



Transitionen von der Erstausbildung ins Erwerbsleben
Transitions de l'Ecole à l'Emploi
Transitions from Education to Employment



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CONSTRUCTION OF STANDARDISED VARIABLES ON INCOME FROM GAINFUL OCCUPATION FOR THE TREE_i COHORT

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Abstract

This paper documents the construction of composite variables on income from gainful occupation (salaries from employment and earnings from self-employment) pertaining to the respondents of the TREE (Transitions from Education to Employment) panel survey's first cohort (TREE1). The paper describes the data and the assumptions that underlie the construction of the composite variables. Its objective is to provide TREE data users with ready-to-use information on respondents' income from gainful occupation that are consistent, methodologically "state of the art" and comparable across survey waves. The variables will be included in the next TREE1 data release, which is scheduled for 2023. Until then, the new salary composite variables are available to data users upon request.¹ The Stata code used to generate the variables is included in this paper as an appendix.

Keywords

Salary, wages, earnings, income, TREE, Switzerland, panel study

¹ Mailto: tree.soz@unibe.ch. Please note that in order to obtain the data, users will need to have signed a data user agreement pertaining to the main TREE1 dataset (<https://www.swissubase.ch/en/catalogue/studies/12476/18017/datasets/816/1521/overview>).

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1. Objective

This documentation describes the construction of composite salary² variables for the first cohort of the TREE survey (TREEI, Transitions from Education to Employment; see Gomensoro & Meyer, 2017; TREE, 2016) collected from the third (t3/2003) to the ninth (t9/2014) survey wave. The TREEI dataset includes highly detailed information on salaries for main or multiple gainful activities. To date, however, the dataset lacks composite salary variables that are ready to use and comparable across survey waves (from t3/2003 to t9/2014). It was therefore left to users, for instance, to convert hourly wages to monthly salaries or net to gross earnings (and vice versa), or to aggregate salaries from multiple jobs. On the one hand, this was highly inefficient as every user had to develop his or her own procedures to this end. On the other hand, this led to the development of divergent practices, calculation methods and estimations. In order to facilitate those preparation steps we propose different composite variables that are comparable across survey waves. This paper describes how we constructed the composite variables and documents the assumptions that underlie our methodology. Our method is largely in line with methodological approaches in other national and international studies collecting data on income from gainful occupation (FSO, 2021; Kuhn, 2010, 2019). The composite variables will be included in the next TREEI data release, which is scheduled to be published in 2023. Until then, they are available to TREE data users on request.³ The Stata code we used for the construction of the composite variables is included in Appendix 6.

In Section 2, we describe the salary composite variables and the primary variables from TREEI that we use in the calculation of it. We then explain how we constructed those composite variables (Section 3), including the data preparation (3.1), the construction of composite variables comparable across survey waves (3.2), of variables that account for all available salary information in the 9th survey wave (3.4), and the conversion from net to gross salaries (3.3). Section 4 concludes with some remarks to data users.

2. Salary data in TREEI

The TREE survey and its instruments have evolved over the course of the survey waves and as respondents' life courses have progressed. For example, the volume and accuracy of data on occupational activities and salaries increased over time, which is related to the growing importance of occupational activities once a significant proportion of respondents have acquired post-compulsory education and start entering working life around three to four years after the end of compulsory school. The expansion of data on salaries is also related to important changes in survey modes. Salaries were surveyed from t3 (2003) onward, i.e., three years after the end of compulsory education, when a relevant share of respondents began to enter the labour market.

² We define salary as the monetary earnings from employed or self-employed/independent gainful activities.

³ Mailto: tree.soz@unibe.ch. Please note that in order to obtain the data, users will need to have signed a data user agreement pertaining to the main TREEI dataset (<https://www.swissubase.ch/en/catalogue/studies/12476/t8017/datasets/816/1521/overview>).

Up to survey wave t_4 (2004), the primary survey mode was a written questionnaire. As of t_5 (2005), the survey adopted a mixed mode design with a CATI part followed by a self-completed complementary questionnaire (see TREE, 2016i; Gomensoro & Meyer, 2017). These changes with regard to survey modes and instrument design allowed for a more detailed collection of data on salaries. For respondents gainfully employed (including self-employment) at the time of the survey, the complementary questionnaire included detailed questions on the main occupational activity and salaries. As of survey wave t_9 (2014), the collection of data on earnings was transferred from the complementary questionnaire to the CATI part and, at the same time, extended such that all gainful occupational activities which respondents reported at the moment of the survey are covered. These changes in design and instrumentation affect the type and degree of detail of earnings data available in progressing panel waves and have implications on the number of valid observations.

Appendix I provides an overview of the available data on income earned from gainful occupation (including self-employment). From the third to the fifth survey waves, salary of the main gainful occupation was surveyed as hourly wage (*sala1*) or monthly earnings (*sala2*), in some cases within an open text question (*sala3*). From panel wave six to eight, data on 13th monthly salaries has been additionally collected (*sala5*; *sala6*). As of the ninth survey wave, TREE added the possibility to report yearly earnings (*sala7*), to specify other types of income from gainful occupation such as bonus, share of profits or similar benefits (*sala8*) and to enter salary in foreign currencies (*sala11*; *foreign_currency*). Furthermore, salaries at t_9 have been collected for *all* gainful occupations held by a given respondent.⁴ Finally, the list of variables of interest includes the weekly hours of work (*jobh*; *jobhbmin*; *jobhbmax*) and the terms of employment (*jobs*) in order to distinguish between employment and self-employment.

Detailed salary data are crucial for researchers, but preparing them can be challenging and time-consuming. TREE allows respondents to report their salaries in several “formats” (hourly, monthly, yearly; gross or net, etc.), which is known to increase data quality, as no conversion calculations need to be performed during the interview. In order to simplify and standardise these various formats, we propose two sets of monthly salary composite variables (see Table 1). The first set contains variables that are comparable across waves and based on the main gainful occupation (salary: *t3sala_comp* to *t9sala_comp*; full-time equivalent salary: *t3sala_fte_comp* to *t9sala_fte_comp*). The second set includes composite variables (salary: *t9sala_all_comp*; full-time equivalent salary: *t9sala_fte_all_comp*) based on aggregate data of all gainful occupations at $t_9/2014$.⁵ In the variable names, “*t3*”, “*t4*”...”*t9*” refer to the survey wave, “*sala*” to salary, “*fte*” to full time equivalent, “*all*” to all gainful activities and “*comp*” to composite. Both sets of monthly salary composite variables correspond to gross salaries (including social insurance contributions).

⁴ The composite salary can thus be calculated on the basis of the actual compensation a respondent claims to have received (which may differ from the the salary specified in the contract or from administrative salary data; FSO 2021).

⁵ Including information on 13th month salary and special payments such as bonus, overtime pay, etc.

