

**UNITED NATIONS  
ECONOMIC COMMISSION FOR EUROPE  
CONFERENCE OF EUROPEAN STATISTICIANS**

Expert meeting on measuring poverty and equality  
26-27 September 2017, Budva, Montenegro  
**Session F: Measuring wealth and in-kind transfers**

## **The influence of wealth on poverty and inequality in Switzerland**

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### **Abstract**

Beyond income, wealth is one of most relevant component among national and international indicators of household finances. Apart from its utility function as an income source and a material resource, wealth has many different functions. It can, for instance, guarantee financial security, augment the social status of individuals and give access to political power and occupational opportunities otherwise difficult to reach.

On top of these important considerations, the concern that poverty measures are upward biased if wealth is not properly taken into account has led reconsideration of traditional statistical indicators. This happened with the OECD guidelines on how to set up data collection on wealth, the establishment of the Household Finance and Consumption Network in 2006, and the creation of the Household Finance and Consumption Survey (HFCS) in the euro area. In Switzerland, different surveys started to collect information about wealth at the beginning of the 2000s and this gives the unique opportunity to compare different surveys from the same country. Any difference can therefore be attributed to differences among surveys than among national contexts.

In addition to this, Switzerland presents an interesting case study for the analysis on wealth because of the extremely high level of wealth owned by Swiss households (according to tax register data analysed by CreditSuisse (2016), the median wealth in Switzerland is the highest in the world and amounts to USD 244,000; wealth inequality is also high). Implications on poverty rates and inequality measures are thus expected to be large.

Because wealth has been included only recently into population surveys, the consequences on data quality of how data is collected in different surveys remain largely unknown. To assess the impact of survey characteristics, we compare total net worth and housing wealth across two widely used surveys: the Statistics on Income and Living Conditions (CH-SILC), the Survey of Health, Ageing and Retirement in Europe (SHARE). Housing wealth represents the largest component even in this country where home ownership is relatively low. It is therefore interesting to evaluate the impact of this wealth component on poverty and inequality. We perform this evaluation according to the criteria of relevance, external coherence and

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accuracy. Preliminary analyses have shown that the differences in data quality are mainly driven by the relevance of questions on wealth, which is defined by the OECD as the “degree to which statistics meet the needs of actual and potential users [...] thus it depends upon coverage of the required topics and the use of appropriate definitions or concepts”.

The results of this analysis will be presented for several age groups comparing means, deciles and indices of poverty and inequality (e.g. Gini, Theil, Atkinson, and the HSCV). The conclusions will highlight the effect of the omission of wealth, and particularly of housing wealth, from the classical measures of poverty and inequality based on income.

## *Introduction*

For a long time, researchers on inequality and poverty have claimed that income alone was not sufficient to measure economic wellbeing (Sierminska, Smeeding & Allegranza, 2013). Apart from the approaches on material deprivation (Towsend, 1979; OECD, 2008) and those on multidimensional poverty (Alkire & Santos, 2010; Alkire, Apablaza & Jung, 2014; Babones, Simona & Suter, 2015), until recently, the empirical analyses on economic poverty and inequality have been based only on income. The decision not to include other variables was a constrained choice due to the lack of available data on other important resources, such as wealth, for the entire population. The Luxembourg Wealth Study (LWS) and the first release of the Household Finance and Consumption Survey (HFCS) in 2013 have provided new tools for the methodological research that combines income and wealth (Jännti, Sierminska & Van Kerm, 2013; Kuypers & Marx, 2016). Despite its high level of median wealth per capita and its high level of inequality, Switzerland has however been excluded from these new data. In order not to lose international comparability, Switzerland has therefore initiated a national process of data collection with two pioneering modules on wealth included in CH-SILC 2011 and 2015. Recommendations about how to collect information on wealth have been transmitted to Eurostat for the implementation of similar questionnaires in 12 European countries taking part in EU-SILC 2017.<sup>1</sup> Switzerland is therefore the first country to have implemented such a questionnaire and comparable data will soon be available at the European level.

Using these new modules and the last wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) for Switzerland, this paper aims at evaluating the quality of wealth data and at computing indices of inequality and poverty based on a combination of income and wealth.

The analysis focuses on housing wealth. This particular focus is dictated by the importance of this wealth component. Previous research has demonstrated that the share of owner-occupiers is linked to wealth accumulation and wealth inequality (Dietz & Haurin, 2003; Kaas et al., 2015). Some authors have also claimed that housing wealth could be considered as a fourth pillar in rich countries because it increases the money available for non-housing consumption by reducing housing expenditure (Bradbury, 2013). In addition to this, given the information on different wealth sources that each survey collects, only when comparability of housing wealth is established, can total net worth be correctly evaluated. Despite the low home ownership rate of Switzerland, real estate property is the most important wealth component in this country (52.5% of total net worth is composed by housing wealth). The situation is similar in many other European countries and for instance in Germany. The correct estimation of this component allows therefore identifying a large part of total net worth. In addition to this, the focus on only one wealth component simplifies the analysis and increases the accuracy of the estimation.

