2.5 Income and Replacement Rates
Erik Mjos, Gema Zamanz, Memakhi Fernandes

Incomes of the elderly form one of the main research and policy issues in the area of aging. On the one hand, aging populations imply that in pay-as-you-go systems the incomes of more retirees have to be paid by fewer workers, which may put an unacceptable burden on the younger generations, and may lead to concerns about the affordability of pension systems. On the other hand, there are also concerns about whether individuals have accumulated enough pension wealth to secure an acceptable retirement income. In this section, we will compare income distributions and income changes, especially those related to retirement, in SHARE, HRS, and ELSA, and will briefly look at changes in income inequality related to retirement.

Definitions and Construction of Income Variables

In all three surveys, income is asked in great detail. Because in this section we compare overall household income, the answers to the large numbers of questions about detailed income components have to be converted into a single measure. Apart from a relatively straightforward but tedious programming effort to sum the individual components, taking account of different routing through the questionnaire depending on answers to previous questions, this also requires a non-negligible amount of imputation. The latter is necessary, because respondents sometimes do not know a specific amount, in which case they often are asked to indicate a range through an unfolding brackets sequence, or they refuse to answer a certain question. Given the large number of questions that the total household income depends on, even a small fraction of missing data or bracket responses implies that for a relatively large fraction of households, an exact total cannot be directly computed. Paccagnella and Weber (2005) discuss these issues in detail.

Although there are some differences, the imputation methods used are fairly similar across studies and across waves. Therefore, we will not discuss these here in detail. A description of the method used for SHARE is given in Brugiavini et al. (2005, 2008), a summary of the imputation methods for the RAND HRS is given in chapter 3 of St.Claire et al. (2008), and the imputation methods used for ELSA are documented in Taylor et al. (2003).

There are, however, substantial differences in the definitions of the income variables provided. Gross income was asked in SHARE Wave 1, which consequently provided gross household income, both nominal and purchasing power parity (ppp) adjusted, using a weighted mean of the 11 original SHARE countries in 2004 as a basis. In contrast, net income components were asked in SHARE Wave 2. From these, both nominal and ppp-adjusted net household income have been generated by the imputation team of SHARE. The basis for the ppp adjustments is Germany in 2004. The reasons for changing the basis for ppp adjustments are explained in Christiels (2008a, 2008b), who also outlines how the ppp adjustments should be performed. As argued in Paccagnella and Weber (2005), for comparisons of income levels across countries it is preferable to use ppp-adjusted income.

A preliminary version of the generated (and imputed) ppp-adjusted net income data for SHARE Wave 2 has kindly been made available to us by Omar Paccagnella. The change from gross to net and to a different base for the ppp adjustments means that the generated income variables from the public releases of SHARE Wave 1 cannot be used for compari-

son with Wave 2 data. Therefore, tentative conversions from gross to net have been made for Wave 1 by the same team, and these have been made available to us as well.

The HRS asks about gross income. The RAND version of the HRS thus includes generated (and imputed) variables for nominal gross total household income for each wave. In order to make HRS income comparable to SHARE income, we have to convert gross income to net income and then convert the latter from nominal dollars to ppp adjusted euros. The first task was accomplished for the 2000, 2002, and 2004 waves of the HRS by Rohwedder et al. (2006), who submitted HRS data to the NBER Internet TAXSIM calculator (http://www.nber.org/taxsim/; see also Feenberg & Courts, 1993). A preliminary version of an update of this, which includes HRS 2006 income data, was kindly made available to us by Philip Pantoja. However, several states in the USA levy state income taxes. State information is not available in the public release of the HRS. Therefore, the resulting data set contains 51 records for each respondent (50 states and DC). By restricting the data to only those states that are in the Census Division the respondent lives in (which is available in the public data), we could narrow this down to 3-9 states per household.

