

Impact of changing the survey institute on SILC 18 results

1. Response rate

For SILC18, changing the survey institute responsible for conducting the survey brought about a sharp decline in household response rates.

Complete households

Complete household rates (i.e. the percentage of complete households in relation to activated households) per survey year and per wave are as follows:

Table 1. Percentage of complete households per survey year and per wave

	Percentage of complete households						
	ALL	W1 ALTEL	W1 CASTEM	W1	W2	W3	W4
SILC15	70.2	42.0	62.5	57.8	81.5	75.3	81.2
SILC16	69.3	42.1	60.5	56.5	77.9	74.0	82.5
SILC17	68.9	41.8	61.3	56.1	79.1	70.9	82.4
SILC18	49.4	21.8	37.1	32.9	62.8	56.9	67.6
Relative evolution : (SILC18-SILC17) / SILC18	-28.2%	-47.9%	-39.4%	-41.4%	-20.6%	-19.8%	-18.0%

Table 2. Number of complete households per survey year and per wave

		Number of complete households						
		ALL	W1 ALTEL	V1 CASTEM	W1	W2	W3	W4
SILC15	Total	10643	1032	3475	4507	2016	2149	1971
	Respondents	7468	433	2173	2606	1643	1618	1601
SILC16	Total	11199	985	3525	4510	2735	2096	1858
	Respondents	7762	415	2133	2548	2131	1550	1533
SILC17	Total	11795	1208	3315	4523	2637	2797	1838
	Respondents	8122	505	2032	2537	2087	1984	1514
SILC18	Total	13518	1636	4253	5889	2618	2688	2323
	Respondents	6680	356	1579	1935	1645	1530	1570

The complete households rate for SILC18 was noticeably lower than that of previous years. Taking all waves into account and regarding SILC17, the decline in complete households was 19.5 percentage points, i.e. a relative decline of 28.2%. This fall in the response rate was distinctly more pronounced for wave 1 (-41.4%), and remained considerable for waves 2 (-20.6%), 3 (-19.8%) and 4 (-18%). The sharp increase in total non-response (TNR) in wave 1 weakens the longitudinal panel. The low response rates will accumulate over the following survey years and cause a cumulated longitudinal erosion that is much larger than expected to meet the quality and reliability demands of our indicators.

Individuals aged 16 and over in total unit non-response (TuNR) in complete households

Within complete households, certain individuals eligible for the individual questionnaire refused to answer. Table 3 shows the percentage of individuals aged 16 and over in TuNR within complete households.

Table 3 Percentage of individuals aged 16 and over in TuNR in complete households by survey year and wave

	Percentage of individuals aged 16 and over without proxy in TNRu in complete households						
	ALL	V1 ALTEL	V1 CASTEM	V1	V2	V3	V4
SILC15	10.3	9.3	11.7	11.4	10.0	10.5	8.8
SILC16	10.9	9.6	11.8	11.5	10.0	11.1	10.7
SILC17	11.2	8.6	11.4	10.9	11.8	10.8	11.3
SILC18	14.0	17.7	18.7	18.5	12.6	12.7	10.9
Relative evolution : (SILC18-SILC17) / SILC18	24.6%	105.6%	63.9%	69.6%	6.5%	17.5%	-3.2%

As was the case for the response rates for the household questionnaire, the response rates for the individual questionnaire were worse in 2018 than in previous years (rising from 11.2% to 14%); an increase in TuNR of 24.6% between 2017 and 2018), in particular for waves 1 (+69% TuNR) and even more so for the altels (+106%).

2. Impact on weightings

Cross-sectional weightings

The low response rates did not result in any changes in the cross-sectional weightings. The correction mechanisms for non-response and calibration all converged, although the calibration limits for waves 1 had to be adjusted during the correction process for non-response¹. In this way, the cross-sectional weightings were carried out in almost the same manner as in 2017.

As a reminder, the SILC weightings were revised in 2014, when it was decided to freeze both the explanatory variables for non-response and the calibration variables. Revisions are planned every ten years. This has been called into question following the unusually high non-response rates of 2018. However, it has been decided to maintain the variables defined in 2014. As the increase in TNR (total non-response) in 2018 was due above all to the change in the institute conducting the survey, it is possible that it will not last. We hope to correct for a large part of the additional TNR in 2018 with the strong increase in the quantity and quality of auxiliary variables to correct for TNR following the revision of 2014. Concordance rates, related to the model's quality, are rather encouraging² (Table 4).

