**Assignment weeks 3, 4 and 5**

# *To answer all the questions below, you must use Stata (and, specifically, DASP, if requested). Be concise and clear in your answers.*

# *The assignment is divided into three exercises (the points assigned to each exercise are indicated next to each exercise). Please answer (A) directly in this file after each question (Q) and please attach the \*.do file (do-file) that you generated. Rename both files as: “Assignment weeks 3-4-5 - Name, Surname”. Please submit this completed file and the \*.do through the virtual drop box (boîte de dépôt) in the course portal, no later than Tuesday, February 23 11:59 p.m. (*[*Québec time*](https://www.timeanddate.com/worldclock/converter.html?iso=20190227T045900&p1=189)*).*

***Please, organize your dofile by exercise. Feel free to make your comments/discussions in the do-file.***

# Exercise 1 (4%)

Assume that the population is composed of six individuals belonging to two population groups, 1 and 2. The following table shows the distribution of incomes for three different periods.

|  |  |  |  |
| --- | --- | --- | --- |
| *Group* | *inc1* | *inc2* | *inc3* |
| 1 | 1 | 2 | 2 |
| 1 | 2 | 2 | 4 |
| 1 | 9 | 2 | 18 |
| 2 | 3 | 6 | 2 |
| 2 | 6 | 6 | 4 |
| 2 | 27 | 6 | 18 |

* 1. Discuss if the following affirmations are true or false and why, and this, for the distribution *inc1*.

1. Based on the *Scale invariance principle* the income inequality of group1 is equal to that of group 2. Input the data and confirm your justifications by estimating the Gini index by the population group.

**A:** True. The gini coefficients of both the groups are the same (0.444444)

1. By considering the *Scale invariance principle* and the *Population principle,* the income inequality of the group1 is equal to that of the total population.

**A:**False- Only the scale invariance principle is observed. Population principle does not hold in the case of group 1 income as no similar income is replicated. In inc1, the second group’s income is scaled up by 3.

1. The between group inequality of *inc1* is equal to that of *inc2.* Also, check this using the ***dentropyg*** DASP command (for instance, for theta=0).

**A:** True. Using Theil’s index the between group inequality index is 0.130812, and using dentropyg it is 0.143841

1.2 Using the DASP command ***dentropyg***, decompose the entropy index (the parameter theta = 0). Do this for each of the three periods.

**A:**  0.143841 (period 1); 0.143841 (period 2); -0.000000(period 3)

1.3 Estimate the Gini inequality for each of the three distributions with the ***igini*** DASP command and discuss the results.

**A:** gini coefficient for inc\_1= 0.534722; gini coefficient for inc\_2= 0.250000; gini coefficient for inc\_3= 0.444444.

Inequality was the highest in the first period followed by the third period. Period two is when inequality reached its lowest.

# Exercise 2 (5.5%)

Assume that the population is composed of eight households.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *identifier* | *pre\_tax\_income* | *hhsize* | *nchild* | *nelderly* |
| 1 | 240 | 4 | 2 | 1 |
| 2 | 600 | 5 | 3 | 1 |
| 3 | 230 | 3 | 2 | 0 |
| 4 | 1250 | 3 | 1 | 1 |
| 5 | 1900 | 4 | 1 | 1 |
| 6 | 280 | 4 | 2 | 0 |
| 7 | 620 | 3 | 1 | 1 |
| 8 | 880 | 4 | 3 | 0 |
| **Total** | **6000** | **30** | **15** | **5** |

The disposable income of the household is composed of three income sources:

1. The post tax income = pre-tax income – income tax;
2. The received child allowances
3. The received elderly pension

The government disposes two potential scenarios (A and B).

1. ***Scenario A:*** apply a proportional income tax of 10%. Then, 20% of the total collected taxes are equally distributed on the elderly population as pensions. The rest of the budget is equally distributed across the population of children, as allowances.
2. ***Scenario B:*** apply a proportional income tax of 10%, and then redistribute the generated revenue equally across the population of children. In that case, the universal elderly pension is equal to zero.