This paper is structured as follows. We start by giving some general information about the two surveys on which the analysis is based. We continue by presenting the guidelines to measure data quality. We then analyse the data according to the criteria on quality of wealth data. The first criterion we analyse in this paper is the relevance of the questions on wealth in their latest versions compared to their previous versions of the questionnaires. The second criterion is the external coherence of the data with respect to tax statistics at the national level. The third and last criterion is accuracy in terms of non-response and imputation of missing data. After this evaluation of data

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<sup>1</sup> These countries are Belgium, Czech Republic, Finland (sub-sampling), Iceland, Italy, Latvia (sub-sampling), Lithuania, Netherlands, Austria (partly), Portugal (sub-sampling), Sweden, and the United Kingdom.

quality, we estimate commonly used indices of inequality and poverty combining income and wealth. We perform the analysis for different age groups highlight the role of housing wealth. We conclude with final remarks and suggestions on how to collect and handle data on housing wealth and on how to estimate indices of inequality and poverty that combine income and wealth.

#### *National and international databases on wealth*

As mentioned earlier, two of the most used international databases without Swiss data on income and wealth are the LWS and the HFCS. In addition to these two databases, there is the World Wealth and Income Database, which provides complete data on income and wealth only for the USA, France and China (Piketty & Zucman, 2014). In this last example, statistics on income and wealth come from tax records. Another highly quoted report based on tax records is the Credit Suisse Global Wealth Report. Being based in Switzerland, this report contains information about Swiss wealth, but it entails several drawbacks compared to other statistics based on survey data. Although tax records present an excellent data source to study historical trends of wealth inequality and top wealth shares, they have important shortcomings. They notably have no information on the lowest part of the wealth distribution, data refer not to households but to tax units, and important wealth components are not covered (social security wealth, some wealth abroad, undervaluation of real estate or consumer credits). Even more importantly, the analytical potential of tax data is limited because it is not possible to relate wealth to other variables, such as many socio-economic characteristics, life satisfaction or health. Furthermore, information about investment decisions such as risk aversion or psychological factors (e.g. the big-five concept of personality) is not covered by tax data.

To the best of our knowledge, there are two international surveys that contain information about wealth in Switzerland. The first database is the International Social Survey Programme, which contains a categorical variable about wealth in 2009. Being categorical, this variable is not suitable for the construction of indices of inequality and poverty. The second database is SHARE. SHARE is an academically driven survey at the European level on health and ageing of retirees. The sample does not cover the entire population, but only households where at least one of the respondents is aged at least 50 at the time where the questionnaire is given. Except for a few modules concerning finances, family or household questions that are answered only by the designated financial, family or household respondent, the questionnaire submitted to the main respondent and to his/her partner. Unlike other surveys, the recurrence of this survey is not guaranteed on a regular basis. The panel started in 2004 and collected information about wealth in each wave except from 2008/2009. Given its panel structure, SHARE suffers from attrition and benefits from learning effects of participants. We will use this survey in the analysis of wealth in Switzerland.

Before the targeted wealth modules in SILC, there was some information about wealth in Switzerland also in other surveys. The eldest survey is the Household Budget Survey (HBS), which collects information about wealth only at the household level with paper diaries without having any individual questionnaire. This survey started in 1990, under the name of Survey on Income and Consumption, and is conducted at a yearly basis since 2000. Its focus is placed on consumption of durable goods. Housing wealth is collected since 1998 and in 2015, a global question on taxable wealth was included in the survey. Unfortunately, the way the question has been asked in this survey points to major problems in the correct estimation of housing wealth. In this survey, we have information on the historical market value of the house without information on for the value of mortgages. There is however information on payments for mortgages (interests and amortisation). Estimating the mortgage would require strong assumptions about interest rates and amortisation,

which vary widely between households. For this reason, we exclude this survey from further data analysis. Another survey with information on wealth is the Swiss Household Panel (SHP). The SHP is a yearly panel survey that started in 1999 with an individual and a household questionnaire. Refreshment samples were introduced in 2004 and 2013. This survey is part of a set of cross-national comparable panels (the CNEF).<sup>2</sup> The SHP contains categorical information about wealth in 2009 and 2010 and continuous information about home wealth and other wealth in 2012 and 2016. We do not use these data for the current version of this paper, but we might include them in the comparison when the 2016 wave becomes publically available.

For the current version of this paper, we therefore rely on SHARE 2015 for comparison of data quality and on SILC 2015 for the analysis on inequality and poverty. This last survey is a 4-year rotating household panel available for Switzerland since 2007. Data on income and wealth refer to the preceding year. There are therefore several similarities between SHARE and SILC. Both surveys rely on a random sample of the permanent resident population stratified over seven macro regions. None of these surveys performs an oversampling of top wealth holders. The survey mode is CATI (Computer Assisted Telephone Interview) with some exceptions for particular cases. Another similarity is that they both impute missing values for income and wealth.

### *Measuring data quality*

The OECD proposes seven criteria to evaluate quality of wealth data (OECD, 2013a, 2013b). These seven criteria are 1. Institutional environment, 2. Relevance, 3. Coherence, 4. Timeliness, 5. Accessibility, 6. Comparability, and 7. Accuracy. This set of criteria has been used by Tiefensee and Grabka (2016) to assess the quality of the HFCS by comparing the surveys in the different Euro-countries.

