Written Exam for the M.Sc. in Economics, Winter 2010/2011- R

Advanced Development Economics – Macro Aspects

Master's Course

22.02.2011

(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.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students' self-service system.

The percentage weights assigned to each question should only be regarded as indicative. The final grade will ultimately be based on an assessment of the quality of the answers to all questions in the exam in their totality

A. Verbal questions (30%)

Question 1. Discuss which *mechanisms* may be responsible for the fertility decline, and why the timing of the fertility decline might be important vis-à-vis contemporary comparative development?

Question 2. Why might the Protestant Reformation matter to long-run development? What does the data say? Be sure to explain how the study(ies) you refer to reach this conclusion.

B. Analytical Questions (70%)

Consider an economy in the process of development. Time is discrete , t=0,1,2,.. and extents into the infinite future. Individuals live for two periods. Each "household" is represented by a unique parent, who will be rearing a number of off-spring, n_t. Accordingly, as a matter of accounting, the population at time t+1, L_{t+1}, is given by the population in the previous period multiplied by the number of off-spring: $n_t L_t$

In the first period of life individuals are children. During this period, the child live off the consumption of her parent. In period two individuals are grown up. They work and decide on how to divide their resulting income, I_t, between consumption, c_t, and expenditure on having off-spring on their own, n_t.

The preferences of an individual being a parent in period t are given by $u_t = \log(c_t) + \beta \log(n_t)$, and the budget constraint is $c_t + \lambda n_t = I_t$.

Question 1. Solve the maximization problem, and derive the solution for optimal family size (i.e., optimal n_t). Comment on the result

Production, Y_t, is given by $Y_t = AL_t^{\alpha} X^{1-\alpha}$ where A is the level of productivity, X is land area (both are assumed constant), and L_t is the labor force at time t. Assume labor compensation is given by the average product, Y_t/L_t (because there are no property rights to land, say). As a result, the income of the representative parent, supplying 1 unit of labor, is simply $I_t = AL_t^{\alpha-1} X^{1-\alpha}$.

Question 2. Derive the law of motion for population size.
Question 3. (i) Illustrate the phase diagram for the model. (ii) Establish that a (unique) steady state exist and that it is stable. (iii) Explain the economic intuition behind the adjustment to steady state, starting at an arbitrary L_0
Question 4. (i) Derive steady state population density, (L/X)* as a function of the parameters in the model. Suppose A increases permanently. (ii) What is the impact on (L/X)*? (iii) Illustrate this experiment in the phase diagram and explain the adjustment process to the new steady state.

Consider the Table below.

TABLE 2: Explaining Population Density in 1500 CE

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	IV
	Dependent Variable is Log Population Density in 1500 CE					
Log Years since Neolithic Transition	0.833*** (0.298)		1.025*** (0.223)	1.087*** (0.184)	1.389*** (0.224)	2.077*** (0.391)
Log Land Productivity		0.587*** (0.071)	0.641*** (0.059)	0.576*** (0.052)	0.573*** (0.095)	0.571*** (0.082)
Log Absolute Latitude		-0.425*** (0.124)	-0.353*** (0.104)	-0.314*** (0.103)	-0.278** (0.131)	-0.248** (0.117)
Mean Distance to Nearest Coast or River				-0.392*** (0.142)	0.220 (0.346)	0.250 (0.333)
Percentage of Land within 100 km of Coast or River				0.899*** (0.282)	1.185*** (0.377)	1.350*** (0.380)
Continent Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	147	147	147	147	96	96
R-squared	0.40	0.60	0.66	0.73	0.73	0.70
First-stage F-statistic	–	–	–	–	–	14.65
Overid. p-value	–	–	–	–	–	0.440

NOTES – (i) log land productivity is the first principal component of the log of the percentage of arable land and the log of an agricultural suitability index; (ii) the IV regression employs the numbers of prehistoric domesticable species of plants and animals as instruments for log transition timing; (iii) the statistic for the first-stage F-test of these instruments is significant at the 1 percent level; (iv) the p-value for the overidentifying restrictions test corresponds to Hansen's J statistic, distributed in this case as chi-square with one degree of freedom; (v) a single continent dummy is used to represent the Americas, which is natural given the historical period examined; (vi) regressions (5)-(6) do not employ the Oceania dummy due to a single observation for this continent in the IV data-restricted sample; (vii) robust standard error estimates are reported in parentheses; (viii) *** denotes statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level, all for two-sided hypothesis tests.

Question 5. (i) What is the "Neolithic revolution"? (ii) Why would the *timing* of it affect population density in 1500 CE? (iii) Consider column 6; why would the number of domesticable species of plants and animals (see notes below table) be a suitable instrument for the timing of the Neolithic transition?