Monthly wages in the
Swiss Household Panel

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This paper describes the construction of monthly income from employment and self employment in the Swiss Household Panel (SHP). It documents the assumptions that have to be taken and addresses possibilities and difficulties when relating monthly income variables with the number of working hours. Finally, some descriptive statistics of the monthly wages are provided from 1999 to 2008. These show a high correlation of wages across the years, which is higher than correlation from yearly wages. This underlies the suitability of these variables on monthly wages for labour market research with the SHP. Median and average hourly wages have increased slightly from 2002 to 2008. The inequality of wages has remained stable for the total population.

1. Aim

The principal aim of the collection of income in the Swiss Household Panel (SHP) was to provide income on a yearly basis. The user files of the SHP and the Cross National Equivalent File (CNEF) therefore provide a series of yearly income variables at the individual and household level. The amount of the yearly income depends both on the income level and the length of the period this income has been received. However, labour market research is mostly interested in the income level only. For this, monthly measures are preferable to yearly measures, because it does not depend on the number of month an income has been received during a year. If related to hours worked, it can also serve to compute hourly wages.

Although so far, the SHP has not asked explicitly about monthly income from employment and self employment, it is possible to construct monthly income variable at the basis of the information available in the survey. Even though not explicitly stated, the question wording can be interpreted as asking about income at the moment of the interview. Respondents have the choice to report their income either on a monthly basis or a yearly basis. For income from employment, about 78 percent of respondents choose to report their salary on a monthly basis.

For income from self employment, about 42 percent report their monthly income.[1] While we directly know the monthly salaries in these cases, the situation is more complicated for respondents who reported their yearly income. They may not have worked during the entire year or they may have changed their income level. Unfortunately, we do not know whether the yearly income reported refers to the yearly income level at the moment of the interview or whether it represents an average over different income levels received during the year.

In this paper, we describe the steps and decisions taken to construct monthly income variables for employment and self employment in the SHP (section 2). Section 3 briefly discusses possibilities and difficulties when linking monthly income with working hours. Basic descriptive statistics are presented in section 4.

2. Constructing monthly income

2.1. Obtaining monthly income

Yearly income and monthly income

In the Swiss Household Panel, respondents have the choice to indicate their income either on a monthly or on a yearly basis. The monthly basis provides a direct measure of monthly income from employment and self employment. To the reported income amounts, 1/12 of extra month salaries or bonuses are added if applicable. Bonuses and gratifications are assumed to amount to one month salary (see Kuhn 2008 for details).

If respondents indicated their income on a yearly basis, the amount of income reported by respondents has to be transformed into a monthly income. This is problematic if respondents have changed their job, because the yearly income amount may reflect an average over the old and the new jobs. There is a similar problem if respondents have not worked during the entire year. As a consequence, we do not construct monthly income if respondents changed their jobs or working status since the previous interview (or in the last 12 month)[2]. If income has been provided on a yearly basis and neither working status nor jobs have changed, the monthly income simply amounts to the yearly income amount divided by 12.[3]

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[1] Ca. 39 percent report their income from self employment on a yearly basis. The rest involves irregular income, one-off payments or no answer.

[2] This information is provided in the variable p$$w18 in the individual user file of the SHP.

[3] Instead of the original answers, the constructed yearly income (i$$empy and i$$indy from the user file) have been taken for this procedure, because the constructed variable has already passed a number of plausibility checks and has been corrected for clear mistakes in the original codes (see Kuhn 2008 for the plausibility checks and construction of the yearly income variables).

Family allowances

In Switzerland, family allowances are paid together with salaries. The amounts paid per child are defined by the cantonal security system and are independent of job characteristics. We therefore consider them as part of the social security system and not as part of wages. Yet, because they are added to the ordinary salary, survey respondents often include family allowances in the income amount.[4] Since 2004, this information is included in the SHP (information from variable p$$i58e) and family allowances are deducted from the salary, if they have been included in this amount. In the years before, no adjustment for family allowances has been made.

