ICAE Working Paper Series - No. 73 - December 2017

Inheritances and the Accumulation of Wealth in the Eurozone

Stefan Humer, Mathias Moser and Matthias Schnetzer

JOHANNES KEPLER UNIVERSITY LINZ

ICAE INSTITUTE FOR COMPREHENSIVE ANALYSIS OF THE ECONOMY

Institute for Comprehensive Analysis of the Economy
Johannes Kepler University Linz
Altenbergerstraße 69, 4040 Linz
icae@jku.at
www.jku.at/icae

Inheritances and the Accumulation of Wealth in the Eurozone*

Stefan Humer[a]·Mathias Moser[a,b,c]·Matthias Schnetzer[d]

[a]Research Institute Economics of Inequality, WU Vienna
[b]Institute for Economic Geography, WU Vienna
[c]Institute for Comprehensive Analysis of the Economy (ICAE), JKU Linz
[d]Department of Economics, Vienna Chamber of Labor

Abstract

This paper empirically compares the contribution of the two major wealth accumulation factors—earned income and inheritances—to the within country net wealth position of Eurozone households with HFCS data. Using unconditional quantile regressions, we show the varying importance of earned income and inheritances at different parts of the per country distributions and compare them to Eurozone averages. The elasticities of both wealth sources are overly non-linear and display an inverted "U" shape pattern. Around the median household, an additional percentile in the income distribution corresponds to an increase in the net wealth distribution of as much as 0.5 percentiles, while an additional percentile in the inheritance distribution yields up to 1.3 percentiles. At the bottom of the wealth distribution, households have to climb less than two percentiles in the income distribution to compensate a one percentile increase in the inheritance distribution, whereas this ratio surges to almost four percentiles at the top tail and varies distinctively between different countries. These results emphasize the relative importance of inheritances versus income from employment for private wealth creation and question common perceptions of meritocracy.

Keywords: Wealth distribution, household structure
JEL Classification: C21, D31

1 Introduction

The principle of meritocracy rests upon the promise of social advancement through individual achievement rather than ascription. In many societies, thus, the opinion prevails that willingness

*Financial support by the Austrian Chamber of Labour (Vienna & Lower Austria) is gratefully acknowledged. We thank Wilfried Altzinger, Markus Marterbauer, Michael Mesch, Thomas Piketty, Miriam Rehm, Alyssa Schneebaum, and Daniel Waldenström for helpful comments and suggestions. Furthermore, the research assistance and comments of Michael Ertl are gratefully acknowledged. All remaining errors are our own.

to work hard paves the way for material well-being and upward social mobility. However, the vision of equal opportunities for individual social progress has been contested regularly in the political discourse and in social sciences. In particular, intergenerational transfers are considered as decisive determinant for individual opportunities. Inheritances and inter vivos gifts can act a substantive head start for the beneficiaries that can hardly be caught up by non-heirs. This advantage seems all the more important given the manifest rise in the concentration of (heritable) wealth over the last decades in many countries (Piketty and Zucman, 2014; Saez and Zucman, 2016).

Following Piketty (2014), intergenerational transmissions of wealth have driven social inequalities in the last decades, leading to the return of "patrimonial capitalism" in the 21st century. Piketty contrasts today with the social relations in the early nineteenth century when inheritances and marriage-portions were much more important for private wealth accumulation than income from labour. While social disparities have been smoothing for most of the twentieth century, Piketty claims that the division between heirs and non-heirs is again characterizing today's societies. This impression has also found resonance in the economics literature where the contribution of inheritances to life-cycle wealth has been intensively discussed (Gale and Scholz, 1994; Kessler and Masson, 1989; Kotlikoff, 1988; Kotlikoff and Summers, 1981; Modigliani, 1988; Piketty et al., 2014). Still, the relative significance of inheritances and earned income for private wealth accumulation is inconclusive (Arrondel et al., 2014; Semyonov and Lewin-Epstein, 2013). This paper aims to shed more light on the relative importance of wealth transfers and income from employment for the wealth distribution in selected Eurozone countries.

Insights into the inheritance-income relationship are important for policy-makers for, e.g., an assessment whether meritocratic principles are eroding. Some empirical findings undermine the belief in meritocracy by showing a perpetuated interrelation of inheritances and inequality. This line of argument concludes that current inequalities transform into unequal intergenerational wealth transmissions which in turn inhibit social mobility (Clark and Cummins, 2015; Corak, 2013; Westermeier et al., 2016). Still, it is disputed whether inheritances have an equalizing or dis-equalizing effect on the wealth distribution (Cowell et al., 2016). Recent research shows that inheritances constitute a substantial source of wealth heterogeneity even among households with similar lifetime earnings (De Nardi and Yang, 2014). In the same vein, there is evidence that the dispersion in inheritances has a stronger impact on wealth inequality than income differences in Eurozone countries (Leitner, 2016). By contrast, findings from Scandinavian countries suggest that inheritances might in fact reduce overall wealth inequality due to the greater relative importance of inheritances at the lower end of the distribution (Adermon et al., 2015; Boserup et al., 2016; Elinder et al., 2016).

While there is no consensus concerning the role of inheritances for wealth inequality, even the definition of transfer wealth is not beyond dispute. The literature has seen intense discussions regarding the distinction between transfer and self-made wealth, for instance, whether returns to inherited wealth are associated with the one or the other (Kotlikoff, 1988; Modigliani, 1988). In addition, inheritances and inter vivos gifts normally do not include implicit gifts like appointing

an offspring as an equal partner in a lucrative family business or paying tuition fees for college education. Meeting the costs of food and clothing for dependents is however not considered a gift but provisioning for the family. Despite these widely recognised points, the precise definition of transfer wealth is for large parts subject to interpretation.

Conceptually, our paper follows the related literature where households mainly acquire wealth from two sources: income from employment (or earned income, synonymously) and inheritances, including inter vivos gifts (Fessler and Schürz, 2015; Gale and Scholz, 1994; Piketty et al., 2014). Both income channels contribute to the relative wealth position conditional on the size of either component and the underlying circumstances of wealth accumulation. The former condition is trivial but subject to a number of constraints, such as the arrangement of tax and welfare systems or cultural aspects shaping consumption and savings patterns. Of course, the idiosyncratic developments of specific economies shape the possibilities and incentives for private wealth accumulation. For instance, well-developed welfare states generally require lower levels of private household wealth due to the substitution effects of welfare state expenditures (Bogliacino and Maestri, 2016; Fessler and Schürz, 2015; Hurd et al., 2012). First and foremost, comprehensive public pension systems and universal provision of social housing reduce the need for private wealth accumulation and precautionary savings. Moreover, the conditions for private wealth accumulation in post-transition economies like Eastern Europe have been aggravated for a long time compared to Western European countries. In addition to these structural aspects of welfare state arrangements, country-specific earnings uncertainty and capital market imperfections may also have a significant impact on the savings patterns over the lifecycle (Irvine and Wang, 2001; Kessler and Masson, 1988).

The main objective of this paper is to compare the role of inheritances and earned income vis-á-vis private household wealth in different countries of the Eurozone. We base our analysis on harmonized survey data from the HFCS 2010 and estimate the relative importance of both factors in each individual country, measured as the elasticities of the marginal distributions of income and inheritances respectively. Using unconditional quantile regressions, we show the varying importance of earned income and inheritances at different parts of the per country distributions and compare them to Eurozone averages. Although this work is limited to the available cross-section data sets on wealth, we strongly believe the results can provide further evidence to shed light on the relation of these two factors for wealth accumulation.

We start with introducing the rather novel HFCS survey data in section 2 where we also address considerations concerning cross-country comparability of wealth data. In this article, we make use of unconditional quantile regressions which we briefly describe in section 3. We then explain our empirical strategy in section 4 and present our results in section 5. In section 6, we address the limitations of our empirical exercise before section 7 concludes our findings.

2 The Household Finance and Consumption Survey

To assess the relative importance of income from employment and inheritances for household wealth, we make use of the very first wave of the Household Finance and Consumption Survey (HFCS 2010). This survey has been carried out by the European Central Bank in order to gather micro-level structural information on household assets and liabilities in the Eurozone. The survey employs a harmonized questionnaire for all 15 participating countries, which leads to a total sample size of 62,521 representative households for which information on the balance sheets were collected. Apart from a broad range of household financial variables, the data set offers socio-economic information on the individual level such as social status, age, sex, and education. The main asset of the HFCS, however, is the availability of household wealth information in combination with socio-economic characteristics, which is a unique feature among European household surveys.

Since the HFCS is a young data source, a brief assessment of data quality might be convenient at this point, while we refer to ECB (2013a) for a more in-depth quality analysis. In most countries, there is no benchmark survey for household wealth to cross-validate HFCS information. Thus, the papers on data quality do not focus on the moments of distribution but rather on comparisons of aggregate values. The typical approach is to compare totals for single wealth categories in the HFCS to the national accounts (Alvaredo et al., 2017; Andreasch and Lindner, 2016; Honkkila and Kavonius, 2013; Vermeulen, 2016). The common result of this exercise is that survey aggregates in almost every case fall short of the macro data, mostly due to underrepresentation of the upper tail of the wealth distribution. A desire for oversampling rich households in wealth surveys thus unites the mentioned papers. There is, however, more benchmark data with respect to the income variables in the HFCS, with EU-SILC being the most common source. While the HFCS displays lower average incomes from employment than EU-SILC, it outperforms SILC in capturing capital income (Sierminska and Medgyesi, 2013). For almost all countries, the Gini coefficient for household gross income is higher in HFCS than in EU-SILC. Putting all this together the HFCS data has clearly strengths and weaknesses, however, it provides the unique opportunity for research on the joint distribution of wealth, income, inheritances and household characteristics in the Euro Area. Before we turn to the main variables for our research, two challenges for cross-country comparisons need to be addressed.

First, variations in total wealth and its structure may be subject to differing institutional arrangements in each country. Social norms, welfare regimes, and the public provision of goods may influence the necessity for households to accumulate wealth. We therefore rely on country-specific regressions that are based on the national net wealth distribution. Furthermore, not only wealth but also income and inheritances are transformed by calculating the national cumulated density functions (CDFs). By comparing the ranks of households in these national distributions, we also can safely discard any purchasing-power considerations since the within country percentiles are not affected by different relative price levels across countries. Using ranks therefore facilitates the comparison of parameters for different countries and simplifies the interpretation of results, especially when addressing the relation of the two factors to each other.

Concerning the cross-country comparability of wealth data due to differing survey designs (Tiefensee and Grabka, 2014) and diverse institutional settings (Bover, 2010; Fessler and Schürz, 2013), we apply an innovative technique to control for varying household structures as has been presented by Fessler et al. (2014). While the common approach would rely on the characteristics of only one rather arbitrarily chosen reference person, the authors propose to take the age and gender composition of all household members into consideration. For this purpose, we encode the household composition in so-called *household strings*. The age of individuals is classified in four groups (1: below 16, 2: 16 to 34 years, 3: 35 to 65 and 4: above 65), while gender is represented by three identifiers (1: male, 2: female and 3: children)[1]. Hence, a couple consisting of a woman and a man both 35–64 years old is represented by the string `3132`. If they had two children, the string would be `31321313`. Applying this logic to all households in our sample, we can use these household strings via dummy variables as a significant more flexible control mechanismn compared to including only the age and gender of a reference person. Since age closely connects to the potential years of accumulation, this more comprehensive view on the age composition of households should play out its virtues especially in the context of wealth regressions. Our analysis adapts the proposed methodology and encodes the household with the information on up to four members. If household size exeeds four, we give preference to the maturer individuals. A sensitivity analysis reveals that this is a reasonable approach, since it allows a large number of different households as controls on the one hand, but does not use very sparse household types for the correction on the other hand.

