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Abstract

This paper investigates the sources of inequality in household gross and net wealth across eight euro-area countries applying the Shapley value approach to decomposition. The research draws on micro data from the Eurosystem Household Finance and Consumption Survey 2010. Dispersion in bequests and inter vivos transfers obtained by households are found to have a remarkable effect on wealth inequality that is stronger than the one of income differences. In Austria, Germany and Cyprus the contribution of real and financial assets inherited or received as gifts to gross and net wealth inequality attains about 40%. Nevertheless, also the distribution of household characteristics (age, education, size, number of adults and children in the household, marital status) within countries shapes the observed wealth dispersion.

Keywords: inequality, wealth distribution, decomposition analysis, inheritance, inter vivos transfers, income distribution, Europe

JEL classification: D31, D63, O52, O57

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Introduction

The topic of household wealth and its distribution has been discussed intensively in the recent literature. One of the reasons for this is the increase of accumulated private wealth in relation to the national income in the affluent industrialised economies particularly from the late 1970s onwards. Before, in the course of the first half of the 20th century, two world wars and the economic depression in between effected a remarkable capital destruction and thus a slump in the ratio of wealth to national income which still remained relatively stable in the three decades following WWII (Piketty, 2014). In addition to this development, in most OECD countries inequality of income rose from the 1980s onwards (see e.g. OECD, 2015). From research based on national (survey) data one can also conclude that at least in a couple of countries also inequality of private wealth started to increase from at least the mid-1980s. For the United States this is argued by e.g. Wolff (2007, 2010) and Kennickell (2003), for Canada by Morissette et al. (2003), for Sweden by Klevmarken (2004), for Finland by Jäntii (2006), for Italy by Brandolini et al. (2004), for Germany by Hauser and Stein (2003) and for France by Piketty (2014). Overviews on developments in wealth inequality on the national level can also be found in Jäntti and Sierminska (2007) and Bonesmo Fredriksen (2012).

Another reason for the increased interest in research on household wealth is that most recently micro data have become available that allows one to study wealth accumulation and inequality not only for individual countries but also across countries in a comparative manner: first via the Luxembourg Wealth Study Database and more recently based on data from the Eurosystem Household Finance and Consumption Survey (HFCS).

This paper aims to analyse the sources of wealth inequality for various euro-area countries and to compare those determinants. As the accumulation of wealth by households is facilitated by the receipt of bequests or gifts (mostly of ancestors), wealth inequality of one generation is likely to be passed on to the following, which over longer periods of time may result in an increase in inequality of wealth within a society. As documented by Piketty and Zucman (2014) in Germany and France the ratio of bequests and gifts to the total stock of private wealth has increased considerably, while remaining rather stable in the United Kingdom and Sweden.

In principle, households accumulate wealth in three ways. Either they save and invest out of their income from employment or self-employment or out of financial sources. The second way, important for many households, is to receive bequests or gifts and save them instead of using the assets for consumptive purposes. A third form, which however cannot be dealt with in this paper, is that the assets owned appreciate in real terms. In our paper we are interested in the process of households' building up of wealth via the first two processes and the respective inequality in asset holdings that results therefrom. In order to detect the sources of wealth inequality across countries we apply a decomposition methodology based on the Shapley value approach to the inequality measure used most frequently in the literature – the Gini index. This decomposition method allows for an assessment of the relative importance of explanatory factors for inequality. While some authors (see the literature review below) have worked already for some decades on measuring how much of the accumulated stock of household

wealth can be attributed to inheritance and intergenerational inter vivos transfers (contrary to wealth accumulated over the life cycle via saving and investment), decomposition approaches to the distribution of wealth have been performed only recently. However, in the literature one can find up to now only decompositions by wealth source but not by subgroups. This latter analysis is performed in the following and should highlight the relative importance of inheritance, income and household characteristics in shaping wealth inequality in a cross-country manner, thus providing a novel contribution to the literature.

The paper is organised as follows: Section 2 provides a brief discussion of the literature on developments of household wealth inequality, the effects of inheritance and inter vivos transfers and on decomposition methods used to analyse income and wealth inequality. Section 3 discusses the most relevant aspects of the data used (sources, measurement issues and definitions) and Section 4 introduces the concept of the Shapley value approach to decomposition, discussing the way we apply this method. Section 5 presents the empirical results of the analysis for inequality in gross and net wealth of households. Section 6 concludes.

Literature review

Existing evidence indicates that wealth is less equally distributed than income. The reasons for this are manifold (for an overview see e.g. Davies and Shorrocks, 2000). Apart from an obvious existing variation in structural differences in terms of skills or fortune, and preferences in terms of saving and consumption behaviour etc. which renders people more or less capable of or disposed to make a fortune, wealth inequality is driven by two main sources. First, the accumulation of wealth takes time if achieved via saving out of income and investment of funds; hence over the lifecycle households have the chance to build up assets, which are then used as a tool to secure consumption levels in times of negative income shocks or lowered income levels after retirement. Thus we would expect a dispersion of wealth according to age groups in the society. The second reason for wealth inequality is to be found in the intergenerational transmission of wealth via bequests or inter vivos gifts. The results of the research on which of the two reasons is more important in shaping the existing wealth distribution differ remarkably. In one of the first empirical papers on the topic Kotlikoff and Summers (1981) summed up the amounts received as gifts or bequests by the current generation, capitalised those and yielded a figure for the present value of household wealth accruing from intergenerational transfers of 46% in total wealth. In a later paper (Kotlikoff and Summers, 1988) they summed up the difference between after-tax labour earnings and consumption expenditure over time, which they denoted as their estimate of aggregate lifecycle wealth, amounting to 19% of total current household wealth in the United States at that time. The remaining 81% they claimed of household wealth can be attributed to inheritance (including gifts). Modigliani (1988) to the contrary argued that only about 20% can be interpreted as such. The large divergence in the results of the cited studies stems inter alia from different views on which investments in the offspring (e.g. education) can be interpreted as intergenerational inter vivos transfers, if household expenditure on durable goods is interpreted as consumption rather than saving and it depends on the degree of capitalisation of intergenerationally transferred wealth. Wolff (2002) estimates a share of 19-35% (excluding investments in education of the offspring) using data from the US Survey of Consumer Finances between 1989 and 1998, while Gale and Scholtz (1994) assume that 51% of the wealth is made up of transfers from ancestors, including trust accumulations and life insurance payments to children in inter vivos transfers but excluding college payments. Davies and Shorrocks (2000) believe that a reasonable rough estimate would be to assume the share of gifts and bequests in total wealth to amount to 35% to 45% in the United States. For France Kessler and Masson (1989) apply the approach of Kotlikoff and Summers (1981) and presents a range of 35-46% depending on the interest rate used for capitalisation of inheritance, while for Canada Davies and St-Hilaire (1987) the same approach results in a range of 35-53%.

The literature on the links between wealth accumulation and inheritance claims that the distribution of household wealth strongly depends on the patterns of bequests or gifts made before the death of the bequeathers to their offspring. For the United States Wolff and Gittleman (2011) and for France Arrondel et al. (2001) find that these wealth transfers are more concentrated than total wealth holdings in those countries. In a very recent paper Fessler and Schürz (2015) highlight the effect of intergenerational transfers on the wealth distribution in euro-area countries, i.e. households are on average lifted by 14 net wealth percentiles in the distribution if having received an inheritance (or inter vivos gift).