The statistically correct way to use these data would be to do a multiple imputation using posterior probabilities of living in each state. This, however, requires the total number of respondents from each state in the HRS, which is not available. Therefore, we have opted for a practical approximation, which treats the different records per household as independent observations, but keeps their combined sampling weight equal to the original sampling weight of the household by multiplying the original weight by a state population size (within the age-gender-race-ethnicity cell of the respondent) based proportion.

We then converted nominal dollars to ppp-adjusted euros by augmenting a spreadsheet, kindly provided to us by Dimitris Christiels, which computes the ppp adjustment factors for the SHARE countries, with OECD data on price levels, inflation rates, and exchange rates for the USA and computing ppp adjustment factors using the same formulas as used for the SHARE countries (Christiels, 2008a, 2008b).

Finally, ELSA provides net income (in English pounds per week) in its financial derived variables data set. At the time of writing, this data set was not yet available (not even a preliminary version) for 2006. Hence, when we compare cross-sectional income distributions below, we only include ELSA for the 2004 comparisons. For the income change analyses, we used the changes from 2002 to 2004 in ELSA to compare with 2004-2006 changes in SHARE and HRS. The ELSA amounts were ppp adjusted using the same OECD sources and the spreadsheet used for the HRS as well.

Despite the efforts to arrive at income measures that are closely comparable, some problems with the definitions and calculations of these variables remain. To mention the most salient of these: (1) The income measure in ELSA is more aimed at measuring disposable income than simply net (after tax) income. One of its components is “take home pay”, which subtracts, among others, union fees and “etc.” from gross earnings. These components are not subtracted from gross earnings in the other studies. (2) For the IRS data, the TAXSIM program occasionally returns very large (positive) tax amounts, resulting in negative incomes. Sometimes it also returns large negative tax amounts, especially of state taxes. (3) The preliminary net income variable for SHARE Wave 1 is based on very crude computations and may therefore be subject to occasional substantial errors. (4) The ppp adjustments are based on OECD estimates of price levels, inflation rates, and exchange rates. Those estimates are updated frequently and occasionally result in substantial changes.
Hence, the results presented in this section are tentative and should only be used with considerable caution. As time progresses, experience with using the derived variables will probably lead to substantial improvements in these variables. Stronger conclusions about similarities and differences between countries and studies can then be drawn.

In the following, all analyses are performed at the household level, on a data set from which net household incomes (PPP adjusted towards 2004 German euros) of less than 1,000 euros or more than 1 million euros have been removed. The 1 million threshold only affects a handful of observations in the HRS, with one observation with a net income of more than 14 million euros in 2006. Although a detailed study does not give rise to a suspicion of reporting errors, and this may well reflect an aspect of the US economy that is rarely observed in Europe, this particular case increases mean income substantially (10%) and the standard deviation almost without bound, so that we cannot expect that these results give an accurate picture of the US income distribution. The restriction to only households with net incomes of 1,000 euros or more was imposed for similar reasons, although here the mere fact that incomes are below 1,000 euros is itself reason for concern about the accuracy of the data. This holds especially for incomes that are zero or negative. Small positive incomes tend to have effects on the distribution of relative income changes that are similar to the effect of the single outlier on the US income distribution, if their next wave’s income is well above 1,000 euros. This restriction removes about 1.5% of HRS households, 2.5% from SHARE Wave 1 and 5.5% from SHARE Wave 2, and 2.5% from ELSA.

Income Distributions in 2004 and 2006

We first compare income distributions within the three studies separately for 2004 and 2006. Table 1 presents a few key characteristics of these distributions. The distributions all share the typical characteristics of income distributions: the mean is considerably higher than the median and the amount of variation is very large. This is the result of the asymmetry and long right tails of the distributions. The large skewnesses and kurtoses (not reported here) confirm this.

