First Exam (A1) of Social Economics and Public Policy 2023

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Time: 3 hours. You may not use a calculator. Please handle in the questions sheet signed with your answers. Answers written in pencil are not subject to revision. The Exam has three main questions with different parts and choices. Please number your answers carefully and answer only the required number of questions in each question. See Formula sheet in the end of

Question 1 – Conceptual Exercises

Evaluate if each sentence is True or False (if any part is false the whole sentence is false). **YOU DO NOT NEED TO COMMENT WHY JUST Indicate** if each small letter is true or false. Answer only 25 (and only 25) of the 34 items from parts I to IV below **(0.28 points each)**:

I – Inequality and Social Welfare

a. The choice between national wide versus regional price indices in general affect income inequality measures.
b. Income measurement error with zero mean does not affect social welfare measures.
c. Lorenz dominance provide a valid comparison for all inequality measures.
d. Lorenz curves can be seen as the general case of Concentration curves.
e. Concentration ratios share the same upward bound as the Gini index.
f. The advantage of the J-Divergence over the Theil T index is to allow decompositions between and within groups across variables such as education or gender.
g. Inequality, mean and social welfare levels captured by household surveys such as PNAD are all underestimated by not capturing the income of the richest. The substitution of top incomes in PNAD by the ones extracted from Personal Income Tax data shows that in Brazil.
h. The proportion of the richest 10% in income is an inequality measure that does not follow the principle of transfers (Pigou-Dalton).
i. Income inequality measures captured by the share of the bottom 25% in income is consistent with Atkinson approach that derives inequality directly from a social welfare function.
j. The growth of the proportion of active age population (PIA) in overall population provides a measure of the demographic bonus while the growth of years of schooling provides a measure of the educational bonus.
k. The Theil-T Index dual can replace with some advantages the Gini index in the Poverty Indicator proposed by Amartaya Sen (1976). Being one improvement making poverty exactly decomposable.
l. Increases in inequality within groups below and above the median, ceteris paribus, tend to increase both polarization and inequality (Gini).
m. The alienation concept is related to inequality between groups.

II - Poverty

a. Poverty targets based on P^1 (Poverty Gap) have difficulty in inducing actions aimed at the poorest in society.
b. The minimum cost of overcoming poverty can be calculated from the poverty gap P^1. The rise of social benefits to its already beneficiaries is less costly in , than raising the poverty line by the same amount.
c. The existence of pure economies of scale within households makes (linear) per capita household income to overestimate poverty.
d. Social benefits fixed independently of household size can lead to fragmentation of families in the unified social register (CadÚnico).
e. Datt-Ravallion decompositon allows to decompose poverty changes exactly into mean and inequality terms.
f. The counterfactual of poverty measures with a distribution of year t and mean income of year t+1 is generated dividing the micro income data of year t+1 by the growth factor between the two years.
g. If the proportion of poor in a given society A is always bigger than in society B so is the squared poverty gap.
h. The poverty dominance analysis allows to reduce the arbitrariness derived from choosing a specific poverty line.
i. If the Income Cumulative Distribution Function of society A is always above the one of society B, then we can ensure that all three FGT indicators (P^0, P^1 and P^i) are always higher in A than in B for any poverty line.
j. If we adopt a social goal system based on the income poverty indicator known as the poverty head-count ratio (P^0) we will implicitly assume that priority is given to the least poor of the poor.

III – Global Social Indicators and Social Targets

a. The standard Human Development Index (HDI), after incorporating the log of income as a component, is sensitive to inequality.
b. The Inequality adjusted Human Development Index (IHDI) is irresponsive to mean changes in HDI components,
c. The Multidimensional Poverty Index (MPI) is sensitive to the intensity of poverty across different dimensions (for example, child school enrollment) but not to the number of children not enrolled in school in a given household.
d. A system of targets based on international indicators such as MDGs and SDGs allows to lengthen the planning horizons of policy makers; intermediate actions between different levels of government and creates automatically insurance against systemic (aggregate) shocks through published rankings.
e. If politicians are less concerned with underrepresented groups in the electoral market, such as children, social targets can eliminate completely the distance of the treatment given to different groups.
f. Ceará State uses municipality education performance to distribute the proceeds of its State Taxes (ICMS). This can not only improve local education performance, bring external resources but also increase the incentive to raise each municipality efforts to raise the education budget.
g. Idiosyncratic shocks can be dealt with in a social targets framework through published rankings.

IV - Empirical Methods Analysis

a. In the context of a Mincerian (log-linear) earnings equation, the concept of the net contribution to inequality (isolating its effects from other variables) is measured by the R^2 of a regression with only one constant term and the variable that we want to evaluate the net contribution (education, for example).
b. The advantage of running bivariate regressions with a constant over using simple cross tabulations is to provide confidence intervals to test hypothesis.
c. In the context of a Stepwise Procedure, it is not possible to capture externality effects of infrastructure because the procedure is automatic and carried out without any theory.
d. Differences in differences estimator (DD or diff-in-diff) is captured by an interactive term in a regression. This work for continuous but not for discrete regression models.

