



Labour Force Section, 23 May 2017

Revision of SLFS weighting from 2010 to 2016: integration of social insurance data in processing non-response and in the calibration process

Information:

Information service of the Employment and income section

Tel.: +41 463 64 00

email: info.arbeit@bfs.admin.ch

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1. Introduction

Until now, the weighting methods for the SLFS were always based on:

1. An estimate of the probabilities of inclusion to calculate the initial weights and
2. A calibration procedure of these initial weights to take account of the known demographic sizes of the reference population (sex, age, nationality, civil status, canton, etc.).

From the 2nd quarter 1991 to the 1st quarter 2014, the SLFS sample was drawn from landline telephone directories, except for the special sample of foreigners, which from 2003 was taken from the migration information system (SYMIC). Since the 2nd quarter 2014, the SLFS sample (including the sample of foreigners) has been drawn from the survey framework for individual and household surveys (SRPH). This frame is created from the data that has to be provided by the official registers of persons, such as the communal and cantonal population registers. It contains demographic data as well as AVS/AHV numbers (social security numbers). Due to the SLFS's rotation plan, we had to wait for the 3rd quarter 2015 for all four waves comprising the sample to come from the SRPH. From then on, we had at our disposal the AVS/AHV numbers of 100% of SLFS participants, enabling us to develop better weighting procedures.

Whereas the calculation of the initial weights remained fairly rudimentary for samples taken from telephone directories (the main information used was the size of household and the number of landline numbers in the household according to survey statements), the move to the SRPH had already enabled us to introduce a more elaborate model for the correction of non-response thanks to the matching of the gross sample with demographic statistics (STATPOP¹) (correction model for non-response in wave 1 from the 2nd quarter 2014, in waves 1 and 2 from 3rd quarter 2014, in waves 1, 2 and 3 from 2nd quarter 2015 and for all 4 waves from 3rd quarter 2015).

Since then, we have obtained complete copies of some of the social insurance registers. This has allowed us to further improve the correction models for non-response in calculating the initial weights as of 3rd quarter 2015. Prior to that quarter, a revision could not be carried out as we needed 100% of the AVS/AHV numbers in order to make corrections for non-response². However, we took advantage of the new data to establish additional calibration procedures from 1st quarter 2010 onward, which included new essential variables such as income from employment subject to AVS/AHV contributions or whether persons were registered or not at a regional job centre (ORP). These new calibrations could be made for the 2010-2015 period, as we already had approximately 95% of the AVS/AHV numbers of SLFS participants thanks to the SESAM project³. However, due to a lack of exhaustive individual data on the reference population (STATPOP), it was not possible to go back further than 2010.

Correction for non-response and calibrations generally allow variance and bias to be reduced. In principle, the greater the correlation between a variable of interest and a calibration variable, the greater the increase in accuracy. Statistical accuracy can thus be heightened with regard to labour market status (employed/unemployed based on ILO definition⁴/economically inactive persons).

¹ Population and Household statistics

² To make corrections for non-response, the registers have to be matched with the gross sample (including non-respondents). This could not be done with samples taken from telephone directories. We did not know who the non-responding telephone numbers belonged to and even basic characteristics such as age, sex and nationality were unknown.

³ SESAM data is created on the basis of SLFS data linked with information gathered from different social insurance registers (old age, survivors' and disability insurance (AVS/AHV, AI/IV, PC/EL and AC/ALV). Matching is done using the AVS/AHV number. Before the introduction of SRPH to SLFS, AVS/AHV numbers were attributed with the help of the Central Compensation Office on the basis of surnames, first names and date of birth.

⁴ International Labour Organisation

2. Basis

By matching, register information can be obtained for the survey's net sample. Matching can also be used to obtain the same information from registers for the calibration framework (STATPOP). Different numbers can be calculated on the basis of this framework by cross-referencing register variables with basic demographic variables (sex, age, nationality, etc.). The last step is to integrate these numbers as calibration margins. In this way, the correct number of registered job seekers by sex, age group, etc., can be obtained from weighted data. As around half of unemployed persons (based on ILO definition) are registered job seekers, improved statistical accuracy can be achieved for this specific status, even though it is based on a different definition.

Prior to calibration, the non-response process is completed with new variables drawn from social insurance registers.

