The role of housing in wealth inequality in Eurozone countries

Master thesis

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Abstract

The paper studies the role of housing in wealth inequality in 15 Eurozone countries based on the HFCS data. Wealth inequality at national level is studied using Gini coefficient decomposition techniques. The results suggest that primary housing wealth is the main asset class in household portfolios of considered countries. Although the shares of wealth invested in private businesses and stocks are considerably smaller than that of housing, they have the highest rank correlation with net wealth compared to other asset classes for the majority of countries. Housing wealth is found to be the main equalizing asset along with bonds, deposits, valuables and vehicles due to the fact that their shares in total net wealth of low wealth households tend to be disproportionately higher. International comparison shows that wealth inequality is lower in countries with higher homeownership rates and higher shares of wealth invested in primary residence. Between groups Gini decomposition suggests that most of wealth inequality comes from between group differences. Moreover, wealth inequality within the group of homeowners is considerably lower than within the group of non-homeowners. Quantile regression analysis identifies positive relationship between homeownership, education, income and net wealth levels for the majority of counties. The relationship between net wealth levels and explanatory variables is particularly strong at bottom quantile. Counterfactual decomposition shows that the largest part of cross-country differences comes from the country specific factors rather than differences in characteristics attributable to country populations.

JEL classification: D30, D31

Keywords: wealth inequality, housing wealth, Gini coefficient decomposition, counterfactual decomposition, quantile regressions

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EZ15 – 15 countries: AT, BE, CY, DE, ES, FI, FR, GR, IT, LU, MT, NL, PT, SI, SK

HFCS – Household Finance and Consumption Survey

HMR – Household Main Residence

HSCV – Half Squared Coefficient of Variation

MLD – Mean Logarithmic Deviation

PDF – Probability Density Function

1 Introduction

Levels and disparities of wealth are important indicator of potential household vulnerabilities that are taken into consideration in designing economic and social policies. Practical importance of the analysis encourages numerous research efforts in that field. First microeconomic surveys that were meant to gather data on material conditions of households can be traced back to the UK of year 1795 (OECD, 2011). In the US first data on net wealth of households started to appear after 1962, once the Survey of Financial Characteristics of Consumers became available (McKernan et al., 2012). Other prominent surveys of household wealth at national level include CFS, SIPP and PSID in the US, EFF in Spain, SHIW in Italy and GSOEP in Germany.[1]

Over time, statistical methods developed into complex surveys suitable for cross-country comparison. One of the most extensively studied cross-country surveys on wealth so far has been the Luxembourg Wealth Study (LWS), which consists of harmonized wealth micro-data from twelve countries (Jantti et al., 2008). Another internationally comparable dataset - Survey on Household Ageing and Retirement in Europe (SHARE) – includes data on households aged 50+ that limits its usefulness for wealth inequality studies. The main drawback of the data available for international comparison is the lack of objective measurements of private businesses and uncertainty regarding pension wealth.

The studies on income inequality pioneered the research on the gap between the poor and the rich because of the prevalence of available data from income surveys and possibility to use tax returns to construct proxies for private income. The first comprehensive global income distributions analysis became available in 2002 (Milanovic, 2002).

As a measure of economic welfare, household wealth is at least as important as income. Although wealth inequality among households tends to be higher than income inequality, it received much less attention until recently, partly because of the lack of good quality data (Cowell et al., 2012). Prior to the 1960s, data on wealth was limited to small unrepresentative surveys, real estate and wealth tax records – none of the sources qualifying as complete (Davies and Shorrocks, 2000). In Europe Italian national survey SHIW of 1965 was one of the first to include questions on savings level of households; however, institutional data on

[1] Survey of Consumer Finances (SCF), Survey of Income and Program Participation (SIPP), Panel Study of income Dynamics (PSID). Spanish Survey of Household Finances (Encuesta Financiera de las Familias, EFF), Survey on Household Income and Wealth (SHIW), German Socio-Economic Panel (GSOEP).

tax returns tracing back to the 1920s in countries with wealth tax such as Sweden had also been used in previous research (Spant, 1987). The perspective of international wealth inequality came into consideration after LWS became available in 2007. LWS includes wealth aggregates that are broadly comparable across countries; however, it also has methodological differences that cannot be easily eliminated (Sierminska et al., 2006). The first attempt to estimate world distribution of wealth was performed only in 2006 (Davies et al., 2011).

Another reason behind the importance of studying wealth levels is the propensity of consumption out of wealth that contributes to the current and future consumption of households and through bequest can also effect the consumption of future generations (York, 2012). Given that the stock of savings represents a cumulated excess of income over expenditure over time it indirectly reflects historical levels of inequality. This notion is particularly important if consistent panel data is not available. It is also important to stress, that the recorded level of wealth is a good proxy for future welfare of households because of a momentum in wealth accumulation that results from the ability of the wealthy households to invest in education, housing, high return business ventures and the economies of scale in handling their finance. Therefore, in the best case the study of financial flows alone, without considering the accumulated wealth of households is incomplete, but in the worst case in can even be misleading.

In that respect, the role of housing cannot be overestimated. It is not only the most valuable item on the balance sheet of households, but it also provides a solid basis for wealth accumulation. It has been noted that homeowners build wealth quicker than otherwise comparable renter households, even when factors likely to account for household differences in permanent income and the marginal propensity to save and to invest are controlled for (Di et al., 2003). For the UK it has also been shown that once young households become home owners they are much more likely to accumulate wealth in housing equity rather than diversify their savings across other asset classes (Banks et al., 2004). These are the reasons why this study pays particular attention to the role of housing in wealth inequality.

This study is based on a new micro-level survey of households in 15 Eurozone countries – Household Finance and Consumption Survey (HFCS) coordinated by the ECB. The survey offers the most recent and comprehensive data on European households that provides a solid ground for direct international comparison. The HFCS covers only Eurozone member state, therefore many other countries such as the UK, Sweden, Denmark, Norway, and the US that might be interesting for comparative purposes, cannot be directly included in this study.

However, the design of the study is meant to be comparable with existing and forthcoming publications on wealth. Therefore we keep definitions of net wealth and it's components as they are defined in the HFCS dataset.

Although the timing, sampling and imputation implementation methods differ across counties the main demographic and financial welfare variables are harmonized and do not require any discretional adjustments (ECB, 2013). The chapter devoted to the description of the dataset also covers challenges associated with national specifics of the survey and their implications for the analysis.

The data of the HFCS for Europe shows that apart from being more unequally distributed than income, wealth is also highly concentrated among wealthiest households – top 10% households in Europe hold 50% of total net wealth and 31% of income (see **Table 15**). The estimates from the HFCS correspond to those of Kennickell (2003) that studied distribution of wealth in the US using SCF data and came to the conclusion that approximately 70% of wealth is concentrated among top 10% of wealthiest households. This empirical fact results in the wealth distribution being highly skewed: the mean of net wealth for Europe of 231 800 euro is much higher than the median of 109 200 euro. That is problematic for two reasons. First of all, the analysis performed at the mean of the distribution is not going to be revealing. That means that we need to employ quantile regression analysis and other techniques that allow capturing and analyzing non-normally distributed data. Second of all, the collection of the data might be troublesome due to non-responses among the richest households. In this case the reasons for non-response will be correlated with the object of study, resulting in biased estimates. This problem can be mitigated by the oversampling of the rich households with subsequent calibration of the final sample weight based on external census or institutional statistics.

The role of the rich in wealth studies is widely discussed in the existing literature. For instance Atkinson and Piketty (2007) argued that apart from the intention of achieving a representative sample three main reasons why researchers should care particularly about the rich is their command over resources, their command over people and their global significance. Waldenström (2008) also motivated his thorough study of the rich by their disproportional significance in economic and political life of the society, while Davies and Shorrocks (2000) mention the possibility to use wealth for consumption smoothing as the main reason to study it.

The aim of this paper is fourfold and it is meant to answer the following questions:

1. What is the role of housing in wealth inequality in 15 Eurozone countries?

2. In which subgroups of the society is wealth most unevenly distributed?
3. What assets classes reduce wealth inequality?
4. What drives international differences in wealth levels?

The research uses main techniques from wealth distribution analysis to study how wealth and its main components are distributed among households at national level. The analysis is performed for the whole sample and for specific sub-groups: homeowners and non-homeowners.

The methodological approach to answering the set research questions consists of three main building blocks. First, in order to understand the main factors underlying wealth inequality at national levels we perform Gini coefficient decomposition analysis that allows quantifying the contribution of different wealth components and different population subgroups to total inequality. In particular, an important goal of our work is to measure the contribution of housing wealth to overall wealth inequality. Second, through the use of quantile regressions we investigate whether observable household characteristics can explain recorded levels of net wealth. Lastly, we investigate the effect of environment and household characteristics on net wealth levels in different Eurozone countries. The analysis is performed using counterfactual decomposition of international differences on coefficient and covariate effects. We also provide cultural and economic reason behind the differences.

The timeliness and relevancy of the paper are determined by a lively public discussion on wealth re-distribution in European countries and the need for the clear understanding of what drives wealth inequality. Previous research concentrated mainly on income inequality that limits the range of policy implications that can be drawn based on the results. Therefore current research is performing the task of quantifying wealth inequality in Eurozone countries along with providing insight about the contribution of specific assets to total wealth inequality. The paper also considers international differences in the levels of net wealth.

The rest of the paper is structured as follows. Section 2 provides an overview of preceding studies and highlights their implications for the current research. Section 3 is devoted to the description of the data. Section 4 formalizes the methodological approach to data analysis. Section 5 presents empirical results and their discussion. Section 6 summarizes the main implications of the analysis and concludes.

2 Literature review

2.1 Consumption-saving theories

As noted by Lucas (1987) the understanding of factors that affect levels of consumption and saving of households is important for the complete analysis of the costs of business cycles. The theoretical literature provides a broad spectrum of explanations of why people accumulate wealth.

Already in 1936 Keynes argued that the share of income devoted to savings is increasing with income. More detailed explanation of consumption-saving decisions were proposed by Modigliani and Brumberg in their ground laying research on the Life-Cycle Hypothesis (LCH) in 1954 and empirically tested by Modiglaini and Ando in 1963. The broadly complementary idea of the Permanent Income Hypothesis (PIH) of consumption smoothing through consumption out of permanent income rather than current income was developed by Friedman (1957) and empirically tested by Hall (1978). Both theories suggest that households will create asset buffers against potential as well as certain changes in the level of income to maintain a stable level of consumption over their whole lifetime. However, the theories can be criticized on the basis of empirical observations in the US, where aggregate savings rates are higher among other reasons due to bequest motives (Kotlikoff and Summers, 1981). On the other hand, observable deviations from standard behavior in Sweden in terms of relatively low private lifecycle savings noted by Klevmarken (2006) can be explained by a more reliable public pension system in the country. Other obstacles for achieving perfectly smooth consumption are borrowing constraints at the young age, as well as imperfect foresight with respect to income, medical expenses and longevity that inevitably results in precautionary savings.

Skinner and Zeldes (2002) contrasted the importance of bequest and life-cycle motives for saving, and concluded that due to the fact that saving can simultaneously serve both purposes these motives generally overlap and cannot be easily separated. Other explanations of wealth accumulation patterns and motives can be found in the field of behavioral economics (Camerer et al., 2004). Shefrin and Thaler (1988) presented “behavioral life-cycle” theory by introducing the concept of mental accounting for wealth that results in distinctions between pension wealth, college money, vocation money and other types of saving accounts that are treated interchangeably in other theories. In 2000 Carroll was one of the first to incorporate the notion of habit formation in the consumption model, from which follows that the utility

from consumption in the current period depends on the reference point of consumption in previous periods.

2.2 *Wealth inequality studies*

One of the most recent papers on wealth distribution deals with the relationship between a broader access to investments in stocks and wealth inequality (Bilias et al., 2013). The authors used counterfactual analysis in order to examine intertemporal changes in the composition of the US stockholder pool based on the data from the US SCF survey between 1989 and 2001. Apart from uncovering substantial shifts in stockholder pool composition the authors come to the conclusion that more accessible investment opportunities in stocks do not necessarily lead to more equally distributed wealth. The paper also documents a dramatic increase in the importance of stockholding for net wealth inequality during the observed time frame.

In another study counterfactual analysis based on quantile regressions was used on a sample of 13 countries for decomposing the effects of population characteristics and economic environment (Christelis et al., 2013). International comparison suggested that Europeans tend to invest more in home equity than in stocks compared to households in the US, at the same time they also tend to borrow less in the form of mortgages. Overall, the study concluded that the main source of observed differences came from country environment rather than population characteristics. That suggests that there is an ample room for international convergence in terms of propensities of asset ownership and amounts held.

As a part of the LWS data analysis initiative Sierminska, Brandolini and Smeeding (2006) estimated wealth inequality in five developed countries – Canada, Finland, Italy, Sweden and the United States obtaining Gini indexes ranging from 0.60 in Finland to 0.89 in Sweden. It is noteworthy that the authors also adjust the LWS data by adding estimates of pension assets and business equity value.

Brown and Taylor (2008) put a particular emphasis on studying the determinants of debt and asset holdings at household level in Germany, Great Britain and the US. By performing a range of OLS, quantile and Tobit regressions the authors conclude that the poorest and the youngest households are the most vulnerable social groups that do not have sufficient wealth buffers to accommodate negative shocks to income. In the process of the analysis the authors also identified most relevant explanatory variables to be used is such type of econometrical research. The summary of the most relevant preceding studies on wealth is presented in **Table** 1 of Appendix 1.

2.3 The role of housing wealth

In many countries housing wealth is the largest item in households' wealth portfolios (Bicakova and Sierminska, 2008). One explanation of that fact is the versatile nature of housing. Apart from social status, which is difficult to estimate numerically and will not be discussed in this paper, it provides both – consumption services and opportunity to store wealth. Therefore it is important to understand the main forces that motivate households to own residential housing (HMR).

A recent paper by Cowell, Karagiannaki and McKnight (2012) examines the relationship between wealth holdings and demographic characteristics in an international context. The authors examined different components of net wealth, including mortgage debt and student loans. One of the findings of the study refers to the role of house prices in the UK in the increased relative wealth equality during 2000-05 as measured by the Gini coefficient. However, the authors also note that absolute gaps between high and low wealth households in the UK have grown substantially during the period.

One of the most prominent studies of wealth inequality, and particularly the role of housing in wealth disparities in Spain, was performed by Azpitarte (2010). The author analyzed the distribution of household wealth in Spain based on Spanish Survey of Household Finances (EFF) and identified the contribution of specific assets to overall wealth inequality. The main findings of the study are that income is more equally distributed than wealth and that housing wealth appears to play an equalizing role in wealth inequality as opposed to financial wealth whose share in total wealth is increasing in wealth. Although from a relative inequality perspective housing wealth tends to be equalizing assets, it is still one of the main factors explaining why wealth is more unequally distributed than income. The author also notes that the differences in the degree of wealth and income inequalities do not stem from differences in age groups, as the Modigliani-Brumberg life cycle hypothesis would suggest (Modigliani and Brumberg, 1954).

Another recent paper focusing on wealth and income distribution at national level is based on Austrian HSFW and EU-SILC surveys (Lindner, 2011). The authors look at the contribution of different assets to overall inequality as measured by the Gini index. The results of the study broadly coincide with those of Azpitarte (2010) in the sense that housing wealth is found to be an equalizing asset, while more sophisticated financial instruments tend to increase overall inequality.

3 Data

Previous studies on international comparison of net wealth encountered various difficulties with the compatibility of data from different countries in terms of definitions, sampling procedures and timing. This study uses the benefit of a coordinated international survey among Eurozone countries published by the ECB in 2013. The survey design is meant to eliminate these incompatibility issues at the very start by reducing the number of assumptions and adjustments needed. Therefore the efforts on data harmonization for this study are much smaller in magnitude than those exercised by other authors in their attempt to estimate the distribution of wealth in international context (Guiso et al., 2002; Davies and Shorrocks, 2000).

The analysis covers 15 Eurozone countries listed in **Table 2** in Appendix 1. Two out of 17 Eurozone countries did not participate in the first wave of the HFCS – Ireland and Estonia. Although the selection of counties is predetermined by their membership in the monetary union, they still represent a wide spectrum of cultures, attitudes to housing, historical developments affecting wealth accumulation conditions, demographics and public wealth systems.

The overall dataset of the HFCS consists of 62 500 households[2]. The size of the sample ranges from 340 in Slovenia to 15 000 in France (see **Table 10**). The target population covered by the surveys consists of all private households and their current members residing in the national territory at the time of data collection. It is important to notice that persons living in collective households and in institutions are generally excluded from the target population (ECB, 2013). As noted by Ziegelmeyer (2012) the fact that elderly people in nursing homes are excluded from the sample can create a bias in the analysis of wealth deccumulation, especially given the ageing population trends in Europe.

The survey provides sampling weights that correspond to the inverse probability of being selected in the sample. The weights are calibrated to external sources and adjusted with respect to coverage issues and non-responses. In the calibration of weights the size of households was taken into account, therefore sampling weighs are attributable also to each individual member of the household. All countries applied the same weighting procedure, therefore the sum of all weights is equal to the total number of households in the 15 Eurozone

[2] Household is defined as a person living alone or a group of people who live together in the same private dwelling and share expenditures (ECB, 2013).

countries. In this study sampling weights are used to calculate all representative statistics in order to account for the fact that the data was gathered using complex sampling designs rather than random sampling.

For end users the HFCS provides 5 datasets that differ in terms of imputed missing values. The recovery of missing information by imputation method allows performing analysis with complete-data methods and results in higher efficiency of estimations. All five implicate datasets are used to generate point estimates and variances of parameters. In the course of the study each of the five data sets is analysed separately and at the later stage the results are combined according to the methodology proposed by Rubin (1987).

