



EUROPEAN CENTRAL BANK  
EUROSYSTEM

## Working Paper Series

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Private wealth across European countries: the role of income, inheritance and the welfare state



No 1847 / September 2015



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## Abstract

Using microdata from the Household Finance and Consumption Survey (HFCS), this study examines the role of inheritance, income and welfare state policies in explaining differences in household net wealth within and between euro area countries. First, about one third of the households in the 13 European countries we study report having received an inheritance, and these households have considerably higher net wealth than those which did not inherit. Second, regression analyses on households' relative wealth position show that, on average, having received an inheritance lifts a household by about 14 net wealth percentiles. At the same time, each additional percentile in the income distribution is associated with about 0.4 net wealth percentiles. These results are consistent across countries. Third, multilevel cross-country regressions show that the degree of welfare state spending across countries is negatively correlated with household net wealth. These findings suggest that social services provided by the state are substitutes for private wealth accumulation and partly explain observed differences in levels of household net wealth across European countries. In particular, the effect of substitution relative to net wealth decreases with growing wealth levels. This implies that an increase in welfare state spending goes along with an increase - rather than a decrease - of observed wealth inequality.

JEL CLASSIFICATION: D30, D31

KEY WORDS: WEALTH DISTRIBUTION, INTERGENERATIONAL TRANSFERS, WELFARE STATE, HOUSEHOLD MICRODATA

## Non-technical summary

We study the role of inheritance, income and welfare state policies in explaining differences in household net wealth within and between euro area countries.

Across all euro area countries, inheritance plays a decisive role in defining the relative position of households in the distribution of wealth. Heir households hold substantially higher net wealth levels than their non-heir counterparts. This finding holds along different household types as well as along the entire net wealth distribution. Besides controlling for a large set of socioeconomic characteristics of households, we also apply very flexible controls of household structure based on the number of household members as well as possible combinations of age and gender categories. Using methods from the decomposition literature, we compare heir households to their non-heir counterparts. The difference in net wealth reaches about €100,000 at the median level of net wealth and increases beyond €1 million at the 99<sup>th</sup> percentile of the net wealth distribution. These values are considerable, as net wealth of heir households is about €210,000 at the median and about €3,000,000 at the 99<sup>th</sup> percentile.

We focus on the households' relative position with regard to other households as opposed to the households' absolute wealth or income values. We prefer this approach because one's relative position in a society is decisive for social status and questions of richness and poverty, which are relative phenomena. It is also statistically more robust as it is less exposed to measurement error. On average, an intergenerational transfer lifts a household by 14 net wealth percentiles, while an additional percentile in the income distribution is associated with 0.4 net wealth percentiles. Receiving an intergenerational transfer is therefore a higher contributor to net wealth, being equivalent to an income increase that leads to a new rank in the income distribution about 35 percentiles higher. This relative importance of intergenerational transfers versus income position varies from about 25 (the lowest, in Slovakia) to 52 (the highest, in Austria) income percentiles, being equivalent to an intergenerational transfer.

Another key finding of the paper is the importance of the welfare state for the distribution of wealth. An effective and well-developed welfare state goes hand in hand with lower levels of private wealth. The measured inequality of wealth is higher in countries with a relatively more developed welfare state. Why is this the case? The substitution effect of welfare state expenditures with regard to private wealth holdings is significant along the full net wealth distribution, but is relatively lower at higher levels of net wealth. Given an increase in welfare state expenditure, the percentage decrease in net wealth of poorer households is relatively stronger than for households in the upper part of the wealth distribution. This finding implies that given an increase of welfare state expenditure, wealth inequality measured by standard relative inequality measures, such as the Gini-coefficient,

will increase. We also illustrate that the effects on net wealth that we find are in line with displacement effects found in the literature, even under an assumption of strongly increasing displacement effects along the wealth distribution for which there is some support in the literature (Engelhardt and Kumar, 2011).

Characterizing “welfare” and “well-being” of individuals is often the ultimate goal of inequality analyses of income, consumption and wealth. Even in an elaborate approach where a variety of such measures is used and different dimensions are taken into account, cross-country comparisons are especially difficult. Public spending affects households across the income and wealth distributions differently. More public expenditure can go along with more inequality of private wealth in the short run. Welfare state policies influence long term inequality through different channels. Positive effects on social mobility might lead to lower inequality in the long term.

State social security tends to be a substitute for low risk assets. Therefore while for the poor this allows more consumption and permits less precautionary savings it might likely allow the wealthy to take more risk in their private wealth portfolios and reduce the less risky part, leading to higher returns on the portfolios of wealthier households. The withdrawal of the welfare state since the 1970s and the rise of the importance of private wealth, which also leads to the rising importance of inheritances (Piketty, 2011), are two sides of the same coin. They both increase the concentration of power in our democracies, a function of wealth which is reserved for the very top of the distribution. More research is necessary to understand the complex mechanisms between public welfare and private wealth and their different relevance across the wealth distribution. This is not only of great importance for the individual but for our societies and our political systems as a whole.

## 1. Introduction

In his recent book “Capital in the Twenty-First Century,” Piketty (2013) argues that since the rate of return on capital is generally higher than the growth rate of the economy under capitalism, income loses importance as the critical source of wealth over time, while inheritances<sup>1</sup> become increasingly important. He proposes that, for the sake of democracy and to prevent extensive capital concentration, a tax on wealth ought to be implemented to slow down this process.

Using administrative tax data, Piketty (2013) and others extensively document the evolution of the concentration of income (Alvaredo, Atkinson, Piketty, and Saez, 2013) and inheritances (Piketty, 2011) as a source of flows into wealth as well as the stock of wealth itself (Kopczuk and Saez, 2004). Using tax data is advantageous in that they provide good coverage of information for the wealthiest households and cover a long period of time. Such data often fail to provide any additional micro-level information on the individuals and households paying the taxes, which would be necessary to investigate joint distributions.

Survey data, on the other hand, provide a large amount of information on the characteristics of individual observations. These data are used in many studies concerned with wealth, income, and inheritances, and studies which link these important socioeconomic variables to each other. In a recent contribution Wolff and Gittleman (2013) summarize the relevant theoretical and empirical literature extensively. Only relatively few studies discuss wealth, income, and inheritances from a cross-country comparative perspective, largely due to the lack of appropriate data to do so.

Semyonov and Lewin-Epstein (2013) used the Survey for Health, Aging and Retirement in Europe (SHARE), the Health and Retirement Study (HRS) for the US, and the English Longitudinal Study of Aging (ELSA) for the UK to investigate the determinants of wealth for the elderly to compare the accumulation process across countries. They find that there are considerable differences in the distribution of net wealth across Europe and compared to the US. Income and inheritances impact net wealth in a very similar way across countries, however. At the same time, they do not find any systematic association between country level characteristics and net wealth or the way net wealth is accumulated.

In the present study, we investigate the relationship between income, inheritances, and the welfare state in households with members of all ages, not just those over 50 as in Semyonov and Lewin-Epstein (2013). We use the Household Finance and Consumption Survey (HFCS), which is an a priori harmonized dataset with a focus on the household balance sheet. Controlling for a rich set of covariates and using methods from the decomposition literature, we show that heir-households hold substantially higher net wealth levels than their non-heir counterparts. On average, an intergenerational transfer lifts a household by 14 net wealth percentiles, while an additional percentile in the income distribution

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<sup>1</sup>Throughout the paper we use the term inheritance to refer to any type of intergenerational transfers such as inheritances or gifts.

is associated with 0.4 net wealth percentiles. Receiving an intergenerational transfer is therefore a higher contributor to net wealth, being equivalent to an income increase that leads to a new rank in the income distribution about 35 percentiles higher. Along with this contribution, we employ multilevel cross-country regression to show that welfare state expenditures, such as pension, social security, or labor market expenditures, are *substitutes* for private wealth. In that vein our contribution also relates to the literature dealing with displacement effects between social security and private wealth originated by the seminal contribution of Feldstein (1974). Whereas Feldstein (1974) used aggregate time series data to show that a 1 dollar increase in social security wealth depresses private saving by about 40 cents, other recent contributions such as Jappelli (1995) and Alessie, Angelini, and van Santen (2013) use household survey data to estimate similar substitution effects. Indeed we show that welfare state expenditures are substitutes for private wealth accumulation. The more insurance the state provides against the contingencies of life, the less need households have to accumulate wealth for precautionary reasons. That translates to relatively lower average net wealth holdings for households in countries with higher welfare state expenditures. Furthermore we show that given an increase in welfare state expenditure, the percentage decrease in net wealth of poorer households is relatively stronger than for households in the upper part of the wealth distribution. This suggests that an increase in welfare state activity goes along with an increase - rather than a decrease - of observed wealth inequality. We also illustrate that the effects on net wealth we establish are roughly in line with displacement effects found in the literature. Note, however, that our analysis deals with short rather than long term effects on wealth inequality. Welfare state policies might influence long term inequality through different channels. Possible effects on social mobility might for example lead to lower inequality in the long term.

We present the study as follows. Section 2 contains conceptual reasoning about the definition and accumulation of wealth in general and discusses possible sources of difference in wealth accumulation across households and countries. Section 3 describes the dataset employed and the important ways in which it differs from data which have been used in previous studies of household wealth accumulation. Section 4 contains the main empirical analysis. We analyze the relationship between inheritances, income, welfare policies, and wealth in three steps. First, we compare the *absolute* wealth level of households who have inherited with those who have not inherited (section 4.1). Second, we analyze how inheritances and income are related to a household's *relative* wealth position in a society (section 4.2). In both cases, we control for household structure and other important determinants of wealth to determine the relationship between income/inheritances and wealth. Third, we incorporate the importance of the findings in subsections 4.1 and 4.2 to examine the relation between country level welfare state expenditure and the level of household wealth in different countries in subsection 4.3. Section 5 derives four stylized facts from the findings and concludes.