3. Social insurance registers used

Register	Source	Description
Register of individual accounts (IA)	CCO ⁵	The register of individual accounts mainly records income and contribution periods for each person subject to AVS/AHV-AI/IA. It is used to calculate AVS/AHV-AI/IA pension when a request is submitted.
AVS/AHV-IA/AI pension register	CCO	This register keeps a record of AVS/AHV-AI/IA and assistance allowance recipients, as well as providing information on the benefits received.
Supplementary benefits	CCO	Data on recipients of benefits supplementary to AVS/AHV are collected on behalf of the FSIO ⁶ .
Information system on employment agencies and labour market statistics (PLASTA)	SECO ⁷	All job seekers who contact a regional placement office are recorded in PLASTA. Information on their professional career and non-financial benefits (e.g.: MMT ^{*8}) is recorded.
Computerised system for unemployment fund payments (SIPAC)	SECO	Job seekers receiving unemployment insurance benefits are recorded in SIPAC. Information is collected on all financial benefits, number of days benefits are received as well as on persons whose entitlement to unemployment benefits has ended.
Data from AVS/AHV funds matched with the business register (BUR-ACT project)	STATE NT ⁹	As part of the BUR-ACT project aimed at updating the Business and Enterprise Register (BER), data from the AVS/AHV funds are supplied directly to the FSO, where they are paired with the BER, thus gaining information with regard to businesses in particular on the legal form and economic activity.

⁵ Central Compensation Office

⁶ Federal Social Insurance Office

⁷ State Secretariat for Economic Affairs

⁸ *Labour market measures

⁹ Structural business statistics

4. Difficulties

4.1. *Difficulty with data availability*

The weighting of quarterly SLFS data has to be done in a short space of time (approx. 2 weeks after the end of the reference quarter). Data from the social insurance registers, however, are not ready at this stage for the reference period. Furthermore, data from the various registers are not all available at the same time. Whereas SECO data are available after a short space of time (3 months for reliable data on persons whose entitlement to unemployment benefits has ended), those from individual accounts take up to a year and a half (April 2+2).

These time lags are not a complete obstacle as far as the use of data for weighting SLFS results is concerned. Some of the information is very stable over time and a high level of correlation can be observed up to 1 or even 2 years later. Such is the case for the most interesting information drawn from the individual accounts. Statistical accuracy can therefore still be increased by calibrating data from a different reference period.

4.2. *Persons for whom no AVS/AHV number has been found*

In order to match survey data with data from social insurance registers, AVS/AHV numbers must be available. But prior to the 3rd quarter 2015, the AVS/AHV numbers of respondents to waves 1 to 4 were not comprehensively available. On the basis of information collected during the survey (surname, first name and date of birth), the AVS/AHV numbers were allocated to all target persons where possible.

Using information collected during the survey, we created proxy variables for the auxiliary variables contained in the framework for persons with no AVS/AHV number. However, we were unable to assign values by means of proxy for certain variables. This means that none of the information collected during the survey allows us to make a more or less reliable estimate of people receiving supplementary benefits (AVS/AHV/AI) or of persons whose entitlement to unemployment benefits has come to an end. In any case, the number of persons with no AVS/AHV number is small and numbers of these groups in the overall population are very low. The level of correspondence between the values obtained via proxy and those from registers is relatively high for all the other variables.

5. Creating calibration frameworks

The creation of breakdowns for the calibration framework is done by matching the most recent register data with STATPOP data from the start of the quarter (which is the same as STATPOP at the end of the previous quarter¹⁰). Certain people who have recently immigrated to Switzerland and who are included in STATPOP were not yet present at the time of reference for the register data; they should be considered as a separate group in the periphery of the calibration. Furthermore, part of the population covered by register data does not belong or no longer belongs to the permanent resident population at the moment that STATPOP is taken into consideration. Most of the variables can be recreated using the activity “Social protection and the labour market”, more usually known by its acronym SESAM.

Illustration of the creation of the calibration framework for 3rd quarter 2015

Most recent register data		Most recent STATPOP		Calibration framework
Cfw 12.2013 Employee Self-employed Without gainful	matched with	STATPOP 06.2015 Emigrations Deaths Other exits Non-permanent residents Einwanderung	=	After matching ci_typact_2 01. Employee 02. Self-employed or employee and self-employed -10. Not concerned -11. Not yet present in the reference population
Cfw 12.2014 Supplementary benefits (AHV/IV) No supplementary benefits (AHV/IV)	matched with	STATPOP 06.2015 Emigrations Deaths Other exits Non-permanent residents Immigrations	=	After matching el_typepc 01. Supplementary benefits AHV 02. Supplementary benefits IV -99. Not yet present in the
SECO July 2015 Registered unemployed Non-unemployed job-seekers Not registered at an RPO	matched with	STATPOP 06.2015 Non-permanent residents	=	After matching p_statorp_2 1. Registered unemployed 2. Other non-unemployed job-seekers -10. Not concerned

¹⁰ The foreign population is adjusted to the quarterly average by extrapolating STATPOP with trends from ZEMIS.