3.1 The scope of the analysis

Prior to engaging in the data analysis it is important to formalise the definition of wealth, because in the broadest sense it includes human capital, real and financial assets – public as well as private (Jenkins, 1990). The study is based on the definition and breakdown of net wealth according to the survey design of the HFCS. Net wealth is estimated as a sum of all real and financial assets minus outstanding mortgage debt and other liabilities. Total household assets exclude public and occupational pension wealth. See **Table 3** in Appendix 3 for the complete list of net wealth components. Real assets account for the biggest share of households' net wealth, with primary residence owned by households being the most significant asset class.

There are also caveats brought by legal questions of ownership, use and control rights of assets that we have to bear in mind. In the course of this study the value of human capital such as education or health will not be estimated. Such approach to the definition of wealth can also be found in the work of Davies and Shorrocks (2000), although the concept of multidimensional richness incorporating non-material characteristics has also been extensively studied (Peichl and Pestel, 2010).

Given the specifics of the dataset, the analysis does not cover the role of public wealth such as infrastructure, educational and healthcare systems in overall wealth inequity. Even the analysis of pension wealth is limited to investments in private pension funds. Overall, mentioned limitations and caveats can introduce some bias in the analysis of obtained inequality measures; however, appropriate adjustments can be made as long as the drawbacks are clearly identified.

In terms of the time frame of the analysis, the obtained inequality measures may refer to different periods in different countries. The reference dates range from the late 2008 for

Spain to mid-2011 for Italy, while for the majority of countries the considered time frame is year 2010. The precise time frames of conducted surveys are presented in **Table 2**. Cross country analysis can be particularly affected by the values of financial and real assets reported in different time periods. The current study does not perform any asset price or purchasing-power parity adjustments across countries.

Another dimension of research that has to be carefully considered is the unit of analysis. The distinction between households and individuals becomes particularly important, if there are inherent differences in the sizes of rich and poor households. As it has been shown, the Gini index tends to be slightly lower, if wealth distribution is analysed at household rather than at individual level (Deininger and Squire, 1996). If poor families tend to have a higher number of household members than rich families, then the resulting measure of inequality would be underestimated compared to per capita estimates. Sierminska and Smeeding (2005) thoroughly analysed the measurement issues and concluded that scales can affect the results and sensitivity analysis should typically be performed. However, as noted by Davies and Shorrocks (2000) the choice between analysing wealth across households or individuals is largely determined by the source of data rather than by an opinion about the most appropriate economic unit. This study analyses wealth at household level, because there is no standard approach to assign portions of wealth to individual household members. Moreover, the use of "household" as a unit of account is a widely acknowledged method employed in the wealth distribution literature and we want to make our results to be directly comparable to preceding studies (Azpitarte, 2010; Brandolini et al, 2004).

3.2 Descriptive statistics

The analysis of micro-data has several distinct advantages over macro-analysis in situations when the underlying population is not homogenous. Aggregation and averaging can result in misleading conclusions, because these procedures hide asset-liability mismatches at household level. While overall assets can be much higher than debt for the aggregate population, individual households might be heavily indebted. Moreover, households with leveraged wealth can be more likely subject to idiosyncratic shocks. Over-indebtedness on European level can be represented by the share of households with negative net wealth levels. The share of households with negative net wealth in all 15 countries was 4.8%, at the same time it was above 10% in the Netherlands and Finland (see **Table 11**). Micro-level analysis can be used to find out whether differences in the structure of net wealth and demographics of the underlying population can contribute to explaining wealth inequality levels in different

countries. Moreover, micro-data analysis provides opportunity to draw conclusions about specific groups of the population based on their income, wealth, education level or homeownership[3] status.

The HFCS statistics is collected at household level, and due to historical and cultural reasons the number of people in one household can differ dramatically from country to country. According to the OECD statistics Ireland, Slovakia and Cyprus have one of the largest households, while Bulgaria and Germany one of the lowest among the OECD countries. For instance single-person households constitute more than 35% of households in Finland and Germany, while in Greece, Portugal or Slovenia this proportion is less than 20% (OECD, 2012). Descriptive statistics on household size from the HFCS confirms observations from the OECD statistics and is available in **Table 10**. Absolute levels of net wealth also vary heavily across countries. See **Table 13** and **Table 14** for statistics on average and median net wealth in each country. Apart from the fact that mean values are much larger than median values, which signifies about highly positively skewed distribution of net wealth, it is important to notice that large developed countries such as France and Germany do not have the highest indicators of net wealth levels, meaning that the problem of wealth inequality is more acute in these countries.

As noted by Cowell et al. (2012) the implications of the life cycle hypothesis suggest that populations with different age profile are supposed to be on different stages of wealth accumulation that might partly explain cross-country difference in wealth holdings. Age structure of the Eurozone countries shows that the share of household members over 65 years old is over 20% in Germany and only 14% in Slovakia (see **Table 20**). Age distribution of households' heads[4] in combination with the average household size also contributes to the heterogeneity of wealth levels in different countries. Given that average household size in Germany is 2.0 while in Slovakia it is 2.8 it is not unexpected that the share of household heads 65+ is the same for Germany as for Slovakia – close to 30% (see **Table 19**, **Table 20** and **Table 10**). Germany, Finland and France also have disproportionately large shares of young household heads that just start their wealth accumulation and very often borrow to invest in education, housing or to smooth consumption. Thus the variation of wealth levels within a country captured by the half squared coefficient of variation (HSCV) partially corresponds to the high concentration of households at two generational extremes.

[3] Homeowner is defined as a household that owns a primary residence.
[4] Household head is defined as the oldest person in the household.

The specifics of the data on wealth levels are related to unit or item non-response at the upper tails of wealth distribution. The problem of item non-response is usually mitigated by imputation techniques (Juste and Kuester, 1991). On the other hand, given that higher unit non-response is correlated with the object of the study, it introduces bias in the estimations and makes the inequality analysis more problematic. As noted by Davies and Shorrocks (2000) oversampling of the rich is an important feature of survey design procedure that allows obtaining more reliable inferences about households in the upper tail of the wealth distribution. Oversampling of the rich performed by the HFCS provides a solid basis for more accurate mapping of the richest households with respect to all other households.

One of the first attempts to conduct an international comparison of portfolios of the rich was performed by Carroll (2002), highlighting the propensity of rich people to invest proportionally more in risky assets. In their study of global wealth inequality Davies et al. (2011) estimated the share of wealth attributable to the top 10% of wealthiest households to be 51% for core countries. This result corresponds to the share of net wealth attributable to the top 10% of wealthiest households in 15 Eurozone countries of 50% estimated based on the HFCS (see **Table 15**). Austria and Germany show a particularly high concentration of wealth in the ownership of the top 1% of wealthiest households. In Germany one quarter of all wealth belongs to the top 1% of wealthiest households. In both countries around 60% of all net wealth is concentrated in the possession of the top 10% of wealthiest households.

4 Methodology

This section is devoted to the methodology of data analysis and consists of four distinct parts. The research is based on the main techniques from wealth distribution analysis previously applied to other datasets that were available before the HFCS and incorporates the benefits of recent advancements in imputation and variance estimation techniques through the use of 5 multiple implicates and 1000 replicated weights.

In the first part, inequality analysis is performed using Gini coefficient decomposition. The decomposition method looks at the Gini coefficient from the perspective of contributions of different groups such as home owners and non-homeowners to the total index. An alternative angle to the analysis of the role of different sources in wealth accumulation decomposition is taken by considering contributions of different assets to the total index.

The second part of the section is devoted to quantile regression (QR) analysis. The research is meant to identify whether observable household characteristics can explain recorded levels of

net wealth. The main benefit of the QR analysis is that it goes beyond standard models of conditional mean in empirical research. It acknowledges that the effects of covariates on the dependent variable can differ along the conditional distribution of the considered dependent variable. The method allows fitting several different regressions at various percentiles of the distribution of the dependent variable and thus getting a more complete picture of the interrelationship. The approach is based on Least Absolute Deviations (LAD) rather than OLS and therefore is more robust to outliers and distributional assumptions of error terms.

The third part of the section is devoted to counterfactual decomposition analysis of net wealth across countries. The method is based on the approach proposed by Blinder and Oaxaca in 1973. The intuition behind the decomposition of total international difference into effects of environment and characteristics lies in the opportunity to observe specific characteristics of households in one country and use estimated coefficients from another country in order to predict cross-country counterfactual levels of net wealth. The availability of counterfactual measures allows separating the effect of covariates and coefficients on observed differences. The main drawback of the counterfactual decomposition is that it ignores any causality between characteristics and the environment. The distribution of characteristics may reflect their impact and vice versa. The extensions of Blinder and Oaxaca approach allow decomposing the effect of the environment and coefficients along the whole probability density function.

The fourth part discusses variance estimation using bootstrapping and multiple imputations.

4.1 Inequality measures

Apart from the problem of inconsistencies in the definition of household wealth, which in this study is dealt with by using the data from a harmonized database, the second most important source of diverging estimates of wealth inequality comes from employing different measures of inequality (Jenkins, 1990).

Given that negative wealth is much more common than negative income, in our analysis we have to rely on measures that can deal with zero or negative values, such as the Gini coefficient and the Squared Coefficient of Variation (HSCV) - General Entropy measure with $\alpha=2$ (Deaton, 1997). We also provide an overview about inequality in terms of percentile ratios.

In order to estimate the robustness of the results and see how inferences are affected by the exclusion of negative and zero values we present also other commonly used measures of inequality, which are sensitive to changes in different parts of the distribution: Mean

logarithmic deviation (GE(a) with α=0) and Theil (GE(a) with α=1) index. While Gini is more sensitive to the middle of the distribution Theil's index is influenced by the relative distance between the rich and the poor. HSCV is very sensitive to inequality at high wealth levels but less so to inequality at other regions of the distribution (Cowell, 1977; Shorrocks, 1980).

There are two main dimensions along which the Gini index can be decomposed. One of them is decomposition by asset contribution proposed by Lerman and Yitzhaki (1985), and formally implemented by Lopez-Feldman (2006). The second dimension of decomposition considers contribution of different groups to the total index as proposed by Rao (1969). Although Theil (1967) favored decomposition of inequality measures that are based on entropy rather than decomposition of the Gini index, Pyatt (1976) showed that also decomposition of the Gini index provides useful information for discrimination analysis.

4.1.1 Gini index

The Gini index is one of the most widely used and reported measures of inequality. It is based on the Lorenz curve, which plots the share of population against the share of resources these people collectively possess (Lorenz, 1905) see **Figure 1**. The main idea behind the Gini coefficient is to quantify how evenly a resource is distributed in a population (Farris, 2010). Although it has been in use in social studies for almost a century since its formulation by the Gini (1912, 1921), it has not been immune to critique since one measure cannot capture all peculiarities of the whole distribution. Argumentation of Atkinson (1970) against the traditional measures of inequality such as Gini is referring to the set of desirable properties of good inequality measures formulated by Dalton (1920). The properties refer to the changes in ranking of distributions in response to proportional, absolute and asymmetric changes. By definition the Gini coefficient attaches more weight to transfers affecting middle income classes. One characteristics of the Gini index is that it does not provide a unique mapping between changes in the index and the underlying income distribution. Therefore improvement in wealth inequality as measured by the index can come from a more even distribution between top and bottom percentiles as well as between middle and bottom percentiles (Deininger and Squire, 1996). The above discussion means that complete picture about wealth inequality can be obtained only after applying several estimation approaches.

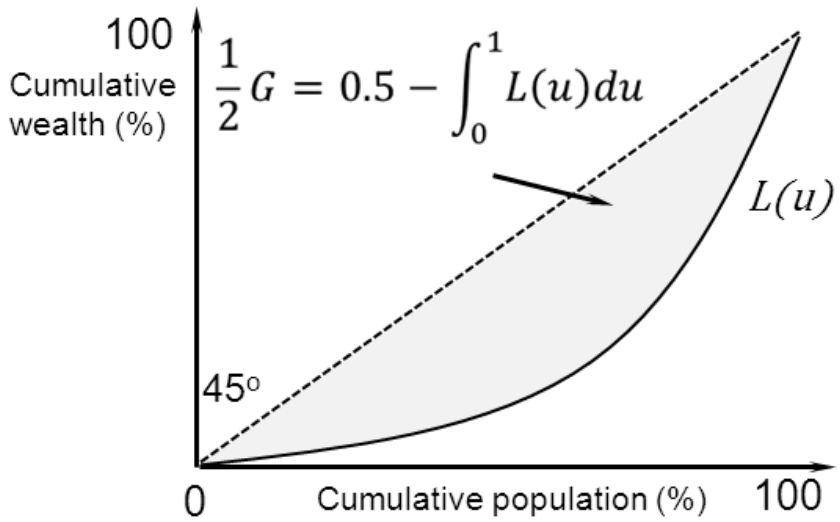


Figure 1. Lorenz curve and Gini estimation.

4.1.1 Gini decomposition by group contribution

Rao (1969) was one of the first to propose the way to decompose concentration ratio into contributions from different subgroups and from different assets. The proposed approach motivated researchers to look into the importance of different sub-populations and different components of wealth as sources of inequality in the distribution of wealth in a population (Pyatt, 1976). We base our analysis on the decomposition of the Gini index defended by Lambert and Aronson (1993) and empirically applied by Azpitarte (2010) on Spanish household data. Lambert and Aronson (1993) showed that the decomposition of the Gini index can be visually presented using Lorenz curve (see **Figure 2**).

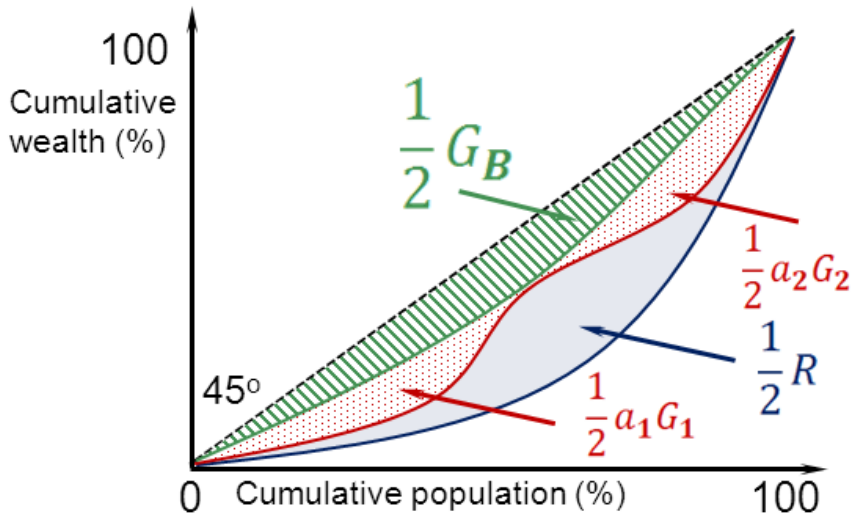


Figure 2. Gini index decomposition based on Lorenz curve.

$$G = G_B + \sum a_i G_i + R$$

G - Gini index
G_B - between-groups Gini coefficient.[5]
a_i - product of wealth share and population share attributable to group i
G_i - within-group Gini coefficient is the Gini coefficient for wealth within subgroup i
R - residual which is zero, if the subgroup wealth ranges do not overlap.

It has been argued that the Gini coefficient is not the best inequality measure to be decomposed into "within-group" and "between-group", because there is bound to be a residual term if wealth levels overlap among groups (Foster and Shneyerov, 1999). On the other hand generalized entropy class of measures can be well split into components using a property of additive decomposability, in a sense that they can be represented as a weighted sum of inequality measures within each sub-group plus the contribution arising from between sub-group means (Shorrocks, 1980).

4.1.2 Gini decomposition by asset contribution

The basis for decomposing the Gini coefficient into individual contribution of assets and debt constituting net wealth was provided by Pyatt, Chen, and Fei (1980), and later refined by Lerman and Yitzhaki (1985). The idea behind the decomposition is that Gini coefficient can be represented as the product of the source's own Gini, its share in total net wealth and its correlation with the rank of total net wealth. The approach was also implemented by Brandolini et al. (2004) in their empirical study of household wealth distribution in Italy and by Lopez-Feldman (2006) in his STATA programming exercise.

$$G = \sum_{i=1}^{I} S_i G_i R_i$$

G - Gini index
S_i - Share of source k in total wealth (see **Table 3**)
G_i - Gini index of a wealth source i (see **Table 4**)
R_i - The Gini correlation of wealth from source i with total net wealth[6] (see **Table 5**)

As argued by Stark, Taylor, Yitzhaki (1986) the idea behind the decomposition is that the contribution of each asset to the overall Gini is dependent on three components:

[5] Calculated by substituting wealth levels in each group by corresponding group means.
[6] R_k= Cov[y_k, F(y)]/Cov[y_k, F(y_k)], where F(y) and F(y_k) are the cumulative distributions of total wealth and of wealth from source k.

1) the importance of the wealth source in terms of its share in total wealth
2) how unequally the source is distributed as measured by the Gini index
3) how the wealth source is correlated with the distribution of total wealth

That means that even wealth sources that have high share in total wealth might not be contributing a lot to the overall Gini, if they are equally distributed among people. On the other hand, the effect of increase in the level of one particular wealth source can have a mitigating or aggravating effect on inequality depending on whether it has higher or lower share in the wealth portfolio of poor people compared with rich people.

The authors also showed that it is possible to measure the effect of a small percentage (p_i) change in any component on the overall Gini. The percentage change in inequality resulting from a small percentage change in a wealth source i equals the initial relative contribution of the wealth source to overall Gini minus the share of the wealth source in total wealth.

$$\frac{\partial G/\partial p_i}{G} = \frac{S_i G_i R_i}{G} - S_i$$

The approach allows estimating not only the absolute contribution of a specific wealth source to the overall Gini, but also tracing how this contribution is formed according to the three dimensions mentioned above. However, it is necessary to notice that Shorrocks (1983) criticized this decomposition of the Gini index proposed by Pyatt, Chen, and Fei (1980), because the decomposition rule is not unique and depends on the precise formula used to present the inequity index.