## 2. Wealth and Wealth Accumulation

### Wealth

Earlier studies have generated some key facts about the distribution of private household wealth (among them Jenkins (1990), Davies and Shorrocks (2000), Sierminska, Brandolini, and Smeeding (2006) and Kennickell (2012)): Net wealth is very concentrated and distributed much more unequally than income. The bottom 50 percent in the wealth distribution of households holds only a tiny fraction of aggregate wealth. Nonfinancial assets outweigh financial assets and consist mainly of households' main residences. Finally, the distribution of financial assets is substantially more unequal across households than the distribution of nonfinancial assets. Household wealth was lower during the period from the 1950s to the 1970s than in later decades, reflecting among other things recovery from World War II destruction. Saez and Piketty (2012) mention also anti-private capital policies including rent control, financial repression and nationalization policies. Politics were reversed in the 1980s and 1990s via globalization, deregulation "and large wealth transfers from public to private hands through cheap privatization" (p.9). Thus the rise of private wealth is partly due to a decline of public wealth.

Since the beginning of private wealth analysis the question of what should be counted as private wealth and how public wealth and public services should be taken into account has been strongly debated. The rising importance of private wealth and the concomitant withdrawal of the welfare state since the 1970s, which has become further challenged since the crisis 2007 which led to tight fiscal situations in many countries, have even increased the importance of this debate.

Most researchers mean non-human assets minus debt when they talk about wealth. Most of the time they also exclude any intangible assets like pension rights or social security wealth and basically any other rights to uncertain future benefits (Davies and Shorrocks, 2000). Even though they are very important for the welfare of the individuals, problems with such rights are manifold. Davies and Shorrocks (2000) use the term "augmented wealth" to refer to a broader definition of (net) wealth (net worth), also including entitlements to future pension streams, and at the same time point to a number of problems involved with such a broader definition (risk adjustments, discount rates, borrowing constraints, etc.). To calculate the present value of an expected value of an insurance one has to take into account the value of the insurance and additionally the probability of an insurance incident taking place and insurance claims being honored. In the case of pension claims that implies knowledge of the year of retirement and information on life expectancy.

The economic well-being of a household is influenced by both private resources (income and wealth) from the market and the family (inheritances, gifts, non-monetary support) and public welfare. Both sources of resources provide different forms of insurance against

the contingencies of life. A household's income, its wealth and the government transfers it receives are mutually determined, and this interplay takes place in a complex way that is often ignored in analyses of inequality.

The characteristics of both components of economic well-being differ *ex ante*. The nature of public welfare is different from the one of private wealth, as the former involves by definition a group of people organizing social structures. While private wealth is at the disposal of the individual owner at the time of measurement public welfare entitlements depend on the future decisions of the state which provides them. That is why the OECD in their recently published guidelines for microstatistics in household wealth recommend that such claims should be excluded from the net wealth definition of microstatistics. At the same time they recommend to use country information to provide some indication of the significance of such entitlements in different countries:

“The exclusion of entitlements in social security schemes, as recommended here for micro statistics on household wealth, is primarily for practical reasons and to maintain consistency with the SNA's definition of financial assets.

...It may be argued that, even where estimates of pension entitlements in social security schemes can be derived for individual households, they would be of limited usefulness in cases where a government can change the basis on which the entitlements are determined in order to keep them within the bounds of what is feasible from a budget perspective.

...To assist in analysing the wealth data in isolation, countries should provide some indication of the likely significance of excluding pension entitlements for their measures of financial assets and net worth” ((OECD, 2013a, p.71)).

One way to take into account such entitlements would be to estimate them for all households individually or to use aggregates. A strand of literature follows this approach to calculate so-called displacement effects. Feldstein (1974) used aggregate time series data to show that a 1 dollar increase in Social Security Wealth depresses private saving by about 40 cents (displacement effect). Many contributions such as Hubbard (1986) and Jappelli (1995) tend to use cross sections of household surveys to estimate similar substitution effects. Gale (1998) who introduced an age-related adjustment factor used a cross section of the Survey of Consumer Finances. All of these studies had to rely on proxy estimates for past earnings, which are usually combinations of current income, age, education and other sociodemographic variables.

Among the more recent studies are the few like Hurd, Michaud, and Rohwedder (2012) which use cross-country variation to identify displacement effects. They apply educational aggregates from a pooled sample of retired males aged 65 to 75 from the HRS (for the US), ELSA (for the UK) and SHARE (for Europe) and estimate displacement effects between 23 and 44 percent with regard to financial wealth. Also Alessie, Angelini, and van Santen (2013) use a cross-section (SHARE-LIFE) and are able to use the included retrospective information on job history and the first wage in each past job to construct a measure of



the present value of past earnings. Using median regression they estimate that each euro of additional pension wealth is related to a decline of 61 euro cent of private wealth.

A part of our contribution is related to this literature. However, we are not primarily interested in an estimate of the actual displacement effect in different countries but rather examine if the remaining wealth differences between countries - once controlled for important drivers of wealth at the microlevel - can be explained by cross-country differences in welfare state expenditures. While the displacement effect literature asks how much households lower their private wealth holdings if their personal social security entitlements increase by 1 euro, we ask how much of the differences in private wealth is explainable by differences in country-level social security measures and for which households such differences matter in particular.

It is important to note that our result that social welfare reduces private wealth for poorer households relatively more than for wealthier households does not imply that the displacement effect as defined in the displacement effect literature is larger for poorer households. As social security entitlements are much more equally distributed than private wealth, even a lower displacement effect for poorer households could lead to a stronger relative decrease in their private wealth levels. Imagine a poor household with private wealth 100, pension entitlement 50, and displacement effect 0.2, which would lead to a reduction of 10% in private wealth and compare to a rich household with private wealth 1000, pension entitlement 100 and displacement effect 0.5, which would lead to a reduction of 5% in private wealth. See also “Back of the envelope” calculations in table 7 in section 4.3.

We stick to the definition of marketable wealth as our variable of interest. Marketable wealth is displaced by social security wealth or other welfare state activities. Most studies in the displacement effect literature also analyse effects on marketable wealth, while some are only able to examine effects on financial wealth. We analyse all private households and not as in some studies of the displacement effect literature only subsets - like households with members older than 50 (SHARE). As in the displacement effect literature, social security entitlements and other insurance type claims figure as explanatory variables in our analysis. As we use cross-country variation in welfare spending, we use country-level aggregates rather than individually estimated social security entitlements, as is the case in a large part of the displacement effect literature.

## **Wealth Accumulation**

In order to understand the complex process of wealth accumulation of households one has to study microdata of households on income, wealth and expenditure. Households

accumulate wealth in different ways. First, households may save out of their income. Mostly it will be labor income that forms the resource for saving, but for the wealthy it will be rather wealth income. Second, households may receive intergenerational transfers or gifts and if they do not consume them then the wealth transfers will increase their wealth accumulation. Further factors influencing wealth accumulation may be family background, culture and religion (Keister, 2005).

A central idea in this paper is that also public welfare may play a role in determining private wealth accumulation. The welfare state provides private households with income or different forms of insurance. And households that receive public support may need lower levels of saving. Greater public spending can mean that households which would have had to save to make basic investments in their well-being, to protect themselves from shocks, or to smooth their consumption over time, need to save less. Thus the consumption level of these households can increase, which would at the same time lower their wealth levels. On the other hand households without essential public goods (education, health, social protection, retirement) would have to save more privately.

A primary motive of precautionary saving is to have some reserves for a rainy day or for retirement. Similarly, the life-cycle hypothesis suggests that individuals try to smooth their consumption over their whole life by saving in times when their earnings are higher in order to maintain the level of consumption for times when earnings are lower. Looking at empirical data there is large variation in savings from income of household members. Capital income on previously accumulated wealth plays an important role in wealth accumulation only for households in the top wealth percentiles. The rest of the population mostly accumulates wealth when their labor market income exceeds expenditures.

On the other hand, an increasing share of the population receives inheritances and these inheritances account for an increasing share in total wealth (Piketty, 2011). Although in voluntary household surveys they are not covered adequately, these kinds of wealth transfers are heavily concentrated at the top of the distribution and their impact on wealth concentration may be far reaching.

The degree to which states provide welfare to their citizens differs from country to country. We investigate the relationship between household wealth and national welfare policies on three dimensions: pension expenditures, social security, and labor market policies.

Investment and income from financial wealth such as interest and dividends or from real wealth such as rental income or imputed rent are only important at the top of the wealth distribution. At the lower end, households tend to use low-risk investments to insure against a rainy day. As it comes with relatively low risk, state social security tends to be a substitute for low risk assets. Therefore while for the poor the effect will mainly allow more consumption and less precautionary saving it might likely allow the wealthy to take more risk in their private wealth portfolios and reduce the less risky part, leading to higher returns on the portfolios of wealthier households. Using aggregate data already Feldstein (1974) observed, that

The marginal propensity to consume social security wealth is generally statistically significant and slightly larger than the propensity to consume ordinary wealth. This difference probably reflects the fact that a large portion of ordinary wealth is held by a small fraction of households for whom bequests and the accumulation of larger fortunes are more important than saving for retirement (Feldstein, 1974, p.916).

The fact that he found from aggregates that the propensity to consume out of additional social security wealth tends to be higher than that from “ordinary” private wealth translates to our finding at the microlevel, that increases in social welfare lead to stronger relative decreases of private wealth for poorer households. While with aggregate data one can only speculate about the related patterns our analysis can illustrate this changing relative importance along the wealth distribution.

### 3. Data

We use data from the first wave of the HFCS (2010), a euro area-wide project to gather data on real and financial assets and liabilities of households. More than 62,000 households across the euro area were interviewed, leading to a micro dataset which is representative at the euro area and member state level. While the goal was maximized harmonization in terms of the questionnaire used in the survey across countries, the interview methods, data editing, multiple imputation techniques, and all other aspects of data production, national differences were accounted for by adapting to country specifics where necessary. Because the detailed questionnaire section on intergenerational transfers was not entirely implemented in Italy and Finland, we exclude them from our analysis. Table 1 shows information on the fieldwork period, net sample size, response rates, oversampling of the wealthy, and the survey mode used in data collection. In total the selected sample consists of more than 43,000 households across the euro area. In consistency and plausibility checks and comparisons with other existing datasets the ECB showed that even datasets with relatively low response rates like the German one fit existing other statistics rather well. This might be a result of the extensive work which was allocated to the data production process and appropriate non-response weighting and imputation procedures (ECB, 2013b).