Second, different sampling strategies in the participating countries may lead to varying degrees of coverage, especially of high-wealth individuals. While this issue can be mitigated by oversampling this particular group, such a strategy is not feasible for every country: oversampling is not available for Austria, Malta, the Netherlands, Slovakia, and Slovenia in the HFCS data. Therefore, the gap between the top in the actual wealth distribution and its representation in the survey may vary significantly by country (Tiefensee and Grabka, 2014). This problem of unit non-response at the top tail has also been addressed by Vermeulen (2014, 2016) and is in general alleviated by using statistical imputation methods. For our study such an approach is, however, not feasible. While household wealth can be imputed univariately with Pareto methods (Bach et al., 2015; Eckerstorfer et al., 2015), we would also need to impute a number of additional household variables and individual characteristics that cannot be assigned easily. A sensible imputation approach would therefore need to estimate all these variables in a multivariate way which is not the focus of this paper. Nonetheless, by applying robust estimation methods (see Section 3), the effect of structural unit non-response at the upper tail should be minimal for the remaining quantiles of the distribution. Since wealth data is subject to differential item non-response (Vermeulen, 2014, 2016), the HFCS makes use of multiple imputations for all missing values (Little and Rubin, 2002). To account for the inherent uncertainty of the imputation procedure, five values are chosen to replace the missing information, based on different random draws from the joint distribution of the collected data. Thereby, it is possible to partly reflect the uncertainty of the imputation

[1] It is argued that outcomes like household income or wealth are only negligibly affected by the gender of children.

process. All figures and calculations reported in this paper were derived using 100 complex survey weights, all five multiple imputations, and the application of Rubin's rule. Detailed information on the complex survey design and the data collection process can be found in ECB (2013a).

Having addressed the most important cautions and features of the HFCS data, we now describe the three main variables of interest for our study, which are net wealth, income from employment, and inheritances.

The dependent variable in our analysis is household net wealth, which is a unique feature of the HFCS data. Apart from this data set, there is no comparable source for private wealth information on a European level. Household net wealth equals total gross wealth, composed of tangibles and financial assets, minus liabilities. Tangibles comprise real estate, vehicles, business wealth, and other valuables like jewelry or antiques. Sight accounts, savings, shares, mutual funds, and bonds add up to financial wealth. Finally, liabilities involve collateralized and non-collateralized loans, leasing contracts, credit card debt and other obligations. The HFCS provides a very thorough inquiry on every single of these net wealth components at present values of 2010. For a detailed overview of the single wealth components we refer to the exhaustive documentation by the ECB (2013b).

Regarding income from employment, the HFCS provides annual gross values for all household members. We define income from employment as all types of remuneration for (actual or former) labour input, that is employee income in cash or near cash, self-employment income, and pension income. This definition explicitly excludes capital gains and property income from interest, dividends, rent and so forth. The demarcation is motivated by the conventional view that capital incomes are not attached to labour and thus not relevant for our research question. The HFCS gathers this income information on an individual level for the last calendar year. Since the HFCS provides income data for only one year, this snapshot of income information might underlie transitory fluctuations. Notwithstanding, we assume that the reported income distribution is a reasonable proxy for the average position of households in the distribution during the accumulation phase up to date. This is backed by empirical evidence that the correlation between annual and life-time earnings stabilizes early in the career (Bönke et al., 2015).

The third variable of interest are inheritances and gifts which are reported on the household level in the HFCS. The survey captures the monetary value at the time of receipt of the three most substantial inheritances and gifts ever received by household members. Additionally, the HFCS collects information on the years of receipt (bottom-coded to 1925), the donor and the kind of assets received, including money, dwellings, land, business, life insurances, and other valuables. To account for differing dates of receipt, we capitalize all inheritances to their present value in accordance with the HFCS 2010 wave. This procedure is based on the assumption of an average of 3% percent interest per annum.[2] In three countries some households lacked the information on the year of receipt. Following the intention to use the same number of observations in all specifications, we imputed these missing values based on the inheritance type as well as the age

[2] As a sensitivity check, we also varied the rate between 1% and 5% without causing substantial changes to our findings. These results are available upon request.

and gender composition of the household members. In case of Greece and Portugal this applies to a negligible fraction of households (less than 2% and 4% respectively). On the contrary, in France we had to fill in the inheritance year for almost 20% of the sample, which raises concerns about the comparability of the estimates for France with the results of the other countries in our analysis. However, this does not affect our main specification based on a dummy variable capturing whether the household has already received an inheritance or not.

The inheritance information in the survey should be regarded as seriously downward biased (Alvaredo et al., 2017), since it does not account for implicit gifts (Kotlikoff, 1988) and underlies potential recall biases or forward telescoping. Another caveat is that the survey data only cover already received inheritances at the time of the interview and all other households are treated as non-heirs. However, the probability for non-heirs to inherit in the future is not equal for households with different endowments (Wolff and Gittleman, 2014). Nevertheless, we abstain from imputing expected inheritances since we are interested in the past accumulation phase up to date.

For this study, we have to exclude observations for Cyprus, Finland, Italy, Malta, and the Netherlands from the HFCS survey. These countries either do not provide data on intergenerational wealth transfers (FI and IT) or lack information on the sex or age of household members apart from the reference person (CY and MT). The latter information is indispensable for controlling for differing household structures in our estimation procedure. The Netherlands is the only country in the HFCS survey that conducted computer-assisted web interviews (CAWI) instead of personal interviews. This might be one reason for the implausibly low share of heirs (only 8.4% of all households). The CAWI method could at least explain part of the significant differences compared to the other countries, since information on private wealth collected with personal interviews is in general regarded to be more reliable than web inquiries. For instance, interviewers may persuade respondents to participate in the survey, increase response rates, and reduce the risk of response bias (ECB, 2013a). For this reason, we also excluded the Netherlands from our calculations. This leaves us with a reduced sample of 40,200 household observations from Austria, Belgium, Germany, Spain, France, Greece, Luxembourg, Portugal, Slovenia, and Slovakia, which represent roughly 75% (103,940,000) of Eurozone households.

Table 1 provides descriptive statistics for the countries and variables in use. First of all, the differences between the average and the median wealth (P50) across the Eurozone countries are remarkable. The ratios of mean and median are for all countries significantly greater than one, illustrating that wealth distributions are generally skewed to the right. Furthermore, also the dispersion of median wealth levels across countries is remarkable in itself. For instance, while median net wealth in Germany amounts to slightly above €50,000, it is roughly €180,000 in Spain. However, the survey period in Spain was around 2008 when the real estate bubble boosted residential wealth, while most other countries started gathering data in 2010 (ECB, 2013a). Another explanation for the disparities in the median are different home ownership rates. In Germany and Austria, the median household is a renter, in Spain and Greece the median household owns its main residence (ECB, 2013b). There are also large differences in the average household income from employment. Slovakia exhibits the smallest value with an annual

Table 1: Descriptive Statistics

	Net wealth				Explanatories							
	Mean	P05	P50	P95	Income	Inheritances		Female	Age	TEdu.	Ret.	Entr.
	k€	k€	k€	k€	μ (k€)	%	μ (k€)	%	μ	%	%	%
AT	265.0	-0.2	76.4	934.5	39.3	35.4	268.5	55.8	51.0	13.6	35.5	9.4
BE	338.6	0.3	206.2	1073.4	43.1	35.1	219.7	46.4	52.2	37.8	32.5	4.6
DE	195.2	-1.6	51.4	661.2	37.5	33.9	238.5	49.0	51.9	29.2	29.7	6.8
ES	291.4	0.2	182.7	878.5	27.5	30.4	438.4	49.4	52.7	25.7	20.7	8.3
FR	233.4	0.4	115.8	775.4	29.5	39.8	245.5	39.2	52.1	23.4	34.2	7.9
GR	147.8	0.0	101.9	469.3	26.4	30.5	95.2	59.3	49.9	20.3	27.9	14.8
LU	710.1	0.1	397.8	2023.9	73.8	28.9	357.2	40.5	49.9	26.2	24.3	5.8
NL	170.2	-34.6	103.6	581.2	40.6	8.4	115.5	36.7	51.9	33.6	21.3	3.9
PT	152.9	0.0	75.2	482.4	18.6	29.5	74.7	29.7	55.1	9.1	36.2	10.4
SI	148.7	0.3	100.7	434.5	20.9	40.2	160.5	58.2	51.2	22.5	40.6	3.5
SK	79.7	1.5	61.2	207.4	13.0	38.3	48.0	55.4	48.1	16.3	26.1	7.3

Note: TEdu: Tertiary Education; Ret: Retirees; Entr: Entrepreneurs; Source: HFCS, own calculations.

income of €13,000 while Belgium displays the highest income (€43,100). The household income gathered in the HFCS should yet be handled with caution. In comparison with the European benchmark household income survey EU-SILC, the HFCS income data deviates substantially for some countries. The HFCS income data exceed the EU-SILC figures in Luxembourg and Belgium, and vice versa in France, Slovenia, and Italy (Sierminska and Medgyesi, 2013). This is mainly due to the better coverage of labour income in EU-SILC data. The share of labour income in total gross household income measured in EU-SILC surpasses the HFCS figure for every country with differences up to 10 percentage points. Concerning inheritances, the table shows the share of households that have already inherited and the average value received. Based on the participation rates we can identify three groups of countries. The Southern European countries show comparatively low rates (around 30% in Portugal, Spain, and Greece), the Western European countries are in the middle (34 to 35% in Austria, Germany, and Belgium), and the Eastern European countries display high rates (38 to 40% for Slovenia and Slovakia). France with almost 40% heir households does not fit into the rough classification. Average inheritances at their present value range from €45,500 in Slovakia to €356,200 in Spain. These values are conditional on the receipt of an inheritance and exclude all non-heirs. The remaining socio-economic variables are based on the information for the household reference person and serve as control variables in our calculations.

3 Unconditional Quantile Regression

Linear regressions are useful to gain first insights into the data as the relationships between multiple variables can often be approximated by the conditional mean. With income and wealth data these are, however, only rough reflections of the truth, since the conditional mean is a bad approximation for very skewed distributions. One method commonly applied to model such responses

is quantile regression, which originally was used as a robust method of estimation when the normality assumption is not strictly satisfied. This is especially the case if *unobservable constituents* (Koenker and Bassett, 1978) influence the conditional distribution of the variable regressed on. In wealth regressions, this can be considered to be a problem since the additional information included in micro data sets is often limited. Coefficients of quantile regressions are however expressed in terms of the conditional distribution as opposed to effects on the *unconditional* distribution of the dependent variable.

