

# Development ECON 2273

## Problem Set 4

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### ANSWER KEY

1. **Inequality calculations** Find the UNU-WIDER database on World Income Inequality [http://www.wider.unu.edu/research/Database/en\\_GB/wiid/](http://www.wider.unu.edu/research/Database/en_GB/wiid/). Get the deciles divisions for South Africa in 1993 and the United States in 1994 (there are several US versions, which show slightly different things, use the one measuring Disposable Income from the Luxembourg Income Study (LIS) 2016). You will likely want to copy the decile information to a new worksheet. Throughout we will assume that everyone in a decile gets the same amount: so if the bottom decile gets 2% of total income, then that is evenly divided among everyone in that decile.

- (a) Create the Lorenz Curve for South Africa in 1993 based on the decile information using an x-y chart. Remember to include the starting point with 0 population and 0 income and set the range for each axis to go from 0 to 100.

**Answer:** See attached chart. Many students will not plot the cumulative percentage, but the percent in each decile for the Lorenz curve (if the last number is 46%, the income of the top decile, they have done it wrong). Try to write tell them it should be cumulative. The numbers for all of this question can be somewhat off from mine and still be right.

- (b) Create the Lorenz Curve for the US in 1994 on the same chart. Add the “perfect equality” line. Print out your chart and include it with your problem set.

- (c) Which country was more equal in 1993/1994? Does the Lorenz criterion allow us to unambiguously say which was more equal? Why?

**Answer:** Since the Lorenz Curves do not cross, and the US is always above South Africa, the Lorenz Dominance Criterion unambiguously ranks the US as more equal.

- (d) What is the Gini coefficient for South Africa in 1993 based on the deciles? (Use the formula rather than trying to calculate areas. You do not need to show your work.) Check your work by seeing if your calculation is close to the Gini reported in the WIID—it will not be exactly the same since we are ignoring inequality within deciles.

**Answer:** Gini in South Africa: I calculate 0.58, close to the 0.593 (or 59.3, also reported is 59.5) in the WIID.

(e) Is the South African Gini higher than the WIID reported Gini for the US?

**Answer:** US Gini 0.36, so South African more unequal.

(f) Calculate the Kuznets ratio, the ratio of the share of income of the top 20% to the bottom 40%, for the US and South Africa. Which country is more unequal by this measure?

**Answer:** Kuznets ratio South Africa: 7.84 for 20%/40%, or 9.6 for 20%/20% (either 20/40 or 20/20 is fine). US: 2.47 for 20%/40%, or 4.68 for 20%/20%. The US is more equal by the Kuznets ratio.

2. **Inequality over Development** Consider an economy consisting of 5 people, all of whom initially work in a traditional agriculture sector earning \$500 a year. Suppose the modern sector starts to develop and hires a new worker each year, paying \$2000 a year. So in year 0 there are no modern sector workers, in year 1 there is 1 modern sector worker and in year 5 all of them work in the modern sector.

(a) Calculate the GDP per person for each year from 0 to 5.

**Answer:** year 0: 500, year 1: 800, year 2: 1100, year 3: 1400, year 4: 1700, year 5: 2000.

(b) Calculate the Gini coefficient for each year from 0 to 5.

**Answer:** year 0: 0, year 1: 0.3, year 2: 0.327, year 3: 0.257, year 4: 0.141, year 5: 0.

(c) Plot the Gini coefficients over time (put year on the x-axis and inequality on the y-axis).

(d) Plot the GDP per capita on the x-axis against the Gini on the y-axis.

(e) Does this simple model of development support Kuznets's hypothesis? Does it explain why it seems like worsening and then improving inequality should be a general feature of economic development?

**Answer:** See attached spreadsheet and graphs. The simple model illustrates how moving from an equal, but poor, society to a richer society can have increasing inequality and then decreasing inequality. If development does not happen for everyone at the same time, then we might expect this to be a general feature of development.

3. **Changes in regional poverty**

(a) Chen and Ravallion (2008) report the mean consumption of the poor in table 10. In which region were the poor with a poverty line of \$1.25 the worst off in 1981? How about in 2005? Does the same pattern hold for those under \$2.00 a day?

**Answer:** Worst off in East Asia and Pacific in 1981. Worst off in Sub-Saharan Africa in 2005. The same pattern holds for under \$2.00 a day.

(b) Calculate the percentage change in the consumption of the \$1.25 poor from 1981 to 2005 for each region. Which region has improved the lot of the poor the most?

**Answer:** East Asia has had the most growth in the income of the poor.

(c) Compare the number of people in poverty (\$1.25) in East Asia and Sub-Saharan Africa in 1981 and 2005. Why does the increase in the mean consumption of the poor in East

Asia between 1981 and 2005 understate how much better off the poor in 1981 are in 2005?

**Answer:** Useful calculations for the comparison (students do not have to report these). In East Asia there were 1071 million in poverty in 1981 while only 316 million in 2005. In Sub-Saharan Africa there were 213.7 million and 390.6 million in 2005 (Table 8 Chen and Ravallion, 2008). With a fixed poverty line many who were in poverty in 1981 are not (or would not be) in 2005 since they are no longer poor. The mean consumption of the poor understates how much the poor in East Asia are better off because it ignores the 700 million people no longer in poverty. This question is difficult since it requires understanding how the selection of the head count ratio matters. Students should get full credit for a credible answer.