4.2 Quantile Regressions

Traditional OLS regressions limit data analysis to the conditional means of distributions of considered variables. Such approach provides misleading results if the relationship between the variables is not constant along the conditional distribution of the dependent variable.

Quantile regression techniques involve running several regressions at different percentiles of the conditional distribution of the dependent variable that allows for more detailed analysis of the relationship between dependent and independent variables (Mosteller and Tukey, 1977). As noted by Koenker and Hallock (2001) quantile regressions expand empirical analysis beyond conditional mean modelling. Bushinsky (1998) lists several reasons in favour of using quantile regression. The benefit of the technique is in the use of Absolute Least Deviation (LAD) optimization method as opposed to OLS optimization. This type of regressions is robust to non-normal errors and outliers and can analyse the effects of the

independent variables within specific percentiles of the distribution of the dependent variable rather than only at its mean.

The use of quintile regressions for complex survey data analysis involves several important aspects such as the use of bootstrap procedure, the decision whether to apply survey weights and the incorporation of the results from multiple imputations. In STATA software standard errors of quantile regressions are obtained using the method suggested by Koenker and Bassett (1982); however, as noted by Roger (1992b) the standard errors can be underestimated if errors are heteroscedastic. Therefore the author suggests using a routine implemented by Gould (1992) based on bootstrapping procedure proposed by Efron (1982) that allows obtaining standard errors without additional assumptions.

In the literature on survey analysis there is a long lived discussion on the appropriateness of using sample weights in regressions. As noted by Roger (1992a) there are two philosophical approaches to data analysis, both of which are appropriate if performed correctly. From the point of view of "econometricians'" no weighting is necessary, if we assume that the model is correctly specified. "Statisticians'" approach concentrates on the description of the data, rather than on the behavioural inferences, therefore it involves applying weights inversely proportional to the probability of being sampled to calculate standard errors. Roger (1992a) also notes that if the difference between weighted and unweighted results is significant, it is a sign that weights should be used either in the regressions itself or accounted for at the stage of making inferences for the whole population. Roger stresses that in any case sampling weights cannot be simply ignored.

4.3 Counterfactual decomposition

Oaxaca-Blinder (O-B) decomposition technique allows separating the effect of observable differences in characteristics between two groups and the effect of unobservable characteristics specific to each of these groups that can be called "environment" or "discrimination" (Oaxaca, 1973; Blinder, 1973). Originally O-B decomposition was developed to analyse counterfactual differences in mean earnings in the framework of discrimination studies of labour economics. One of the widely used variations of O-B decomposition advocated by Neumark (1988) is based on a non-discriminatory vector of coefficients estimated based on the whole sample. Jann (2008) formally implemented the O-B method in STATA.

$$NW_A - NW_B = [E(X_A)-E(X_B)]'\beta^* + [E(X_A)'(\beta_A-\beta^*) + E(X_B)'(\beta^* - \beta_B)] = E+U$$

$$E=[E(X_A)-E(X_B)]'\beta^*$$

$$U=E(X_A)'(\beta_A-\beta^*) + E(X_B)'(\beta^* - \beta_B)$$

$NW_{A/B}$ – net wealth level in country A (base country) and country B
β^* – non-discriminatory vector of coefficients estimated based on the whole sample
$E(X_{A/B})$ – expectations of a vector of characteristics of country A/B
$\beta_{A/B}$ – coefficients specific to country A/B
E – part of actual difference attributable to differences in observed characteristics
U – part of actual difference attributable to differences in environments and unobserved variables

Bicakova and Sierminska (2008) applied the Oaxaca-Blinder decomposition technique for analysing cross-country differences in home ownership. The authors used household characteristics from one country and combined them with Probit coefficients from another country in order to simulate counterfactual predictions of home ownership rates.

Christelis, Georgarakos and Haliassos (2013) used an extension of the Oaxaca-Blinder technique developed by Machado and Mata (2005) to decompose differences in distributions of household asset ownership rates in US and Europe into differences in characteristics and differences in economic environments. Their empirical research is based on a set of Probit regressions, where participation in a given asset is regressed on a number of household characteristics. Bilias, Georgarakos and Haliassos (2013) used a similar approach to decompose intertemporal changes in equity holdings in the US using a set of quantile regressions.

4.4 Variances estimation

Apart from providing unbiased and consistent model estimators the aim of econometric analysis is to provide unbiased and consistent standard errors of these estimates. The importance of correct standard errors is determined by the pre-requisite of identifying the statistical significance of the estimators and constructing their confidence intervals. Recent developments in statistical and econometrical analysis allow using multiple imputations and bootstrap techniques for deriving critical values for test statistics (Brownstone and Valletta, 2001). At the same time these methods can also be used to come up with unbiased estimators.

According to the pre-defined design of the HFCS survey, it provides 1000 replicate weights based on rescaled bootstrapping method of Rao and Wu (1988) and further developed by Rao, Wu and Yue (1992). The choice of bootstrap errors over Jackknife or Balanced

Repeated Replications (BRR) was primarily determined by the fact that it is the only replication procedure that can allow for arbitrary number of replicates, whereas in the other methods the number of replicates is determined by the number of PSUs and/or number of strata. The reason for being suitable for compilation is that bootstrap samples are independently drawn across strata, so the replicate weights of different countries can be stacked and analysed as if they came from a single bootstrap procedure, meaning that the variance in the combined dataset can be estimated in a standard way. Apart from the flexibility the method provides in terms of data aggregation from different countries it also performs better than Jackknife in the case of non-smooth statistics such as distribution quantiles in terms of the consistency of variance estimation (Kovar et al., 1988).

The bootstrap procedure involves repeated re-sampling with replacement from the observed sample, performing estimation given each bootstrapped sample, and then using the distribution of the resulting estimates to approximate the original sampling distribution (Efron, 1979; 1982). The sample should be large enough in order to precisely reflect the true population, although it has been shown that in many cases the bootstrap procedure achieves accurate estimates of sampling distributions at smaller sample sizes than standard large-sample analytic techniques (Hall, 1992).

Another angle of looking at the problem of biased results was taken by Rubin (1987) that laid the grounds for the use of multiple imputations to compensate for missing values and correct for unrealistic responses. Apart from describing properties of multiple imputations in his book Rubin argued that multiple imputations allow for additional variability due to non-response and can increase the efficiency of estimation. The proposed method strikes a balance between the drawbacks caused by case-deletions due to non-responses and newly introduced problems resulting from replacing missing values with a single imputation. With the exception of rare situations case-deletion strategies typically result in low power and biased estimates, while single fitted values create a false sense of certainty (Little and Rubin, 1987).

The multiple imputation approach is meant to provide consistent estimators of coefficients, as well as a statistical measure of accuracy for these coefficients by addressing the problems caused by survey non-response, missing data and measurement error. Due to imputation errors, resulting confidence intervals should be broadened. As noted by Montalto and Sung (1996) an analysis that is based on single imputed values treats imputed values as if they were known with certainty, thus systematically underestimate variability. However, as long as the variables used in the imputation model have an identifiable relationship with the imputed

variables, the imputation process adds information. It is also important to notice that the information quality is limited by the precision of the imputation process. Usually the imputation procedure is performed in a centralised way by the data provider that is capable of incorporating confidential information about respondents, such as precise location or financial characteristics, in order to construct imputation models (Brownstone and Valletta, 2001).

Having obtained several data sets with imputed values researchers can perform their desired analysis separately on each dataset and then average computed results to come up with consistent parameter estimates. The formal way of combining results from several imputed datasets is presented by Rubin (1987) and summarized in **Appendix 2.**

5 Results

5.1 Inequality measures

Prior to proceeding with the decomposition of the Gini coefficients by asset and group contributions it is important to get an overview about general wealth inequality within each country. Additional insight can be gained from examining individual inequality indicators in comparison to other Eurozone countries. The survey data suggests that overall net wealth inequality measured by the Gini coefficient is equal to 0.68, which is in line with the estimates of Davies et al. (2011) that reported median world wealth Gini of 0.7 (see **Figure 5**). The estimated wealth inequality as measured by the Gini coefficient is considerably higher than that of the income inequality of 30.5 estimated by EUROSTAT for Euroarea countries in 2010 based on SILC data. Austria and Germany dominate the Eurozone 15 countries in terms of inequality, both having a Gini index of 0.76. Countries with a large population – Germany, France and Austria – dominate smaller countries such as Slovakia and Slovenia that have low indicators of inequality of 0.45 and 0.53 respectively that results in a high overall Gini coefficient in the EZ15.

Other measures of inequality such as the Half Squared Coefficient of Variation (HSCV) and percentile ratios provide another angle to the analysis of wealth inequality (see **Figure 6**, **Table 16**, **Table 17** and **Table 18**). The estimates of HSCV suggest that Spain and Portugal are the countries with the highest net wealth inequality. On the other hand, percentile ratios indicate that Finland, Germany and France have an extremely high divide between the 75th and 25th percentiles of the net wealth distribution. Slovakia, Slovenia and Greece are consistently characterized by low values of inequality. The reasons behind the changes in

ranking among the countries with the highest inequality can be traced back to the probability density functions (PDF) of net wealth in these countries. The Gini coefficient is more sensitive to the variation in the middle of the distribution, while the HSCV is more sensitive to the inequality at the top of the distribution. Percentile ratios are highly affected by the shape of the cumulative density function. **Figure 4** presents PDFs of an inverse hyperbolic sine transformation of net wealth for each EZ15 country. The benefits of using such a transformation in wealth studies are discussed in detail by Pence (2006). On the example of Spain and Finland it is possible to see why the former has the highest HSCV, and the latter reports the highest 75/25 percentile ratio. The shape of the PDF of Finland exhibits a distinct concentration of the density at negative values that leads low 25th percentile estimate, while the shape of the wealth distribution for Spain has a highly concentrated density at the right of the spectrum that leads to higher variance and a relatively flat cumulative distribution function (CDF) in bottom percentiles that picks up only after the 75th percentile.

Inequality measures from the General Entropy family such as Mean Log Deviation (MLD) and Theil, which are less sensitive to the inequality at the top of distribution than the HSCV, are more consistent with the results of the Gini coefficient, putting Germany and Austria at the top in terms of net wealth inequality (see **Table 18**).

5.2 Gini decomposition

The decomposition exercise in combination with cross country comparison provides an opportunity of tracing back identified heterogeneities in wealth inequality indicators to country specific characteristics. The composition of net wealth portfolios reported in **Table 3** clearly identifies several structural differences. Net wealth of the population in the Netherlands, taken as a whole, appears to be excessively overleveraged, with households' main residence (HMR) comprising 91% of net wealth. Taken together with other housing, total investments in real estate in the Netherlands reach 100% of net wealth. Financial burden indicators also signal about an excessive leveraging for the Netherlands with the median debt-to-asset ratio for indebted households reaching 41.3% (see **Table 12**). At the same time the median mortgage service-to-income ratio for the Netherlands of 14.2% is lower than EZ15 median of 15.9% that can be explained by low interest rates and long term borrowing possibilities in the country. It is noteworthy that households in the Netherlands prefer storing large shares of their net wealth in the form of bonds, deposits and voluntary pensions instead of paying back debts. The share of voluntary pensions of 19% of net wealth is particularly high compared to other EZ15 counties.

In Finland and Greece households invest less in primary housing, but they report considerable investments in secondary housing that makes the overall wealth stored in real estate close to 90% of net wealth. Apart from different income levels another major difference between the two countries is that households in Finland borrow more in terms of mortgage and non-mortgage debt to finance other investments such as bonds, shares and mutual funds.

The importance of secondary housing is particularly apparent in Cyprus and Luxembourg where this asset class has the highest rank correlation with net wealth and in absolute terms contributes to the Gini coefficient as much as the primary housing (see **Table 5**).

High net wealth inequality in Austria is partly attributable to the large share of private business in the country that directly relates to the relationship between wealth and status introduced by Raussanov (2010) and the use of private businesses as a way to "get ahead of the Joneses". The share of net wealth invested in private businesses is 25% in Austria that is comparable only to the indicators of smaller countries such as Malta and Cyprus.

In the case of Germany, high wealth inequality is attributable to several overlapping demographical, cultural and historical factors. First of all, the German population is characterized by small, nucleus households (see **Table 10**). In many cases these small households are headed by young people under 35 years of age that only start their life cycle wealth accumulation (see **Table 19**). On the other side of the spectrum there are households headed by people over 65 years of age who already started their wealth deccumulation. As a result, many very young and very old households are compared to a large group of wealthy households headed by middle-aged people, who account for 52% of all households in the country (see **Table 21** and **Figure 3**). That means that generational divide plays a major role in the overall wealth inequality in Germany. Other contributing factors include the fact that Germany has EZ15's lowest homeownership rates and a high share of wealth stored in private businesses – the "Mittelstand" inherent to the German economy (see **Figure 7** and **Table 3**). It is also important to point out the divide in wealth levels caused by the separation of Germany after the Second World War that has not been entirely eliminated, despite all the efforts after the re-unification.

The fact that households in Italy have low leverage is well documented in the study by Bicakova and Sierminska (2008), in which the authors note that relatively high homeownership rates and low mortgage take up rates can be explained by alternative ways of financing, such as family transfers. The data from the HFCS confirms the previously observed situation in Italy, but also shows that the overall leverage rates are even lower in

Slovakia and Slovenia, where credit constrains can be added to the aforementioned reasons for low mortgage take up rates.

Although primary housing occupies the largest share of net wealth for the majority of countries it is by far not the most highly correlated asset class with net wealth. Wealth invested in private businesses typically has the highest rank correlation, especially for Austria, Malta and Germany (see **Table 5**). The low correlation of primary housing with net wealth is explained by the fact that its share in net wealth tends to decrease as net wealth increases, while the opposite is true for investments in private business and stocks. Rank correlation of mortgage debt is low in absolute terms but negative, that indicates that also rich households tend to finance part of their investment in housing through debt. The trend is particularly strong in Germany, Cyprus and France. In Finland and the Netherlands the correlation is slightly positive that shows that wealthier households tend to pay back mortgage debt. Aversion to holding debt of all types among the rich is particularly apparent in Slovakia. The attitude of richer households to other types of debt differs from country to country more dramatically. In some countries such as the Netherlands, Austria, Belgium and Germany the correlation is positive, and since debt enters in the calculations of net wealth with a negative sign, it means that wealthier households tend to pay back this type of debt. In other countries such as France and Italy the correlation is still negative, meaning that wealthier households tend to borrow more in absolute terms, although in relation to total net wealth the share of debt might still decrease for richer households.

In France, where individual and collective private pension schemes are encouraged through tax benefits, wealth invested in voluntary pensions is highly correlated with net wealth that taken together with high share of this assets class in net wealth results in its high absolute contribution to the overall Gini in the country (see **Table 6**).

The estimates of the marginal effect of small changes in a given asset class on inequality, holding wealth stored in other types of assets constant, unambiguously show that households main residence is the main equalizing asset class for all countries followed by bonds, deposits, vehicles and valuables for selected countries (see **Table 7**).

The equalizing marginal effect of primary housing is explained by large shares of this asset class in net wealth for all counties, moderate rank correlation with net wealth and a very low Gini coefficient within this asset class. The overall rational behind the wealth equalization lays in the difference of importance of housing, bonds and valuables for the poor and the rich. Given that the share of these assets in net wealth decreases with wealth any changes in their

holdings of these assets would disproportionally affect poorer people. The mirrored reasoning is behind the high marginal disequalizing effect of private business wealth.

The estimation of the Gini coefficients separately for the group of homeowners and for the group of non-homeowners shows that net wealth is much more equally distributed among the households that own their main residence (see **Table 9**). Between group decomposition shows that the main part of inequality comes from between group inequality (see **Table 8**). That means that wealth equalization efforts should target non-homeowners as one of the most socially unsecure parts of the society. One of the policy implications is that households without primary housing should be given preferential tax treatment with respect to mortgage payments and state support in the estimation of fair value of property. Unbiased advice on the fair value of real estate and an optimal loan-to-value ratio is particularly important for low net worth households considering the fact that additional financial burden can drastically aggravate their financial situation and even lead to bankruptcy.

5.3 Quantile regressions

Quantile regressions allow capturing differences in the importance of observable characteristics for net wealth levels at different parts of the conditional distribution of the dependent variable. Making such distinction is important for understanding the underlying forces that drive wealth inequality. Moreover, in the case of distinct differences among the quantiles a targeted policy advice can be formulated.

At the bottom quantile the majority of considered explanatory variables such as income, age, as well as dummy variables for being a foreigner, owning a house and graduating from college have a statistically significant relationship with net wealth levels (**Table 22**). Higher income levels and the fact that a household owns the primary residence are consistently positively associated with higher net wealth levels. For the majority of countries, controlling for other factors, age and education have a positive and statistically significant effect on net wealth levels. The results indicate that households might not deccumulate wealth at older age as it is suggested by the life cycle hypothesis. Greece is the only country where older age is associated with lower net wealth level.

With the exception of Finland, Spain and Greece being unemployed at the bottom quantile is not statistically significantly associated with the net wealth of households. This observation, to a large extent, can be attributed to the fact that employment status is related to income level that is also included in the regression as an explanatory factor. For a few countries, such as Austria, Belgium, Luxembourg, Greece and Slovakia being a foreigner is negatively

associated with net wealth levels. The household size is statistically significant only for Germany and Slovakia. The negative sign of the coefficients for Germany can be attributed to the fact that the bottom quantile is considered.