Estimating unconditional effects at different positions of the endogenous variable is not a trivial task, because it involves integrating over the whole conditional distribution $F(y|X = x)$. Several approaches aim to solve this issue, as for example Machado and Mata (2005) or Melly (2005).

This paper follows an approach by Firpo et al. (2009) to assess the effects of changes in the covariates on marginal quantiles of an outcome variable. Their method is based on a transformation of the endogenous variable for a given quantile, which is called *recentered influence function* (RIF). This allows for the measurement of a shift in the distribution of X on any moment of the outcome variable, assuming the conditional distribution between X and y to be constant.

The estimator for this *unconditional partial effect* with respect to quantiles of the outcome is

$$\alpha(q_\tau) = \int \frac{dE[\mathrm{RIF}(y, q_\tau)|X = x]}{dx}\, dF(x) \quad , \tag{1}$$

which in turn is based on the Recentered Influence Function,

$$\mathrm{RIF}(y, q_\tau) = q_\tau + \frac{\tau - \mathrm{I}(y \leq q_\tau)}{f_Y(q_\tau)} = c_{1,\tau} \times \mathrm{I}(y > q_\tau) + c_{2,\tau} \quad , \tag{2}$$

where $c_{1,\tau} = 1/f_Y(q_\tau)$, $c_{2,\tau} = q_\tau - c_{1,\tau}(1 - \tau)$ and $f_Y(q_\tau)$ is the marginal density of y at a quantile τ. Firpo et al. (2009) give an estimator for y above a certain quantile conditional on x as,

$$E[\mathrm{RIF}(y, q_\tau)|X = x] = c_{1,\tau} \times \Pr[y > q_\tau|X = x] + c_{2,\tau} \quad . \tag{3}$$

The usage of quantile regression techniques thus has two major virtues. First, by looking at different quantiles, our findings are simultaneously more robust to outlying observations and to underreporting at the top of the wealth distribution. This argument closely relates to the insight that the median is a more robust statistic as compared to the mean. Second, it allows for explicitly relaxing the assumption that the interrelations of wealth, inheritances, income, and other control variables are homogenous across the whole wealth distribution.

In addition, the application of the recently developed unconditional variant of quantile regressions enables us to present results that are easy to understand and interpret. Our coefficient estimates directly relate to specific quantiles of the unconditional wealth distribution, i.e. households at the 5^{th}, 50^{th} or 95^{th} percentile. This interpretation is inherently different from conditional quantile regression techniques where coefficients correspond to a more abstract *residual* distribu-

tion of the dependent variable, which reflects the dispersion of net wealth that cannot be explained by the control variables in the regression.

4 Estimation approach

We now briefly describe the steps of our empirical strategy. First, we calculate the marginal effects of inheritances and income from employment on the net wealth position of households for each country. This is done using Unconditional Quantile Regressions to explicitly model the whole distribution in order to consider varying effects of income and inheritances at different net wealth positions for each country. Second, we derive ratios between these effects to show their relative importance. Third, we analyze the differences in these ratios across the net wealth distribution to check for non-linear behavior, since previous studies have shown the non-linear nature of wealth data and the necessity to consider this characteristic in the modeling procedure (Humer et al., 2015).

To shed light on this issue, we utilize unconditional quantile regressions to estimate two separate equations of the form,

$$\begin{aligned} \text{CDF}_{\text{Net wealth}} = \beta_0 &+ \beta_1 \text{Inheritance} + \beta_2 \text{CDF}_{\text{Income}} \\ &+ \beta_3 \text{Gender} + \beta_4 \text{Age} + \beta_5 \text{Age}^2 + \beta_6 \text{Tertiary Education} \\ &+ \beta_7 \text{Retiree} + \beta_8 \text{Entrepreneur} + \beta_9 \text{Household types} + \varepsilon \quad , \end{aligned} \tag{4}$$

with

$$\text{Inheritance} = \begin{cases} \text{I}_{\text{Inheritance}>0} & \text{(4a)} \\ \text{CDF}_{\text{Inheritance}} \quad . & \text{(4b)} \end{cases}$$

We are primarily interested in the relative importance of inheritances and earned income at different positions of the respective national net wealth distribution, measured by the coefficients β_1 and β_2. With regard to inheritances, we estimate one specification with a dummy variable for the receipt (equation 4a) and an alternative specification with the household's position in the distribution of inheritances (equation 4b). Since households received inheritances at different points in the past, the marginal distribution of inheritances is based on their present value as described above. While the dummy specification depicts the expected shift in the net wealth distribution conditional on having received at least one inheritance, the second formulation accounts for the value of transferred wealth via ranking households by the present value of inheritances. The associated coefficient then refers to the expected shift in the wealth distribution corresponding to a marginal increase in the inheritance-based household ranking.[3]

[3] As non-heir households enter the CDF with the value corresponding to the proportion of households that have not inherited yet, the CDF could be interacted with the inheritance dummy or rescaled between zero and one

Both specifications control for a number of standard socio-economic characteristics for each household, which may affect the wealth position apart from income and inheritances. Since socio-economic variables (gender, age, and education) are collected on the individual level in the HFCS, we choose to assign the values of the survey reference persons to the households. For wealth accumulation, age evidently is a variable of great interest. Nevertheless, we refrain from sample restriction or building age cohorts (Cowell et al., 2016) since we are interested in the distribution as a whole while controlling for age in our estimations. We further include a quadratic age effect to capture effects predicted by the permanent income hypothesis. The specification accounts for two very distinct groups in society, retirees and entrepreneurs, that have shown to matter for the households wealth position in previous work (Humer et al., 2015). Finally, we control for varying household structures as mentioned above and proposed by Fessler et al. (2014). Since the specific estimates for these controls are not at the center of our analysis, we refrain from interpreting them in detail and refer the interested reader to Tables 1 and 2 in the Appendix. Conditionally on being statistically significant these estimates in general show the expected signs.

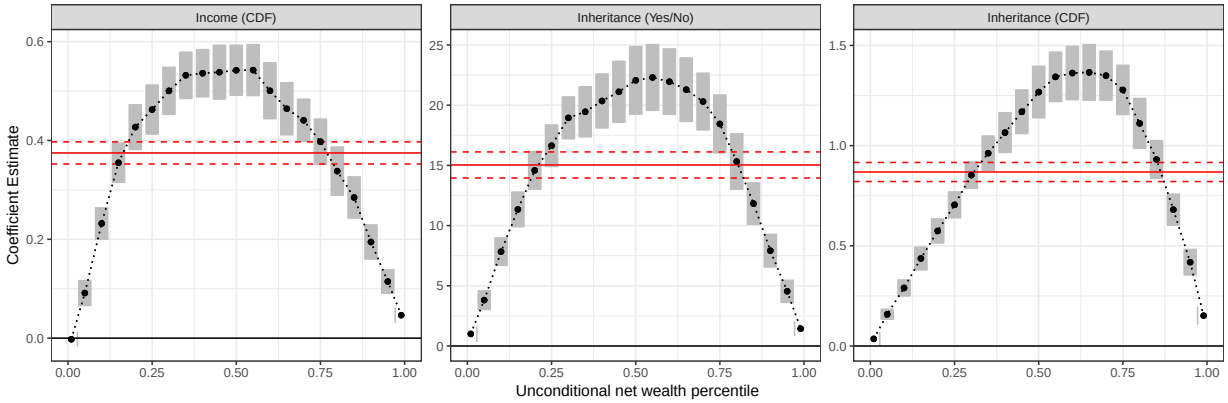
We propose an intuitive way to present the results of regression (4). While it is complex to contrast the differences between countries by only comparing coefficients, we add an illustration of country-specific deviations from the Eurozone average. The coefficients for the Eurozone are obtained in a pooled-sample approach of equation (4). Note that all households in the pooled sample are still ranked by their national distributions which provides a population-weighted average for the Eurozone. For the country regressions, we re-estimate the equation fully-interacted with a vector of country dummies. The corresponding confidence intervals for the Eurozone and the single countries are obtained using 100 bootstrap replicate weights provided by the HFCS. In order to illustrate the country-specific deviations, we take 1,000 draws from within the confidence intervals of both the Eurozone and the country coefficients for each quantile and subtract them from each other. If the distribution of the obtained differences cluster around zero, there are no significant deviations between the Eurozone average and the country coefficient. Furthermore, if 50% of the differences were above and 50% were below zero, there would be no significant deviation. In contrast, if 100% of the 1,000 values are below/above zero, the country coefficient is almost certainly below/above the European average.

We thus are able to show the deviations from the European average and their statistical significance by country. The calculations are based on the relative position of households in the country-specific distributions for wealth, income, and inheritances and facilitate the comparison without the need for purchasing-power considerations. Furthermore, this approach simplifies the interpretation of results, especially when addressing the relation of the two factors to each other.

only for heir households. However, this simple transformation has no influence on the covariances considered in the model and simply changes the scaling of the β_2 coefficient. It can be shown that the parameter in such an alternative specification conforms to the original β_2 times the proportion of heirs in each country. Besides negligible value added, such an approach would also impede cross-national comparisons of the inheritance coefficients, since countries are characterized by different proportions of non-heir households (see Table 1).

5 Results

Figure 1 illustrates the parameters of interest for the Eurozone as a whole.[4] The β_2 coefficient of specification (4) is shown in the left panel. With regard to income from employment, the rise of one percentile in the income distribution is associated with an OLS estimate of around 0.4 percentiles in the wealth CDF, which is consistent with similar results from Fessler and Schürz (2015). However, the quantile regression approach reveals gains between 0.1 and slightly more than 0.5 percentiles in the net wealth distribution, emerging as an inverted "U"-styled pattern. This shape indicates that a rise in the distribution of earned income contributes most to wealth accumulation in the broad middle of the net wealth distribution.