Table 4 Concordance rates while correcting for non-response

	SILC 16	SILC 17	SILC 18
Wave 1 altel	62.7	61.4	65.9
Wave 1 castem	70.5	70.0	67.1
Wave 2	70.2	72.4	69.1
Wave 3	74.5	70.5	68.8
Wave 4	73.3	76.8	67.0

¹ As a reminder, depending on the calibration method, lower and upper limits can be defined to avoid negative weights or an explosion of weights after calibration. This is the case for the SILC survey, in which we use a limited calibration method. These limits regulate the ratio between weight before and after calibration.

² Here we use the notion of concordance rates as defined in the SAS/STAT 9.2 User's guide for example (2009), 2nd ed, page 3338 .

Profiles most affected by increase in TNR among auxiliary weighting variables

The increase in TNR was analysed for all auxiliary variables used for the cross-sectional weighting by wave. Some auxiliary variables are used at household level (e.g. group of total equivalent incomes), and some at individual level (e.g. nationality). The main areas with the greatest increase in TNR were as follows:

Foreign nationality

- Household composition by nationality: "Solely foreign nationals, none of whom are from a neighbouring country" (waves 2 and 3)
- Foreign nationality, except Northern and Western Europe (all waves)

Level of income and deprivation

- Total equivalent incomes, all CCO sources taken together that are less than or equal to the median (wave 1 altel)
- At least one unemployment allowance in the household (wave 1 castem)
- Presence of supplementary benefits in the household (wave 1 castem)
- Living space divided by number of household members less than or equal to 20 m² (wave 1 castem)

Household type

- Exclusively male household (wave 1 altel)
- Age group of the oldest person in household lower than 34 (wave 1 castem)
- House move (change of building) in past two years (wave 1 castem and wave 2)

The list below shows the most affected variables as well as the relevant waves. It is worth noting that if a variable is not concerned, this may be due to response rates that are no worse than the average rates in the wave concerned but also to the fact that the variable in question is not used as an explanatory variable for that wave (not selected in 2014).

The example below illustrates the most noticeable types of change:

1° Wave 3: Nationality group = Other countries (1: Switzerland 2:
Northern and Western Europe 3: Southern Europe 4: Other countries)

Average rate of complete households for wave 3:

- SILC 17: 70.93%
- SILC 18: 56.92%

Among all foreign nationals outside Northern, Western and Southern Europe, the rate of complete households is as follows:

- SILC 17: 56.39%
- SILC 18: 28.81%

The average response rate in wave 3 fell by 19% ($=1-(56.92/70.93)$) whereas it fell by 49% for foreign nationals outside of Northern, Western and Southern Europe ($=1-28.81/56.39$).

Impact on the profiles most affected by the additional TNR

As expected, the profiles most affected by TNR are those for which the increase in weights was strongest.

Figures 4, 5, 6 and 7 in the weighting annex show the change in weights compared with the average weight (average weight / sub-group weight). A value of 0.5 thus means that the sub-group's weight is twice as high as the average weight and therefore that the sub-group replied around³ twice as infrequently as the mean. The figures show that:

- Figure 4: Sharp rise in weights for 18-24 year-olds (and therefore fall in ratio between average weight / weight for 18-24 year-olds). This is consistent with observations for the response rates (in the weightings, the variable *Reference age of oldest person in household* is used, in the manner outlined: *under age 34*)
- Figure 5: Sharp rise in weights for foreign nationals
- Figure 6: Rise in weights for lowest income households (mode p0-p20).
- Figure 7: Sharp rise in weights for materially deprived households, consistent with the fact that lower income households respond less.