<table>
<thead>
<tr>
<th>Study</th>
<th>Median</th>
<th>Mean</th>
<th>s.d.</th>
<th>Gini</th>
<th>Median</th>
<th>Mean</th>
<th>s.d.</th>
<th>Gini</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHARE</td>
<td>22,000</td>
<td>35,000</td>
<td>42,000</td>
<td>0.49</td>
<td>17,000</td>
<td>23,000</td>
<td>22,000</td>
<td>0.44</td>
</tr>
<tr>
<td>HRS</td>
<td>32,000</td>
<td>45,000</td>
<td>52,000</td>
<td>0.47</td>
<td>30,000</td>
<td>43,000</td>
<td>51,000</td>
<td>0.47</td>
</tr>
<tr>
<td>ELSA</td>
<td>18,000</td>
<td>24,000</td>
<td>26,000</td>
<td>0.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Distribution of real net total household income, PPP-adjusted (in 2004 Euros)

More striking in this table are, however, the sizes of the differences in the income distributions from different studies and, especially for SHARE, the large drop in incomes between 2004 and 2006. Some of the qualitative patterns in the differences are well known or easy to explain. For example, the smaller variation in ELSA and the corresponding smaller Gini coefficient (less inequality) are to be expected because the population is much more homogeneous than all SHARE countries combined or the much larger and diverse USA. Also the higher median and mean incomes and larger variation in the USA than in Europe are well known. In addition to just generally higher incomes in the USA, his also reflects the much higher labor force participation of women in this age group, as shown in the previous section.

The drops in median and average income in the HRS do not necessarily reflect an income drop in the population, because the HRS does not contain a refreshment sample in 2006. Hence, the 2006 sample is typically two years older than the 2004 sample and contains largely the same respondents (except for some nonresponse patterns). The cross-sectional weights included with the HRS are only partially able to correct for this. In fact, we will see below that median and mean income differences at the individual level in the HRS are of a similar order of magnitude. Income drops at the individual level are to be expected, because a non-negligible fraction of the sample (and population) will have retired between waves, which is generally associated with a significant income drop. We will study this below.

The differences in median and mean income in SHARE between 2004 and 2006 are partially due to differences in sample composition, in particular the inclusion of Poland and the Czech Republic in Wave 2 of SHARE. If we exclude these from the 2006 computations, the median and mean each increase by about 2,000 euros and the Gini coefficient decreases to 0.42. However, this still leaves a large income drop to be explained. Apart from true declines in (real) income, a prime candidate explanation for this is the imperfection in the algorithm used to compute net income from gross income components in SHARE Wave 1. Indeed, there are some indications that the subtracted tax amounts are too small. Most likely, this will be improved in a future release, where more detailed tax calculations may be performed. Another potential explanation could be random nonresponse, which could make the refreshment samples in Wave 2 very different from the Wave 1 respondents who are not present in the Wave 2 sample. The latter can typically be corrected to a large extent by computing attrition-corrected weights and using these corrected weights to compute estimates of interest. This has been done for the HRS by Kaptyn et al. (2006), but they did not find any noticeable bias due to selective nonresponse that was not already corrected for by the HRS-provided cross-sectional weights. Therefore, we have used the standard HRS weights in this chapter. Perhaps such an analysis for SHARE will show that corrections are more important. We leave this for further research.

Changes in Household Income and their Relation with Retirement

Table 1 above presented differences between 2004 and 2006 that reflect differences between overall distributions, but not necessarily average differences at the household level, because the figures are based on partially different samples. Even in the HRS, where no refreshment sample was added in 2006, there are households that were present in earlier waves but not in 2004 who returned to the sample, and households that were present in 2004 but not in 2006. Different cross-sectional weights in the two waves are then used to make each sample representative of the population in the same year. In contrast, we turn our intention to income changes at the household level. That is, we select only the households that are present in both waves, compute their income changes, and study the distributions of these. Where the differences between marginal distributions mainly (should) reflect economic growth and inflation, the analyses here mainly reflect income changes as a result of the aging process, i.e., reflect income difference across the life cycle. This is especially interesting for individuals who have retired between waves. Retirement is often accompanied by a drop in income, because pensions tend to be lower than final earnings. A priori, we would expect this effect to be larger on average in the USA than in
Europe, because participation in a pension plan is often mandatory in Europe, whereas it is often voluntary in the USA, while there has been some concern about whether Americans save enough for their retirement.