6. Dealing with non-response

From 3rd quarter 2015, we have used social insurance data to deal with non-response. The auxiliary variables used are detailed under point 7 of this document. The non-response mechanism can be broken down into an initial non-response to the first interview, followed by an erosion over subsequent waves. The probabilities of initial non-response or erosion are assumed to be uniform within homogeneous response groups. Homogeneous response groups are created by applying a segmentation algorithm to the gross sample of persons requested or re-requested to participate in the wave under consideration. For initial non-response, the “candidate” auxiliary variables for segmentation are drawn from different registers. For erosion, we have additional auxiliary variables, since we can use certain survey variables from the previous wave, such as education or labour market status.

7. List of new variables used for calibration and non-response.

Name	Description	Source	Content:	Reference pe- riod and availa- bility at time of weighting	Variable used for:		the calibration, broken down by: the ventilations are not cross- referenced				
					calibration	non-response	canton	sex	age group	Origin (CH/FO)	NUTS2
Cltypact1	Status of AVS 1 con- tributor	CCO, individual accounts	-99=Not yet present in the reference population or not concerned 2=employed person	T-2 (for 1st quarter: T-3)	X	X	X				
Cltypact2	Status of AVS 2 con- tributor	CCO, individual accounts	1=employee 2=Self employed or employee and self-employed -10=Not concerned -11=Not yet present in the reference population or not concerned	T-2 (for 1st quarter: T-3)	X	X		X	X	X	
Clnact	Number of jobs sub- ject to AVS contribu- tion	CCO, individual accounts	1=1 gainful employment 2=2 gainful employments and more -10=Not concerned -11=Not yet present in the reference population or not concerned	T-2 (for 1st quarter: T-3)	X	X		X		X	
CIRMDEC	Income subject to AVS contribution (deciles)	CCO, individual accounts	1=1st decile of income subject to AVS contribution 2=2nd decile of income subject to AVS contribution 3=3rd decile of income subject to AVS contribution 4=4th decile of income subject to AVS contribution 5=5th decile of income subject to AVS contribution 6=6th decile of income subject to AVS contribution 7=7th decile of income subject to AVS contribution 8=8th decile of income subject to AVS contribution 9=9th decile of income subject to AVS contribution 10=10th decile of income subject to AVS contribution -10=Not concerned -11=Not yet present in the reference population or not concerned	T-2 (for 1st quarter: T-3)	X	X		X		X	
RRpinv	Disability pension - degree of disability	CCO - AVS/AHV- IA/AI pension register	-99=Not yet present in the reference population or not concerned 1=Up to 100% disability	T-1 (for 1st quarter: T-2)	X	X		X		X	

Name	Description	Source	Content:	Reference pe- riod and avail- ability at time of weighting	Variable used for:		the calibration, broken down by: the ventilations are not cross- referenced				
					calibration	non-response	canton	sex	age group	Origin (CH/FO)	NUTS2
ELtypepc	Type of supplemen- tary benefit	CCO - Supple- mentary bene- fits	-99=Not yet present in the reference population or not concerned 1=Receives AVS 2=Receives AI	T-1 (for 1st quarter: T-2)	X	X		X			
Pstatorp1	Statut ORP 1	SECO - PLASTA	2=Registered unemployed and non-unemployed job seekers -10=Not concerned	1st month of quarter consid- ered	X	X		X	X	X	X
Pstatorp2	Statut ORP 2	SECO - PLASTA	1=Registered unemployed 2=Other non-employed job seeker -10=Not concerned	1st month of quarter consid- ered	X	X					
	Time elapsed since last ORP registration	SECO - PLASTA	1=less than 12 months 2=12 to less than 24 months 3=24 to less than 5 years -10=Not concerned	1st month of quarter consid- ered	X	X		X		X	
	Time elapsed since last end of entitle- ment	SECO - SIPAC	1=Less than 5 years -10=Not concerned	1st month of quarter consid- ered	X	X		X		X	