All the composite variables have to be considered as estimations implying certain approximations that are also found in other data sources. The variables for the analysis of salaries are constructed from self-reported data at the time of data collection (it is not from administrative income registers) and are therefore not necessarily representative of the average monthly wage during the entire year. Moreover, the ratio between net and gross wages is also subject to an element of approximation, as social insurance contribution rates vary across cantons, age groups and companies in Switzerland. The composite variables refer to monthly gross earnings, as this implies fewer conversions and thus fewer approximations (72% of salaries have been reported as gross salaries, 83% have been reported as monthly salaries). In t9/2014, 89% of the respondents for which we have data on salary pursued only one gainful activity, while 11% reported several.⁶

Table 1: Salary composite variables

Variable name	label	Scale/classification
Salary based on main job (comparable across survey waves)		
t3sala_comp – t9sala_comp	t3 – t9 monthly salary (main gainful activity; gross; Swiss Francs)	Swiss Francs per month
t3sala_fte_comp – t9sala_fte_comp	t3 – t9 monthly full-time equivalent salary (main gainful activity; gross; Swiss Francs)	Swiss Francs per month
Salary based on all jobs (not comparable with previous survey waves)		
t9sala_all_comp	t9 monthly salary (all gainful activities; gross; Swiss Francs)	Swiss Francs per month
t9sala_all_fte_comp	t9 monthly full-time equivalent salary (all gainful activities; gross; Swiss Francs)	Swiss Francs per month

3. Construction of standardised composite salary variables

In this chapter, we summarise the main steps of the construction of the TREEI salary composite variables. The Stata code used to calculate the variables is documented in Appendix 6.

3.1. Data preparation: plausibility checks and corrections

The first step of the construction of the composite variables consists in data preparation and plausibility checks. Firstly, we replace some missing salary values with open text data (*t3-t8sala3*) that is presently not published in the data release. For instance, some respondents mentioned their yearly salary in open text, and we transform it into monthly salary (that means replace missing values in *t3-t8sala2*).⁷ Secondly, we run some plausibility checks and we correct some inconsistencies within the data. As in all quantitative surveys, respondents may report unrealistic salary values or errors may occur when filling out the questionnaire (for instance entering the hourly instead of the monthly salary or entering a zero too many or too few in the reported amount). Our aim here is to identify unrealistic amounts, whether they are unreasonably high (monthly > 10,000 CHF; hourly > 120 CHF) or unreasonably low (monthly > 2,000 CHF; hourly > 10 CHF). In those cases, we evaluate if some extreme salaries are plausible by comparing

⁶ There is no technical limitation as to the number of simultaneous gainful occupations reported/collected. The maximum number reported in t9 was five.

⁷ In total, we replaced 8 missing values in t4, 2 in t5, 76 in t6, 63 in t7 and 119 in t8.

with profession, occupation rate, financial situation of the respondent, salaries in other survey waves (etc.) and, in the event, replace it by missing values (or recode it on rare occasions). Thirdly, in some cases (95 observations across all survey waves) we dispose of both hourly and monthly salary data for the same job. In those cases, we prioritize the monthly salary data, as the composite salary variables are in monthly format. Finally, we recode the number of working hours per week in $t9$ ($t9jobh$), if it varies or in case of missing values, by the average between the minimum ($t9jobhbmin$) and the maximum ($t9jobhbmax$) estimated amount of working hours (see Appendix 1).

3.2. Construction of longitudinal composite variables

In order to ensure longitudinal comparability, we construct composite variables ($t3sala_comp - t9sala_comp$) exclusively by drawing on variables that are available in all survey waves. First, we consider available data in monthly format ($salaz$) that does not require conversion (except in case of reported net salaries). If salaries are not reported in monthly format, we compute them based on hourly wages, which we multiply by the number of working hours per month. Working hours per month are obtained by multiplying working hours per week ($jobh$; capped at 42 hours) with the average number of weeks per month (52 weeks divided by 12 months = 4.33 weeks per month). Although the Swiss Employment Act allows for weekly working hours exceeding 42 (particularly in some economic sectors such as health, agriculture and military), the average for a full-time position is close to 42 hours (FSO 2021, p. 18; FSO 2022). This is why we cap weekly working hours at 42 (even if respondents report more). We then convert net salaries into gross salaries (see Section 3.3) in order to obtain monthly salaries from $t3/2003$ to $t9/2014$. The full-time equivalent longitudinal composite variables ($t3sala_fte_comp - t9sala_fte_comp$) are calculated based on previous salary values. Salaries are simply divided by the working rate: the ratio between the number of hours actually worked ($jobh$)⁸ and the number of hours of full-time work (42 hours per week).

3.3. Conversion from net to gross salaries

Respondents are free to report net or gross salaries. The gross salary corresponds to earnings without any deduction of social security contributions. The net salary is obtained by subtracting the social security contributions from the gross salary. Note that in Switzerland, health insurance and taxes have to be paid after receiving the net salary.⁹ For many analyses, the net salary, or even the disposable salary that accounts for taxes and health insurance cost, are more relevant and reflect socio-economic status and available resources more adequately. However, any conversion between net and gross salary is only approximate, as social security contributions vary by

⁸ Capped at 42 hours per week.

⁹ Taxes are directly deducted from the salary for foreign residents (with the exception of those with a long-term settlement permit C). For Swiss residents and foreign residents with a C permit, taxes are not deducted on the pay slip as social insurance contributions are.

age, status (employee or self-employed), annual income, company and canton. In addition, taxes and health insurance cost are difficult to estimate in Switzerland (Kuhn, 2019).

The Swiss social security system is composed of three pillars (see Appendix 2). Employees must contribute to the first and second pillars. Self-employed individuals must contribute only to part of the first pillar, which leads to higher social contribution rates for employees. Consequently, we are setting up two conversion systems to compute gross monthly salaries that account for mandatory contributions. We therefore do not take into account a possible contribution to the second pillar for self-employed persons and to the third pillar (for all cases), as such contributions are not mandatory.

Conversion of salaries from dependent employment

When converting net to gross salary from dependent employment, we apply an average social security contribution rate that takes into account all contributions from first and second pillars of 9.4% (age group 18-24 years old) from t3/2003 to t7/2007 and of 12.2% (age group 25-34 years old) from t8/2010 to t9/2014. Note that the rate increases substantially from one age group to the next, as the first pillar becomes mandatory at the age of 20. We convert from net to gross monthly salary with the following formulas:

$$t3sala_comp = t3_monthly_salary / (1 - 9.4\%)$$

...

$$t7sala_comp = t7_monthly_salary / (1 - 9.4\%)$$

$$t8sala_comp = t8_monthly_salary / (1 - 12.2\%)$$

$$t9sala_comp = t9_monthly_salary / (1 - 12.2\%)$$

In order to accurately convert net to gross salaries, overall contribution rates by age class (18-24 and 24-35 years old) are used (BFS, 2010). Those rates are calculated based on the 2008 Swiss Earnings Structure Survey (ESS) data.¹⁰ Presently, there is no more accurate information on social contribution rates in Switzerland. We decided not to distinguish rates by economic sectors (as it is done, e.g., in the Swiss Labour Force Survey), as this complicates calculations substantially and as the contribution rates are not available for all economic sectors. When comparing calculations with and without accounting for economic sectors, we noticed that differences by age class are more substantial than differences by economic sector. We also tested other conversion strategies (based on Bertschy et al., 2014 or Combet & Oesch, 2019). This has led to less accurate (i.e. accounting only for the first pillar underestimates salaries if reported in net format) or similar results (i.e. considering a fixed rate may be arbitrary and does not account for the increase of the contribution rate by age).

¹⁰ The ESS surveys public and private companies in Switzerland, among other things, on salaries and social security contributions of their employees. The sample covers about one third of all Swiss employees.

Conversion of salaries from self-employment

For self-employment, we only account for the insurance for old age or widowhood (AHV/AVS), the disability insurance (IV/AI) and the income compensation allowance (EO/APG), as those are the mandatory contributions. The contribution rate is at a maximum of 9.5% for t3/2003 to t8/2010 and of 9.7% for t9/2014. Lower contribution rates based on degressive scales are applied in case of low salaries (see Appendix 4 and Appendix 5). If the salary is below the minimum threshold and therefore not subject to contributions, a minimum deduction must be paid. This means that the higher the annual salary, the higher the social security contribution rate until the maximum rate is reached.

