Econ 435/835: Development Economics

Assignment 2

Due Date: Monday, 4^{th} November 2013.

1. Complementarities arise in all sorts of situations. Here is one in a skill acquisition problem.

Consider an economy in which each worker has to decide whether to acquire education and become a high-skilled worker or remain low-skilled. Acquiring education is costly; one has to incur a cost C to acquire education. Assume that interest-free education loans are available to everybody.

Let I_H and I_L denote the incomes earned by a high- and low-skilled worker respectively. These incomes are defined as $I_H = (1+\theta)H$ and $I_L = (1+\theta)L$, where H and L are constants $(H > L)$ and θ is the fraction of the population that decides to become high skilled. This formulation captures the idea that a person's productivity is positively linked not only to his own skills, but also to that of his fellow workers. Assume that all individuals simultaneously choose whether or not to become skilled.

(i) Explain why this is like a coordination problem. What is the complementarity?

(ii) Show that if $H - L < C < 2(H - L)$, there are two equilibria: one in which everybody acquires skills, and one in which nobody does.

(iii) [*This and part (iv) are for MA students.*] Show that there is a third equilibrium in which only a fraction of the population becomes high-skilled. Give an algebraic expression for this fraction, and argue intuitively that this equilibrium is "unstable" i.e. that if a small number of people were to deviate away from it due to exogenous reasons, it is likely to give way to one of the two extreme cases in part (b).

(iv) Change the example slightly. Suppose the return to low-skilled occupations is now given by $I_L = (1 + \lambda\theta)L$, where λ is some constant. The return to high-skilled jobs is the same as before.

Show that if the value of λ is sufficiently high, there is only one possible equilibrium. Can you explain why multiple equilibria arise in the first case but not in the second.

(v) [*This is for all students*] Consider another variation. Incomes from different occupations are independent of the number of high-skilled people in the economy. Specifically, $I_H = H$ and $I_L = L$. However, the cost of education is variable, and is given by $C(\theta) = (1 - \theta)/\theta$, which is decreasing in θ (the idea here is that it is easier to learn i.e. costs are lower, if there are more educated people around). Show that once again, there are at least two possible equilibria, as in (b). Describe them.

2. Consider the Murphy-Shleifer Vishny framework (the basic version in which the wage for all workers, irrespective of which firm they work in, is 1) in which there are k traditional sectors and in each sector there is a potential monopolist with a modern technology who is considering entry, but has to use F units of labor as start-up costs. Suppose that we introduce taxes into this framework.

(i) Suppose the monopolist's profits are taxed at the rate t, and this tax revenue is distributed back to the consumers in the economy. Can there be multiple equilibrium under this extension? If so, give the set of parameters under which multiple equilibria exist in the model.

(ii) Consider instead that the tax is on the monopolist's revenues. Can there be multiple equilibrium now? If so, give the set of parameters under which multiple equilibria exist in the model.

3. Let us try to replicate the results from a relatively simple but interesting paper, "Is Inequality Harmful for Growth?" by Torsten Persson and Guido Tabellini in the *American Economic Review* (June, 1994). They wish to see if the level of income inequality affects growth. Luckily for us, Torsten Persson provides the Excel data files on his web-site at:
http://people.su.se/~tpers/data.htm

(i) Using the post-war data, try to replicate their results in Table 5 (the relevant income inequality variable is MIDDLE, the income share accruing to the middle quintile of the distribution). [*Please include your Stata-ouput*]

(ii) Starting with Kuznets, many have argued that the relationship between income level and inequality has an inverse U shape. Let us check if this holds for growth and inequality too. In empirical analysis, such things can be checked by running a regression of the form:

$$y = \alpha + \beta x + \gamma x^2 + \varepsilon$$

If $\beta > 0$ <u>and</u> $\gamma < 0$, then y is increasing in x upto the point $\frac{\beta}{2\gamma}$ and decreasing beyond it (convince yourself of this inverted U shape by doing the necessary calculus). Re-run Persson and Tabellini's post-war regressions including both the inequality measure as well as the square of the measure. Do you find any evidence for or against an inverted U shape here?

(iii) As discussed in class, some have criticized the findings on inequality and income as saying it is capturing the "Latin America effect." Run Persson and Tabellini's post-war regression excluding the Latin American countries. Do their findings on inequality being harmful for growth still hold up?

4. [*For MA students only.*] Let us try to replicate the results of the famous Acemoglu, Johnson, Robinson's (AJR) 2001 paper, "The Colonial Origins of Comparative Development." While AJR provide some of the data in the Appendix to their paper, David Albouy at the University of Michigan has recently criticized some of the data in AJR's paper. While we will not go into his criticism per se, (helpfully for us) at Albouy's website (http://www-personal.umich.edu/~albouy/) you will find a Stata file containing the data for AJR's paper (as well as Albouy's modification).

(i) Using this data, try to replicate Table 2 (columns 2, 5 and 6) and Table 4 (columns 1-6) in AJR's paper. [*Please include your Stata-ouput.*]

(ii) While AJR argue that institutions are important in explaining differences in income levels across countries (more precisely, they use log GDP in 1995), one wonders if a similar argument can be made for explaining differences in growth rates as well.

Using the Penn World Tables, gather country GDP per capita data for 1985 and 1995, and then estimate OLS and IV regressions of the growth rate between 1985 and 1995 on institutions and latitude (basically, column (5) in Table 2 and column (2) in Table 4, but using growth rate as the dependent variable). Do you find that institutions cause growth? In AJR's paper, there is a big difference between the OLS and IV estimates. Do you find a similar discrepancy here?

Try the following different measures of growth $\frac{y_{1995}-y_{1985}}{y_{1985}}$, $\frac{y_{1995}}{y_{1985}}$, $\log(\frac{y_{1995}-y_{1985}}{y_{1985}})$, $\log(\frac{y_{1995}}{y_{1985}})$. Do any of these give a better fit than the others?