**Assignment weeks 9, 10 and 11**

*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 directly in this file after each question and please attach the \*.do file (do-file) that you generated. Rename both files as: “**Assignment weeks 9-10-11 - 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, April 13 11:59 p.m. (*[***Québec time***](https://www.timeanddate.com/worldclock/converter.html?iso=20190410T035900&p1=189)*).*

# Exercise 1 (4.5%): Week 11

Assume that the population is composed of six individuals. The scores of each of the three dimensions of well-being are reported in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Individual 1 | 4 | 20 | 12 |
| Individual 2 | 8 | 12 | 0 |
| Individual 3 | 16 | 16 | 24 |
| Individual 4 | 12 | 12 | 16 |
| Individual 5 | 28 | 20 | 8 |
| Individual 6 | 24 | 16 | 12 |

Assume that the poverty threshold of each of the three dimensions is 14. Perform the following computations with Stata.

* 1. Using the union approach, estimate the proportion of poor individuals. Redo the estimation using the appropriate DASP command.

**A :** clear

input id w1 w2 w3

1 4 20 12

2 8 12 0

3 16 16 24

4 12 12 16

5 28 20 8

6 24 16 12

end

gen mdp\_uni = 1

replace mdp\_uni = 0 if w1 > 14 & w2 > 14 & w3 > 14

sum mdp\_uni

imdp\_uhi w1 w2 w3, pl1(14) pl2(14) pl3(14)

* 1. Using the intersection approach, estimate the proportion of poor individuals. Redo the estimation using the appropriate DASP command.

**A :** gen mdp\_ihi = 0

replace mdp\_ihi = 1 if w1 < 14 & w2 < 14 & w3 < 14

sum mdp\_ihi

imdp\_ihi w1 w2 w3, pl1(14) pl2(14) pl3(14)

* 1. Which approach is more sensitive to the increase in individual multiple deprivations?

**A :** Intersection approach is more sensitive to the increase in individual multiple deprivations.

Example:

preserve

clear

input id w1 w2 w3

1 4 20 12

2 8 12 0

3 16 16 24

4 12 12 12

5 28 20 8

6 24 16 12

end

imdp\_uhi w1 w2 w3, pl1(14) pl2(14) pl3(14)

imdp\_ihi w1 w2 w3, pl1(14) pl2(14) pl3(14)

restore

* 1. Estimate the Alkire and Foster (2007) index MPI( when the dimensional cut-off is equal to 2 (the poor are those with two or three dimensions of deprivation).

**A :** forvalues i=1/3 {

gen del\_`i' = 0 if w`i' >= 14

replace del\_`i' = 1 if w`i' < 14

}

egen sum\_del = rowtotal(del\_\*)

gen af\_poor = (sum\_del>=2)

gen w\_af\_poor = (sum\_del /3)\* af\_poor

mean af\_poor w\_af\_poor

* 1. Now estimate the same indices using the appropriate DASP command. Discuss the findings.

**A :** imdp\_afi w1 w2 w3, dcut(2) pl1(14) pl2(14) pl3(14)

* 1. Assume that the government has 24$ and can target one dimension with a universal transfer. Which targeted dimension would most reduce the union index, and the intersection index? Discuss your findings.

**A :** \* Targeting w1

preserve

replace w1 = w1+6

forvalues i=1/3 {

gen del\_`i' = 0 if w`i' >= 14

replace del\_`i' = 1 if w`i' < 14

}

imdp\_uhi w1 w2 w3, pl1(14) pl2(14) pl3(14)

imdp\_ihi w1 w2 w3, pl1(14) pl2(14) pl3(14)

restore

\* Targeting w2

preserve

replace w2 = w2+6

forvalues i=1/3 {

gen del\_`i' = 0 if w`i' >= 14

replace del\_`i' = 1 if w`i' < 14

}

imdp\_uhi w1 w2 w3, pl1(14) pl2(14) pl3(14)

imdp\_ihi w1 w2 w3, pl1(14) pl2(14) pl3(14)

restore

\* Targeting w3

preserve

replace w3 = w3+6

forvalues i=1/3 {

gen del\_`i' = 0 if w`i' >= 14

replace del\_`i' = 1 if w`i' < 14

}

imdp\_uhi w1 w2 w3, pl1(14) pl2(14) pl3(14)

imdp\_ihi w1 w2 w3, pl1(14) pl2(14) pl3(14)

restore

\* Targeting dimension 3 would most reduce the union index since the union index counts individuals as poor even if they are deprived in one dimension. By targeting dimension 3, the government effectively helps individual 5 and individual 6 to escape poverty, who are only deprived in only one dimension pre-transfer. Other individuals are poor in multiple dimension (except for individual 3 who is non-poor) so targeting other individuals through other dimensions would not help reducing the union index.