In this paper we apply a decomposition approach, an analysis which has already a long tradition in the literature; to be more precise, we perform a decomposition by subgroups, including also groups of households with different levels of inheritance and income received. Early applications and methodological analysis on income sources have been delivered by e.g. Cowell (1980), Fei et al. (1978), Fields (1979) and Shorrocks (1982). On decomposition by population subgroups, Theil (1972) was probably the first to deliver methods and was followed by Bourguignon (1979), Shorrocks (1980, 1984) and Foster and Shneyerov (1996a, 1996b). However, regression-based methods such as the Shapley value approach were introduced somewhat later in the inequality literature starting with Shorrocks (1999 – reprint 2013). In the chapter on methodology below we present the approach. Applications have been done by Fields and Yoo (2000) on labour income inequality in Korea, by Morduch and Sicular (2002) and Wan (2004) on income inequality in rural China, by Molini and Wan (2008) on Vietnam and Gunatilaka and Chotikapanich (2009) on expenditure inequality in Sri Lanka. Contrary to Shorrocks (1999), Fields (2003) estimates the share of the log variance of income that is attributable to explanatory factors. As Manna and Regoli (2012), applying the latter and the Shorrocks method to Italian income inequality, however point out, the Fields decomposition approach has the drawback of being limited to a log-linear functional form for the income generating. A critical review of the Shapley value approach is deliverd by Cowell and Fiorio (2009) and Chantreuil and Trannoy (2013). Israeli (2007) shows how the Shapley approach is related to the method proposed by Fields (2003), who decomposes the R^2 of the underlying regression instead of the resulting inequality measure. The most important advantage of the Shapley value approach is that it takes the potential correlation amongst all regressors into account. More recently Chernozhukov et al. (2009) and Fortin et al. (2010) have introduced applications of decomposition analysis based on counterfactual analysis. For a comparison of various (regression and non-regression based) methods of decomposition see e.g. Heshmati (2004).

Most decomposition analyses have been performed on income inequality and its development over time; only some applications have been done so far on wealth inequality. Wolff (2002) decomposes the coefficient of variation in order to analyse the effect of bequests on wealth inequality in the United States in the 1990s. Brandolini et al. (2004) assess for Italy and Azpitarte (2008) for Spain that wealth inequality is mostly driven by inequality in real assets in contrast to financial wealth assets. Sierminska et al. (2010) study the drivers of the gender wealth gap in Germany, while Lindner decomposes wealth inequality by components for Austria (2011) and other euro-area countries (2015) based on HFCS data. Sierminska and Doorly (2012) analyse the participation and wealth levels for chosen assets across households and show that household characteristics explain a sizeable portion of both wealth participation and wealth levels in a sample of European countries, the United States and Canada. However, no author has decomposed inequality of household wealth by subgroups, which is the aim of this paper thus providing a novel contribution to the literature.

Data

The data for the analysis presented in this paper are drawn from the Eurosystem Household Finance and Consumption Survey for the year 2010 (HFCS 2010 - UDB 1.1 published in February 2015), which was conducted in 15 euro-area countries[1], as Estonia and Ireland are not included. Latvia and Lithuania were not yet members of the euro area at that time. A detailed description of the methodology of the survey is presented by the European Central Bank (2013a). The HFCS provides data on gross and net wealth holdings of households and their components and socioeconomic characteristics for the households and their individual members. Moreover, it covers data on inheritance and gifts received and gross income. Interpreting results in cross-country comparisons of wealth inequality should be done cautiously. As discussed by e.g. Fessler et al. (2013b) and Tiefensee and Grabka (2014), although a lot of ex-ante harmonisation was conducted (European Central Bank, 2013a), there are several aspects of potential methodological constraints regarding cross-country comparability due to non-harmonisation of sampling frames, sample sizes, survey modes, oversampling of top wealth households, reference periods, weighting or imputation methods applied and variations in initial response rates by countries. Nevertheless, as emphasised by Tiefensee and Grabka (2014), 'the HFCS is still the best dataset for cross-country comparisons of wealth levels and inequality in the euro area and it is definitely a first (big) step into the right direction'. The HFCS data offer in order to correct for item non-response five different multiple imputations. We take these imputations into account in our analysis by using Rubin's Rule (Rubin, 1987), which is simply averaging over the estimated coefficients of all five implicates when calculating the final coefficient. Moreover unit non-response is accounted for in the HFCS data by providing 1000 replicate weights, which are all used in our estimations.

In our analysis we decompose two different variables depicting wealth holdings of households: gross wealth (total household assets excluding public and occupational pension wealth) and net wealth (gross wealth minus total outstanding household liabilities). As explanatory variables we apply first total household gross income and five different types of inheritances and gifts (household main residence, further dwellings, land, business and the sum of other assets) received by all household members. Obviously, the net income of households would be a better measure to assess the potential of households to save out of their income; moreover, present income may not be the best predictor of income flows accrued by individuals in their previous (working) life; however, this information is so far not available in the HFCS. In the HFCS 2010 the reference person is asked to provide information on whether the main household residence, if owned, was inherited or a gift. Furthermore, information is collected on up to three inheritances or substantial gifts from someone who is not a part of the current household. Since in the case of Finland no data were provided on inheritances, in the case of France no information was available on the way of acquisition of the household main residence (which could be a bequest or gift) and for Italy and the Netherlands only 2.1% and 6.7% of all households provided information on inheritances (and gifts) received, we had to exclude those four countries from the analysis. Malta could not be included in the analysis either due to multiple data problems. In general, inheritance data have to be interpreted cautiously since inheritances are notoriously under-reported in

[1] The HFCS 2010 was conducted in Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Italy, Luxembourg, Malta, the Netherlands, Portugal, Spain, the Slovak Republic and Slovenia.

wealth surveys. Particularly the rate of refusing to answer questions concerning inheritances increases in line with the wealth holdings of households (Fessler et al., 2013a, 2013b). Most probably this therefore results in an underestimation of wealth inequality.

It should be pointed out that bequests and gifts acquired in the past are not automatically part of the actual present wealth level. In the period between acquisition and the time of the interview of the survey, assets may have been used not only for the accumulation of the wealth stock by the household but e.g. also for consumption purposes or inter-household transfers. In the HFCS households are asked for inherited assets (and gifts) and their value at the time of acquisition, irrespective of if the households still hold them or not. We calculated their present value using the national CPI. Thus a regression of wealth stocks on wealth transfers (received as bequests or gifts) is not a performance of explaining the total sum of wealth by its parts.

In addition to the value of the property at the time of acquisition (by way of inheritance or gift) information is collected on the date of acquisition. In order to make the assets inherited or acquired as gifts comparable both with each other in households and between households, we have to calculate the present value of the assets. This problem is dealt with in different ways in the literature; the assumptions made differ between a depreciation of the real value of assets (by leaving the nominal value of the acquired asset unchanged) and an appreciation of up to 3 per cent annually. Given the lack of information on actual appreciation we resort to the conservative method applied by e.g. Fessler et al. (2008, 2013a, 2013b) assuming the retention of the real value of the asset by appreciation, using the annual national consumer price index (CPI). The data were provided by the AMECO database from 1960 onwards for all countries except for the Slovak Republic and Slovenia. Thus we excluded those two countries from the analysis as well. For assets acquired before 1960 we have to assume no increase in value up to 1960. Of those households having received inheritances and gifts, 1.5% acquired them before 1960 (unweighted average over country shares). Concerning the application of the CPI for the calculation of the present value of the assets inherited or received as gifts we do not differentiate between different kinds of assets since households could swap between asset types. However, in the regression analysis we use the information of asset types however to construct different explanatory variables. In the case of dwellings, land and businesses (including securities and shares) acquired we assume that households have a relatively higher incentive to keep those assets and further invest in them and that those assets appreciate with an interest rate exceeding the CPI (the applied appreciation rate for bequests and gifts) resulting in higher wealth of households having inherited those assets. Thus the present value of the following groups of assets acquired via inheritance (or as gift) were used as separate explanatory variables: household main residence; dwellings apart from household main residence and use of dwellings; land; businesses (also farms are included), securities and shares; further assets inherited (or received as gifts). The latter group of assets includes also the values of those inheritances (or gifts) which comprise more than one specific asset, since in such cases the value of individual assets is not provided for in the HFCS data file.[2] Some information which was used as an additional explanatory variable was not collected in all euro-area countries. This was the case for the question of expectations on the receipt of a substantial gift or inheritance in the future for Spain.

