EUROPEAN SOCIAL SURVEY ROUND 8 WEIGHTING STRATEGY

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v2 5-7-2018 (v1 28-6-2018; v0 29-5-2018)

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Introduction

This report provides details regarding the weighting strategy undertaken in Round 8 of the European Social Survey (ESS8). It has been the aim of the SWEP to adopt a weighting strategy that is consistent with the one used in previous ESS Rounds, specifically Round 7. For this reason, only in a few cases has SWEP decided to introduce (minor) changes in the current weighting strategy. However, following the work presented in this report, SWEP may consider the opportunity to propose new approaches, aimed at improving the already well-established scientific accuracy of the ESS weighting procedures.

Twenty-three countries participated in Round 8. Table 1 presents these countries and key sample characteristics. For each country, three weighting factors have been included in the final release of the ESS8 data file: design weight, post-stratified design weight, and population size weight. Their name in the data file is the same across countries and follows the notation used in previous ESS Rounds. Design weight ("*dweight*") adjusts for unequal probability of selection, if necessary. Post-stratified design weight ("*pspwght*") includes design weight, yet adjusts for any differences that may still occur, due to differential nonresponse or random sampling variability, between the sample and the general population aged 15 and over of a country with regard to two weighting dimensions. These dimensions vary somewhat across countries, but in principle the first dimension is given by the interaction of gender, age group (15-34; 35-54; 55+), and, for some countries, education (low, medium, high); the second dimension is usually geographically region (typically, but not always, NUTS2). Table 2 in this report describes these

dimensions. Population size weight ("*pweight*") accounts for the fact that the net sample size varies little between countries (see Table 1), while the general population aged 15 or over of ESS8 participating countries varies considerably from 0.3 million (Iceland) or 1.1 million (Estonia) to 71 million (Germany) or 121 million (Russia). The use of *pspwght* is recommended in any analyses that aim to draw inferences related to the general population of a country or when comparisons between countries are performed. Instead, (pspwght*pweight) should be used for analyses in which countries are combined to represent a larger geographical region (e.g. comparing "Nordic countries" with "Mediterranean countries", or producing estimates for "all ESS countries").

Design Weight

The design weight corrects for differences in the probability of a sample element (person) to be included in the gross sample. Depending on the sample design, there may be several stages in the selection process for which the inclusion probability must be taken into account. Thus, the formula of design weight is:

$$dweight = 1/\prod_{i=1}^{n} p_i$$

where p_i=the (conditional inclusion probability of the Sample element (or higher-level unit to which it belongs) at stage *i* and the design has *n* stages.

The inclusion probabilities at each stage, $\{p_i\}$, were obtained from the Sample Design Data Files (SDDF), provided by the National Coordinator (NC) of each participating country. The SDDFs were checked regarding any potential errors or

inconsistencies between the collected data and the design of the sample, as documented in the Sample Sign-Off Form of each country. Where necessary, the data were edited (with the approval of the NC) or the NC was asked to supply an amended version of the file.

After calculating the initial value of *dweight*, the distribution was examined and large outliers were trimmed to a maximum value if necessary. In practice, such trimming was only necessary in six countries. In three of these countries (AT, IE and NL), the maximum value was 4μ, where μ was the mean of the initial *dweight* in the country. In two countries (LT and PT) the maximum value is trimmed to 5μ and in one (GB) to 6μ. This decision has been based on how the values of *dweight* are distributed and whether there are cases that can be treated as outliers. It is worth mentioning that the number of observations for which the value of *dweight* has been trimmed is relatively small (one observation in each of AT, IE, NL, 12 in GB, 13 in LT, 50 in PT). After this procedure, the (trimmed) design weights have been scaled to have a mean of 1 in each country. Due to this final step, the maximum value of *dweight* may slightly exceed the original maximum value.

Table 1. ESS8 Participating Countries and their Sample Characteristics

Countries	Sampling Design				Net Sample Size
	Multi-Domain	Explicit Stratification	Multi-Stage	Sample Elements	
Austria	Y	Y	Y*	Households	2010
Belgium	Y	Y	Y*	Persons	1766
Switzerland		implicit		Persons	1525
Czech Republic		implicit	Y	Addresses	2269
Germany	Y	Y	Y	Persons	2852
Estonia		Y		Persons	2019
Spain		Y	Y	Persons	1958
Finland		implicit		Persons	1925
France	Y	Y	Y*	Dwellings	2070
United Kingdom		implicit	Y	Addresses	1959
Hungary	Y	Y	Y*	Persons	1614
Ireland		implicit	Y	Addresses	2757
Israel		Y	Y	Addresses	2557
Iceland	Y	Y*	Y*	Persons	880
Italy	Y	Y	Y*	Persons	2626
Lithuania	Y	Y	Y*	Addresses	2122
Netherlands				Addresses	1681
Norway		Y		Persons	1545
Poland	Y	implicit*	Y*	Persons	1694
Portugal	Y	Y	Y*	Addresses	1270
Russia	Y	Y	Y	Dwellings	2430
Sweden		Y		Persons	1551
Slovenia		implicit	Y	Persons	1307

Y=Yes

*only in one domain

Post-Stratified Design Weight

Post-stratification (strictly, calibration) is used to adjust the design weights, such that the sample of each country reflects the estimated distribution of the population aged 15 or over. The released ESS8 data provides the adjusted weight (*pspwght*), rather than the adjustment, so the weight can be used on its own and does not need to be (and indeed should not be) combined with the design weight. In case experienced data users may want to derive their own non-response or post-stratification adjustment, then the design weight alone can be included.

The post-stratification carried out takes into account population structure estimates regarding gender, age groups (15-34 / 35-54 / 55+), level of educational attainment (in three groups), and region. These measures are combined in weighting dimensions that vary by country. Table 2 presents these weighting dimensions and the source of the population structure estimates (referred to in this report as "Control Data", for consistency with previous ESS reports).