For some parts of our analysis, we have to exclude also Malta<sup>2</sup> and Cyprus,<sup>3</sup> and the sample size in Slovenia does not allow for any representative interpretation at the country level. Nevertheless we use the Slovenian data in our pooled and multilevel analysis and also report country level results.

Our main interest lies in the joint distribution of wealth, income and intergenerational transfers and its links to welfare state policies. The HFCS is one of the few datasets suited

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<sup>2</sup>In Malta the age of the household members is not included in a continuous way.

<sup>3</sup>In Cyprus not all individual characteristics are gathered for all household members.

Table 1: General information on the HFCS wave 1

	Fieldwork period	Net sample size	Response rate (%)	Over-sampling	Survey mode
Austria	2010/2011	2,380	55.7	No	CAPI
Belgium	2010	2,364	21.8	Yes	CAPI
Cyprus	2010	1,237	31.4	Yes	CAPI(12%)/PAPI(88%)
Germany	2010/2011	3,565	18.7	Yes	CAPI
Spain	2008/2009	6,197	56.7	Yes	CAPI
France	2009/2010	15,006	69.0	Yes	CAPI
Greece	2009	2,971	47.2	Yes	CAPI
Luxembourg	2010/2011	950	20.0	Yes	CAPI
Malta	2010/2011	843	29.9	No	CAPI(81%)/PAPI(19%)
Netherlands	2010	1,301	57.5	No	CAWI
Portugal	2010	4,404	64.1	Yes	CAPI
Slovakia	2010	2,057	n.a.	No	CAPI
Slovenia	2010	343	36.4	No	CAPI

*Notes:*

- (i) Computer-assisted personal interview (CAPI); paper based personal interview (PAPI); computer-assisted web interview (CAWI).  
(ii) *Source:* HFCS 2010.

for this purpose, as its main task is to collect detailed information on household balance sheets. In its definition of wealth, the HFCS follows other well-established wealth surveys such as the SCF (Survey of Consumer Finances) or the EFF (Encuesta Financiera de las Familias) in Spain. Wealth can in general be - more or less easily - liquidated and transferred, and it can be used as collateral. It includes therefore only marketable wealth as defined in Davies and Shorrocks (2000) and recommended by the OECD (2013a, p.71). An advantage of this versus other cross-country datasets which also include information about assets and liabilities is that it includes all private households as opposed to only a subset.

Net wealth is defined as real assets plus financial assets minus debt of a household. Real assets consist of the main residence, other real estate property, investments in self-employed businesses, vehicles, and other valuables. Financial assets are current accounts, savings deposits, mutual funds, bonds, stocks, money owed to the household, and other financial assets. Debt consists of collateralized debt as well as uncollateralized debt, including credit card debt and overdrafts.

Gross household income is the sum of employee income, self-employment income, income from pensions, regular social transfers, regular private transfers, income from real estate property, income from financial investments, income from private business and partner-

ships and other non-specified sources of income.<sup>4</sup> As in most other studies (Jappelli, 1995; Gale, 1998, see e.g.) in the literature (see section 2) we have to rely on current income, age, education and other sociodemographic variables and their combinations to proxy past earnings.

The key variable with regard to intergenerational transfers is a binary variable which indicates if any person in a household ever received an intergenerational wealth transfer as gift and/or inheritance. It is constructed of two different survey questions: the first asks whether the household became an owner of its main residence via an intergenerational transfer, while the second asks for any additional inheritances or gifts received. The indicator takes the value one if one or both questions were answered with yes and zero otherwise. The dataset also contains information on the value of the main residence at the time the household came to own it via an inheritance or gift, as well as information on the number of other intergenerational transfers received and the money values of the largest three of them at the time of the transfer. We primarily use the binary variable (intergenerational transfer received or not) as it is unclear how the present value of the inheritances received should be calculated.<sup>5</sup>

Other variables we use in the study are the gender and age of all household members, and the education and labor force status of the respondent for household level information. We also include a variable indicating if the household is an entrepreneur household, which is defined as a household which owns a share in a company in which at least one household member is working.

Additional country-level data we use for our analysis with regard to the welfare state are taken from the Eurostat New Cronos database.<sup>6</sup> We use pension and total social security (protection) expenditure as percentage of gross domestic product of the respective countries, as well as expenditure per unemployed for active labor market policy. As precautionary saving for retirement is a major reason to accumulate wealth, we use state pension expenditures as a main measure for welfare state activity which might induce lower private wealth holdings. Social security protection encompasses other major insurance functions which relieve households of the burden of a defined set of risks or needs. As a third proxy for welfare state activity we use active labor market policy expenditure, which might decrease uncertainty with regard to future income streams and therefore also allow for less precautionary saving.

The ECB methodological report contains detailed information on all HFCS variables (ECB, 2013b). In general, we use complex survey weights and all five multiple imputations

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<sup>4</sup>The HFCS provides gross income rather than net income. This difference should not matter for the part of the analysis where we only use the rank of the household in the income distribution as the rank should not be changed by taxes or social insurance contributions (see section 4.2). For the part where we are concerned with levels (see 4.3) and how much cross-country differences in welfare expenditures explain, it is a more conservative choice than net income. As net income is more equally distributed than gross income it would explain less of the differences in wealth levels than gross income, leaving more explanatory power to inheritance and cross country welfare effects.

<sup>5</sup>This is especially worrisome given the heterogeneous cross-country HFCS dataset. See appendix C for additional analysis on the value of the intergenerational transfers and their impact on inequality.

<sup>6</sup><http://www.eui.eu/Research/Library/ResearchGuides/Economics/Statistics/DataPortal/NewCronos.aspx>;

and apply Rubin's rule throughout the paper. Replicate standard errors are obtained using 50 replicate weights provided in the HFCS.<sup>7</sup>

## 4. Analysis and Results

We analyze the relationship between inheritances, income, welfare policies, and wealth in three steps. First, we compare the *absolute* wealth level of households who have inherited with those who have not inherited (section 4.1). Second, we analyze how inheritances and income are related to a household's *relative* wealth position in a society (section 4.2). In both cases, we control for household structure and other important determinants of wealth to determine the relationship between income/inheritances and wealth. Third, we incorporate the importance of the findings in subsections 4.1 and 4.2 to examine the relation between country level welfare state expenditure and the level of household wealth in different countries in subsection 4.3.

### 4.1. Heir versus non-heir households

Table 2 shows descriptive information on this section's main variables of interest, inheritances, income, and net wealth. The percentage share of households which have inherited is given in column one. Overall, one third of the households in all countries report that they have inherited. The lowest share is reported for Luxembourg (29%) and the highest for Cyprus (44%). Mean and median net wealth varies substantially across European countries. Especially striking is the fact that median wealth is relatively small in the central and northern European countries, which are typically regarded as "rich" countries. Differences in mean and median gross household income fit relatively well to previously existing rankings (see e.g. ECB, 2013b).

However, e.g. the low median wealth figures of Germany are not an anomaly or problem of the HFCS. The German Socio Economic Panel delivers very similar figures for Germany. Fessler and Schürz (2013) illustrate that it makes hardly any sense to talk about rich and poor countries in terms of household wealth, as households belonging to the wealthiest and the poorest households of Europe are to be found in all countries. Wealth is very different from income with regard to the overlap of the distributions of different countries. While for income one can show that between different countries the overlap is far from perfect and hardly exists for low- versus high income countries (Milanovic, 2012), the overlap is almost complete with regard to wealth. The specific shapes of the distributions are shaped by institutional factors like public housing, health, taxation and retirement policies.

It remains unclear how much of the empirically observed differences in net wealth might

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<sup>7</sup>Since the focus of our multilevel analysis in section 4.3 lies on the institutional differences across countries, we use the unweighted first implicate of the HFCS in section 4.3, because using survey weights would reduce the impact of all less populated countries enormously and our main focus in this section are cross country differences.

be due to (i) to differences in methodology of the underlying data production process; (ii) to institutional differences such as pension systems, taxation or welfare programs; (iii) to historical differences such as land reform or war; or (iv) to differences in the structure and behavior of economic agents as households or individuals (ECB, 2013a,b; Fessler, Lindner, and Segalla, 2014; Bover, Casado, Costa, Caju, McCarthy, Sierminska, Tzamourani, Villanueva, and Zavadil, 2014; Fessler and Schürz, 2013).

Table 2: Descriptive Statistics

	Inherited (%)	Mean NW	Median NW	Mean Inc	Median Inc
ALL	33.1	222.9	100.0	38.4	29.0
AT	35.4	265.0	76.4	43.9	32.3
BE	35.1	338.6	206.2	49.5	33.7
CY	44.3	670.9	266.9	43.3	32.3
DE	33.9	195.2	51.4	43.5	32.5
ES	30.2	291.4	182.7	31.3	24.8
FR	39.8	233.4	115.8	36.9	29.2
GR	30.5	147.8	101.9	27.7	22.0
LU	28.9	710.1	397.8	83.7	64.8
MT	32.1	366.0	215.9	26.4	21.6
NL	32.1	170.2	103.6	45.8	40.6
PT	29.5	152.9	75.2	20.3	14.6
SI	29.5	148.7	100.7	22.3	18.0
SK	38.3	79.7	61.2	13.5	11.2

*Notes:*

(i) Wealth and income figures are presented in thousands of euros.

(ii) *Source:* HFCS 2010.