Impact on distribution of weights

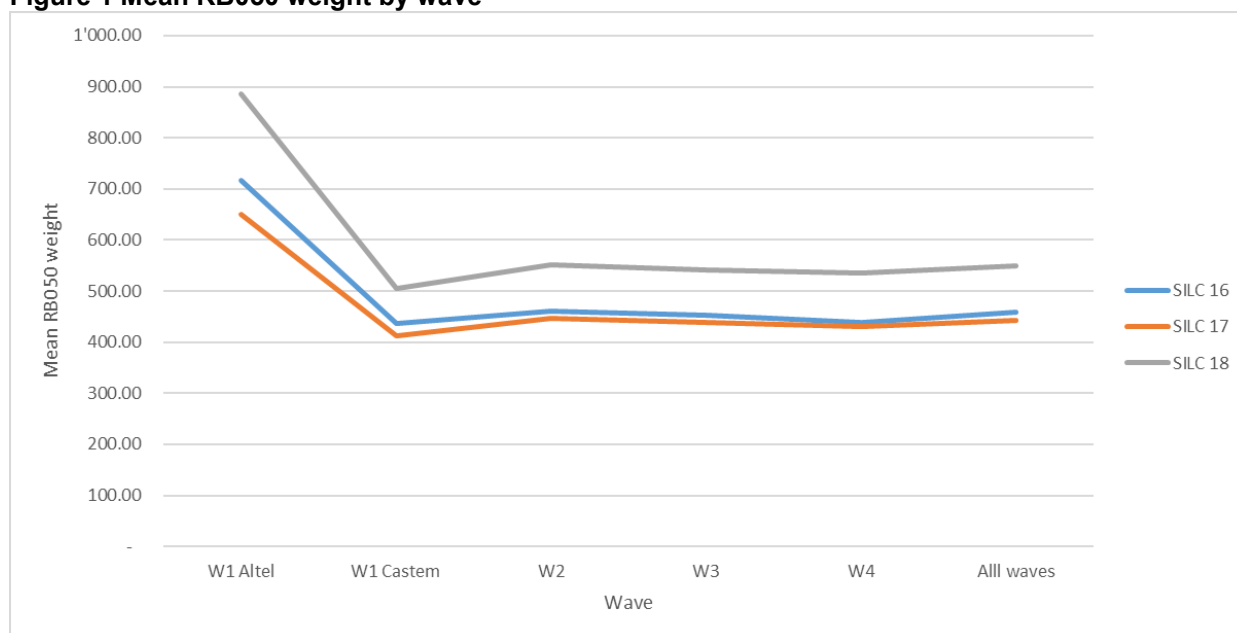
The table below shows the change in the mean and in the coefficient of variation (CV) of weight RB050 by wave and by survey year:

Table 5 Mean and coefficient of variation (CV) of weight RB050 by wave and survey year

	Survey year	W1 Altel	W1 Castem	W2	W3	W4	All waves
Mean	SILC 16	717.44	436.88	461.15	452.93	438.02	458.36
Mean	SILC 17	649.44	412.04	446.71	439.07	429.89	442.83
Mean	SILC 18	886.20	505.90	550.89	540.61	535.85	549.14
CV	SILC 16	0.49	0.47	0.59	0.74	0.53	0.59
CV	SILC 17	0.35	0.40	0.62	0.62	0.76	0.60
CV	SILC 18	0.54	0.68	0.71	0.76	0.69	0.71

A tendency can clearly be seen for the weight RB050 to rise. This can be explained by the low response rate in 2018 and the fact that respondents received a larger weight to compensate for non-responders. However, in the graph below, the change is greater for altels from wave 1 than for other waves.