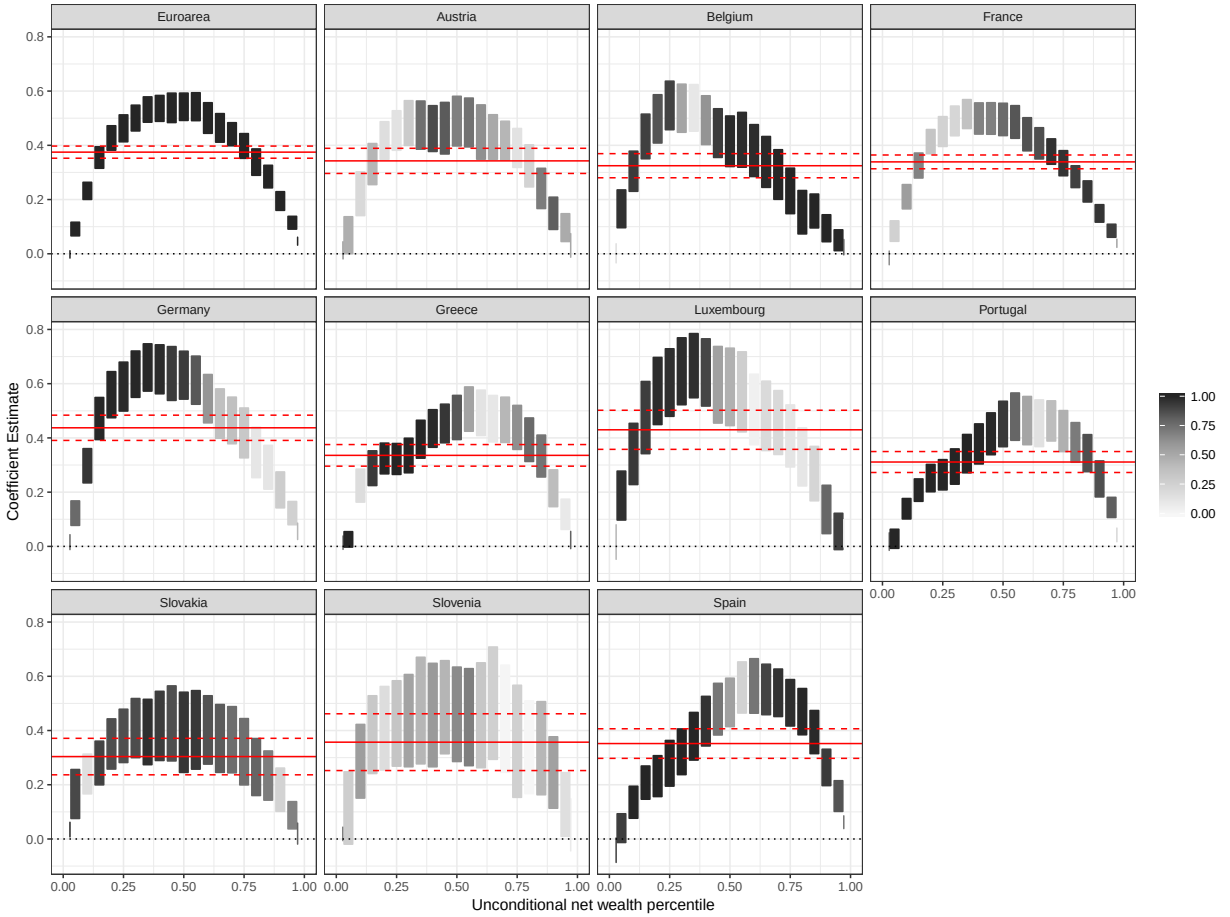
Notes: This figure shows the estimated regression coefficients for our variables of interest i) relative income position, ii) inheritance indicator and iii) relative inheritance position across quantiles of the unconditional national distribution of net wealth. Gray bars depict 95% confidence bands. Full results including socio-economic controls can be found in the appendix. See text for data definitions and sources.

Figure 1: Unconditional quantile regression estimates for the Eurozone

Similar patterns are also found for the inheritance variables as specified in (4a) and (4b). Concerning the inheritance dummy variable, the effect on the net wealth position of households amounts to approximately 15 percentiles in the OLS specification. In the non-linear perspective, the receipt of an inheritance corresponds to a 22 percentile gain in the net wealth distribution. Again, households around the median display the most significant effects of transfer wealth. Even though the coefficients of the inheritance CDF also exhibit the inverted "U" shape, the pattern is slightly skewed to the upper part of the distribution. A one percentile gain in the inheritance distribution corresponds to 0.9 percentiles in the OLS specification and as much as 1.3 percentiles between the 50^{th} and 75^{th} percentile in the quantile regression approach.

The Eurozone estimates express the average effects for all households in the observed countries as measured in national CDFs. However, we are interested in the country-specific differences concerning the effects of income and inheritances on the net wealth position. As already mentioned, such differences could arise from a number of institutional settings, for example differing tax levels on both income sources, labor market characteristics, wage setting processes, and housing policies which may facilitate wealth accumulation. There is no viable way for a thorough inquiry of all

[4] Tables 1 and 2 in the Appendix provide the regression results for all variables for the baseline OLS estimation and selected quantiles of the unconditional quantile regression approach.



Notes: This figure shows the estimated regression coefficients for the variable of interest i) relative income position across quantiles of the unconditional national distribution of net wealth. Bars depict 95% confidence bands. Dark colors imply a higher level of interestingness, i.e. higher confidence in statistically significant difference compared to the overall Euroarea estimate. Full results including socio-economic controls can be found in the appendix. See text for data definitions and sources.

Figure 2: Country-specific deviations: Effect of Income CDF

the complex country-specific institutional arrangements that influence wealth creation. We thus only highlight a limited set of potential factors at this point. Concerning tax policies, two of the countries covered in our study do not levy inheritance taxes (Austria and Slovakia), while all others do. However, the tax systems differ substantially since in some countries lineal relatives are fully exempted from the tax, as in Portugal and Slovenia, whereas others impose high top rates for lineal heirs like 45% in France, 34% in Spain, and 30% in Belgium and Germany. Also the income tax regimes differ significantly across countries which may lead to uneven possibilities for wealth creation. Exemplarily, the top marginal income tax rates range from roughly 22% in Slovakia to 54% in France. Regarding wage setting processes, most countries in our sample have introduced general minimum wages while in Austria minimum wages are negotiated on an industry level. In 2009, the minimum wages ranged between 39% of the median wage in Spain to 63% of the median wage in France, according to the OECD database. The country-specific *ex ante* differences in the wealth accumulation possibilities are thus far from negligible.

We assess these country differences for our three main variables (income CDF, inheritance

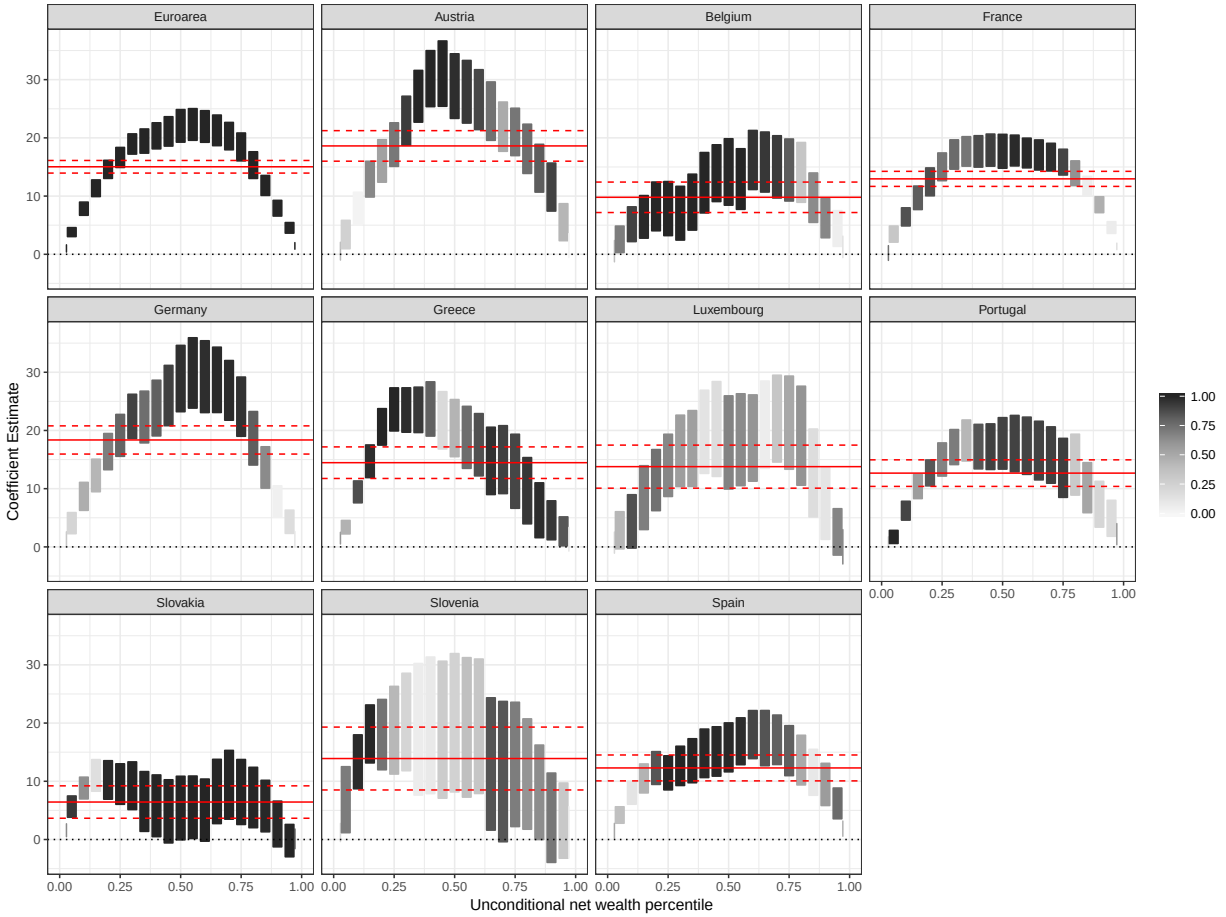
dummy, and inheritance CDF) in Figures 2, 3 and 4. Figure 2 shows the elasticities between a marginal increase in the distribution of earned income and the net wealth distribution. The bars indicate the 95% confidence interval for the unconditional quantile regression, the vertical lines display the OLS estimate and its confidence interval. In general we note, that the Eurozone average is an appropriate approximation for most countries along large parts of the wealth distribution. All countries share the more or less pronounced inverted U-shape pattern, where marginal changes of the income distribution contribute most to the net wealth position in the middle of the distribution.

To illustrate the country-specific differences from the Euro average, we color the bars according to the significance of deviation. As described above, we calculate the differences of 1,000 draws from within the confidence intervals (i.e. the bars) of the Eurozone average and the country estimates. The higher the share of these differences that are above/below zero, the more likely the country estimate differs from the Eurozone average. Briefly, if 50% of the differences are above and 50% are below zero, we do not measure significant deviation and the value in the figure equals 0. If 100% are above/below zero, the value equals 1. Thus, the darker the bars, the higher our confidence in the country-specific deviation from the Eurozone average.

The figure shows that in Germany and Luxembourg, the income coefficient is significantly higher than the Eurozone average at the bottom half of the distribution, while it is lower in Portugal, Greece, and Spain. In contrast, Spain and to a lesser extent Portugal also display significantly higher values at the top of the distribution which means that income plays a comparatively strong role in the upper part of the wealth CDF. Interestingly, the first row in the figure perfectly illustrates the rationale of our approach. The OLS estimate would show almost identical results for Austria, Belgium, France, and the Eurozone average. However, we see that the income coefficients for Belgium are strictly below-average and indicate a less pronounced income-wealth relationship for the upper half of the wealth distribution.

Figure 3 illustrates the estimates for the inheritance dummy. Again, most of the countries share the inverted U-shape pattern of the Eurozone average, with the exception of Slovakia. There are remarkable upward deviations from the European average for Austria and Germany particularly around the median. In both countries, the additional gain of an inheritance amounts to roughly six percentiles which is the maximum value across the Eurozone. Thus, the inverted U-shape is significantly more distinct for Austria and Germany with coefficients of almost 30 gained percentiles at the median. In contrast, households in Belgium, Spain, and France show rather damped curves with below-average contributions of inheritances. In these countries, inheritances seem to play a minor role for wealth accumulation compared to most other states. In Greece, inheritances seem to be of importance particularly for the bottom half of the distribution and less so at the top. The figures for Slovakia are significantly below the European average and indicate that inheritances are associated with a rise of only 5 percentiles in the wealth distribution. We hypothesize that this could be due to the limited possibilities for private wealth accumulation in past generations.

