Written Exam for the M.Sc. in Economics winter 2013-14-R
Advanced Development Economics – Macro aspects
Master's Course
February 20th, 2014
(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by "eksamen på dansk" in brackets, you must write your exam paper in Danish.

This exam consists of 3 pages in total

A. Verbal questions

Question A.1. *Figure 1 shows a strong negative correlation between "settler mortality rates" (calculated in ex colonies around the turn of the 20th century) and contemporary GDP per capita. Explain how this link between mortality rates among settlers and current income might allow us to identify the impact of institutions on growth.*

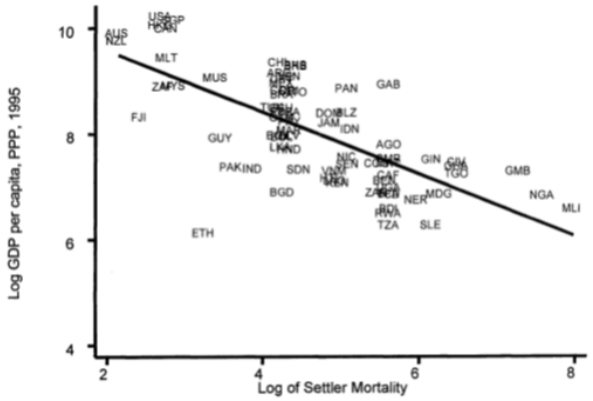

FIGURE 1. REDUCED-FORM RELATIONSHIP BETWEEN INCOME AND SETTLER MORTALITY

Question A.2. *In 1979 China enacted the so-called one child policy. Explain how this policy might be useful in identifying the impact of fertility on economic growth.*

B. Analytical questions

Consider an economy in the process of development. Time is discrete $t = 0, 1...\infty$. The economy comprises two sectors: an agricultural sector (the "a" sector") and a manufacturing sector (the "m"-sector). The agricultural sector employs a technology, which exhibits constant returns to labor input, L_{at}, and land, X, which is a fixed factor. So $Y = AL_a^{1-\alpha}X^{\alpha}$; where A is the level of technology in the a-sector. Correspondingly $Y_{mt} = BL_{mt}$. That is, the m-sector operates under constant returns to labor input; B is the level of technology. Both A and B are assumed to be parametrically fixed.The price of the m-sector good is normalized to one, so the absolute and relative price of the a-good is p. We assume labor in the a-sector is rewarded by its average product, so that $w_a = pY_a = L_a$; in the m-sector we have $w_m = Y_m = L_m = B$. Labor is fully mobile between the two sectors. Households live for two periods, and derive utility from m-goods, m_t, and offspring, n_t, in accordance with $u_t = \ln(n_t) + m_t$. They live for two periods: period one consititutes childhood and during period 2 they work (supplying one unit of labor inelastically) and have children who each require one unit of food. The budget constraint is thus $w = p_t n_t + m_t$.

Question 1. *Solve the household's problem and show that optimal family size is given by $n_t = 1/p_t$ and demand for m-goods is $m = w - 1$. Comment on these results.*

Question 2. (a) *Use the non-arbitrage condition $w_a = w_m = w$, the labor market clearing condition, $L_a + L_m = L$; and the equilibrium condition for the m-market $m_t L_t = Y_{mt}$ to show that in the static general equilibrium: $L_a/L = 1/B, L_m/L = (B-1)/B$ and*

$$p_t = \frac{B^{1-\alpha}L_t^{\alpha}}{AX^{\alpha}}$$

(b) Explain why p depends on B, A and L in the manner suggested by the formula and why B determines labor's allocation across sectors.

People reproduce in proportion to their numbers, $L_{t+1} = n_t L_t$. Hence, given the equilibrium price, we have the following law of motion for L

$$L_{t+1} = \frac{AX^{\alpha}}{B^{1-\alpha}}L_t^{1-\alpha} \equiv \Psi(L_t), \ L_0 \text{ given.}$$

We also have the following definition

Definition 1 *A steady state equilibrium, L^*, fullfills $L_{t+1} = L_t = L^*$ and $L^* = \Psi(L^*)$*

Question 3. *Construct the phasediagram for the model.*

Question 4. *(i) Use the phasediagram to assess stability of the steady state. (ii) Draw the time path for n and p and explain how the economy adjusts starting from an initial condition, $L_0 < L$.*

Question 5. *Derive the steady state level of population density, (L/X) , as well as GDP per capita. (hint: GDP is in this economy given by $Y = pY_a + Y_m$).*

Question 6. *Suppose an economy, which initially is in steady state, is hit by a permanent positive shock to B. (i) Illustrate the consequences using the phasediagram. (ii) Illustrate the time paths for n; p and y and explain the adjustment to the new steady state. Redo the exercise for an increase in A.*

Question 7. *Discuss the empirical relevance of the model.*