

**ECO6171 Economic Development: Internal Aspects
Final Exam**

Note: This exam has 4 questions.

Problem 1: Growth and poverty (20 points)

Consider an economy of 5 individuals. The initial income distribution at t_0 is $y_0 = (100, 125, 150, 230, 400)$. At time t_1 it changes to $y_1 = (125, 130, 170, 325, 420)$. Assume that the poverty line is 200 and use the following FGT index:

$$P_2 = \frac{1}{I} \sum_{i=1}^I (\max [(z - y_i) / z, 0])^2.$$

- Decompose the poverty change into a growth effect and an inequality effect using Datt and Ravallion's approach. Datt and Ravallion use the initial period as an anchor point for the decomposition.
- Decompose the poverty change into a growth effect and an inequality effect using Kakwani's approach. Kakwani uses both periods as anchor points for the decomposition.

Problem 2: Poverty dominance (25 points)

Consider the following expression for additive poverty indices:

$$P_F(z) = \int_0^z p(y, z) dF(y),$$

with $p(y, z) \geq 0$ if $y < z$ and $p(y, z) = 0$ elsewhere. It is possible to develop stochastic dominance condition to avoid the task of choosing a particular poverty index.

- Define classes of poverty indices linked to ethical principles.
- Write down and prove the sufficiency of a stochastic dominance condition for each class of poverty indices.

Problem 3: A model of ethnic conflict (20 points)

Consider an economy with 2 ethnic groups, A and B . The proportion of the population belonging to A is π . Assume that there are 2 different political alternatives. Each ethnic group has a preferred political alternative. We assume that if the alternative of ethnic group i ($i = A$ or B) is produced in a proportion $\gamma \in [0, 1]$, each member of the group gets a utility of γ , and a utility of 0 if it is not produced. A *political system* is a particular way of choosing among the different alternatives. A *conflict* is then a challenge to the political system, which is costly. In case of conflict, the winner group produces its preferred political alternative and each member of the other ethnic group gets a utility of 0. Suppose that conflict entails resource contributions r_i from every member of group i , so the average contribution to conflict in the economy is given by $R = \pi r_A + (1 - \pi)r_B$. We refer to R as the intensity of conflict. We assume that, in case of conflict, the probability that group A wins the conflict is given by:

$$p = \frac{\pi r_A}{R}.$$

Suppose that there is a utility cost of $r_i^2/2$ of spending r_i . In this context, the expected utility of an individual of group A when spending r_A is

$$u_A(r_A) = \frac{\pi r_A}{\pi r_A + (1 - \pi)r_B} - \frac{r_A^2}{2}.$$

$u_B(r_B)$ is defined analogously. Assume that we have conflict.

- a) Determine the intensity R of this conflict.
- b) What is the probability p_A that group A wins the conflict?
- c) What is the value of the indirect utility of group A ?
- d) What is the value of the indirect utility of group B ?

Problem 4: CD-curves (35 points)

Let $q = 1 + t$ be a vector of K consumption goods where t represents the vector of indirect taxes. Consider a budget neutral indirect tax reform that increases the tax on good j and uses the proceeds to decrease the tax on good ℓ . Assume that $x(y, q)$ is the consumption vector at income y when prices are q . Let $X_k(q) = \int_0^a x_k(y, q) dF(y)$ be the average consumption of good k . Using Roy's identity, we know that the impact of an increase of t_k on individual real income $\rho(y, q, q^R)$ is given by $-x_k(y, q)$.

- a) Consider the following economic efficiency ratio

$$\gamma = \frac{X_\ell + \sum_{k=1}^K t_k \frac{\partial X_k}{\partial q_\ell}}{X_\ell} \bigg/ \frac{X_j + \sum_{k=1}^K t_k \frac{\partial X_k}{\partial q_j}}{X_j}$$

Give an expression of dt_j in proportion of γ and dt_ℓ in a neutral budget framework.

- b) Define classes of poverty indices linked to ethical principles and write down and prove the necessity of a stochastic dominance condition for a poverty-reducing tax reform for each class of poverty indices.
- c) The following figure shows the second order consumption dominance curves for food and non food expenditures in Mexico and the ratio of those two curves. Identify by $\gamma_2(2)$ the critical efficiency ratio for a maximum poverty line $z^+ = 2$ and by $z_2(1.5)$, the critical poverty line for a maximum efficiency ratio $\gamma^+ = 1.5$.

