Written Exam for the M.Sc. in Economics winter 2014-15

Advanced Development Economics – Macro aspects

Master's Course

December 22nd , 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.

The exam consists of 3 pages in total.

A: Verbal questions

Table 2
The history augmented Solow model.

Dependent variable	Log GDP per worker, 2000			
	(1)	(2)	(3)	(4)
$\log(s)$	1.215***			
	(0.148)			
$\log(n+d+g)$	−1.707***			
	(0.435)			
$\log(s)-\log(n+d+g)$		1.255***	0.595***	0.594***
		(0.135)	(0.162)	(0.153)
YFD			−0.0222***	−0.0186***
			(0.0034)	(0.0038)
Regional FE	No	No	No	Yes
$\beta_1+\beta_2=0$ (p-value)	0.31			
Implied α		0.56	0.37	0.37
$\alpha=1/3$ (p-value)		0.00	0.53	0.51
Observations	110	110	110	110
R^2	0.448	0.445	0.634	0.735

Question A.1.

Consider the regression table above, which contains some results from the article "The History Augmented Solow model" by C-J. Dalgaard and H. Strulik, 2013, *European Economic Review*. The notation is as follow: "*s*" represents the average investment rate from 1960-2000, "*n*+*d*+*g*" comprises the average growth rate of the labor force 1960-2000 ("*n*"), the rate of depreciation (*d*) and the rate of productivity growth "*g*" (collectively put to g+d=0.05 for all countries), while "YFD" denotes the year of the fertility decline, and "Regional FE" refers to regional fixed effects.

The estimation equation is derived within an augmented Solow model featuring a Cobb-Douglas production function with α being the exponent for capital input.

(i) Explain why the fertility transition theoretically should appear alongside standard "Solow controls". (ii) Comment on the parameter estimates: are the results consistent with what might expect? What might explain why the estimate for α changes when YFD is included in the regression? (iii) What needs to be assumed for the reported estimates to be unbiased?

Question A.2.

What is the "International epidemiological transition"? How does it potentially help us *identify* the impact of changes in life expectancy on economic growth?

Question A.3.

In a much cited contribution by Daron Acemoglu, Simon Johnson and James Robinson, published in the *Quarterly Journal of Economics*, the authors document a strong *negative* correlation between population density in 1500 and contemporary levels of GDP per capita, among former colonies.

Explain: (i) Why this correlation is noteworthy, and, (ii) how this correlation might tell us something about the relative importance of *two* of the so-called "fundamental determinants of productivity".

B: Analytical Questions

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 B.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 $Y_t = A L_t^{\alpha} X^{1-\alpha}$ 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 B.2. Derive the law of motion for population size, and use it to construct the phase diagram for the model. Establish that a steady state exists; that it is unique, and stable.

Question B.3. How is income per capita affected by technological innovations (i.e., changes in "A") in the short run and in the long run? Is this prediction supported by empirical evidence? Explain.

Suppose now that we augment the model to allow for income taxation. Hence, assume households get the income $I(1-\tau)$, where τ is the tax rate. For simplicity, suppose the revenue is simply "wasted" (e.g., goes to fund the consumption of a ruling elite).

Question B.4. How is the steady state level of income per capita affected by changes in the level of taxation? How is steady state *welfare* affected by increasing taxation. Discuss the policy relevance of these results.