**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*](about:blank)*).*

***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; Based on the scale invariance principle, the level of income inequality in group 1 is equal to that of group 2**

**/\* Q1.1A estimate the Gini index by population group \*/**

**igini group\***

**/\* alternatively, which should produce the same result \*/**

**igini group, 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: TRUE; The population principle states that inequality would not be changed by a simple replication of the population. Hence, the income inequality of group1 will be equal to that of the total population.**

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; The ratio between the average income of the two groups for the inc1 and inc2 was 3 (inc1 = 12/4; inc2 =24/8). Hence, the between group inequality of inc1 is equal to that of inc2**

**Check Using DASP**

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

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

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, hgroup(group) theta(0)**

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

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

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 first group (inc1) is the one with the less income inequality given that its Gini index is closer to 1 (0.534722) as against inc2 (0.25) and inc3 (0.44). However, to make a more informed decision as to the differences in the income inequality, we need to take into consideration specific structural characteristics that define each group which was not made available.**

# 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: Given a 10% income tax for Scenario A and B**

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

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

**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**

**60% of the collected tax revenue as guaranteed universal income implies: (0.6\*0.1\*6000)**

**Across total population of 30 implies: 0.6\*0.1\*6000/30**

**The command scalar to be used for guaranteed universal income is guaranteed\_inc\_A.**

**Therefore, stata command for pcuincA is equal to (0.6\*0.1\*6000/30)**

**scalar guaranteed\_inc\_A = 6000\*0.1\*0.6/30**

**Since the guaranteed universal income for scenario B is equal to zero**

**scalar guaranteed\_inc\_B = 0**

**Generating per capita guaranteed univeral income (pcuincA and pcuincB)**

**gen pcuincA = hhsize\* guaranteed\_inc\_A /hhsize**

**gen pcuincB = hhsize\* guaranteed\_inc\_B /hhsize**

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

**60% of collected tax revenue is meant to be used for guaranteed universal income and the rest as child allowance implies (1-0.6=0.4): 0.4\*0.1\*6000**

**We have 15 children in our population. Therefore, the child allowance is equal to: (0.04\*0.1\*6000)/15**

**The command scalar to be used for child allowance is child\_all\_A.**

**Therefore, stata command for child\_all\_A is equal to (0.04\*0.1\*6000)/15.**

**scalar child\_all\_A = 6000\*0.1\*0.04/15**

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

**We have 15 children in our population. Therefore, the child allowance is equal to: (0.1\*6000)/15 given that guaranteed universal income is zero**

**The command scalar to be used for child allowance is child\_all\_B.**

**Therefore, stata command for pcallowB is equal to (0.1\*6000)/15.**

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

**Generating per capita child allowances (pcallowA and pcallowB)**

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

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

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: Recall that the per capita disposable income is equal to the per capita pre\_tax\_income plus the guaranteed universal income plus the per capita child allowances**

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

**gen dpcincB= pcincatB + pcuincB + pcallowB**

**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: Decomposing the income inequality for all the scenarios**

**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 results shows that Scenario A is the one with that reduces inequality the most in disposable incomes when comparing the total absolute reduction (0.368990 as against 0.348667)**

**Also, child Allowances is seen as the most important source in reducing inequality.**

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: 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 result shows that without any program, the poverty gap is: 0.1166667**

**By implementing the transfer program, the poverty gap becomes: 0.0616667**

**This implies that the program reduces the poverty gap by about 0.055.**

**This difference is significant by about 10% (P>|t| = 0.0858)**

# Exercise 3 (3%)

* 1. Load the file data\_1, then initialize the sampling design with the variables *strata, psu* and *sweight*.

**A: Using the svyset command we can initialize the sampling design of the data file.**

**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, pline(21000) hs( hsize)**

* 1. Now, estimate 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)**

**The result shows that for male (0.327669) about 32.77% of them are poor, which is slightly below the average for the total population of about 34.59%. On the other hand, for female (0.410438) it indicates that about 41.44% of them are poor, much higher than the population average of 34.59%.**