\* On another hand, targeting dimension 1 or 2 would most reduce the intersection index. Before transfers, there is only one individual (individual 2) who is classified as poor, as she is poor in all dimensions. By targeting either dimension 1 or dimension 2, individual 2 is no longer classified as poor, thus reducing the intersection index to 0.

# Exercise 2 (4%): Week 11

For the case of tri-dimensional well-being dimensions, the Bourguignon and Chakravarty (2003) poverty index (henceforth the BC index ) is defined as follows:

Where is the contribution of the individual to the total poverty:

*and*

Using the data of exercise 1,

* 1. Estimate the Bourguignon and Chakravarty (2003) poverty index when .

**A**: scalar beta = 1/3

scalar e = 1

scalar alpha = 1

forvalues i=1/3 {

gen z`i' = 14

gen ngap`i' = (z`i'-w`i')/z`i'\*(z`i'>w`i')

}

gen pi = (beta\*ngap1^e + beta\*ngap2^e + beta\*ngap3^e)^(alpha/e)

replace pi=0 if ngap1==0 & ngap2==0 & ngap3==0

sum pi

scalar MDI\_BC = r(mean)

dis MDI\_BC

* 1. Redo the estimation using the appropriate DASP command.

**A :** imdp\_bci w1 w2 w3, pl1(14) b1(0.333) pl2(14) b2(0.333) pl3(14) b3(0.333) alpha(1) beta(0.333) gamma(1)

* 1. Generate three new variables (nw\_\*) wherein individuals equalize their well-being dimensions (example: gen nw\_1 = (w\_1+ w\_2+w\_3)/3) (i.e. For instance, individual 1 has 4, 20, 12 in the three dimensions respectively. After the equalisation, we will have: 12, 12, 12). Then, using DASP, re-estimate the BC index with the new vectors of well-being. Explain the direction of the change in the BC index.

**A :** gen nw1 = (w1+ w2+w3)/3

gen nw2 = nw1

gen nw3 = nw1

imdp\_bci nw1 nw2 nw3, pl1(14) b1(0.333) pl2(14) b2(0.333) pl3(14) b3(0.333) alpha(1) beta(0.333) gamma(1)

After equalisation, the BC index decreases because there are two individuals (5 and 6) who are better-off and are able to escape poverty.

# Exercise 3 (4%):

The data file ***Canada\_1996\_2005\_random\_sample\_3*** is a randomly drawn sample of 100 000 observations. It contains the information on gross incomes, taxes and transfers.

* 1. Using the observations from 2005, estimate the expected marginal tax, benefit and net income rates for the range of gross incomes between 1000 and 31000$ (hints: use the DASP ***cnpe*** command with the option: type(dnp)).

**A :** cnpe T B N, xvar(X) min(1000) max(31000) type(dnp)

* 1. Estimate the redistributive impact on the Gini inequality index for the years of 1999, 2002 and 2005 (hints: use the Stata commands preserve/restore to preserve the data after using the Stata command keep if year==…).

**A :** foreach num of numlist 1999 2002 2005 {

preserve

keep if year == `num'

dis "Year = " `num'

igini X N

local Gini\_X=el(e(est),1,1)

local Gini\_N=el(e(est),2,1)

dis "Difference = " `Gini\_X' - `Gini\_N'

restore

}

* 1. Estimate the Kakwani progressivity index per year using the DASP command ***iprog*** (hints: use the option gobs(year)).

**A :** iprog T, ginc(X) gobs(year)

* 1. Using the observations from 2005, check the TR progressivity condition for the tax T by using the DASP command ***cprog***.

**A :** keep if year == 2005

cprog T, rank(X)

\* T is progressive since L-C>=0 for all percentiles.

* 1. In which province was inequality the highest in 2005? In which province was the Kakwani tax progressivity index the highest in 2005?

**A :** igini X, hgroup(province)

\* In 2005, inequality (pre-tax) was highest in Newfoundland.

iprog T, ginc(X) gobs(province)

\* Alberta has the highest Kakwani tax progressivity index in 2005.