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# NET WEALTH ACROSS THE EURO AREA

# WHY HOUSEHOLD STRUCTURE MATTERS AND HOW TO CONTROL FOR IT

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In 2014 all ECB publications feature a motif taken from the €20 banknote.

HOUSEHOLD FINANCE AND CONSUMPTION NETWORK

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

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

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

1) understanding economic behaviour of individual households, developments in aggregate variables and the interactions between the two;

2) evaluating the impact of shocks, policies and institutional changes on household portfolios and other variables;

3) understanding the implications of heterogeneity for aggregate variables;

4) estimating choices of different households and their reaction to economic shocks;

5) building and calibrating realistic economic models incorporating heterogeneous agents;

6) gaining insights into issues such as monetary policy transmission and financial stability.

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

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

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**Appendix**
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**Abstract**

We study the link between household structure and cross country differences in the wealth distribution using a recently compiled data set for the euro area (HFCS). We estimate counterfactual distributions using non-parametric re-weighting to examine the extent to which differences in the unconditional distributions of wealth across euro area countries can be explained by differences in household structure. We find that imposing a common household structure has strong effects on both the full unconditional distributions as well as its mappings to different inequality measures. For the median 50% of the differences are explained for Austria, 15% for Germany, 25% for Italy, 14% for Spain and 38% for Malta. For others as Belgium, France, Greece, Luxembourg, Portugal, Slovenia and Slovakia household structure masks the differences to the euro area median and Finland and the Netherlands change their position from below to above the euro area median. The impact on the mean and percentile ratios is similarly strong and varies with regard to direction and level across countries and their distributions. We can confirm the finding of Bover (2010) that the effect on the Gini is somewhat less pronounced, but might mask relevant information by being a net effect of different accumulated effects along the distribution. Country rankings based on almost all of these measures are severely affected alluding to the need for cautious interpretation when dealing with such rankings. Furthermore, the explanatory power of household structure changes along the net wealth distribution. Therefore we argue for more flexible controls for household structure. We provide such a set of controls to account for household type fixed effects which are based on the number of household members as well as possible combinations of age categories and gender.

JEL Classification: D30, D31

Key Words: Wealth Distribution, Household Structure, Survey Methodology, Unconditional Distribution, Non-Parametric Re-Weighting, Counterfactuals

## Non-technical summary

We study the importance of differences in the household structure, whenever key estimates of household wealth are compared across countries. Using the Household Finance and Consumption Survey (HFCS) we propose a method to control for such differences in a regression analysis.

For the first time the HFCS provides euro area wide (Estonia and Ireland did not take part in the first wave of the HFCS) information on the complete balance sheet of households. The questionnaire and the surveying methodology were ex ante coordinated and synchronized across countries. But if we aim at comparing wealth distributions between countries, one major challenge lies in the unit of observations - the household itself. The household structure varies quite drastically across countries with respect to the number of household members, age profiles and gender composition. Clearly household structure influences estimates of the wealth distribution in each country. Imagine two countries A and B, both populated with three individuals each endowed with wealth 1 but in country A they form 3 and in country B only two households. In country A we would observe perfect wealth equality measured at the household level while in country B the distribution would be unequal. Additional to the number of household members also age profiles and gender composition might play an important role for the basic form of the household as unit of observation. Previous work in the literature on international comparisons either treated households as homogeneous across countries, applied some equalizing such as dividing net wealth by the number of household members or its square root, or compared conditional on certain age bands. However, given the large number of different countries and the heterogeneity of household structures observed in a data set like the HFCS the topic of household structure deserves more attention. This is true for all household level variables but especially relevant for variables such as net wealth which are ultimately accumulated at the individual level and all main sources such as income and inheritance are phenomena at the individual level.

We study this link between household structure and cross country differences in the wealth distribution using the HFCS. We estimate counterfactual distributions using non-parametric re-weighting to examine the extent to which differences in the unconditional distributions of wealth across euro area countries can be explained by differences in household structure. This procedure takes the household structure of the whole euro area as given and estimates - using a re-weighting scheme - the wealth distribution of each country in a fictional setting where the country under investigation had the same household structure as the euro area as a whole. Our re-weighting method can be interpreted as a flexible alternative to equivalence scales. Instead of re-scaling the household level variable of interest it ensures that - comparing countries - only differences within a certain household type are considered and differences due to variation in the relative share of household types across countries are filtered out. The household type is

not based on an arbitrary chosen reference person, its characteristics and the corresponding household size. Rather we allow for every possible combination of household size, age, and gender of the adult population up to four household members. Hence we are able to control for a very detailed categorization of the household structure. Our approach allows for 329 potentially different household types, whereof 249 are actually observed in the euro area.

The top 30 household types in the euro area include already more than 90% of the observed euro area household population, and between 82% and 95% in each individual country. Imposing a common household structure has strong effects on both the full unconditional distributions as well as its mappings to different inequality measures. For the median 50% of the differences are explained for Austria, 15% for Germany, 25% for Italy, 14% for Spain and 38% for Malta. For others as Belgium, France, Greece, Luxembourg, Portugal, Slovenia and Slovakia household structure masks the differences to the euro area median and Finland and the Netherlands change their position from below to above the euro area median. The impact on the mean and percentile ratios is similarly strong and varies with regard to direction and level across countries and their distributions. We confirm the findings in the literature that the effect on the Gini is somewhat less pronounced, but might mask relevant information by being a net effect of different accumulated effects along the distribution.
Thus, country rankings based on almost all of these measures are severely affected by the household structure in each country alluding to the need for cautious interpretation when dealing with such rankings. Furthermore, the explanatory power of household structure changes along the net wealth distribution. We argue in favor of very flexible controls of household structure and provide such a set of controls to account for household type fixed effects, based on the number of household members as well as possible combinations of age and gender categories. The proposed set of controls are a preferable alternative to standard household controls in regression analysis, which mostly rely on an arbitrarily chosen reference person.

# 1 Introduction

Using the first a priori harmonized cross country data set which allows for analyses of net wealth distributions across countries in the euro area, we "standardize" the different household structures across countries to estimate the contribution of differences in household structure with regard to differences in the observed net wealth distributions as well as measures based on these distributions. At the medians of the net wealth distributions of the euro area and the respective country wealth distribution - 50% of that differences can be explained for Austria, 15% for Germany, 25% for Italy, 14% for Spain and 38% for Malta. For other countries such as Belgium, France, Greece, Luxembourg, Portugal, Slovenia and Slovakia household structure overlays the differences to the euro area median. The impact on the mean and percentile ratios is similarly strong. We can confirm the finding of Bover (2010) that the effect on the Gini is somewhat less pronounced, but might mask relevant information by being a net effect of different accumulated effects along the distribution. Country rankings based on almost all of these measures are severely affected alluding to the need for cautious interpretation when dealing with such rankings. As household structure matters a lot we argue to use more flexible controls than the standard household size in addition to age, age squared, and gender of a more or less arbitrarily chosen representative member of the household. We provide such a set of controls to account for household type fixed effects which are based on the number of household members as well as possible combinations of age and gender of all of them.[1]

The most important stylized facts about the distribution of net wealth are well known and well documented. Net wealth is distributed more unequally than income. The distribution of inherited wealth is more unequally distributed than wealth in general; and the differences in wealth distribution across developed countries are large (Davies and Shorrocks (2000)). Despite the fact that net wealth and its distribution - resources and their allocation - is at the heart of economics, theoretical models struggle to reproduce the observed skewness of the distribution and empirical analyses suffer from the lack of comparable data across countries. While consumption smoothing or intergenerational transmission are well covered by theoretical models, the strong differences across countries and the amount of wealth concentration are still a major obstacle for modelling (Cagetti and DeNardi (2005)). It is unclear how much of the empirically observed differences might be accountable (i) to differences in methodology of the underlying data production process, (ii) to institutional differences such as pension

[1]These controls are a non-parametric and very flexible way to control for household structure and also can be used additionally to the information of a household reference person to further control within the defined household types. Furthermore, we provide the weights to standardize household structure across the euro area to further analyze the contribution of household structure of any distribution and any statistic with regard to the set of all HFCS variables using the approach proposed in this paper. The data set containing information on the household types, the weights and variables to merge the data set to the HFCS can be found here: `http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1663-annexes.zip`.

systems, taxation or welfare programs, (iii) to historical differences such as land reform or war, or (iv) to differences in the structure and behaviour of economic agents as households or individuals.

International comparisons of wealth distributions reliant on post-harmonized data and definitions originally collected through a broad variety of different methodologies are known to lead to differences in the observed wealth distributions and therefore might disguise or exaggerate the true differences. The Luxembourg Wealth Study is the main example for such an harmonization endeavour and the differences in estimates for the US net wealth distribution between the Panel Study of Income Dynamics (PSID) and Survey of Consumer Finances (SCF) illustrate the importance of methodological differences in data production (see Sierminska, Brandolini, and Smeeding (2006) or Bover (2005)).

The Household Finance and Consumption Survey (HFCS) of the Eurosystem is the first project to a priori harmonize the data production process of wealth surveys across the 17 member countries[2] of the Eurosystem and therefore delivers the first large data set allowing for reasonable cross-country comparison of net wealth among a large number of developed countries (ECB (2013a) and ECB (2013b)).

Whereas remaining methodological differences in this a priori harmonized cross country data set might still be of importance especially at the tails of the wealth distribution and differences due to institutions, history and behaviour need to be elucidated in future research, we concentrate on differences in the wealth distribution due to variation in the form of the unit of observation - the household - and its different structure across countries. Net wealth is usually surveyed for households, not individuals, and cannot be partitioned to household members without further assumptions. This convention might be useful for different reasons. First, we might be interested in possession of or access to resources instead of ownership of an individual inside a household.[3] Second, the control over some assets inside a household might differ from the ownership structure.[4] Third, it might be impossible to allocate all assets inside a household to individuals. For an economic interpretation of cross-country comparisons these differences in household structure are important. Imagine two countries A and B, both populated with three individuals each endowed with wealth 1 but in country A they form 3 and in country B only two households. In country A we would observe perfect wealth equality measured at the household level while in country B the distribution would be unequal. Additional to the number of household members also age profiles and gender composition might

[2]The first wave of the HFCS includes only 15 of the 17 - at the time of the filed period - member countries, excluding Ireland and Estonia.