Gross and net income

In the SHP, respondents are free to either provide net or gross income. Social security contributions therefore have to be simulated according to the Swiss Social security system. Compulsory social security contributions involve premiums for state old age insurance (AHV/AVS, first pillar), invalidity insurance (IV/AI), unemployment insurance, company old age insurance (second pillar) as well as accident insurance and company invalidity insurance.[5]

According to the social security system the following rules have been applied.

- Retirement age for men is at 65 years. For women retirement age has been 62 years until 2001, 63 years from 2002 to 2004 and 64 years since 2005.

- Contributions for state old age insurance (AHV/AVS, first pillar) have to be paid by the working population from the age of 20. The premium paid by employees amounts to 5.05 % of the salary. It has to be paid until retirement age, or, if yearly income from work exceeds 16'800 CHF, also after the retirement age.

- Contributions for unemployment insurance have to be paid according to the same criteria as for the state old age insurance (first pillar). The premiums amount to 1 % of the salary. However, no premiums have to be paid for the part of the salary that exceeds 106'800 CHF.

- Company old age insurance (second pillar) is mandatory if employees are over 25 years old and if their salary exceeds an income threshold. This threshold varied

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[4] About 45 percent of employees receiving family allowances include family allowances in the income amount.

[5] The old age social security involves three pillars. The first pillar consists of state old age insurance (AHV/AVS) which covers all Swiss residents and provides basic requirements in old age. The second pillar is provided by company for the working population and should provide a similar standard of living as before retirement "in an appropriate manner". The Swiss legislation fixes the minimum requirements which the occupational benefit plans must fulfil. The third pillar consists of individual providence, which are encouraged though fiscal measures.

between 19'350 CHF and 25'320 CHF during the period so far covered by the SHP (1999 to 2008).

Apart from these rules set by Swiss legislation, a number of assumptions are necessary in order to construct gross and net income.

- For respondents who do not indicate whether their income amount refers to gross or net income, we assume that the net income has been given, because it is more frequent to indicate net amounts.

- Premiums for accident insurance and company invalidity insurance are assumed to amount to 2 % of the salary.

- Premiums for company old age insurance (2nd pillar) are assumed to amount to 8 % of the salary.

The percentages of the salary for the premiums indicated refer to the gross salary.

2.2. Plausibility checks and Correction

The monthly income amounts obtained in this way are subjected to a series controls described in table 1. For manual corrections, we consider income variables and working hours reported in other panel waves, as well as job and education related variables. Only if a problem in the income indicated is obvious, manual corrections are applied. A manual correction either means to replace the income by the correct value if the correct value is known or to set the income to missing (-8, other error) otherwise.

Criteria for checks	Measure
Yearly income has been set to -4 "no personal income".	Monthly income is set to -4, too.
Manual corrections have been applied to the yearly incomes.	Manual checks for plausibility.
Monthly income is available but yearly income has been set to missing.	Cases are manually checked for plausibility. Usually, the yearly income was considered as missing or implausible, because it was not clear during how many months the income has been touched. For monthly income, this information is not relevant, so that in these cases monthly income is available but yearly income is considered as missing.
Monthly income is at least 1000 CHF higher than the yearly income divided by 12	Manual checks for plausibility.
Monthly income is higher than 30'000 CHF.	Manual checks on whether the reference period has been coded correctly by interviewers, to be sure that the amount given does not refer to yearly income.
Income amount represents only a rough estimate without further indication regarding the reference period.	Monthly amount is set to -8 (missing for other reasons), because no reference period has been provided with the income.
Hourly wages are lower than 10 CHF, respondent is over 20 years old.	Manual checks for plausibility.
Hourly wages are higher than 200 CHF, respondent is over 20 years old.	Manual checks for plausibility.
Strong variation in hourly wages over time	Manual checks for plausibility.