Degressive scales (see Appendix 5) indicate yearly and gross salary ranges and allow the conversion of gross to net annual salary. However, we want to convert net to gross monthly salaries. Net monthly salary ranges are thus calculated from the gross yearly amounts by applying the contribution rate to convert gross to net salaries and by dividing those net amounts by twelve months (see Appendix 4). In doing so, the problem is that the thresholds overlap between salary intervals. To address this problem, we decided that the net income reference thresholds would be the averages of the two net salaries in between, following closely the method applied in the Swiss Labour Force Survey (FSO, 2010). For instance, someone who earned 56,199 CHF in 2014 paid 9.2% of social security contribution and has a net salary of 51,028 CHF (= 56,199 * [1 - 9.2%]). Contrariwise, someone who earned one extra Franc (56,200 CHF), paid 9.7% of social security contribution and thus has a lower net salary of 50,749 CHF (= 56,200 * [1 - 9.7%]). The threshold between 9.2% and 9.7% in 2014 is thus calculated as follows: $([51,028 + 50,749]/2)/12 = 4241$. Based on this, the following formula is used to convert net to gross earnings from self-employment with adequate monthly conversion rates (see Appendix 4). In cases where the salary is below the first threshold, we add the minimum amount to the net monthly salary.

$$t3sala_comp = t3_monthly_salary / (1 - conversion_rate)$$

...

$$t9sala_comp = t9_monthly_salary / (1 - conversion_rate)$$

3.4. Aggregation of salaries from all gainful activities in t9/2014

In addition to salary variables that are comparable across survey waves, we constructed two variables (*t9sala_all_comp* and *t9sala_fte_all_comp*) that account for all available salary data and all gainful activities in t9 (see Table 1) in order to have the most complete measure. In case of multiple jobs, the following steps are carried out independently for each job before aggregating all the salaries. First, we consider salaries reported in monthly or hourly formats, as we have done for the longitudinal composite variables (see part 3.2). If the salary is reported in yearly format (*t9sala11*), we convert it into a monthly format by dividing it by 12. If respondents report salaries in foreign currencies (*t9foreign_currency*), we convert them by applying the exchange rate in spring 2014. Second, if mentioned, we add a 1/12 of the 13th salaries (*t9sala5* and *t9sala6*) to the salary composite variable. Third, we consider additional benefits beyond the regular salaries (bonuses etc.; *t9sala8*) by adding them fully if reported monthly (*t9salaz2*) or one-twelfth of them if reported annually (*t9salaz7*).¹¹ Third, we convert salaries of each job from net to gross (if reported net) by applying the procedure described in Section 3.3. Finally, we aggregate the gross salaries from all gainful activities (if more than one) to obtain the salary estimation (*t9sala_all_comp*). In order to obtain the full-time equivalent salary (*t9sala_all_fte_comp*), we apply the same calculation as before, i.e. we divide the salary value (*t9sala_all_comp*) by the total level of occupation of all jobs held.

4. Conclusive remarks

To conclude, we would like to recall that these composite variables are approximations that are subject to certain limitations described within this text, such as the fact that we cannot take into account social security contributions that are optional. Note that the data do not take into account inflation (see Appendix 3), that users should check for the plausibility of extreme values (salaries below 1,500-2,000 CHF per month and higher than 20,000 CHF) and that we highly recommend the use of weights in order to compensate for panel attrition (Sacchi, 2011; TREE, 2016h). We also recommend using the variables *t9sala_comp* or *t9sala_fte_comp* (rather than *t9sala_all_comp* or *t9sala_fte_all_comp*) when comparing with salaries of other survey waves (t3/2003 to t8/2010).

Our primary objective in providing these standardised salary composite variables is to facilitate the use of TREE-based salary data, to provide a relevant data conversion method which is robust, reliable and in line with good practices, and to standardise salary conversion practices among TREE data users. We provide ready-to-use composite variables that are comparable across survey waves or that account for all the salary data available from the most recent available survey wave (2014¹²). This will allow greater comparability between results based on TREEi data, but also with other national and international studies.

¹¹ *t9salaz2* and *t9salaz7* do not appear in Table 1. See TREE (2016g) for more detail.

¹² A 10th survey wave has been conducted in 2019/20, the data of which are scheduled for release in 2023.

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6. Appendices

Appendix 1: Variables used in the calculation of TREEI salary composite variables

Variable name	Opening question	Item	Scale/classification	Survey wave/year and survey mode						
				t3 2003	t4 2004	t5 2005	t6 2006	t7 2007	t8 2010	t9 2014
sala1	How much do you earn?	I have an hourly wage and earn:	Francs per hour	Qwritten	Qwritten (Qtel)	aQemp	aQemp	aQemp	aQemp	CATI
sala2	How much do you earn?	I have a monthly wage and earn:	Francs per month	Qwritten	Qwritten (Qtel)	aQemp	aQemp	aQemp	aQemp	CATI
sala3	How much do you earn?	Another mode of payment	Text, Francs per text	Qwritten	Qwritten (Qtel)	aQemp	aQemp	aQemp	aQemp	CATI
sala4	How much do you earn?	Is this counted pre-tax or after tax?	1=Pre-tax; 2=After tax	Qwritten	Qwritten (Qtel)	aQemp	aQemp	aQemp	aQemp	CATI
sala5	None	Are you paid a 13th monthly salary?	1=yes; 2=no				aQemp	aQemp	aQemp	CATI
sala6	None	Did you include the 13th monthly salary in the above indicated sums?	1=yes; 2=no				aQemp	aQemp	aQemp	CATI
sala7	How much do you earn at this job?	None	Yearly salary [Swiss Francs]							CATI
sala8	How much do you earn at this job?	In addition to your reported salary, do you receive a bonus, share of profits or similar forms of benefits?	1=yes; 2=no							CATI
sala11	How much do you earn at this job?	None	Income in foreign currency (amount)							CATI
foreign_currency	In which currency do you receive your salary?	None								CATI
jobs	None	What are the terms of your employment?	1=Employed in a public or private institution; 2=Employed in a private household (e.g. babysitter, cleaning staff); 3=Self-employed person; 4=Freelancer; 5=Working in a family business; 8=don't know	Qwritten (Qtel)	Qwritten (Qtel)	CATI	CATI	CATI	CATI	CATI
jobh,	None	On average, approximately how many hours per week do you work at this job? (hours per week)	Hours	Qwritten (Qtel)	Qwritten (Qtel)	CATI	CATI	CATI	CATI	CATI
jobhbmin	None	If you look back on the past three months: could you give me an approximate indication as to how many hours per week you have worked at least?	Hours							CATI
jobhbmax	None	And what about the maximum hours per week?	Hours							CATI

Abbreviations: Qwritten: written questionnaire; Qtel: telephone interview; aQemp: complementary questionnaire « employment »; CATI: computer-assisted telephone interview.
 Secondary survey mode between brackets. (Sources: TREE, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g)

Appendix 2: The three pillars of the Swiss social insurance system

The Swiss social insurance system basically rests on three pillars. The first pillar includes

- a) Insurance for old age or widowhood (AHV/AVS: Alters- und Hinterlassenenversicherung/Assurance vieillesse et survivants) that applies to all adult residents irrespective of whether they are active on the labour market or not;
- b) Disability benefit (IV/AI: Invalidenversicherung/Assurance-invalidité)
- c) Income compensation allowance (EO/APG: Erwerbersatzordnung/allocations pour perte de gain).¹³
- d.) additional insurances (when employed) such as unemployment benefits, parental leave, child allowance, social assistance.