[3]Children who live in a house might benefit as much from the house as their parents who own the house and who even have some legal duty to give them shelter.

[4]As for example in the case of subsidized assets which are subsidized only for one individual and therefore often refer to children or elderly which might not be in control of the assets. However, the role of intra-household power structures can not be analyzed with our data.

play an important role for the basic form of the household as unit of observation. Previous work on international comparisons either treated households as homogeneous across countries, applied some equalizing such as dividing net wealth by the number of household members or its square root, or compared conditional on certain age bands (Banks, Blundell, and Smith (2004)). However, given the large number of different countries and the heterogeneity of household structures observed in a data set like the HFCS the topic of household structure deserves more attention. This is true for all household level variables but especially relevant for variables such as net wealth which are ultimately accumulated at the individual level and all main sources such as income and inheritance are phenomena at the individual level.

As is known in the literature household formation is influenced by a wide variety of (economic) factors. Chiuri and Jappelli (2003) and Martins and Villanueva (2009) for example elaborate on the link between the credit market and household formation of the young while Becker, Bentolila, Fernandes, and Ichino (2010) and Kaplan (2012) focus on the connection between the labor market and housing arrangements of the young. There are also empirical results for other age groups. Attanasio and Hoynes (2000) for example established a link between mortality and wealth and hence the household structure for the elderly. In this paper we do not require or impose that the household structure is determined exogenously since we do not want to establish a causal link between household structure and the indicators under investigation. We instead focus on a method to compare differences within similar household types while filtering out differences due to the relative share of these household types across countries. Our approach can be viewed as an alternative to equivalence scales and other equalizing techniques without any need for assumptions concerning the household members utility. Another advantage of the approach presented in this paper is that it allows comparisons of any variable controlling for differences in household structure while coming up with equivalence scales - which are problematic enough already for income - for wealth, different assets or asset participation rates seems very hard. Furthermore, this approach allows for a more flexible control for household structure as well as an evaluation of the remaining difference across countries once the household structure is accounted for by estimating counterfactual distributions by imposing a common (the average) household structure on all countries.[5] We do this by using non-parametric re-weighting and examine to what extent differences in the unconditional distributions of net wealth between euro area countries are due to differences in household structure.[6] To put it simple, instead of taking averages across countries and take the difference of those, we take the difference of averages of the same household types across countries and then take the average of these. We take that approach because we want to see

[5] One can also think of this procedure as a micro-simulation assuming no behavioural effects of the household formation. We thank an anonymous referee for pointing out this possibility.

[6] As a benchmark we divide household wealth and multiply the household weight by the number of household members to produce a measure of the individual wealth distribution under the assumption of equal intra household division of wealth.

the differences in wealth for similar households and not the differences due to differences in household types. We further show the effect of these differences on the most common inequality measures and find that imposing a common household structure has strong effects on both, the full unconditional distributions as well as its mappings to different inequality measures. Our paper is closest to the recent papers by Bover (2010) who estimates counterfactual US net wealth distributions relying on the Spanish household structure and Peichl, Pestel, and Schneider (2012) who examine the effect of changes in the German household structure on the income distribution. It differs in using a large data set of a priori harmonized cross country data and by conducting a more flexible non-parametric approach with regard to the definition of household types.

The rest of this paper is structured as follows. Section 2.1 introduces the data set and its main properties and differences to existing data. In section 2.2 we discuss the implemented non-parametric estimation strategy to generate the relevant counterfactual distributions. The main part of the paper, section 3, discusses the results reached from our empirical exercise and is split in two parts. First we discuss the differences due to household structure on the full distributions, on wealth inequality measurement and on the ownership of certain assets in section 3.1. Second, in section 3.2 we argue for more flexible controls for household structure in regression analyses than are usually used and provide such controls based on our re-weighting approach. Section 4 discusses the results and concludes.

# 2 Data and estimation strategy

## 2.1 Data

We use the first wave of the HFCS, a euro area-wide project to gather data on real and financial assets and liabilities of euro area households. In the first wave of HFCS (2010) more than 62,000 households across the euro area were interviewed, leading to a micro dataset which is not only arguably representative at the euro area but also at the level of each member state. While the goal was maximized harmonization in terms of questionnaire, interview method, editing, multiple imputation and all other aspects of data production, national differences were accounted for by adapting to country specifics where necessary. Table 1 shows basic information such as fieldwork period, net sample size, response rates, oversampling of the wealthy as well as survey mode for all HFCS 2010 country surveys.

Our main variable to illustrate the importance of household structure is net wealth. While in general household structure is important for all variables at the household level and might even be important for variables at the individual level it is crucial for net wealth. Net wealth

Table 1: General information on the HFCS wave 1

| | Fieldwork period | Net sample size | Response rate (%) | Over-sampling | Survey mode[i] |
|---|---|---|---|---|---|
| Austria | 2010/2011 | 2,380 | 55.7 | No | CAPI |
| Belgium | 2010 | 2,364 | 21.8 | Yes | CAPI |
| Cyprus | 2010 | 1,237 | 31.4 | Yes | CAPI(12%)/PAPI(88%) |
| Germany | 2010/2011 | 3,565 | 18.7 | Yes | CAPI |
| Spain | 2008/2009 | 6,197 | 56.7 | Yes | CAPI |
| Finland | 2009/2010 | 10,989 | 82.2 | Yes | CAPI(3%)/CATI(97%) |
| France | 2009/2010 | 15,006 | 69.0 | Yes | CAPI |
| Greece | 2009 | 2,971 | 47.2 | Yes | CAPI |
| Italy | 2010 | 7,951 | 52.1 | No | CAPI(85%)/PAPI(15%) |
| Luxembourg | 2010/2011 | 950 | 20.0 | Yes | CAPI |
| Malta | 2010/2011 | 843 | 29.9 | No | CAPI(81%)/PAPI(19%) |
| Netherlands | 2010 | 1,301 | 57.5 | No | CAWI |
| Portugal | 2010 | 4,404 | 64.1 | Yes | CAPI |
| Slovakia | 2010 | 2,057 | n.a. | No | CAPI |
| Slovenia | 2010 | 343 | 36.4 | No | CAPI |

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

is ultimately accumulated via savings from income or inheritance (and gifts), which are both (all) phenomena at the level of the individual. At the same time consumption and therefore savings as well as probabilities of inheritances received at the household level are highly dependent on the size of the household and the individuals age profile. Household net wealth is defined as real assets plus financial assets minus debt of a household. Real assets consist of the main residence, other real estate property, investments in self-employed businesses, vehicles and other valuables. Financial assets are current accounts, savings deposits, mutual funds, bonds, stocks, money owed to the household and other financial assets. Debt consists of collateralized debt as well as uncollateralized debt including credit card debt and overdrafts (see table 2).[7]

Table 2: HFCS household balance sheet

| | | |
|---|---|---|
| + Real assets | Real estate | Household main residence |
| | | Other real estate property |
| | Business | Self-employed |
| | Other | Vehicles |
| | | Valuables |
| + Financial assets | Deposits | Sight accounts |
| | | Savings accounts |
| | Shares | |
| | Bonds | |
| | Mutual funds | |
| | Business | Non-self-employed |
| | Money owed to households as private loans | |
| | Private pension plans | |
| | Other | Options, futures, royalities, etc. |
| - Debt | Collateralized | Household main residence |
| | | Other real estate property |
| | Non-collateralized | Credit cards / overdraft |
| | | Other loans |
| = Net wealth | | |

*Notes:*
(i) *Source:* Eurosystem HFCS 2010.

See the ECB methodological report for detailed information on all HFCS variables (ECB (2013b)). Throughout our paper we use complex survey weights as well as the multiple imputations provided by the HFCS.

[7]The HFCS does not collect information on the outstanding amount for a leasing contract, and hence these form of liability is not included in the debt level.

## 2.2 Estimation strategy

**Reweighting** We observe cross-sections with draws from the country-distribution functions $P^c$ of the vector $(W, H)$ consisting of net wealth $W$ and household structure $H$. We want to identify and estimate differences in the distribution of wealth $P(W)$, or differences in statistics with regard to the distribution of wealth, $\nu(P(W))$, which are due to differences in household structure $H$ between countries $c \in C$. Whereas in general many statistics $\nu$ might be of interest we focus on percentiles, certain percentile ratios, the Gini-coefficient, as well as extensive and intensive margins of components of net wealth. We neither claim nor require an exogenous formation of the household structure, since we do not want to establish a causal link between household structure and the wealth distribution. Re-weighting household types is an alternative to equivalence scales. Instead of rescaling the household level variable of interest it ensures that - comparing countries - only differences within a certain household type are considered and differences due to variation in the relative share of household types across countries are filtered out. Put differently, after re-weighting the fact that a household is of a certain type does not reveal any information about the country in which this household is most likely located as the shares of household types are balanced across countries.

Let $P^{ea}(W, H)$ denote the overall distribution of $(W, H)$ in the 14 countries surveyed in the first HFCS wave which include all variables necessary for this analysis[8] (henceforth called the euro area), and $P^c(W, H)$ the particular distributions for country $c \in C$. We then want to identify the counterfactual distribution $P^c_{ea}(W)$, in which the differences in the distribution of wealth $W$ in a certain country $c$ which are due to differences in the household structure $H$ between the particular country and the euro area as a whole are eliminated. The differences between $P^c(W)$ and $P^c_{ea}(W)$, as well as differences between measures $\nu(P^c(W))$ and $\nu(P^c_{ea}(W))$ are the differences which are due to household structure. Formally we can write the counterfactual of interest of country $c$ as,

$$P^c_{ea}(W) := \int_H P^c(W, H) dP^{ea}(H). \tag{1}$$

We can rewrite the counterfactual distribution in equation 1[9]

$$P^c_{ea}(W) := \int_H P^c(W, H) \Psi_H(H) dP^c(H), \tag{2}$$

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

[8] We had to exclude Cyprus because it collects gender only for one household member, see ECB (2013a) page 83.

[9] Note that we could formulate the counterfactual distribution also as $P^c_{ea}(W \leq w) = E^1[\mathbf{1}(W \leq w)\Psi_H]$ (as e.g. in Bover (2010))

$$\Psi_H := \frac{P^{ea}(H)}{P^c(H)} \tag{3}$$

A simple example of the mechanics of this re-weighting method is given in Appendix B. This appendix additionally provides information on the observed changes in household weights applying the re-weighting procedure.

