Methodology report

SILC longitudinal data

How should rotating panel data be used?

Contents

1 Introduction

The SILC survey (Statistics on Income and Living Conditions) is a survey on income and living conditions in households in Switzerland. Its aim is to examine poverty, social exclusion and living conditions. It is an annual survey that is coordinated at European level by Eurostat (the statistical authority of the European Union). In addition to European questions, some Swiss questions are also asked. Modules on particular subjects are integrated every year at the request of Eurostat or only due to Swiss initiative. The SILC survey is a rotating panel: its participants are interviewed over several consecutive years. This allows the portrayal of milestones in people's life trajectories and the study of trends in their living conditions.

This is not a presentation of the process. Detailed information on the methods used is available in the quality reports (www.silc.bfs.admin.ch → Documents on methodology). The aim is to present the use of rotating panel data in a longitudinal context.

2 Cross-sectional data

The selected households are interviewed over four years and new households are sampled and interviewed every year following the system described below.

For example, the 2016 SILC cross-sectional sample consists of roughly equal proportions of:
- Households selected in 2013 that are in their fourth and final interview year (wave 4)
- Households selected in 2014 that are in their third interview year (wave 3)
- Households selected in 2015 that are in their second interview year (wave 2)
- New households selected in 2016 that are in their first interview year (wave 1)

Figure 1 Structure of cross-sectional data, example for 2016

	2013	2014	2015	2016	2017	2018	2019
W1 2013	w1	w2	w3	w3			
W1 2014		w1	w2	w3	w4		
W1 2015			w1	w2	w3	w4	
W1 2016				w1	w2	w3	w4

3 Longitudinal data

The structure of the SILC sample in a rotating panel makes it possible to analyse the individual variables over several years. Analyses are made either of the transitions between previous years (T-1, T-2 and T-3) and the year of arrival (T, see Transitions between two years in 3.1),or over four years (see Monitoring over four years in 3.2).

Given the characteristics of a rotating panel, the number of observations that may be evaluated depends on the transition analysed. The longer the transition, the lower the number of observations available. This is for two reasons:
1) Firstly, the longer the transition period, the smaller the number of combinable sub-panels (shown in green in the graphs below);
2) Secondly, due to attrition: In an ideal scenario, everyone interviewed in the first year is also interviewed in the following three years. Unfortunately, this is not necessarily the case. There are three reasons for attrition, i.e. a decrease in the net sample size (sample of respondents) over the duration of a panel: people who have fallen off the radar (due to death, permanent departure abroad, admission to an institution), refusal to participate and people unable to be tracked down (contact impossible).

3.1 Transitions between two years

For transitions between two years, we select individuals that are in a responding household both in the year at the start of the transition period and the year of the end of the transition.

The first case concerns transitions with a gap of one year between the start and the end of the transition (transition over one year). Of approx. 17 000 people interviewed in 2016, 10 000 may be studied longitudinally over a transition period of one year (see figure 2).

Figure 2 Transition over one year

	2013	2014	2015	2016	2017	2018	2019
W1 2013	w1	w2	w3	w4			
W1 2014		w1	w2	w3	w4		
W1 2015			w1	w2	w3	w4	
W1 2016				w1	w2	w3	w4

In the analyses of a transition over two years (Fig. 3), around 7000 individuals are monitored longitudinally.

Figure 3 Transition over two years

	2013	2014	2015	2016	2017	2018	2019
W1 2013	w1	w2	w3	w4			
W1 2014		w1	w2	w3	w4		
W1 2015			w1	w2	w3	w4	
W1 2016				w1	w2	w3	w4

Analyses of a transition over three years (for example from 2013 to 2016, Fig. 4) are only done with individuals who took part in the first wave in 2013 and also responded in 2016. This represents around 3300 people.

Figure 4 Transition over three years

	2013	2014	2015	2016	2017	2018	2019
W1 2013	w1	w2	w3	w4			
W1 2014		w1	w2	w3	w4		
W1 2015			w1	w2	w3	w4	
W1 2016				w1	w2	w3	w4

The prerequisite for including a participant in the population studied is being interviewed in T and in T-2 for transitions over two years and in T and in T-3 for those over three years. Intermediary status (T-1 for example) is not taken into consideration. Therefore, a person who responded in 2014 and 2016 but not in 2015 would nonetheless still be included in the two-year transition of the 2016 longitudinal sample.

3.2 Monitoring over four years

Monitoring over four years such as for the analysis of the dynamics of poverty[1] is a special case. The prerequisite for inclusion in this sample is being in a respondent household in each of the four consecutive waves, unlike for the transitions over one, two or three years (Fig. 5).

Figure 5 Monitoring over four years

	2013	2014	2015	2016	2017	2018	2019
W1 2013	w1	w2	w3	w3			
W1 2014		w1	w2	w3	w4		
W1 2015			w1	w2	w3	w4	
W1 2016				w1	w2	w3	w4

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[1] See Federal Statistical Office (FSO) 2018: "Dynamics of poverty in Switzerland",
https://www.bfs.admin.ch/bfsstatic/dam/assets/4986633/master

Due to the various attrition elements described above, the number of persons that can be evaluated over a four-year monitoring period account not for a quarter of the sample but instead just under 20% (around 3000 people).

4 Weighting

Although the samples are representative of the population living in Switzerland, the same cannot be said for the people who actually respond to the. Certain types of households and persons are more willing to respond than others. For this reason, a weighting is calculated for cross-sectional and longitudinal data with the aim of correcting any bias associated with non-response and of providing a better representation of the population.

For longitudinal data, the three types of attrition described in chapter 3 are taken into consideration in the longitudinal weightings. For the three transition cases described in 3.1, weightings exist to correct any attrition. This weighting is estimated in order to represent the "starting" population (i.e. T-1, T-2 or T-3). Therefore, for the transition from 2015 to 2016, for example, the reference population is that from 2015 (population size as at 31.12.2014).

The weighting used for the longitudinal weighting over four years (see 3.2) is calculated in the same way as the transition weighting over three years.

5 Unit of analysis

For cross-sectional data, analyses on households and persons may be carried out. In contrast, no longitudinal analysis is possible at household level because households are not a stable observation unit over time (due to births, deaths, arrivals or departures from a household). Therefore, evaluations are only possible for persons unlike for cross-sectional data. However, longitudinal analyses may be carried out by household type.

Events or transitions taking place during the longitudinal monitoring may be analysed where the number of observations is sufficient.