Deductions for the first pillar are equivalent to approximately 7% of the gross salary for employees.¹⁴ The rate varies between 5% and 10%, depending on the annual salary for the self-employed. Contribution rates slightly increased between 2003 and 2014 (see *Appendix 4*).

The second pillar of social insurance consists of payments to pension funds contracted by the employers. The payments are mandatory if employees are over 25 years old (many companies contract it for employees before that age) and if their salary exceeds an income threshold. Employer and employee contributions are fixed by pension fund regulations of each pension fund.¹⁵ They are normally fixed on a scale that depends on the age of the contributor. The contributions finance the old-age credits for future pensions and insurance against the risks of death and disability. Thus, contribution rates to pension funds vary widely by age, but also by economic sector and between firms (BFS, 2010). That makes it difficult to survey precisely or to estimate without having access to private administration documents. Note that second pillar payments are not mandatory for self-employed workers.

The third pillar is a private pension scheme available to every adult on a voluntary basis. It is highly encouraged by the State by making it tax deductible until the age of retirement is reached. The maximum amount of the annual contribution is presently set at close to 7,000CHF. A much higher contribution is allowed for people who do not have an occupational pension (second pillar), which is often the case for self-employed individuals.

¹³ b) and c) are mandatory when economically active (for both employed and self-employed).

In some cantons, additional social insurance contributions apply. We intentionally did not account for it as it increases the complexity of the conversion and it represents a small rate of the salary (less than one percent).

¹⁴ The same rate is contributed by the employer.

¹⁵ Applies to all employees from the age of 17 except in case of short-term contracts of three months or less.

Appendix 3: Inflation index in Switzerland from 2003

Year	Survey wave	Inflation index (%; ref. 2003)
2003	t3	100.00
2004	t4	100.78
2005	t5	102.05
2006	t6	103.12
2007	t7	103.80
2010	t8	106.63
2014	t9	105.85

Federal statistical office: http://www.portal-stat.admin.ch/lik_rechner/f/lik_rechner.htm

Appendix 4: Social security contributions (AHV/IV/EO) for self-employed persons from 2003 to 2014 based on net monthly income

2003-2004		2005-2006		2007		2010		2014						
Net monthly income from gainful employment between	Contribution rate (or min. amount)	Net monthly income from gainful employment between	Contribution rate (or min. amount)	Net monthly income from gainful employment between	Contribution rate (or min. amount)	Net monthly income from gainful employment between	Contribution rate (or min. amount)	Net monthly income from gainful employment between	Contribution rate (or min. amount)					
0	689	35 CHF	0	689	35 CHF	0	703	37 CHF	0	746	38 CHF	0	762	40 CHF
690	1184	5.12%	690	1255	5.12%	704	1255	5.12%	747	1263	5.12%	763	1357	5.22%
1185	1514	5.24%	1256	1585	5.24%	1256	1585	5.24%	1264	1601	5.24%	1358	1709	5.35%
1515	1678	5.36%	1586	1749	5.36%	1586	1757	5.36%	1602	1780	5.36%	1710	1888	5.47%
1679	1841	5.48%	1750	1912	5.48%	1758	1927	5.48%	1781	1959	5.48%	1889	2067	5.60%
1842	2004	5.60%	1913	2074	5.60%	1928	2098	5.60%	1960	2137	5.60%	2068	2244	5.72%
2005	2165	5.73%	2075	2235	5.73%	2099	2267	5.73%	2138	2314	5.73%	2245	2420	5.85%
2166	2323	5.97%	2236	2394	5.97%	2268	2433	5.97%	2315	2488	5.97%	2421	2594	6.09%
2324	2481	6.21%	2395	2551	6.21%	2434	2598	6.21%	2489	2661	6.21%	2595	2766	6.34%
2482	2638	6.46%	2552	2704	6.46%	2599	2763	6.46%	2662	2833	6.46%	2767	2937	6.59%
2639	2794	6.70%	2705	2864	6.70%	2764	2926	6.70%	2834	3004	6.70%	2938	3108	6.84%
2795	2950	6.94%	2865	3019	6.94%	2927	3089	6.94%	3005	3139	6.94%	3109	3277	7.09%
2951	3102	7.19%	3020	3172	7.19%	3090	3249	7.19%	3140	3341	7.19%	3278	3444	7.34%
3103	3251	7.55%	3173	3321	7.55%	3250	3405	7.55%	3342	3505	7.55%	3445	3606	7.71%
3252	3399	7.92%	3322	3468	7.92%	3406	3560	7.92%	3506	3667	7.92%	3607	3768	8.08%
3400	3546	8.28%	3469	3615	8.28%	3561	3714	8.28%	3668	3828	8.28%	3769	3927	8.46%
3547	3691	8.65%	3616	3760	8.65%	3715	3866	8.65%	3829	3988	8.65%	3928	4086	8.83%
3692	3833	9.01%	3761	3901	9.01%	3867	4014	9.01%	3989	4143	9.01%	4087	4240	9.20%
≥3834		9.50%	≥3902		9.50%	≥4015		9.50%	≥4144		9.50%	≥4241		9.70%

Own calculation based on AHV/IV, 2005, 2007, 2009, 2013; BSV, 2003

Appendix 5: Social security contributions (AHV/IV/EO) for self-employed persons from 2003 to 2014 based on gross annual income

2003-2004		2005-2006		2007		2010		2014						
Gross annual income from gainful employment between	Contribution rate (or min. amount)	Gross annual income from gainful employment between	Contribution rate (or min. amount)	Gross annual income from gainful employment between	Contribution rate (or min. amount)	Gross annual income from gainful employment between	Contribution rate (or min. amount)	Gross annual income from gainful employment between	Contribution rate (or min. amount)					
0	8499	425 CHF	0	8499	425 CHF	0	8899	445 CHF	0	9199	460 CHF	0	9399	480 CHF
8500	14999	5.12%	8500	15899	5.12%	8900	15899	5.12%	9200	15999	5.12%	9400	17199	5.22%
15000	19199	5.24%	15900	20099	5.24%	15900	20099	5.24%	16000	20299	5.24%	17200	21699	5.35%
19200	21299	5.36%	20100	22199	5.36%	20100	22299	5.36%	20300	22599	5.36%	21700	23999	5.47%
21300	23399	5.48%	22200	24299	5.48%	22300	24499	5.48%	22600	24899	5.48%	24000	26299	5.60%
23400	25499	5.60%	24300	26399	5.60%	24500	26699	5.60%	24900	27199	5.60%	26300	28599	5.72%
25500	27599	5.73%	26400	28499	5.73%	26700	28899	5.73%	27200	29499	5.73%	28600	30899	5.85%
27600	29699	5.97%	28500	30599	5.97%	28900	31099	5.97%	29500	31799	5.97%	30900	33199	6.09%
29700	31799	6.21%	30600	32699	6.21%	31100	33299	6.21%	31800	34099	6.21%	33200	35499	6.34%
31800	33899	6.46%	32700	34700	6.46%	33300	35499	6.46%	34100	36399	6.46%	35500	37799	6.59%
33900	35999	6.70%	34800	36899	6.70%	35500	37699	6.70%	36400	38699	6.70%	37800	40099	6.84%
36000	38099	6.94%	36900	38999	6.94%	37700	39899	6.94%	38700	40099	6.94%	40100	42399	7.09%
38100	40199	7.19%	39000	41099	7.19%	39900	42099	7.19%	41000	43299	7.19%	42400	44699	7.34%
40200	42299	7.55%	41100	43199	7.55%	42100	44299	7.55%	43300	45599	7.55%	44700	46999	7.71%
42300	44399	7.92%	43200	45299	7.92%	44300	46499	7.92%	45600	47899	7.92%	47000	49299	8.08%
44400	46499	8.28%	45300	47399	8.28%	46500	48699	8.28%	47900	50199	8.28%	49300	51599	8.46%
46500	48599	8.65%	47400	49499	8.65%	48700	50899	8.65%	50200	52499	8.65%	51600	53899	8.83%
48600	50699	9.01%	49500	51599	9.01%	50900	53099	9.01%	52500	54799	9.01%	53900	56199	9.20%
≥50700		9.50%	≥51600		9.50%	≥53100		9.50%	≥54800		9.50%	≥56200		9.70%

Source: AHV/IV, 2005, 2007, 2009, 2013; BSV, 2003

Appendix 6: Stata code for the construction of TREE1 composite salary variables

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* For the sake of brevity and clarity, some parts of the syntax used to calculate the composite variables are omitted (2.1. Plausibility checks and some checks at the end of parts 2.4. and 3.4.). The code is primarily made available for the purpose of documentation. It is not intended as a tool to replicate the calculation of the composite variables.