### Conditional on Household Structure

As recipients of inheritances are individuals rather than households, it is obvious that households with more members are more likely to have at least one recipient of an inheritance. In the same vein, it is obvious that older individuals already had more time to receive a gift, and that the likelihood that their parents or grandparents may have died, which in turn increases the probability of an inheritance, is higher as well. Due to social norms, a person's gender may be an important determinant of bequest percipience. Thus, in comparing the net wealth of heir-households with that of non-heir households, it is important to properly control for the age and gender of all household members (as opposed to the standard controls using only information on the age and gender of one household member representing the household). However, household types such as "couple with children," "single mother," or "household with retired household head," which are often used in the literature, select combinations of household size and the age and gender of household members relying on preconceptions about the prevalence and importance of certain household types, which might not fit the question of inheritances but shape the

resulting analysis and interpretation.

Fessler, Lindner, and Segalla (2014) define household types by all possible combinations of 4 age and gender categories for up to 4 household members in each household. This household classification scheme does not impose any ordering of individuals in the household, nor does it take the gender for individuals younger than 16 into account. Households with 5 or more members are treated as 4-person households and sorted based on 4 members, the financially knowledgeable person (the respondent to the survey) and the next 3 persons sorted by descending age. For the 30 most common household types, we compare households in which at least one person has inherited (henceforth called heir households) to households with the same household structure which did not receive such a transfer (henceforth called non-heir households). In our sample, between 83% (lowest, in Slovakia) and 94% (highest, in Germany) of all households are covered by the top 30 household types.

Instead of controlling for household types in a regression on net wealth and interacting an inheritance dummy with the 30 household type dummies, we compare conditional medians of net wealth for heir and non-heir households for all household types. We do this for two reasons: first, this approach filters out differences in the net wealth of households which are due to household size and the age and gender of household members. Second, medians are robust statistics,<sup>8</sup> allowing us to eliminate the most important confounding influence of inheritances, namely household structure. At the same time, it allows us to give an intuitive interpretation to our results.

Table 3 shows this comparison across household types. Household types are coded as in Fessler, Lindner, and Segalla (2014): the household type code describes the composition of the household. Each person in the household receives two digits: the first represents their age category (1 = [-; 15]; 2 = [16; 34]; 3 = [35; 64]; 4 = [65; +]), and the second refers to their gender (1 = male; 2 = female; 3 = below 16). The most common household type is 3132, meaning a 2-person household (4 digits - the age and gender of person one and the age and gender of person two), consisting of a man aged between 35 and 64 [31] and a woman aged between 35 and 64 [32]. The second most common household type in Europe is 42, which is a 1-person household consisting of a woman aged 65 or older.

The results in table 3 show that the share of heir households is - as expected - typically higher for larger households and households with older household members. One can clearly see that conditional on household types, median wealth is always considerably larger in heir households than in non-heir households. The ratio of heir to non-heir households varies from 1.7 to 28.0 overall, and from 1.9 to 7.0 for the top 10 household types (which cover more than 50% of all households). Especially for single men and women between 35 and 64 (Types 31 and 32), which are very common, wealth differences between heir and non-heir households are striking: single male heir households have 7.0 times as much wealth as similar non-heir households, while single female heir households have 6.4 times as much wealth as similar non-heir households. The same is true for young females (household type

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<sup>8</sup>A statistic is called robust if it has a bounded influence function, see Huber (2003)



code 22), where heir households are 10.8 times wealthier than non-heir households. Wealth differences are also considerable in bigger households and households with members above age 64.

Clearly, despite the flexible control for household structure, the wealth differences between heir and non-heir households should not be considered a causal result of the inheritance. Besides the fact that an inheritance will generally increase net wealth of the heir household, other channels correlated with such a transfer likely exist and will confound a causal interpretation.

### Conditional on full set of controls across the net wealth distribution

As a next step to study differences in the wealth levels of heir and non-heir households, we compare households which are similar in observed characteristics beyond household composition which might influence wealth accumulation by using propensity score re-weighting, as introduced by DiNardo, Fortin, and Lemieux (1996). The DiNardo, Fortin, Lemieux decomposition (DFL decomposition) is usually used to balance a treated and a untreated (control) population with regard to their covariates in order to estimate a causal effect of the treatment. Opposed to the goal of causal inference, we use their method to balance heir and non-heir household populations with regard to their covariate distributions only to ensure that we compare the net wealth of households which are most similar in their observable characteristics. The counterfactual of interest is  $P_{heirs}^{non-heirs}(NW)$ , the net wealth distribution of non-heirs ( $nh$ ) with the same characteristics  $X$  as heirs:

$$P_h^{nh}(NW) := \int_H P^{nh}(NW, X) dP^h(X). \quad (1)$$

We can rewrite the counterfactual distribution in equation 1 as

$$P_h^{nh}(NW) := \int_H P^{nh}(NW, X) \Psi_X(X) dP^{nh}(X), \quad (2)$$

where the re-weighting function  $\Psi_X$  is defined as

$$\Psi_X := \frac{P^h(X)}{P^{nh}(X)} \quad (3)$$

To get the re-weights  $\Psi_X$  to balance the covariates of heir- and non-heir households, we estimate the propensity of each household to be a heir-household using a logit model,

$$\hat{P}_i^h = Prob(Heir|X = x_i) = \frac{1}{1 + e^{-(\beta_0 + x_i'\beta)}} \quad (4)$$

and consequently reweight each non-heir household  $i$  by  $\Psi_{X=x_i}$  to create the counterfactual net wealth distribution for heirs  $P_h^{nh}(NW)$ .

As covariates  $X$  we use again the household types as fixed effects to control for household structure and further include the age, age squared, gender, education (a tertiary education dummy variable), and retirement status (a dummy variable retired or not) of the respon-

Table 3: Median Net Wealth by Household Type and Inheritance

HH Types	Type (%)	Heirs (%)	NW non-heirs	NW heirs	Heirs/Non-Heirs
3132	10.8	41.8	130.6	273.8	2.1
42	9.5	34.2	36.0	128.4	3.6
4142	8.6	41.4	141.0	269.6	1.9
31	7.6	31.6	18.6	129.5	7.0
32	5.7	31.6	21.1	135.2	6.4
13133132	5.4	35.6	140.1	272.4	1.9
41	3.6	36.5	49.0	187.9	3.8
21	3.6	15.0	5.5	17.9	3.2
2122	3.5	20.4	15.3	57.7	3.8
133132	3.1	30.8	114.1	251.2	2.2
22	2.9	20.0	4.0	42.6	10.8
213132	2.8	39.9	127.0	258.6	2.0
3241	2.7	42.6	122.2	285.4	2.3
21223132	2.1	36.1	170.7	310.7	1.8
132122	2.1	23.1	27.9	98.7	3.5
223132	2.0	35.4	155.2	287.0	1.8
13132122	1.9	22.1	34.2	89.7	2.6
13223132	1.4	36.2	111.4	207.5	1.9
13213132	1.4	34.8	110.7	254.2	2.3
13132231	1.4	25.6	38.3	181.3	4.7
21213132	1.3	38.2	184.0	320.1	1.7
132231	1.2	25.8	58.6	178.1	3.0
2132	1.0	31.0	23.1	108.2	4.7
3142	0.9	38.4	104.5	253.2	2.4
22223132	0.9	34.8	186.1	370.6	2.0
2231	0.9	25.5	62.8	149.5	2.4
1332	0.9	15.7	8.1	226.4	28.0
2232	0.7	20.1	14.4	109.4	7.6
131332	0.6	16.5	10.8	54.3	5.0
3242	0.4	42.1	91.2	193.3	2.1
Other	9.2	32.0	62.0	208.0	3.4

*Notes:*

(i) This table shows the share of households who received an inheritance, median net wealth in thousand euros for heirs and non-heirs by top 30 household types (Fessler, Lindner, and Segalla, 2014).

(ii) The household type code describes the composition of the household. Two numbers for each individual in a household, where the first refers to age category ((1 = [0; 15]; 2 = [16; 34]; 3 = [35; 64]; 4 = [65; +])) and the second refers to gender for all individuals aged 16+ (1 = male; 2 = female; 3 = below 16). The code is sorted by individual age.

(iii) *Source:* HFCS 2010.

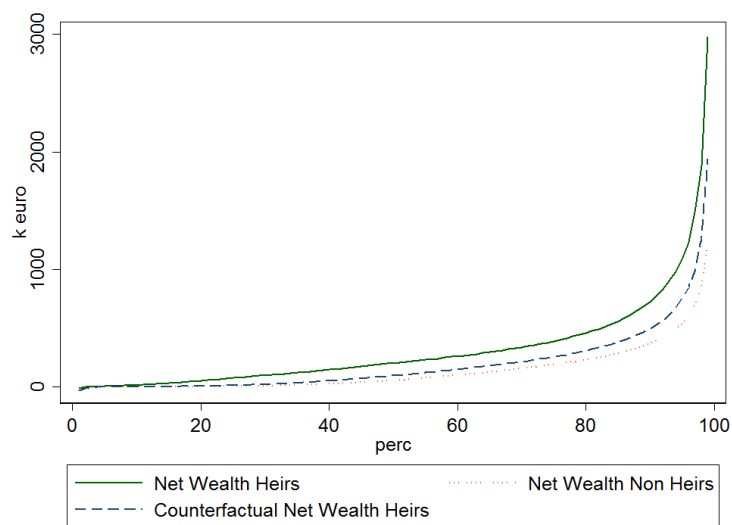
dent. At the household level, we add the position in the gross income distribution as well as a dummy variable indicating if the household is an entrepreneur household. We use propensity scores to re-weight the non-heir household population to match the observed covariate distributions of the heir household population as closely as possible. The resulting re-weighted net wealth distribution characterizes a counterfactual net-wealth distribution of heir households as if they would not have received an inheritance. It ensures that we compare the most similar households with regard to their covariates when comparing net wealth of heir versus non-heir households. Put differently, we filter out differences in net wealth between heir and non-heir households which can be explained by the covariates used.