Median regressions show that for the majority of countries, with the exception of Slovakia and Slovenia, considered explanatory variables are not statistically significantly related to net wealth levels (see **Table 23**). Although for the majority of countries homeownership status and income still remain highly positively associated with net wealth levels the existence of the relationship cannot be identified for all countries in contrast to the bottom quantile.

At another extreme of the conditional distribution of net wealth investigated by the 75th percentile regression, education and foreign background of household head again start to be significantly associated with net wealth levels for such countries as Belgium, Greece and the Netherlands in addition to Slovakia and Slovenia (see **Table 24**). Homeownership status remains a relevant factor for the majority of countries with the exception of Spain, Finland, and France.

Overall, quantile regressions show that at the bottom percentiles net wealth levels are much more dependent on covariates than at the middle or top percentiles. That means that at the middle and top quantiles net wealth levels are more decoupled from observable characteristics than at the bottom quantile. The observation that net wealth levels are more sensitive to changes in observable characteristics at bottom quantile reinforces the necessity of supporting the unemployed and fostering education among households in this particular part of the net wealth distribution.

5.4 Counterfactual decomposition

Counterfactual decompositions of international differences in wealth levels with respect to Germany as a base country suggest that observed differences cannot be attributed solely to such controlling factors as household size, income level, education, age, gender and statuses of being a foreigner, married or unemployed. With the exception of Luxembourg and Belgium covariates and the environment tend to work in opposite directions (see

Figure 8 and **Table 25**). That means that German households on average have a favourable set of characteristics compared to other EZ15 countries. In the case of Luxembourg and Belgium the substantial net wealth gap is due to a less favourable environment in Germany as well as a negative covariate effect, both of which increase the divide. However, in the majority of cases the effect of covariates is not decisive in determining the direction of the gap.

The difference in mean net wealth levels between Germany and such countries as Austria and the Netherlands does not seem to be statistically significant and can be attributed neither to coefficients, nor to covariate effects.

With the exception of Slovakia, Slovenia, Greece and Portugal the role of the country specific environment dominates over the effect of household specific characteristics. For Slovakia, Slovenia and Greece the effect of the environment is not statistically significant, while the largest part of cross-country differences comes from the unfavourable distribution of household specific characteristics in these countries in comparison to Germany. For Portugal the effect of covariates is still negative while the environment in the country has a statistically significant mitigating effect on the net wealth gap.

The model suggests that lower net wealth in Germany compared to France, Italy, Spain, Malta and Cyprus cannot be explained by the differences in the composition of households, but rather comes from unobserved differences mainly attributable to the environment.

Overall, counterfactual decomposition suggests that country specific factors and unobservable household characteristics are the reasons behind different net wealth levels in EZ15 countries. While such countries as Slovakia, Slovenia, Greece and Portugal can break the divide with Germany through working on household characteristics, Germany itself will have to undergo structural changes, if the average wealth level within the country is to be equalized with the rest of the EZ15 countries.

6 Concluding remarks

6.1 Suggestions for further studies

The availability of new data, harmonized across 15 Eurozone countries, provides an ample opportunity for research. This study considers mainly the role of housing in wealth inequality; however, the results suggest that private business is the class of assets that marginally contributes the most to wealth inequality. Therefore it would be reasonable to pay particular attention to the distribution of wealth invested in private business across the population and especially among the very rich. The fact that the rich are not the scaled up versions of the poor has also been pointed out by Carroll (2002). As suggested by Davies et al. (2011) it is also reasonable to consider drivers of the levels of financial assets, non-financial assets and liabilities separately rather than the drivers of net wealth levels as a whole.

The current study identified the importance of generational divide in wealth inequality in the majority of EZ15 countries. That means that studies on wealth distribution within and between different age groups should be considered with the aim of further identifying most vulnerable population groups.

Other extensions may look at the multidimensional concept of wealth that includes not only material net wealth, but also income, health, and education levels as in the study of Peichl and Pestel (2010). The analysis could also include comparison of income and net wealth inequality, because the relationship between income and wealth levels is not always clear cut. Moreover, Apgar and Di (2005) point out the problem of retirees who have considerable wealth stored in housing, but have a low level of income.

The HFCS database includes information on consumption that allows for the analysis of consumption patterns across different population groups. The study of propensities of consumption out of different types of assets can also provide practical implications for forecasting aggregate consumption and money multiplier. Several studies on the relationship between housing wealth and consumption patterns have already been conducted (Gan, 2010).

Although the data on public wealth and public pensions is not provided by the HFCS narrowed down case studies of the relationship between saving patterns and public welfare can be performed in the continuation of studies by Feldstein (1974). As suggested by Davies and Shorrocks (2000) researchers could look at the role of inheritance in wealth inequality and wealth level formation especially in such countries as Slovakia, Slovenia and Spain that have large households, high homeownership rates and relatively low wealth inequality as measured by the Gini coefficient.

A combination of simulation techniques with micro-data can bring valuable insights regarding envisioned effects of tax reforms, changes in the social security charges as well as stress testing of households according to different scenarios of interest rate hikes. The estimation of potential household default rates can be particularly valuable for macro-prudential financial stability.

The use of alternative units of analyses and equivalence scales discussed by Sierminska and Smeeding (2005) could bring additional insights in the measures of wealth inequality as well as serve as a robustness check for the analysis carried out at the household level. As one of alternative equivalence scales the square root of a household size can be used (Gottschalk and Smeeding, 1997).

Given that the very rich households have a distinctly different net wealth structure it is reasonable to study international differences among the very rich, thus bypassing the problem

of negative wealth holdings as suggested by Cowell (2013). Moreover, the shape of the distribution of net wealth is also different from the rest of the population, and as noted by Davies and Shorrocks (2000) the top tail is well approximated by Pareto distribution.

6.2 Conclusions

The study investigated the role of housing in wealth inequality in 15 Eurozone countries. Homeownership status and income are found to be associated with higher net wealth levels for the majority of countries controlling for other demographic variables such as age, education, employment status and foreign background of the household head. Quantile regression analysis revealed that net wealth levels are more strongly associated with explanatory demographic variables at the bottom quantile, rather than at the middle or top quantiles. The results suggest that polices aiming at net wealth level equalization should target households at the bottom quantile through rising their education level, as well as designing tailored employment and professional re-education programs.

Using Gini decomposition techniques we showed that housing wealth can be considered an equalizing assets type along with bonds, deposits, vehicles and valuables due to their low rank correlation with net wealth and higher importance for low net wealth households. At the margin, wealth invested in private businesses and secondary housing is found having strong disequalizing effects. Net wealth is found to be more equally distributed among homeowners compared to non-homeowners. The study identifies households that do not own their primary residence as a group subject to state support in the form of tax reliefs, more favorable mortgage conditions and state supervised consultations on the fair value of housing and optimal loan-to-value ratio for acquiring primary residence. International harmonization is found to be dependent primarily on the changes in country specific environments rather than changes in the composition of household characteristics. Overall the study makes apparent that homeownership status can serve as an important identification factor for targeted wealth equalization policies.

References

Ando, Albert and Franco Modigliani (1963). "The life cycle hypothesis of saving: Aggregated implications and tests", American Economic Review, 53, pp. 55-84.

Apgar, William and Zhu Xiao Di (2005). “Housing Wealth and Retirement Savings: Enhancing Financial Wealth for Older Americans.” W05-8. Joint Center for Housing Studies, Harvard University.

Atkinson, B. Anthony and Thomas Piketty, eds. (2007). Top Incomes over the Twentieth Century. Oxford University Press, Oxford.

Atkinson, B. Anthony (1970). "On the measurement of economic inequality", Journal of Economic Theory, 2 (3), pp. 244–263.

Azpitarte, Francisco (2010). "The Household Wealth Distribution in Spain: the Role of Housing and Financial Wealth", Hacienda Publica Española/Revista de Economia Publica, vol. 94, no. 3, pp. 65-90.

Banks, James, Richard Blundell and James Smith (2004). "Wealth Portfolios in the United Kingdom and the United States", NBER Chapters, in: Perspectives on the Economics of Aging, pp. 205-246

Bicakova, Alena and Eva M. Sierminska (2008). "Mortgage Market Maturity and Homeownership Inequality among Young Households: A Five-Country Perspective", SOEPpapers on Multidisciplinary Panel Data Research 90, DIW Berlin, The German Socio-Economic Panel (SOEP).

Bilias, Yannis, Dimitris Georgarakos and Michael Haliassos (2013). "Equity Culture and the Distribution of Wealth", Available at SSRN: http://ssrn.com/abstract=731805 or http://dx.doi.org/10.2139/ssrn.731805

Blinder, Alan (1973). "Wage Discrimination: Reduced Form and Structural Estimates", Journal of Human Resources, 8 (4): pp. 436–455.

Brandolini, Andrea, Luigi Cannari, Giovanni D’Alessio and Ivan Faiella (2004). “Household Wealth Distribution in Italy in the 1990s”, Bank of Italy, Economic Research Department, Working Paper No. 414.

Brown, Sarah and Karl Taylor (2008). "Household debt and financial assets: evidence from Germany, Great Britain and the USA", Journal of the Royal Statistical Society Series A, Royal Statistical Society, vol. 171(3), pp. 615-643.

Brownstone, David and Robert Valletta (2011). "The Bootstrap and Multiple Imputations: Harnessing Increased Computing Power for Improved Statistical Tests", Journal of Economic Perspectives, Vol.15, nr. 4, pp. 129–141.

Bushinsky, Moshe (1998). "Recent advances in quantile regression models", Journal of Human Resources, 33(1): pp. 88-126.

Camerer, Colin, George Loewenstein and Matthew Rabin, eds. (2004). Advances in Behavioral Economics. New York: Russell Sage Foundation. Princeton University Press.

Carroll, Christopher (2000). “Solving Consumption Models with Multiplicative Habits”, Economics Letters, 68(1), pp. 67–77.

Carroll, Christopher (2002). “Portfolios of the Rich”, in L. Guiso, M. Haliassos and T. Jappelli (eds.), Household Portfolios, pp. 1-24 Cambridge, Mass.: MIT Press.

Christelis, Dimitris, Dimitris Georgarakos, and Michael Haliassos (2013). “Differences in Portfolios Across Countries: Economic Environment versus Household Characteristics.” Review of Economics and Statistics, 95:1, pp. 220-236.

Cowell, Frank (2013). "UK Wealth Inquality in International Context" in Hills, J. (ed.) Wealth in the UK, Oxford University Press, Oxford.

Cowell, Frank (1977). Measuring Inequality, Philip Allan, Oxford.

Cowell, Frank, Eleni Karagiannaki and Abigail McKnight (2012). "Mapping and Measuring The Distribution of Household Wealth: A Cross-Country Analysis", GINI Discussion Paper, 71, University of Amsterdam.

Dalton, Hugh (1920). "The Measurement of the Inequality of Incomes", The Economic Journal, Vol. 30, No. 119, pp. 348-361.

Davies, James and Anthony Shorrocks (2000). “The Distribution of Wealth”, in A. B. Atkinson and F. Bourguignon (eds.), Handbook of Income Distribution, Vol. 1: 605-675. Amsterdam: North-Holland.

Davies, James B., Susanna Sandström, Anthony B. Shorrocks and Edward N. Wolff (2011). "The Level and Distribution of Global Household Wealth", The Economic Journal 121, pp.223-254.

Deaton, Agnus (1997). The Analysis of Household Surveys: A Microeconometric Approach to Development Policy (pp. 67-73). Johns Hopkins University Press.

Deininger, Klaus and Lyn Squire (1996). “A New Data Set Measuring Income Inequality”, World Bank Economic Review, 10(3), pp. 565–91.

Di, Zhu Xiao, Yi Yang and Xiaodong Liu (2003). "The Importance of Housing to the Accumulation of Household Net Wealth", Joint Center for Housing Studies at Harvard University, Working Paper W03-5.

ECB (2013). "The Eurosystem Household Finance and Consumption Survey Results from the first wave", Statistics Paper Series no 2.

ECB (2013a). "HFCS User Database Description", Doc.UDB1, April 2013.

Efron, Bradley (1979). "Bootstrap methods: another look at the jackknife", Annals of Statistics, 7: pp. 1-26.

Efron, Bradle (1982). The Jacknife, the Bootstrap and Other Resampling Plans, SIAM, Philadelphia, Pennsylvania.

Farris, Frank (2010). "The Gini Index and Measures of Inequality", American Mathematical Monthly, Volume 117, Number 10, pp. 851-864.

Feldstein, Martin (1974). "Social Security, induced retirement, and aggregate capital accumulation", Journal of Political Economy, 82: pp. 905-926.

Foster, James and Shneyerov Artyom (1999). "A general class of additively decomposable inequality measures", Economic Theory, 14, pp. 89–111.

Friedman, Martin (1957). A theory of the consumption function. Princeton, NJ: Princeton University Press.

Gan, Jie (2010). "Housing Wealth and Consumption Growth: Evidence from a Large Panel of Households", Review Of Financial Studies, 23(6), pp. 2229-2267.

Gini, Corrado (1912). Variabilità e Mutabilità. Bologna: Tipografia di Paolo Cuppin, pp. 76-87.

Gini, Corrado (1921). "Measurement of inequality and incomes", The Economic Journal 31, 124–126, pp. 37-87.

Gottschalk, Peter and Timothy M. Smeeding (1997). “Cross-National Comparisons of Earnings and Income Inequality”, Journal of Economic Literature, 35, pp. 633–687.

Gould, William (1992). "Quantile regression and bootstrapped standard errors", Stata Technical Bulletin, 9: pp. 19–21.

Guiso, Luigi, Michael Haliassos and Tullio Jappelli (2002). “Introduction”, in L. Guiso, M. Haliassos and T. Jappelli (eds.), Household Portfolios, pp. 1-24 Cambridge, Mass.: MIT Press.

Hall, Peter (1992). The Bootstrap and Edgeworth Expansion. New York: Springer Verlag.

Hall, Robert (1978). "Stochastic implications of the life-cycle permanent income hypothesis: Theory and evidence", Journal of Political Economy, 86, pp. 971-987.

Jann, Ben (2008). "OAXACA: Stata module to compute the Blinder-Oaxaca decomposition", Statistical Software Components S456936, Boston College Department of Economics, revised 25 Aug 2011.

Jantti, Markus, Eva Sierminska and Tim Smeeding (2008). ”The Joint Distribution of Household Income and Wealth: Evidence from the Luxembourg Wealth Study", OECD Social, Employment and Migration Working Papers 65, OECD Publishing.

Jenkins, Stephen (1990). "The distribution of wealth: measurement and models", Journal of Economic Surveys, Vol. 4, pp. 329-360.

Juster, Thomas and Kathleen Kuester (1991). Differences in the measurement of wealth, wealth inequality and wealth composition obtained from alternative U.S. wealth surveys, Review of Income and Wealth 37: pp. 33-62

Kennickell, Arthur B. (2003). "A Rolling Tide: Changes in the Distribution of Wealth in the U.S., 1989-2001", FEDS Working Paper No. 2003-24; Levy Economics Institute Working Paper No. 393.

Keynes, J. Maynard (1936). The general theory of employment, interest, and money. London: Macmillan.

Klevmarken, N. Anders (2006). "The Distribution of Wealth in Sweden: Trends and Driving factors", Working Paper Series 2006:4, Uppsala University, Department of Economics.

Koenker, Roger and Gilbert Basset (1982). "Robust Tests for Heteroscedasticity Based on Regression Quantiles," Econometrica, Econometric Society, vol. 50(1), pp. 43-61.

Koenker, Roger and Kevin Hallock (2001). "Quantile regression", Journal of Economic Perspectives, 15(4): pp. 143-156.

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

Kovar, J. G., J. N. K. Rao, and C. F. J. Wu (1988). “Bootstrap and other methods to measure errors in survey estimates”, The Canadian Journal of Statistics, Vol. 16. Issue Supplement S1, pp. 25–45.

Lambert, Peter and RichardAronson (1993). Inequality decomposition analysis and the Gini coeffcient revisited. Economic Journal, vol. 103, pp. 1221-27.

Lerman, Robert and Shlomo Yitzhaki (1985). "Income inequality effects by income source: A new approach and applications to the United States", Review of Economics and Statistics, 67(1): pp. 151-156.

Lindner, Peter (2011). "Decomposition of wealth and income using micro data from Austria", Oesterreichische Nationalbank Working paper Nr 173.

Little, Roderick and Donald Rubin (1987). Statistical Analysis with Missing Data. New York: John Wiley and Sons.

Lopez-Feldman, Alejandro (2006). "Decomposing inequality and obtaining marginal effects", Stata Journal, 6(1): pp. 106-111.

Lorenz, O. Max (1905). "Methods of measuring the concentration of wealth", Journal of the American Statistical Association. 9, pp. 209–219.

Lucas, Robert (1987). Models of business cycles. New York: Basil Blackwell.

Machado, José and José Mata (2005). “Counterfactual Decomposition of Changes in Wage Distributions Using Quantile Regression”, Journal of Applied Econometrics, 20(4), pp. 445-65.

McKernan, Signe-Mary, Caroline Ratcliffe and Trina Williams Shanks (2012). "Is Poverty Incompatible with Asset Accumulation?", in Philip N. Jefferson (Ed.), Oxford Handbook of the Economics of Poverty. Oxford, New York : Oxford University Press.

Milanovic, Branko (2002). "True World Income Distribution, 1988 and 1993: First Calculation Based on Household Surveys Alone", Economic Journal, 112: pp. 51-92.

Modigliani, Franco and Richard Brumberg (1954). "Utility analysis and the consumption function: An interpretation of cross-section data", in: K.K. Kurihara (ed.), Post-Keynesian Economics, pp. 388-436. New Brunswick, NJ: Rutgers University Press.

Montalto, Catherine Phillips and Jaimie Sung (1996). "Multiple Imputation In The 1992 Survey Of Consumer Finances", Financial Counseling and Planning, Vol. 7. pp. 133-46.

