ANNEX C

Grossing up Techniques

1. Simple grossing-up for each cell of the questionnaire

Question by question, the number of responses in the cell is multiplied by the ratio of the number of respondents eligible to the question compared with the number of respondents to the question.

Let h =1,…,H denote the strata. The grossed-up total for a peculiar cell c of question q in stratum h is defined by:

$$\hat{t}_{hqc} = \frac{N_h}{n_{r,hq}} \sum_{i=1}^{n_{r,hq}} y_{hqci},$$

where $n_{r,hq}$ is the number of respondents to question q in stratum h, y_{hqci} is the response of unit i in stratum h to cell c of question q (1 if the unit tick this cell, 0 otherwise) and N_h is the number of eligible businesses in stratum h.

2. Applying some form of correction

In the case that the respondents in the stratum do not reflect the size structure of the stratum, one additional subdivision can be made, for example, separating the stratum by employment size band, and applying simple grossing for each.

Let denote g = 1,…G_h the different groups. The estimated total is then:

$$\hat{t}_{hqc} = \sum_{g=1}^{G_h} \sum_{i=1}^{n_{r,gq}} \frac{N_h}{n_h} \frac{n_g}{n_{r,gq}} y_{gqci}$$

where N_h is the number of units in the population in stratum h, n_h is the number of units sampled in stratum h, n_g is the number of sampled units in group g, $n_{r,gq}$ is the number of respondents to question q in group g and y_{gqci} is the response of unit i in group g to cell c of question q.

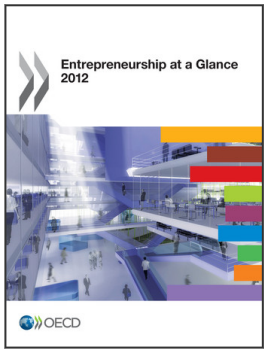
3. Using an auxiliary variable

For example, employment or turnover can be used to calculate estimated totals by applying a weight to each stratum.

Let $h = 1 \ldots H$ denote the strata and x the auxiliary variable. The estimated total in a stratum h for a cell c of question q is given by:

$$\hat{t}_{hqc} = \frac{N_h}{n_{r,hq}} \sum_{i=1}^{n_{r,hq}} g_{hq} y_{hqci}$$, with the g-weight: $$g_{hq} = \frac{n_{r,hq}}{N_h} \frac{\sum_{j=1}^{N_h} x_j}{\sum_{i=1}^{n_{r,hq}} x_{hi}}$$

where x_{hi} is the value of the auxiliary variable for unit i in stratum h, $n_{r,hq}$ is the number of respondents to question q in stratum h, y_{hqci} is the response of unit i in stratum h to cell c of question q (1 if the unit tick the cell, 0 otherwise), and N_h is the number of units in the population in the stratum h.



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