Figure 1 shows the observed net wealth distributions of heir and non-heir households as well as the re-weighted non-heir household distribution (figure 1a). It further shows the absolute observed differences between the net wealth of heir-households and non-heir households and the difference between heir households and their non-heir counterparts along the net wealth distribution in thousands of euros (figure 1b). The difference between heir households and their non-heir counterparts is the difference which can not be explained by characteristics  $X$ . Heir households have considerably higher net wealth than their non-heir counterparts. The difference reaches about €110,000 at median net wealth and increases up to more than €1 million at the 99<sup>th</sup> percentile of the net wealth distributions. These values are considerable, as net wealth of heir households is about €210,000 at the median (non-heir households about €60,000; re-weighted non-heir household about €100,000) and about 3 million Euros at the 99<sup>th</sup> percentile (non-heir households about 1.2 million; re-weighted non-heir households about 1.9 million). Over the full distribution, heir households tend to have considerably higher levels of net wealth than their non-heir counterparts.

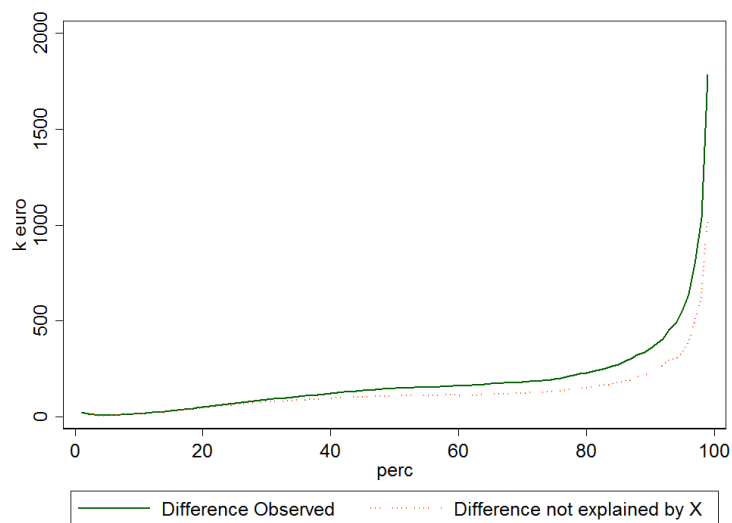
## 4.2. Net wealth position regressions

To examine the relationship between income, inheritance, and net wealth, we regress a household's position in the net wealth distribution (using the cumulative distribution function) on the household's position in the income distribution and the heir/non-heir inheritance dummy variable. In doing so, we calculate the household's positions in the net wealth and income distribution over all countries in the pooled regressions, and within country in the respective country-level regressions. This strategy allows us to focus on the household's relative wealth position, instead of their absolute wealth levels. We prefer this approach because one's relative position in society is by definition the decisive measure of social status. Richness, and poverty are relative phenomena. It is also more statistically robust to use relative measures of wealth and income, because such measures are less exposed to measurement error since only the household ranking with regard to income and wealth is relevant and not the exact income and wealth values. We use the same set of controls as in our DFL decomposition in section 4.1. Therefore coefficients are interpreted

Figure 1: Effect of Inheritance



(a) Net Wealth



(b) Difference in NW

*Notes:*

(i) Graph (a) shows the quantile function of net wealth for heir households, non-heir households and the counterfactual quantile function based on propensity score reweighting as if heirs would not have received an inheritance. Reweights are based on a logit model of an inheritance dummy on household income, age, age squared, and dummy variables for being an entrepreneur household and for the gender, a education, and retirement status of the respondent, as well as the top 30 household type fixed effects.

(ii) Graph (b) shows the observed differences in net wealth between heir and non-heir households as well as the differences between the counterfactual distribution and the original heir households distribution, i.e. the gain in net wealth which is related to the inheritance implied by the estimated counterfactual, in thousands of euros across the net wealth distribution.

(iii) *Source:* HFCS 2010.

as relative effects on the position of a household in the wealth distribution, while later in section 4.3 we try to explain observed differences in wealth levels and coefficients are interpreted as relative effects with regard to the net wealth of a household.

### **Pooled net wealth position regressions**

Table 4 shows pooled regressions of net wealth position on an inheritance dummy signifying heir households, the rank of the household in the household gross income distribution and using an increasingly large set of controls. Without controls, having received an inheritance increases the position in the net wealth distribution by 18 percentiles, while for every percentile in the income distribution households tend to gain 0.4 percentiles in the net wealth distribution. Using an increasing number of controls dampens the relation between being a heir household and the rank in the net wealth distribution to about 14 percentiles, while the relation to income stays remarkably stable. The coefficients stay highly significant over all specifications and controls have the expected results. Entrepreneur households have significantly higher positions in the wealth distribution. If the respondent for household level information of the household has tertiary education or is retired, that relates positively and significantly to a higher position in the net wealth distribution. The respondent for household level information being female is significantly negatively related to the households net wealth position. The age effect is hump-shaped. However, the interpretation of the age and gender coefficients is only straightforward for the regressions where no household type fixed effects are included. Once they are included (OLS III and IV) the personal characteristics of the respondent for household level information only control additionally to the household type fixed effects which already include a large part of the age and all of the gender information at the household level for all household members. Nevertheless we continue to use these personal controls also in the household type fixed effects specifications as they refer to the person responding to all wealth related questions in the survey and might therefore also contain relevant behavioural traits with regard to information given at the household level and allow for higher flexibility within age brackets used for the household type fixed effects<sup>9</sup>.

### **Country-level net wealth position regressions**

Table 5 shows country-level regressions of the net wealth position in the net wealth distribution (country level) on an inheritance dummy signifying heir households, the position of the household in the household gross income distribution (country level) and using our full set of controls as in the pooled regressions. In all countries having received an inheritance is significantly related to obtaining a higher position in the net wealth distribution. The coefficients range from 5.5 (lowest, in Slovakia) to 17.2 (highest, in Austria) net wealth percentiles. The coefficients for the position in the income distributions are significant in

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<sup>9</sup>We also examined the relevance of inheritance expectations of the respondent, but did not find any significant impact on actual net wealth or other regression results.

Table 4: Pooled Net Wealth Position Regressions

	OLS	OLS II	OLS III	OLS IV
Inheritance	17.915*** (0.568)	14.083*** (0.566)	13.810*** (0.542)	13.467*** (0.576)
Income position	0.398*** (0.009)	0.351*** (0.010)	0.303*** (0.010)	0.386*** (0.011)
Female		-3.036*** (0.571)	-2.220*** (0.716)	-1.172* (0.669)
Age		1.163*** (0.092)	0.793*** (0.124)	0.764*** (0.120)
Age squared		-0.007*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
Tertiary education		4.942*** (0.654)	5.955*** (0.616)	4.879*** (0.615)
Retired		2.655*** (0.730)	2.898*** (0.676)	3.614*** (0.611)
Entrepreneur		16.280*** (0.917)	15.277*** (0.869)	14.002*** (0.823)
Controls		X	X	X
Household Type FE			X	X
Country FE				X
<i>N</i>	41501	41476	41476	41476

*Notes:*

(i) This table shows pooled ols regressions of the cumulative distribution function of net wealth on the inheritance dummy and the cumulative distribution function of income. Malta as well as Cyprus are not included as not all control variables are available.

(ii) Standard errors are presented in parentheses and \*, \*\*, \*\*\* denote significance at the 10, 5, and 1% level.

(iii) OLS includes no controls. OLS II includes age, age squared, gender, a tertiary education and a retired dummy of the respondent for household level information as well as an entrepreneur household dummy. OLS III includes additionally the top 30 household type fixed effects (FLS 2014). OLS IV includes additionally country fixed effects.

(iv) *Source:* HFCS 2010.

all countries and range from 0.1 (lowest, in The Netherlands) to 0.5 (highest, in Germany) net wealth percentiles for each additional income percentile. While the patterns with regard to inheritance and income are relatively consistent across countries we incorporate the differences found here in our multilevel analysis (see section 4.3) by using random coefficient models.

### 4.3. Multilevel Regression

We use multilevel regressions to examine possible correlations between welfare state activities and the level of net wealth between different countries. The degree to which states organize and provide social benefits differs strongly from country to country. While in some countries individuals need to provide for old age themselves, in other countries saving for retirement is largely organized by the state via the public social security systems. While the pension systems might be one of the most important factors explaining individual private wealth differences among countries, other dissimilarities exist with regard to health insurance, unemployment insurance, maternity leave, family subsidies, other subsidies, and further state transfers which might affect saving patterns, the necessity to save in general, and therefore wealth accumulation and resulting wealth levels. We hypothesize that services, transfers and insurances provided by the state are substitutes for private wealth, implying a negative relationship between certain welfare state expenditures and observed private wealth of households.

As a first step, Figure 2<sup>10</sup> shows graphical evidence for this negative relationship for social security expenditure across countries. The Scatter Plot with a fitted regression line shows that mean household net wealth tends to be lower in countries with higher social security expenditure (see 2a). While the evidence for a negative relationship is rather weak for the mean it is clearly visible for the 25th percentile of net wealth (see 2b), which suggests that the substitutive effect relative with regard to private wealth might be larger for households at the lower end of the wealth distribution.