[2] In the case of Belgium 57% of the present value of inheritances and gifts could be assigned to one of the five specific groups of assets described above (i.e. the rest of the value had to be assigned to the category ‘other assets’). For further countries analysed: ES: 66%, LU: 71%, AT: 80%, DE: 82%, PT: 84%, CY: 93%, GR: 94%.

Furthermore we use socioeconomic characteristics as explanatory variables. For this we employed personal characteristics of the household members in order to construct variables for the household level. These are the household level of educational attainment, the average age of adult household members (being more than 19 years of age), the household size, i.e. the number of adults and children in the household. Moreover, we used dummies for the marital status of the household reference person (being single, married, widowed, divorced or living in a consensual union on a legal basis). The reference person of the household provided in the HFCS – UDB 1.1 data file version (variable DHIDH1) is chosen according to the 'Canberra' definition.[3] The household level of educational attainment is calculated as the average attainment level (expressed in average years of schooling needed to attain the education level stated for the individual household members) of all household members above the age of 16 and no longer in education (and thus potentially available for the labour market). The use of socioeconomic characteristics is particularly important in the case of cross-country comparisons since differences in household structures have a substantial effect on the measured summary statistics of wealth distribution in the euro area (see e.g. Fessler et al., 2014). For instance, we expect that households with more members, those with higher average education levels and with higher average age of the household members tend to possess higher stocks of gross and net wealth.

[3] The procedure of identification of the reference person is described in United Nations Economic Commission for Europe (2011).

Methodology

The advantage of a regression-based approach is that the relative importance of many variables and groups of them to explain inequality (socioeconomic characteristics of individuals or households such as age, gender, educational attainment, employment status, but also decisive monetary values such as income, etc.) is taken into account simultaneously. Thus, the regression approach (step 1) allows assessing the importance of each of these explanatory variables conditional on all other variables for any dimension of inequality considered (in our case stocks of household gross and net wealth). The Shapley value approach (step 2) then further allows calculating the contribution of each of these explanatory variables to the respective inequality measure.

The Shapley value approach can be illustrated by using a simple example with three explanatory variables. We first regress individual wealth levels y on these explanatory variables x_i $(i = 1,2,3)$,

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon,$$

where ε denotes the error term. The predicted wealth level is then given by

$$\hat{y}_{123} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \hat{\beta}_3 x_3.$$

This predicted value is then used to calculate the Gini coefficient $\hat{G}^{(0)}_{\{123\}}$, where subscripts denote the variables included. In the first round we then eliminate one variable and calculate the predicted wealth levels $\hat{y}_{\{23\}}, \hat{y}_{\{13\}}$ and $\hat{y}_{\{12\}}$ for each household using the vectors of x_i and the original coefficients β_i from our wealth estimation (see step 1 of the approach). The corresponding Gini coefficients are then given by $\hat{G}^{(1)}_{\{23\}}, \hat{G}^{(1)}_{\{13\}}$ and $\hat{G}^{(1)}_{\{12\}}$ respectively. Analogously, in a second round we eliminate two variables, thus calculating $\hat{y}_{\{1\}}, \hat{y}_{\{2\}}$ and $\hat{y}_{\{3\}}$. The resulting Gini coefficients are $\hat{G}^{(2)}_{\{1\}}, \hat{G}^{(2)}_{\{2\}}$ and $\hat{G}^{(2)}_{\{3\}}$. The final round would then be to include the constant only; the resulting Gini coefficient would thus be $\hat{G}^{(3)}_{\{\}} = 0$.

The marginal contributions are then calculated using the Gini coefficients. The first round marginal contributions for each variable are $C_1^{(1)} = \hat{G}^{(0)}_{\{123\}} - \hat{G}^{(1)}_{\{23\}}$, $C_2^{(1)} = \hat{G}^{(0)}_{\{123\}} - \hat{G}^{(1)}_{\{13\}}$ and $C_3^{(1)} = \hat{G}^{(0)}_{\{123\}} - \hat{G}^{(1)}_{\{12\}}$.

The marginal contributions in the second round of the first variable are given by

$$C_1^{(2,1)} = \hat{G}^{(1)}_{\{12\}} - \hat{G}^{(2)}_{\{2\}} \text{ and } C_1^{(2,2)} = \hat{G}^{(1)}_{\{13\}} - \hat{G}^{(2)}_{\{3\}}$$

The average of these contributions is the marginal contribution of the first variable in the second round, i.e. $C_1^{(2)} = \frac{1}{2}\left(C_1^{(2,1)} + C_1^{(2,2)}\right)$. Similarly we calculate $C_2^{(2)}$ and $C_3^{(2)}$. The third round contribution is given by $C_1^{(3)} = \hat{G}^{(2)}_{\{1\}} - \hat{G}^{(3)}_{\{\}} = \hat{G}^{(2)}_{\{1\}}$ as $\hat{G}^{(3)}_{\{\}} = 0$ and analogously for $C_2^{(3)} = \hat{G}^{(2)}_{\{2\}}$ and $C_3^{(3)} = \hat{G}^{(2)}_{\{3\}}$.

Finally, averaging the marginal contributions of each variable over all rounds $j = 1,2,3$ results in the total marginal effect of each variable, i.e.

$$C_j = \frac{1}{3} \cdot \left(C_j{}^{(1)} + C_j{}^{(2)} + C_j{}^{(3)} \right) .$$

The proportion of inequality not explained is then given by

$$C_R = G - \hat{G}^{(0)}_{\{123\}} .$$

The approach can easily be extended to any number of explanatory factors and to other inequality measures. However, since the number of combinations and thus Gini coefficients to be calculated grows exponentially with the number of variables, in practice is it necessary to combine the variables to seven or eight explanatory factors in order to keep the necessary computing time tolerable. In our case we included in the explanatory factor inheritance the effect of the individual types of bequests and gifts and the effect of expected inheritance; the factor household age includes the variable household age and household age^2, household structure includes the effect of both the variables number of adults and number of children and the explanatory factor marital status comprises the effect of all three dummy variables for single, widowed and divorced reference persons of households (comparing their wealth holdings with those of reference persons being married or living in a consensual union).

Wan (2002) points to the fact that the presence of a negative constant in the regression equation may lead to negative predicted individual income levels. In that case the calculation of a Gini coefficient and thus the contributions of individual variables to overall inequality would be impossible. To overcome this pitfall he shows in Wan (2004) that different model specifications can be used for the underlying estimated income (in our case wealth) generating function, delivering moreover better log-likelihood values than the linear estimation model. Following his approach, we choose for the analysis in this paper a semilog model:

$$\ln y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon . \qquad (1)$$

Since the distribution of wealth data is not only highly skewed but net wealth data also comprise, due to outstanding debts of households, negative and zero values we cannot apply a logarithmic transformation of the data but resort to a transformation often used in the literature on wealth stocks (see e.g. Burbidge et al., 1988; MacKinnon and Magee, 1990; Pence, 2006; Schneebaum et al., 2014) – the inverse hyperbolic sine transformation (IHS):

$$y_i = IHS(W_i) = \ln\left(W_i + \sqrt{W_i{}^2 + 1} \right) . \qquad (2)$$

This transformation is used not only for the wealth stocks but also the calculated sums of inheritances and gifts and the income of households since both can also feature zero and the latter for self-employed income also negative values. Thus our semilog model takes the form:

$$\ln y = \ln\left(W + \sqrt{W^2 + 1} \right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon . \qquad (3)$$