Question 2 – Conceptual and Discursive – Choose 1 (and only 1) of the 3 items below: **(1.5 points)**

I) i. What is your favorite income inequality index? ii. Justify your choice in pratical, ethical and theoretical grounds using its formula and respective social welfare function specification. Illustrate its main features. iii. Describe decomposition methods applied to it.. iv. (Bonus 0,5 points: What are the main challenges to measure income distribution in Brazil?).

II) i. What are the possible constraints imposed on the social welfare function below so that the Pigou-Dalton's Principle of Transfer is observed? Provide examples. ii. Write down the functional form of the Social Welfare function associated with the Gini Index from the equation below. Explain each component. iii. Sketch and explain the passage from the Social Welfare Function to the Gini inequality measure. iv. (Bonus 0,5 points: How to incorporate the temporal choice dimension in the equation below. Explain.)

$$u(x^*) = \int_0^\infty w(x)u(x)\,f(x)dx$$

III) i. What is your favorite poverty framework? Analyze its properties (uni x multidimensional; relative x absolute; subjective x objective indigence x poverty; etc) ii. Justify your choice. iii. (Bonus 0,5 points: Provide the main, historical trends and measurement issues associated comparing in broad terms the evolution of unidimensional (income based poverty) and multidimensional in Brazil).

Question 3 – Quantitative Questions – Choose 1 (and only 1) of the 3 items below: **(1.5 points)**

I) i. Compare advantages and disadvantages of the income based poverty indicators known as P^0, P^1 and the Mean Squared Poverty Gap (P^2). Give the general and specific formulas and intuition. Sketch their relationship with poverty dominance concepts. ii) Calculate the Proportion of the Poor (P0), the Mean Squared Poverty Gap (P2), the Mean Poverty Gap (P1) and the mean cost of eradicating poverty per person for the 2 following periods and assuming a poverty line of 5 units: Period 1 = {2, 4, 6,8}; Period

2 = {3, 4, 7,10}. iv. Do we have first order dominance of the distribution in period 2 in relation to period 1? Consider the relevant range of poverty lines going up to 7. v. As in the Datt-Ravallion decomposition, generate the contra factual distribution values of the mean in period 1 and distribution in period 2.

II) Empirical Analysis of the Logistic regression: i. Discuss the level and the evolution of poverty in Brazil and in Rio de Janeiro State from the binomial logistic regression below. ii. How to interpret the two terms for education in the regression below? iii. What if the regression also displayed a negative coefficient for the mean education in the State. How would you interpret that? iv. What is the importance of restricting the sample to those with age 25 years of age or above?. v**.** What is the advantage of multivariate poverty analysis? vi. What is the difference between multivariate analysis of poverty and multidimensional poverty index?

Binomial Logistic Regression Poverty Line FGV CPS – For those with age 25 years of age or above.

INTERACTION STATE*YEAR OBS: Other State Categories are not displayed below Also controls for gender age, city size and variables related to access to infrastructure are also not displayed.

Parameter	Category	Estimate	Standard Error	Chi-Squared	sig	Conditional Odds Ratio
YEARS OF EDUCATION		-0.0232	0.0001	25542.3	**	0.97703
(YEARS OF EDUCATION)^2		-0.0102	0.0000	728969	**	0.98983
STATE	RJ	0.0332	0.0010	1036.69	**	1.03371
STATE	zSP	0.0000	0.0000	.		1.00000
YEAR	a2015	-0.7293	0.0009	603648	**	0.48223
YEAR	z2004	0.0000	0.0000	.		1.00000
STATE*YEAR	RJ	-0.0661	0.0018	1411.80	**	0.93605
STATE*YEAR	RJ	0.0000	0.0000	.		1.00000
STATE*YEAR	zSP	0.0000	0.0000	.		1.00000

III) Imagine a set of four countries to be compared. In Table below you will see some of their respective social indicators, for each there is a minimum and maximum values to be considered for calculating the Human Development Index (HDI). In Table 2, you will see their loss due to inequality.

Table 1 - Indicator	Minimum	Maximum	Country's arithmetic mean
Life expectancy (years)	20	85	Brazil: 75.7
			Cuba: 79.9
			USA: 79.5
			China: 76.4
Expected years of schooling (years)	0	18	Brazil: 15.4
			Cuba: 14.0
			USA: 16.5
			China: 13.8
Mean years of schooling (years)	0	15	Brazil: 7.8
			Cuba: 11.8
			USA: 13.4
			China: 7.8
Gross national income per capita (2011 PPP $)	100	75000	Brazil: 13,755
			Cuba: 7,524
			USA: 54,941
			China: 15,270

Table 2 - Loss of HDI due to inequality

Brazil	23.9
China	14.5
Cuba	0
United States	13.8

Table 3 Below we already calculate the HDI and the Inequality Adjusted HDI for each country and rank them.

	HDI	Rank	InAdj HDI	Rank
Brazil	0.751924	3	0.572214	4
Cuba	0.777754	2	0.777754	2
USA	0.924204	1	0.796664	1
China	0.746589	4	0.638333	3

i. Summarize your take from the findings about Brazil posed on Table 3 above. ii.. Explain the methodology to construct the Inequality Adjusted Human Development Index (IHDI). iii. Provide the main advantages of IHDI compared to standard income based social welfare measures.

Good Luck!