DJA command to perform the decomposition of inequalities

Luis Huesca, Linda Llamas, A. Araar

CIAD/U. Laval

May 18th, 2016

Outline

Outline

Goals and objectives

Objectives are twofold:

1. Determine the overall effect for the tax-benefit system on inequality, and,
2. Show the different distributive components effect on inequality.

DJA Command Advantages:

- It determines non-parametrically the equals among the distribution.
- It leads to identify optimal tax outcomes(DJA, 2003: 66).
- It provides a change-in-inequality approach and a cost-of-inequality based on the society willingness to eliminate inequality in terms of monetary units.
- It goes beyond than other inequality decomposition commands (i.e. by subgroups of populations ineqdeco.ado and by income components dsineqs.ado: generalized entropy, Atkinson, Gini).

Overview

Approaches to measuring equity in tax/benefit system (redistributive effect):

- Kakwani (1984): simple average index of vertical and re-ranking components.
- Aronson, Johnson, and Lambert (1994): decompose the Gini coefficient to reveal vertical, horizontal and re-ranking effects.
- Duclos, Jalbert, Araar (2003): Non-parametrically selection of equals using Gini and Atkinson Indices.

Approaches

Approaches to determine equity contributions of separate tax and benefits instruments:

- Lambert (1985): sum of vertical effects with interactions and no re-ranking.
- Jenkins (1988): vertical and re-ranking (which do not add up to total).
- Duclos (1993): vertical and horizontal equity, and re-ranking effects.
- Huesca and Araar (2014): analytical approach by sources.
- Urban (2014): vertical and horizontal components.

Redistributive Equity Concepts

- Does redistribution compress the distribution of post-tax incomes? (Vertical equity)
- Are equals in pre-tax incomes treated equally by the tax system? (Classical horizontal equity)
- Does the redistribution re-rank households? (Horizontal equity as non reranking).

Redistributive Equity Concepts

- Does redistribution compress the distribution of post-tax incomes? (Vertical equity)
- Are equals in pre-tax incomes treated equally by the tax system? (Classical horizontal equity)
- Does the redistribution re-rank households? (Horizontal equity as non reranking).

Rank i	X	N_A	N_B	N_C
1	100	90	90	100
2	100	90	100	100
3	150	100	90	90
4	150	100	100	90
5	200	140	140	140
6	200	140	140	140
Average	**150**	**110**	**110**	**110**

$$I_X = 0.148 \; ; I_N = 0.101$$

Outline

Methodology and calculation

VE: Vertical equity, since inequality has decreased.

HE: Horizontal inequity equals zero, since equals are treated equally.

RE: Reranking inequity since some households are re-ranked.

$$dI(\epsilon, \rho) = \underbrace{I_X(\rho) - IC_N(\rho)}_{\text{Vertical equity}} - \underbrace{(IP_N(\rho) - IC_N(\rho))}_{\text{Horizontal inequity}} - \underbrace{(I_N(\rho) - IP_N(\rho))}_{\text{Reranking}}$$

Methodology and calculation

VE: Vertical equity, since inequality has decreased.

HE: Horizontal inequity equals zero, since equals are treated equally.

RE: Reranking inequity since some households are re-ranked.

$$dI(\epsilon, \rho) = \underbrace{I_X(\rho) - IC_N(\rho)}_{\text{Vertical equity}} - \underbrace{(IP_N(\rho) - IC_N(\rho))}_{\text{Horizontal inequity}} - \underbrace{(I_N(\rho) - IP_N(\rho))}_{\text{Reranking}}$$

- Using household microdata from ENIGH 2014 we compute the following expression: $X=N+T+SSC-B-P$ Where: X is the gross income, N net income, T the tax burden, "SSC" social security contributions, "B" benefits, and "P" as pensions.

Outline

Syntax of DJA Command

- Redistributive Effect of Inequality (RE):
  dja varlist , [HWeight(varname) HSize(varname) RHO(real)
  EPS(real)]

- varlist is a list of two variables that are the gross and net income
  variables (or T or B);

- HWeight: [aw, fw, w] unit weighs from the survey;

- HSize: Household size. For example, if the variable of interest is per
  capita income;

- RHO: Gini value for sensitity;

- EPS: stands for value of Atkinson sensitivty.

Dataset and variables

Descriptive statistics tax-benefit data ENIGH 2014, Mexico

```
. use "C:\Eusmex\Database\NXTB2014", clear

. codebook, compact

Variable      Obs Unique      Mean  Min       Max  Label

factor_hog  19479   1837  1625.905  171     12787  Factor de expansión del hogar
Xeq_14      19104  19068  4014.316    0  693629.8  gross income (pesos mxn)
Neq_14      19104  18097  3990.354    0  458075.7  net income (pesos mxn)
B           19104   5422  123.1517    0  18846.55  benefits without pensions
P           19104   1405  307.3098    0  55348.01  pensions
```