Since we are not interested in the decomposition of the log of net wealth, but net wealth in nominal terms, in the second step of the decomposition analysis we calculate the fitted values for the wealth levels of households after taking the antilog of the above model, resulting in:

$$e^{\ln \hat{y}_i} = e^{\hat{\beta}_0} * \left(e^{\hat{\beta}_1}\right)^{x_{1i}} * \left(e^{\hat{\beta}_2}\right)^{x_{2i}} * \left(e^{\hat{\beta}_3}\right)^{x_{3i}}, \quad (4)$$

where $\hat{\beta}_i$ denotes the coefficients of the estimated regression (3). In our case, after the above-described IHS transformation, this results in

$$\hat{y}_i = \hat{W}_i + \sqrt{\hat{W}_i^2 + 1} = e^{\hat{\beta}_0} * \left(e^{\hat{\beta}_1}\right)^{x_{1i}} * \left(e^{\hat{\beta}_2}\right)^{x_{2i}} * \left(e^{\hat{\beta}_3}\right)^{x_{3i}}. \quad (5)$$

The advantage of this model is that in this case the constant $e^{\hat{\beta}_0}$ becomes now a positive scalar which does not influence the magnitude of the calculated Gini coefficient. The elimination procedure as described above however remains unchanged. As one can see, we approximate wealth inequality with the transformed fitted values of the household wealth levels $\hat{W}_i + \sqrt{\hat{W}_i^2 + 1}$ stemming from $e^{\ln(\hat{W}_i + \sqrt{\hat{W}_i^2 + 1})}$ instead of $\hat{W}_i$. This would only be problematic if we had a large number of negative predicted values. However, since in our sample this is only the case in about 4% of the cases (with mostly low absolute values) the inequality levels calculated are almost the same based either on $\hat{W}_i + \sqrt{\hat{W}_i^2 + 1}$ or $\hat{W}_i$.

Empirical results

In order to describe the situation of wealth distribution in the analysed countries, we start by taking a look at the inequality of income and wealth across countries. Table 1 presents the Gini indices of wealth of households. We can observe that both gross and net wealth are distributed much more unequally compared to household gross income. Moreover, the Gini indices for household wealth are much higher in Austria and Germany, while lowest in Spain, Greece and Belgium. Bequests and gifts at present value are even more unequally distributed than net wealth. Taking into account the underreporting of inheritances, the inequality of bequests may be even higher. This is an effect of the relatively low rates of households having acquired an inheritance (or substantial gift) up to the date of the survey. In Portugal only an estimated 26.5% of all households received bequests, while in Austria the share is 35.2%.

Table 1 / Descriptive statistics of inheritance and gifts, gross and net wealth and household income

	AT	BE	CY	DE	ES	FR	GR	IT	LU	NL	PT
Number of households	2343	2272	1222	3531	6016	14786	2880	7658	937	1299	4294
received inheritance or gift	35.2	31.5	31.2	33.5	30.1	38.3	30.4	2.1	28.9	6.7	26.5
received inh. or gift before 1960	0.7	3.3	1.6	0.6	3.0	2.1	0.1	0.0	1.3	0.8	2.9
Gini coefficients											
Gross wealth	0.734	0.573	0.662	0.725	0.542	0.651	0.539	0.598	0.614	0.514	0.635
Net wealth	0.762	0.608	0.698	0.758	0.580	0.679	0.561	0.609	0.661	0.654	0.670
Real estate wealth	0.732	0.544	0.628	0.760	0.513	0.650	0.553	0.602	0.629	0.584	0.621
Inheritance - present value	0.885	0.910	0.893	0.892	0.922	0.922	0.900	0.998	0.894	0.980	0.948
Gross household income	0.420	0.484	0.446	0.428	0.413	0.384	0.400	0.398	0.420	0.319	0.450

Source: HFCS 2010, own calculations.

Regression analysis

Following the Shapley value decomposition approach described above we first regress the IHS-transformed gross wealth level of the household on the explanatory variables (for a detailed description of those see the part on data above). In our case these are first the HIS-transformed (calculated) present values of five different groups of specific asset types inherited or acquired as gifts. Further explanatory variables are a dummy for the expectation of future substantial bequests or gifts, gross household income and a set of socioeconomic characteristics[4]: the average age of the household members (and the square of this variable), the average education level of household members and the number of adults and children in the household. Moreover, we apply dummies for the marital states of the reference person of the household. We expect wealth of households to increase conditionally on amounts of inheritances (and substantial gifts) acquired and household gross income respectively.

The results presented in Table 2 show that in general the coefficients have the expected signs and are significant for a large part of the explanatory variables in most countries. The explained part of the variance amounts to 34% on average (unweighted over countries) as shown by the R^2. For those three asset types being most important in total value of inherited wealth on average (household main residence, land and further dwellings) the positive conditional correlation with gross wealth is highest for Germany and Austria. An interesting result is that the incidence of having inherited a business alters the conditional accumulation behaviour (more precise results) of households not in all countries significantly, i.e. in Austria, Cyprus and Portugal.

The higher the average age of the household, the more the members had time to accumulate wealth. Coefficients for age and age^2 show that household gross wealth rises with increasing average age of the (adult) household members; however no significant results concerning age could be found for Germany and Luxembourg. For most countries on average the conditional peak of wealth is reached at about 55 years (average age of adult household members). Households with higher average education levels hold conditionally higher gross wealth. In general larger households seem to have the possibility to accumulate higher wealth. Only in the case of Portugal significant results are available for the number of children in the household. More children in the household correlate with lower levels of gross wealth. As expected, households where the reference person is married or lives in a consensual union have conditionally higher wealth compared to all other households. For completeness we should also mention here that in an earlier version of the regression model we included also the gender of the reference person as an explanatory variable and the share of female members in households. However, the results were non-significant.

[4] Obviously one could apply different explanatory variables particularly for detecting the influence of household characteristics. In a robust check we also used alternatively the household type dummies applied by Fessler et al. (2014). The results concerning the contributions of inheritance and gifts, income and education remained robust. The advantage of our set of explanatory variables is that we can identify the individual effects of age, number of adults and children and marital status of reference persons, which are in the case of the above mentioned household type dummies intermingled.