An overview of similar techniques which emerged after the contribution of DiNardo, Fortin, and Lemieux (1996) can be found in Fortin, Lemieux, and Firpo (2011). Instead of using a re-weighting approach we could also directly estimate the counterfactual distributions $P^c_{ea}(W)$ as proposed in Chernozhukov, Fernandez-Val, and Melly (2009). Another possibility recently proposed is the influence function regression approach by Fortin, Lemieux, and Firpo (2009) which is based on the first order approximation of $\nu$, as a function of $P^c$ around $P^{ea}$. Note that given the counterfactual distributions $P^c_{ea}(W)$, we can decompose the differences between any measure of the observed distributions $\nu(P^{ea}(W))$ and $\nu(P^c(W))$ in the following way:

$$\nu(P^{ea}(W)) - \nu(P^c(W)) = [\nu(P^{ea}(W)) - \nu(P^c_{ea}(W))] + [\nu(P^c_{ea}(W)) - \nu(P^c(W))], \tag{4}$$

where the first term reflects the differences remaining after controlling for differences in household structures across countries and the second covers the differences explained by differences in household structure.

We plot the respective quantile functions $Q^c(W)$, $Q^{ea}(W)$, the counterfactual quantile functions $Q^c_{ea}(W)$ as well as the resulting observed differences $d_{obs} := Q^{ea}(W) - Q^c(W)$ and the resulting differences after re-weighting $d_{rew} := Q^{ea}(W) - Q^c_{ea}(W)$. Note that analogous to equation 4 the relation $\frac{d_{obs} - d_{rew}}{d_{obs}}$ is a measure of the observed differences which can be explained by differences in household structure at every quantile $u$ (see Appendix C).

**Household Structure** We use the overall (or weighted average) household structure $H^{ea}$ which refers to the union $\bigcup_{c \in C} H^c$ of the collection of country level household types $\{H^c : c \in C\}$ as a reference. First, it includes by definition all household types observed in all countries. Second, it minimizes the overall need for re-weighting as it is the weighted average of country level household structure. However, we have to assure that we choose a set of household types that is large enough to flexibly control for the differences in household structure, i.e. helps us compare "apples to apples" but which is at the same time small enough to ensure enough overlap between the countries. In both extreme cases of a very small, where only one household type is assumed, or very large number of household type cells in which every type of household only exists in one certain country, re-weighting to the overall household structure would be without any effect.

We define household types by all possible combinations of 4 age categories and gender for

each individual (member) up to 4 individuals in each household.[10] We are (i) not taking a particular order of individuals or (ii) gender for individuals aged 15 or below into account. Households with 5 or more members are treated as 4 person households and sorted with regard to the first 4 members, the financially knowledgeable person (respondent) and the next 3 persons sorted by descending age. This results in 329 possible household types of which 249 are observed at least once in the euro area. A detailed description of the construction of these cells can be found in Appendix A.[11]

Table 3 shows the top 30 household types that occur most often in the euro area and include more than 90% of the observed euro area household population and between 82 and 95% in each individual country. It also shows the top 10 categories for each of the countries which all are subsets of the euro area top 30 household types and include between 48 and 72% of households in all countries. However, already large differences can be seen in the occurrence of the top types. The household type code describes the composition of the household. Two numbers for each individual in a household, where the first refers to age category $((1 = [-, 15]; 2 = [16, 34]; 3 = [35, 64]; 4 = [65, +]))$ and the second refers to gender for all individuals aged 16+ $(1 = male; 2 = female; 3 = below\ 16)$. The code is sorted by individual age. The most common household type 3132 is therefore a two person household (4 digits), consisting of a man aged between 35 and 64 (31) and a woman aged between 35 and 64 (32). This category consists of 10.2% of all euro area households. Around 9.5% of households are single households consisting of a woman aged 65+, which is the second most common household type. All other household type codes are to be read analogously. As one can see by the distributions of the top ten household categories in each country among the euro area top 30 categories, certain types which are rather relevant in southern or eastern countries (e.g. type 21223132 make up more than 4% of households in Spain, Greece, Italy, Malta and Slovakia) and are not even in the top ten in northern countries. Also the typical single households are rather different. Whereas middle age singles (types 31 and 32) are very typical for e.g. Austria, Germany, Finland or the Netherlands they are much less important in Spain, Greece or Portugal.

[10] There are only about 5.6% of households with more then 4 household members in the euro area.

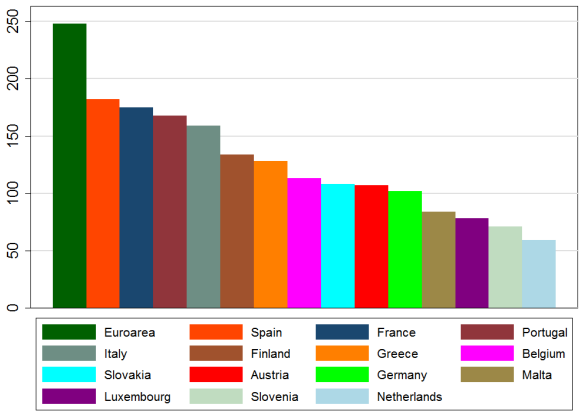
[11] We tried several possible definitions to construct household types based on gender as well as age of individuals living in a certain households. Results are robust across a great variety of combinations. Setting the limit at this 329 possible types is a compromise between ensuring enough flexibility to compare "apples to apples" as well as having enough common support between countries given a certain definition of household types to generate meaningful counterfactuals.

Table 3: Occurance of top 10 country wise household types among the euro area top 30 household types in percent of the respective household populations

| Top 30 EA | HH Size | Categories | EA | AT | BE | DE | ES | FI | FR | GR | IT | LU | MT | NL | PT | SL | SK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3132 | 10.2 | 13.3 | 10.2 | 12.7 | 7.6 | 12.8 | 11.6 | 6.4 | 6.7 | 7.2 | 7.4 | 9.3 | 9.0 | 10.7 | 8.0 |
| 2 | 1 | 42 | 9.5 | 8.8 | 7.7 | 10.2 | 7.5 | 10.4 | 11.3 | 6.7 | 9.6 | 5.7 | 6.8 | 8.2 | 8.5 | 11.4 | 6.1 |
| 3 | 2 | 4142 | 9.1 | 7.3 | 9.4 | 10.1 | 8.1 | 7.6 | 7.0 | 8.8 | 11.2 | 7.9 | 8.4 | 9.1 | 9.3 | 5.2 | 4.9 |
| 4 | 1 | 31 | 7.0 | 7.7 | 7.9 | 10.0 | 3.7 | 9.2 | 6.7 |  | 4.1 | 9.8 | 4.6 | 12.3 |  | 8.8 | 3.5 |
| 5 | 1 | 32 | 5.7 | 10.0 | 6.9 | 5.7 |  | 8.0 | 6.6 | 3.6 | 5.2 | 5.6 | 3.8 | 8.1 | 2.8 | 3.8 | 5.2 |
| 6 | 4 | 13133132 | 5.6 | 4.0 | 4.6 | 4.7 | 6.1 | 4.9 | 6.0 | 7.4 | 6.8 | 7.6 | 8.0 | 5.8 | 5.1 | 7.0 |  |
| 7 | 1 | 41 | 3.6 | 3.4 | 5.1 | 4.3 |  | 3.3 | 4.0 |  | 3.4 | 3.1 |  | 2.7 |  |  | 3.6 |
| 8 | 3 | 133132 | 3.4 |  |  |  | 5.2 |  |  | 3.3 | 4.7 |  | 4.3 |  | 4.7 |  |  |
| 9 | 1 | 21 | 3.3 | 4.7 | 3.4 | 5.3 |  | 5.1 | 3.8 |  |  |  |  |  |  |  |  |
| 10 | 2 | 2122 | 3.2 | 3.3 | 2.9 |  | 3.1 | 6.2 | 4.6 |  |  | 3.5 |  | 4.9 |  |  |  |
| 11 | 3 | 213132 | 3.0 |  |  |  | 3.3 |  |  | 4.6 | 3.8 | 3.3 | 7.1 |  | 5.2 | 4.3 | 4.7 |
| 12 | 2 | 3241 | 2.8 |  |  | 3.4 |  |  |  | 4.0 |  |  |  | 2.7 |  |  |  |
| 13 | 1 | 22 | 2.6 | 4.1 |  | 4.2 |  | 4.0 |  |  |  | 3.0 |  | 3.1 |  |  |  |
| 14 | 4 | 21223132 | 2.4 |  |  |  | 4.3 |  |  | 4.1 | 4.3 |  | 5.2 |  |  |  | 5.5 |
| 15 | 3 | 223132 | 2.1 |  |  |  | 3.2 |  |  |  |  |  | 3.8 |  | 3.7 | 3.5 | 3.6 |
| 16 | 3 | 132122 | 2.0 |  |  |  |  |  | 2.8 |  |  |  |  |  |  |  |  |
| 17 | 4 | 13132122 | 1.7 |  | 2.8 |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 | 4 | 13223132 | 1.6 |  |  |  |  |  |  |  |  |  |  |  | 2.7 |  |  |
| 19 | 4 | 13213132 | 1.6 |  |  |  |  |  |  |  |  |  |  |  | 3.0 |  |  |
| 20 | 4 | 13132231 | 1.4 |  |  |  |  |  |  | 3.4 |  |  |  |  |  |  |  |
| 21 | 4 | 21213132 | 1.4 |  |  |  |  |  |  |  |  |  |  |  |  | 4.4 | 3.5 |
| 22 | 3 | 132231 | 1.1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 23 | 2 | 3142 | 1.0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 | 4 | 22223132 | 1.0 |  |  |  |  |  |  |  |  |  |  |  |  | 3.3 |  |
| 25 | 2 | 2132 | 0.9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 | 2 | 2231 | 0.9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 27 | 2 | 1332 | 0.8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 | 2 | 2232 | 0.7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 29 | 3 | 131332 | 0.6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 | 2 | 3242 | 0.5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sum of Countrywise Top 10 |  |  |  | 66.6 | 60.9 | 70.5 | 52.3 | 71.5 | 64.4 | 52.3 | 59.8 | 56.7 | 59.6 | 66.1 | 54.0 | 62.3 | 48.7 |
| Sum of Euroarea Top 30 |  |  | 90.6 | 91.7 | 90.2 | 94.1 | 83.7 | 94.7 | 92.6 | 84.0 | 89.2 | 89.8 | 87.1 | 92.8 | 82.9 | 85.6 | 82.7 |

*Notes:*
(i) The household type codes show the age an gender of each household member, i.e. the first character reveals age as 1 = $[-, 15]$; 2 = $[16, 34]$; 3 = $[35, 64]$; 4 = $[65, +]$ and the second refers to gender by 1 = *male*; 2 = *female*; 3 = *below* 16. Only the Top 10 household types for each country are listed with their relative percentage share inside the country.
(ii) Common support exists for all euroarea top 30 types but household type 131332, which is not observed in Slovenia.
(iii) *Source:* Eurosystem HFCS 2010.

