Written Exam for the M.Sc. in Economics winter 2015-16-R
Advanced Development Economics – Macro aspects
Master's Course
(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 exam consists of 4 pages in total.

PART I: ANALYTICAL QUESTIONS (40%)

QUESTION A. Child quantity-quality trade-off and the demographic transition.

Consider a household with a utility function

$$u = (1-\gamma)\ln c + \gamma\left[\ln n + \ln h\right]$$

where c is the level of consumption, n is the number (*quantity*) of children in the household, h is the level of human capital (*quality*) of each child, and the parameter $\gamma \in (0,1)$.

Assume that the level of human capital of each child decreases with the rate of technological progress in the economy (for example because technological innovations reduce the usefulness of the existing set of skills), but that it increases with investments in the level of education the child receives. Then, to model this, suppose that human capital is given by

$$h = \frac{e}{e+g}$$

where e is the level of education a child gets, and g is the rate of technological progress in the economy.

Each household is endowed with 1 unit of time, which is entirely supplied to the labor market, and provides a level of income y. The household's problem is then maximizing u, subject to the budget constraint

$$c + (\tau^q + \tau^e e)n = y$$

where τ^q is the fraction of the household's time devoted to to raise a child regardless of the amount of education that the child receives; and τ^e is the fraction of the household's time required to provide one unit of education to a child (therefore $\tau^q + \tau^e e$ represents the total time cost of raising a child that gets a level e of education).

A.1. Solve the household's utility maximization problem, and show that the optimal levels of n and e are given by

$$e = \left(\frac{g\tau^q}{\tau^e} \right)^{1/2}$$

and

$$n = \frac{\gamma\, y}{\tau^q + \left(g\tau^e\tau^q\right)^{1/2}}$$

A.2. What is the effect of faster technological progress (an increase in g) on the optimal level of education (*quality*) of children? What is the economic interpretation of your result?

A.3. What is the effect of faster technological progress (an increase in g) on the optimal number (*quantity*) of children? What is the economic interpretation behind of your result?

A.4. The rate of technological progress in pre-industrial times was very low. What type of equilibrium will our model predict for investments in education and total fertility rates in such a setting? Would that equilibrium be consistent with the characteristics of an economy with Malthusian characteristics?

A.5. What does the model predict for fertility decisions and investments in children education (or the demand of human capital), when the rate of technological progress g increases? What do those predictions imply for the relationship between fertility decisions and the demand for human capital?

A.6. The model predicts that a sustained increase in the rate of technological progress can give rise to a permanent increase in the demand for human capital and thereby to a permanent decline in fertility, or a *demographic transition*. In general: What are the consequences of the demographic transition on the level of economic development?

A.7. How is the *timing* of the demographic transition related to levels of income per capita, when we examine data across countries?

PART II: VERBAL QUESTIONS (60%)

QUESTION B. Geography and institutions.

Columns 1-4 of Panel A in the table below show Marcela Alsan's recent findings that African regions with climate conditions that provided a suitable habitat for the Tse

Tse fly (which is measured by a historical *Tse Tse Suitability Index*, TSI), tend to be significantly less developed today (when the proxy for the level of development is the intensity of lights by night):

	(1)	(2)	(3)	(4)	(5)
Panel A. Dependent variable is the log mean luminosity					
TSI	–0.480**	–0.441*	–0.744***	–0.452*	–0.296
	(0.236)	(0.234)	(0.228)	(0.252)	(0.246)
Historical centralization					1.083***
					(0.247)
Panel B. Dependent variable is the log number of cattle					
TSI	–1.270**	–1.172**	–1.491***	–0.639*	–0.648*
	(0.473)	(0.447)	(0.390)	(0.320)	(0.323)
Historical centralization					–0.060
					(0.319)
Climate controls	Yes	Yes	Yes	Yes	Yes
Malaria index	No	Yes	Yes	Yes	Yes
Other geographic controls	No	No	Yes	Yes	Yes
Country fixed effects	No	No	No	Yes	Yes
Observations	665	665	665	665	665
Number clusters	48	48	48	48	48

Notes: This table reports OLS estimates of the TSI on log (mean luminosity +0.01) for the year 2008 in panel A and log (number of cattle + 1) for the year 2005 in panel B. Satellite light data are from NOAA and cattle data are from the FAO. Each column of each panel represents a separate regression and the cell reports the coefficient on the TSI or the coefficient on a measure of district-level precolonial historical centralization. Climate controls include temperature, relative humidity, and the proportion of land area in the tropics, as well as the first-order interaction of temperature and humidity. The malaria ecology index was developed by Kiszewski et al. (2004). Other geography controls include mean altitude, the FAO's agricultural suitability index, absolute latitude, longitude, and a binary indicator for whether a province is located adjacent to an inland body of water exceeding 500 square kilometers in area and for proximity to the coast. Historical centralization captures the proportion of a district's current inhabitants whose ancestors lived in a centralized society and is based on data from the *Ethnographic Atlas* (Murdock 1967). Robust standard errors clustered by country are in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Source: Alsan, Marcella (2015). The Effect of the TseTse Fly on African Development. *American Economic Review* 105(1): 382-410.

B.1. By looking at the coefficients in columns 1-4 of Panel A, do you consider the author's findings to be robust? Why?

B.2. One of the conclusions of the paper is that differences in geographic and climatic endowments can shape institutions and thereby have long-run effects on the level of economic development.What type of relationship between TSI and *institutions* is likely to be driving the relationship between TSI and economic development in Africa, by looking at the results displayed in the table?

B.3 In general: Why are *geography* and *climate* considered as *fundamental* causes of differences in economic development across countries?

QUESTION C. Culture and economic development.

Several researchers have argued that *culture* can be considered as a *fundamental* cause of differences in economic performance; and some studies have shown empirically that differences in specific dimensions of culture (like the relative importance of individualism as opposed to collectivism), as well as in broader measures of culture (like indices that mix attitudes towards individualism with levels of generalized trust and respect for others), can explain differences in levels of economic development.

C.1. How has *culture* been defined in the empirical literature on development economics and comparative economic development, and why has it emerged as one of the *fundamental* reasons of differences in economic performance?

C.2. Why could higher levels of generalized trust in others, respect for others, and higher confidence in the virtues of individualism, be conducive to better economic performance?