Table 2 / OLS estimations predicting IHS-transformed household gross wealth

Independent Variables	AT	BE	CY	DE	ES	GR	LU	PT
Inheritance by asset types								
Household main residence	0.140***	0.061***	0.078***	0.120***	0.041***	0.093***	0.081***	0.076***
- (IHS)	(0.008)	(0.017)	(0.017)	(0.010)	(0.007)	(0.006)	(0.023)	(0.009)
Money - (IHS)	0.042***	0.036***	0.100***	0.074***	0.038***	0.134***	0.038***	0.048***
	(0.015)	(0.011)	(0.029)	(0.010)	(0.009)	(0.050)	(0.014)	(0.014)
Dwellings excl. HH main res.	0.076***	0.057***	0.034*	0.072***	0.050***	0.002	0.022	0.041***
- (IHS)	(0.014)	(0.012)	(0.018)	(0.013)	(0.006)	(0.016)	(0.019)	(0.012)
Land - (IHS)	0.100***	0.058***	0.066***	0.109***	0.061***	0.038	0.038**	0.094***
	(0.016)	(0.019)	(0.014)	(0.023)	(0.010)	(0.043)	(0.019)	(0.009)
Business - (IHS)	0.035	0.066***	-0.016	0.134***	0.056***	.	0.193***	0.054
	(0.053)	(0.019)	(0.064)	(0.029)	(0.013)	.	(0.073)	(0.066)
Other assets - (IHS)	0.104***	0.081***	0.067**	0.081***	0.060***	0.041	0.044***	0.086***
	(0.012)	(0.014)	(0.030)	(0.020)	(0.010)	(0.029)	(0.014)	(0.016)
Expectation of substantial	0.323**	0.406***	-0.234	0.492***	.	0.280*	0.190	0.505***
gift or inheritance	(0.150)	(0.137)	(0.283)	(0.124)	.	(0.158)	(0.170)	(0.095)
Gross income - (IHS)	0.669***	0.403***	0.351***	0.913***	0.314***	0.340***	0.336*	0.296***
	(0.231)	(0.078)	(0.109)	(0.139)	(0.058)	(0.111)	(0.197)	(0.058)
Household age	0.095***	0.112***	0.134**	-0.001	0.123***	0.238***	0.013	0.088***
(average of adults)	(0.020)	(0.023)	(0.063)	(0.033)	(0.021)	(0.034)	(0.040)	(0.022)
Household age^2	-0.001***	-0.001***	-0.001**	0.000	-0.001***	-0.002***	0.000	-0.001***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household education	0.131***	0.132***	0.110***	0.210***	0.107***	0.085***	0.177***	0.174***
(average of years of adults)	(0.032)	(0.019)	(0.032)	(0.029)	(0.011)	(0.022)	(0.024)	(0.012)
Number of adults	0.365***	0.427***	0.097	0.356**	0.115	0.212***	0.469***	0.067
	(0.107)	(0.089)	(0.113)	(0.145)	(0.071)	(0.074)	(0.118)	(0.066)
Number of children	0.021	-0.127	0.027	-0.036	0.026	0.049	0.030	-0.152**
	(0.066)	(0.118)	(0.081)	(0.079)	(0.070)	(0.068)	(0.090)	(0.063)
Reference person: single	-0.517***	-0.452***	-1.121***	-0.586***	-0.620***	-0.906***	-0.970***	-1.457***
	(0.164)	(0.173)	(0.424)	(0.224)	(0.135)	(0.161)	(0.251)	(0.198)
Reference person: widowed	-0.647***	-0.363*	-1.774***	-0.457	0.101	-0.478*	0.524*	-0.864***
	(0.201)	(0.214)	(0.606)	(0.285)	(0.124)	(0.266)	(0.271)	(0.190)
Reference person: divorced	-0.926***	-0.608***	-0.939**	-0.968***	-0.767***	-0.875***	-0.254	-1.184***
	(0.189)	(0.214)	(0.464)	(0.260)	(0.217)	(0.230)	(0.256)	(0.211)
Constant	-1.141	1.722*	4.668***	-2.958**	4.104***	0.016	5.106***	4.401***
	(2.333)	(1.001)	(1.764)	(1.456)	(0.776)	(1.546)	(1.845)	(0.751)
$R^{2+)}$	0.396	0.302	0.347	0.439	0.343	0.234	0.396	0.225
Observations	2350	2,270	1,054	3,495	6,192	2,879	950	4,304

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
+) R2 using Fisher's z over imputed data
Source: HFCS 2010 - UDB 1.1, own calculations.

In addition to gross wealth of households we also regress net wealth levels on the above-described explanatory variables. The results reported in Table 3 above are similar to those with respect to household gross wealth. Coefficient signs remain in general the same, whilst the share of the explained variance drops to an R^2 of some 18%. This is no surprise since the underlying decisions of households to borrow money for private or business purposes are even more influenced by reasons difficult to be described with the information available from the HFCS. In general, the signs of the coefficients do not change and remain significant in almost all cases. The size of the coefficients increases for most

variables throughout the majority of countries, particularly for inheritance (and gifts) and household income, but also in the case of household age, education level and number of adults in the household. For single and widowed reference person the coefficients become insignificant in a couple of countries while for households with divorced reference persons the value of the negative coefficient rises in most countries.

Table 3 / OLS estimations predicting IHS transformed household net wealth

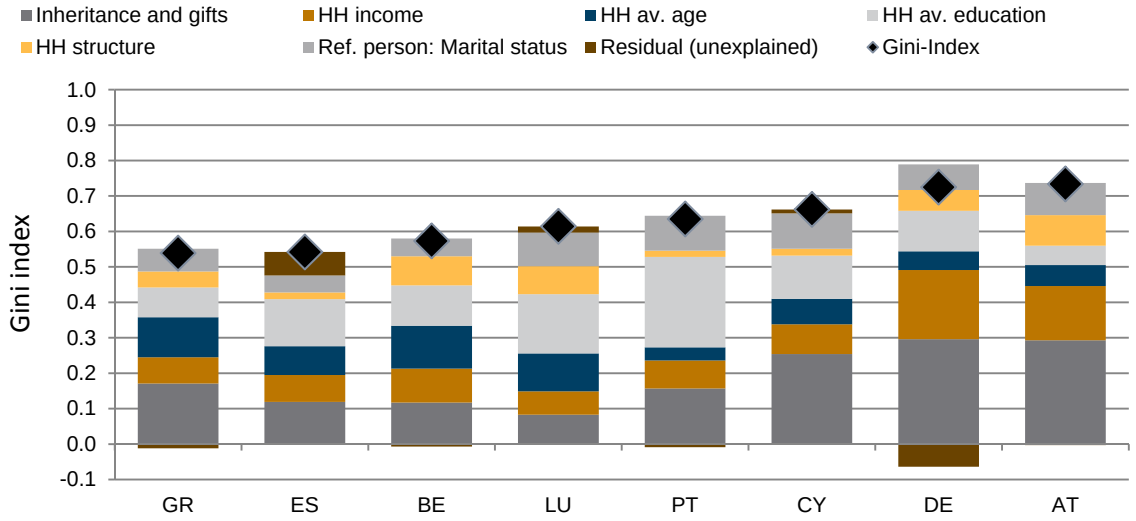
Independent Variables	AT	BE	CY	DE	ES	GR	LU	PT
Inheritance by asset types								
Household main residence	0.211***	0.086***	0.106**	0.173***	0.084***	0.147***	0.136***	0.098***
- (IHS)	(0.021)	(0.021)	(0.043)	(0.020)	(0.013)	(0.010)	(0.035)	(0.014)
Money - (IHS)	0.058*	0.030	0.156***	0.133***	0.064***	0.171**	0.080***	0.071**
	(0.031)	(0.026)	(0.047)	(0.022)	(0.022)	(0.074)	(0.025)	(0.029)
Dwellings excl. HH main res.	0.087***	0.056**	0.014	0.102***	0.073***	0.025	0.004	0.061***
- (IHS)	(0.033)	(0.025)	(0.050)	(0.025)	(0.014)	(0.023)	(0.047)	(0.016)
Land - (IHS)	0.169***	0.076***	0.124***	0.153***	0.087***	-0.093	0.090**	0.129***
	(0.026)	(0.024)	(0.028)	(0.041)	(0.015)	(0.146)	(0.035)	(0.016)
Business, securities	-0.152	0.105***	0.014	0.177***	0.102***	.	0.243**	0.111
and shares - (IHS)	(0.180)	(0.026)	(0.089)	(0.040)	(0.017)	.	(0.099)	(0.081)
Other assets - (IHS)	0.124***	0.058	0.088**	0.098**	0.087***	0.064*	0.054**	0.122***
	(0.033)	(0.052)	(0.044)	(0.045)	(0.016)	(0.034)	(0.022)	(0.025)
Expectation of substantial	0.859**	0.277	0.459	1.429***	.	0.472	0.239	0.859***
gift or inheritance	(0.425)	(0.270)	(0.502)	(0.286)	.	(0.319)	(0.427)	(0.188)
Gross income - (IHS)	0.993**	0.446***	0.321*	1.215***	0.217**	0.353***	0.421	0.243***
	(0.437)	(0.097)	(0.185)	(0.240)	(0.088)	(0.129)	(0.258)	(0.062)
Household age	0.130**	0.196***	0.076	0.021	0.349***	0.221***	0.146	0.200***
(average of adults)	(0.053)	(0.051)	(0.091)	(0.068)	(0.060)	(0.042)	(0.091)	(0.041)
Household age^2	-0.001	-0.001***	-0.000	0.001	-0.003***	-0.002***	-0.001	-0.001***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
Household education	0.226***	0.162***	0.186***	0.279***	0.160***	0.123***	0.261***	0.223***
(average of years of adults)	(0.067)	(0.028)	(0.059)	(0.059)	(0.025)	(0.031)	(0.049)	(0.021)
Number of adults	0.412*	0.638***	-0.024	0.714**	0.198	0.378***	0.669***	0.302***
	(0.213)	(0.140)	(0.287)	(0.304)	(0.163)	(0.128)	(0.238)	(0.113)
Number of children	-0.506**	-0.252	-0.097	0.119	-0.168	0.043	-0.367	-0.202*
	(0.254)	(0.171)	(0.137)	(0.209)	(0.240)	(0.148)	(0.246)	(0.120)
Reference person: single	-0.389	-0.220	-2.132**	0.009	-0.863**	-0.742**	-0.899*	-1.488***
	(0.476)	(0.335)	(0.906)	(0.519)	(0.343)	(0.316)	(0.541)	(0.323)
Reference person: widowed	-0.536	-0.058	-2.734**	-0.353	0.414*	-0.184	0.227	-0.657***
	(0.375)	(0.338)	(1.089)	(0.507)	(0.236)	(0.294)	(0.735)	(0.226)
Reference person: divorced	-1.772***	-0.420	-2.399**	-2.159***	-1.716**	-1.550***	-0.216	-1.733***
	(0.575)	(0.356)	(1.080)	(0.654)	(0.731)	(0.354)	(0.624)	(0.394)
Constant	-8.722*	-2.645	3.914	-11.71***	-2.853	-1.914	-2.305	-0.407
	(5.036)	(1.740)	(2.818)	(2.974)	(2.010)	(1.667)	(3.173)	(1.389)
$R^{2+)}$	0.194	0.186	0.117	0.243	0.203	0.149	0.208	0.159
Observations	2,350	2,270	1,054	3,495	6,192	2,879	950	4,304