Finally, Figure 4 presents the estimates for the effect of the position in the marginal distribution of inheritances which we use as robustness check. By and large the country patterns are consistent

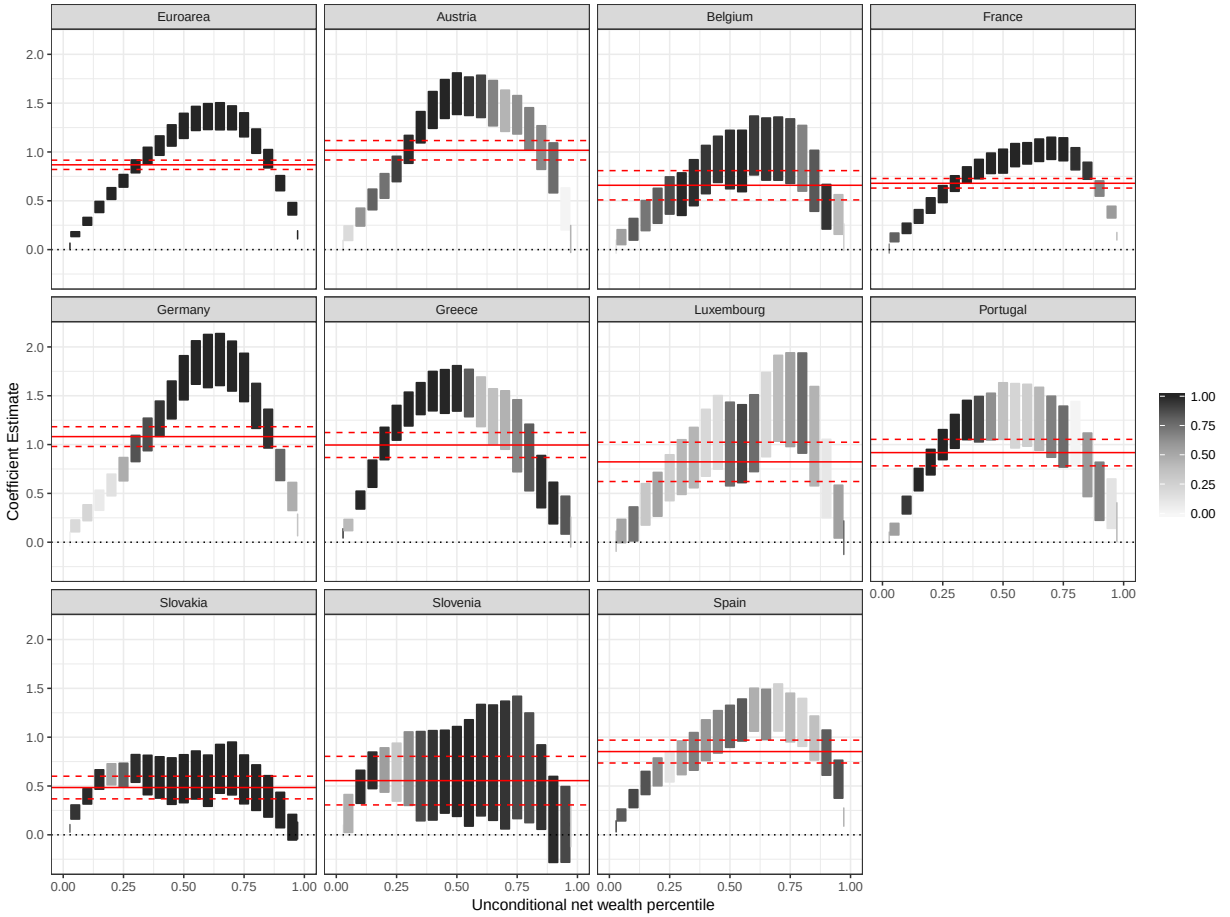


Notes: This figure shows the estimated regression coefficients for the variable of interest ii) inheritance indicator across quantiles of the unconditional national distribution of net wealth. Bars depict 95% confidence bands. Dark colors imply a higher level of interestingness, i.e. higher confidence in statistically significant difference compared to the overall Euroarea estimate. Full results including socio-economic controls can be found in the appendix. See text for data definitions and sources.

Figure 3: Country-specific deviations: Effect of Inheritance Dummy

with the dummy approach, although some patterns intensify by including the distributional form of received inheritances (i.e., the CDF). The most remarkable differences can be seen for Slovenia. For the dummy variable, the deviations from the Eurozone average were insignificant, while in the CDF approach a rise in the marginal distribution of inheritances contribute significantly less to wealth accumulation than in other countries. Thus, both Eastern European countries seem to show a weak relationship between inheritances and wealth. Still, Germany and Austria exhibit the most pronounced inverted U-shape pattern.

Overall we note that in all countries climbing one percentile in the distribution of inheritances is significantly stronger related to household wealth than gaining one percentile in the income CDF (see Table 2). This is a result of the dominant inverted U-pattern and the associated coefficients sizes. At the median, the coefficients for the income CDF range between roughly 0.4 and 0.6, the significant estimates for the inheritance CDF vary between 0.6 and 1.7 percentiles in the net wealth distribution. Concerning the inheritance dummy variable, the effect on the net wealth position of households is considerably larger (see Table 1). The estimates at the median almost



Notes: This figure shows the estimated regression coefficients for the variable of interest iii) relative inheritance position across quantiles of the unconditional national distribution of net wealth. Bars depict 95% confidence bands. Dark colors imply a higher level of interestingness, i.e. higher confidence in statistically significant difference compared to the overall Euroarea estimate. Full results including socio-economic controls can be found in the appendix. See text for data definitions and sources.

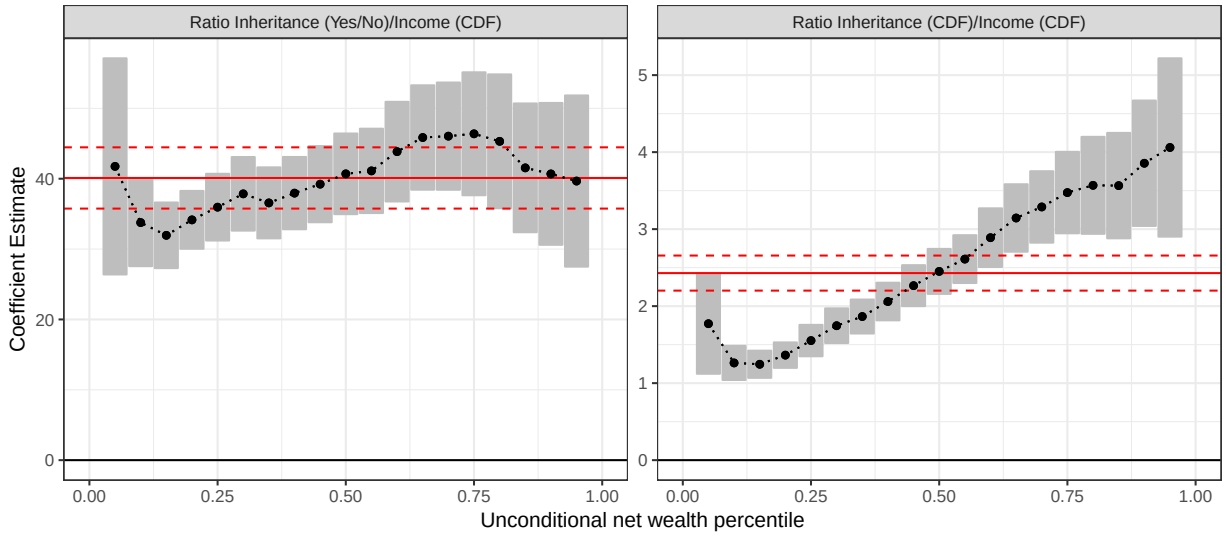
Figure 4: Country-specific deviations: Effect of Inheritance CDF

yield a 29 percentile gain for heir households in Germany and Austria.

The influence of income from employment and inheritances have also been shown to vary considerably between countries and along the net wealth distribution. In short, Germany and Luxembourg exhibit the largest effect for the income CDF (above 0.4 in the OLS specification and roughly 0.6 at the median of the quantile regression). Austria, Germany, and Greece show the highest estimates for the inheritance CDF (roughly 1.0 in the OLS and 1.6 in the median). Finally, Austria and Germany also display the highest coefficients for the inheritance dummy (around 18 in the OLS and 29 in the median). In some countries, the inheritance dummy has a larger effect in the upper half of the net wealth distribution (AT, BE, FR, DE, ES), while in other countries the effect is larger in the bottom half (GR, SI). The results for Slovakia are inconclusive and partly statistically insignificant.

Finally, we turn to our main result which is a measure for the relative contribution of earned income and inheritances. The nature of the regression specification allows us to easily compare the estimates for income from employment and wealth transfers. The left panel of Figure 5 shows

the relative importance of inheritances as compared to earned income. The values in this figure indicate how many percentiles a household would have to climb in the income CDF in order to compensate the receipt of an inheritance. In the Eurozone average, this ratio ranges between 30 and 45 percentiles, conditional on the position in the national wealth distribution. Both, the OLS estimate and the median in the unconditional quantile regression yield roughly 40 percentiles. From the 10^{th} to the 75^{th} percentile of the net wealth distribution, the relative contribution of inheritances compared to income increases with rising wealth, and slightly decreases at the top.



Notes: This figure depicts the ratio between the estimates for the inheritance variables and the coefficients for the relative income position across quantiles of the unconditional national distribution of net wealth. It shows how many percentiles a household would have to climb in the income CDF in order to compensate for the receipt of an inheritance or a marginal increase in the inheritance CDF respectively. Gray bars depict 95% confidence bands. See text for data definitions and sources.

Figure 5: Quantile Regression: Ratio of Inheritance to Income Percentile Gain

In the right panel of Figure 5, we compare the coefficients of income and inheritances both expressed in terms of the CDF. Since both estimates return the change in net wealth quantiles given a change in the CDF position, the relative representation provides insights into how many income percentiles a household needs to compensate a one percentile increase in the inheritance CDF. The figure therefore gives the relative importance of income and inheritances in the Eurozone average on a concerted measurement scale. Again, the ratio is rising significantly with the net wealth position of households. Thus, the relative importance of inheritances for wealth accumulation is higher for households at the top of the distribution than for households at the bottom. As can be clearly seen in the figure and in Table 2, the quantile regression approach reveals more details about the relationship than the OLS specification. The ratio based on the OLS estimates yields 2.4, while the quantile ratios range between 1.8 at the 5^{th} percentile and sligthly above 4 in the 95^{th} percentile of the wealth distribution.

