**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. Based on *Scale Invariance principle*, the income inequality in the two groups is the same for all periods. All incomes in the second group during the three periods (inc1, inc2 and inc3) are scaled by a constant number (inc1 is scales by 3; inc2 is scaled by 3; and inc3 is scaled by 1 (group 2 in inc3 simply a replication of the first group, essentially implying no difference in inequality between the two groups). The value in the second group is 3 times the values in the first group.

One can confirm this by using the **dentropyg** command.

The entropy index for the two groups is the same (= 0.422837 for both groups)

**dentropyg inc\*, hgroup(group) theta (0)**

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:** no. The inequality within groups is the same but the inequality within one group is not necessarily the same as the inequality of the total population. For example by running the command **igini inc1, hgroup(group)**, we see that inequality within group is the same but the inequality in the total population is different from the inequalities in the groups



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:** The between group inequality in both cases is 0.143841

**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)**

Within group = 0.422837

Between group = 0.143841

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

Within group = 0.0000

Between group = 0.143841

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

Within group = 0.422837

Between group = 0.0000

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

**Stata DASP command: igini inc\*** or **igini inc1 inc2 inc3**

**A:**

Gini index for inc1 = 0.534722;

Gini index for inc2 = 0.250000;

Gini index for inc3 = 0.444444



# 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:**

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

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

**\*generating per capita universal income (pcuincA) with scenario A**

**scalar pcui = 0.6\*0.1\*6000/30**

**gen pcuincA = pcui\*hhsize**

**gen pcuincB = 0**

\*generating per capita child allowance with scenario A

**scalar pc\_child\_allA = 0.4\*0.1\*6000/15**

**gen pcallowA = pc\_child\_allA\*nchild**

\*generating per capita child allowance with scenario B

**scalar pc\_child\_allB = 0.1\*6000/15**

**gen pcallowB = pc\_child\_allB\*nchild**

\*generating per capita disposable income with the scenario A (pcincatA+ pcuincA+ pcallowA)

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

\*generating per capita disposable income with the scenario B

**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: Command: igini dpcincA dpcincB**

Gini for *dpcincA* = 0.266012

Gini for *dpcincB* = 0.252553

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 **

**diginis pcincatB pcuincB pcallowB**



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: Scenario A**

Contributions to Gini inequality

* per capita post tax income = 27.8%
* universal income -0.14% (implying it reduces inequality)
* child allowance -1.5% (implying it reduces inequality)

**Scenario B**

Contributions to Gini inequality

* per capita post tax income = 26.9%
* universal income 0.0% (there was no such policy measure)
* child allowance -1.7% (implying child allowance reduces inequality)

From the above, the set of transfer programs reduce inequality in disposable incomes the most in scenario B. This maybe due to poor targeting of the universal income support which did not make any attempt to support household in accordance with their level of income. The child allowance seems to be more effective than the universal income.

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:** Without the child allowance, the headcount poverty is 36.67%. With child allowance, the per capita income of all households is above the poverty line. The child allowance helps reduce headcount poverty from 36.67% to 0%. The difference is significant at 10% (p>|t| = 8.59)

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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:** The poverty gap is reduced from 11.67% to 0% as a result of the child allowance. The difference is significant at 10% ( p>|t| = 9.9)

Comment: The households that receive child allowances have some improvement in well-being, but this improvement is not enough to make them escape poverty. This is what explains the unchanged level of headcount. In the inverse, the poverty gap index is sensitive to any improvement in the well-being of the poor, and this explains the reduction of this index.



# 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: The headcount is 33.27%**



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

**A:** Headcount poverty is higher for female headed households (37.16%) as compared to male headed households (32.15%). Headcount poverty among female headed households is above the average for the total population (which is 33.27%)

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



Is the difference significant? We can use the following command to see if the difference is significant:

**difgt ae\_exp ae\_exp, alpha(0) hsize1(hsize) test(0) cond1(sex==1) hsize2(hsize) cond2(sex==2) pline(21000) pline(21000)**

As is seen from the table below, the hypothesis that the difference between the two equals zero is rejected and we conclude that the difference in the level of headcount poverty between the two groups is indeed significant

