a government which spends a fraction z of GDP every ear, so that government spending is zY. Use the national income identity $Y = C + I + G$ to work out the new rule for capital accumulation in the Solow model. How will the governments pending affect the long run growth rate and the stead state level of GDP?

3. Reading + essay:

World Economic Outlook, October 2012. "The Good, the Bad and the Ugly: 100 Years of Dealing with Public Debt Overhangs, pp: 101-126

In your essay, please focus on answering following questions:

1. What question does the article analyze?
2. What are the main conclusions drawn from the historical experience from debt reconciliation?
3. Pick one case study and explain the implications.
4. Do you have any further suggestions for the further analysis? DO you have an objections /recommendations for the content of the article?

Notes on problem sets.

Should be delivered via moodle only, by **October, 30th, 23:55**. You have to be enrolled in Moodle, too, not only in SIS, to be able to post problem set there.

Please follow these additional rules - it helps us to do our jobs better (if we correct your problem sets faster, we have more time to prepare lectures and seminars):

1. ONE file only. Do everything you can in order to put everything into one file. No "zips" or "rars" please. All text editors can import images, tables and even videos and append it to the main text.
2. Don't forget to assign a name to your file that will be displayed in Moodle.
3. Name of your file: NameProblemSetX.*; example: BaxaProblemSet1.pdf.
4. The file type: If you can, submit pdf version. Prefer older MS Office file types over docx.
5. You are encouraged to work in teams. The names of your colleagues should be written in the header of your problem set. However, essay should be written by your own.
6. In the essay part, we want to see whether you are able to make critical summary of the article - i.e. understand and explain IN YOUR OWN WORDS what are the main ideas, results and comment on they validity. We are not expecting any form of journalism, or free essay on the topic, we want you to learn how to read articles. Therefore, please, avoid things like:
    - "borrowing" expressions or full sentences from the article - it is called plagiarism
    - using pronoun "we" in summary part - you are speaking about author's ideas and results
    - using pronouns "we" in discussion part - it is your opinion about the article + it should be individual, do not be ashamed of your opinions