* Content:

* 1. Data preparation (missing values, plausibility checks, correction of errors, accounting for additional information from open text variables)

* 2. Salary for t3 to t9 based on first work activity (comparable across waves)

* 2.1. Plausibility checks

* 2.2. Calculation of salary from t3 to t9 (based on first gainful occupation activity)

* 2.2.1. Recode based on sala2 variables (monthly salaries)

* 2.2.2. Recode based on sala1 variables (hourly salaries)

* 2.3. Recoding from net to gross salaries

* 2.3.1. Independent gainful activities

* 2.3.2. Dependent gainful activities

* 2.4. Calculation of full-time equivalent salary (based on first gainful occupation activity)

* 3. Salary for t9 based on all gainful work activities and all available variables

* 3.1. Calculation of t9 salary for each work activity (for salary composite variable)

* 3.2. Recoding from net to gross salary for every job in t9

* 3.3. Calculation of gross t9 salary

* 3.4. Calculation of full time equivalent gross t9 salary

* 1. Data preparation (missing values, plausibility checks, correction of errors, accounting for additional information from open text variables)

**Before running this syntax, the following TREE1 datasets should be merged

*TREE_data_wave-3-2003_version_2016_english.dta

*TREE_data_wave-4-2004_version_2016_english.dta

*TREE_data_wave-5-2005_version_2016_english.dta

*TREE_data_wave-6-2006_version_2016_english.dta

*TREE_data_wave-7-2007_version_2016_english.dta

*TREE_data_wave-8-2010_version_2016_english.dta

*TREE_data_wave-9-2014_version_2016_english.dta

*TREE_data_weights_wave1-9_version_2016.dta

*Save of original variables (if needed)

```
foreach i of numlist 3 (1) 9 {
```

```
  clonevar t`i`sala1_org = t`i`sala1
```

```
  clonevar t`i`sala2_org = t`i`sala2
```

```
  clonevar t`i`sala3_org = t`i`sala3
```

```
  clonevar t`i`jobh_org = t`i`jobh
```

```
}
```

```
foreach i of numlist 4 (1) 12 {
```

```
  clonevar t9sala`i`_org = t9sala`i`
```

```
}
```

```
foreach i of numlist 2 (1) 7 {
```

```
  clonevar t9jobh`i`_org = t9jobh`i`
```

```
}
```

*Recode of jobh

mvdecode t*jobh, mv(98=.a) // 98 = variation in number of hours. We can't estimate full time equivalent salaries if we don't have the number of working hours

mvdecode t9jobh*, mv(98=.a)

* We can correct missing values for t9jobh with t9jobhbmin and t9jobhbmax (not for t3 to t8 as jobhbmin and jobhbmax have been introduced in t9). Replace of t9jobh missing values by the mean of t9jobhbmin and t9jobhbmax (or, in case of one missing value in t9jobhbmin or t9jobhbmax with the non-missing variable between t9jobhbmin and t9jobhbmax)

```
replace t9jobh = ((t9jobhbmin+t9jobhbmax)/2) if mi(t9jobh) & !mi(t9jobhbmin) & !mi(t9jobhbmax) & t9valids==1
replace t9jobh = t9jobhbmin if mi(t9jobh) & !mi(t9jobhbmin) & t9valids==1
replace t9jobh = t9jobhbmax if mi(t9jobh) & !mi(t9jobhbmax) & t9valids==1
clonevar t9jobh1=t9jobh
```

```
foreach i of numlist 2 (1) 7 {
replace t9jobh`i' = ((t9jobhbmin`i'+t9jobhbmax`i')/2) if mi(t9jobh`i') & !mi(t9jobhbmin`i') & !mi(t9jobhbmax`i') & t9valids==1
replace t9jobh`i' = t9jobhbmin`i' if mi(t9jobh`i') & !mi(t9jobhbmin`i') & t9valids==1
replace t9jobh`i' = t9jobhbmax`i' if mi(t9jobh`i') & !mi(t9jobhbmax`i') & t9valids==1
}
```

*uniformization of names of variables

```
foreach i of numlist 1 (1) 12 {
clonevar t9sala`i'_1 = t9sala`i'
}
```

*Replacement of missing values of t4sala2, t5sala2, t6sala2, t7sala2 and t8sala2 in case of open text information on salary (information not included in the TREE1 data release 2016 - based on t`i`sala3a variable). Mostly bonus or yearly salaries. Replacements not listed in this syntax. In total, we replaced 8 missing values in t4, 2 in t5, 76 in t6, 63 in t7 and 119 in t8.

* 2. Salary for t3 to t9 based on first work activity (comparable across waves)

* Note on t9 salary on first work activity: From t3 to t8, data on salary has been collected for the main gainful activity only. In t9, salaries of all activities have been collected. The maximum number of multiple jobs a respondent holds in a given survey wave defines the number activity variable (sets). Due to technical reasons, the data of the first or main activity is not always contained in the first variable (set). We therefore proceed according to the following rule: When the first work activity is missing, we consider the second one. When the first and second work activities are missing, we consider the third one, and so on.

* 2.1. Plausibility checks

* Plausibility checks are not represented here. In this part, we check the data and correct some inconsistencies within the data. Our aim here is to identify unrealistic amounts, whether they are too high (monthly>10,000 CHF; hourly>120 CHF) or too low (monthly>2,000 CHF; hourly>10 CHF). In those cases, we evaluate if some extreme salaries are plausible by comparing with profession, occupation rate, financial situation of the respondent, salaries in other survey waves (etc.) and, in the event, replace it by missing values (or recode it on rare occasions). In some cases (95 cases across all survey waves) we dispose of both hourly and monthly salary data for the same job. In those cases, we prioritize the monthly salary data, as the composite salary variables are in monthly format.