Table 2 presents some overall statistics. This table and all results presented below are based on a (large) subsample of households, in which the respondent was single in both waves, or in which the respondent lived with the same spouse or partner in both waves. Hence, this filters out changes due to changes in household composition. From Table 2, we see that indeed at the median, incomes decline in the age group studied. The decline is smallest in ELSA, which may be related to the fact that income is lowest there already. The decline is largest in SHARE. The figures for percentage change are, however, somewhat difficult to interpret because the median and mean have different signs. Therefore, we have plotted the densities of percentage change for the three studies in Figure 1, separately for households in which at least one of the spouses retired between waves and for households in which this was not the case (already retired or not yet retired).

<table>
<thead>
<tr>
<th></th>
<th>Absolute Change</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>Mean</td>
</tr>
<tr>
<td>SHARE</td>
<td>-1,100</td>
<td>-6,900</td>
</tr>
<tr>
<td>HRS</td>
<td>-1,000</td>
<td>-3,100</td>
</tr>
<tr>
<td>ELSA</td>
<td>-200</td>
<td>-1,200</td>
</tr>
</tbody>
</table>

Table 2: Distribution of net household income changes (PPP adjusted 2004 Euros).

Note: ELSA results refer to changes between 2002 and 2004.

Figure 1 shows some expected common patterns. The distribution of income change tends to peak at about 0% (no change) if there is no change in retirement status, and has more of its mass below zero (income decline) if people retired in between waves. For the "no-change" households, the HRS is most closely concentrated around zero, and SHARE has the widest spread around this number. This may be the result of the coarseness of the gross to net conversion for Wave 1 of SHARE, leading to both positive and negative errors, so that the density is more dispersed than the true density. Later refinements of this variable may shed more light on this. For the households that retired between waves, the graphs for ELSA and SHARE are qualitatively similar, with a peak at about -35% and a long tail to the right. The HRS picture is different, because the largest peak is at 0%, but with a second peak at -35%.

Figure 1: Distributions of relative income changes.
The Relation between Retirement and Income Inequality

Retirement can have two different effects on income inequality: (1) If there is a sizeable fraction of the population without a satisfactory pension and another group that does have a decent pension, then individuals with similar earnings before retirement may have widely different incomes after retirement, and this may substantially increase income inequality. On the other hand, if either almost all individuals have a satisfactory pension, or almost all individuals only have a (usually minimal) public pension, then income inequality may decrease substantially. For the case where all individuals only receive a (usually homogeneous) public pension, this is obvious. The case where all individuals have a decent private pension also leads to a decrease in income inequality, because private pensions are typically based on a smoothed version of earnings before retirement. Earnings variations across the lifecycle may then lead to contemporaneous inequality while working, but may lead to similar pensions.

To study the net effect of retirement on income inequality, we restrict our sample to the households in which the respondent and/or the respondent’s spouse retired between waves, and compute the Gini coefficient before retirement (2004) and after retirement (2006). Table 3 presents the results. Note that the Gini coefficients are smaller than the ones in Table 1, because the restricted sample is more homogeneous than the whole 50+ population. We see that retirement has no discernable effect on income inequality in the HRS and ELSA, but has a substantial inequality-reducing effect in SHARE.

<table>
<thead>
<tr>
<th>Study</th>
<th>Gini Coefficient 2004</th>
<th>Gini Coefficient 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHARE</td>
<td>0.47</td>
<td>0.37</td>
</tr>
<tr>
<td>HRS</td>
<td>0.42</td>
<td>0.43</td>
</tr>
<tr>
<td>ELSA</td>
<td>0.37</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Table 3: Income inequality before and after retirement (for those who retired between waves)

Note: ELSA results refer to change between 2002 and 2004

References


