**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 | 8 | 2 |
| 1 | 2 | 8 | 4 |
| 1 | 9 | 8 | 18 |
| 2 | 3 | 24 | 2 |
| 2 | 6 | 24 | 4 |
| 2 | 27 | 24 | 18 |

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

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 population group.

**A: True because the distribution income inc1 in group2 is obtained by multiplying all income in group1 by 3. Justifications: igini inc1, hgroup (group)**

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

**A: False because the total distribution income inc1 does not include a replication of that in group1.**

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

**A: True because the ratio between the average income of the two groups for the periods 1 and 2 is the same (12/4=24/8=3)**

**dentropyg inc1, theta(0) hgroup(group) // Between inequality=0.143841**

**dentropyg inc2, theta(0) hgroup(group) // Between inequality=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: dentropyg inc1, theta(0) hgroup(group)**

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

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

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

**A: igini inc\***

**/\* The second distribution is the one with the highest social welfare giving that the income of the majority of individuals (4/6) is higher than their income during the other periods \*/**

# Exercise 2 (5.5%)

Assume that the population is composed of eight households.

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

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

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

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

* Scenario A: applying 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 equally redistributed across the population of children, as allowances.
* Scenario B: applying a proportional income tax of 10%, and then equally redistributing the generated revenues across the population of children. 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: /\***

**For a given household, the post\_tax\_income in Scenario A is equal to its pre\_tax\_income minus 10% of the pre\_tax\_income.**

**Thus, post\_tax\_income= pre\_tax\_income\*(1-0.1)**

**Now, to compute the per capita post\_tax\_income (pcincatA), we have to divide by the household size.**

**This explains the form of the two following command lines.**

**\*/**

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

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

**/\***

**The collected tax revenue in scenario A is 10% of the total incomes : 0.1\*6000, of which 60% is equally distributed across the population as a guaranteed universal income**

**\*/**

**scalar uinc\_A = 0.6\*0.1\*6000**

**scalar uinc\_B = 0**

**/\***

**Generating the per capita universal income**

**\*/**

**gen pcuincA = uinc\_A/hhsize**

**gen pcuincB = uinc\_B/hhsize**

**/\***

**The collected tax revenue in scenario A is 10% of the total incomes : 0.1\*6000, of which 40% is equally distributed across the population of children, as allowances**

**We have 15 children in our population. Thus the child allowance is equal to : (0.4\*0.1\*6000)/15**

**\*/**

**scalar child\_all\_A = (0.4\*0.1\*6000)/15**

**/\***

**The collected tax revenue in scenario B is 10% of the total incomes : 0.1\*6000**

**We have 15 children in our population. Thus the child allowance is equal to : (0.1\*6000)/15**

**\*/**

**scalar child\_all\_B = (0.1\*6000)/15**

**/\***

**We generate the per capita child allowances**

**By household the total received allowances:**

**- In scenario A: nchild\*child\_all\_A**

**- In scenario B: nchild\*child\_all\_B**

**\*/**

**gen pcallowA = nchild\*child\_all\_A/hhsize**

**gen pcallowB = nchild\*child\_all\_B/hhsize**

**/\***

**The per capita disposable income is equal to the per capita pre\_tax\_income plus the per capita universal income plus the per capita child allowances plus**

**\*/**

**gen dpcincA= pcincatA+ pcuincA+ pcallowA**

**gen dpcincB= pcincatB+ pcuincB+ 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* the scenario B)*.*

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

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

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

**A: /\***

**The set of transfer programs will reduced inequality in disposable incomes the most in scenario A because income sources are more diversified than in scenario B where the contribution of the per capita universal income is nil.**

**\*/**

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

**A: // generating the per capita income without applying any program**

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

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

2.6 Estimate the change in the poverty gap related to the program B (with respect to the initial distribution) when the poverty line is 100 (use the DASP command *difgt*). Discuss the found results in 2.5 and 2.6.

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

**/\***

**The households that receive child allowances perceive some improvement in well-being, but this improvement is not enough to escape poverty.**

**This is what explains the unchanged level of headcount. On the opposite, the poverty gap index is sensitive to any improvement in the well-being encountering for the dependency rate.**

**\*/**

# Exercise 3 (3%)

* 1. Load the file data\_1, 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 when the poverty line is equal to 21 000.

**A: ifgt ae\_exp, hsize(hsize) pline(21000) alpha(0)**

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

**A: ifgt ae\_exp, alpha(0) hsize(hsize) hgroup(sex) pline(21000)**

**/\***

**------------------------------------------------------------------------------------------------**

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

**---------------+--------------------------------------------------------------------------------**

**1: Male | 0.321482 0.014029 0.293949 0.349014 21000.00**

**2: Female | 0.371593 0.035153 0.302603 0.440583 21000.00**

**---------------+--------------------------------------------------------------------------------**

**Population | 0.332727 0.014759 0.303761 0.361694 21000.00**

**------------------------------------------------------------------------------------------------**

**Female-headed households are poorer than male-headed ones.**

**\*/**