The aim our paper differs in some respects. As we do not compare surveys in different countries, but surveys in the same country, the institutional environment (1) and data accessibility (5) are more standardised than in international surveys. According to the OECD, institutions should be “adequately resourced to produce the statistics of interest”. The surveys reviewed here have been collected either by FORS (SHARE) or by the Swiss Federal Statistical Office (SFSO) (CH-SILC), which are both experienced, professional and equipped with the necessary resources for data collection and evaluation. FORS is a privately governed and publically funded institution for the research in social sciences that distributes all databases free of charge for research purposes. The SFSO is the Swiss national statistical office and distributes plausibilised and imputed data to researchers placing different prices to data releases according to the survey required. This process of data imputation and plausibilisation takes time and creates longer waiting times between the completion of fieldwork and the release of the data. Data on wealth are publically available for SHARE, but not for SILC. In this last case, they have to be obtained upon special agreements. Timeliness (4) is an important aspect for cross-national data which should compare countries at the same time point. The different surveys are not intended to be comparable and to refer to the same time point. Differences in timeliness might therefore help to understand the divergence of certain results, but they are not a criterion for this analysis. In addition to this, cross-country comparability (6) is not part of the relevant criteria for

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<sup>2</sup> The Swiss Household Panel (SHP) is part of the Cross-National Equivalent Files (CNEF). Among the CNEF, there are also the German Socio-Economic Panel (SOEP), the Household Income and Labour situation in Australia (HILDA), Understanding society about the UK and the PSID in the USA that collect information on wealth. Given the difference in the questions on wealth, only very limited comparability is possible between the SHP and the other household surveys listed above.

this analysis, but comparability between different waves of the same survey is presented in the first part of the analysis. To assess the data quality of the different surveys in Switzerland, namely relevance (2), coherence (3) and accuracy (7), are important. This paper focuses therefore on a comparison of national surveys according to their relevance for the measurement of wealth, their external coherence compared with national tax records and their accuracy in connection with imputed values. These concepts are explained in details in dedicated sections.

### *Relevance*

Relevance is defined by the OECD as the “degree to which statistics meet the needs of actual and potential users [...] thus it depends upon coverage of the required topics and the use of appropriate definitions or concepts” (OECD, 2013b, p. 193). In this section, we analyse relevance of the most recent questionnaires on wealth of CH-SILC and SHARE. Table 1 shows that the implementation of data collection on housing wealth has some similarities and some differences between the two surveys.

Table 1: Variables on housing wealth in the different surveys

<b>Survey</b>	<b>Variable</b>	<b>Value</b>	<b>Question wording</b>
SILC 2015	Real estate assets	If possible, please refer to its current market value, otherwise to the taxable value, the insurance value or the purchase price	In your opinion, what would be the value of your real estate assets (houses and land) including your main property and mortgages?
	Mortgage	Amount still to pay on mortgage	Can you indicate the total value of your mortgages?
SHARE 2015	Main property	Current market value	In your opinion, how much would you receive if you sold your property today?
	Other real estate assets	Current market value	In your opinion, how much would this property be worth now if you sold it?
	Mortgage on main property	Amount still to pay on mortgage or loan	How much do you or your husband/wife/partner still have to pay on your mortgages or loans, excluding interest?

A similarity between the two surveys is that they collect information on the value of the house and on mortgages with two separate questions. The number of questions on wealth is of crucial importance because people might for instance forget about a small mortgage if the question is not specifically asked. Surveys that ask only a general question about wealth are therefore expected to suffer from underreporting. Too many questions might however induce non-response. Looking at Table 1, it is clear that these two surveys differ in the number of questions asked. SILC does not distinguish the primary from the secondary residence and asks a question about mortgages on all real estate assets, whereas SHARE asks two separate questions about assets for the primary residence and other real estate assets and only one question about mortgages on the primary residence. This choice has important implications for the imputation because these surveys contain many information on the primary residence (size, year of construction, environment), but much less on the secondary residence. For this reason, house characteristics are not used in SILC for the imputation of missing values.

The second column of Table 1 indicates that the value of a real estate property cannot be measured easily and depends on estimations. Respondents might refer to different measures when indicating the value of the house (e.g. price at the time of purchase, estimated market value, taxable value, insurance value or reallocation value). Even if difficult to acquire, the OECD suggests using current market values to estimate housing wealth. Compared to its previous version (CH-SILC 2011), CH-SILC 2015 asks respondents to choose the type of the value indicated among the estimated current market value, the historical market value, the taxable value and the insurance value. Respondents tend to indicate the current market value, as suggested by the survey, and as second choice, the purchase price or the taxable value (see Figure 1). A distinction emerges between the current market value and the purchase price when we run multinomial logistic regressions on socio-demographic characteristics of respondents. Results indicate that active, high-educated men living in urban areas and large houses prefer the current market value, whereas young people and inactive, low-educated women living in rural areas and small houses prefer the purchase price. This is an important information because this value choice might reduce selective non-response. SHARE differs in this respect and follows the OECD guidelines specifying the type of value (i.e. the current market value) that respondents have to indicate.

