

Written exam at the Department of Economics, winter 2020-2021
Advanced Development Economics – Macro aspects

Individual 12-hour take-home exam
12 December 2020 from 10:00 to 22:00.

The exam has 7 pages in total, and consists of 3 questions (each question has multiple parts).

Please write all your answers in English.

As a guideline, each question (A, B, and C) has a weight of about $\frac{1}{3}$, although the final grade is determined by an overall assessment of all the answers provided.

As a recommendation, use maximum 3 pages of text to answer question B, and maximum 3 pages of text to answer question C.

A take-home exam paper cannot exceed 10 pages – and one page is defined as 2400 keystrokes.

The paper must be uploaded as *one PDF document*. The PDF document must be named with exam number only (e.g. '1234.pdf') and uploaded to Digital Exam.

You may use all exam aids and support materials, provided you do not quote or cite other people's work without acknowledging the source and provided you do not copy and submit the work of other people or your own work.

Be careful not to cheat at exams!

Exam cheating occurs for example if you:

- Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text.
- Use the ideas or thoughts of others without making use of source referencing, so it may appear to be your own idea or your thoughts.
- Reuse parts of a written paper that you have previously submitted and for which you have received a pass grade without making use of quotation marks or source references (self-plagiarism).
- Receive help from others in contrary to the rules laid down in part 4.12 of the Faculty of Social Science's common part of the curriculum on cooperation/sparring.

You can read more about the rules on exam cheating on your Study Site and in part 4.12 of the Faculty of Social Science's common part of the curriculum.

Exam cheating is always sanctioned by a written warning and expulsion from the exam in question. In most cases, the student will also be expelled from the University for one semester.

QUESTION A. Population and income dynamics in preindustrial times.

Consider an economy in the pre-industrial era, in which time is discrete and the time horizon is infinite ($t = 0, 1, \dots, \infty$).

All households in the economy are identical, and derive utility from consumption and the number of surviving children.

Assume that all children have a constant probability π of surviving infancy, and that infancy lasts for one period. That is, if b_t children are born in period t to a given household, the number of surviving children in that period (n_t) is

$$n_t = \pi b_t$$

where $\pi \in [0, 1]$.

The utility function u_t for each household is given by

$$u_t = \gamma \ln(n_t) + (1 - \gamma) \ln(c_t)$$

where $\gamma \in (0, 1)$ is a fixed parameter, and c_t and n_t are the levels of consumption and surviving children per household in each period, respectively.

Each household has an endowment of 1 unit of time that is entirely supplied in the labor market each period, and that generates a household income of y_t . The typical household's budget constraint is then given by

$$y_t = \rho n_t + c_t$$

where $\rho > 0$ is a fixed parameter that represents the costs of raising a child that has survived infancy.

Each period, a single homogeneous good is produced using land, labor, and the existing technology in the economy.

The supply of land is exogenous and fixed at a level X .

The total supply of labor (or, equivalently, the total population size) is the result of households' fertility decisions in the preceding period. That is, each period

$$L_{t+1} = n_t L_t$$

where L_{t+1} and L_t are total labor supply (or total population) in periods $t + 1$ and t , respectively; and n_t is the net fertility rate specified above.

The existing technology affects the productivity of all factors and has two components. One component is exogenous, while the other reflects Ester Boserup's (1965) argument that sustained population growth promotes the adoption of new technologies [Boserup, Ester, 1965, "The Conditions of Agricultural Progress"].

Under these conditions, total output in each period (Y_t) is given by

$$Y_t = A_t X^\alpha L_t^{1-\alpha}$$

where $\alpha \in (0, 1)$ is a fixed parameter, and A_t is the level of technological sophistication in period t , which in turn is given by

$$A_t = A L_t^\beta$$

where $A > 0$ is the exogenous component of technology, and $\beta \in (0, 1)$ and $\alpha > \beta$ are fixed parameters.