Figure 1: Number of household types in the euro area

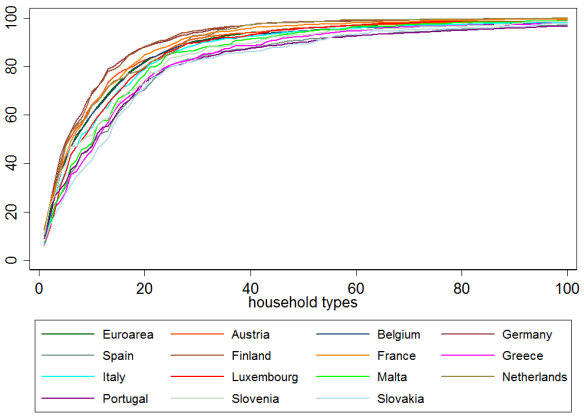



*Notes:*
(i) This graph shows the number of different household types observed as described in section 2.2.
(ii) *Source:* Eurosystem HFCS 2010.

Figures 1, 2 and 3 show the occurrence of household types across countries and the distributions and re-weighted distributions of the euro area top 100 most populated household types, respectively. The distributions are sorted by the occurrence of household types in the euro area. Figure 1 illustrates the differences in the variety of household types observed across countries. The larger the sample size, the higher the probability that also sparsely populated household types are drawn into the samples. Also certain sampling schemes or interviewer modes (such as CAWI[12] in the Netherlands) might lead to a smaller variety of household types. As can be seen in figure 2 all the top household types are relatively common across the euro area. The top 30 euro area types include at least about 83% in Slovakia and at most about 95% in Finland. Figure 3 shows the distributions when the data is re-weighted to the euro area average as described in section 2.2. As can be seen the common support between countries is large but does not include all household types in all country samples. The country variation is completely eliminated for the first few types and in general strongly reduced but small variation remains (compare figures 2 and 3). This is because for some countries certain household types are not observed at all, implying that they can not be re-weighted which translates to the remaining extrapolation outside the common support (between countries) as discussed in Appendix B.

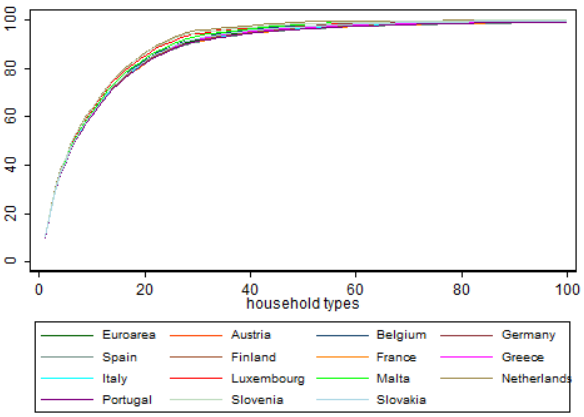
[12]Computer-assisted web interview.

Figure 2: Distribution of household types in the euro area




*Notes:*
(i) This graph shows the distributions of different household types observed as described in section 2.2.
(ii) *Source:* Eurosystem HFCS 2010.

Figure 3: Re-weighted distribution of household types in the euro area




*Notes:*
(i) This graph shows the distributions of different household types observed as described in section 2.2 re-weighted to the euro area distribution.
(ii) *Source:* Eurosystem HFCS 2010.

# 3 Results

## 3.1 Why household structure matters

Table 4 includes all the main results of the paper. It shows estimates of the mean, selected percentiles as well as selected inequality measures estimated for the observed distributions, $P^{ea}(W)$ and $P^{c}(W)$ as well as estimated for the counterfactual distributions $P^{c}_{ea}(W)$, where euro area household structure is imposed using non-parametric re-weighting as described in section 2.2 and Appendix B. Differences between any statistic $\nu(P^{c}(W))$ and $\nu(P^{c}_{ea}(W))$ are the differences which can be explained by differences in household structure.

**Mean** The euro area mean is 230 thousand Euro. The means of the euro area countries range from as low as 80 thousand Euro (Slovakia) to as high as 710 thousand Euro (Luxembourg). The impact of imposing the euro area household structure to all countries is large for many of them. Note that as the household structure of larger countries is more important for the euro area they are in general also more stable with regard to this type of re-weighting. There are different groups of countries. Austria, Belgium, France and Luxembourg already have an above euro area mean of net wealth but move even further away through re-weighting. Household structure in these countries is dampening means with regard to the average euro area household structure. Spain, Italy and Malta also have an above euro area mean but move closer to the euro area. In the case of Spain around 23% of the difference to the euro area is explained only by household structure. For Italy this value is 47% and for Malta even 48%. Germany, Finland and the Netherlands have means below the euro area mean and move up towards the euro area mean. Around 43% of the difference to the euro area mean is explained for Germany, 39% also for Finland and about 32% for the Netherlands. Greece, Portugal, Slovenia and Slovakia all have below euro area means and their means decrease even more with re-weighting, implying that the household structure exaggerates their wealth in euro area comparisons.

**Percentiles** The counterfactual percentiles in the second part of table 4 illustrate the variation of the importance of household structure between countries and along the net wealth distribution. In general differences between observed and counterfactual distributions are relatively stronger at the bottom than at the top, but effects are considerable all along the distribution. For example, Finland's median is 86 thousand Euro and well bellow the euro area median of 109 thousand Euro whereas its re-weighted median 112 thousand Euro already lies above the euro area median. Also the Netherlands changes its position from below to above the median. For other countries large parts of the differences to euro area medians are explained by household structure (50% for Austria, 15% for Germany, 14% for Spain, 25%

for Italy and 38% for Malta) others again move further away. Note especially that for the median it is not the same countries as for the mean where the gap between the euro area and their observed distribution is smaller or larger. Austria moves away for the mean but gets closer for the median. Belgium, France, Greece, Luxembourg, Portugal, Slovenia and Slovakia move away from the euro area for both. Germany, Spain, Italy and Malta get closer for both. Finland and the Netherlands even change position with regard to the median while both get closer to the euro area in case of the mean. Note, that the patterns differ along the distribution for many countries such as Austria, France, Slovenia and Slovakia which move closer for some areas and further away for others. Finland, Greece, the Netherlands and Portugal even switch position with regard to the euro area in some areas. Belgium and Luxembourg always move away from the euro area whereas Germany and Italy are always getting closer.

**Inequality Measures** The third part of table 4 shows the impact of household structure on selected percentile ratios as well as the Gini coefficient of net wealth. Again large parts of the differences to the euro area measure can be explained by household structure. For the most robust measure $P75/P25$, all countries but Belgium, Luxembourg (further away) and the Netherlands (switches position) get closer to the euro area measure. For Finland which has a 34 $P75/P25$ ratio as opposed to only 17 for the euro area 95% of the difference can be explained by household structure. This figure is about 27% for Germany, 48% for France and 53% for Italy. Again effects are large for many countries, and again they are different for different measures. While $P75/P25$ gets closer to the euro area $P90/P10$ moves further away from the euro area for France even though in both cases french inequality is reduced by re-weighting. The Gini coefficient seems less sensitive to household structure and about half of the countries move closer to the euro area Gini and half of them move further away. However, as Bover (2010) mentioned, the Gini masks relevant information by being a net effect of different accumulated effects along the distribution.

The main driving force behind these results are the differences in household size. Values of the re-weighted net wealth distributions for southern and eastern European countries in general are lower than the observed values because of their above average household size and the ones of northern European countries are higher because of their below average household size. Furthermore, the size of the impact of imposing the common household structure along the distribution of net wealth also depends heavily on the age and gender structures and occurrence of household types. That leads to the result that the relevance of household structure varies considerably along the distribution and has different patterns across different countries. In all (regression) analyses where controls for household structure (number of household members, age and gender) are desirable this strong variation of the importance of household structure with regard to different countries and along their net wealth distributions