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
+) R2 using Fisher's z over imputed data
Source: HFCS 2010 - UDB 1.1, own calculations.

Shapley value decomposition

Now we turn from the explanation of wealth levels of household to the explanation of national wealth inequality levels by applying the Shapley value approach to inequality decomposition. Figure 1 presents the decomposition results for gross household wealth. First we see that the Gini index calculated from the predicted values of the wealth generating function is quite similar to the one based on the original wealth data on households. Only in the case of Germany wealth inequality is slightly more overestimated, for Spain slightly more underestimated.

Figure 1 / Shapley value decomposition - gross wealth contribution of groups of explanatory variables to Gini index



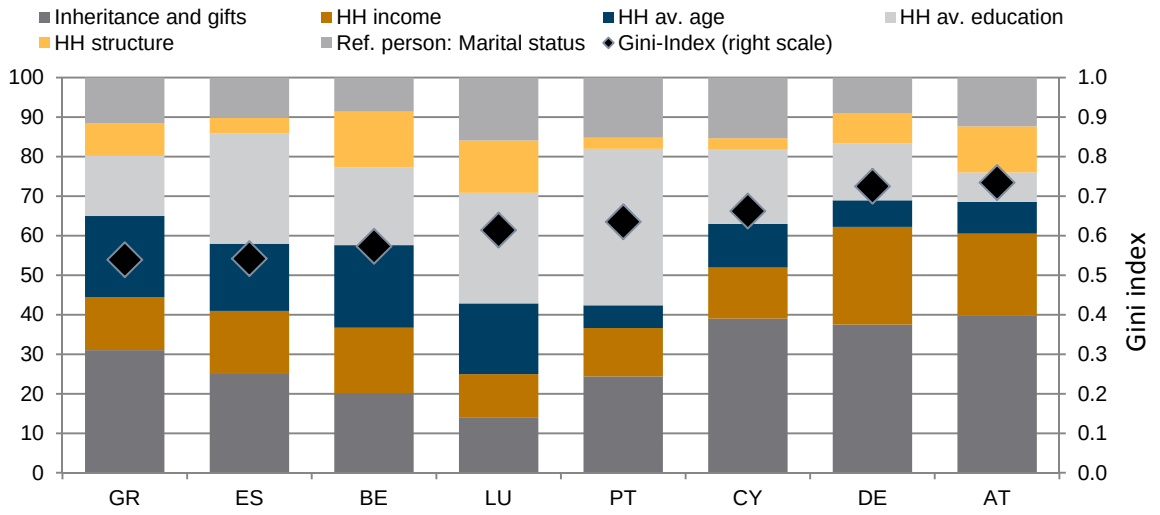
Source: HFCS 2010 - UDB 1.1, wiiw calculations.

From the explanation of the methodology above one can derive that the extent to which an explanatory factor or variable contributes to the Gini coefficient depends, first, on the dispersion of wealth between the household subgroups being defined by the characteristics described by the variables and, second, on the shares of the subgroups in the total population. In our case in order to keep the computing time of the Shapley value analysis tolerable we collapsed the effects of the individual types of bequests and gifts and the effect of expected inheritance to the explanatory factor inheritance and gifts; the factor household age includes the variables household age and household age^2; household structure includes the effect of both the variables number of adults and number of children and the explanatory factor marital status comprises the effect of all three dummy variables for single, widowed and divorced reference persons of households.

In the case of the decomposition of gross wealth we can observe that for the countries analysed on average almost 45% of the wealth inequality can be explained by the variation of gross income and acquired bequests and gifts (see Figure 2). Thus the differences in the accumulation of wealth are

significantly driven by the variations in household characteristics. However, the results differ strongly between countries. In Austria, Cyprus and Germany, those countries with the highest levels of inequality of gross wealth, the inequality of inheritances is the most important driver of overall wealth dispersion – almost 40% of the explained inequality stems therefrom. However, in relative terms (as a share of the overall explained inequality) also in the case of the country with the lowest level of dispersion in gross wealth, i.e. Greece, 30% of the Gini coefficient can be explained by the inequality of inheritances. The lowest contribution of inheritances to the overall Gini index – only 14% of the explained variation – can be found in Luxembourg, most likely a combination of relatively low inequality of inheritances and a low share of households having received bequests at all. In the rest of the countries analysed, inheritances explain between 20% and 25% of the Gini index. A noticeable divergence between Germany and Austria on the one hand and all other countries analysed can be observed in the case of the contribution of household gross income.