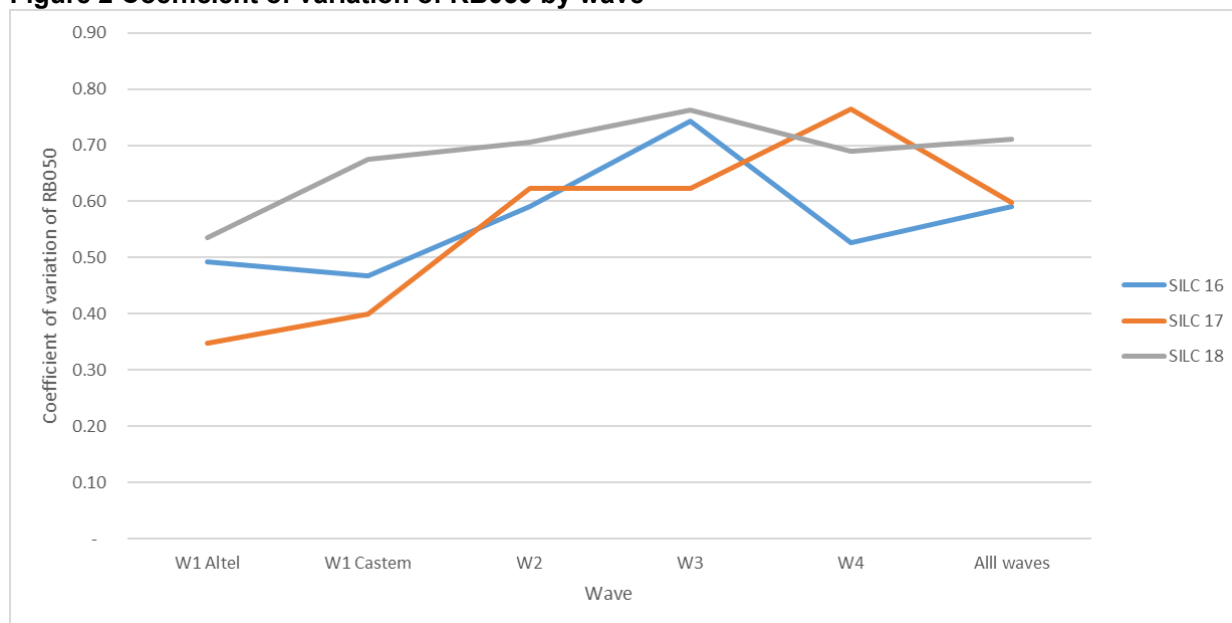
Figure 1 Mean RB050 weight by wave



³ Several effects are accumulated in the calculation of weights, the main one being correction for non-response, as well as the effect of final calibration.

Overall, the differences in variability between SILC 18 and 16-17, remain fairly limited (coefficient of variation of weight $CV = \text{std} / \text{mean}$, cf. figure 2). This means that the low response rates in 2018 had a moderate effect on the overall dispersion of weights. It cannot be excluded, however, that greater effects were felt by certain sub-groups.

Figure 2 Coefficient of variation of RB050 by wave



The evolvement of the RB050 min-max-median shows very few marked differences with the exception of waves 1 castem and altel for which the maximum (P100) changed greatly. This is especially damaging as the weight of wave 1 is the basis for calculating the weights of the subsequent waves (SILC 2019 ss.).

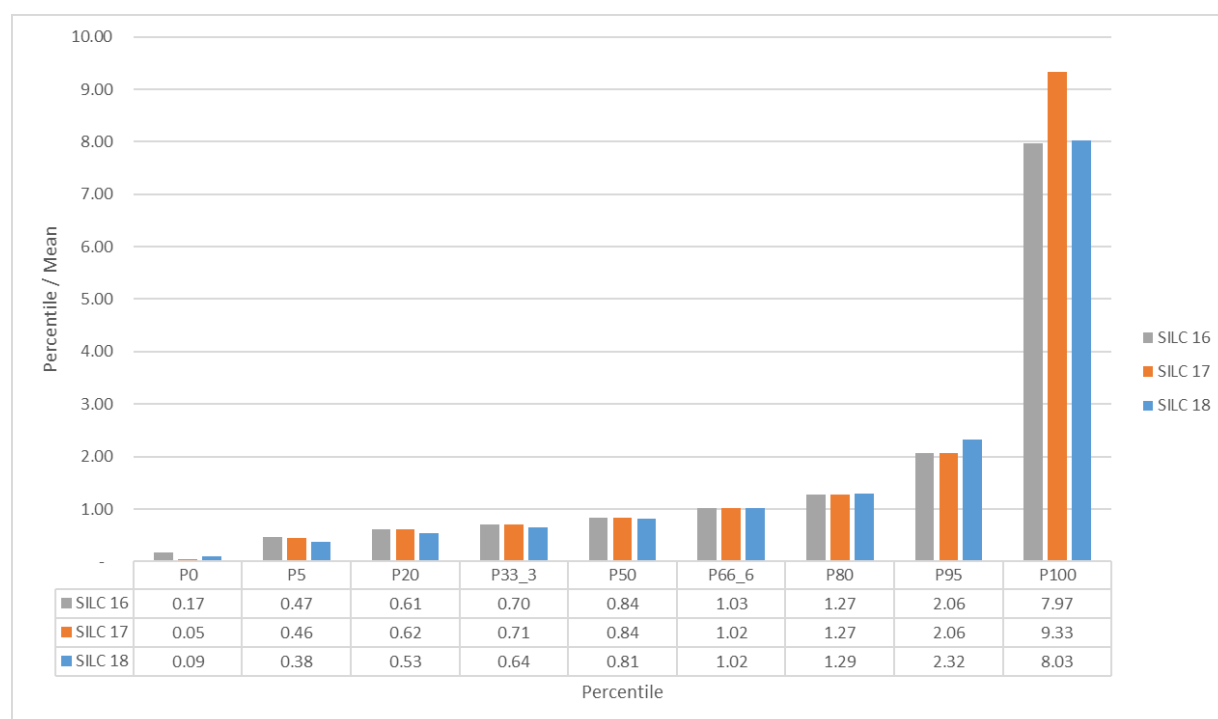
Table 6 Distribution of RB050 by year and by wave

		W1 Altel	W1 Castem	W2	W3	W4	All waves
Min	SILC 16	120	107	78	76	82	76
Min	SILC 17	177	89	57	21	67	21
Min	SILC 18	242	111	88	50	88	50
P50	SILC 16	635	376	390	349	381	385
P50	SILC 17	600	362	365	369	339	370
P50	SILC 18	718	427	435	430	443	443
Max	SILC 16	2532	1585	2973	3654	2097	3654
Max	SILC 17	1917	1826	2841	3149	4133	4133
Max	SILC 18	3321	4013	3857	4409	2892	4409

The maximal weights of waves 2 and 3 also increased but in a more moderate fashion.