Table 4: Effects of household structure differences across countries (in thousand Euro)

| Variable Names | EA | AT | BE | DE | ES | FI | FR | GR | IT | LU | MT | NL | PT | SI | SK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 229.84 | 265.03 | 338.65 | 195.17 | 291.35 | 161.53 | 233.40 | 147.76 | 275.20 | 710.09 | 365.99 | 170.24 | 152.92 | 148.74 | 79.66 |
| Counterfactual | . | 280.50 | 343.62 | 210.00 | 277.05 | 188.16 | 255.68 | 134.46 | 254.11 | 729.93 | 300.59 | 189.11 | 141.73 | 132.02 | 73.90 |
| P10 | 1.19 | 0.98 | 2.78 | 0.06 | 5.66 | -0.57 | 1.58 | 2.00 | 5.00 | 5.04 | 16.11 | -3.80 | 1.04 | 4.22 | 12.92 |
| Counterfactual | . | 1.12 | 2.97 | 0.16 | 3.49 | 0.11 | 1.87 | 0.92 | 4.00 | 6.51 | 7.88 | -0.06 | 0.56 | 2.97 | 7.76 |
| P25 | 15.47 | 10.31 | 40.24 | 6.60 | 77.87 | 6.38 | 9.80 | 30.00 | 34.24 | 59.24 | 88.54 | 14.10 | 18.37 | 40.84 | 36.45 |
| Counterfactual | . | 11.52 | 46.11 | 8.10 | 64.51 | 13.92 | 12.97 | 20.96 | 22.32 | 80.31 | 66.05 | 20.04 | 11.67 | 29.59 | 32.03 |
| P50 | 108.85 | 76.44 | 206.25 | 51.36 | 182.72 | 85.75 | 115.80 | 101.93 | 173.50 | 397.84 | 215.93 | 103.56 | 75.21 | 100.66 | 61.18 |
| Counterfactual | . | 92.74 | 213.42 | 59.95 | 172.12 | 111.97 | 135.00 | 90.02 | 157.13 | 417.07 | 174.81 | 124.84 | 68.13 | 83.04 | 56.04 |
| P75 | 268.35 | 250.47 | 417.36 | 209.82 | 330.98 | 220.22 | 279.10 | 193.27 | 321.43 | 738.13 | 394.09 | 259.10 | 160.13 | 212.09 | 98.66 |
| Counterfactual | . | 266.78 | 423.84 | 225.60 | 311.96 | 254.06 | 300.40 | 171.53 | 304.04 | 741.38 | 345.56 | 283.37 | 150.32 | 192.06 | 91.15 |
| P90 | 504.89 | 542.16 | 705.14 | 442.32 | 607.68 | 397.32 | 511.58 | 331.78 | 577.13 | 1,375.37 | 693.08 | 427.64 | 297.23 | 317.18 | 151.86 |
| Counterfactual | . | 552.55 | 725.30 | 475.43 | 561.16 | 441.82 | 549.17 | 301.90 | 537.10 | 1,392.36 | 624.46 | 455.55 | 286.92 | 300.71 | 141.29 |
| P75/P25 | 17.35 | 24.34 | 10.39 | 31.79 | 4.25 | 34.49 | 28.47 | 6.44 | 9.39 | 12.53 | 4.45 | 18.53 | 8.72 | 5.24 | 2.71 |
| Counterfactual | . | 23.18 | 9.23 | 27.86 | 4.84 | 18.25 | 23.17 | 8.18 | 13.62 | 9.24 | 5.24 | 14.33 | 12.90 | 6.61 | 2.85 |
| P90/P50 | 4.64 | 7.13 | 3.42 | 8.62 | 3.33 | 4.63 | 4.42 | 3.25 | 3.33 | 3.46 | 3.21 | 4.13 | 3.95 | 3.15 | 2.48 |
| Counterfactual | . | 5.98 | 3.40 | 7.93 | 3.26 | 3.95 | 4.07 | 3.35 | 3.42 | 3.34 | 3.57 | 3.65 | 4.21 | 3.62 | 2.52 |
| P90/P10 | 424.01 | 581.05 | 253.82 | 7,371.25 | 107.64 | -692.19 | 323.64 | 165.89 | 115.43 | 274.28 | 43.33 | -162.21 | 286.92 | 75.56 | 11.77 |
| Counterfactual | . | 519.28 | 244.58 | 3,155.16 | 160.65 | 3,909.91 | 293.80 | 329.98 | 134.28 | 217.16 | 79.24 | #[iii] | 513.40 | 101.61 | 18.22 |
| Gini | 0.68 | 0.76 | 0.61 | 0.76 | 0.58 | 0.66 | 0.68 | 0.56 | 0.61 | 0.66 | 0.60 | 0.65 | 0.67 | 0.53 | 0.45 |
| Counterfactual | . | 0.75 | 0.60 | 0.75 | 0.60 | 0.63 | 0.67 | 0.58 | 0.63 | 0.65 | 0.59 | 0.63 | 0.68 | 0.54 | 0.46 |

*Notes:*

(i) This table shows (in thousand Euro) the mean, percentiles, and distributional measures (percentile ratios and Gini coefficient) of net wealth in the euro area. For each statistic, one can see the estimate based on original weights and the counterfactual estimates using the re-weighted household weights controlling for the differences of the household structure.

(ii) For the euro area there is no counterfactual estimate by definition, thus cells are denoted with a dot.

(iii) In the Netherlands P10 is zero in implicate 1, hence the P90/P10 quantile ratio cannot be estimated.

(iv) *Source:* Eurosystem HFCS 2010.

calls for very flexible controls.

More results of imposing common household structure are shown in the Appendix C. See table C.1 and C.2 for counterfactuals for the extensive and intensive margins of net wealth components. See also figures C.1 to C.14, for country wise comparisons of the countries' net wealth distributions to the euro area distribution, the countries re-weighted distribution, the differences between those as well as a comparison of a ad-hoc individual level net wealth distribution where net wealth is divided by and household weights are multiplied by household members for each household. That assumes an equal allocation of household level wealth to household members.

### 3.2 How to control for household structure

Most empirical papers use the household size as well as age (age squared) and gender of a more or less arbitrarily selected so called reference person or householder - such as the reference person according to the Canberra definition or highest income earner - to control for household structure. This approach implies strong functional assumptions about the relationship of household structure and the variable(s) of interest. Furthermore, it ignores age and gender of all other household member in two or more person household, which in all HFCS countries are the majority of households. However for most household level variables as net wealth, household income, participation rates in certain assets, transfers, inheritances and gifts, portfolio choice, and many more, age and gender of all household members will be relevant to the households realization of a certain variable. This fact is already relevant when comparing households within countries but is especially important for cross country comparison if the patterns of household structure are different between countries. While a 3 person household with a reference person aged around 30 living still with her older parents might be relatively common in Spain it is not in Germany, where the three person household with a (female) reference person aged around 30 is more likely to be a couple with a child. Using only household size and a reference persons age and gender information will not differentiate between these household types. The more the occurrence of such household types differs strongly between countries the more explanatory power will be transferred to other variables with cross country differences or country fixed effects, possibly leading to large bias and therefore misleading results.

We argue for taking into account the most relevant characteristics, i.e. age and gender, and possible combinations of all household members when controlling for household structure is desirable. One way to do so is to add a household type fixed effect for most relevant house-

hold types (e.g. the top 30 for the euro area as shown in table 3).[13] If net wealth is regressed on standard household characteristic controls (a set of household size dummies, gender, age, and age squared of the reference person) and the top 30 set of household type fixed effects 22 of the 30 stay significant and the joint F-test on all of them having zero explanatory power is also rejected. Furthermore, one can regress each of the household type dummies on the standard household characteristics controls (as above) and then regress net wealth on those residuals, which represent the information in the household type dummies which is orthogonal to the standard household characteristics controls. Again the $H_0$ of the joint F-test that the explanatory power of the residuals (the information orthogonal to the standard controls) is zero is rejected.

Therefore, even with only the top 30 populated household types in the euro area and including a quadratic age term in the standard controls additional explanatory power of the household type fixed effect can be shown. Naturally, this result holds for any standard household structure control not including a quadratic age term or assuming linearity along household size. The explanatory power of course increases if all 249 household types are included. However, while such a large number of household type fixed effect are of no concern at the euro area level using the full HFCS dataset with more than 62.000 observations, it might be problematic for smaller subsets of the data. Note therefore that a small number - like the top 30 for which illustrated their significance as additional controls - might include already a large proportion of households and the subset of household fixed effects used can be chosen according to their occurrence in the data used. For the full HFCS sample all the 249 household types might be appropriate, whereas for the subset of southern countries another subset of household type fixed effects might be in order than for a northern subset of countries. Even though the explanatory power of using the top 30 household types alone is close to using the standard household characteristic controls we recommend using both together. Additionally, household type fixed effects or the re-weights might be used to check robustness of results when for some reasons standard household characteristic controls are preferred.

# 4 Concluding remarks

In this paper we highlight the importance of household structure for household level analyses. We use non-parametric re-weighting to impose the euro area household structure on all observed euro area countries and examine the extent to which differences in the observed unconditional distributions of net wealth between countries are due to differences in the struc-

[13] We provide an indicator resulting from our non-parametric procedure to define a set of different household types as explained in section 2.2, from which such a set of dummy variables can easily be constructed, here: `http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1663-annexes.zip`.

ture of the household as the unit of observation.
We employ the euro area Household Finance and Consumption Survey, the first high quality a-priori harmonized dataset which allows for such a cross country comparison across 14 euro area countries. We find that household structure plays a major role in explaining differences in net wealth distributions as well as their mappings to inequality measures across all countries. Additionally, country rankings are severely altered once controlling for household structure. At different parts of the net wealth distribution household structure either accounts for a large part of the differences to the euro area net wealth distribution or masks the extent of these differences. These patterns differ between countries with regard to direction and size of the effect of imposing a common household structure. Our re-weighting method can be interpreted as a flexible alternative to equivalence scales.

At the bottom differences between observed and counterfactual distributions are relatively stronger than at the top. For the median 50% of the differences are explained for Austria, 15% for Germany, 14% for Spain, 25% for Italy and 38% for Malta. For others as Belgium, France, Greece, Luxembourg, Portugal, Slovenia and Slovakia household structure masks the differences to the euro area median. Finland's median is 86 thousand Euro and well bellow the euro area median of 109 thousand Euro whereas its re-weighted median 112 thousand Euro already lies above the euro area median. The Netherlands also changes its position from below to above the euro area median. Patterns differ along the distribution for many countries such as Austria, France, Slovenia and Slovakia which move closer for some areas and further away for others. Finland, Greece, the Netherlands and Portugal even switch position with regard to the euro area in some areas. Belgium and Luxembourg always move away from the euro area whereas Germany and Italy are always getting closer. Beside the direction of the effects also their level changes considerably along countries as well as their net wealth distributions.

The impact on percentile ratios is similarly strong. We can confirm the finding of Bover (2010) that the effect on the Gini is somewhat less pronounced, but might mask relevant information by being a net effect of different accumulated effects along the distribution.

Given those findings we argue for more flexible controls for household structure and illustrate that even a small subset of the top 30 populated of our non-parametrically defined household types adds explanatory power to the standard approach of using information on household size and age and gender of a reference person only. Together with the definition of our household types which can be used flexibly to control for household type fixed effects in regression we provide our re-weighting weights which allow to analyse the relevance of household structure for any HFCS variable.