Name	Description	Source	Content:	Reference pe- riod and availa- bility at time of weighting	Variable used for:		the calibration, broken down by:				
					calibration	non-response	the ventilations are not cross- referenced				
							canton	sex	age group	Origin (CH/FO)	NUTS2
NG08	Economic activity (NOGA) of enterprise	STATENT	-11=Not yet present in the reference population or not concerned -10=Not concerned Agriculture, forestry and fishing B=B/C/D/E. Mining and quarrying/manufacturing industry/product. And distrib.electricity/product.and distr.water;disposal F=F. Construction G=G. Wholesale and retail trade; repair of motor vehicles and motorcy- cles H=H. Transportation and storage I=I. Accommodation and food service activities J =J. Information and communication K=K. Financial and insurance activities L=L+N. Real estate activities + administrative and support service activi- ties M=M. Professional, scientific and technical activities O=O/U. Public administration/extraterritorial activities P =P. Teaching Q=Q. Human health and social work activities R=R/S/T.	T-2 (for 1st quarter: T-3)	X	X		X		X	
	Legal form of enter- prise	STATENT	-10=Not concerned -11=Not yet present in the reference population or not concerned 01= self-employed manager 02=Companies (employed manager) 03=Public enterprises 04=Public administration 99=Not attributed	T-2 (for 1st quarter: T-3)	X	X					

Name	Description	Source	Content:	Reference period and availability at time of weighting	Variable used for:		the calibration, broken down by:				
					calibration	non-response	the ventilations are not cross-referenced				
							canton	sex	age group	Origin (CH/FO)	NUTS2
Typo_men	Composition of private households: simple classifications with age groups 0-17/18 and more (permanent resident population or main residence)	STATPOP	101=single adult male 102=single adult female 110=Two adults of different sex 111=Two adults of same sex 120=Three or more adults 201=A minor person 202=Two minor person 210=Single adult male with minor(s) 211=Single adult female with minor(s) 220=Two adults of different sex with minor(s) 221=Two adults of same sex with minor(s) 230=Three or more adults with minor(s) 8=Not applicable	Last month of quarter before quarter considered		X					
Hhsize	Size of household	STATPOP	1=1. 1-person household 2=2. 2-person household 3=3. 3-4-person household 4=4. 5-Person household and more	Last month of quarter before quarter considered		X					
gkats	Type of dwelling	STATPOP (GWS)	1021=Single-family house 1025=Multi-family house 1020=Residential buildings with ancillary use 1040=Buildings with partial residential use -99=Not available	Last month of quarter before quarter considered		X					
taille_silc	Size of dwelling	STATPOP (GWS)	1=Less than 20m2 per person 2=20m2 and more per person -99=Not available	Last month of quarter before quarter considered		X					

8. Results

A comparison of results from the old and the new methods on a selection of standard tables, as well as the coefficients of respective variations lead to the following observations:

- The new method has a definite impact on the SLFS results.
- Apart from a few exceptions (results based on a very small number of observations), all of the variation coefficients are improved, some considerably more than others.

Tab. 1: Impact of the SLFS revision on the 1st quarter 2010 and on the 4th quarter 2016: employed persons

1st quarter 2010 (average)			4th quarter 2016 (average)						Improvement (-) or deterioration (+) in CV due to revision
Headcount in thousands			Headcount in thousands				% change between 1st quarter 2010 and 4th quarter 2016		
not revised	revised		not revised	CV ¹⁾	revised	CV ¹⁾	not revised	revised	
4228	4158	TOTAL	4712	0.34	4652	0.30	11.4	11.9	-11.3
3298	3252	Swiss nationals	3523	0.39	3475	0.35	6.8	6.8	-9.8
930	906	Foreign nationals	1189	0.69	1177	0.59	27.8	29.9	-14.3
		of whom:							
657	631	UE-28 + EFTA	862	0.76	851	0.66	31.3	34.8	-13.6
273	274	third party states	326	1.59	326	1.69	19.4	18.8	6.3
565	569	15-24 year-olds	589	1.19	591	1.15	4.2	4.0	-3.1
1336	1325	25-39 year-olds	1511	0.51	1498	0.49	13.1	13.0	-4.0
1580	1536	40-54 year-olds	1653	0.45	1626	0.42	4.6	5.9	-8.0
635	618	55-64 year-olds	775	0.92	752	0.76	22.1	21.7	-17.0
112	110	65+ year-olds	184	3.39	185	3.23	63.9	67.5	-4.9
592	586	Self-employed	565	2.18	594	1.78	-4.6	1.4	-18.6
82	82	Family workers	82	5.99	86	6.18	0.2	4.9	3.2
3327	3264	Employees	3846	0.47	3752	0.40	15.6	14.9	-13.8
228	226	Apprentices	219	2.78	220	2.73	-3.9	-2.6	-1.8
2787	2747	Persons in full-time employment	3003	0.63	2955	0.56	7.8	7.6	-11.0
1441	1411	Persons in part-time employment	1709	1.06	1696	0.98	18.6	20.2	-7.4
		of whom:							
280	276	under-employed	335	2.85	344	2.70	19.6	24.6	-5.2
1161	1135	not under-employed	1374	1.24	1352	1.18	18.3	19.1	-5.3
2287	2248	MEN	2519	0.42	2491	0.37	10.2	10.8	-12.7
292	291	15-24 year-olds	304	1.66	306	1.57	4.1	5.3	-5.3
719	712	25-39 year-olds	798	0.57	790	0.53	11.0	11.0	-7.7
850	832	40-54 year-olds	886	0.48	873	0.43	4.2	5.0	-10.6
357	347	55-64 year-olds	418	1.17	407	0.97	17.1	17.5	-16.8
69	67	65+ year-olds	114	4.24	114	3.92	64.7	71.3	-7.6
1975	1945	Persons in full-time employment	2089	0.63	2063	0.54	5.8	6.1	-14.6
312	303	Persons in part-time employment	430	2.58	428	2.34	38.0	41.3	-9.2
		of whom:							
69	65	under-employed	93	5.78	95	5.27	35.4	46.8	-8.8
243	238	not under-employed	337	2.98	332	2.74	38.7	39.7	-8.1
1942	1910	WOMEN	2193	0.53	2161	0.48	12.9	13.1	-10.9
273	278	15-24 year-olds	285	1.67	285	1.65	4.2	2.6	-1.4
617	613	25-39 year-olds	713	0.87	707	0.85	15.5	15.4	-2.8
730	704	40-54 year-olds	767	0.79	753	0.73	5.1	6.9	-7.6
278	272	55-64 year-olds	357	1.45	345	1.19	28.4	27.0	-17.8
43	44	65+ year-olds	70	5.57	71	5.54	62.6	61.8	-0.5
812	802	Persons in full-time employment	914	1.46	892	1.34	12.5	11.3	-8.1
1129	1108	Persons in part-time employment	1279	1.11	1269	1.03	13.2	14.4	-7.1
		of whom:							
212	212	under-employed	243	3.25	249	3.10	14.5	17.7	-4.5
918	897	not under-employed	1036	1.33	1020	1.27	12.9	13.7	-4.5