Figure 1: Value choice in SILC 2015



As presented in the following sections, all these choices have important consequences on data accuracy.

### *Coherence*

Before an analysis of accuracy, we investigate coherence. Coherence is defined as the adequacy of the data to be reliably combined in different ways and for different uses. External coherence is the coherence with external sources of information, such as national accounts or population census.

Survey data on wealth can also be compared with tax statistics, but all structural differences of the two statistics should be taken into account. The first difference is given by the unit of analysis. Tax statistics use tax units, which can be different from the households measured in survey data. Cohabiting couples not legally married or in a recognized partnership are for instance considered as two separate tax units even if they are part of the same household. Another difference is that the tax value of real estate properties is usually lower than the market value. Depending on the canton, taxes on real estate are estimated at 70-100% of the market value, which is re-estimated every 10-15 years. The Swiss National Bank collects data on real estate properties since 1998. Foellmi and Martinez (2016) found that SNB data and tax data show the same trend over time.

Given that national accounts are aggregates of the overall population, we could not compute the coherence of SHARE and we focused on SILC data. Table 2 illustrate how SILC data on positive housing wealth corresponds in an accurate way to the national aggregate of the corresponding year (we remind that income and wealth collected by SILC refer to the previous year). Positive housing wealth in SILC is 98% of the national aggregate. Net worth in SILC is slightly less precise, but still 88% of the national aggregate. We can therefore conclude that SILC is coherent with national accounts.

Table 2: Comparison between SILC 2015 and Positive National Accounts (PNA) 2014

PNA for real estate assets 2014	1,820,517,000,000	PNA for net worth 2014	3,339,725,000,000
SILC 2015	1,761,000,000,000	SILC 2015	2,061,000,000,000
PNA for real estate assets 2014 (mean)	220,999	PNA for net worth 2014 (mean)	405,421
SILC 2015 (mean)	217,212	SILC 2015 (mean)	356,301
Ratio	0.98	Ratio	0.88

### *Accuracy*

Accuracy refers to the degree to which the data correctly allow estimation of the population characteristics they are designed to describe.

We analyse accuracy with descriptive statistics across surveys and with analyses of non-response.

In order to evaluate the distribution, we plot means by age groups with SILC and SHARE. Figure 2 shows that the two surveys are extremely close in terms of positive housing wealth for the

comparable age groups. Given that SILC was coherent with respect to this wealth source, this means that the coherence of SHARE data is also high. The picture changes when we analyse mortgages. SHARE has much lower means of mortgages and this is because there is no question about mortgages on secondary properties. Mortgages are therefore underestimated in this survey and consequently net housing worth is overestimated. A closer look at the distribution by percentiles shows that this bias is particularly strong at the top of the distribution, where mortgages might be strategic investments to reduce the fiscal burden of these households. We can therefore conclude that the measure of net housing wealth in SILC data is more precise than the measure of net housing wealth in SHARE.

Figure 2: Housing wealth by age groups, comparison of SILC and SHARE



In terms of missing observations and non-response, we must acknowledge that there is a difference between unit non-response (UNR) and item non-response (INR). UNR happens when the unit (the interviewee) refuses to answer to the entire questionnaire, whereas INR represents the refusal to answer to particular questions. INR might happen for several reasons. Some questions might be judged too personal to be answered, whereas others might require too much effort to find the correct information (e.g. questions linked to specific income components or special insurances that need particular documentation). UNR is corrected through weighting, whereas INR is corrected through imputations. In this section, we analyse INR.

With a set of 16 socio-demographic variables that might influence INR, we find that only 8.5% of the INR regarding housing wealth in SILC and 5.2% of the INR of housing wealth in SHARE are explained. We can therefore conclude that there are non-response is not selective on observables in both surveys.

Apart from INR, both SILC and SHARE trim the data at the extremes. SHARE imputes the top and bottom 2% of the distribution and implausible values, whereas SILC trims top observations that exceed three times the inter quartile range. In SHARE, we know whether the amount has been imputed because of complete INR, because the answer was not precise and belonged to a bracket of values, or because the value exceeded predetermined thresholds. The thresholds set by SHARE can be found in Table 3. The imputation procedure in SHARE is more complex than in SILC and imputed values for net housing wealth constitute a higher percentage (24% in SHARE vs. 9% in SILC). Non-response rates are similar for positive housing wealth and mortgages. Excluding data trimming, SILC has considerably lower non-response rates (7 p.p. lower) for the same age groups due to refusals or "don't knows" than SHARE. The mean wealth of imputed value is slightly higher than the mean of non-imputed values in SHARE and slightly lower in SILC. Although it is difficult to judge the precision of imputations, we can conclude that imputations in SHARE are based on more information, but SILC impute fewer cases also due to the possibility to choose the type of value of housing wealth.

