**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 do-file 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 | 2 | 16 | 2 |
| 1 | 4 | 16 | 4 |
| 1 | 18 | 16 | 18 |
| 2 | 4 | 32 | 2 |
| 2 | 8 | 32 | 4 |
| 2 | 36 | 32 | 18 |

* 1. For the distribution *inc1,* state whether the following statements are true or false and why.

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

**A: TRUE, the inequality in group 1 and 2 are the same, this is because multiplying all income by the same scaler would not change the relative differences.** **The scale invariance principle says that an inequality index should not change if all incomes are scaled by a common factor. In our case incomes in group 1 are multiplied by 2 to get corresponding incomes for group 2.**

**igini inc1, hgroup(group) the Gini index also agrees to this statement as the estimates are the same.**

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;** **The population principle that states that the inequality should remain the same to the population doubled or trippled and in our case, scaling does not necessarily mean replication as such we are going to find differences in inequality index .**

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

**A:** **TRUE, the ratio between the average income of the two groups in period 1 is 1 / 2 and as well as in period 2 (16 /32), this shows that group inequality was the same**

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

**A:**  **dentropyg inc1, hgroup(group) theta(0)**

**dentropyg inc2, hgroup(group) theta(0)**

**dentropyg inc3, hgroup(group) theta(0)**

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

**A: igini inc1 inc2 inc3**

**Index : Gini index**

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**Variable | Estimate STE LB UB**

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**1: GINI\_inc1 | 0.500000 0.069166 0.322203 0.677797**

**2: GINI\_inc2 | 0.166667 0.024845 0.102800 0.230533**

**3: GINI\_inc3 | 0.444444 0.071001 0.261930 0.626958**

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**The first distribution is the one that seem to have a higher social welfare. This is so because that the income of each individual is higher than their incomes during the other periods.**

# Exercise 2 (5.5%)

Assume that the population is composed of eight households.

|  |  |  |  |
| --- | --- | --- | --- |
| *Identifier* | *pre\_tax\_income* | *hhsize* | *nchild* |
| 1 | 480 | 8 | 4 |
| 2 | 1200 | 10 | 6 |
| 3 | 460 | 6 | 4 |
| 4 | 2500 | 6 | 2 |
| 5 | 3800 | 8 | 2 |
| 6 | 560 | 8 | 4 |
| 7 | 1240 | 6 | 2 |
| 8 | 1760 | 8 | 6 |
| **Total** | **12000** | **60** | **30** |

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

1. post tax income = pre-tax income – income tax;
2. child allowances
3. Guaranteed universal income

The government perceives two potential scenarios (A and B):

* Scenario A: apply a proportional income tax of 10%. 60% of the total collected taxes are equally distributed across the population as a guaranteed universal income. The rest of the budget is redistributed equally across the population of children, as child allowances.
* Scenario B: apply a proportional income tax of 10%, and then redistribute equally the generate revenue across the child population. In that case, the guaranteed universal income 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;
* *pcuincA:* per capita universal income with the scenario A;
* *pcuincB:*  per capita universal income s 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+ pcuincA+ pcallowA*);
* *dpcincB:* per capita disposable income with the scenario B (*pcincatB+ pcuincB + pcallowB*).

**A:** **gen pcincatA= pre\_tax\_income\*(1.00-0.1)/ hhsize**

**gen pcincatB= pre\_tax\_income\*(1.00-0.1)/ hhsize**

**gen pcuincatA=(720)/hhsize**

**gen pcuincatB=(0)/hhsize**

**gen pcallowA= nchild\*child\_All\_A**

**gen pcallowB= nchild\*child\_All\_B**

**gen dpcincA= pcincatA+ pcuincatA+ pcallowA**

**gen dpcincB= pcincatB+ pcuincatB+ 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.

**A: igini dpcincA dpcincB,hsize(hhsize)**

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, pcuincA and pcallowA* for the scenario A and *pcincatB, pcuincB and pcallowB* for the scenario B)*.*

**A:**  **diginis pcincatA pcuincatA pcallowA,hsize(hhsize)**

**diginis pcincatB pcuincatB pcallowB,hsize(hhsize)**

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:**

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

**A: gen pcinc= pre\_tax\_income/ hhsize**

**difgt dpcincB pcinc,alpha(0)hsize1( hhsize)hsize2( hhsize)pline1(100)pline2(100)**

2.6 With a poverty equal to 100, estimate the change in the poverty gap under scenario B (with respect to the initial distribution) (use the DASP command *difgt*). Discuss the found results in 2.5 and 2.6.

**A:** **difgt dpcincB pcinc,alpha(1)hsize1( hhsize)test(0) hsize2( hhsize)pline1(100)pline2(100)**

# Exercise 3 (3%)

* 1. Load the file data\_3, 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 poverty when the measurement of well-being is the adult equivalent expenditures, and when the poverty line is equal to 21 000.

**A:**  **ifgt ae\_exp, pline (21000) hs( hsize)**

**Estimate of headcount poverty: 0.31(the headcount poverty is 31%)**

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

**A: ifgt ae\_exp, pline(21000) hs( hsize) hgroup(sex)**

**Poverty index : FGT index**

**Household size : hsize**

**Sampling weight : sweight**

**Group variable : sex**

**Parameter alpha : 0.00**

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**Group | Estimate STE LB UB Pov. line**

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**1: Male | 0.301265 0.013811 0.274160 0.328370 21000.00**

**2: Female | 0.370129 0.033178 0.305014 0.435243 21000.00**

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**Population | 0.316088 0.013949 0.288713 0.343464 21000.00**

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**The results show that the headcount poverty is higher in females with 37% than in males with 30%**