Mosteller, Frederick and John Tukey (1977). Data Analysis and Regression: A Second Course in Statistics. Reading, Mass.: Addison-Wesley.

Neumark, David (1988). "Employers' Discriminatory Behavior and the Estimation of Wage Discrimination", The Journal of Human Resources, 23: pp. 279–295.

Oaxaca, Ronald (1973). "Male-Female Wage Differentials in Urban Labor Markets", International Economic Review, 14 (3): pp. 693–709.

OECD (2011). "Income and Wealth", in How's Life?: Measuring Wellbeing, OECD Publishing.

OECD (2012). OECD Family Database, OECD, Paris (www.oecd.org/social/family/database)

Peichl, Andreas and Nico Pestel (2010). "Multidimensional Measurement of Richness: Theory and an Application to Germany", SOEPpapers on Multidisciplinary Panel Data Research 295, DIW Berlin, The German Socio-Economic Panel (SOEP).

Pence, Karen (2006). "The Role of Wealth Transformations: An Application to Estimating the Effect of Tax Incentives on Saving", The B.E. Journal of Economic Analysis & Policy, Vol. 5:1, article 20.

Pyatt, Graham (1976). "On the Interpretation and Disaggregation of Gini Coefficients", The Economic Journal, 86, (June), pp. 243-255.

Pyatt, Graham, Chau-nan Chen and John Fei (1980). "The Distribution of Income by Factor Components", Quarterly Journal of Economics, 95: pp. 451-473.

Rao, J. N. K, and C. F. J. Wu (1988). "Resampling inference with complex survey data", Journal of the American Statistical Association, Vol. 83, pp. 231–241.

Rao, J. N. K, C. F. J. Wu and K. Yue (1992). "Some recent work on resampling methods for complex surveys", Survey Methodology, Vol. 18, No. 2, pp. 209-217.

Rao, V. M. (1969). "Two Decompositions of Concentration Ratio", Journal of the Royal Statistical Society, Series A, 132: pp. 418-425.

Rogers, William (1992a). "Probability weighting", Stata Technical Bulletin, 8: pp. 15–17.

Rogers, William (1992b). "Quantile regression standard errors", Stata Technical Bulletin, 9: pp. 16–19.

Roussanov, Nikolai (2010). “Diversification and its Discontents: Idiosyncratic and Entrepreneurial Risk in the Quest for Social Status”, Journal of Finance, Vol. 65: 5, pp. 1755-1788.

Rubin, Donald (1987). Multiple Imputation for Nonresponse in Surveys. New York: John Wiley and Sons.

Shefrin, H. H. and Thaler, R. H. (1988). "The behavioral life-cycle hypothesis", Economic Inquiry, 26, pp. 609-643.

Shorrocks, Anthony (1983). “The Impact of Income Components on the Distribution of Family Incomes”, Quarterly Journal of Economics, 98: pp. 311-326.

Shorrocks, Anthony (1980). “A Class of Additively Decomposable Inequality Measures”, Econometrica, 48, pp. 613-625.

Sierminska, Eva and Timothy Smeeding (2005). “Measurement Issues: Equivalence Scales, Accounting Framework, and Reference Unit”, paper prepared for the LWS Workshop: “Construction and Usage of Comparable Microdata on Wealth: the LWS”, Banca de Italia, Perugia, Italy, 27-29 January.

Sierminska, Eva, Andrea Brandolini and Timothy Smeeding (2006). "The Luxembourg Wealth Study – A cross-country comparable database for household wealth research", Journal of Economic Inequality, Springer, vol. 4(3), pp. 375-383.

Skinner, Jonathan and Stephen P. Zeldes (2002). "The Importance of Bequests and Life-Cycle Saving in Capital Accumulation: A New Answer", American Economic Review, American Economic Association, vol. 92(2), pp. 274-278.

Spant, Roland (1987). “Wealth distribution in Sweden: 1920-1983”, in E. N. Wolff (ed.) International Comparisons of the Distribution of Household Wealth. Oxford: Clarendon Press.

Stark, Oded, Edward Taylor and Shlomo Yitzhaki (1986). "Remittances and inequality", Economic Journal, 96: pp. 722–740.

Theil, Henri (1967). Economics and Information Theory. Amsterdam: North-Holland.

Waldenström, Daniel (2008). "Why Should Inequality Researchers Care about the Rich?", IFC Bulletin, No. 28, pp. 421-427.

York, E. Anne and Marilyn Dutton. “Religious Beliefs and Wealth Accumulation.” Journal of Business and Economic Research, 10 (2012), pp. 407-418.

Ziegelmeyer, Michael (2012). “Nursing home residents make a difference - The overestimation of saving rates at older ages”, Economics Letters, 117(5): pp. 569–572.

Appendix 1

Table 1. Summary table of preceding studies on wealth.

Author	Published	Database	Coverage	Reference date
Spant	1987	Tax returns	SE	1920 to 1983
Kennickell	2003	SCF, Forbes	US	1989 to 2001
Brandolini, Cannari, D'Alessio, Faiella	2004	SHIW	IT	The 1990s
Sierminska, Brandofin and Smeeding	2006	LWS	CA, FI, IT, SE, US	1999-2002
Brown and Taylor	2008	BHPS, GSEP, PSID,	DE, GB,US	2000, 2002, 2001
Azpitarte	2010	EFF	ES	2002
Davies, Sandstrom, Shorrocks and Wolff	2011	HBS and sample survey estimates	Global	2000
Cowell	2011	LWS	UK, CA, US, SE	CA(1999), SE (2002), the UK, US (2000)
Lindner	2011	HSFW and EU-SILC	AT	2004
Cowell, Karagiannaki, McKnight	2012	LWS, BHPS, SCF, PSID, SHIW, HWS, HINK/HEK	UK, US, IT, FI, SE	Mid-1990s - the mid- 2000s
Bilias, Georgarakos and Haliassos	2013	SCF	US	2000s
Christelis, Georgarakos and Haliassos	2013	HRS, ELSA, SHARE	US, EU12	2004-2005

Note: Abbreviations:
Household balance sheet (HBS), Household Wealth Survey (HWS), Survey of Consumer Finances (SCF), Health and Retirement Study HRS), Luxembourg Wealth Study (LWS), British Household Panel Survey (BHPS), German Socio-economic Panel (GSEP), Panel Study of Income Dynamics (PSID), Spanish Survey of Household Finances (EFF), English Longitudinal Study of Aging (ELSA), Swedish Household Income Survey (HINK/HEK), Survey of Households Income and Wealth (SHIW), the survey on financial wealth from the OeNB (HSFW), European Union Statistics on Income and Living Conditions (EU-SILC), European countries the Survey of Health, Aging and Retirement in Europe (SHARE).
Source: Compiled by the author based on the corresponding papers.

Table 2. HFCS reference periods.

Country	Fieldwork	Assets & Liabilities	Income
Belgium	04/10 – 10/10	Time of interview	2009
Germany	09/10 – 07/11	Time of interview	2009
Greece	6/09 – 9/09	Time of interview	Last 12 months
Spain	11/08 – 07/09	Time of interview	2009
France	10/09 – 02/10	Time of interview	2009
Italy	01/11 – 08/11	31/12/2010	2009
Cyprus	04/10 – 01/11	Time of interview	2009
Luxembourg	09/10 – 04/11	Time of interview	2009
Malta	10/10 – 02/11	Time of interview	Last 12 months
Netherlands	04/10 – 12/10	31/12/2009	2009
Austria	09/10 – 05/11	Time of interview	2009
Portugal	04/10 – 07/10	Time of interview	2009
Slovenia	10/10 – 12/10	Time of interview	2009
Slovakia	09/10 – 10/10	Time of interview	Last 12 months
Finland	01/10 – 05/10	31/12/2009	2009

Source: ECB, 2013

Appendix 2

Variance estimation for 5 implicates and 1000 replicate weights.

1000 Rescaled Bootstrap Weights

$$V_*(Y) = \frac{1}{1000-1}\sum_{b=1}^{1000}(Y_{*b} - \overline{Y_*})^2$$

5 Implicates

$$W = \frac{1}{5}\sum_{i=1}^{5} V_{*i}(Y) \qquad B = \frac{1}{4}\sum_{i=1}^{5}(\overline{Y_{*i}} - \overline{Y})^2$$

Final Variance

$$V(Y) = W + \frac{6}{5}B$$

Source: Rao and Wu (1988), Rao, Wu and Yue (1992), Rubin (1987), ECB (2013a).

Appendix 3

Table 3. Breakdown of net wealth by component (S_i).

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
Main residence	47%	56%	36%	47%	60%	67%	53%	60%	63%	58%	46%	91%	53%	70%	77%	56%
Other real estate	12%	13%	39%	23%	26%	27%	22%	30%	17%	34%	17%	10%	26%	14%	7%	21%
Private business	25%	5%	24%	15%	11%	4%	10%	5%	9%	3%	24%	3%	13%	10%	5%	11%
Valuables and vehicles	5%	3%	2%	5%	3%	6%	5%	5%	5%	4%	3%	5%	5%	4%	6%	5%
Bonds and deposits	13%	17%	4%	12%	6%	10%	8%	6%	7%	6%	9%	15%	10%	4%	7%	9%
Shares, mutual funds	3%	8%	1%	4%	2%	7%	4%	0%	2%	3%	2%	4%	2%	1%	0%	3%
Voluntary pension	2%	5%	3%	6%	2%	2%	8%	1%	1%	2%	2%	19%	1%	1%	1%	5%
Other fin. assets	1%	1%	0%	1%	1%	0%	1%	0%	0%	0%	0%	1%	1%	0%	0%	1%
Mortgage	-5%	-8%	-9%	-12%	-10%	-16%	-8%	-6%	-3%	-10%	-3%	-40%	-10%	-1%	-3%	-10%
Other debt	-1%	-1%	-2%	-2%	-2%	-6%	-3%	-2%	-1%	-1%	-1%	-8%	-1%	-2%	-1%	-2%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Note:
Net wealth is estimated as a sum of all real and financial assets minus outstanding liabilities
Private business includes values of private self-employed and private non self-employed business.
Other financial assets include money owned to household and other financial assets.
Voluntary pension also includes whole life insurance, but excludes public and occupational pension wealth.
Shares, mutual funds also include managed accounts
Other debt includes outstanding balances on credit lines or overdrafts, outstanding balance of credit cards for which the owner of the card is charged interest, and outstanding balances on all other loans (car loans, consumer loans, instalment loans, private loans from relatives, friends, employers etc.)
Source: Own calculations based on HFCS data.

Table 4. Gini coefficients for each component of net wealth and total Gini (G_i).

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ15
Main residence	0.72	0.51	0.55	0.73	0.46	0.56	0.62	0.52	0.58	0.55	0.49	0.56	0.56	0.48	0.42	0.62
Other real estate	0.96	0.92	0.82	0.94	0.85	0.85	0.90	0.84	0.91	0.91	0.86	0.97	0.92	0.90	0.94	0.91
Private business	0.98	0.98	0.96	0.99	0.97	0.99	0.98	0.96	0.97	0.99	0.98	0.98	0.99	0.97	0.98	0.98
Valuables and vehicles	0.68	0.69	0.58	0.70	0.65	0.66	0.70	0.66	0.55	0.64	0.66	0.63	0.72	0.69	0.68	0.67
Bonds and deposits	0.71	0.82	0.82	0.71	0.79	0.73	0.69	0.81	0.73	0.72	0.61	0.70	0.79	0.84	0.72	0.74
Shares, mutual funds	0.97	0.95	0.95	0.94	0.97	0.94	0.96	0.99	0.97	0.94	0.93	0.94	0.98	0.91	0.99	0.96
Voluntary pension	0.95	0.83	0.85	0.84	0.93	0.93	0.92	0.98	0.91	0.87	0.89	0.73	0.96	0.93	0.93	0.90
Other fin. assets	0.98	0.99	0.97	0.95	0.99	.	0.98	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.97	0.98
Mortgage	-0.93	-0.83	-0.78	-0.89	-0.83	-0.82	-0.88	-0.91	-0.94	-0.81	-0.93	-0.73	-0.85	-0.95	-0.94	-0.88
Other debt	-0.95	-0.93	-0.82	-0.90	-0.89	-0.85	-0.92	-0.90	-0.95	-0.87	-0.92	-0.88	-0.94	-0.87	-0.94	-0.92
Total	**0.76**	**0.61**	**0.70**	**0.76**	**0.58**	**0.66**	**0.68**	**0.56**	**0.61**	**0.66**	**0.60**	**0.65**	**0.67**	**0.53**	**0.45**	**0.68**

Note:
Net wealth is estimated as a sum of all real and financial assets minus outstanding liabilities
Private business includes values of private self-employed and private non self-employed business.
Other financial assets include money owned to household and other financial assets.
Voluntary pension also includes whole life insurance, but excludes public and occupational pension wealth.
Shares, mutual funds also include managed accounts
Other debt includes outstanding balances on credit lines or overdrafts, outstanding balance of credit cards for which the owner of the card is charged interest, and outstanding balances on all other loans (car loans, consumer loans, instalment loans, private loans from relatives, friends, employers etc.)
Source: Own calculations based on HFCS data.

Table 5. Rank correlation of net wealth components with total net wealth (R_i).

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ15
Main residence	0.90	0.84	0.79	0.88	0.81	0.79	0.86	0.82	0.92	0.87	0.85	0.70	0.81	0.89	0.90	0.86
Other real estate	0.86	0.83	0.90	0.88	0.84	0.86	0.88	0.86	0.87	0.90	0.86	0.79	0.91	0.82	0.75	0.86
Private business	0.97	0.89	0.94	0.96	0.90	0.92	0.91	0.73	0.87	0.89	0.97	0.53	0.95	0.93	0.90	0.92
Valuables and vehicles	0.67	0.57	0.55	0.67	0.50	0.56	0.70	0.49	0.58	0.66	0.59	0.50	0.60	0.54	0.58	0.62
Bonds and deposits	0.77	0.85	0.63	0.77	0.69	0.66	0.67	0.68	0.70	0.68	0.55	0.65	0.73	0.60	0.53	0.71
Shares, mutual funds	0.80	0.87	0.77	0.77	0.82	0.85	0.85	0.76	0.82	0.82	0.71	0.78	0.83	0.63	0.68	0.80
Voluntary pension	0.60	0.55	0.59	0.69	0.68	0.66	0.82	0.68	0.50	0.50	0.57	0.53	0.68	0.58	0.42	0.64
Other fin. assets	0.59	0.74	0.45	0.64	0.69	.	0.67	0.42	0.53	0.64	0.64	0.71	0.58	0.48	0.49	0.63
Mortgage	-0.25	-0.11	-0.33	-0.42	-0.01	0.02	-0.33	-0.12	-0.21	-0.12	-0.30	-0.08	-0.19	-0.07	0.05	-0.23
Other debt	0.35	0.21	-0.08	0.10	-0.06	-0.11	-0.22	-0.12	-0.25	0.08	-0.17	0.43	-0.05	-0.03	0.02	-0.01
Net wealth	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

Note:
Net wealth is estimated as a sum of all real and financial assets minus outstanding liabilities
Private business includes values of private self-employed and private non self-employed business.
Other financial assets include money owned to household and other financial assets.
Voluntary pension also includes whole life insurance, but excludes public and occupational pension wealth.
Shares, mutual funds also include managed accounts
Other debt includes outstanding balances on credit lines or overdrafts, outstanding balance of credit cards for which the owner of the card is charged interest, and outstanding balances on all other loans (car loans, consumer loans, instalment loans, private loans from relatives, friends, employers etc.)
Source: Own calculations based on HFCS data.

Table 6. Absolute contributions to total Gini ($S_i G_i R_i$).

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
Main residence	0.31	0.24	0.16	0.30	0.22	0.30	0.28	0.26	0.34	0.28	0.19	0.36	0.24	0.30	0.29	0.30
Other real estate	0.10	0.10	0.29	0.19	0.19	0.20	0.17	0.22	0.13	0.28	0.13	0.07	0.21	0.11	0.05	0.17
Private business	0.24	0.05	0.22	0.14	0.09	0.04	0.09	0.04	0.08	0.03	0.22	0.02	0.12	0.09	0.05	0.10
Valuables and vehicles	0.02	0.01	0.01	0.02	0.01	0.02	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02
Bonds and deposits	0.07	0.12	0.02	0.07	0.03	0.05	0.04	0.03	0.04	0.03	0.03	0.07	0.06	0.02	0.02	0.05
Shares, mutual funds	0.02	0.06	0.01	0.03	0.02	0.06	0.03	0.00	0.02	0.03	0.01	0.03	0.01	0.00	0.00	0.03
Voluntary pension	0.01	0.02	0.01	0.04	0.01	0.01	0.06	0.00	0.00	0.01	0.01	0.08	0.01	0.01	0.00	0.03
Other fin. assets	0.00	0.01	0.00	0.01	0.01	.	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Mortgage	-0.01	-0.01	-0.02	-0.05	-0.00	0.00	-0.02	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.00	0.00	-0.02
Other debt	0.00	0.00	-0.00	0.00	-0.00	-0.01	-0.01	-0.00	-0.00	0.00	-0.00	0.03	-0.00	-0.00	0.00	-0.00
Total	**0.76**	**0.61**	**0.70**	**0.76**	**0.58**	**0.66**	**0.68**	**0.56**	**0.61**	**0.66**	**0.60**	**0.65**	**0.67**	**0.53**	**0.45**	**0.68**

Note:
Net wealth is estimated as a sum of all real and financial assets minus outstanding liabilities
Private business includes values of private self-employed and private non self-employed business.
Other financial assets include money owned to household and other financial assets.
Voluntary pension also includes whole life insurance, but excludes public and occupational pension wealth.
Shares, mutual funds also include managed accounts
Other debt includes outstanding balances on credit lines or overdrafts, outstanding balance of credit cards for which the owner of the card is charged interest, and outstanding balances on all other loans (car loans, consumer loans, instalment loans, private loans from relatives, friends, employers etc.)
Source: Own calculations based on HFCS data.