The method of calculating *pspwght* was based on the STATA package "IPFWEIGHT"[1]. The weighting factor *pspwght* has been derived through iterative procedures that performed stepwise adjustments of the weight, beginning with *dweight* as the base weight, until it has achieved the margins of Control Data, as defined by two weighting dimensions. In most of the cases these dimensions comprised Region and either GAE (Gender*AgeGroup*Education) or GA (Gender*AgeGroup). The procedure of deriving *pspwght* has been applied country-by-country.

[1] IPFWEIGHT STATA package has been developed by Michael Bergmann, University of Mannheim (now Technical University of Munich).

In most of the cases, the estimates related to gender, age, education, and region have been taken from the Labour Force Survey (LFS), year 2016. When LFS data was incomplete or absent, these estimates have been procured from other sources: either data provided by the NCs (referred to in this Report as "ESS Population Statistics" or "ESS Statistics") or data obtained from the Office for National Statistics of that country (presented in this Report as "Statistics [country name]").

When Control Data has been taken from LFS, annual estimates have been derived from the respective quarterly data sets. This was done by appending the quarterly data sets, calculating weighted counts for each quarter for each cell of each weighting margin, and then deriving the average weighted counts ("COUNTS") across quarters. Finally, the LFS margins have been derived as:

$$p_{LFS} = COUNTS \; / \; (SUM \; OF \; COUNTS \; FOR \; MARGIN)$$

where:
p_{LFS}= LFS margins for each weighting dimension, each country
COUNTS=average weighted counts, each country

Before applying the IPFWEIGHT procedure, adjustments were made for item missing data in the ESS survey data and/or the LFS data. This has been done by adopting the strategy used in Round 7 of the ESS[2]. The maximum value of PSPWGHT has been constrained to 4. The mean of PSPWGHT has been constrained to 1 (both these constraints are set within the IPFWEIGHT package).

[2] Berzelak et al. (2016) "ESS Round 7 Weighting Procedures"

Table2: ESS8 Post-Stratification Weighting Dimensions and source of Control Data by country

Countries ESS8	Post-stratification			
	Weighting Dimensions (G=Gender; A=Age; E=Edu; R=Region)	Source & Year for G, A, E	Definition of Region	Source & Year for Region
Austria	GAE; R	LFS 2016	NUTS2 (9)	Statistics Austria 2016
Belgium	GR; AR; ER	LFS 2016	NUTS1 (3)	LFS 2016
Switzerland	GA; R	LFS 2016	NUTS2 - 6/7 *	LFS 2016
Czechia	GAE; R	LFS 2016	NUTS2 (8)	LFS 2016
Germany	GAE; R	LFS 2016	NUTS1 (16)	LFS 2016
Estonia	GAE	LFS 2016	-	
Spain	GAE; R	LFS 2016	NUTS1 (7)	LFS 2016
Finland	GAE; R	LFS 2016	NUTS2 4/5 *	ESS STATS
France	GAE; R	LFS 2016	NUTS1 (8)*	LFS 2016
Great Britain	GA; R	LFS 2016	NUTS1 (12)	LFS 2016
Hungary	GAE; R	LFS 2016	NUTS2 (7)	LFS 2016
Ireland	GA; R	LFS 2016	NUTS2 (2)	LFS 2016
Israel	GA; E	NC & Statistics Israel 2016	-	
Iceland	GA; E	LFS 2016	-	
Italy	GAE; R	LFS 2016	NUTS1 (5)	LFS 2016
Lithuania	GAE	LFS 2016	-	
Netherlands	GAE; R	LFS 2016	NUTS2 (12)	NC 2016
Norway	GAE; R	LFS 2016	NUTS2 (7)	LFS 2016
Poland	GA; R	LFS 2016	NUTS2 (16)	LFS 2016
Portugal	GAE; R	LFS 2016	NUTS2 (5)	LFS 2016
Russia	GAE; R	ESS STATS , Census 2010	Regions (8)	ESS STATS, Census 2010
Sweden	GAE; R	LFS + Statistics Sweden	NUTS2 (8)	Statistics Sweden
Slovenia	GAE; R	LFS 2016	NUTS2 (2)	LFS 2016

* **France** [and **Portugal]**: some regions are not covered by the ESS (FR83; FRA1-FRA5; PT20; and PT30). The variable region in Control Data was amended & recoded accordingly.

* **Finland:** Variable Region recoded in order to maintain comparability with previous rounds (see Berzelak et al. (2016) "ESS Round 7 Weighting Procedures).

* **Switzerland**: Two large regions were unified in order to maintain comparability with previous rounds (CH03 and Zurich).

* **Israel, Italy,** and **Russia** did not participate in Round 7; the weighting dimensions are similar to those in Round 5 or 6.

Population weight

A population size adjustment weight, *pweight*, is provided for analyses that include more than two countries and accounts for the fact that the ESS8 participating countries have similar sized net samples but vary greatly with regard to the size of the general population aged 15+.

The formula for the population weight is

$$pweight = \frac{General\ Population\ aged\ 15+}{Net\ Sample\ Size} * 10000$$

The data source for the numerator of this weight comes from the Eurostat online Database[3] (September 2017 estimates of the 2016 population) with regard to the general population aged 15+. A note that this weighting factor has been derived country-by-country. Depending on which countries are included in analysis, *pweight* can be rescaled by the user in order to obtain an overall mean weight of 1.0 if so desired. Note also that as *dweight* and *pspwght* are both scaled to a mean of 1.0 in each country, this means that *pweight* can be used in combination with either of those weights.

[3] https://ec.europa.eu/eurostat/data/database