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<sup>10</sup>See a similar figure for pension expenditure (figure 4) in Appendix B

Table 5: Country Level Net Wealth Position Regressions

	AT	BE	CY	DE	ES	FR	GR	LU	MT	NL	PT	SI	SK
Inheritance	17.230*** (1.437)	8.890*** (1.191)	15.570*** (1.898)	17.083*** (1.365)	11.327*** (0.966)	11.598*** (0.659)	13.984*** (1.435)	12.224*** (1.750)	12.920*** (1.735)	8.129** (3.910)	12.593*** (1.065)	13.501*** (2.377)	5.547*** (1.355)
Income position	0.329*** (0.032)	0.338*** (0.030)	0.395*** (0.038)	0.459*** (0.027)	0.392*** (0.021)	0.428*** (0.014)	0.347*** (0.022)	0.454*** (0.034)	0.252*** (0.043)	0.111*** (0.043)	0.347*** (0.022)	0.240*** (0.052)	0.225*** (0.043)
Female	-1.558 (1.915)	-1.083 (1.819)	-4.186* (2.230)	-2.165 (1.769)	0.093 (1.545)	-0.843 (0.770)	-5.963*** (1.785)	-3.416 (2.709)	2.651 (2.296)	-0.022 (3.004)	-2.803** (1.220)	3.797 (2.734)	0.409 (1.831)
Age	0.897*** (0.250)	1.422*** (0.345)	1.133*** (0.409)	0.329 (0.277)	1.006*** (0.252)	0.899*** (0.170)	0.690*** (0.262)	0.792 (0.526)	2.651 (2.296)	0.491 (0.746)	1.100*** (0.278)	0.521 (0.525)	0.964*** (0.373)
Age squared	-0.006** (0.003)	-0.010*** (0.003)	-0.009** (0.004)	-0.001 (0.003)	-0.005** (0.002)	-0.005*** (0.002)	-0.006** (0.003)	-0.004 (0.005)	-0.007*** (0.007)	0.001 (0.007)	-0.008*** (0.003)	-0.002 (0.005)	-0.007** (0.004)
Tertiary education	1.570 (1.377)	7.664*** (1.397)	2.319 (1.931)	4.602*** (1.376)	8.255*** (1.281)	4.760*** (0.802)	5.833*** (1.599)	5.041** (2.021)	7.217*** (1.956)	3.696* (2.231)	11.811*** (1.578)	9.538*** (2.628)	12.733*** (1.522)
Retired	2.585* (1.457)	10.217*** (3.293)	3.574 (3.866)	4.895** (2.035)	4.248** (1.683)	5.366*** (1.013)	4.840** (2.041)	4.802 (3.157)	7.541** (2.977)	-4.198 (3.602)	0.889 (1.492)	15.306*** (4.331)	-5.254* (3.078)
Entrepreneur	21.727*** (2.619)	16.696*** (2.524)	19.006*** (2.067)	8.409*** (1.532)	16.317*** (1.810)	21.335*** (1.134)	11.553*** (1.830)	15.694*** (3.623)	28.914*** (3.287)	15.267** (7.296)	24.052*** (1.614)	23.477*** (3.698)	10.424*** (2.576)
Controls	X	X	X	X	X	X	X	X	X	X	X	X	X
Household Type FE	X	X	X	X	X	X	X	X	X	X	X	X	X
N	2380	2327	1237	3562	6192	14999	2970	949	843	1298	4398	343	2056

Notes:

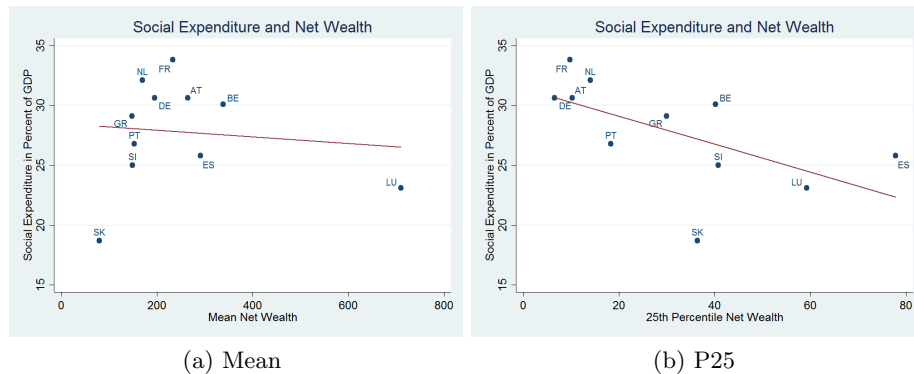
(i) This table shows country OLS regressions of the cumulative distribution function of net wealth on the inheritance dummy and the cumulative distribution function of income. They include age, age squared, gender, a tertiary education and a retired dummy of the respondent for household level information and an entrepreneur household dummy as well as the top 30 household type fixed effects (Fessler, Lindner, and Segalla, 2014). Note that age and age squared is not included for Malta, as the HFCS data in the Malta does not include a continuous age variable and no household type fixed effects are included for Cyprus as they do not report all necessary variables for all household members to produce such flexible household level controls.

(ii) Standard errors are presented in parentheses and \*, \*\*, \*\*\* denote significance at the 10, 5, and 1% level.

(iii) Source: HFCS 2010.



Figure 2: Social Security Expenditure and Net Wealth



Notes:

- (i) Graph (a) shows a scatter plot of country level mean net wealth and total social expenditure as percent of gdp.
- (ii) Graph (b) shows a scatter plot of country level 25th percentile of net wealth and total social expenditure as percent of gdp.
- (iii) *Source:* Eurosystem HFCS 2010. New Cronos Database 2010.

We regress net wealth on income (both transformed by a hyperbolic sine function) and the inheritance dummy as well as all controls we used in our previous regressions and add welfare state country level variables.

The hyperbolic sine transformation ensures that we can use all - including negative - net wealth values and additionally leads to a straightforward interpretation of the estimates, as they refer to percentage changes in the dependent variable net wealth<sup>11</sup>. Note that the dependent variable in these multilevel regressions is therefore different from the ranks of net wealth we used as dependent variables in sections 4.2, as we are now explaining differences in net wealth levels instead of differences in the position in net wealth distributions. Coefficients are interpreted as relative effects with regard to the net wealth of a household while before they were interpreted as relative effects on the position of a household in the wealth distribution.

Additionally we allow for random coefficients in the case of income and inheritances to accommodate for the different patterns found in our previous regressions. Results are shown in Table 6 and details on the models used can be found in Appendix A.1. As in our net wealth position regressions income and inheritances stay remarkably stable over all specifications.

The Null-model (Null, column 2) shows that only about 3% of the total variance measured by the intra-class correlations (ICC) is attributable to the country level. Once we

<sup>11</sup>Note that at the very bottom, about below the 4<sup>th</sup> percentile in our case, a percentage-change interpretation for the inverse hyperbolic sine is problematic. However, the pattern of strongly increasing negative effects for very low wealth levels remains valid.

Table 6: Multilevel Regressions

	Null	HH-Lev	Pension	PensionRE	Social	SocialRE	Labor	LaborRE
Inheritance	1.397*** (0.041)	1.397*** (0.041)	1.397*** (0.041)	1.337*** (0.138)	1.397*** (0.041)	1.346*** (0.134)	1.361*** (0.126)	1.397*** (0.041)
Income	0.345*** (0.015)	0.345*** (0.015)	0.345*** (0.015)	0.432*** (0.087)	0.346*** (0.015)	0.433*** (0.087)	0.431*** (0.088)	0.345*** (0.015)
Pension expenditure		-0.170*** (0.065)		-0.151** (0.069)				
Social expenditure					-0.071** (0.034)	-0.064** (0.033)		
Labor market policy							-0.134 (0.142)	-0.000 (0.165)
Controls	X	X	X	X	X	X	X	X
Random Coefficients								
Var Country	.636	.299	.182	.005	.210	.005	.008	.299
Var Households	18.230	14.977	14.977	14.868	14.977	14.869	14.870	14.977
ICC	.0336	.0196	.0121		.0138		.0005	
N	41501	41496	41496	41496	41496	41496	41496	41496

Notes:

- (i) This table shows pooled multilevel regressions. Random coefficients refer to household income as well as the inheritance dummy. We use the full set of controls as in previous regressions. Malta as well as Cyprus are not included as not all control variables are available.
- (ii) Null refers to a benchmark model with country random effects only. HH-Lev adds household level controls. Models Pension-LaborRE refer to multilevel models allowing for random intercepts of the country level variables (pension, social security and active labor market expenditures) as well as additional random coefficients (RE models) for income and inheritance effects.
- (iii) Standard errors are presented in parentheses and \*, \*\*, \*\*\* denote significance at the 10, 5, and 1% level.
- (iv) Source: HFCS 2010.

add controls at the household level as well as the inheritance dummy and income (HH-Lev, column 3) this number drops to only 1.9%.<sup>12</sup> As next steps we add the welfare state country level variables and estimate one model only allowing for random intercepts and one model allowing additionally for random coefficients for the inheritance dummy and income each (Pension-LaborRE, column 4 to column 9).

The main result of these hierarchical linear models is that pension and social security expenditure measured as shares of GDP show significant and negative correlation with household net wealth levels. Also the active labor market policy indicator, which reflects expenditure per unemployed used for active labor market policy is negatively correlated (but insignificant).

We regard this as evidence that welfare state expenditures indeed act as substitutes for private wealth accumulation and explain partly observed differences in household net wealth among euro area countries. A larger and more active welfare state leads to less need for private households to accumulate private wealth. That is in line with the results found in the displacement literature (see section 2) and contrasts the results of Semyonov and Lewin-Epstein (2013), who could not confirm a significant impact of cross country differences on wealth levels across different countries.

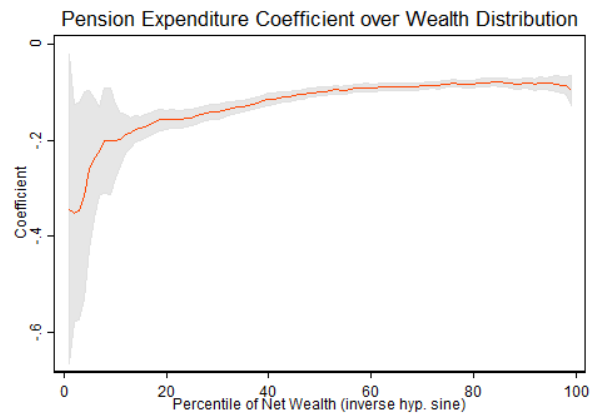
The graphical evidence in figure 2 suggests that the substitution effect is stronger at the lower end of the wealth distribution, where households might reduce their precautionary savings and increase consumption, once the welfare state is insuring better against life contingencies. To examine this relationship quantitatively in a multivariate setting, we estimate quantile regressions of (the inverse hyperbolic sine of) net wealth on the same covariates as in our multilevel-models for all quantiles P1 to P99, and add pension and social security expenditure, which were significant in the multilevel case. Definitions and data can be found in Appendix 8. Graph a and b in figure 3 show the resulting coefficients along the net wealth distribution. The fact that the ICC was very low in the multilevel models (Null and HH-Lev) in table 6 as well as the fact that the OLS estimates (shown below graphs a and b in figure 3) are close to those in the multilevel case support the fact that it should not be too worrisome that we ignore the multilevel structure of the data in the case of our quantile regressions.