* 2.2. Calculation of salary from t3 to t9 (based on first gainful occupation activity)

```
foreach i of numlist 3(1)9 {
gen t`i`sala_comp=.
label var t`i`sala_comp "t`i' salary estimation (1st work activity; monthly gross; CHF)"
}
```

* 2.2.1. Recode based on sala2 variables (monthly salaries)

```
*Recode if any monthly salary data t*sala2
foreach i of numlist 3(1)9 {
replace t`i`sala_comp=t`i`sala2 if t`i`sala2>0 & !mi(t`i`sala2)
}
```

* 2.2.2. Recode based on sala1 variables (hourly salaries)

```
*Principle: We have working hours for the first job (except in t9)
/// Hours of different jobs are not counted, only the first work activity
/// Number of working hours are capped at 42.(higher numbers are recoded to 42 - full-time)
/// Respondents could get paid the overtime but we consider 42h as a maximum
/// We consider t*sala1 (salary by hours) when t*sala2 (salary by month) is not responded
```

```

* Generation of capped working hours
foreach i of numlist 3(1)9 {
gen t`i`jobh_plaf=t`i`jobh
label var t`i`jobh_plaf "t`i` working hours per week (max limited to 42)"
replace t`i`jobh_plaf=42 if t`i`jobh>42 & !mi(t`i`jobh)
recode t`i`jobh_plaf (0=.)
replace t`i`jobh_plaf=. if (mi(t`i`sala1) & mi(t`i`sala2)) & !mi(t`i`jobh_plaf)
}

```

```

foreach i of numlist 1(1)7 {
gen t9jobh_plaf i=t9jobh`i`
label var t9jobh_plaf i "t9 working hours per week (max limited to 42)-- job`i`"
replace t9jobh_plaf i=42 if t9jobh_plaf i>42 & !mi(t9jobh_plaf i)
recode t9jobh_plaf i (0=.)
}

```

```

foreach i of numlist 1(1)7 {
replace t9jobh_plaf=t9jobh_plaf i if ((!mi(t9sala1_`i`) & t9sala1_`i`>0 & !mi(t9jobh_plaf i)) | (!mi(t9sala2_`i`) & t9sala2_`i`>0) & !mi(t9jobh_plaf i)) & !mi(t9jobh_plaf i) & mi(t9jobh_plaf) & mi(t9sala1) & mi(t9sala2)
}

```

```

*Recode if any hourly salary data (*sala1)
foreach i of numlist 3(1)9 {
replace t`i`sala_comp=t`i`sala1*t`i`jobh_plaf*(52/12) if mi(t`i`sala_comp) & !mi(t`i`sala1) & !mi(t`i`jobh_plaf)
}

```

*In case t9sala1_1 or t9sala2_1 is empty, we consider the salary (rather be monthly or hourly informed) of the first job appearing in the data structure.

```

foreach i of numlist 1(1)7 {
replace t9sala_comp=t9sala2_`i` if t9sala2_`i`>0 & !mi(t9sala2_`i`) & mi(t9sala_comp)
replace t9sala_comp=t9sala1_`i`*t9jobh_plaf i*(52/12) if !mi(t9sala1_`i`) & !mi(t9jobh_plaf i) & mi(t9sala_comp)
}

```

* 2.3. Recoding from net to gross salaries

* Social contributions differ between employees and independent workers (no compulsory BVG for independent).

* We recode from net to gross (and not the opposite) as salaries has been more often indicated gross.

* t*sala4 indicates if salary has been informed gross or net salaries with missing t*sala4 are considered as gross

```

foreach i of numlist 3(1)9{
replace t`i`sala4=1 if mi(t`i`sala4) & !mi(t`i`sala_comp) & t`i`valids==1
}

```

```

foreach i of numlist 1(1)7{
replace t9sala4_`i`=1 if mi(t9sala4_`i`) & (!mi(t9sala1_`i`)!mi(t9sala2_`i`))
} //same for 2nd to 7th job at t9

```

* recode of t9sala4 in case 2nd to 7th job is taken into account

```

foreach i of numlist 1(1)7{
replace t9sala4=t9sala4_`i` if mi(t9sala4) & !mi(t9sala_comp) & !mi(t9sala4_`i`) & ((!mi(t9sala1_`i`) & t9sala1_`i`>0)|(!mi(t9sala2_`i`) & t9sala2_`i`>0))
}

```

* t*9ala4 indicates if salary has been informed gross or net salaries with missing t*sala4 are considered as gross

```

replace t9sala4=1 if mi(t9sala4) & !mi(t9sala_comp) & t9valids==1

```

* 2.3.1. Independent gainful activities

* Independent workers only pay AHV IV and EO (digressive scale for low salaries) (BVG is not compulsory)

* Social contribution (minimal contribution, digressive scale, rates) for independent workers changed in 2003, 2005, 2007, 2009, 2011 and 2013

* We applied social contributions for independents informed by the Federal Office of Social Insurances (Bundesamt für Sozialversicherung)

* We take into account those changes in the calculation from net to gross salaries


```

replace t'isala_comp=t'isala_comp / 0.91353 if t'isala_comp >= 3715 & t'isala_comp < 3867 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.90987 if t'isala_comp >= 3867 & t'isala_comp < 4015 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.90500 if t'isala_comp >= 4015 & t'isala4==2 & t'ijobs==4
}

```

* Calculation of gross salaries. From net to gross for t8 (2010)

```

foreach i of numlist 8 (1) 8{
replace t'isala_comp=t'isala_comp + 38.33333333 if t'isala_comp >= 0 & t'isala_comp < 747 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94884 if t'isala_comp >= 747 & t'isala_comp < 1264 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94763 if t'isala_comp >= 1264 & t'isala_comp < 1602 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94641 if t'isala_comp >= 1602 & t'isala_comp < 1781 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94519 if t'isala_comp >= 1781 & t'isala_comp < 1960 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94397 if t'isala_comp >= 1960 & t'isala_comp < 2138 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94275 if t'isala_comp >= 2138 & t'isala_comp < 2315 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94033 if t'isala_comp >= 2315 & t'isala_comp < 2489 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.93789 if t'isala_comp >= 2489 & t'isala_comp < 2662 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.93545 if t'isala_comp >= 2662 & t'isala_comp < 2834 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.93301 if t'isala_comp >= 2834 & t'isala_comp < 3005 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.93058 if t'isala_comp >= 3005 & t'isala_comp < 3140 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.92814 if t'isala_comp >= 3140 & t'isala_comp < 3342 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.92449 if t'isala_comp >= 3342 & t'isala_comp < 3506 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.92083 if t'isala_comp >= 3506 & t'isala_comp < 3668 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.91717 if t'isala_comp >= 3668 & t'isala_comp < 3829 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.91353 if t'isala_comp >= 3829 & t'isala_comp < 3989 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.90987 if t'isala_comp >= 3989 & t'isala_comp < 4144 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.90500 if t'isala_comp >= 4144 & t'isala4==2 & t'ijobs==4
}

```

* Calculation of gross salaries. From net to gross for t9 (2014)

```

foreach i of numlist 9 (1) 9{
replace t'isala_comp=t'isala_comp + 480/12 if t'isala_comp >= 0 & t'isala_comp < 763 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94777 if t'isala_comp >= 763 & t'isala_comp < 1358 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94652 if t'isala_comp >= 1358 & t'isala_comp < 1710 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94528 if t'isala_comp >= 1710 & t'isala_comp < 1889 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94404 if t'isala_comp >= 1889 & t'isala_comp < 2068 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94279 if t'isala_comp >= 2068 & t'isala_comp < 2245 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.94155 if t'isala_comp >= 2245 & t'isala_comp < 2421 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.93907 if t'isala_comp >= 2421 & t'isala_comp < 2595 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.93658 if t'isala_comp >= 2595 & t'isala_comp < 2767 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.93409 if t'isala_comp >= 2767 & t'isala_comp < 2938 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.93160 if t'isala_comp >= 2938 & t'isala_comp < 3109 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.92912 if t'isala_comp >= 3109 & t'isala_comp < 3278 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.92663 if t'isala_comp >= 3278 & t'isala_comp < 3445 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.92290 if t'isala_comp >= 3445 & t'isala_comp < 3607 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.91916 if t'isala_comp >= 3607 & t'isala_comp < 3769 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.91543 if t'isala_comp >= 3769 & t'isala_comp < 3928 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.91171 if t'isala_comp >= 3928 & t'isala_comp < 4087 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.90798 if t'isala_comp >= 4087 & t'isala_comp < 4241 & t'isala4==2 & t'ijobs==4
replace t'isala_comp=t'isala_comp / 0.90300 if t'isala_comp >= 4241 & t'isala4==2 & t'ijobs==4
}

