

Problem Set # 8: Migration and Spatial Distribution

PART A

You are provided with data on the population age distribution of a hypothetical country on 1/1/1996 and 1/1/2006, as well as a life table pertaining to the period 1/1/1996-1/1/2006.

1. Using the Life Table Survival Ratio Method, estimate the number of net surviving migrants on 1/1/2006 by five-year age groups (10-14, 15-19, ..., 65+). This involves the following steps:

(a) Project the 1/1/1996 population 10 years forward under the assumption that the population is closed to migration. This involves the following survivorship ratios:

$${}_5\hat{N}_{x+10}(2006.0) = {}_5N_x(1996.0) \cdot \frac{{}_5L_{x+10}}{{}_5L_x}$$

$$\hat{N}_{65+}(2006.0) = N_{55+}(1996.0) \cdot \frac{T_{65}}{T_{55}}$$

These are the expected population counts on 1/1/2006 in the absence of migration.

(b) Estimate net surviving migrants in each age group (10-14, 15-19, ..., 65+) on 1/1/2006 by taking the difference between observed and expected population counts on 1/1/2006

$${}_5NSM_x(2006.0) = {}_5N_x(2006.0) - {}_5\hat{N}_x(2006.0)$$

2. Using backward survival to the mid-point of the intercensal period, estimate the number of net migrations for the period 1/1/1996-1/1/2006, by five-year age groups (5-9, 10-14, ..., 60+). This involves surviving *backwards* the “net surviving migrants” estimated above to the mid-point of the intercensal period, i., by 5 years, using backward survivorship ratios:

$${}_5NM_{x-5}[1996.0,2006.0] = {}_5NSM_x(2006.0) \cdot \frac{{}_5L_{x-5}}{{}_5L_x}$$

$$NM_{60+}[1996.0,2006.0] = NSM_{65+}(2006.0) \cdot \frac{T_{60}}{T_{65}}$$

3. Compare the total number of net surviving migrants (ages 10+) on 1/1/2006 to the total number of net migrations (ages 5+) for the period 1/1/1996-1/1/2006. Why do these two numbers differ?

PART B

You are provided with data on the distribution of whites and non-whites by neighborhood in a hypothetical city.

1. Calculate the Index of Dissimilarity. Give a verbal interpretation of this index.
2. **(optional)** Draw a Lorenz curve and calculate the corresponding Gini coefficient.
3. **(optional)** Show graphically that the Index of Dissimilarity calculated in (1) corresponds to the largest vertical distance between the diagonal and the Lorenz curve you drew in (2).