The effect of a 1 percentage point increase in state pension expenditure as a share of GDP on net wealth is a decrease about 20% less wealth for households around the 10th net wealth percentile. The size of the negative impact is smaller for wealthier households, but remains at above 10% of net wealth. Social security expenditure shows a similar but somewhat weaker effect, ranging at around 10% at the 10th net wealth percentile and coming close to zero for the wealthiest. For reasons of comparisons all effects are normal-

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<sup>12</sup>Given that result, multilevel modelling might not even be regarded as necessary. However some authors point out that the hierarchical structure of information should be mirrored in the analysis.

Figure 3: Effects along the Net Wealth Distribution



(a) Pension (OLS-estimate: -0.142 (0.011))



(b) Social (OLS-estimate: -0.044 (0.004))

*Notes:*

(i) These graphs show the coefficients of pension and social expenditure measured as a percentage share of GDP from 99 quantile regressions of (the hyperbolic sine) of net wealth on these welfare state country level measures. All three models also include age, age squared, gender, a tertiary education and a retired dummy of the respondent for household level information as well as an entrepreneur household dummy and the top 30 household type fixed effects (i.e. all controls we used in the analyses before).

(ii) *Source:* HFCS 2010. New Cronos Database 2010. ESS multicountry database 2010.

ized to expenditure changes of 1 percentage point of GDP as measured in the regressions. Note that this implies relative changes which are the larger for pension than for social security expenditure. For pension expenditure it is between 6.6% (Austria) and 11.9% (Slovakia), and for social security the effect translates to between 3.1% (The Netherlands) and 5.3% (Slovakia). See table 8 in appendix B for the country-level data.

#### 4.4. Illustration of the size of effects

Cautious interpretation of these effects, especially at the lower tail, is necessary. For the least wealthy households, even small changes in the amount of wealth held are large changes in the share of total household wealth. Indeed the displacement effects found here are in line with those estimated in the displacement effects literature: depending on the methods and data used, these effects are usually between 0.41 and 1, meaning a decrease of private wealth between 41 cents and €1 for each additional euro in public security wealth (Alessie, Angelini, and van Santen, 2013).

Table 7 presents an Illustration using a “back of the envelope” calculation to show that reasonable displacement effects are in line with our results for the relative wealth effects. We assume low, middle, and high wealth households, with wealth roughly equal to observed wealth levels at P10, P50 and P90 in the empirical data. We further assume the pension wealth of these households, namely one which is relatively low for the poor household, average for the middle one (roughly 10 times median yearly income as the OECD (2013b, p.147) suggests), and relatively high for the wealthy household. We further impose the condition that a one percentage point increase in pension expenditure is a seven percent increase in this expenditure, as is the case in Austria. Austria is the country in our data with the highest pension expenditure as a share of GDP, and thus the country which experiences the lowest percent change in spending when expenditure changes by one percentage point (meaning that this is the most conservative assumption to make). Finally, results in Engelhardt and Kumar (2011) show that the displacement effect might be stronger at the upper end of the distribution. We thus assume displacement effects similar to the ones estimated in the displacement effect literature, between 0.4 for the least wealthy household, 0.75 for the middle and 1 (full displacement) for the wealthy household. Under these assumptions taken from the literature, we see a decrease in net wealth of 47% for the low wealth household, of 16% for the middle wealth household, and 8% for the high wealth household. These numbers are roughly in line with our results for pension wealth in figure 3. In fact, the estimates obtained here are conservative. Had we assumed higher pension wealth for the low wealth household, a larger increase in expenditure, or higher displacement rates, we would have seen a stronger effect for the low wealth household and the declining effect for wealthier households would have been even more pronounced.

Table 7: Illustration: Back of the Envelope Calculation of Implied Displacement Effects

	Low Wealth( $\approx P10$ )	Middle Wealth ( $\approx P50$ )	High Wealth ( $\approx P90$ )
Net wealth	3,000	100,000	500,000
Pension wealth	50,000	300,000	600,000
1 PP ( $\approx 7\%$ ) increase	3,500	21,000	42,000
Assumed displacement effect	0.4	0.75	1
Effect in % of net wealth	47	16	8

*Notes:*

(i) This table shows a “back of the envelope” calculation to illustrate that the estimated decreases in private wealth along the wealth distribution are in line with displacement effects estimated in the literature.

(ii) As our pension expenditure measure enters in percent of GDP, 1PP change translates to about a 7% increase in the actual pension expenditure (highest pension expenditure are about 15% of GDP for Austria, lowest about 8% for Slovakia), under the assumption that the increase is distributed equally along the distribution of pension entitlements.

(iii) *Source:* Thought Experiment for illustrative reasons.

Additional welfare state spending is negatively associated with all wealth levels but decreasing in size relative to wealth across the full net wealth distribution. This is in line with the displacement effects estimated in the literature and unambiguous in our quantile regression analysis.

We regard this as evidence that (i) an increase in welfare state activity might allow households to reduce their savings and consume more and (ii) this effect leads to a stronger relative effect on the net wealth of poorer households. Using relative inequality measures like the Gini coefficient this mechanism would lead to increased observed inequality of private net wealth given an increase of welfare state activity. Similarly, when comparing wealth distributions across countries differences in inequality might partly be due to such effects. In countries with high welfare state activity especially households in the lower half of the wealth distribution might have less need to accumulate precautionary savings but instead show higher consumption levels. Such countries might at the same time show extended levels of inequality due to this effect.

## 5. Discussion and Conclusion

This study examines three main contributors to household wealth: inheritances, income, and welfare state spending. The analysis focuses on the relation of inheritance and income to the relative position of households in the wealth distribution, and finds that inheritances and income play an important role in a household's relative position in the wealth distribution. Further, multilevel cross country regressions show that welfare state activities such as pension and social security expenditures are substitutes for private wealth and significantly explain part of the observed differences in private wealth across countries.

Four stylized facts emerge:

**Stylized Fact 1** *Heir households hold substantially higher net wealth levels than their non-heir counterparts. This finding holds along different household types as well as along the entire net wealth distribution, controlling for a large set of socioeconomic characteristics of households.*

Using methods from the decomposition literature, we compare heir households to their non-heir counterparts. The difference in net wealth reaches about €100,000 at the median level of net wealth and increases beyond €1 million at the 99<sup>th</sup> percentile of the net wealth distribution. These values are considerable, as net wealth of heir households is about €210,000 at the median (non-heir households have about 60,000; reweighted non-heir household about 100,000) and about €3,000,000 at the 99<sup>th</sup> percentile (non-heir households about 1.2 million; re-weighted non-heir households about 1.9 million). Over the full distribution, heir-households have considerably higher levels of net wealth than their non-heir counterparts.

**Stylized Fact 2** *On average, an intergenerational transfer lifts a household by 14 net wealth percentiles, while an additional percentile in the income distribution is associated with 0.4 net wealth percentiles. Receiving an intergenerational transfer is therefore a higher contributor to net wealth, being equivalent to an income increase that leads to a new rank in the income distribution about 35 percentiles higher. This relative importance of intergenerational transfers versus income position varies from about 25 (Slovakia) to 52 (Austria) income percentiles being equivalent to an intergenerational transfer.*

We focus on the households relative position with regard to other households as opposed to the households' absolute wealth or income values. We prefer this approach because one's relative position in a society is decisive for social status and questions of richness and poverty, which are relative phenomena. It is also statistically more robust as it is less exposed to measurement error, because only the household ranking with regard to income and wealth is relevant instead of their exact values.

**Stylized Fact 3** *Welfare state expenditures are substitutes for private wealth accumulation. The more insurance the state provides against the contingencies of life, the less need*

*the households have to accumulate wealth for precautionary reasons. That translates to relatively lower average net wealth holdings for households in countries with higher welfare state expenditures.*

We show a significant correlation between country-level welfare-state expenditures and differences in absolute wealth levels across countries. In multilevel cross-country regressions we find that the extent of welfare state activities across countries measured by pension and social security expenditures are negatively correlated with net wealth levels. These findings indicate that social services provided by the state are substitutes for private wealth accumulation and to a certain degree explain observed differences in levels of household net wealth across euro area countries.

**Stylized Fact 4** *The substitution effect of welfare state expenditures with regard to private wealth holdings is significant along the full net wealth distribution, but is relatively lower at higher levels of net wealth. Given an increase in welfare state expenditure, the percentage decrease in net wealth of poorer households is relatively stronger than for households in the upper part of the wealth distribution. This finding implies that given an increase of welfare state expenditure, wealth inequality measured by standard relative inequality measures such as the Gini-coefficient will increase.*

We provide evidence that the negative relation between welfare state spending and household net wealth is stronger at the lower end of the distribution of net wealth. As the state organizes and offers more public insurance, there is less need for relatively poor households to hold precautionary savings, and more income might be used for consumption purposes. Given these mechanisms, it might be that increases in welfare state activity are accompanied by more and not less wealth inequality, as they might allow households, especially those at the lower end of the distribution, to consume more, which in turn will lower their wealth holdings. Note, however, that our analysis deals with short rather than long term effects on wealth inequality. Welfare state policies might influence long term inequality through different channels. Possible effects on social mobility might for example lead to lower inequality in the long term.

We also illustrate that the effects on net wealth that we find are in line with displacement effects found in the literature, even under an assumption of strongly increasing displacement effects along the wealth distribution for which there is some support in the literature (Engelhardt and Kumar, 2011). More research is necessary to understand the complex mechanisms between public welfare and private wealth and their different relevance across the wealth distribution.