A.1. Show that the optimal number of children born in the typical household b_t^* , the resulting net rate of fertility n_t^* , and the optimal level of household consumption c_t^* are equal to

$$b_t^* = \frac{\gamma}{\rho\pi} y_t$$

$$n_t^* = \frac{\gamma}{\rho} y_t$$

and

$$c_t^* = (1 - \gamma) y_t$$

respectively, and interpret these results in intuitive terms.

A.2. What is the effect of a decline in infant mortality (an increase in π) on net fertility n_t^* ? Comment on the intuition of your results.

A.3. Are your findings in **A.2.** consistent with historical evidence studied in the course? Elaborate on your answer.

A.4. Demonstrate that the steady state level of population density is given by

$$\frac{L^*}{X} = \left(\frac{\gamma}{\rho} A X^\beta \right)^{\frac{1}{\alpha-\beta}}.$$

Two hints to calculate $\frac{L^}{X}$:* (i) Calculate the average level of household income $y_t \equiv \frac{Y_t}{L_t}$, and use it to describe the optimal dynamics of total population ($L_{t+1} = n_t^* L_t$). (ii) Recall that α and $\beta \in (0, 1)$, and $\alpha > \beta$, which implies that $\alpha - \beta > 0$ and $\alpha - \beta < 1$, and also that $-1 < \beta - \alpha < 0$.

A.5. Demonstrate that the steady state level of household income is given by

$$y^* = \frac{\rho}{\gamma}.$$

A.6. Assume that the economy is in a steady state. What are the long-run effects of an exogenous positive technological shock (an increase in A) on income per capita and population density? Comment on the intuition of your results.

A.7. Are the effects that you describe in **A.6.** consistent with the empirical evidence studied in the course? Elaborate on your answer.

QUESTION B. Dictatorship.

Richard A. Posner analyzes the relationship between different political regimes and economic performance, in a blog posted in the Becker-Posner Blog in 2010 [Posner, Richard A., 2010, "Autocracy, Democracy, and Economic Welfare", available at: <https://www.becker-posner-blog.com/2010/10/autocracy-democracy-and-economic-welfareposner.html>].

Posner starts his analysis proposing that democracy and dictatorship should not be seen as a dichotomy, but instead as points located on a spectrum that has direct democracy on one end and one-man dictatorship on the other end, and includes constitutional democracy, quasi-democratic polities, and oligarchy in the middle. He then proposed that the spectrum of political systems has a resemblance with the variety of managerial structures that can be found in the business world. As examples, he cites managerial systems that maximize centralization, minimize redundancy, and maximize top-down control; as compared to others that accept redundancy and reduce control in order to foster innovation, adaptation to a changing environment, and autonomy among employees. In the main part of the analysis, Posner draws a correspondence between economic outcomes and the described spectra of political regimes and managerial systems. He proposes that "the simpler an economy [...], the more adaptive a dictatorial political system; [and] the more complex the economy, the more adaptive democracy is" (Posner, 2010). He illustrates this idea with the case of the Soviet Union, arguing that its command and control economy worked well during World War II, but proved to be "fatally maladapted to the complexities of a civilian economy" (Posner, 2010).

B.1. Based on the arguments above, Posner concludes that "dictatorship will often be optimal for very poor countries" (Posner, 2010). Comment on this conclusion in light of the literature on institutions as fundamental determinants of economic development.

B.2. María Angélica Bautista, Felipe González, Luis R. Martínez, Pablo Muñoz, and Mounu Prem (2020, "Technocratic Autocracy, Higher Education and Social Mobility") published recently an empirical study of the consequences of policies and reforms implemented during dictatorships. They focus on the capture of university education during Augusto Pinochet's dictatorship in Chile. The authors present an empirical analysis that uncovers causal estimates of the socioeconomic consequences of that intervention. Describe in detail the strategy that the authors use to identify those causal estimates.

B.3. Table 2 in Bautista *et al.* (2020) presents estimates of the consequences of Pinochet's capture of higher education on labor market outcomes. (The Table is available for easier reference in the next page.) What are the main results shown in this Table?

