

### 18.5.3. Grossing-up procedures

**Grossing up procedures have been applied to:** Individuals and Households

Let  $h$  be one of the final strata of households (Final stratum = Region x Degree of Urbanization), then this will take the following values:  $h = 1, 2, \dots, H$  (where  $H = 90$ ). In each of the final strata (let  $h$ ), if statistical information was selected from a sample of  $n'_h$  households, the extrapolation factor of the household of order  $j$  belonging to the PSU of order  $i$  was defined as:

$$w_{hij} = \frac{N_h}{a_h \cdot N_{hi}} \cdot \frac{N_{hi}}{n_{hi}} \cdot \frac{1}{r_l} \cdot t_{hij} = \frac{N_h}{a_h \cdot n_{hi}} \cdot \frac{1}{r_l} \cdot t_{hij} \quad (9)$$

From relations (8) in paragraph 18.1.2.2 and (9), we have:

$$w_{hij} = \frac{N_h}{a_h \cdot \frac{n_h}{a_h}} \cdot \frac{1}{r_l} \cdot t_{hij} \Rightarrow w_{hij} = \frac{N_h}{n_h} \cdot \frac{1}{r_l} \cdot t_{hij} \quad (10)$$

where:

$\frac{N_h}{n_h}$ : Inverse of initial inclusion selection probabilities of sampling households in  $h$  stratum,

as estimator of the stratum total  $Y_h$  (for any variable  $y$ ) is self-weighting,

$r_l$ : Response propensity in weighting class  $c_l$  ( 13 Regions-NUTS 2 plus unified strata in former Greater Thessaloniki and Regional Unities in former Greater Athens Area)

$t_{hij}$ : Factor, which adjusts the sample weights of households, so that the sample totals conform to the population totals on a cell-by-cell basis (Population Weighting Adjustment). The auxiliary variable used at household level is the household size (1,2,3,4 or 5+ members) at NUTS 1 level, for the definition of cells or classes.

The distribution of households by size class per NUTS1 is estimated by using population projections. These projections are based on vital statistics (population census, births, deaths, migration) and the Population Census 2011.

In each of the final strata of households (let  $h$ ), if statistical information was selected from a sample of  $m_h$  individuals, the extrapolation factor of the individual of order  $k$  belonging to the  $hij$  household is defined as follows:

$$w_{hijk} = w_{hij} \cdot \frac{1}{p_{hijk}} \cdot g_{hijk} \quad (11)$$

where:

$w_{hijk}$  : The extrapolation factor of the  $hij$  household in which the  $hijk$  individual belongs.

$p_{hijk}$  : The selection probability of the  $hijk$  individual, which belongs to the  $hij$  household.

As one individual was selected with equal probabilities out of  $m_{hij}$  members belonging to

the target population, the  $p_{hijk}$  is defined as:  $p_{hijk} = \frac{1}{m_{hij}}$

$g_{hijk}$  : Factor, which adjusts the sample weights of individuals, so that the sample distribution conforms to the population distribution across a set of classes at NUTS1 level. The classes are 24, which are defined by crossing sex by age groups (2 sex categories  $\times$  12 age groups). The age groups are defined by the year intervals: 16-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69 and 70-74.

The population distribution of individuals by sex and age groups NUTS1 is estimated by using population projections. These projections are based on vital statistics (population census, births, deaths, migration) and the Population Census 2011.