Figure 2 / Shapley value decomposition - gross wealth contribution of groups of explanatory variables to explained inquality, in %

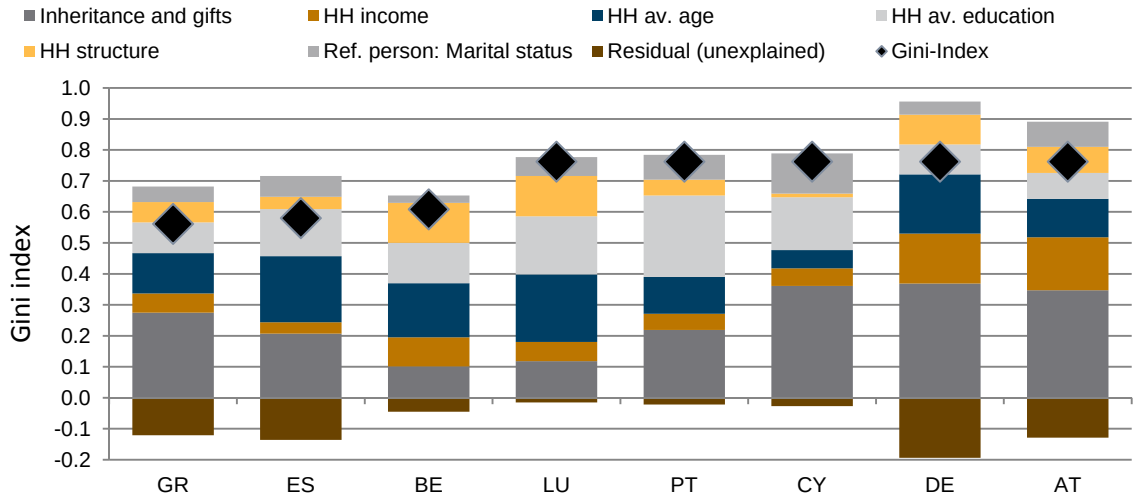


Source: HFCS 2010 - UDB 1.1, wiiw calculations.

In Germany and Austria household income explains 25% and 21% respectively of the inequality level, while the average contribution for all other EU members analysed amounts to only 14%. Even stronger differences can be detected according to the contributions of the average education level of households. This fits well to the differences in dispersion of household education levels across countries. Within the European Union, Portugal features the highest level of inequality in educational attainment rates (see e.g. Leitner and Stehrer, 2014), while particularly low dispersion according to this characteristic is to be found in Germany and Austria. Also the ranking of the other countries in the Shapley decomposition corresponds with the one according to educational inequality between households, with the exception of Greece. In Portugal the dispersion in education is the main single driver of wealth inequality, explaining 40% of the Gini index. In Spain and Luxembourg still 28% of the explained variations stems from education and in all other countries the contribution ranges between 14% and 20%, except for Austria. In the latter country, educational differences account for only 7% of the dispersion of gross wealth. In the case of the average age of the household members, one can see that the contribution to total inequality does not only depend on the conditional effect age has according to the regression analysis on wealth

levels. Also the differences between countries in the actual age structure of the population and thus the relative size of the age groups influence the decomposition results. In Germany, Austria and surprisingly also Portugal, the contribution of age is quite low, adding between 6% and 8% to the Gini index. In all other countries variation by average age of household members seems to be contributing more strongly to overall wealth inequality, between 11% and 21%. As we could already expect from the underlying regression analysis, gross wealth does not significantly differ conditional on all other explanatory variables between households of different size in Portugal, Spain and Cyprus. Hence, the size of the contribution amounts to 2.8%, 2.9% and 4% in those three countries. In Luxembourg, Belgium and Austria differences in the structure of households are more important in explaining wealth inequality, the contribution ranges between 12% and 14% of the explained inequality. Wealth differences due to the marital status of the reference person are relatively low in Belgium and Germany (both 9%) but substantially higher in the South European countries of Portugal and Cyprus (both 15%) and Luxembourg (16%). In all other countries the contribution ranges between 10% and 12.5%.

Figure 3 / Shapley value decomposition - net wealth contribution of groups of explanatory variables to Gini index

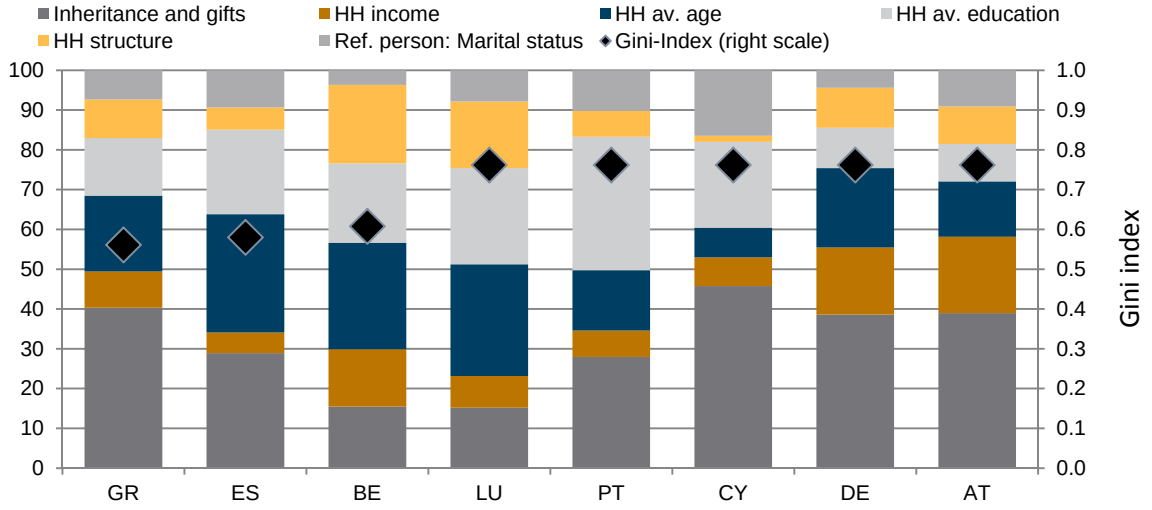


Source: HFCS 2010 - UDB 1.1, wiiw calculations.

The subsequent step in the analysis is the decomposition of the net wealth of households. A glance at Figure 3 shows that the results look quite similar to the decomposition of gross wealth. However, our wealth generating functions stemming from the regressions by country presented in Table 3 above lead to an overestimation of inequality in household net wealth in all countries analysed. Looking into the detailed results for net wealth by quantiles, we can detect that the highest relative differences between predicted and original values are between the 40th and 60th percentile for most countries. Here we tend to underestimate the levels of net wealth. Thus the cross-country comparisons of absolute contributions of explanatory variables to the Gini coefficient have to be interpreted with care, while the comparison of the shares in the explained (calculated) inequality is less problematic. Although in absolute terms the contributions of bequests and gifts are still highest in Cyprus, Austria and Germany, in relative terms also in Greece inheritance accounts for about 40% of the explained inequality in net wealth of households (see Figure 4). In Spain and Portugal the contribution is close to 30%, while in Luxembourg

and Belgium it both amounts to about 15%. For household income the contributions are again relatively larger in Germany (17%) and Austria (19%) and also remarkable in Belgium (14%). In all other countries they range in between only 6% and 9% of total inequality. The ranking of the contributions of the average education level of the households is comparable to the decomposition of gross wealth as well as the shares in the explained inequality. In Austria, Germany and Greece they amount to on average 11.5%, while in Portugal to 34%. In the rest of the countries the share ranges between 20% in Belgium and 24% in Luxembourg.

Figure 4 / Shapley value decomposition - net wealth contribution of groups of explanatory variables to explained inequality, in %



Source: HFCS 2010 - UDB 1.1, wiiw calculations.

Age differences between households are more important in the explanation of net wealth compared to gross wealth of households. An important reason for this is most likely to be found in the higher debt level of younger aged persons and the life cycle of saving and investment. Only in the case of Cyprus the contribution is below 10%, in the other countries the share ranges between 14% in Austria and 30% in Spain. The contribution of household structure is small particularly in the case of Cyprus (1.5%), but also for Spain and Portugal (both 6%), while in the rest of the analysed countries it ranges between 9% and 17%. Only in Belgium household size differences account for about 20% of the total Gini index. On average the explanatory power of the marital status of the reference person is somewhat smaller compared to the case of gross wealth. However, differences between countries are larger in this respect. While in Germany and Belgium only 4% of inequality in net wealth is explained by those explanatory variables, in Cyprus the respective contribution amounts to almost 17%.