B.4. How do the main findings in Bautista *et al.*'s (2020) study relate to Richard A. Posner's (2010) conclusion in **B.1.**?

Table 2: Labor market outcomes

	Census 1992				CASEN (1990-2015)	
	In Labor Force	Seeking Work	Domestic Worker	High-skill, white-collar	Log Total Income	
	(1)	(2)	(3)	(4)	(5)	(6)
[a] Yr Age 21	0.008*** (0.0003) [0.000]	-0.001*** (0.0001) [0.004]	-0.001*** (0.0001) [0.000]	0.004*** (0.0005) [0.003]	0.011*** (0.002) [0.002]	- -
[b] Yr Age 21 x $\mathbb{1}(\text{Yr Age 21} \geq 1973)$	-0.012*** (0.0006) [0.000]	0.002*** (0.0001) [0.003]	0.001*** (0.0002) [0.000]	-0.017*** (0.0008) [0.000]	-0.020*** (0.002) [0.000]	-0.006** (0.003) [0.118]
IV: Any College	0.333*** (0.017) [0.002]	-0.060*** (0.004) [0.003]	-0.034*** (0.005) [0.000]	0.476*** (0.015) [0.000]	0.761*** (0.090) [0.001]	0.232** (0.099) [0.078]
Birth county x gender FE	Yes	Yes	Yes	Yes	Yes	Yes
In labor force FE	No	Yes	No	No	-	-
Survey year FE	-	-	-	-	Yes	Yes
Age FE	-	-	-	-	No	Yes
Mean of dependent variable	0.758	0.033	0.011	0.431	740,530	740,530
Observations	1,024,570	1,024,570	773,922	770,652	118,301	118,301
R-squared (Reduc. Form)	0.200	0.013	0.024	0.032	0.153	0.160
p-value a+b=0	0.000	0.000	0.000	0.000	0.000	-
First-stage KP F-stat	2733.6	2623.9	2120.2	2094.1	422.3	391.6

Notes: Source of data and dependent variable in the headers. Sample includes individuals born between 1943 and 1960 (both inclusive) that report 4+ years of secondary. Real income in columns 5-6 deflated using yearly CPI. "Yr Age 21" is a continuous variable indicating the year at which the cohort reached age 21, normalized to zero in 1972. "Yr Age 21 x $\mathbb{1}(\text{Yr Age 21} \geq 1973)$ " is the interaction of this variable with a dummy for cohorts that reached age 21 on or after 1973. In the IV regression, the interaction term is used as excluded instrument for any college education (the trend is an included instrument). Standard errors clustered by county of birth in parentheses. P-values from wild cluster bootstrap procedure for clustering at the cohort level in brackets (see [Cameron and Miller \(2015\)](#) for details). *** p<0.01, ** p<0.05, * p<0.1

Source: *Bautista et al. (2020)*

QUESTION C. Intergenerational mobility in Africa.

Alberto Alesina, Sebastian Hohmann, Stelios Michalopoulos, and Elias Papaioannou (2020) published recently a comprehensive study on intergenerational mobility (IM) in educational attainment across countries and regions in Africa. They use census data, which is available for 27 countries after independence, and construct measures of downward and upward IM based on the probability that children of parents with completed primary education fail to complete that level of education, and the probability that children of parents without primary education complete primary education, respectively. The authors map IM and uncover large spatial disparities between and within countries. They also identify a number of geographic and historical correlates of IM, and provide evidence that regional disparities matter crucially for education in Africa.

C.1. What is the correlation between IM in educational attainment and the level of economic development in Africa?

C.2. Alesina *et al.* (2020) identify a number of significant geographic and historical correlates for both upward and downward IM. Are these findings consistent with the pattern of persistence found in the empirical literature on the role of geography and culture as fundamental determinants of economic development? Provide examples to elaborate on your answer.

C.3. The authors also uncover an important degree of inertia in IM, by showing that literacy of the old generation explains roughly half of the observed differences in IM. How do you interpret this result?