

Indian Statistical Institute, Bangalore

B. Math (Hons.) Third Year
Second Semester - Economics III

Final Exam

Duration: 3 hours

Date: April 27, 2016

Total marks: 75

PART A

Questions 1 and 2 are compulsory

1. Define Lorenz consistent inequality measures. [30]

- a) Let $x = \{x_1, x_2, \dots, x_n\}$ be an income distribution, arranged in an ascending order and $x_1 > 0$. Further, $\lambda(x)$ be the average income of x . Which of the following inequality indices is Lorenz consistent? Explain in each case which inequality axioms are violated.

1) $\theta_1 = \frac{\sum_{i=1}^n \sum_{j=1}^n \bar{x}_i - \bar{x}_j}{2n^2 \lambda(x)}$

2) $\theta_2 = \frac{\text{Share of income of the poorest 10\% of population}}{\text{Share of income of the richest 10\% of population}}$

3) $\theta_3 = \frac{\sum_{i=1}^n (x_i - \lambda(x))^2}{n}$

4) $\theta_4 = 1 - \frac{1}{n\lambda(x)} \sum_{i=1}^n \frac{1}{i} \sum_{j=1}^i x_j$

5) $\theta_5 = \frac{\sum_{i=1}^n (x_i - \lambda(x))^2}{n\lambda(x)^2}$

2. Answer any three [3× 5=15]

- a) State Atkinson's theorem on Lorenz dominance and welfare ordering.
- b) Explain the drawbacks of this theorem.
- c) Discuss how this theorem has been modified by Dasgupta Sen and Starret (1973) (DST)?
- d) What is Generalized Lorenz curve (GLC)? Explain how the problems of DST theorem can be addressed by the GLC.
- e) Explain Shorrocks' theorem on addressing issues of the trade-off between inequality and efficiency of income distributions.
- f) Consider income distributions $x = \{1,2,3\}$ and $y = \{2,2,3\}$. If a policy maker's objective is to compare welfare between these two distributions, explain with justifications whether the issue of trade off between inequality and efficiency arises in this context or not.

PART B

Answer three of the following questions. Each carries 10 marks.

3. Suppose a society consists of two mutually exclusive and exhaustive subgroups of population, namely H and O, with income distributions being $X_H = \{12,18\}$ and $X_O = \{15,15\}$. [2 + 5 + 3 = 10]

- a) Considering any additive decomposable inequality index compute the within and the between group inequality components of this society.
- b) State the Generalized Additive Decomposability (GAD) postulate.
- c) Show how GAD postulate changes the between group inequality component in between X_H and X_O .

4. Define or explain the following: [3 + 3 + 4 = 10]

- (a) Parade of dwarfs
- (b) Gender wage gap
- (c) Kuznets inverse relation

5. With information in Table 3 of S Subramanian and D. Jayaraj (2015) [5 + 5 = 10]

- (a) Discuss trends in rural versus urban inequality.
- (b) Give an example of how relative and absolute measures of inequality differ.

6. Based on Figures 8.2 and 8.4 from Piketty [2 + 2 + 3 + 3 = 10]

- (a) What data and indicator are used for Figure 8.2?
- (b) Explain the variables in Figure 8.4
- (c) Which was the period of decline in inequality and why?
- (d) How does the top 1000 percentile differ from others in respect of sources of income?

7. Consider the following income distributions [5 + 5 = 10]

$$x = \{10,12,15,18,20,22\}$$

$$y = \{11,11,15,18,19,23\}$$

State whether Lorenz dominance of x over y holds or not? Answer this question with the help of rank preserving progressive/ regressive transfer.

Which distribution is more unequal? Justify your answers considering the inequality axioms.