Table 3. Range of feasible values of asset variables - SHARE 2015

Description	Lower bound (L)	Upper bound (U)
Amount still to pay on mortgages or loans	150	10000000
Value of the house	1000	15000000
Value of real estate	500	10000000

Notes: Amounts in Euro

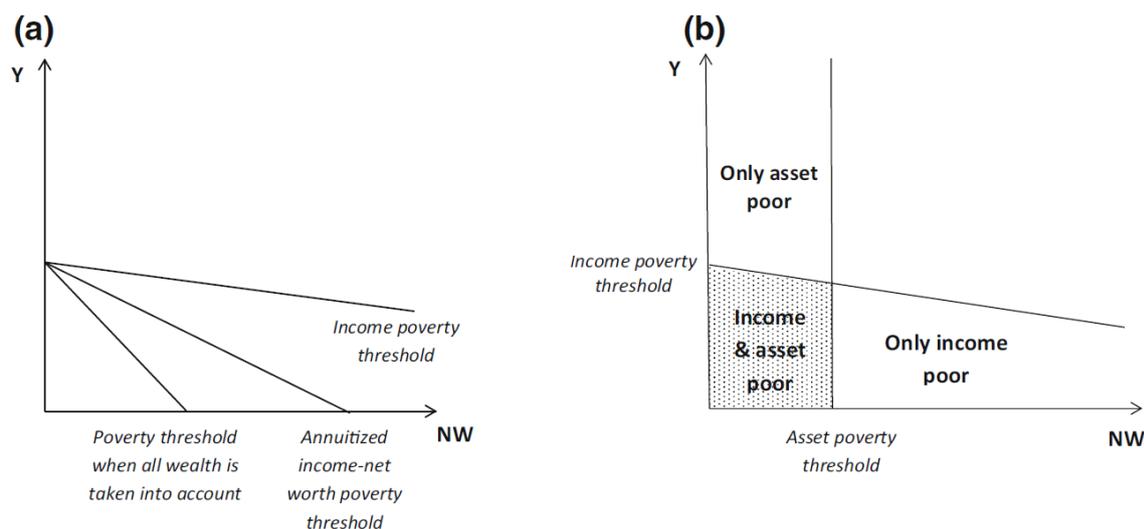
### *The joint distribution of income and wealth applied to Switzerland*

Now that we have established that SILC data on housing wealth is of good quality, we can focus on an analysis of inequality and poverty.

According to tax register data, Switzerland has around 716,000 millionaires and the median wealth of the country corresponds to USD 244,000 (CreditSuisse, 2016). In 2011, the top 10% of wealth owners detained around 75% of all wealth, the top 1% had 40% of all wealth and the top 0.1% slightly more than 20% (Foellmi & Martinez, 2016). These estimates decrease when pension wealth is taken into account. Figures about wealth inequality in this country are all based on tax statistics. The Gini index of net worth was 0.8 in 1997 (Davies et al. 2011), the highest among 26 countries, 0.85 in 2008 (Peters, 2011) and 0.72 in 2016 (Davies et al. 2016). Wealth inequality is therefore almost three times higher than the inequality of disposable income in this country (Suter et al. 2016). Given that wealth can be used to smooth consumption during periods of low income, research has been stimulated to create a more comprehensive measure of inequality and poverty based on both income and wealth. To the best of our knowledge, no figure exists about the joint distribution of income and wealth in this country. Studies on income and wealth inequality based on the LWS found a strong correlation between income and wealth even after the inclusion of common socio-demographic explanatory variables (Jännti, Sierminska & Van Kerm, 2013). Even if there might be a trade-off between income and wealth because of individual choices, the covariation is found to be particularly strong at the extremes of the distribution. There are mainly two approaches to combine income and wealth in the

literature. The first approach creates a unidimensional poverty index through the annualisation of wealth (see Weisbroad & Hansen 1968, Short & Ruggles 2004 and Zagorsky 2005 with different surveys from the US, Van den Bosch 1998 with the Belgian Socio-Economic Panel, Brandolini et al. 2010 with LWS data), the second approach uses two separate poverty lines (Kim & Kim 2013 for Korea, Azpitarte 2012 for Spain and the US, Headey 2008 for Australia, Haveman & Wolff 2004 for the US). Results from both approaches have been recently compared by Kuypers & Marx (2016) for Germany and Belgium. The two approaches can be graphically represented in Figure 3.

Figure 3: Poverty lines according to two different methodologies



Sources: Kuypers & Mark (2016), Brandolini et al (2010). Notes: a. Unidimensional poverty index, b. Two-dimensional poverty index.

Annualised income illustrated in Figure 3a corresponds to the following formula:

$$AY_t = Y_t + \left[ \frac{\rho}{1 - (1 + \rho)^{-n}} \right] NW_{t-1}$$

$$n = T \quad \text{for unmarried,}$$

$$T_1 + (T - T_1)b \quad \text{for married}$$

where the sum of income (Y) and net worth (NW) is corrected for life expectancy ( $n$ )<sup>3</sup> and the interest rate ( $\rho$ ), which is usually set at 2%<sup>4</sup>. The two-dimensional poverty index can be summarized by the following two expressions:

<sup>3</sup> It is interesting to notice that wealth and life expectancy are correlated. Wealthy respondents live longer and their wealth is therefore spread over more years. As they are the wealthiest, this should not have an impact on poverty rates. Some authors have proposed to correct for this correlation in future studies (Kuypers & Marx, 2013).