Table 2 provides a more detailed view with the country-specific income-inheritance ratios. The patterns for the inheritance dummy resemble very much the ratios with the inheritance CDF. The ratios in Austria, Belgium, Germany, and France are higher in the upper part of the distribution indicating that inheritances are more important for wealth accumulation at the top. In Greece

and Portugal, the ratios peak in the bottom half. The Eastern European countries exhibit values that are partly insignificant and mostly far below the European average.

Table 2: Ratios between inheritance and income coefficients

	EU	AT	BE	DE	ES	FR	GR	LU	PT	SI	SK
Inheritance (Yes/No)											
OLS	**40.11**	**54.33**	**30.15**	**42.00**	**34.93**	**38.23**	**43.10**	**32.06**	**40.74**	**38.95**	**21.17**
P0.05	**41.75**	49.54	**15.52**	**33.31**	105.16	**41.52**	130.80	*15.23*	61.13	59.87	**34.04**
P0.25	**35.96**	**41.44**	**14.35**	**32.51**	**41.01**	**33.33**	**73.25**	**23.18**	**56.85**	*44.06*	**25.04**
P0.50	**40.69**	**59.06**	**34.09**	**45.80**	**31.42**	**35.71**	**42.92**	**30.50**	**39.40**	*43.61*	**13.73**
P0.75	**46.39**	**53.85**	**62.43**	**57.56**	**30.38**	**47.39**	**29.61**	**52.39**	**31.93**	35.80	**25.36**
P0.95	**39.67**	57.19	88.89	*35.18*	**39.15**	**54.17**	*22.57*	46.83	*34.18*	25.49	-2.18
Inheritance (CDF)											
OLS	**2.43**	**3.09**	**2.07**	**2.63**	**2.50**	**2.05**	**3.04**	**1.94**	**2.98**	**1.57**	**1.58**
P0.05	**1.77**	2.53	*0.77*	**1.38**	5.64	**1.49**	7.32	*0.61*	4.87	1.99	**1.42**
P0.25	**1.55**	**1.84**	**1.03**	**1.28**	**2.59**	**1.26**	**3.96**	**1.09**	**3.84**	**1.55**	**1.62**
P0.50	**2.45**	**3.41**	**2.26**	**2.84**	**2.27**	**1.86**	**3.40**	**1.72**	**3.00**	*1.44*	*1.44*
P0.75	**3.47**	**3.78**	**4.51**	**4.57**	**2.46**	**3.25**	**2.52**	**3.76**	**2.56**	2.13	*1.74*
P0.95	**4.06**	*4.75*	7.82	**4.48**	**3.73**	**5.06**	2.36	6.72	**2.77**	0.83	0.86

Source: HFCS 2010, own calculations. The table shows the ratios of inheritance and income parameter estimates of OLS and quantile regressions at the 5th, 25th, 50th, 75th and 95th percentile. Estimates with an associated p–value below 0.01 are depicted in bold, values below 0.05 in italics. Insignificant estimates (p–value above 0.05) are given in gray.

All in all, our calculations indicate a strong effect of transfer wealth on the net wealth position of households in the Eurozone countries. It is not surprising prima facie that inheritances lead to a substantial boost for wealth accumulation since the average size of inherited wealth is a multiple of annual income from employment in most countries. However, the scale of the relative importance and its non-linear character are striking. In fact, these results question meritocratic principles in European countries and contest the view of equality of opportunities in wealth creation.

6 Limitations

There are inherent difficulties when trying to empirically analyze the complex relationship between inheritances, earned income and net wealth, since the only available data source are voluntary household surveys. We thus would prefer complete household information for our three main variables over the whole life-cycle. This would allow for the calculation of households' life-cycle position in the income distribution and include all inheritances received during lifetime. However, currently available data sources only provide snapshots in time and are hitherto imperfect in their coverage. In the light of data availability, this papers research question thus focuses on past wealth accumulation processes up to now. Of course, households may receive inheritances in the future and move their position in the income and wealth distributions, which demands caution when generalizing the results. Nonetheless, the relationship between the current state of past wealth accumulation may provide insights into the relative importance of inheritances and income from employment.

Concerning the coverage of the data, there are several papers that attest underreporting in the HFCS compared to administrative aggregates for income (Honkkila and Kavonius, 2013) and wealth (Andreasch and Lindner, 2016; ECB, 2013a; Vermeulen, 2016). Furthermore, Alvaredo et al. (2017) find significant underreporting of survey data on inheritances using data for France and the United States. The reasons for underreporting range from a lacking coverage of very rich households to a potential downward bias in the whole sample. Efforts to adjust for the missing top of the wealth distribution (Eckerstorfer et al., 2015; Vermeulen, 2016) is not feasible when all variables have to be estimated. We thus acknowledge that we do not capture the relationship at the unobserved top of the wealth distribution.

7 Conclusion

This paper analyzes the role of inheritances and income from employment for the accumulation of wealth in the Eurozone. From a theoretical perspective, these two factors comprise the core of wealth accumulation but encompass different channels through which individual prosperity can be achieved. While income from employment highlights an individual-achievement perspective, inheritances are based on the achievements of previous generations. The question how these two variables contribute to household wealth is therefore not merely a trade-off between two different factors, but *expressis verbis* a mirror of societal configuration and preferences.

For a consistent analysis of this relationship, HFCS data provide a unique opportunity for the Eurozone. We use unconditional quantile regression specifications to relate the importance of inheritances and income to the households' relative position in the net wealth distribution. This approach is—given the scarcity of wealth data—limited in several ways, but our results provide first insights into the respective roles of inheritances and income from employment for wealth accumulation and the differences across the Eurozone countries. All calculations are adjusted for country-specific differences in the household structure and control for socio-economic idiosyncrasies of households.

We extend existing research by applying unconditional quantile regressions to investigate whether the importance of income and inheritances differs along the net wealth distribution. For the considered Eurozone countries as a whole, our results suggest that earned income is most strongly related to the middle of the wealth distribution which leads to an inverted "U" shape pattern. While a gain of one percentile in the income distribution is associated on average with a relative net wealth increase of roughly 0.4 percentiles, quantile regressions show the non-linear behavior of this relation. Depending on the position in the wealth distribution, the effect of income ranges between 0.1 and 0.5 percentiles. This trend is representative for most countries in our sample, with few variation. For instance, Belgium and France experience a above-average decline in the upper half of the distribution, while Portugal and Spain show a less pronounced decline in the importance of income.

For the second accumulation factor, inheritances, we employ both a dichotomous inheritance indicator and the relative position in the inheritance distribution, which may serve as robustness

check. For the Eurozone average, receiving an inheritance means as much as a 22 percentile hike in the respective country's wealth distribution. Quantile regressions show that inheritances as well follow a inverted "U" shape pattern, which is however skewed towards wealthier households. While this is still a proper description for most countries, the individual patterns vary between stronger (Austria Germany) and slightly lower effects (France, Spain).

Though insightful on their own, the particular interest of this paper lies in the *relative* importance of the two accumulation factors. By relating the estimated coefficients for the income and inheritances CDFs to each other, we are able to show that cross-country differences in this ratio are manifest. In Austria, Greece, and Portugal, households have to climb around three percentiles in the income distribution to compensate a one percentile increase in the inheritance distribution. In Germany, this value is 2.6. In Slovakia and Slovenia (both 1.6) the ratios are much lower.

These findings emphasize the outstanding role of inheritances for the accumulation of wealth and the positioning within the net wealth distribution of households. These results also correspond with other research focusing on the strong contribution of inheritances to total wealth inequality (Fessler and Schürz, 2015; Leitner, 2016; Westermeier et al., 2016). Following Piketty (2014), inheritances will be even more important than earned income for wealth accumulation in the future. This will also pose major challenges for economic policy, since self-made wealth is generally acknowledged while transfer wealth is often considered to be an hurdle for equality of opportunity. Western economies promote the idea of meritocracy where individual achievement and effort are pivotal. The outstanding significance of inheritances for social advance, as measured in the relative net wealth position of households, undermines these meritocratic principles. At the worst, impending social persistence could deteriorate credibility in Western welfare regimes.

References

Adermon, A., M. Lindahl, and D. Waldenström (2015): "Intergenerational wealth mobility and the role of inheritance: Evidence from multiple generations". *mimeo*.

Alvaredo, F., B. Garbinti, and T. Piketty (2017): "On the Share of Inheritance in Aggregate Wealth: Europe and the USA, 1900–2010". *Economica* 84 (334), pp. 239–260.

Andreasch, M. and P. Lindner (2016): "Micro- and Macrodata: a Comparison of the Household Finance and Consumption Survey with Financial Accounts in Austria". *Journal of Official Statistics* 32 (1), pp. 1–28.

Arrondel, L., M. Roger, and F. Savignac (2014): *Wealth and income in the euro area: Heterogeneity in households' behaviours?* Working Paper Series 1709. European Central Bank. URL: http://ideas.repec.org/p/ecb/ecbwps/20141709.html.

Bach, S., A. Thiemann, and A. Zucco (2015): *The Top Tail of the Wealth Distribution in Germany, France, Spain, and Greece*. Discussion Papers 1502. Deutsches Institut für Wirtschaftsforschung.

Bogliacino, F. and V. Maestri (2016): "Wealth Inequality and the Great Recession". *Intereconomics* 51 (2), pp. 61–66.

Bönke, T., G. Corneo, and H. Lüthen (2015): "Lifetime Earnings Inequality in Germany". *Journal of Labor Economics* 33 (1), pp. 171–208.

Boserup, S. H., W. Kopczuk, and C. T. Kreiner (2016): "The Role of Bequests in Shaping Wealth Inequality: Evidence from Danish Wealth Records". *American Economic Review: Papers and Proceedings* 106 (5), pp. 656–661.

Bover, O. (2010): "Wealth Inequality and Household Structure: U.S. vs. Spain". *Review of Income and Wealth* 56 (2), pp. 259–290.

Clark, G. and N. Cummins (2015): "Intergenerational Wealth Mobility in England, 1858–2012: Surnames and Social Mobility". *The Economic Journal* 125 (582), pp. 61–85.

Corak, M. (2013): "Income Inequality, Equality of Opportunity, and Intergenerational Mobility". *Journal of Economic Perspectives* 27 (3), pp. 79–102.

Cowell, F., B. Nolan, J. Olivera, and P. VanKerm (2016): *Wealth, Top Incomes and Inequality*. Working Paper 9. LSE.

De Nardi, M. and F. Yang (2014): "Bequests and heterogeneity in retirement wealth". *European Economic Review* 72, pp. 182–196.

Eckerstorfer, P., J. Halak, J. Kapeller, B. Schütz, F. Springholz, and R. Wildauer (2015): "Correcting for the Missing Rich: An Application to Wealth Survey Data". *Review of Income and Wealth*.

Elinder, M., O. Erixson, and D. Waldenström (2016): *Inheritance and wealth inequality: Evidence from population registers*. Discussion Paper Series DP11191. Centre for Economic Policy Research.

European Central Bank (2013a): "The Eurosystem Household Finance and Consumption Survey - Methodological Report for the First Wave". *ECB Statistics Paper Series* 1.

— (2013b): "The Eurosystem Household Finance and Consumption Survey - Results from the First Wave". *ECB Statistics Paper Series* 2.