Table 7. Marginal contributions to Gini coefficients.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
Main residence	-0.06	-0.17	-0.14	-0.07	-0.21	-0.22	-0.11	-0.14	-0.08	-0.16	-0.14	-0.36	-0.17	-0.14	-0.12	-0.12
Other real estate	0.01	0.03	0.02	0.02	0.06	0.03	0.04	0.09	0.05	0.08	0.04	0.02	0.06	0.06	0.04	0.03
Private business	0.06	0.02	0.07	0.04	0.05	0.01	0.03	0.01	0.03	0.01	0.13	-0.01	0.05	0.07	0.05	0.04
Valuables and vehicles	-0.02	-0.01	-0.01	-0.02	-0.02	-0.03	-0.01	-0.02	-0.02	-0.02	-0.01	-0.03	-0.02	-0.01	-0.01	-0.02
Bonds and deposits	-0.03	0.02	-0.01	-0.03	-0.00	-0.03	-0.02	-0.00	-0.01	-0.02	-0.04	-0.05	-0.01	-0.00	-0.01	-0.02
Shares, mutual funds	0.00	0.03	0.00	-0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00
Voluntary pension	-0.00	-0.01	-0.01	-0.02	0.00	-0.00	0.01	0.00	-0.00	-0.01	-0.00	-0.08	-0.00	0.00	-0.00	-0.01
Other fin. assets	-0.00	0.00	-0.00	-0.00	0.00	.	-0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	-0.00
Mortgage	0.04	0.07	0.06	0.06	0.09	0.17	0.05	0.05	0.02	0.09	0.01	0.36	0.08	0.01	0.04	0.07
Other debt	0.01	0.01	0.01	0.02	0.01	0.05	0.02	0.01	0.01	0.01	0.01	0.13	0.01	0.02	0.01	0.02

Note:
Net wealth is estimated as a sum of all real and financial assets minus outstanding liabilities
Private business includes values of private self-employed and private non self-employed business.
Other financial assets include money owned to household and other financial assets.
Voluntary pension also includes whole life insurance, but excludes public and occupational pension wealth.
Shares, mutual funds also include managed accounts
Other debt includes outstanding balances on credit lines or overdrafts, outstanding balance of credit cards for which the owner of the card is charged interest, and outstanding balances on all other loans (car loans, consumer loans, instalment loans, private loans from relatives, friends, employers etc.)
Source: Own calculations based on HFCS data.

Table 8. Gini decomposition by homeownership status.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
Between	0.40	0.24	0.18	0.42	0.13	0.29	0.35	0.21	0.26	0.27	0.17	0.31	0.22	0.16	0.09	0.31
Overlap	0.30	0.33	0.47	0.28	0.41	0.33	0.29	0.31	0.33	0.36	0.39	0.24	0.40	0.36	0.35	0.32
Within	0.04	0.03	0.03	0.02	0.02	- 0.02	0.03	0.01	0.01	0.02	0.02	0.00	0.04	- 0.00	- 0.00	0.02
Gini (excl. <0)	**0.73**	**0.59**	**0.68**	**0.72**	**0.56**	**0.60**	**0.66**	**0.53**	**0.60**	**0.64**	**0.59**	**0.55**	**0.65**	**0.51**	**0.44**	**0.65**

Note: The estimates refer to non-negative wealth levels.
Homeowners defined as households that own main residence.
Source: Own calculations based on HFCS data.

Table 9. Gini coefficient within groups.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
Non-homeowners	0.81	0.84	0.82	0.76	0.84	0.77	0.81	0.76	0.75	0.79	0.77	0.62	0.82	0.79	0.76	0.78
Homeowners	0.58	0.48	0.63	0.57	0.50	0.49	0.50	0.44	0.48	0.55	0.52	0.41	0.58	0.45	0.40	0.53

Note: The estimates refer to non-negative wealth levels.
Homeowners defined as households that own main residence.
Source: Own calculations based on HFCS data.

Appendix 4

Table 10. Average household size and HFCS survey sampling size.

	AT	BE	CY	DE	ES	FI	FR	GR
Sampled HH	2 380	2 327	1 237	3 565	6 197	10 989	15 006	2 971
Sum of weights	3 773 956	4 692 601	303 242	39 673 000	17 017 706	2 531 500	27 860 408	4 114 150
Average HH size	2.1	2.3	2.8	2.0	2.7	2.1	2.2	2.6
	IT	**LU**	**MT**	**NL**	**PT**	**SI**	**SK**	**EZ**
Sampled HH	7 951	950.00	843.00	1 301	4 404	343.00	2 057	62 521
Sum of weights	23 817 962	186 440	143 677	7 386 144	3 932 010	777 777	1 911 664	138 122 237
Average HH size	2.5	2.5	2.9	2.2	2.7	2.6	2.8	2.3

Source: Own calculations based on HFCS data

Table 11. Share of households with negative wealth.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
HH with wealth<0	5.3%	2.7%	2.8%	7.4%	3.5%	10.6%	3.9%	2.6%	1.4%	3.8%	0.8%	11.7%	2.6%	2.0%	1.2%	4.8%

Source: Own calculations based on HFCS data

Table 12. Financial burden indicators.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
Debt/asset of indebted HH	16.7	18.2	17.0	28.4	17.9	34.6	18.9	14.8	11.7	18.2	6.2	41.3	25.7	3.9	6.6	21.8
Debt/income of indebted HH	35.6	79.8	157.0	37.3	113.5	64.3	50.4	47.2	50.3	86.9	52.0	194.1	134.0	26.6	22.7	62.0
Debt service to income ratio[a]	2.9	13.8	22.5	6.7	19.2	.	13.1	9.4	10.6	15.7	8.4	12.6	16.0	11.0	9.0	11.1
Mortgage service/income ratio[b]	4.6	14.8	5.3	12.8	20.5	11.9	17.4	16.4	15.5	16.3	12.8	14.2	16.7	11.7	20.4	15.9
Loan /value of main residence	18.7	28.8	31.9	41.9	31.0	48.6	32.4	31.6	30.0	27.5	19.9	52.5	41.4	5.4	37.3	37.3

Note:
a - Debt service to income ratio, all indebted households
b- *Mortgage debt service to income ratio* of households with mortgage debt
Source: Eurosystem Household Finance and Consumption Survey (2013)

Table 13. Mean net wealth, total assets and total liabilities in EUR thousands.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ15
Total assets	281.8	368.9	742	222.2	324	197.9	258.3	159.7	287	791.9	378.2	252.1	170.3	154	83	257.4
	(49.8)	**(12.0)**	**(57.7)**	**(12.1)**	**(9.4)**	**(1.9)**	**(5.9)**	**(5.1)**	**(8.0)**	**(59.1)**	**(52.2)**	**(6.3)**	**(8.3)**	**(11.6)**	**(2.0)**	**(4.3)**
Total liabilities	47	67.5	108.7	57	65.2	60.8	53.1	32.6	46.8	140.2	35.8	124.6	46.2	11.9	12.4	60.8
	(11.3)	**(3.0)**	**(6.1)**	**(2.9)**	**(3.0)**	**(0.7)**	**(1.5)**	**(1.8)**	**(2.2)**	**(8.4)**	**(3.9)**	**(6.4)**	**(1.8)**	**(1.8)**	**(0.9)**	**(1.2)**
Net wealth	265	338.6	670.9	195.2	291.4	161.5	233.4	147.8	275.2	710.1	366	170.2	152.9	148.7	79.7	230.8
	(47.9)	**(11.8)**	**(56.5)**	**(11.9)**	**(9.2)**	**(1.9)**	**(5.8)**	**(5.0)**	**(8.1)**	**(58.2)**	**(51.8)**	**(6.2)**	**(8.1)**	**(11.5)**	**(2.0)**	**(4.2)**

Note: Standard errors are shown in parenthesis below their corresponding figure.
Source: ECB, 2013

Table 14. Median net wealth, total assets and total liabilities in EUR thousands.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ15
Total assets	92.8	249.9	331.9	67.9	210.2	132.7	150.4	110.2	188	494.4	227.4	217.3	93.2	105.2	64.4	142
	(9.7)	**(8.6)**	**(17.1)**	**(5.0)**	**(5.3)**	**(2.1)**	**(3.2)**	**(2.6)**	**(4.6)**	**(19.9)**	**(10.8)**	**(9.0)**	**(3.0)**	**(10.4)**	**(1.3)**	**(2.1)**
Total liabilities	13.8	39.3	60.2	12.6	36	29.4	28.4	14.6	15	73.4	15.7	89.1	31.7	4.3	3.2	21.5
	(3.2)	**(4.1)**	**(5.4)**	**(1.2)**	**(2.6)**	**(0.9)**	**(1.1)**	**(1.6)**	**(1.7)**	**(8.8)**	**(2.4)**	**(6.1)**	**(2.7)**	**(1.4)**	**(0.7)**	**(1.0)**
Net wealth	76.4	206.2	266.9	51.4	182.7	85.8	115.8	101.9	173.5	397.8	215.9	103.6	75.2	100.7	61.2	109.2
	(11.0)	**(7.0)**	**(17.3)**	**(3.2)**	**(3.8)**	**(2.1)**	**(4.0)**	**(2.5)**	**(3.9)**	**(17.1)**	**(11.1)**	**(8.1)**	**(3.0)**	**(11.3)**	**(1.7)**	**(1.9)**

Note: Standard errors are shown in parenthesis below their corresponding figure.
Source: ECB, 2013

Table 15. Distribution of net wealth according to percentiles.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
Top 1%	23%	13%	19%	25%	15%	12%	18%	9%	14%	22%	21%	9%	21%	9%	8%	18%
Top 5%	48%	32%	43%	46%	31%	31%	37%	26%	32%	40%	36%	26%	41%	25%	22%	37%
Top 10%	61%	44%	57%	59%	44%	45%	50%	39%	45%	51%	47%	40%	53%	37%	33%	50%
Bottom 90%	39%	56%	43%	41%	56%	55%	50%	61%	55%	49%	53%	60%	47%	63%	67%	50%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Own calculations based on HFCS data.

Table 16. Percentile ratios.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
p90/p50	7.1	3.4	5.5	8.6	3.3	4.6	4.4	3.3	3.3	3.5	3.2	4.1	4.0	3.2	2.5	4.6
p75/p25	24.3	10.4	6.8	31.8	4.3	34.5	28.5	6.4	9.4	12.5	4.5	18.5	8.7	5.2	2.7	17.3

Source: Own calculations based on HFCS data

Table 17. Inequality measures for positive and negative values of net wealth.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
GE (2) HSCV	4.47	1.33	3.07	5.76	8.28	1.84	6.51	0.82	1.83	3.31	6.10	0.98	7.10	0.69	0.56	5.17
Gini	0.76	0.61	0.70	0.76	0.58	0.66	0.68	0.56	0.61	0.66	0.60	0.65	0.67	0.53	0.45	0.68

Note : GE(a) is more sensitive to the changes in the upper tail of distribution as (a) increases; Source: Own calculations based on HFCS data

Table 18. Inequality measures for non-negative values of net wealth.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ 15
GE(0) MLD	1.58	1.09	1.09	1.54	0.81	1.17	1.35	0.80	1.01	1.23	0.88	0.82	1.17	0.69	0.47	1.23
GE (1) Theil	1.22	0.69	0.99	1.21	0.71	0.71	0.98	0.51	0.73	0.96	0.92	0.53	1.04	0.47	0.36	0.93
GE (2) HSCV	4.11	1.26	2.86	5.14	7.86	1.54	6.20	0.74	1.76	3.14	6.00	0.70	6.74	0.63	0.54	4.80
Gini	0.73	0.59	0.68	0.72	0.56	0.60	0.66	0.53	0.60	0.64	0.59	0.55	0.65	0.51	0.44	0.65

Note : GE(a) is more sensitive to the changes in the upper tail of distribution as (a) increases; Source: Own calculations based on HFCS data

Table 19. Breakdown of households according to the age of household head by country.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ
Under 25	3%	2%	0%	4%	0%	6%	4%	3%	0%	1%	.	2%	1%	1%	1%	**2%**
25-34	13%	13%	15%	13%	10%	15%	14%	10%	7%	14%	.	11%	8%	10%	10%	**11%**
35-44	17%	19%	18%	16%	21%	15%	19%	18%	18%	21%	.	21%	19%	14%	16%	**18%**
45-54	20%	20%	23%	21%	20%	18%	17%	16%	20%	22%	.	23%	18%	27%	23%	**20%**
55-64	19%	17%	18%	15%	16%	20%	19%	19%	17%	16%	.	21%	19%	20%	19%	**17%**
65-74	16%	13%	15%	17%	16%	13%	12%	18%	17%	15%	.	15%	17%	15%	21%	**16%**
75+	13%	15%	11%	14%	17%	13%	15%	17%	20%	10%	.	8%	18%	13%	10%	**16%**
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**.**	**100%**	**100%**	**100%**	**100%**	**100%**

Note: Age statistics on Malta is not reported in the survey.
Household head is defined as the oldest person in the household.
Source: Own calculations based on HFCS data.

Table 20. Breakdown of all household members by age and by country.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ
Under 25	25%	29%	31%	25%	26%	29%	32%	25%	26%	30%	.	31%	26%	25%	30%	**27%**
25-34	12%	13%	17%	11%	16%	13%	12%	16%	11%	14%	.	11%	13%	14%	14%	**12%**
35-44	15%	15%	12%	15%	17%	13%	14%	15%	16%	16%	.	14%	17%	14%	14%	**15%**
45-54	16%	14%	15%	16%	14%	14%	12%	13%	15%	14%	.	15%	13%	20%	16%	**15%**
55-64	15%	12%	12%	12%	11%	15%	14%	13%	12%	11%	.	13%	13%	12%	12%	**12%**
65-74	11%	9%	8%	12%	9%	9%	8%	10%	11%	9%	.	10%	10%	9%	10%	**10%**
75+	7%	9%	5%	8%	8%	8%	8%	8%	10%	5%	.	5%	8%	6%	4%	**8%**
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**.**	**100%**	**100%**	**100%**	**100%**	**100%**

Note: Sampling weights are the same for all members of each household. Age statistics on Malta is not reported in the survey.
Source: Own calculations based on HFCS data.

Table 21. Mean net wealth breakdown by age of household head in EUR thousands.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK	EZ
Under 25	11	12	169	16	1	10	15	17	53	20	.	-12	11	3	6	15
25-34	72	101	293	45	113	42	74	74	102	165	.	57	62	118	44	71
35-44	248	246	650	167	201	137	187	140	200	438	.	116	119	170	86	181
45-54	347	372	984	219	329	195	266	191	289	832	.	176	144	170	88	257
55-64	298	413	929	310	425	230	335	184	389	778	.	209	231	164	94	329
65-74	286	480	599	252	343	232	332	159	321	1,231	.	227	163	122	74	288
75+	337	448	257	194	299	174	246	128	253	936	.	277	148	120	83	241
Total	**265**	**339**	**671**	**195**	**291**	**162**	**233**	**148**	**275**	**710**	**366**	**170**	**153**	**149**	**80**	**231**

Note: Age statistics for Malta is not reported in the survey.
Household head is defined as the oldest person in the household.
Source: Own calculations based on HFCS data.

Figure 3. Mean net wealth for top and bottom age brackets of household head.