TWO WORLDS

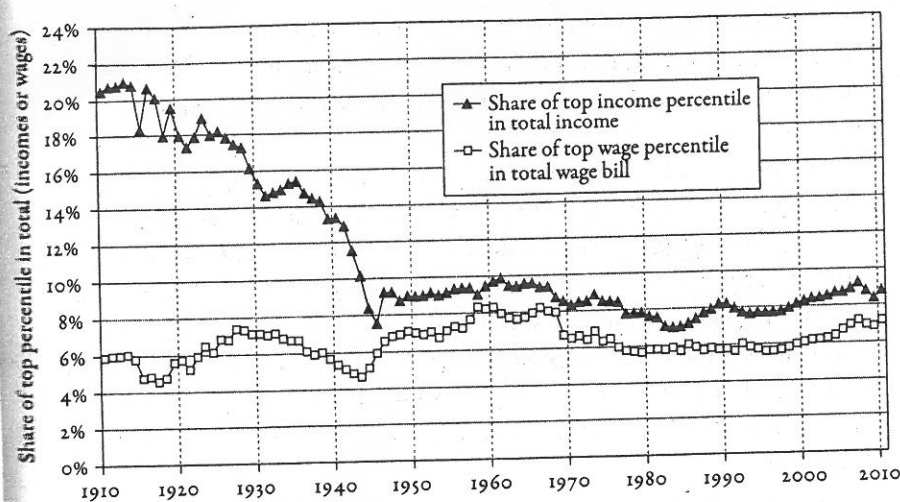


FIGURE 8.2. The fall of rentiers in France, 1910–2010

TWO WORLDS

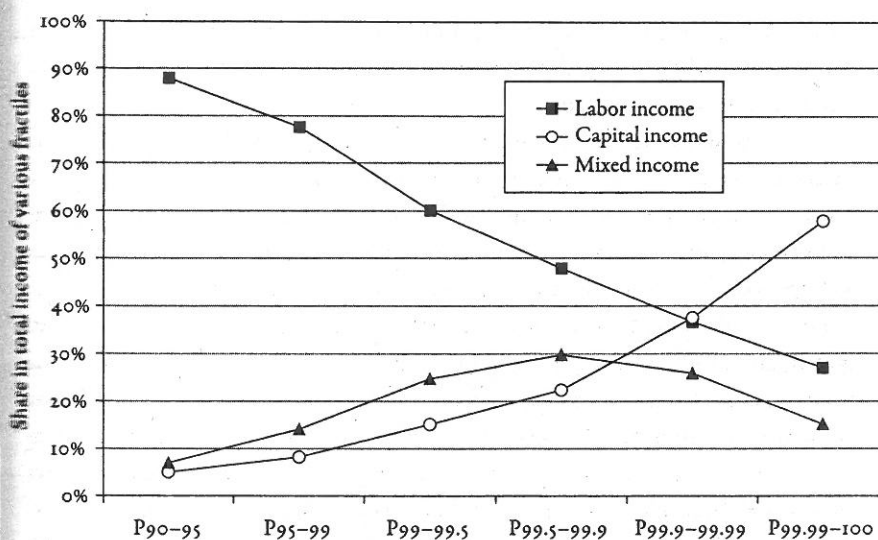


FIGURE 8.4. The composition of top incomes in France in 2005

Table 3: Inequality Measures for the Distribution of Consumption Expenditure in Rural and Urban India: 1983 to 2009–10 (with 1999–2000 Omitted)

Year	Rural India			Urban India		
	Standard Deviation	Coefficient of Variation	The Krtscha Measure	Standard Deviation	Coefficient of Variation	The Krtscha Measure
1983	22.39	1.053	23.58	24.87	0.835	20.76
1987–88	23.72	0.978	23.20	37.42	1.121	41.93
1993–94	23.18	0.945	21.90	48.98	1.244	60.95
2004–05	29.77	1.053	31.36	54.17	1.207	65.40
2009–10	41.84	1.337	55.95	91.59	1.674	153.31

Absolute and intermediate inequality measures are presented in constant (1960–61) rupees. The price deflators employed have been the CPIAL for rural India and the CPIIW for urban India. Source: Unit level data available on CD-ROMs in text format. Labels on the CD-ROMs that have been used to extract unit level data, for the various NSS rounds for which we have performed the analysis, are: NSS, 38th round, Sch 1.0: Consumer Expenditure; NSS, 43rd Round, Sch 1.0: Consumer Expenditure, CC/NSS/6583; NSS, 50th Round Sch 1.0: Consumer Expenditure, CC/CD/3010; NSS, 61st Round, Sch 1.0: Consumer Expenditure; and NSS, 66th Round Sch 1.0: Consumer Expenditure (Uniform and Mixed Reference), CC/NSS/6784, 66, 1.0.