Fessler, P., P. Lindner, and E. Segalla (2014): *Net Wealth across the Euroarea - Why household structure matters and how to control for it*. ECB Working Paper 1663. European Central Bank.

Fessler, P. and M. Schürz (2013): "Cross-Country Comparability of the Eurosystem Household Finance and Consumption Survey". *Monetary Policy and the Economy* Q2/13, pp. 29–50.

— (2015): *Private Wealth across European Countries: The Role of Income, Inheritance and the Welfare State*. ECB Working Paper 1847. European Central Bank.

Firpo, S., N. M. Fortin, and T. Lemieux (2009): "Unconditional quantile regressions". *Econometrica* 77 (3), pp. 953–973.

Gale, W. G. and J. K. Scholz (1994): "Intergenerational transfers and the accumulation of wealth". *The Journal of Economic Perspectives* 8 (4), pp. 145–160.

Honkkila, J. and I. K. Kavonius (2013): *Micro and macro analysis on household income, wealth and saving in the euro area*. Working Paper Series 1619. European Central Bank.

Humer, S., M. Moser, and M. Schnetzer (2015): "Socioeconomic structures of the Austrian wealth distribution". *Empirica* 42 (2), pp. 269–289.

Hurd, M., P.-C. Michaud, and S. Rohwedder (2012): "The Displacement Effect of Public Pensions on the Accumulation of Financial Assets*". *Fiscal Studies* 33 (1), pp. 107–128.

Irvine, I. and S. Wang (2001): "Saving behavior and wealth accumulation in a pure lifecycle model with income uncertainty". *European Economic Review* 45 (2), pp. 233–258.

Kessler, D. and A. Masson (1989): "Bequest and wealth accumulation: are some pieces of the puzzle missing?" *The Journal of Economic Perspectives* 3 (3), pp. 141–152.

Kessler, D. and A. Masson (1988): "On five hot issues on wealth distribution". *European Economic Review* 32 (2), pp. 644–653.

Koenker, R. and G. Bassett (1978): "Regression Quantiles". *Econometrica* 46 (1), pp. 33–50.

Kotlikoff, L. J. (1988): "Intergenerational transfers and savings". *Journal of Econmic Perspectives* 2 (2), pp. 41–58.

Kotlikoff, L. J. and L. H. Summers (1981): "The role of intergenerational transfers in aggregate capital accumulation". *Journal of Political Economy* 89 (4), pp. 706–732.

Leitner, S. (2016): "Drivers of wealth inequality in euro area countries. The effect of inheritance and gifts on household gross and net wealth distribution analysed by applying the Shapley value approach to decomposition". *European Journal of Economics and Economic Policies* 13 (1), pp. 114–136.

Little, R. and D. Rubin (2002): *Statistical analysis with missing values*. Wiley, New York.

Machado, J. A. and J. Mata (2005): "Counterfactual decomposition of changes in wage distributions using quantile regression". *Journal of applied Econometrics* 20 (4), pp. 445–465.

Melly, B. (2005): "Decomposition of differences in distribution using quantile regression". *Labour economics* 12 (4), pp. 577–590.

Modigliani, F. (1988): "The role of intergenerational transfers and life cycle saving in the accumulation of wealth". *The Journal of Economic Perspectives* 2 (2), pp. 15–40.

Piketty, T. (2014): *Capital in the Twenty-first Century*. Harvard University Press.

Piketty, T., G. Postel-Vinay, and J.-L. Rosenthal (2014): "Inherited vs self-made wealth: Theory & evidence from a rentier society (Paris 1872–1927)". *Explorations in economic history* 51, pp. 21–40.

Piketty, T. and G. Zucman (2014): "Capital is back: Wealth-income ratios in rich countries, 1700-2010". *The Quarterly Journal of Economics* 129 (3), pp. 1255–1310.

Saez, E. and G. Zucman (2016): "Wealth inequality in the United States since 1913: Evidence from capitalized income tax data". *The Quarterly Journal of Economics*.

Semyonov, M. and N. Lewin-Epstein (2013): "Ways to richness: Determination of household wealth in 16 countries". *European Sociological Review* 29 (6), pp. 1134–1148.

Sierminska, E. and M. Medgyesi (2013): *The Distribution of Wealth between Households*. Research Note 11/2013. European Commission.

Tiefensee, A. and M. Grabka (2014): "Comparing Wealth - Data Quality of the HFCS". *DIW Discussion Papers* 1427.

Vermeulen, P. (2014): *How fat is the top tail of the wealth distribution?* Working Paper Series 1692. European Central Bank.

— (2016): "Estimating the top tail of the wealth distribution". *American Economic Review: Papers & Proceedings* 106 (5), pp. 646–650.

Westermeier, C., A. Tiefensee, and M. M. Grabka (2016): *Inheritances in Europe: High Earners Reap the Most Benefits*. DIW Economic Bulletin 16/17/2016. DIW Berlin.

Wolff, E. N. and M. Gittleman (2014): "Inheritances and the distribution of wealth or whatever happened to the great inheritance boom?" *The Journal of Economic Inequality* 12 (4), pp. 439–468.

A Quantile Regressions

Table 1: Quantile Regression Coefficients — Inheritance (Yes/No)

	EU	AT	BE	DE	ES	FR	GR	LU	PT	SI	SK
Income (CDF)											
OLS	**0.37**	**0.34**	**0.32**	**0.44**	**0.35**	**0.34**	**0.34**	**0.43**	**0.31**	**0.36**	**0.30**
P0.05	**0.09**	*0.07*	**0.17**	**0.12**	0.04	**0.08**	*0.03*	**0.19**	0.03	*0.11*	**0.17**
P0.25	**0.46**	**0.45**	**0.55**	**0.59**	**0.28**	**0.45**	**0.32**	**0.60**	**0.26**	**0.43**	**0.38**
P0.50	**0.54**	**0.49**	**0.41**	**0.63**	**0.50**	**0.50**	**0.48**	**0.59**	**0.45**	**0.46**	**0.39**
P0.75	**0.40**	**0.39**	**0.23**	**0.42**	**0.50**	**0.33**	**0.44**	**0.41**	**0.43**	**0.36**	**0.32**
P0.95	**0.11**	**0.10**	**0.05**	**0.12**	**0.16**	**0.08**	**0.12**	0.06	**0.14**	*0.13*	**0.09**
Inheritance (Yes/No)											
OLS	**15.03**	**18.62**	**9.79**	**18.37**	**12.29**	**12.96**	**14.47**	**13.79**	**12.67**	**13.91**	**6.43**
P0.05	**3.81**	**3.39**	*2.57*	**4.08**	**4.21**	**3.47**	**3.39**	*2.85*	**1.71**	*6.84*	**5.65**
P0.25	**16.63**	**18.84**	**7.85**	**19.16**	**11.45**	**15.03**	**23.62**	**14.00**	**15.02**	**18.77**	**9.52**
P0.50	**22.06**	**28.89**	**14.14**	**28.92**	**15.83**	**17.69**	**20.40**	**17.94**	**17.78**	**20.05**	*5.40*
P0.75	**18.44**	**21.02**	**14.48**	**24.09**	**15.26**	**15.83**	**12.99**	**21.34**	**13.57**	*12.89*	**8.16**
P0.95	**4.54**	**5.52**	**4.43**	**4.32**	**6.20**	**4.60**	*2.67*	2.58	**4.91**	3.24	-0.19
Age											
OLS	**0.76**	**1.12**	**1.71**	0.04	**1.65**	**1.20**	**1.07**	*0.69*	**1.37**	0.00	0.43
P0.05	0.01	-0.12	0.48	-0.15	*0.76*	-0.11	**-0.43**	-0.36	0.30	0.08	0.28
P0.25	**1.32**	**1.77**	**2.56**	0.51	**2.54**	**1.38**	**1.97**	1.17	**1.70**	0.76	**1.72**
P0.50	**1.20**	**1.72**	**2.59**	0.15	**2.46**	**2.01**	*1.15*	0.85	**1.78**	-0.27	0.59
P0.75	*0.61*	**1.38**	*1.08*	-0.15	**1.41**	**1.30**	**0.89**	*1.12*	**1.54**	0.58	-0.11
P0.95	0.15	0.17	0.14	0.14	*0.41*	*0.20*	*0.54*	0.15	0.26	-1.06	-0.43
Age2											
OLS	**0.00**	**-0.01**	**-0.01**	0.00	**-0.01**	**-0.01**	**-0.01**	0.00	**-0.01**	0.00	0.00
P0.05	0.00	0.00	0.00	0.00	*-0.01*	0.00	**0.00**	0.01	0.00	0.00	0.00
P0.25	**-0.01**	**-0.01**	**-0.02**	0.00	**-0.02**	**-0.01**	**-0.01**	0.00	**-0.01**	-0.01	*-0.01*
P0.50	**-0.01**	**-0.01**	**-0.02**	0.00	**-0.02**	**-0.01**	*-0.01*	0.00	**-0.01**	0.00	0.00
P0.75	0.00	**-0.01**	-0.01	0.00	*-0.01*	**-0.01**	**-0.01**	-0.01	*-0.01*	-0.01	0.01
P0.95	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*	0.00	0.00	0.01	0.01
Female											
OLS	-0.86	-2.03	*-2.85*	-0.40	0.72	*-1.67*	-1.49	-0.33	**-3.99**	0.40	1.23
P0.05	-0.20	0.16	-0.60	-0.03	-1.24	-0.09	0.51	0.31	*-2.59*	-1.63	1.47
P0.25	-0.41	-2.53	1.53	-1.29	2.52	-1.79	2.29	*5.36*	**-9.28**	1.36	2.10
P0.50	-1.44	-3.48	*-6.06*	-1.22	1.07	-2.59	-1.79	-1.66	-4.14	1.32	1.96
P0.75	*-1.96*	-3.16	*-5.73*	-0.68	0.58	*-3.04*	**-5.81**	*-7.87*	-1.01	-0.53	-0.87
P0.95	0.49	-0.17	-1.41	*2.29*	1.61	-0.62	-1.58	-0.31	-0.42	1.71	1.13

Source: HFCS 2010, own calculations. The table shows the parameter estimates of OLS and quantile regressions at the 5th, 25th, 50th, 75th and 95th percentile. Estimates with an associated p–value below 0.01 are depicted in bold, values below 0.05 in italics. Insignificant estimates (p–value above 0.05) are given in gray.