```

* 2.3.2. Dependent gainful activities

*For employees, social contributions (mainly the 2nd pillar) vary by firm, yearly salary, age, type of job, cantons, etc. We estimate the contribution rate for employees based on FSO 2010 that documents the average social contribution rate by age group

* From 2003 to 2007: contribution rate average is 9.4% (age group 18-24)

```

foreach i of numlist 3(1)7 {
replace t'isala_comp = t'isala_comp / 0.906 if t'isala4==2 & t'ijobs!=4 & lmi(t'ijobs)
}

```

* For 2010 and 2014: contribution rate average is 12.2% (age group 25-34)

```

foreach i of numlist 8(1)9 {
replace t'isala_comp = t'isala_comp / 0.878 if t'isala4==2 & t'ijobs!=4 & lmi(t'ijobs)
}

```

```
}
```

```
* 2.4. Calculation of full-time equivalent salary (based on first gainful occupation activity)
```

```
*****
```

```
* Compute full-time equivalent gross salaries from salary (t*sala_comp)
```

```
foreach i of numlist 3(1)9 {
```

```
gen t`i`sala_fte_comp=.
```

```
label var t`i`sala_fte_comp "t`i` full-time equi. salary estimation (1st work activity; monthly gross; CHF)"
```

```
replace t`i`sala_fte_comp=t`i`sala_comp/(t`i`jobh_plaf/42) if !mi(t`i`sala_comp) & !mi(t`i`jobh_plaf)
```

```
}
```

* We highly recommend truncating cases with very high and very low full-time equivalent salaries (at least 1% of higher and 1 % of lower salaries). In Switzerland, a full time equivalent salary may be implausible when under approx. 2000 Francs. Salaries of individuals working full-time from the lower 10% quantile in 2014 were under 3550 CHF (Federal Statistical Office. 2022. Délimitation des quantiles (salaire mensuel net), pour les temps pleins et temps partiels selon le taux d'occupation - Secteur privé et secteur public ensemble - Suisse. Swiss Earnings Structure Survey).

* Data users should also consider using median instead of mean that is not sensitive to outliers.

```
*****
```

```
* 3. Salary for t9 based on all gainful work activities and all available variables
```

```
*****
```

```
* Calculation of t9sala_all_comp and t9sala_fte_all_comp
```

* In t9, we have detailed salary data on all job episodes. We calculate here a composite salary variable that account for all the available t9 salary data

* In the calculation of t9 composite salary based on all work activities, we account for all salaries available. In the calculation of t9 composite full-time equivalent salary, we account for all salaries with the indication of worked hours per week as it is needed to estimate full-time equivalent salaries.

```
* 3.1. Calculation of t9 salary for each work activity (for salary composite variable)
```

```
*****
```

```
* Creation of variables of t9 monthly salary variable for each work activity
```

```
foreach i of numlist 1(1)7 {
```

```
gen t9sala_all_comp`i`=.
```

```
label var t9sala_all_comp`i` "t9 salary estimate (work activity `i`; monthly gross; CHF)"
```

```
}
```

```
* Constructing composite salaries for each work activity
```

```
* Accounting for salaries informed monthly (t9sala2_*)
```

```
foreach i of numlist 1(1)7 {
```

```
replace t9sala_all_comp`i`=t9sala2_`i` if t9sala2_`i`>0 & !mi(t9sala2_`i`)
```

```
}
```

```
* Accounting for salaries informed hourly (t9sala1_*)
```

```
foreach i of numlist 1(1)7 {
```

```
replace t9sala_all_comp`i`=t9sala1_`i`*t9jobh_plaf`i`*(52/12) if mi(t9sala_all_comp`i`) & !mi(t9jobh_plaf`i`)
```

```
}
```

```
* Accounting for annual salary (t9sala7_*)
```

```
foreach i of numlist 1(1)7 {
```

```
replace t9sala_all_comp`i`= t9sala7_`i`/12 if mi(t9sala_all_comp`i`)
```

```
}
```

```
* Add of 13th salary when not included in amounts (t9sala5_* & t9sala6_*)
```

```
foreach i of numlist 1(1)7 {
```

```
replace t9sala_all_comp`i`=t9sala_all_comp`i`*(13/12) if (t9sala5_`i`==1 & t9sala6_`i`==2)
```

```
}
```

```
* Accounting for salaries in foreign currencies (sala11)
```

```
clonevar t9fc_sala_unit1=t9fc_sala_unit
```

```
clonevar t9foreign_currency1=t9foreign_currency
```

```
foreach i of numlist 1(1)7 {
```

```
* if salary informed montly
```

```
replace t9sala_all_comp`i`=t9sala11_`i` if mi(t9sala_all_comp`i`) & !mi(t9sala11_`i`) & t9fc_sala_unit`i`==2
```

```

* if salary informed hourly
replace t9sala_all_comp`i`=t9sala11_`i`*t9jobh_plaf`i`*(52/12) if mi(t9sala_all_comp`i`) & t9fc_sala_unit`i`=1 & !mi(t9jobh_plaf`i`)
* if salary informed annually
replace t9sala_all_comp`i`=(t9sala11_`i`/12) if mi(t9sala_all_comp`i`) & t9fc_sala_unit`i`=7
}
//59 cases replaced on 66 that mentioned a salary in foreign currency
//1 case with daily salary (t9fc_sala_unit`=13) not considered in the calculation. We don't have the data on number of days worked per month.

```

```

* Conversion from foreign currency to CHF
* Conversion rate of the 22th of May 2014 (median of participation date to t9)
* http://www.xe.com/fr/currencytables/?from=CHF&date=2014-05-22

```

```

foreach i of numlist 1(1)7 {
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.2436)) if t9foreign_currency`i`=="AED"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.1109)) if t9foreign_currency`i`=="ARS"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.8211)) if t9foreign_currency`i`=="CAD"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.0445)) if t9foreign_currency`i`=="CZK"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(1.2215)) if t9foreign_currency`i`=="EUR"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(1.5083)) if t9foreign_currency`i`=="GDP"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.1154)) if t9foreign_currency`i`=="HKD"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.0088)) if t9foreign_currency`i`=="JPY"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.1504)) if t9foreign_currency`i`=="NOK"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.7661)) if t9foreign_currency`i`=="NZD"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.0261)) if t9foreign_currency`i`=="RUB"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.1357)) if t9foreign_currency`i`=="SEK"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.0275)) if t9foreign_currency`i`=="THB"
replace t9sala_all_comp`i`=(t9sala_all_comp`i`*(0.8948)) if t9foreign_currency`i`=="USD"
}
//59 cases replaced

```

```

* Extra salaries (Bonus, etc.) added to monthly composite salary
gen t9salaz2_1 = t9salaz2
gen t9salaz7_1 = t9salaz7

```

```

foreach i of numlist 1 (1) 7 {
* extra salaries every month
replace t9sala_all_comp`i`=t9sala_all_comp`i`+t9salaz2_`i` if !mi(t9salaz2_`i`) & !mi(t9sala_all_comp`i`)
* extra salaries year
replace t9sala_all_comp`i`=t9sala_all_comp`i`+(t9salaz7_`i`/12) if !mi(t9salaz7_`i`) & !mi(t9sala_all_comp`i`)
}