<sup>4</sup> Interest rates might depend on the initial level of wealth and on the financial literature (e.g. educational level) of the respondents. These corrections are not taken into account in this version of the paper.

$$\text{Asset poverty} : NW_{t-1} < \zeta Z_t$$

$$\text{Income poverty} : Y_t < Z - r_t NW_{t-1}$$

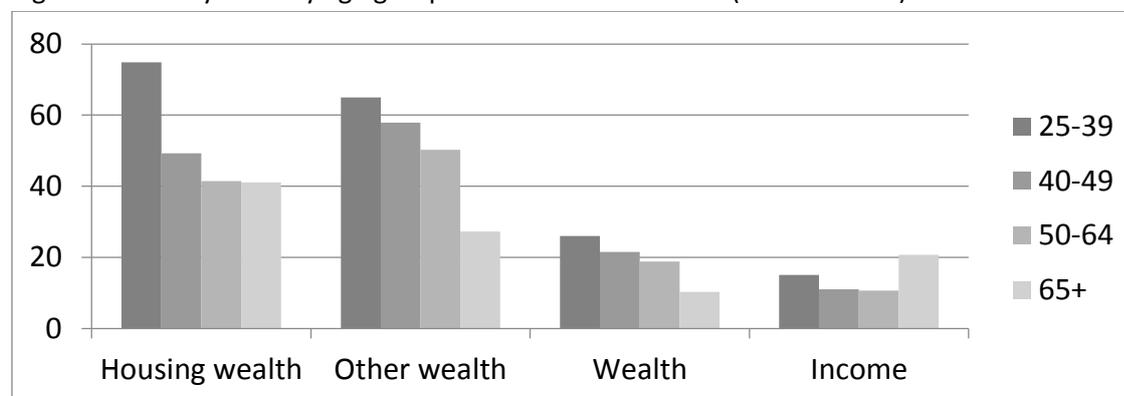
where the income poverty line ( $Z$ ) is reduced both for net worth ( $\zeta$  usually equal to  $1/4$ ) and for income ( $r$ =rate of return on assets).

The second method is able to separate income poor, asset poor and jointly poor households. For this and other reasons<sup>5</sup>, this method suffers from fewer critiques than the method based on annualised income. Annualised income is however more useful to create inequality indices that include wealth. In this empirical test, we apply the two methods to CH-SILC 2015 using the official relative poverty line fixed at 60% of median income<sup>6</sup>, the OECD modified equivalence scale for income and a correction for the household size for wealth<sup>7</sup>. Results are illustrated in the following section, first for poverty and then for inequality.

#### *Results on poverty and inequality with CH-SILC*

Simple results on poverty applying the official poverty line at 60% of the median disposable annual income, which corresponds to 30,072.75 CHF in 2015, are displayed in Figure 4. The figure shows a clear life-course pattern with the young being asset poor and the elderly income poor. From these results, wealth poverty among the young appears higher than income poverty among the elderly. This is partly due to the fact that very few households between 25 and 39 years old have sufficient housing wealth not be defined poor according to this sole criterion.

Figure 4: Poverty rates by age groups and income or wealth (CH-SILC 2015)



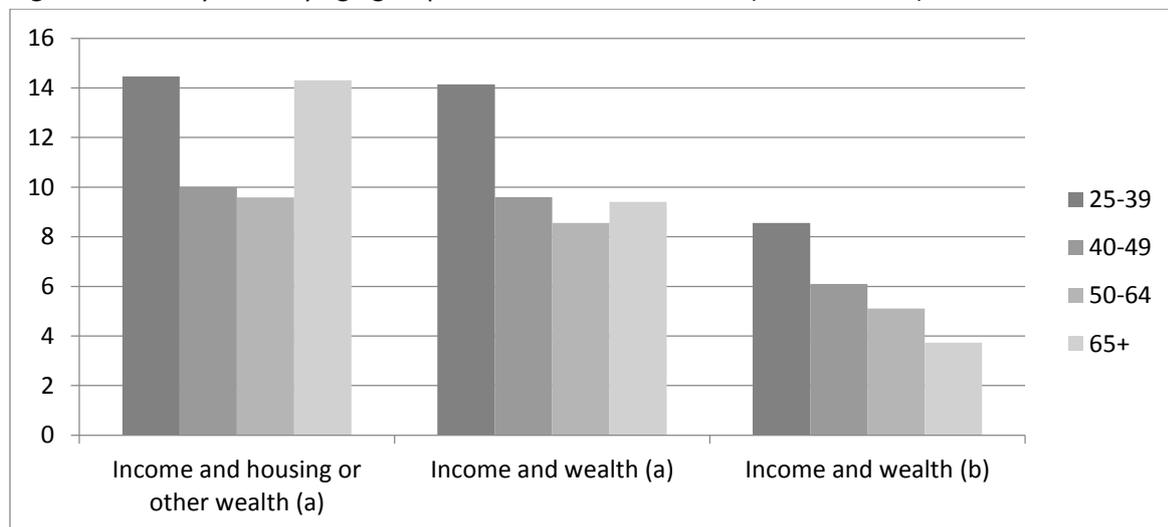
<sup>5</sup> Among other reasons, annualised income is criticised because based on the assumption that all wealth is consumed during the life-course. There is therefore no room for bequests.