Table 1: *(continued)*

	EU	AT	BE	DE	ES	FR	GR	LU	PT	SI	SK
Entrepreneur											
OLS	**13.55**	**16.91**	**14.17**	**9.00**	**12.64**	**21.50**	**7.89**	*6.13*	**12.56**	**18.17**	**7.65**
P0.05	**2.67**	*3.59*	**3.48**	1.75	1.35	**5.56**	1.36	*3.04*	*1.79*	1.43	1.00
P0.25	**9.11**	**8.48**	**14.06**	*7.34*	**7.75**	**15.39**	**6.08**	2.16	**7.47**	10.29	-1.98
P0.50	**15.11**	**18.21**	*15.74*	*8.59*	**14.68**	**24.62**	**10.97**	-0.02	**15.29**	**27.06**	6.17
P0.75	**22.10**	**29.24**	**23.03**	**13.08**	**21.96**	**34.70**	**11.15**	**16.11**	**23.32**	17.19	**18.63**
P0.95	**15.58**	**19.88**	**10.62**	**14.92**	**16.24**	**19.19**	*4.48*	**14.64**	**12.17**	**44.73**	**15.52**
Tertiary Education											
OLS	**5.22**	0.93	**8.37**	**3.95**	**8.25**	**6.15**	**5.29**	*4.08*	**13.28**	**13.31**	**11.29**
P0.05	*1.25*	2.28	-0.23	-0.10	*3.09*	**2.64**	1.38	2.24	0.88	2.98	**2.37**
P0.25	**5.80**	1.13	**7.71**	**5.99**	**7.28**	**7.42**	1.31	0.94	**9.24**	2.97	**7.50**
P0.50	**5.51**	1.71	**12.33**	3.99	**8.99**	**5.82**	**7.71**	1.78	**14.94**	**16.41**	**15.84**
P0.75	**7.32**	1.15	**12.99**	*3.88*	**12.76**	**8.28**	**11.10**	**12.86**	**22.69**	**29.29**	**16.81**
P0.95	**3.88**	-1.03	**3.88**	*1.90*	**7.33**	**5.05**	*5.11*	*6.09*	**16.29**	7.42	**8.20**
Retiree											
OLS	**2.93**	1.63	*5.35*	2.65	2.21	**4.75**	*3.25*	1.61	0.53	**24.14**	-4.17
P0.05	*1.59*	1.54	-1.16	*4.05*	-0.60	*2.28*	-0.13	-0.97	-0.08	*9.20*	*3.19*
P0.25	*3.60*	-0.81	**11.53**	*9.82*	1.69	*4.46*	*4.84*	-4.87	2.11	**28.69**	0.84
P0.50	**5.31**	4.81	6.21	4.13	4.11	**8.97**	2.52	0.52	-0.59	**36.04**	-6.63
P0.75	2.13	1.52	3.84	-4.06	3.47	*5.40*	3.13	5.57	1.85	**26.68**	-9.11
P0.95	1.05	1.74	4.23	-0.78	*4.34*	0.27	-0.25	0.69	-1.67	6.42	*-6.77*

Source: HFCS 2010, own calculations. The table shows the parameter estimates of OLS and quantile regressions at the 5th, 25th, 50th, 75th and 95th percentile. Estimates with an associated p–value below 0.01 are depicted in bold, values below 0.05 in italics. Insignificant estimates (p–value above 0.05) are given in gray.

Table 2: Quantile Regression Coefficients — Inheritance (CDF)

	EU	AT	BE	DE	ES	FR	GR	LU	PT	SI	SK
Income (CDF)											
OLS	**0.36**	**0.33**	**0.32**	**0.41**	**0.34**	**0.33**	**0.33**	**0.42**	**0.31**	**0.35**	**0.31**
P0.05	**0.09**	*0.07*	**0.16**	**0.12**	0.04	**0.08**	*0.02*	**0.19**	0.03	*0.11*	**0.16**
P0.25	**0.45**	**0.45**	**0.54**	**0.58**	**0.27**	**0.45**	**0.31**	**0.60**	**0.26**	**0.41**	**0.38**
P0.50	**0.52**	**0.47**	**0.41**	**0.59**	**0.49**	**0.49**	**0.46**	**0.58**	**0.45**	**0.45**	**0.40**
P0.75	**0.37**	**0.37**	**0.22**	**0.37**	**0.49**	**0.32**	**0.43**	**0.39**	**0.42**	**0.37**	**0.33**
P0.95	**0.10**	**0.09**	*0.05*	**0.10**	**0.15**	**0.08**	**0.12**	0.05	**0.14**	*0.13*	**0.09**
Inheritance (CDF)											
OLS	**0.87**	**1.02**	**0.66**	**1.08**	**0.85**	**0.68**	**1.00**	**0.82**	**0.92**	**0.55**	**0.48**
P0.05	**0.16**	**0.17**	**0.13**	**0.17**	**0.20**	**0.13**	**0.18**	*0.11*	**0.13**	*0.22*	**0.23**
P0.25	**0.70**	**0.83**	**0.55**	**0.75**	**0.69**	**0.57**	**1.22**	**0.66**	**1.00**	**0.64**	**0.61**
P0.50	**1.27**	**1.60**	**0.92**	**1.68**	**1.11**	**0.91**	**1.58**	**1.01**	**1.34**	**0.65**	**0.57**
P0.75	**1.28**	**1.38**	**1.01**	**1.69**	**1.20**	**1.03**	**1.09**	**1.46**	**1.08**	*0.79*	**0.57**
P0.95	**0.42**	**0.42**	**0.36**	**0.47**	**0.57**	**0.38**	**0.28**	*0.31*	**0.40**	0.11	0.08
Age											
OLS	**0.75**	**1.00**	**1.65**	0.04	**1.53**	**1.18**	**1.01**	0.58	**1.33**	-0.06	0.32
P0.05	0.03	-0.14	0.48	-0.13	*0.76*	-0.09	**-0.43**	-0.36	0.29	0.06	0.25
P0.25	**1.38**	**1.74**	**2.50**	*0.60*	**2.47**	**1.43**	**1.98**	1.12	**1.66**	0.72	**1.60**
P0.50	**1.18**	**1.53**	**2.52**	0.16	**2.30**	**1.98**	*1.04*	0.73	**1.71**	-0.31	0.44
P0.75	*0.54*	**1.15**	*0.99*	-0.21	**1.19**	**1.21**	*0.80*	0.88	**1.48**	0.43	-0.23
P0.95	0.10	0.09	0.10	0.10	0.28	0.15	*0.51*	0.07	0.24	-1.07	-0.46
Age2											
OLS	**0.00**	**-0.01**	**-0.01**	0.00	**-0.01**	**-0.01**	**-0.01**	0.00	**-0.01**	0.00	0.00
P0.05	0.00	0.00	0.00	0.00	*-0.01*	0.00	**0.00**	0.01	0.00	0.00	0.00
P0.25	**-0.01**	**-0.01**	**-0.02**	0.00	**-0.02**	**-0.01**	**-0.01**	0.00	**-0.01**	-0.01	-0.01
P0.50	**-0.01**	**-0.01**	**-0.02**	0.00	**-0.02**	**-0.01**	-0.01	0.00	*-0.01*	0.00	0.00
P0.75	0.00	**-0.01**	0.00	0.00	-0.01	**-0.01**	*-0.01*	0.00	*-0.01*	-0.01	0.01
P0.95	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*	0.00	0.00	0.01	0.01
Female											
OLS	-1.03	-1.63	*-2.67*	-0.20	0.48	*-1.67*	-1.62	-0.48	**-4.39**	0.77	1.48
P0.05	-0.23	0.24	-0.56	0.03	-1.32	-0.10	0.48	0.32	*-2.62*	-1.42	1.62
P0.25	-0.55	-2.06	1.67	-1.02	2.32	-1.84	2.07	*5.33*	**-9.67**	1.92	2.39
P0.50	-1.69	-2.85	*-5.79*	-0.87	0.79	-2.61	-2.00	-1.77	*-4.68*	2.00	2.25
P0.75	*-2.21*	-2.81	*-5.47*	-0.46	0.26	*-2.98*	**-5.93**	**-8.26**	-1.50	-0.40	-0.52
P0.95	0.40	-0.10	-1.31	*2.30*	1.47	-0.55	-1.59	-0.45	-0.60	1.79	1.19
Entrepreneur											
OLS	**12.17**	**14.64**	**13.65**	**6.58**	**11.38**	**20.22**	**7.58**	*6.32*	**12.60**	**18.18**	**7.36**
P0.05	**2.56**	*3.27*	**3.41**	1.59	1.31	**5.39**	1.40	*3.07*	*1.78*	1.67	0.83
P0.25	**8.57**	**7.22**	**13.64**	*6.77*	**7.02**	**14.55**	**6.37**	2.32	**7.66**	10.63	-2.25
P0.50	**13.11**	**14.61**	*15.02*	4.87	**12.99**	**22.94**	**10.20**	0.20	**15.27**	**27.50**	5.86
P0.75	**19.59**	**25.52**	**22.21**	*8.51*	**19.76**	**32.54**	**10.47**	**16.44**	**23.20**	16.38	**18.17**
P0.95	**14.56**	**18.63**	**10.30**	**13.24**	**14.99**	**18.30**	*4.24*	**14.72**	**12.12**	**44.98**	**15.44**

Source: HFCS 2010, own calculations. The table shows the parameter estimates of OLS and quantile regressions at the 5th, 25th, 50th, 75th and 95th percentile. Estimates with an associated p–value below 0.01 are depicted in bold, values below 0.05 in italics. Insignificant estimates (p–value above 0.05) are given in gray.

Table 2: *(continued)*

	EU	AT	BE	DE	ES	FR	GR	LU	PT	SI	SK
Tertiary Education											
OLS	**4.60**	1.08	**7.93**	**3.74**	**7.73**	**4.85**	**4.49**	*3.76*	**12.91**	**14.16**	**11.15**
P0.05	*1.23*	2.35	-0.25	0.00	*3.05*	**2.55**	1.21	2.20	0.83	*3.41*	**2.27**
P0.25	**5.68**	1.69	**7.34**	**6.54**	**6.97**	**6.90**	0.13	0.72	**8.86**	4.14	**7.34**
P0.50	**4.61**	1.91	**11.75**	3.70	**8.28**	*4.12*	*6.54*	1.35	**14.40**	**17.63**	**15.70**
P0.75	**6.09**	0.86	**12.26**	3.06	**11.89**	**5.81**	**10.30**	**12.30**	**22.24**	**30.07**	**16.62**
P0.95	**3.34**	-1.21	**3.55**	1.42	**6.87**	**3.96**	*4.93*	*5.95*	**16.13**	*7.58*	**8.18**
Retiree											
OLS	**3.00**	1.74	*4.69*	3.14	2.23	**5.05**	*3.77*	1.16	0.87	**24.07**	-3.86
P0.05	*1.63*	1.56	-1.28	*4.12*	-0.55	*2.47*	-0.07	-0.94	-0.03	*9.50*	*3.17*
P0.25	*3.81*	-0.66	**10.94**	*10.16*	1.76	**5.23**	**5.26**	-4.95	2.45	**29.32**	1.11
P0.50	**5.41**	*4.96*	5.34	4.89	4.15	**9.44**	3.44	0.09	-0.08	**36.90**	-6.11
P0.75	2.11	1.60	2.84	-3.29	3.43	*5.40*	3.82	4.44	2.29	**24.77**	-8.73
P0.95	1.00	1.76	3.82	-0.57	*4.24*	0.10	-0.05	0.26	-1.52	6.44	*-6.62*

Source: HFCS 2010, own calculations. The table shows the parameter estimates of OLS and quantile regressions at the 5th, 25th, 50th, 75th and 95th percentile. Estimates with an associated p–value below 0.01 are depicted in bold, values below 0.05 in italics. Insignificant estimates (p–value above 0.05) are given in gray.