2.1 Using Stata, input the data (the eight observations), and then generate the variables:

* *pcincatA:* per capita post tax income with the scenario A;
* *pcincatB:* per capita post tax income with the scenario B;
* *pceldA:* per capita elderly pension with the scenario A;
* *pceldB:*  per capita elderly pension with the scenario B;
* *pcallowA:* per capita child allowances with the scenario A;
* *pcallowB:*  per capita child allowances with the scenario B;
* *dpcincA:* per capita disposable income with the scenario A (*pcincatA+ pceldA+ pcallowA*);
* *dpcincB:* per capita disposable income with the scenario B (*pcincatB+ pceldB + pcallowB*).

**A:** gen pcincatA=pre\_tax\_income\*(1-0.1)/hhsize

gen pcincatB=pre\_tax\_income\*(1-0.1)/hhsize

scalar child\_allA=6000\*(0.1/15)\*0.8

scalar elderly\_allA=6000\*(0.1/5)\*0.2

scalar child\_allB=6000\*(0.1/15)\*1

scalar elderly\_allB=6000\*(0.1/5)\*0

gen pceldA=nelderly\*elderly\_allA/hhsize

gen pceldB=nelderly\*elderly\_allB

gen pcallowA=nchild\*child\_allA/hhsize

gen pcallowB=nchild\*child\_allB/hhsize

gen dpcincA= pcincatA+pceldA+pcallowA

gen dpcincB=pcincatB+ pceldB + pcallowB

2.2 Using the DASP command *igini*, estimate the inequality in the distribution of the per capita disposable income for each of the two scenarios and discuss the results.

**A:** gini coefficient for the disposable per capita income of scenario A=0.352933; gini coefficient for disposable per capita income of scenario B= 0.348667.

2.3 Using the DASP command *diginis*, decompose the inequality in the distribution of the per capita disposable income for each of the two scenarios (remember that the three income sources are *pcincatA, pceldA and pcallowA* for the scenario A and *pcincatB, pceldB and pcallowB* for the scenario B)*.*

**A:** pcincatA pceldA= .0434688 ; pcincatA pcallowA =-.2059369; pcincatB pcallowB= -.2059369

2.4 Based on the results of 2.2 and 2.3, in which case will the set of transfer programs reduce inequality in disposable incomes the most? Why?

**A:** In both scenarios child allowance contributes to inequality reduction. Inequality is less in scenario B and the decomposition shows an inequality reduction effect of increase in child allowance.

2.5 Estimate the change in the headcount when the scenario B is enacted (with respect to the initial distribution), and the poverty line is 100 (use the DASP command *difgt*).

**A:** the head count of initial distribution = 0.3666667; and head count after scenario B is enacted=.375; and the change in head count is 0.0083333

2.6 Estimate the change in the poverty gap related to the scenario B (with respect to the initial distribution) and when the poverty line is 100 (use the DASP command *difgt*). Compare the results found here with those found in the previous point (2.5).

**A:** poverty gap of initial distribution= .1416667; Poverty gap after scenario B is enacted= .0591667; difference in poverty gaps=-.0825. The poverty gap has decreased. In scenario B poverty gap is 5% of the poverty line (100) which is in monetary terms. Proportion of people under poverty line (head count) increased but the extent to which incomes of the poor lie below the poverty line decreases. Though more people are poor in scenario B they could be near the poverty line and require small transfer to escape poverty.

# Exercise 3 (3%)

* 1. Load the file data\_2, then initialize the sampling design with the variables *strata, psu* and *sweight*.

**A:** svyset psu [pweight=sweight], strata(strata)

* 1. Using the DASP ***ifgt*** command, estimate the headcount when the measurement of well-being is the adult equivalent expenditures and the poverty line is equal to 21 000.

**A:** Estimated head count=0.336664

* 1. Now, estimate the headcount poverty by population groups (defined by the sex of the household head) and discuss the results.

**A:** The proportion of households whose incomes fall below the poverty line is 0.324918 and 0.379359 for male and female headed households respectively**.**