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## A. Methods

### A.1. Multilevel Models

We use multilevel regressions in section 4.3. The basic null model (or variance component model) is given by

$$w_{ij} = \beta_0 + u_{0j} + \varepsilon_{ij}, \quad (5)$$

where  $w_{ij}$  is the inverse hyperbolic sine of net wealth of household  $i$  in country  $j$ ,  $\beta_0$  is the overall mean across countries,  $u_{0j}$  is the country level effect of country  $j$  on net wealth and  $\varepsilon_{ij}$  is a household level residual. The country level effects  $u_{0j}$  - which is at the same time a higher level residual - is assumed to be normally distributed with mean zero and variance  $\sigma_{u0}^2$ .

The between-country variance is estimated in the model as  $\hat{\sigma}_{u0}^2$ , and the within-country between-household variance as  $\hat{\sigma}_{\varepsilon}^2$ . Combining both gives the intraclass correlation coefficient (ICC) or variance partition coefficient (VPC), which tells us the share of variance in wealth which is explained at the country level,

$$icc = \frac{\hat{\sigma}_{u0}^2}{\hat{\sigma}_{u0}^2 + \hat{\sigma}_{\varepsilon}^2}, \quad (6)$$

Additionally to random intercept models, which just add controls  $X_{ij}$  to model 5, we also use random coefficient models which are defined as,

$$w_{ij} = \beta_0 + \beta_1 X_{ij} + (u_{0j} + u_{1j} \times X_{ij} + \varepsilon_{ij}). \quad (7)$$

This model allows the coefficients for some independent variables to vary across countries  $j$ . In our case we allow random coefficients for intergenerational transfers as well as income to allow different patterns across countries which have been found in the country by country regressions (see 4.3).

## B. Net Wealth and Welfare State

Figure 4: Pension Expenditure and Net Wealth



(a) Mean

(b) P25

*Notes:*

- (i) Graph (a) shows a scatter plot of country level mean net wealth and pension expenditure as percent of gdp.
- (ii) Graph (b) shows a scatter plot of country level 25th percentile of net wealth and pension expenditure as percent of gdp.
- (iii) *Source:* Eurosystem HFCS 2010. New Cronos Database 2010.

Table 8: Welfare State Expenditure as Percentage of GDP

	Pension	Social Security
Austria	15.0	30.6
Belgium	12.1	30.1
Germany	12.8	30.6
Spain	11.0	25.8
France	14.4	33.8
Greece	13.9	29.1
Luxembourg	9.4	23.1
The Netherlands	12.9	32.1
Portugal	14.2	26.8
Slovenia	11.3	25.0
Slovakia	8.4	18.7

*Notes:*

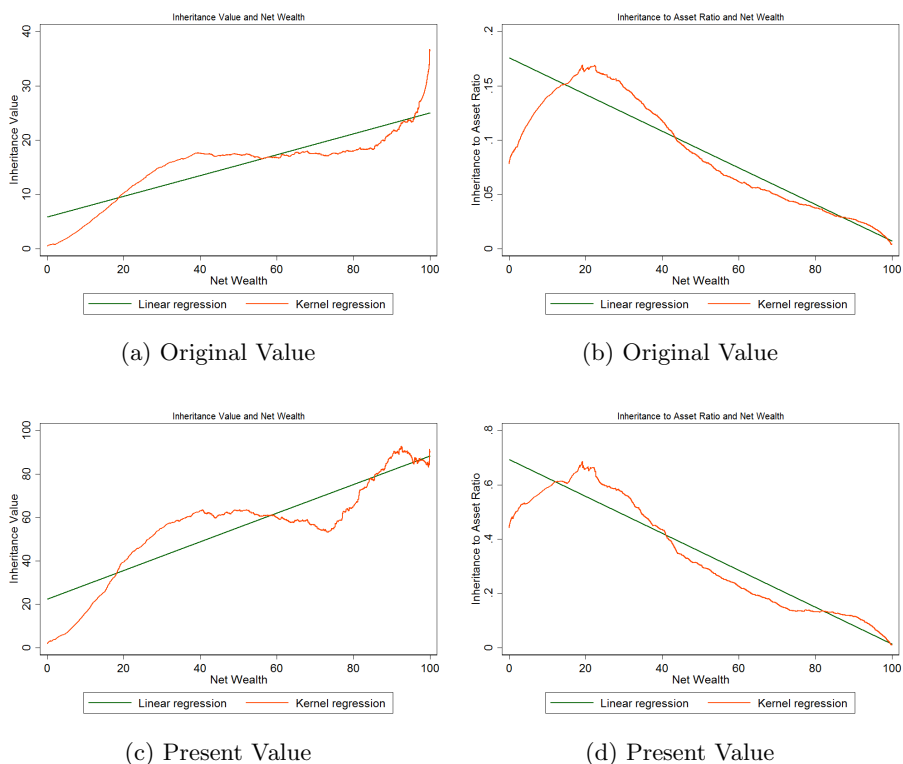
(i) *Source:* Eurostat New Cronos database for Pension and Social Security (protection) as well as the European Social Survey (ESS) multilevel country database for health.

1. Pension: The “Pensions” aggregate comprises part of periodic cash benefits under the disability, old-age, survivors and unemployment functions. It is defined as the sum of the following social benefits: disability pension, early-retirement due to reduced capacity to work, old-age pension, anticipated old-age pension, partial pension, survivors’ pension, early-retirement benefit for labour market reasons. (New Cronos database: tps00103)
2. Social Security: Expenditure on social protection contains social benefits, which consist of transfers, in cash or in kind, to households and individuals to relieve them of the burden of a defined set of risks or needs; administration costs, which represent the costs charged to the scheme for its management and administration; other expenditure, which consists of miscellaneous expenditure by social protection schemes (payment of property income and other). It is calculated in current prices. (New Cronos database: tps00098)

## C. Intergenerational Transfers and Inequality

Intergenerational transfers increase in absolute value with net wealth but decrease in relative (to net wealth) terms with net wealth, which implies an equalizing effect on the overall net wealth distribution (see Figure 5). However, it (i) remains unclear if the value adjustments are appropriate and if this effect might only occur because of (ii) measurement error of intergenerational transfers at the top of the distribution and/or (iii) coverage problems of surveys at the very top. Caveats (i) and (ii) might be less troublesome as with regard to (i) even unadjusted values seem to produce similar effects. With regard to (ii) instrumental variable regressions show that a slope below one still remains in a regression of net wealth on value of intergenerational transfer even if intergenerational transfers are instrumented with different instruments, i.e. still the values of intergenerational transfers relative to net wealth decrease with net wealth implying an equalizing effect. However, coverage at the top (iii) could be very problematic. While the values of intergenerational transfers relative to net wealth might decrease with net wealth up to a certain degree, this might change dramatically at the very top. For heirs of very large businesses or real assets usually not included in household surveys the share of their inherited wealth with regard to their total wealth might likely be close to one. Also the work by Piketty (2011) suggests such figures at the top of the distribution.

Figure 5: Absolute and Relative Inheritance Value and Net Wealth



*Notes:*

- (i) Graph (a) shows a linear regression and a non-parametric kernel regression of the original value of inheritances (in EUR thd) on the cumulative distribution function of net wealth for heir-households.
- (ii) Graph (b) shows a linear regression and a non-parametric kernel regression of the inheritance (original value) to total assets ratio on the cumulative distribution function of net wealth for heir-households.
- (iii) Graph (c) shows a linear regression and a non-parametric kernel regression of the present value (under an assumption of 6% nominal yearly return) of inheritances (in EUR thd) on the cumulative distribution function of net wealth for heir-households.
- (iv) Graph (d) shows a linear regression and a non-parametric kernel regression of the inheritance (present value) to total assets ratio on the cumulative distribution function of net wealth for heir-households.
- (v) *Source:* Eurosystem HFCS 2010.

## Household Finance and Consumption Network

This paper contains research conducted within the Household Finance and Consumption Network (HFCN). The HFCN consists of survey specialists, statisticians and economists from the ECB, the national central banks of the Eurosystem and a number of national statistical institutes.

The HFCN is chaired by Oreste Tristani (ECB) and Carlos Sánchez Muñoz (ECB). Michael Haliassos (Goethe University Frankfurt), Tullio Jappelli (University of Naples Federico II), Arthur Kennickell (Federal Reserve Board) and Peter Tufano (University of Oxford) and act as external consultants, and Sébastien Pérez Duarte (ECB) and Jiri Slacalek (ECB) as Secretaries.

The HFCN collects household-level data on households' finances and consumption in the euro area through a harmonised survey. The HFCN aims at studying in depth the micro-level structural information on euro area households' assets and liabilities. The objectives of the network are:

- 1) understanding economic behaviour of individual households, developments in aggregate variables and the interactions between the two;
- 2) evaluating the impact of shocks, policies and institutional changes on household portfolios and other variables;
- 3) understanding the implications of heterogeneity for aggregate variables;
- 4) estimating choices of different households and their reaction to economic shocks;
- 5) building and calibrating realistic economic models incorporating heterogeneous agents;
- 6) gaining insights into issues such as monetary policy transmission and financial stability.

The refereeing process of this paper has been co-ordinated by a team composed of Oreste Tristani (ECB), Pirmin Fessler (Oesterreichische Nationalbank), Michalis Haliassos (Goethe University Frankfurt), Tullio Jappelli (University of Naples Federico II), Sébastien Pérez-Duarte (ECB), Jiri Slacalek (ECB), Federica Teppa (De Nederlandsche Bank), Peter Tufano (Oxford University) and Philip Vermeulen (ECB).

The paper is released in order to make the results of HFCN research generally available, in preliminary form, to encourage comments and suggestions prior to final publication. The views expressed in the paper are the author's own and do not necessarily reflect those of the ESCB.

## Acknowledgements

We would like to thank Ernst Glatzer, Stefan Humer, Alyssa Schneebaum, Inge Schuch and the participants of the HFCN Meeting in Lisbon (June 2014) as well as an anonymous Referee of the ECB working paper series for valuable comments and discussion.

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ISSN 1725-2806 (online)  
ISBN 978-92-899-1660-8  
DOI 10.2866/201312  
EU catalogue No QB-AR-15-087-EN-N