University of Essex

Decomposition of inequality change into pro-poor growth and mobility components: `dsginideco`

Stephen P. Jenkins (presenter)

and

Philippe Van Kerm

UKSUG, London, 10–11 September 2009

ISER INSTITUTE FOR SOCIAL & ECONOMIC RESEARCH

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Background

- Many tools exist in Stata for the examination of (economic) inequality and related concepts
  - E.g. `ineqdeco`, `sumdist`, `svygei`, `svyatk`, `svylorenz`, `inequal7`, `glcurve`, …
  - … and other tools for summarizing univariate distributions
  - Review with illustrations: Jenkins, S.P. 2006. Estimation and interpretation of measures of inequality, poverty, and social welfare using Stata. NASUG 2006, Boston. http://econpapers.repec.org/paper/bocasug06/16.htm
- The tools can be used to examine differences between distributions
  - e.g. trends over time; differences between regions
- But the focus is on *differences in two marginal distributions*, not the joint distribution

Inequality change from a joint distribution perspective

Change in inequality in the marginal distributions for two years decomposed into two components:

1. *progressivity of income growth*: how much income growth benefits those on lower incomes relative to those on higher incomes
2. *reranking*: how much reranking in income positions is associated with the income growth

This presentation: Stata module to calculate the exact decomposition derived by:

Jenkins, S.P. and Van Kerm, P. "Trends in income inequality, pro-poor income growth and income mobility", *Oxford Economic Papers*, 58 (3), July 2006, 531–548.

- includes empirical analysis comparing USA and Germany

Graphical illustration: USA inequality change 1981–1986

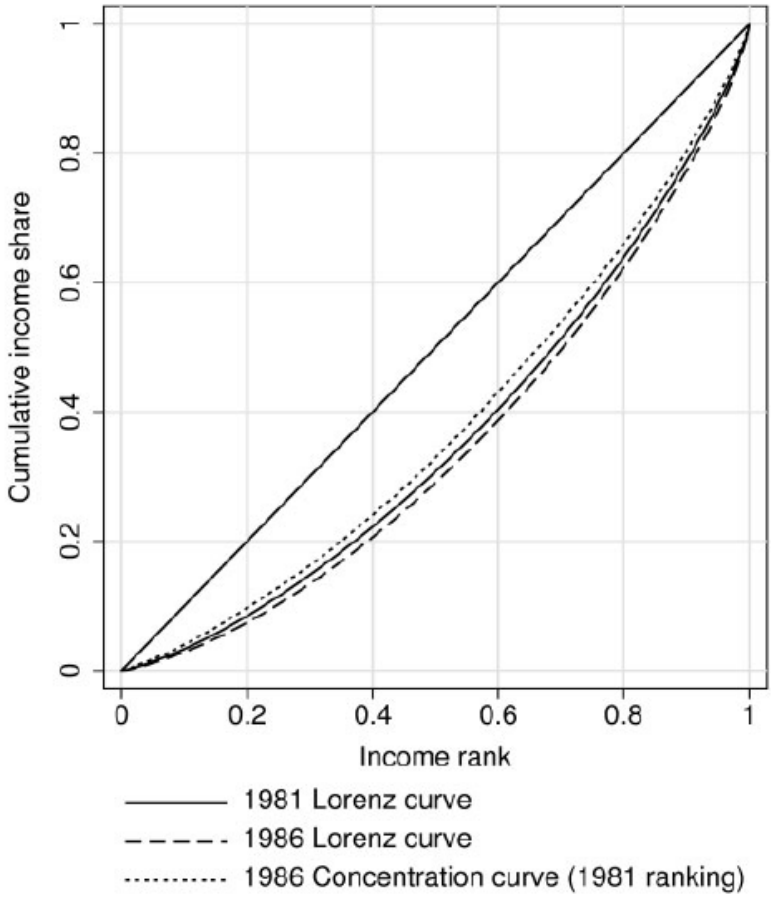

Fig. 1. Decomposition of inequality change (USA, 1981–86)

- Change in inequality in marginal distributions: difference between 1981 and 1986 Lorenz curves
- Progressivity of income growth: from 1986 concentration curve (1981 ranking) to 1986 Lorenz curve
- Reranking: from 1986 concentration curve to 1986 Lorenz curve