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# Appendix A Cell construction

We define household types by all possible combinations of 4 age categories and gender for each individual (member) up to 4 individuals in each household. We are (i) not taking a particular order of individuals or (ii) gender for individuals aged 15 or below into account. Households with 5 or more members are treated as 4 person households and sorted with regard to the first 4 members, the financially knowledgeable person (respondent) and the next 3 persons sorted by descending age. This results in 329 possible household types of which 249 are observed at least once in the euro area.

The following shows the construction of the different household types over all countries in the euro area.

1. We take the first four members of each household.
2. Each members belongs to one of four age groups:

   1: below 16 years

   2: between 16 and 34 years

   3: between 35 and 64 years

   4: above 64 years
3. Each household member belongs to one of three gender groups:

   1: male

   2: female

   3: children
4. Each household member belongs therefore to a unique age-gender cell.
   Examples:

   - A male, 30 year old household member belongs in the cell [21].
   - A female, 68 year old household member belongs in the cell [42].
5. Each household consists of a unique combination of age-gender pairs of the first four household members. We refer to this combination as the household type code. The household type code describes the composition of the household. Two numbers for each individual in a household, where the first refers to age category ((1 = [-; 15]; 2 = [16; 34]; 3 = [35; 64]; 4 = [65;+])) and the second refers to gender for all individuals aged 16+ (1 = male; 2 = female; 3 = below 16). The code is sorted by individual age. The most common household type 3132 is therefore a two person household (4 digits), consisting of a man aged between 35 and 64 [31] and a woman aged between 35 and 64 [32].
   Examples:

- A household with 2 household members consisting of one male, between 35 and 64 years old and one female, between 35 and 64 years old, belongs then to the unique household cell of [31,32].
- A single household with a female, above 64 year old household member belongs to the unique household cell of [42].
- A household with 2 household members consisting of one male, above 64 years and one female, above 64 years, belongs then to the unique household cell of [41,42].

The above three examples represent the most common household types in the euro area.

In order to calculate the number of possible cell combination we start at the person level. One person can be identified by one of the following combinations of age-gender pairs, whereby the first digit reflects the age group and the second the gender of the person. This takes into account that a person below 16 is always a child and a child can never be older than 15 years old.

In table A.5 below in the first rows we see the 7 different person types, that we will observe based on the possible combinations of age and gender groups [A,B,C,D,E,F,G]. Each person falls into one of the 7 categories. For a household size larger than one we may observe different combinations of persons living in such a household. Therefore, the permutations for each household size can be determined as k (householdsize) combinations out of 7 elements (person characteristics).

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

The formula to determine all possible cell combinations for different household sizes is a permutation with repetition without taking the rank order into account. The maximum number of combinations is 329. It allows for combinations of persons living in a household that are very unlikely to be observed in the actual household data e.g. a single household consisting of a minor (below 16 years old). The actual number of household cells observed in the euro area are 249 different types.

Table A.5: Combinations

| Size | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | 7 Combinations | | | |
| 1 | [13]<br>A | [21]<br>B | [22]<br>C | [31]<br>D | [32]<br>E | [41]<br>F | [42]<br>G |
| | | | | 28 Combinations | | | |
| 2 | [A,A] | | | | | | |
| | [A,B] | [B,B] | | | | | |
| | [A,C] | [B,C] | [C,C] | | | | |
| | [A,D] | [B,D] | [C,D] | [D,D] | | | |
| | [A,E] | [B,E] | [C,E] | [D,E] | [E,E] | | |
| | [A,F] | [B,F] | [C,F] | [D,F] | [E,F] | [F,F] | |
| | [A,G] | [B,G] | [C,G] | [D,G] | [E,G] | [F,G] | [G,G] |
| | | | | 84 Combinations | | | |
| 3 | [AAA] | [ABB] | [ACC] | [ADD] | [AEE] | [AFF] | [AGG] |
| | [AAB] | [ABC] | [ACD] | [ADE] | [AEF] | [AFG] | [BGG] |
| | [AAC] | [ABD] | [ACE] | [ADF] | [AEG] | [BFF] | [BBD] |
| | [AAD] | [ABE] | [ACF] | [ADG] | [BEE] | [BFG] | [BBE] |
| | [AAE] | [ABF] | [ACG] | [BDD] | [BEF] | [BCE] | [BBF] |
| | [AAF] | [ABG] | [BCC] | [BDE] | [BBC] | [BDG] | [BDF] |
| | [AAG] | [BBB] | [BCD] | [BEG] | [BCF] | [BCG] | [BBG] |
| | [CCC] | [CDD] | [CEE] | [CFF] | [CGG] | [DEG] | [EFG] |
| | [CCD] | [CDE] | [CEF] | [CFG] | [DDD] | [EFF] | [EEE] |
| | [CCE] | [CDF] | [CEG] | [DFF] | [DDE] | [FGG] | [EEF] |
| | [CCF] | [CDG] | [DEF] | [DGG] | [DDF] | [FFG] | [EEG] |
| | [CCG] | [DEE] | [DFG] | [EGG] | [DDG] | [GGG] | [FFF] |
| | | | | 210 Combinations | | | |
| 4 | [AAAA] | [AABB] | [AACC] | [AADD] | [AAEE] | [AAFF] | [AAGG] |
| | [AAAB] | [AABC] | [AACD] | [AADE] | [AAEF] | [AAFG] | [ABGG] |
| | [AAAC] | [AABD] | [AACE] | [AADF] | [AAEG] | [ABFF] | [ACGG] |
| | [AAAD] | [AABE] | [AACF] | [AADG] | [ABEE] | [ABFG] | [ADGG] |
| | [AAAE] | [AABF] | [AACG] | [ABDD] | [ABEF] | [ACFF] | [AEGG] |
| | [AAAF] | [AABG] | [ABCC] | [ABDE] | [ABEG] | [ACFG] | [AFGG] |
| | [AAAG] | [ABBB] | [ABCD] | [ABDF] | [ACEE] | [ADFF] | [AGGG] |
| | [ABBC] | [ABCE] | [ABDG] | [ACEF] | [ADFG] | [BBGG] | [DDGG] |
| | [ABBD] | [ABCF] | [ACDD] | [ACEG] | [AEFF] | [BCGG] | [DEGG] |
| | [ABBE] | [ABCG] | [ACDE] | [ADEE] | [AEFG] | [BDGG] | [DFGG] |
| | [ABBF] | [ACCC] | [ACDF] | [ADEF] | [AFFF] | [BEGG] | [DGGG] |
| | [ABBG] | [ACCD] | [ACDG] | [ADEG] | [AFFG] | [BFGG] | [EEGG] |
| | [BBBB] | [ACCE] | [ADDD] | [AEEE] | [BBFF] | [BGGG] | [EFGG] |
| | [BBBC] | [ACCF] | [ADDE] | [AEEF] | [BBFG] | [CCGG] | [EGGG] |
| | [BBBD] | [ACCG] | [ADDF] | [AEEG] | [BCFF] | [CDGG] | [FFGG] |
| | [BBBE] | [BBCC] | [ADDG] | [BBEE] | [BCFG] | [CEGG] | [FGGG] |
| | [BBBF] | [BBCD] | [BBDD] | [BBEF] | [BDFF] | [CFGG] | [GGGG] |
| | [BBBG] | [BBCE] | [BBDE] | [BBEG] | [BDFG] | [CGGG] | [DDFF] |
| | [CCDF] | [CDEE] | [BBCF] | [BBDF] | [BCEE] | [BEFF] | [DDFG] |
| | [CCDG] | [CDEF] | [BBCG] | [BBDG] | [BCEF] | [BEFG] | [DEFF] |
| | [CDDD] | [CDEG] | [BCCC] | [BCDD] | [BCEG] | [BFFF] | [DEFG] |
| | [CDDE] | [CEEE] | [BCCD] | [BCDE] | [BDEE] | [BFFG] | [DFFF] |
| | [CDDF] | [CEEF] | [BCCE] | [BCDF] | [BDEF] | [CCFF] | [DFFG] |
| | [CDDG] | [CEEG] | [BCCF] | [BCDG] | [BDEG] | [CCFG] | [EEFF] |
| | [DDDD] | [DDEE] | [BCCG] | [BDDD] | [BEEE] | [CDFF] | [EEFG] |
| | [DDDE] | [DDEF] | [CCCC] | [BDDE] | [BEEF] | [CDFG] | [EFFF] |
| | [DDDF] | [DDEG] | [CCCD] | [BDDF] | [BEEG] | [CEFF] | [EFFG] |
| | [DDDG] | [DEEE] | [CCCE] | [BDDG] | [CCEE] | [CEFG] | [FFFF] |
| | [EEEE] | [DEEF] | [CCCF] | [CCDD] | [CCEF] | [CFFF] | [FFFG] |
| | [EEEF] | [DEEG] | [CCCG] | [CCDE] | [CCEG] | [CFFG] | [EEEG] |

# Appendix B Reweighting methodology

Re-weighting is done as given in equation 3 in section 2.2. Once household types are defined one can re-weight fully non-parametrically instead of using some type of parametrical model to obtain the weights (e.g. propensity score re-weighting). The re-weights are obtained directly by combining the probabilities of a random household being of a certain type in a certain country as well as in the euro area as a whole. Consider the example in table B.1 for the case of full common support.

Table B.1: Example: Re-weighting in case of full common support

| | $EA$ | $C$ | $\Psi_H$ | Re-weighted $C$ |
|---|---|---|---|---|
| P (Type I) | 0.5 | 0.6 | 0.833 | 0.5 |
| P (Type II) | 0.4 | 0.35 | 1.143 | 0.4 |
| P (Type III) | 0.1 | 0.05 | 2.000 | 0.1 |

*Notes:*
(i) $\Psi_H := \frac{P^{ea}(H)}{P^c(H)}$ as defined in 3 is multiplied with the original final household weights (assumed to be one in this example) to re-weight the household types to match their share in the euro area.

Table B.2: Example: Re-weighting in case of incomplete common support

| | $EA$ | $C$ | $\Psi_H$ | Re-weighted $C$ |
|---|---|---|---|---|
| P (Type I) | 0.5 | 0.625 | 0.800 | 0.5 |
| P (Type II) | 0.4 | 0.375 | 1.067 | 0.4 |
| P(Type III) | 0.1 | not observed | missing | missing |

*Notes:*
(i) $\Psi_H := \frac{P^{ea}(H)}{P^c(H)}$ as defined in 3 is multiplied with the original final household weights (assumed to be one in this example) to re-weight the household types to match their share in the euro area.