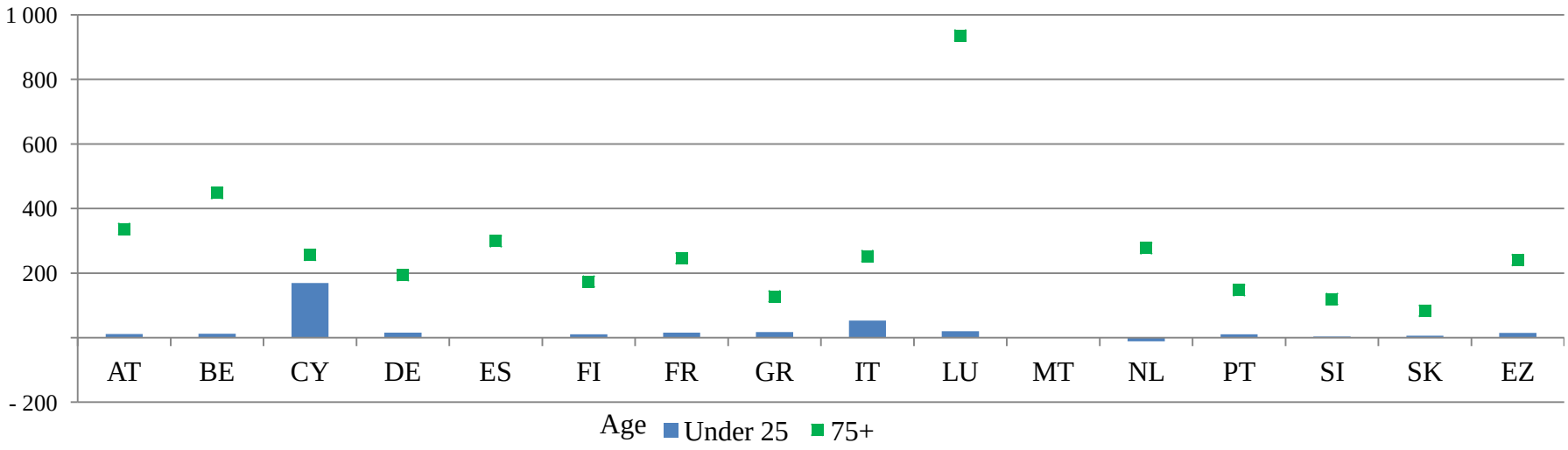
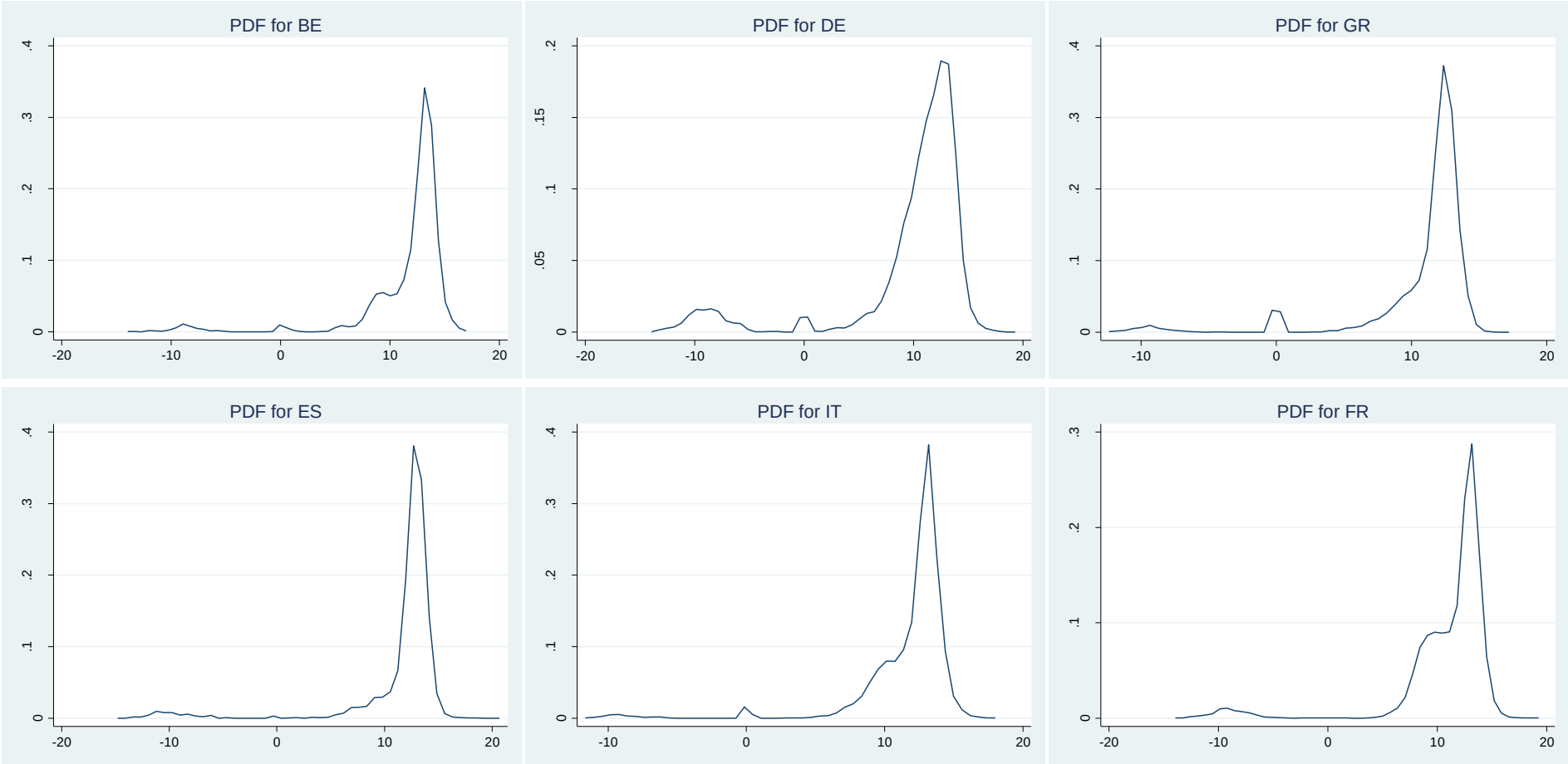
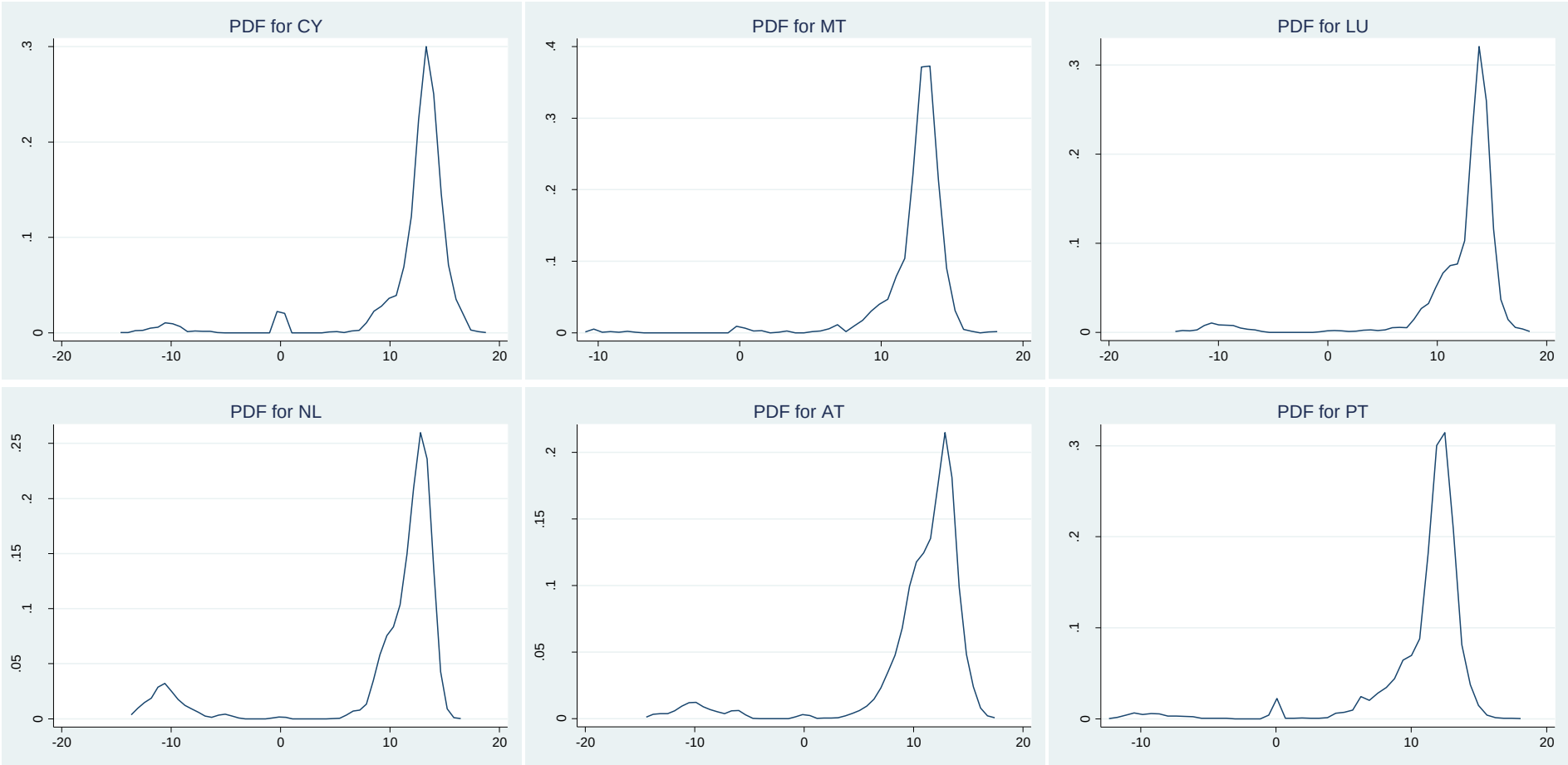
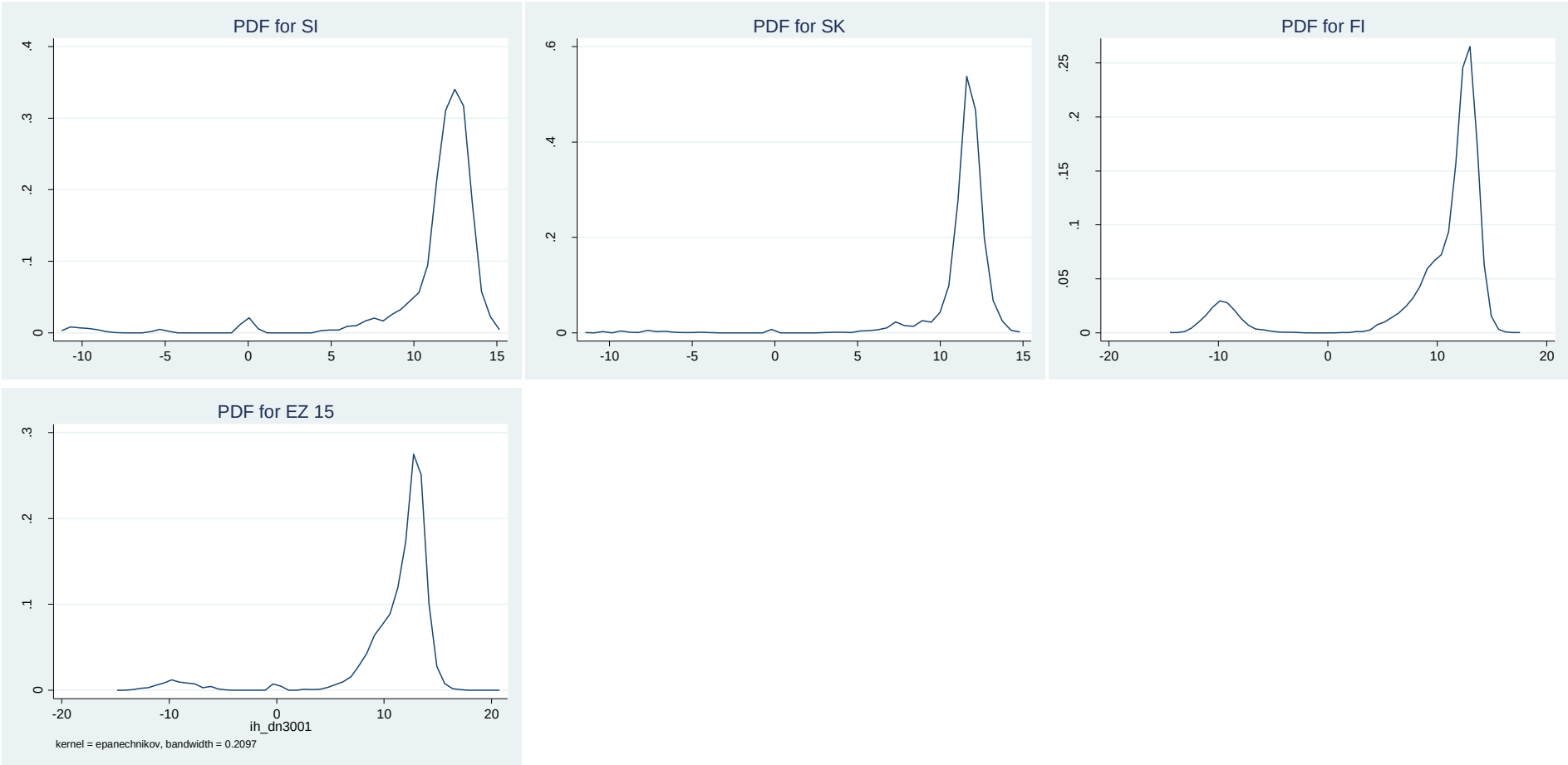


Figure 4. PDF of inverse hyperbolic sine transformation of net wealth.

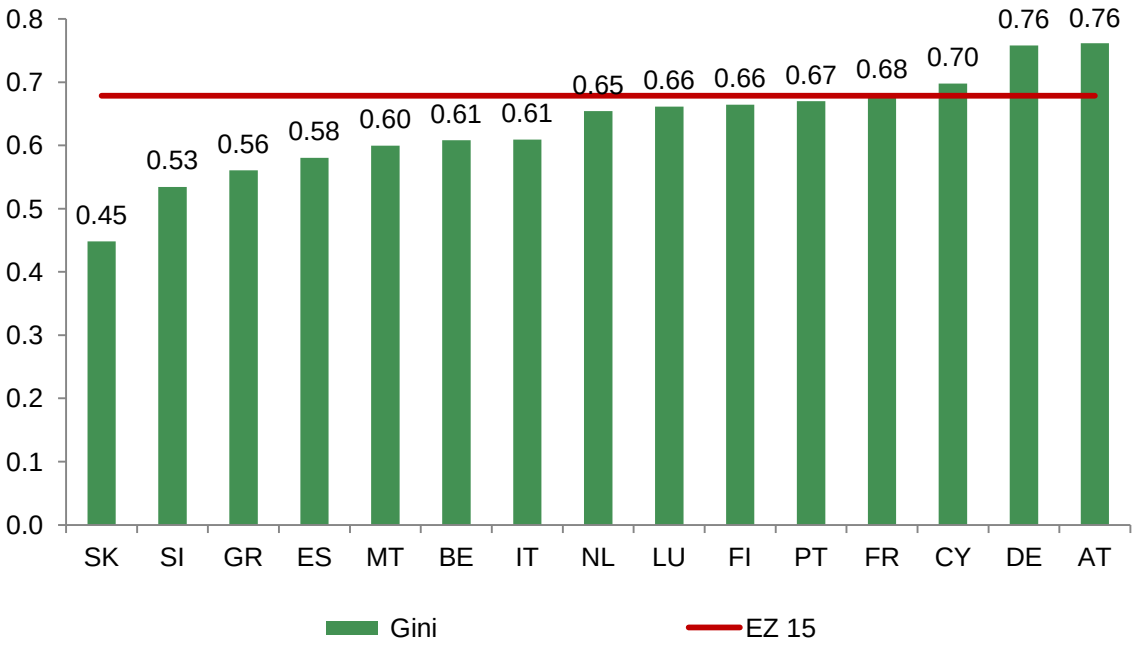



PDF for CY
PDF for MT
PDF for LU
PDF for NL
PDF for AT
PDF for PT



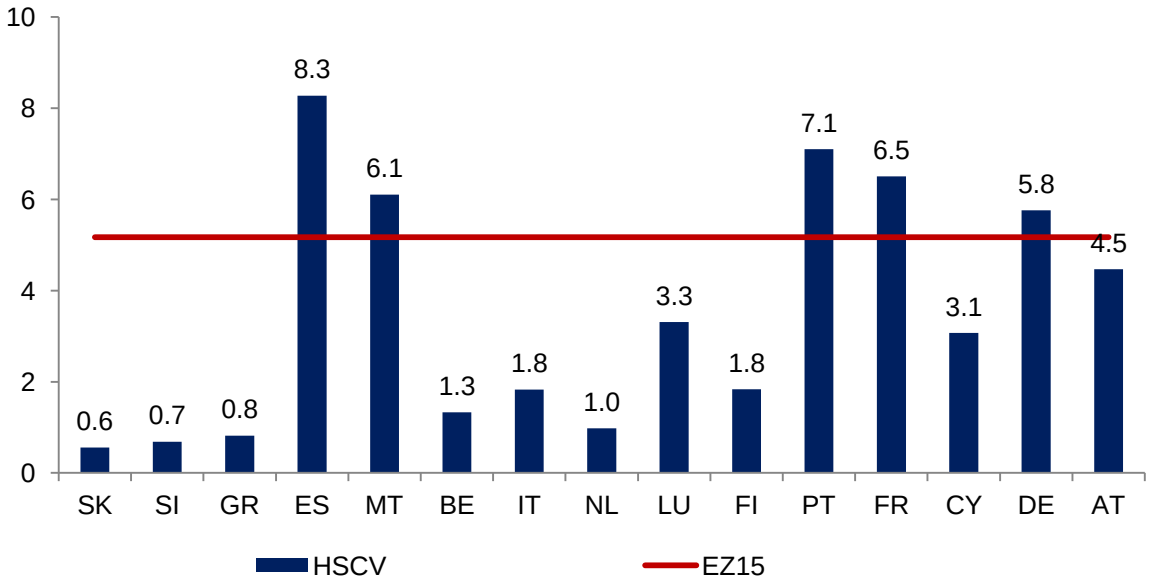
Source: Own calculations based on HFCS
Note: PDF – Probability Density Function

Figure 5. Gini coefficients of net wealth.



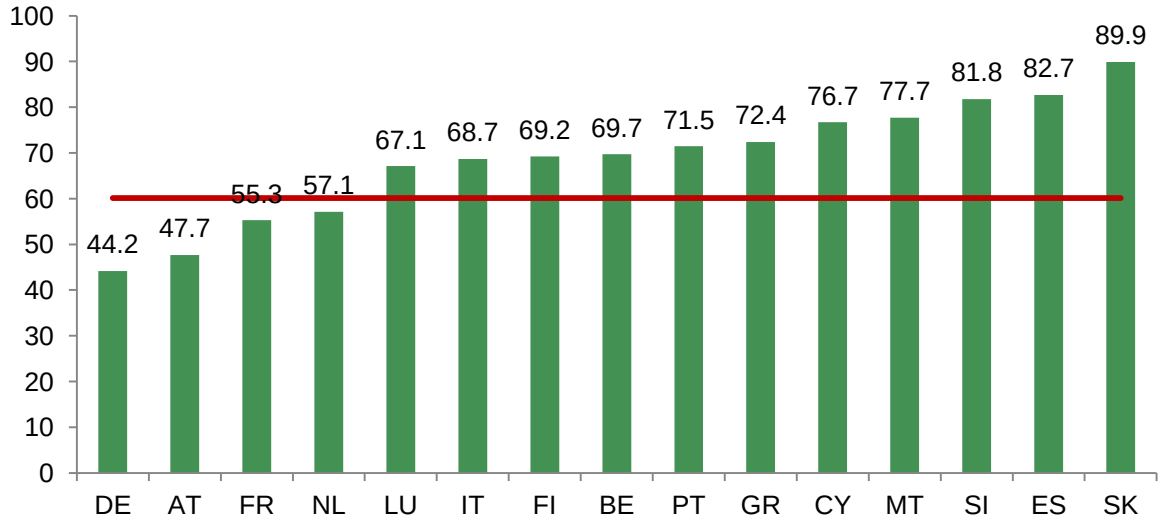
Note: Red horizontal line – value for EZ15.
Source: Own calculations based on HFCS

Figure 6. Half Squared Coefficient of variation (GE(2)) of net wealth.



