CTBL32
Version 5.20

Description

CTBL32 uses a contingency table to adjust a two-variable distribution (such as population by age and region) to specific totals of each of the variables. The workbook is designed to adjust subpopulations by age to the total population by age. The sum of the input totals for the subpopulations does not have to match the input country total. The workbook proportionally adjusts the subpopulation totals to add to the country total as well as to adjusted totals by subarea. Although originally designed to adjust populations by age, the workbook can also be used for deaths by age or births by age of mother.

The workbook utilizes “two-way raking,” also known as iterative proportional fitting or “IPF” n-dimensional scaling, and contingency table adjustment (Shryock, Siegel, and Associates 1971:795; Judson and Popoff 2004; Johnson and Leddy 2011).

Data Required

(1) Original distribution of data by subpopulation and age
(2) Desired totals by age
(3) Desired totals by subpopulation (optional). If not provided, these values default to the column sums over all ages for each subpopulation and are proportionally adjusted to agree with the sum of the desired totals by age.

Assumptions

The technique assumes that the original distribution of the information can be adjusted to obtain an estimate of the actual distribution by successive proportional adjustments of rows and columns through an iterative process.

Procedures

The original distribution of data is adjusted to the desired marginal totals as follows:

(1) Each row of data is adjusted proportionally to the desired row total.
(2) Each column of data is adjusted proportionally to the desired column total.
(3) The first two steps are repeated until the data agree with the desired marginal totals.
Mathematically, for cycle i:

ROW ADJUSTMENT

\[ f_R(i-1,a) = \frac{PDRT(a)}{\sum_s PC(i-1,s,a)} \]

\[ PR(i,s,a) = PC(i-1,s,a) \times f_R(i-1,a) \]

COLUMN ADJUSTMENT

\[ f_C(i,s) = \frac{PDCT(s)}{\sum_a PR(i,s,a)} \]

\[ PC(i,s,a) = PR(i,s,a) \times f_C(i,s) \]

where:

- \( a \) = Age
- \( s \) = Subpopulation

- \( f_R(i,a) \) = row adjustment factor for cycle i and age a
- \( PDRT(a) \) = desired population total for age group a
- \( PR(i,s,a) \) = row adjusted population for cycle i, subpopulation s, age a
- \( f_C(i,s) \) = column adjustment factor for cycle i and subpopulation s
- \( PDCT(s) \) = desired total population for subpopulation s
- \( PC(i,s,a) \) = column adjusted population for cycle i, subpopulation s, age a

**Advantages**

The technique provides an estimated distribution of data that matches any set of desired marginal totals. This allows the user, for example, to enter the final census population for the country and the preliminary estimates for the subpopulations. CTBL32 is useful as a final step in adjusting population projections by regions or states to the total population of a country.

**Limitations**

The technique requires an initial distribution of the data by subpopulation and age.
References


Note

For access to all Subnational Projections Toolkit workbooks and documentation, go to: http://www.census.gov/population/international/software/sptoolkit/