Empirical application

Figure 2 : DJA command syntax : Example using *foreach*
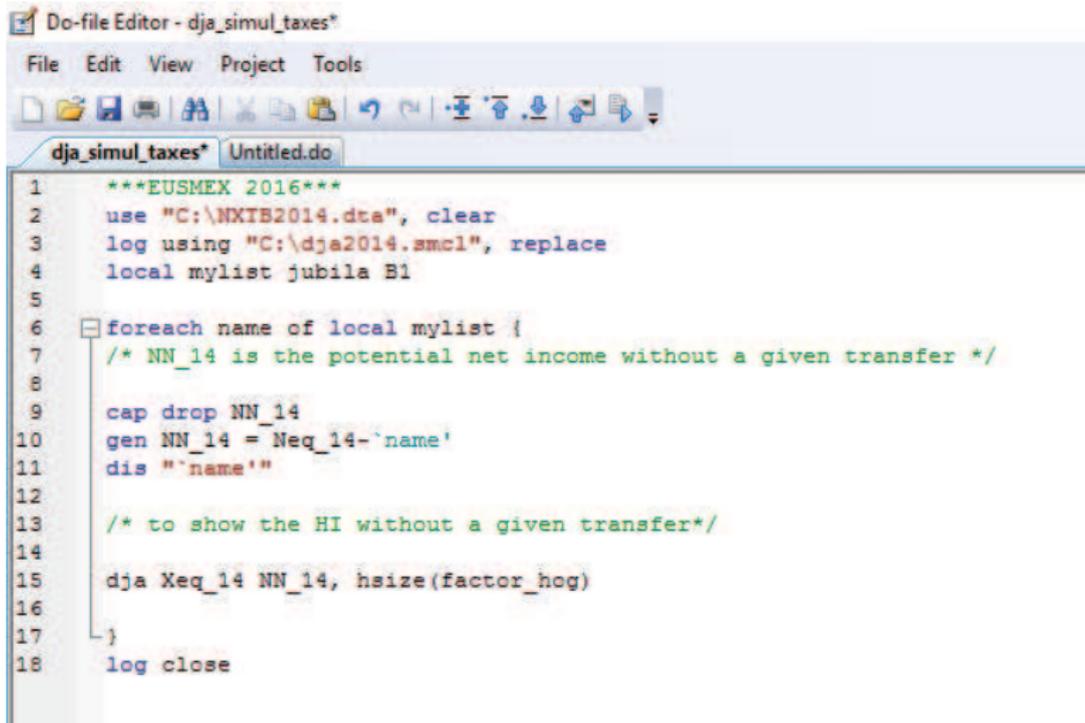

```
Do-file Editor - dja_simul_taxes*
File  Edit  View  Project  Tools

dja_simul_taxes*  Untitled.do
1      ***EUSMEX 2016***
2      use "C:\NXTB2014.dta", clear
3      log using "C:\dja2014.smcl", replace
4      local mylist jubila B1
5
6      foreach name of local mylist {
7        /* NN_14 is the potential net income without a given transfer */
8
9        cap drop NN_14
10       gen NN_14 = Neq_14-`name'
11       dis "`name'"
12
13       /* to show the HI without a given transfer*/
14
15       dja Xeq_14 NN_14, hsize(factor_hog)
16
17      }
18      log close
```

Empirical application

Figure 3 :   Decomposition output using *dja*

Empirical application

Figure 4 : DJA command : Results of decomposition of RE in Mexican case 2014
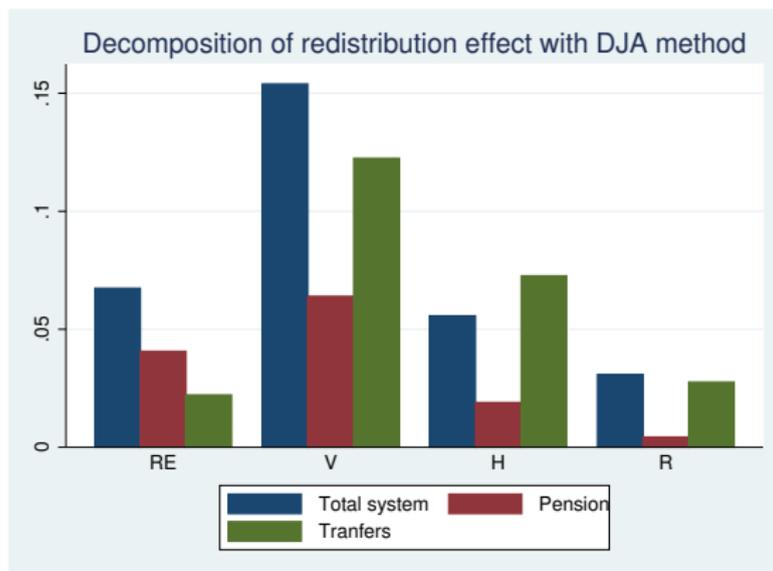
Outline

Conclusions and Recommendations

- DJA command as a new tool to be included in latest version of DASP: http://dasp.ecn.ulaval.ca/

- DJA ado-file improves previous version of DAD software.

- It beats timing processing of calculation.

- Future adjustments in DJA: adding Graph options that can be saved in many different formats: *.gph, *.wmf and *.eps