If household cells are observed in the euro area but not in a specific country $\Psi_H$ is not defined as the denominator is zero (see the example in table B.2). Household types which do not occur cannot be re-weighted. Even though it might be very likely that these household types exist in the country, they might be so rare that they are not covered by the sample drawn. That does not influence the re-weighting procedure for all the observed households. Still the relative share of the household types observed are re-weighted to their relative share in the euro area, i.e. comparable households are compared, non-comparable ones (in the euroarea) are ignored.[14] This can also be interpreted as some extrapolation outside the common

[14]Note that the relative shares are important for our analysis and not that the sum of weights stays the same before and after re-weighting. This sum of weights is relevant for estimates of population totals, which do not make a lot of sense in this type of descriptive decomposition exercise. However, one could rescale the weights linearly to match the pre-re-weighting sum of weights, which would not change the analysis in this paper.

support due to the fact that because of small samples some household types which likely exist might not be part of the sample. However, as the vast majority of households are of very common types this effect due to small samples is likely to be also rather small, which can be shown by comparing household weights and re-weighted household weights.

After implementing the re-weighting procedure that controls for household structure in the HFCS the distribution of household weights in comparison with the original weights provided in the HFCS can be inspected in table B.3. As can be seen the distribution of households weights is almost not affected (hence the additional variance that is introduced through the re-weighting scheme should be very small).

Table B.3: Descriptive statistics of the original and reweighted households weights

| | Original | Reweighted |
|---|---|---|
| P5 | 68 | 64 |
| P10 | 119 | 116 |
| P25 | 306 | 293 |
| Median | 1,027 | 950 |
| Mean | 2,249 | 2,220 |
| P75 | 2,410 | 2,374 |
| P90 | 4,806 | 4,704 |
| P95 | 8,186 | 8,238 |
| Std. Deviation | 4,344 | 4,312 |

*Notes:*
(i) This table shows the mean, percentiles and standard deviation of households weights before ("Original") and after ("Reweighted") accounting for the differences in household structure.
(ii)*Source:* Eurosystem HFCS 2010.

One can also look at the distribution of the change of the weights due to the re-weighting (see table B.4). It is found that for almost 50% of the households the change in the final household weight is less then 20% and for only about 14% of households this change is more then 50%. That is the case because most households are of typical types which have very similar shares across most countries (see table 3 in section 2.2).

Table B.4: Share of household population (weighted) with weight changes

| Reweighted weights are ... | Share in % |
|---|---|
| more than 75% smaller | 1.2 |
| 75%-50% smaller | 3.2 |
| 50%-20% smaller | 24.4 |
| less then 20% change | 49.6 |
| 20%-50% higher | 12.2 |
| 50%-300% higher | 9.2 |
| more than 300% higher | 0.2 |

*Notes:*

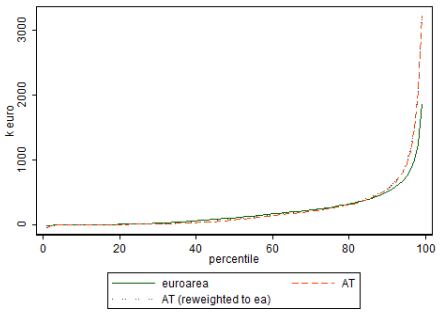
(i) This table shows the distribution of the relative changes in households weights that is due to the reweighting.

(ii)*Source:* Eurosystem HFCS 2010.

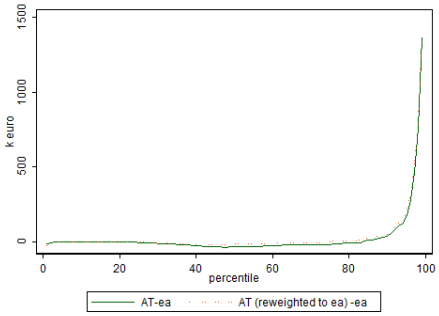
# Appendix C Additional results

Figure C.1: Austrian net wealth distribution with relation to the euro area

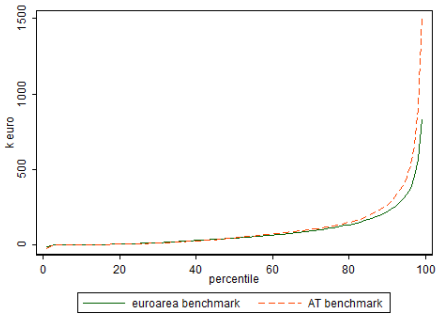
(a) (Reweighted) HH Dist.



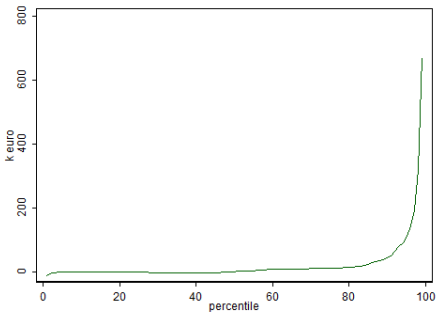

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



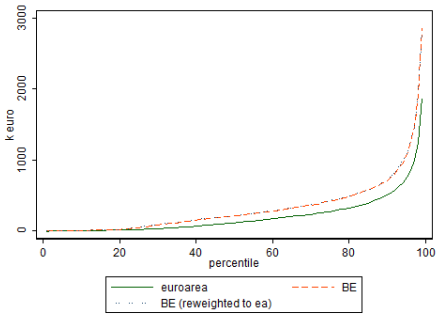

(d) Diff in Hyp. Pers. Dist.



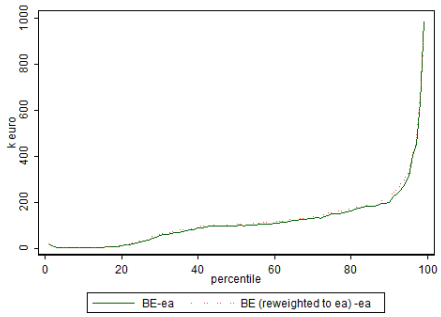

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Austria and the euro area as a whole, as well as a reweighted Austrian net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Austria and the euro area as a whole as well as the differences of the reweighted Austrian distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Austria and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.2: Belgian net wealth distribution with relation to the euro area

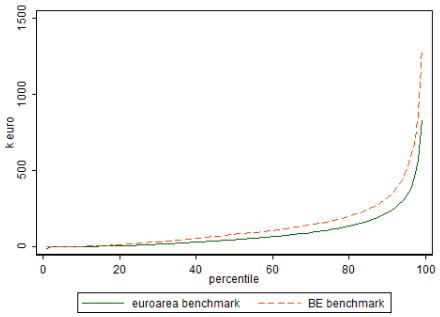
(a) (Reweighted) HH Dist.



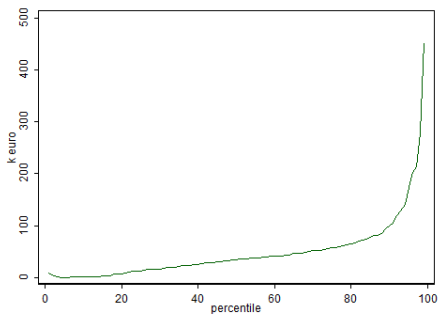

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



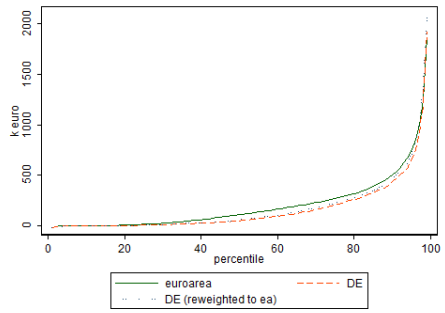

(d) Diff in Hyp. Pers. Dist.



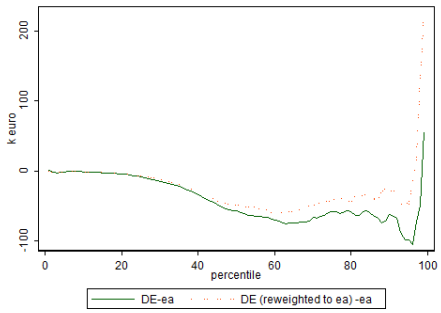

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Belgium and the euro area as a whole, as well as a reweighted Belgian net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Belgium and the euro area as a whole as well as the differences of the reweighted Belgian distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Belgium and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.3: German net wealth distribution with relation to the euro area

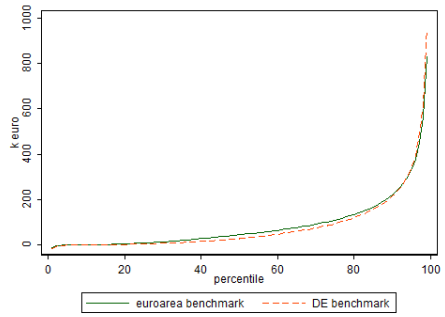
(a) (Reweighted) HH Dist.



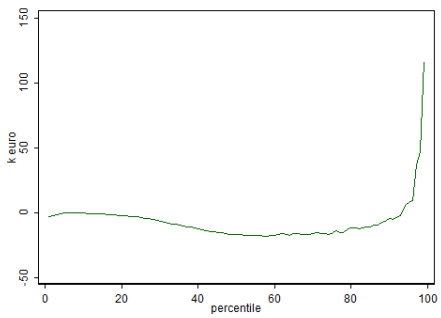

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



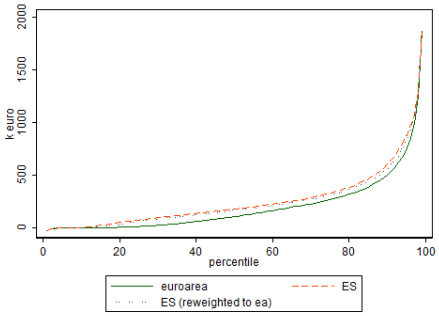

(d) Diff in Hyp. Pers. Dist.