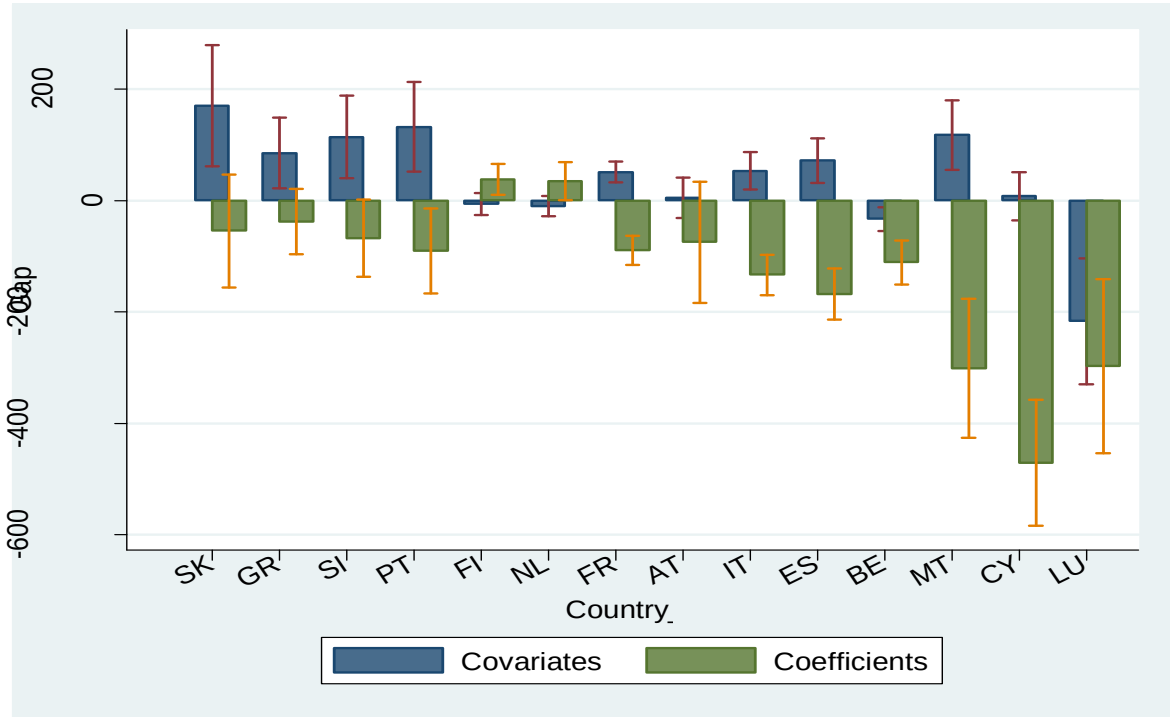
Note: Red horizontal line – value for EZ15 countries.
Source: Own calculations based on HFCS

Figure 7. Homeownership rates in %.



Note: Red horizontal line – value for EZ15.
Source: ECB (2013)

Figure 8. Counterfactual decomposition of net wealth levels.



Note: Germany serves as a base country.
Dependent variable – Net wealth in EUR thousands
Explanatory variables – household size, age, gross income, dummies for higher education, gender, marital status, employment status, being a foreigner, divorced or pensioner for household heads.
Confidence interval 95%
Y-axis represents a net wealth gap compared to Germany measured in EUR thousands.
Source: Own calculations based on HFCS data.

Appendix 5

Table 22. Quantile regressions of net wealth. 25th percentile.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK
Household size	-0.1	1.3	12.3	-8.1***	-76.0	-5.1	-30.7	0.6	-11.4	4.7	-2.1	2.4	-1.5	-0.7	0.6***
	(1)	**(2)**	**(8)**	**(3)**	**(47)**	**(4)**	**(43)**	**(1)**	**(17)**	**(12)**	**(3)**	**(8)**	**(1)**	**(1)**	**(0)**
Income	6.1***	4.7*	34.3***	12.1***	43.7***	14.9***	40.8***	9.8***	24.4***	16.7***	21.4***	5.5***	14.9***	9.7***	5.5***
	(1)	**(3)**	**(8)**	**(1)**	**(10)**	**(1)**	**(10)**	**(2)**	**(3)**	**(5)**	**(5)**	**(2)**	**(1)**	**(1)**	**(1)**
Age	0.1***	1.1***	1.9***	0.5**	-0.8	1.6***	1.1	-0.2***	-0.4	6.3	-	4.5***	0.3**	0.5***	0.1***
	(0)	**(0)**	**(1)**	**(0)**	**(3)**	**(1)**	**(2)**	**(0)**	**(1)**	**(5)**	**(-)**	**(1)**	**(0)**	**(0)**	**(0)**
College	9.6***	45.2***	48.1*	11.0**	288.0	-4.3	79.8	3.2	24.4	76.9	21.1	14.6	20.5***	32.6***	6.9***
	(2)	**(7)**	**(27)**	**(5)**	**(246)**	**(19)**	**(182)**	**(2)**	**(30)**	**(222)**	**(13)**	**(12)**	**(6)**	**(4)**	**(1)**
Unemployed	-1.9	4.0	27.6	3.2	-483.7**	16.6*	68.8	-17.8**	-11.6	19.1	-12.8	38.7	1.0	-9.2	-3.9*
	(2)	**(7)**	**(44)**	**(7)**	**(190)**	**(8)**	**(126)**	**(9)**	**(56)**	**(277)**	**(13)**	**(29)**	**(5)**	**(8)**	**(2)**
Foreigner	-8.2**	-20.8***	-16.6	-3.9	-	-6.5	-	-5.1*	-19.9	-72.1	-24.2	-	-5.6	2.0	-3.8***
	(4)	**(7)**	**(31)**	**(9)**	**(-)**	**(11)**	**(-)**	**(3)**	**(30)**	**(204)**	**(15)**	**(-)**	**(4)**	**(4)**	**(1)**
Homeowner	128.1***	188.9***	166.6***	140.8***	35.4	72.6***	128.9***	82.8***	123.5***	288.9**	138.5***	169.4***	57.0***	68.6***	38.1***
	(7)	**(7)**	**(13)**	**(9)**	**(164)**	**(8)**	**(61)**	**(3)**	**(43)**	**(123)**	**(4)**	**(10)**	**(3)**	**(3)**	**(0)**
Intercept	-17.3***	-74.4***	-224.1***	-42.6**	246.6	-120.9***	-112.5	-10.6**	10.9	-356.6	-18.6	-301.5***	-35.1***	-46.9***	-9.6***
	(4)	**(20)**	**(52)**	**(17)**	**(248)**	**(40)**	**(179)**	**(4)**	**(136)**	**(498)**	**(3)**	**(52)**	**(11)**	**(9)**	**(1)**

Note: Dependent variable - Net Wealth in 1 000 EUR.
Standard errors are shown in parenthesis below their corresponding figure.
College is a dummy variable that is equal to one if household head has higher education.
Unemployed is a dummy variable that is equal to one if household head is unemployed.
Foreigner is a dummy variable that is equal to one if household head immigrated to the country of residence.
Homeowner is a dummy variable that is equal to one if a household owns the primary residence.
Income is gross household income in 10 000 EUR.
*** Statistically significant at 1% significance level.
** Statistically significant at 5% significance level.
* Statistically significant at 10% significance level.
Source: Own calculations based on HFCS data.

Table 23. Quantile regressions of net wealth. 50th percentile.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK
Household size	-1.2	-1.8	21.2	-5.9	-7.4	-17.4	-7.2	-0.1	-4.9	-4.3	-3.4	8.5**	-2.5	3.8	1.6***
	(8)	**(17)**	**(50)**	**(27)**	**(35)**	**(48)**	**(123)**	**(1)**	**(21)**	**(116)**	**(6)**	**(4)**	**(7)**	**(2)**	**(0)**
Income	15.6***	10.7**	58.3	14.2	46.6	18.5	38.8	19.5	36.8**	32.0	33.8***	6.4***	26.9***	18.5***	14.6***
	(6)	**(5)**	**(72)**	**(17)**	**(45)**	**(21)**	**(102)**	**(13)**	**(16)**	**(38)**	**(8)**	**(1)**	**(9)**	**(0)**	**(1)**
Age	0.3	1.5	1.5	0.2	1.7	-1.3	1.4	-0.2	0.5	6.2	-	2.7***	0.4	0.7	0.2***
	(1)	**(2)**	**(7)**	**(1)**	**(12)**	**(6)**	**(5)**	**(0)**	**(2)**	**(8)**	**(-)**	**(0)**	**(1)**	**(0)**	**(0)**
College	16.2	45.1	9.0	8.8	24.1	-102.2	-14.6	9.2	27.2	35.8	1.3	4.8	12.4	50.0***	13.6***
	(28)	**(38)**	**(233)**	**(49)**	**(272)**	**(244)**	**(200)**	**(8)**	**(60)**	**(201)**	**(27)**	**(6)**	**(33)**	**(11)**	**(1)**
Unemployed	11.6	7.1	13.4	1.7	-4.0	105.6	26.6	-7.1	35.2	31.2	-36.6	38.6*	1.8	-22.0**	-4.4**
	(23)	**(41)**	**(195)**	**(34)**	**(369)**	**(246)**	**(234)**	**(11)**	**(82)**	**(164)**	**(39)**	**(22)**	**(19)**	**(9)**	**(2)**
Foreigner	-8.0	-17.5	-41.0	-4.8	-	153.0	-	-6.1	0.6	-69.9	-1.2	-	-0.9	-9.6***	-21.3***
	(40)	**(90)**	**(155)**	**(53)**	**(-)**	**(382)**	**(-)**	**(6)**	**(71)**	**(179)**	**(19)**	**(-)**	**(18)**	**(4)**	**(3)**
Homeowner	198.2***	231.5***	190.5	164.7*	152.0	147.9	177.8	110.6	185.0***	296.7	213.7***	172.2***	79.2***	91.0***	53.2***
	(13)	**(53)**	**(252)**	**(87)**	**(392)**	**(151)**	**(209)**	**(72)**	**(46)**	**(217)**	**(12)**	**(3)**	**(10)**	**(4)**	**(0)**
Intercept	-35.2	-80.1	-185.9	-19.4	-139.2	50.6	-134.0	-13.9	-73.0	-303.6	-18.9	-153.3***	-35.1	-53.9**	-22.1***
	(46)	**(146)**	**(540)**	**(64)**	**(553)**	**(349)**	**(455)**	**(10)**	**(134)**	**(403)**	**(20)**	**(21)**	**(63)**	**(22)**	**(2)**

Note: Dependent variable - Net Wealth in 1 000 EUR.
Standard errors are shown in parenthesis below their corresponding figure.
College is a dummy variable that is equal to one if household head has higher education.
Unemployed is a dummy variable that is equal to one if household head is unemployed.
Foreigner is a dummy variable that is equal to one if household head immigrated to the country of residence.
Homeowner is a dummy variable that is equal to one if a household owns the primary residence.
Income is gross household income in 10 000 EUR.
*** Statistically significant at 1% significance level.
** Statistically significant at 5% significance level.
* Statistically significant at 10% significance level.
Source: Own calculations based on HFCS data.

Table 24. Quantile regressions of net wealth. 75th percentile.

	AT	BE	CY	DE	ES	FI	FR	GR	IT	LU	MT	NL	PT	SI	SK
Household size	-5.8	-2.8	47.0	-14.2	-5.4	-16.2	-23.8	0.6	-6.3	-14.0	-11.8**	13.7**	-4.0	-1.3	-1.7
	(10)	**(5)**	**(75)**	**(38)**	**(56)**	**(83)**	**(134)**	**(3)**	**(45)**	**(104)**	**(6)**	**(6)**	**(4)**	**(6)**	**(5)**
Income	34.8***	19.6***	103.3***	28.3	66.8***	37.9	64.2	32.8***	61.1***	56.2	72.3***	11.1***	51.4***	22.5***	30.4
	(7)	**(4)**	**(37)**	**(25)**	**(21)**	**(39)**	**(76)**	**(4)**	**(23)**	**(39)**	**(9)**	**(2)**	**(6)**	**(4)**	**(37)**
Age	0.4	3.2***	2.1	0.0	3.2	1.0	-0.1	-0.2	0.7	7.0	-	3.4***	0.5	0.2	0.3
	(1)	**(1)**	**(2)**	**(2)**	**(6)**	**(4)**	**(13)**	**(0)**	**(4)**	**(10)**	**(-)**	**(0)**	**(0)**	**(0)**	**(1)**
College	19.7	82.5***	71.1	31.4	59.0	-12.0	5.2	33.0**	54.0	35.8	10.3	25.2***	49.8	39.8***	26.6***
	(46)	**(22)**	**(188)**	**(127)**	**(131)**	**(150)**	**(382)**	**(15)**	**(112)**	**(281)**	**(35)**	**(7)**	**(38)**	**(12)**	**(3)**
Unemployed	17.6	13.1	38.4	2.5	-18.7	-0.4	24.6	2.3	66.7	37.6	-12.3	86.4**	6.0	-4.0	6.2
	(35)	**(14)**	**(130)**	**(66)**	**(115)**	**(135)**	**(328)**	**(10)**	**(123)**	**(211)**	**(35)**	**(38)**	**(14)**	**(16)**	**(7)**
Foreigner	-2.6	-34.2**	44.3	3.4	-	8.2	-	-22.2***	-5.5	-100.8	-36.0**	-	3.4	-23.2***	-13.7*
	(21)	**(13)**	**(276)**	**(69)**	**(-)**	**(167)**	**(-)**	**(6)**	**(108)**	**(203)**	**(15)**	**(-)**	**(15)**	**(4)**	**(8)**
Homeowner	293.3***	301.5***	354.7***	261.1**	189.5	150.5	241.3	143.4***	241.1***	417.7*	317.3***	226.8***	117.5***	157.3***	67.4***
	(33)	**(24)**	**(92)**	**(126)**	**(161)**	**(181)**	**(524)**	**(9)**	**(66)**	**(220)**	**(12)**	**(9)**	**(10)**	**(14)**	**(3)**
Intercept	-53.7	-120.6***	-271.6*	-11.4	-202.4	-67.6	-43.3	-6.4	-95.8	-318.2	-14.9	-162.4***	-44.8	-11.6	-21.4
	(47)	**(27)**	**(161)**	**(67)**	**(341)**	**(245)**	**(609)**	**(15)**	**(287)**	**(598)**	**(11)**	**(19)**	**(28)**	**(18)**	**(44)**

Note: Dependent variable - Net Wealth in 1 000 EUR.
Standard errors are shown in parenthesis below their corresponding figure.
College is a dummy variable that is equal to one if household head has higher education.
Unemployed is a dummy variable that is equal to one if household head is unemployed.
Foreigner is a dummy variable that is equal to one if household head immigrated to the country of residence.
Homeowner is a dummy variable that is equal to one if a household owns the primary residence.
Income is gross household income in 10 000 EUR.
*** Statistically significant at 1% significance level.
** Statistically significant at 5% significance level.
* Statistically significant at 10% significance level.
Source: Own calculations based on HFCS data.

Table 25. Counterfactual decomposition of differences in mean net wealth.

	SK	GR	SI	PT	FI	NL	FR	AT	IT	ES	BE	MT	CY	LU
Difference wrt. Germany	115.5***	47.4***	46.5**	42.2***	31.9**	24.9	-38.2***	-69.8	-80.5***	-96.2***	-144.6***	-183.3***	-463.0***	-514.3***
	(13.4)	**(13.8)**	**(18.9)**	**(15.5)**	**(13.5)**	**(15.6)**	**(14.2)**	**(48.8)**	**(15.6)**	**(15.9)**	**(18.2)**	**(59.0)**	**(61.3)**	**(58.3)**
Covariates	170.1***	85.5***	113.9***	132.4***	-6.2	-9.8	51.0***	5.1	53.2***	71.7***	-33.4***	117.9***	7.7	-216.6***
	(55.5)	**(32.6)**	**(37.9)**	**(40.9)**	**(10.1)**	**(9.3)**	**(9.6)**	**(18.6)**	**(17.2)**	**(20.5)**	**(10.9)**	**(31.8)**	**(21.9)**	**(57.7)**
Coefficients	-54.6	-38.1	-67.5*	-90.2**	38.1***	34.7**	-89.2***	-74.9	-133.7***	-167.9***	-111.2***	-301.2***	-470.7***	-297.7***
	(51.6)	**(29.9)**	**(35.4)**	**(38.8)**	**(14.2)**	**(17.5)**	**(13.4)**	**(55.7)**	**(18.5)**	**(23.4)**	**(20.3)**	**(63.8)**	**(57.7)**	**(79.7)**

Note: Germany serves as a base country.
Dependent variable – Mean net wealth in EUR thousands
Explanatory variables – Household size, age, gross income, as well as dummies for higher education, gender, marital status, employment status, being a foreigner, divorced or pensioner for household heads.
Standard errors are shown in parenthesis below their corresponding figure.
*** Statistically significant at 1% significance level.
** Statistically significant at 5% significance level.
* Statistically significant at 10% significance level.
Source: Own calculations based on HFCS data.