<sup>6</sup> To keep the relativity of the measure, the poverty line might be adjusted at 60% of the median of annualised income. This would of course augment poverty rates. As no agreement has so far been reached about which percentage to use, we apply income poverty lines also to annualised income.

<sup>7</sup> Equivalence scales are usually applied also to wealth because of economies of scale. Wealth supports current consumption and for this reason it should be adjusted by the household size. In case of annualised income, the fact that some children might become self-supporting adults in the future might be compensated by unspent wealth left in the form of bequests. Some studies use the square root equivalence scale for both income and wealth (Brandolini et al. 2010, Azpitarte, 2012). A recent study found that results for poverty are stable if the household size is raised to an exponential value equal to 0.55 or higher. Dividing by the square root of the household size or the simple household size should therefore make no difference on the results.

A more interesting picture appears when both income and wealth are combined (Figure 5). The young and the elderly have a similar poverty rate when either housing wealth or other wealth is combined with income, whereas poverty declines by a large extent for the elderly when both wealth sources are included in the overall measure of wealth. This means that housing wealth is not enough to explain the difference in living conditions between age groups. The accumulation of overall wealth during the life course creates a declining profile of poverty rates across age groups. This declining profile is more visible applying the two-dimensional poverty index, than the unidimensional poverty index. With the unidimensional poverty index, the poverty rate of the young is more similar to their poverty rate according to income and the poverty rate of the elderly is more similar to their poverty rate according to wealth. In both cases, the poverty rates based on both income and wealth are lower than the poverty rates based on only one source. What is also much lower is the poverty rate produced by the two-dimensional poverty index. The difference in poverty rates between the two methods is more than 5 p.p.. The two-dimensional poverty index is therefore more restrictive than the unidimensional poverty index.

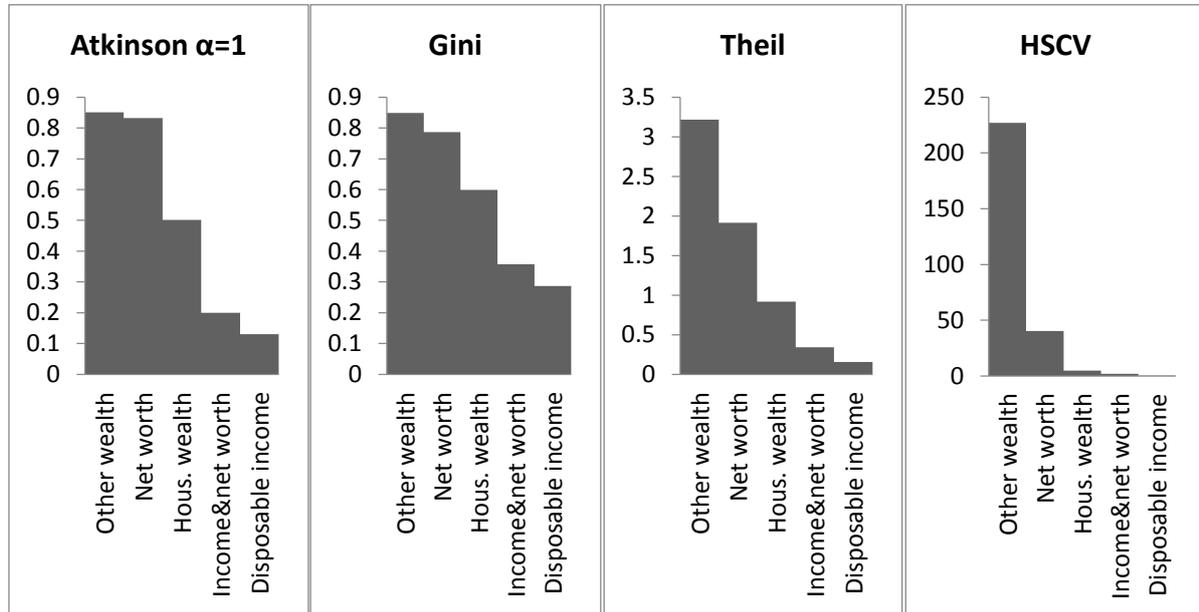
Figure 5: Poverty rates by age groups and income and wealth (CH-SILC 2015)



Income inequality can be computed using different indices. In this paper, we focus on a set of classical indices that study the entire distribution. Therefore, we do not present results about percentile ratios. The reduction of information on the entire income distribution to a single number requires implicit or explicit rules (Suter et al. 2016). The inequality measures we present here weight inequalities at different parts of the distribution. We present one index more sensitive to changes at the bottom of the distribution (the Atkinson's index with the parameter for distaste for inequality equal to one), one index more sensitive to changes at the top of the distribution (the half squared coefficient of variation HSCV) and two indices more sensitive to changes in the middle of the distribution (the Gini coefficient and the Theil index). Confirming previous literature, results indicate that inequality at the top of the wealth distribution is extremely high and that wealth is much more unequally distributed than income all over the distribution (see Figure 6). In 2015, the Gini index for net worth in CH-SILC is equal to 0.79. This figure is not far from what has been found with tax register data. It is interesting to notice that other wealth is much more unequally distributed than housing wealth and that the composite measure of income and net worth has an inequality level in between the inequality of disposable income and net worth. The inequality of annualised income is clearly

more similar to the level of inequality of disposable income than to level of inequality of net worth. Performing some index decompositions, housing wealth is found to contribute to 52.5% of the inequality of the unidimensional index of income and net worth.