```

```

* 3.2. Recoding from net to gross salary for every job in t9
*****

```

```

*Salaries with missing t9sala4_* are considered as gross
foreach i of numlist 1(1)7{
replace t9sala4_`i`=1 if mi(t9sala4_`i`) & !mi(t9sala_all_comp`i`)
}

```

```

* Independent work
* Independent workers only pay insurance for old age or widowhood (AHV/AVS), the disability insurance (IV/AI) and the income compensation allowance (EO/APG) (degressive scale for low salaries)
gen t9jobs_1 = t9jobs
* number of independent workers for seven jobs in t9
foreach i of numlist 1 (1) 7{
count if t9jobs_`i`=4 & t9sala4_`i`=2
} //some salaries are from independent work

```

```

* Calculation of salaries from net to gross for all jobs in t9 (2014)
foreach i of numlist 1 (1) 7{
replace t9sala_all_comp`i`=t9sala_all_comp`i` + 480/12 if t9sala_all_comp`i`>= 0 & t9sala_all_comp`i`< 763 & t9sala4_`i`=2 & t9jobs_`i`=4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.94777 if t9sala_all_comp`i`>= 763 & t9sala_all_comp`i`< 1358 & t9sala4_`i`=2 & t9jobs_`i`=4
}

```



```

replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.94652 if t9sala_all_comp`i`>= 1358 & t9sala_all_comp`i`< 1710 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.94528 if t9sala_all_comp`i`>= 1710 & t9sala_all_comp`i`< 1889 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.94404 if t9sala_all_comp`i`>= 1889 & t9sala_all_comp`i`< 2068 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.94279 if t9sala_all_comp`i`>= 2068 & t9sala_all_comp`i`< 2245 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.94155 if t9sala_all_comp`i`>= 2245 & t9sala_all_comp`i`< 2421 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.93907 if t9sala_all_comp`i`>= 2421 & t9sala_all_comp`i`< 2595 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.93658 if t9sala_all_comp`i`>= 2595 & t9sala_all_comp`i`< 2767 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.93409 if t9sala_all_comp`i`>= 2767 & t9sala_all_comp`i`< 2938 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.93160 if t9sala_all_comp`i`>= 2938 & t9sala_all_comp`i`< 3109 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.92912 if t9sala_all_comp`i`>= 3109 & t9sala_all_comp`i`< 3278 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.92663 if t9sala_all_comp`i`>= 3278 & t9sala_all_comp`i`< 3445 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.92290 if t9sala_all_comp`i`>= 3445 & t9sala_all_comp`i`< 3607 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.91916 if t9sala_all_comp`i`>= 3607 & t9sala_all_comp`i`< 3769 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.91543 if t9sala_all_comp`i`>= 3769 & t9sala_all_comp`i`< 3928 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.91171 if t9sala_all_comp`i`>= 3928 & t9sala_all_comp`i`< 4087 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.90798 if t9sala_all_comp`i`>= 4087 & t9sala_all_comp`i`< 4241 & t9sala4_`i`==2 &
t9jobs_`i`==4
replace t9sala_all_comp`i`=t9sala_all_comp`i` / 0.90300 if t9sala_all_comp`i`>= 4241 & t9sala4_`i`==2 & t9jobs_`i`==4
}

```

* Dependent work

* Differentiation between gross / net for employees

*contribution rate for employees is based on the average social contribution rate by age group calculated by ESPA

* FSO (2010). ESPA: construction des variables d'analyse sur le revenu professionnel et le revenu du ménage. Neuchâtel: Office fédéral de la statistique.

* For 2014: contribution rate average is 12.2% (age group 25-34)

```

foreach i of numlist 1(1)7 {
replace t9sala_all_comp`i` = t9sala_all_comp`i` / 0.878 if t9sala4_`i`==2 & t9jobs_`i`!=4 & !mi(t9jobs_`i`)
}

```

* 3.3. Calculation of gross t9 salary

```

*****
egen t9sala_all_comp = rowtotal (t9sala_all_comp1 t9sala_all_comp2 t9sala_all_comp3 t9sala_all_comp4 t9sala_all_comp5
t9sala_all_comp6 t9sala_all_comp7)
label var t9sala_all_comp "t9 salary estimate (all work activity; monthly gross; CHF)"
recode t9sala_all_comp (0=.)

```

* 3.4. Calculation of full time equivalent gross t9 salary

* Reminder: In the calculation of t9 composite full-time equivalent salary, we account for all salaries with the indication of worked hours per week as it is needed to estimate full-time equivalent salaries.

```

foreach i of numlist 1(1)7 {
replace t9sala_all_comp`i`= . if mi(t9jobh_plaf`i`) & !mi(t9sala_all_comp`i`)
} //to account only for salaries for which we have data on working hours - needed to calculate full-time equivalent salary

```

```

foreach i of numlist 1(1)7 {
replace t9jobh_plaf`i`= . if !mi(t9jobh_plaf`i`) & mi(t9sala_all_comp`i`)
} //to avoid to sum up working hours of jobs with no salary information

```

```

* creation of total of working hours per week (capped at 42)
egen t9jobh_plaf_all = rowtotal (t9jobh_plaf1 t9jobh_plaf2 t9jobh_plaf3 t9jobh_plaf4 t9jobh_plaf5 t9jobh_plaf6 t9jobh_plaf7)
replace t9jobh_plaf_all=42 if t9jobh_plaf_all>42
recode t9jobh_plaf_all (0=.)

* Compute full-time equivalent salaries
egen t9sala_all_fte_comp = rowtotal (t9sala_all_comp1 t9sala_all_comp2 t9sala_all_comp3 t9sala_all_comp4 t9sala_all_comp5
t9sala_all_comp6 t9sala_all_comp7)
label var t9sala_all_fte_comp "t9 full-time equi. salary estimation (all work activities; monthly gross; CHF)"
recode t9sala_all_fte_comp (0=.)
replace t9sala_all_fte_comp=t9sala_all_fte_comp*(42/t9jobh_plaf_all)

* Check of cases with really high salaries
* We replace id==25020011 by missing because for a university assistant is not possible to have an salary >100000 per month. Probably
t9salanomall_comp is for a full time and not for 2h of work (t9jobh1)
replace t9sala_all_fte_comp=. if id==25020011

* We highly recommend truncating cases with very high and very low full time equivalent salaries (at least 1% of higher and 1 % of lower
salaries). In Switzerland, a full time equivalent salary may be implausible when under approx. 2000 Francs. Salaries of individuals working
full-time from the lower 10% quantile in 2014 were under 3550 CHF (Federal Statistical Office. 2022. Délimitation des quantiles (salaire
mensuel net), pour les temps pleins et temps partiels selon le taux d'occupation - Secteur privé et secteur public ensemble - Suisse. Swiss
Earnings Structure Survey).
* Data users should also consider using median instead of mean that is not sensitive to outliers.

keep id t3sala_comp t4sala_comp t5sala_comp t6sala_comp t7sala_comp t8sala_comp t9sala_comp t3sala_fte_comp t4sala_fte_comp
t5sala_fte_comp t6sala_fte_comp t7sala_fte_comp t8sala_fte_comp t9sala_fte_comp t9sala_all_comp t9sala_all_fte_comp

* Merge dataset "TREE_data_weights_wave1-9_version_2016.dta" before running the following lines
svyset psu [pweight=wt9_kal], strata(strata) fpc(fpc) vce(linearized) single(sca)
svy: mean t9sala_all_fte_comp if (t9valids==1)
svy: mean t9sala_all_comp if (t9valids==1)

```