Table 1 : Plausibility checks and measures taken for the construction of monthly salaries

3. Relating monthly working income and working hours

Monthly income from employment and self employment can be linked to the number of working hours in order to calculate standardised income or hourly wages. There are various possibilities to do so, which involve a series of assumptions. It is up to data users to take these decisions, depending on their research design. The purpose of this section is to point out some difficulties and choices which have to be made by data users.

The SHP provides several variables indicating the number of working hours: the number of working hours according to the working contract (p\$\$w74), the actual number of hours worked in the current main job (p\$\$w77) and the actual number of hours worked in all jobs (p\$\$610).

There are three main difficulties when relating working income with hours worked. Firstly, implausible hourly wages (or standardised salaries) may be either due to implausible income amounts or to implausible working hours. While the income amounts are constructed variables, which have been subjected to a series of controls, the information on working hours has not been checked for plausibility.[6] The values correspond to original entries made by interviewers.

A second difficulty is that the questions about income are not linked to any specific job. Question on income from employment and self employment are collected within different modules in the questionnaire. In the module on work, job characteristics explicitly refer to the current main job, whereas questions on income from employment and self employment are asked independently of the employment status and job situation. In cases, where both income from employment and self employment is available or in cases where individuals have several jobs, it is up to data users to make assumptions that link income amounts and working hours.

The third difficulty when relating working hours and wages involves longitudinal data analysis. There has been a change in the data collection between 2001 and 2002 (see Kuhn 2008 for details). Until 2001, there were no separate variables for income from employment and self employment in the SHP. If respondents were independent in their main job (variable p\$\$w29=3 in the SHP), they have been asked about their "monthly income resulting from being self-employed" (question p\$\$i13 in the SHP). If they reported another type of employment, they have been asked about their "total monthly professional income and all other incomes from paid activities" (question p\$\$i13 in the SHP). At the basis of this information, working income (i\$\$wy) has been constructed. Because the variable p\$\$w29 (p\$\$w29=3 for self-employed) has been used as a filter variable, it is nevertheless possible to identify which question they have been asked. However, these differences in data collection have to be kept in mind when longitudinal analyses involving years of both types of data collection are conducted.

4. Descriptive statistics

4.1. Correlation coefficients

The correlation coefficients for monthly salaries vary between 0.76 and 0.94 over the years (cf. table 2). Between every pair of two years, the correlation between monthly salaries is higher than the correlation between yearly salaries (variation between 0.82 and 0.91). This confirms that monthly income amounts better represent the income level of respondents,

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[6]   Of course, plausibility checks do not assure that income amounts are true. Only cases where the implausibility is obvious with respect to other information available in the SHP, income amounts are corrected or considered as missing.

because they are independent of the number of month the income has been received during a year.

	empm03g	empm04g	empm05g	empm06g	empm07g	empm08g
empm02g	0.95	0.91	0.91	0.81	0.84	0.82
empm03g		0.92	0.92	0.89	0.86	0.84
empm04g			0.94	0.85	0.83	0.87
empm05g				0.91	0.93	0.90
empm06g					0.92	0.88
empm07g						0.94

Table 2 : Correlation of monthly income from employment

The correlation coefficients for standardised monthly gross income from employment are lower than when working hours are taken into account. For gross hourly wages from employment, correlation coefficients vary between 0.26 and 0.76. The reason for this lower correlation is measurement error in working hours.

4.2. Monthly salary for full time employment

Table 3 shows descriptive statistics of monthly employment income for respondents working full time employment (at least 90 percent, variable p$$w39). From 1999 to 2002, employment income has not been measured directly. Therefore, values before and after 2002 cannot be directly compared because of the different data collection. From 1999 to 2001, table 3 includes respondents who were not self employed in their main job. From 2002 on, table included respondents who have no income from self-employment or whose income from employment is higher than their income from self-employment. Respondents below 18 years of age or above retirement age have been excluded.