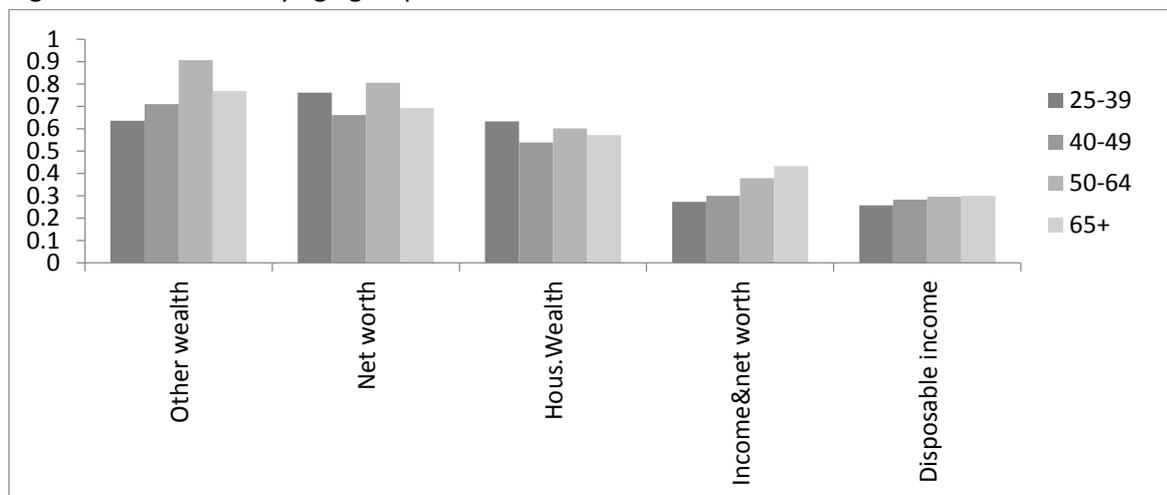
Figure 6: Inequality indices for income and wealth



Source: SILC 2015

We now place a particular focus at the centre of the distribution computing Gini indices by age groups (see Figure 7). With respect to total wealth and other wealth than housing wealth, the group that appears more unequal is composed by individuals between 50 and 64 years old. Housing wealth is more unequally distributed for the young, whereas disposable income and annualized income is more unequal for the elderly. Inequality of annualized income follows the distribution of inequality of disposable income and its level is amplified by wealth.

Figure 7: Gini indices by age groups



Source: SILC 2015

Inequality in annualized income increases with age following a life-cycle model of income and wealth accumulation.

### *Concluding remarks and further discussion*

An analysis of the relevance of questions on housing wealth, coherence with national accounts and accuracy of estimations has certified good data quality for CH-SILC 2015. The possibility to choose the value of housing wealth among current market value, purchase price, taxable or insurance value increases response rate compared to other surveys where respondents have to declare only the current market value. Young households and low-educated individuals are those who benefit the most from the possibility to declare the price they paid when they bought real estate assets.

We apply two methods to combine income and wealth to compute indices of inequality and poverty with CH-SILC 2015. Results indicate that a combination of both housing and non-housing wealth explains the difference in poverty rates between the young and the elderly. Even though the two-dimensional poverty index is much more restrictive than the unidimensional poverty index, the young appear as a more vulnerable group than the elderly with both methods.

With respect to inequality, the most unequal age group depends on the source of wealth we analyse. The young are more unequal in terms of housing wealth, whereas the elderly are more unequal in terms of annualised income.

These results are still subject to a debate about the inclusion or the exclusion of primary home wealth in the measure of total net worth. On the one hand, homes are not easy to convert into cash to foster consumption and their current market value might be detached from the original purchase price. Among home owners, those who live in expensive houses have therefore the same economic possibilities than those who live in basic houses. For these two reasons, primary home wealth should be excluded from the measure used to evaluate poverty. On the other hand, home ownership increases the money available for non-housing consumption by reducing housing expenditure. For this last reason, housing wealth should be included in the measure of poverty. The current structure of SILC does not allow further developments of this methodology. We plan on expanding the analysis using other datasets that disentangle primary home wealth from other types of wealth (e.g. SHP or SHARE) to make some refinements in the measure used to calculate poverty rates based on income and wealth. This might have further consequences on the age-related asset poverty. According to the normal life-cycle, young households have higher mortgages and lower net housing wealth compared to the elderly. Main residences are therefore a high part of net worth of the elderly, whereas young households might appear poorer simply because they have lower net worth and longer life expectancies. Other wealth sources that might change age-related poverty and inequality are pension entitlements. Future work might therefore focus on the inclusion/exclusion of these important wealth components.

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