¹⁾ Coefficient of variation

Tab. 2: Impact of the SLFS revision on the 1st quarter 2010 and on the 4th quarter 2016: unemployment rate (ILO definition)

1st quarter 2010 (average)			4th quarter 2016 (average)						
Percentage			Percentage				% change between 1st quarter 2010 and 4th quarter 2016		Improvement (-) or deterioration (+) in CV due to revision
not revised	revised		not revised	CV ¹⁾	revised	CV ¹⁾	not revised	revised	as %
5.1	5.4	TOTAL	4.3	3.68	4.6	3.12	-15.3	-14.8	-15.0
5.0	5.4	Men	4.1	5.17	4.4	4.09	-18.0	-18.0	-20.9
5.3	5.4	Women	4.6	5.26	4.8	4.81	-12.4	-11.1	-8.5
3.5	3.9	Swiss nationals	2.9	5.48	3.3	4.53	-16.7	-16.0	-17.4
10.4	10.3	Foreign nationals	8.3	4.90	8.3	4.31	-20.3	-20.1	-11.9
		<i>of whom:</i>							
7.0	7.4	UE-28 + EFTA	6.1	7.07	6.2	5.80	-11.6	-15.9	-18.0
17.8	16.4	third party states	13.6	6.72	13.1	7.42	-23.7	-19.8	10.5
9.1	9.5	15-24 year-olds	7.5	7.41	7.8	6.85	-17.6	-18.7	-7.6
5.0	5.2	25-49 year-olds	4.3	5.17	4.7	4.35	-14.5	-10.3	-15.9
3.7	4.0	50-64 year-olds	3.6	7.54	3.6	6.57	-3.7	-9.9	-12.8
8.3	8.7	Without post-compulsory education	8.8	6.61	8.5	6.48	6.9	-2.3	-1.8
5.4	5.6	Upper secondary level	4.2	5.69	4.6	4.89	-21.8	-18.5	-14.1
3.1	3.2	Tertiary level	2.9	7.21	3.1	7.14	-6.2	-2.6	-0.9
1) Coefficient of variation									

9. Consequences

The revision of the SLFS weighting entails the reproduction of all data from 2010 to 2016, the revision of all tables and the recalculation of all synthesis statistics based on the survey, i.e.:

- The Employment Statistics (ES)
- The Work Volume Statistics (WV):
- The statistics of normal working hours in enterprises (NWT)
- The labour market global accounts
- The unemployment statistics based on ILO definition

A break in the series exists between 2009 and 2010 but this new method cannot be applied to the years before 2010. However, the new results calculated back until 2010 already allow us to present a series of 7 years.