Summary and conclusions

This paper has analysed inequality in gross and net wealth of households in selected euro-area countries (Austria, Belgium, Cyprus, Germany, Greece, Luxembourg, Portugal and Spain) in comparison. The analysis is based on micro data from the Eurosystem Household Finance and Consumption Survey 2010 (HFCS 2010 - UDB 1.1). Other countries also covered in the HFCS 2010 had to be skipped due to incomplete coverage of data on inheritance or a lack of CPI data (Finland, France, Italy, Malta, the Netherlands, Slovenia, Slovakia). In order to detect the sources and drivers of wealth inequality we apply the Shapley value approach to decomposition analysis.

Wealth inequality is much higher compared to inequality in income. The comparison of euro-area countries shows that inequality levels of wealth are highest in Austria and Germany, whilst relatively low in the South European countries Spain and Greece but also in Belgium. The accumulation of household wealth takes place via saving and investment out of two sources in particular. First, households save out of their current income from paid and self-employment as well as from financial income. Second, bequests and inter vivos gifts are important transfers of assets that are likely to be used for wealth accumulation particularly by those households that are in no need to use those funds for consumptive purposes.

Our decomposition analysis focuses on the extent to which those two types of sources of wealth accumulation shape the levels of wealth inequality in the euro-area countries in comparison and in addition to what extent the inequality can be attributed to differences in household characteristics. First, we regress gross and net wealth holdings of households on the values of different types of assets acquired by households as substantial bequests or gifts and on current gross household incomes. In addition we apply variables describing socioeconomic characteristics averaged over household members, i.e. average age of adult household members, average of highest education level attained by those household members being potentially available for the labour market and the number of adults and children in the household. We also use dummy variables for the marital status of the reference person of the household (married or living in a consensual union, single, widowed or divorced). In order to make bequests and gifts acquired at different points in time comparable with each other and between households, we make the conservative assumption that the real values of the items do not change over time. Thus we inflate the nominal values of bequests and gifts with the national consumer price indices. For the analysis of how much the income of a household has influenced the wealth built up it would be preferable to have information on the previous income over the whole life cycle for all household members. However, this information is not available in the HFCS 2010 and we have to apply the current gross household income as a proxy for lifetime income. Moreover, the household age captures the cohort effect, i.e. older individuals/households have had the chance to accumulate more wealth compared to younger ones. For our regressions we apply an inverse hyperbolic sine transformation to all monetary variables which approximates the logarithmic transformation in order to raise the fit however without losing negative and zero values which are numerous in wealth data.

Our regressions deliver the expected results with respect to the signs of the coefficients and are significant for most of the variables in the majority of countries. Households with higher amounts of bequests and inter vivos transfers acquired over the previous lifetime, feature conditionally higher levels of gross and net wealth. Those with higher current household income obviously have more funds available for non-consumptive purposes and have thus accumulated relatively higher wealth. Contrary to our assumption, the incidence of having inherited a business, securities or shares increases (conditionally) the tendency to hold higher asset levels not in all countries, i.e. in Austria, Cyprus and Portugal no significant results were found. The present value of inherited businesses, securities and shares is in the case of three countries (BE, DE and LU) and on average over all countries the strongest driver of gross and net wealth; in the latter case also for Spain. Second most important is on average the inherited household main residence and third inherited land. The expectation of a substantial inheritance or gift in the future correlate positively with gross wealth levels in five out of seven countries for which the variable was available; for net wealth levels only in the case of Austria, Germany and Portugal. The cumulative process of building up wealth stocks results in households with higher average age possessing conditionally higher wealth stocks, whilst for Germany and Luxembourg these results are not robust in the case of gross and net wealth, for Cyprus in the case of net wealth. The effect declines over the life cycle and household gross wealth peaks conditionally on average over countries at an average household age of about 55 years. Average household education levels correlate conditionally positively with wealth levels. The variable might also capture some of the longer-term income differences between households, which are not embodied in the differences of current household income. Households with more adults in general hold conditionally more wealth. However, this result is not significant for both gross and net wealth in the case of Cyprus and Spain and for gross wealth in the case of Portugal. The motive of accumulating wealth for later transfers to the offspring seems to be strong as reported in the literature. Thus households with more children might have conditionally higher wealth levels. However, in the regressions the coefficients for the number of children are insignificant, or the opposing trend – that more children in the household prevent the accumulation of more out of the given funds due to current needs – seems to dominate. Households with reference persons who are single, widowed or divorced have conditionally lower gross wealth; the effect however becomes insignificant for single households in the case of net wealth.

Based on the wealth generating functions stemming from our regressions we applied the Shapley decomposition analysis. Gini coefficients are calculated for predicted values of wealth of individual households stemming from all combinations of explanatory variables. The average differences between those Gini indices result in the estimation of the marginal contribution of each explanatory variable to the overall Gini of wealth. In order to keep the necessary computing time tolerable, we collapsed the effect of a couple of variables to explanatory factors. These were the individual types of bequests and gifts and the effect of expected inheritance to the explanatory factor inheritance and gifts; the variables household age and household age^2 to the factor household age; the factor household structure includes the effect of both the variables number of adults and number of children and the explanatory factor marital status comprises the effect of all three dummy variables for single, widowed and divorced reference persons of households (comparing their wealth with those of reference persons being married or living in a consensual union).

On average over the countries analysed, bequests and gifts contribute about 29% to the predicted inequality of gross wealth and 31% to the distribution of net wealth. The contribution of gross household income is lower, with 16% and 11% respectively. However, the results vary considerably between

countries. Austria, Cyprus and Germany show the highest share (40%, 39% and 38%) for gross assets, while for net assets Cyprus features the highest contributions with 46% to the explained inequality. In the case of net wealth Austria, Germany and Greece feature shares of about 40%, while the figures for Portugal and Spain but especially Belgium and Luxembourg are much lower. The contribution of income to both gross and net wealth inequality is relatively high in Austria (21% and 19% respectively), Germany (25%, 17%) and Belgium (17%, 14%). In the other countries the share amounts on average to only 13% in the case of gross wealth inequality and to 7% for net wealth inequality. The results of the decomposition analysis show that differences in household characteristics are an important source of wealth inequality. Average age and education levels both contribute about 19% each to the overall Gini index of net wealth, while in the case of gross wealth, education is with 21% more important compared to the average household age (13%). Differences in the size of households make a contribution of 8% and 10% to gross and net wealth inequality, respectively. The fact that the reference person of a household is not married or living in a consensual union has an effect that contributes on average over countries 12% and 9% to the inequality of gross and net wealth, respectively.

The analysis in this paper reveals that differences in the amount of bequests and inter vivos gifts received by households strongly drive the observed wealth inequality in a number of euro-area countries. In Austria, Germany and Cyprus those differences contribute about 39% to the explained inequality of gross wealth, while for net wealth dispersion Cyprus is, with a share of about 46%, the country where inheritance variation among households is most important. In most countries differences in household characteristics, i.e. age, size, adults, marital status and education level, account for more than half and up to 77% (in the case of Portugal) of wealth inequality. However, in the case of education we have to take into account that the literature points to a strong correlation between attainment levels acquired by ancestors and their offspring, thus part of the inequality is the outcome of an inter vivos transfer in kind. The result of the analysis is that only a part of wealth inequality can be explained by the life cycle hypothesis (which argues that a major source of wealth inequality is to be found in age variations between households), differences in the abilities of households to accrue and accumulate out of income and further variations in household characteristics. Whether or not a person is born into a wealthy and educated family and thus inherits assets determines to a considerable extent whether he or she will make a fortune. The research presented emphasises this obvious fact. The effect is strongest in Austria, Germany and Cyprus.

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