The monthly salaries have been bottom coded at 1500 CHF, which corresponds to about half of the minimal wages in branches who have agreed on collective contracts. Salaries have been top coded at 100 times the median value, which corresponds to the procedure adopted by the Luxemburg Income Study.

Descriptive statistics show no significant increase in medium and average wages from employment from 2002 to 2009. The various measures of inequality neither show an increase of inequality during this period.

	n	Median	Average	Gini	p90/p50	p10/p50	sd of logs
1999	2084	6006	6731	0.26	1.77	0.55	0.52
2000	2173	6323	6881	0.26	1.68	0.55	0.53
2001	2053	6453	7245	0.28	1.77	0.53	0.56
2002	1490	6453	6955	0.27	1.72	0.53	0.55
2003	1571	6453	6980	0.26	1.74	0.56	0.54
2004	2326	6453	6910	0.26	1.68	0.54	0.54
2005	1883	6338	6798	0.26	1.77	0.51	0.56
2006	1959	6350	6899	0.27	1.71	0.52	0.56
2007	1936	6453	6991	0.26	1.68	0.49	0.56
2008	1916	6500	7168	0.27	1.70	0.50	0.57

Table 3 : Descriptive statistics of gross standardised wages

4.3. Hourly wages

Table 4 shows median and average values of hourly wages from employment from 2000 to 2008. To standardise, the monthly salary has been divided firstly by four for a weakly salary (assuming 4 weeks of holidays gives 4 weeks of work per month) and secondly by the number of contractual hours (p$$w46). In 1999, the question about contractual hours has not been asked. Because data collection differed slightly in 2000 and 2001, no direct comparisons between those and later years can be drawn and the statistics are shown in brackets. From 1999 to 2001, table 3 includes respondents who were not self employed in their main job. From 2002 on, table included respondents who have no income from self-employment or whose income from employment is higher than their income from self-employment, assuming that the number of working hours refers to self employment in these cases. Respondents below 18 years of age or above retirement age have been excluded. Cross sectional weights have been used to estimate the median and average values. The hourly wages have been bottom coded at 9.375 CHF, which corresponds to a full time monthly salary of 1500 CHF. Salaries have been top coded at 100 times the median value, which corresponds to the procedure adopted by the Luxemburg Income Study.

The figures show a rather stable wage structure, in terms of the median wage, the mean wage and inequality. Since 2002, an increase in the income level can be observed, where values from 2002 and 2008 are significantly different. The different measures on inequality show that the overall wage inequality has remained stable. Of course, the relative stability of the wage level and in inequality measure does not exclude significant changes in some sub groups.

	n	Median	Average	Gini	p90/p50	p10/p50	sd of logs
2000	2635	36.9	42.5	0.29	1.80	0.56	0.53
2001	2566	37.6	42.7	0.28	1.78	0.52	0.54
2002	2102	37.3	39.3	0.28	1.78	0.39	0.57
2003	2223	37.5	41.2	0.26	1.72	0.55	0.51
2004	3469	37.3	41.5	0.27	1.75	0.55	0.52
2005	2900	37.2	41.5	0.27	1.79	0.55	0.53
2006	2537	37.4	42.0	0.28	1.74	0.53	0.54
2007	2443	37.6	41.2	0.28	1.72	0.52	0.54
2008	2934	38.7	42.9	0.27	1.72	0.54	0.54

Table 4 : Descriptive statistics of gross standardised wages

If we transferring the monthly salary into a standardised monthly salary of 40 working hours per weeks, the gross salary amounts to 6194 CHF for 2008. This is close but slightly higher than the same standardised gross salary of 5823 reported for 2008 according to the wage structure survey of the Swiss Federal statistical office.

5. Literature

Kuhn, Ursina (2008). Collection, construction and plausibility checks of in-come data in the Swiss Household Panel. SHP Working Paper 1_08.

BFS (2009). Schweizerische Lohnstrukturerhebung. Wichtigste Ergebnisse. Neuchâtel: BFS.