A final aspect to be considered in the distribution of weights is the ratio between the different percentiles of weights and the mean weight. The graph below shows that there was no major change in this ratio from year to year.

Figure 3 Ratio between RB050 percentile and mean weight, all waves together

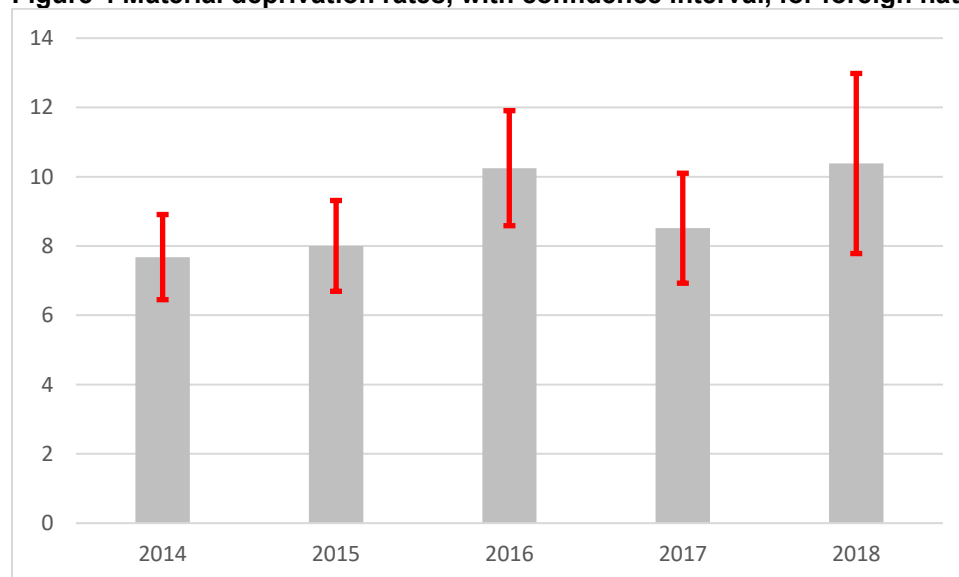


Impact on error margins

The increase in TNR in 2018 brought about a substantial increase in the error margins of estimates (confidence interval).

For estimations across the entire population, the confidence interval increased the risk of poverty by 30% and that of material deprivation by 47%. The growth in confidence intervals was even greater for estimates in sub-groups. For foreign nationals, for example, the confidence interval for the risk of poverty shot up by 42% and even 64% for material deprivation.

Figure 4 Material deprivation rates, with confidence interval, for foreign nationals since 2014



Longitudinal weightings

A few adjustments had to be made when calculating *poidinit* - the weight correcting for total non-response from the survey weight. In fact, the macro adjustment for non-response could not provide a solution as the TNR rate was too high. The rate of respondents to the grid had fallen from 61% for wave 1 in 2017 to 38% for that of 2018. The parameter of the response rate required by HRG (see annex 'Imputation') therefore had to be lowered from 50% to 33% so that the algorithm could converge.

3. Conclusion

The TNR requires an estimate of the probabilities of response to be taken into account in the weighting. The flawed nature of such estimates of response probability leads to a risk of bias. Generally speaking, the greater the TNR, the greater the influence of the flawed estimate of response probabilities on the results and the higher the risk of bias.

The change in 2018 of the survey institute responsible for conducting the SILC survey caused a sharp increase in TNR, rising from around 30% in 2017 to 50% in 2018, all waves considered together.

The measures taken to assess the quality of the correction model for non-response (concordance rates) were of the same order of magnitude as in previous years. It is worth bearing in mind, however, that this type of measure can indicate the number of concordance errors (poor prediction of response status), but not their extent nor the bias risk.

Following the sharp increase in TNR in 2018, a larger bias risk than previously, and problems of comparability with previous years, cannot be excluded, especially for estimates of particular, small sub-groups. However, analyses show that we can hope to correct for some of the TNR bias through weightings.