- Exact decomposition in terms of (generalized) Gini and concentration indices:

  Jenkins and Van Kerm (2006)

Drawn using `glcurve`

University of Essex

An exact decomposition of inequality change (Jenkins & Van Kerm 2006)

Inequality change between year 0 and year 1

= *R*eranking minus *P*rogressivity

$$\Delta(\nu) = R(\nu) - P(\nu)$$

where

Inequality change is the difference in generalized Gini coefficients

$$\Delta(\nu) = G(X^1; \nu) - G(X^0; \nu)$$

Reranking:

$$R(\nu) = G(X^1; \nu) - C(X^0, X^1; \nu)$$

Progressivity of income growth:

$$P(\nu) = G(X^0; \nu) - C(X^0, X^1; \nu)$$

$G(.)$ is the generalized Gini; $C(.)$ is the generalized concentration coeff.

Sensitivity parameter $\nu > 0$: larger values give greater weight to lower ranked individuals; $\nu = 2$ gives the conventional Gini.

ISER INSTITUTE FOR SOCIAL & ECONOMIC RESEARCH

Calculating the inequality change decomposition: `dsginideco` (for version 8.2 and upwards)

- Prerequisite #1: longitudinal data for 2 time periods for a 'large' number of individuals
  - Requires data in wide form, but it's easy to get this from data from data in long form using time series operators (see below)
- Prerequisite #2: `ssc install dsginideco`
  - help file contains a link to a pdf manual with further details
- Syntax:

```
dsginideco var0 var1 [if] [in] [weight] [, parameters(numlist) format(string)
   percentage percformat(string) kakwani ]
```

aweight and fweight are allowed; see [U] 11.1.6 weight – Weights.
by, bootstrap, jackknife are allowed; see [U] 11.1.10 Prefix commands.

- Various options (e.g. choose ν, output formats), and saved results

Example (1)

```
.use http://www.stata-press.com/data/r9/nlswork , clear
(National Longitudinal Survey.  Young Women 14-26 years of age in 1968)

. tsset idcode year
       panel variable:  idcode (unbalanced)
        time variable:  year, 68 to 88, but with gaps
                delta:  1 unit

. gen w = exp(ln_wage)

. dsginideco L.w w

Decomposition of change in S-Gini coefficient of inequality

Average growth rate = 0.077
--------------------------
     Parameter: |      v=2
----------------+---------
 Initial S-Gini |    0.245
   Final S-Gini |    0.266
         Change |    0.021
    R-component |    0.062
    P-component |    0.041
--------------------------
```

Example (2)

```
. dsginideco L.w w , percentage parameters(1.5 2 3 4) kakwani

Decomposition of change in S-Gini coefficient of inequality

Average growth rate = 0.077
------------------------------------------------------
     Parameter: |    v=1.5      v=2      v=3      v=4
----------------+-------------------------------------
 Initial S-Gini |    0.163    0.245    0.333    0.383
   Final S-Gini |    0.182    0.266    0.353    0.402
         Change |    0.020    0.021    0.020    0.019
    R-component |    0.047    0.062    0.082    0.097
    P-component |    0.028    0.041    0.062    0.078
        K-index |    0.386    0.580    0.865    1.098
------------------------------------------------------

Change, P- and R-components as percentage of initial S-Gini:
------------------------------------------------------
     Parameter: |    v=1.5      v=2      v=3      v=4
----------------+-------------------------------------
         Change |     12.1      8.6      6.0      5.0
    R-component |     29.0     25.4     24.5     25.4
    P-component |     16.9     16.9     18.5     20.4
        K-index |    237.7    236.9    259.6    286.4
------------------------------------------------------
```

Inference

- Resampling-based inference may be implemented using `bootstrap` or `jackknife`
  - More details: see help file and manual
  - Application: Jenkins and Van Kerm (2006)

Another application: country growth convergence

- Correspondence between Δ and "sigma convergence" and between R and "beta convergence", linked together in a single framework
- See: O'Neill, D. and Van Kerm, P. (2008). An integrated framework for analysing income convergence. *The Manchester School*, 76(1): 1–20.