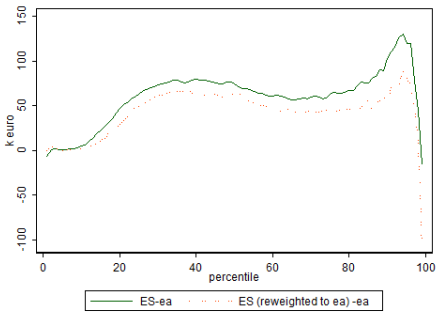

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Germany and the euro area as a whole, as well as a reweighted German net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Germany and the euro area as a whole as well as the differences of the reweighted German distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Germany and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.4: Spanish net wealth distribution with relation to the euro area

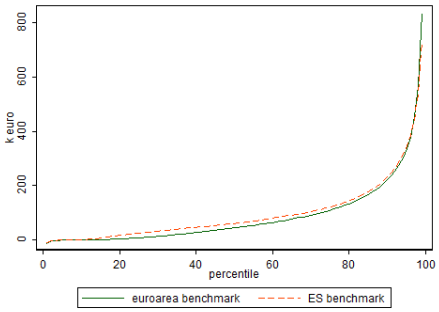
(a) (Reweighted) HH Dist.



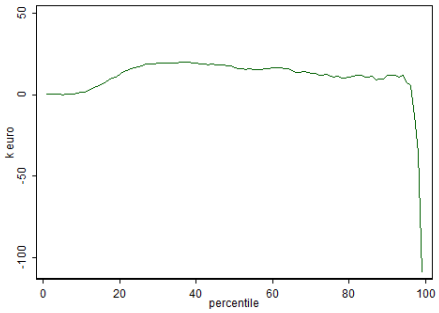

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



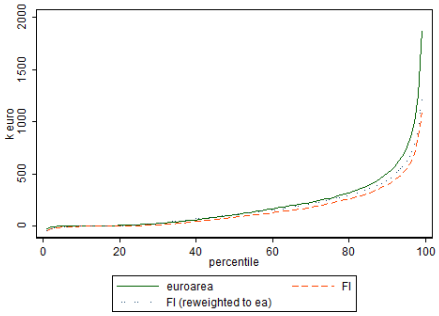

(d) Diff in Hyp. Pers. Dist.



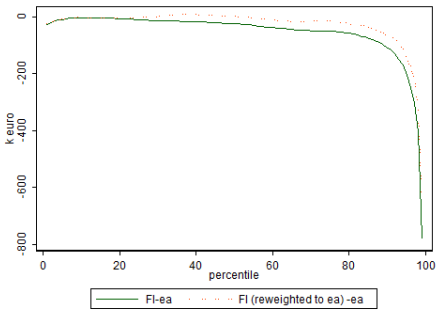

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Spain and the euro area as a whole, as well as a reweighted Spanish net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Spain and the euro area as a whole as well as the differences of the reweighted Spanish distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Spain and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.5: Finnish net wealth distribution with relation to the euro area

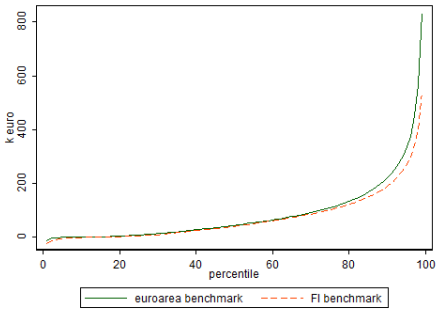
(a) (Reweighted) HH Dist.



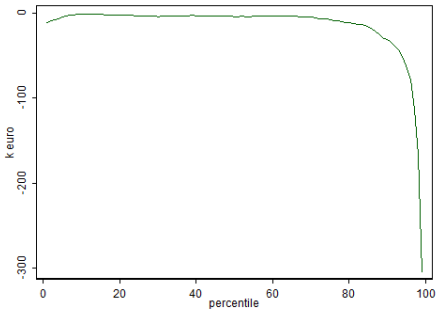

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



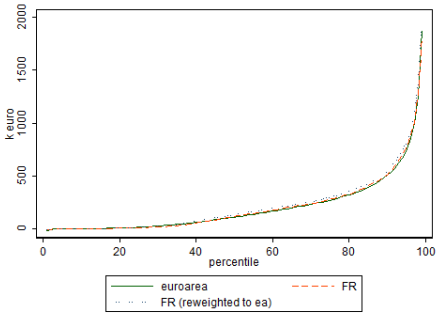

(d) Diff in Hyp. Pers. Dist.



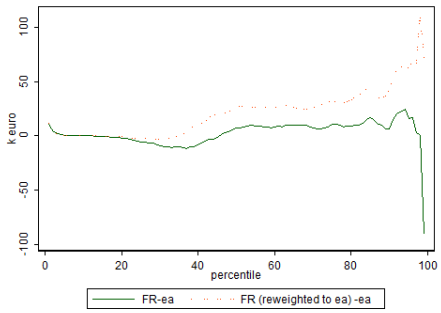

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Finland and the euro area as a whole, as well as a reweighted Finnish net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Finland and the euro area as a whole as well as the differences of the reweighted Finnish distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Finland and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.6: French net wealth distribution with relation to the euro area

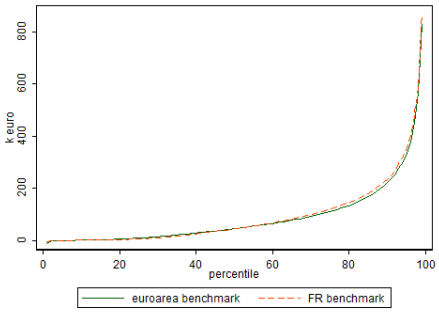
(a) (Reweighted) HH Dist.



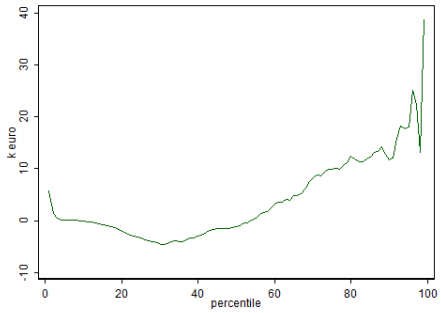

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



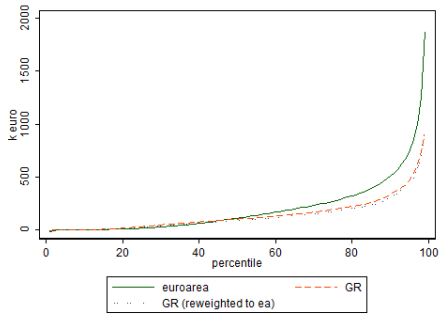

(d) Diff in Hyp. Pers. Dist.



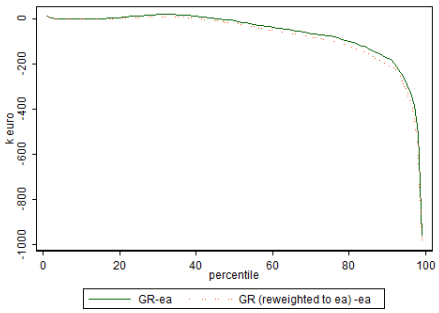

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of France and the euro area as a whole, as well as a reweighted French net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of France and the euro area as a whole as well as the differences of the reweighted French distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of France and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.7: Greek net wealth distribution with relation to the euro area

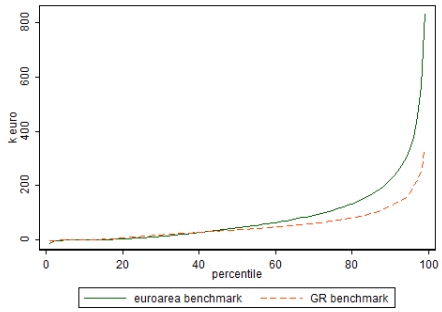
(a) (Reweighted) HH Dist.



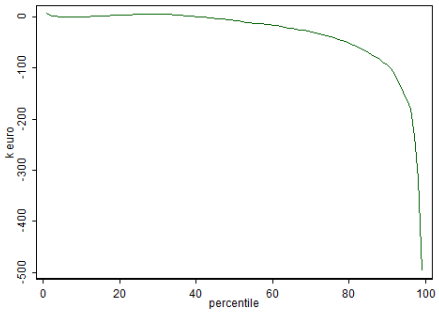

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.




(d) Diff in Hyp. Pers. Dist.




*Notes:*

(i) Graph (a) shows the net wealth distributions (99 percentiles) of Greece and the euro area as a whole, as well as a reweighted Greek net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).

(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Greece and the euro area as a whole as well as the differences of the reweighted Greek distribution (see (i)).

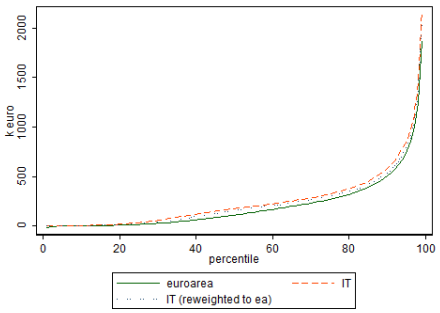
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Greece and the euro area as a whole under the assumption that household wealth is equally shared among all household members.

(iv) Graph (d) shows the differences between the hypothetical personal distributions.

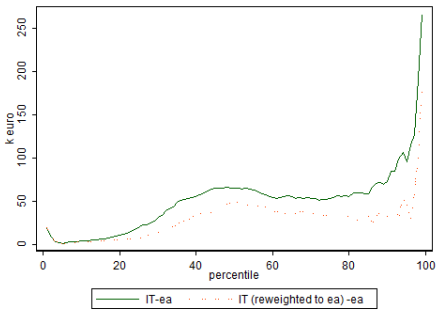
(v) *Source:* Eurosystem HFCS 2010.

Figure C.8: Italian net wealth distribution with relation to the euro area

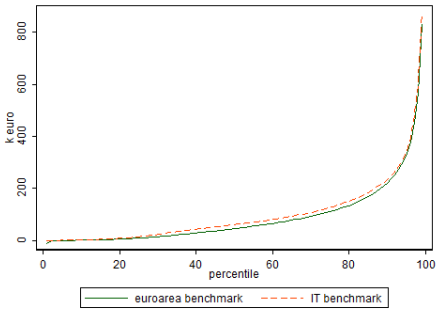
(a) (Reweighted) HH Dist.



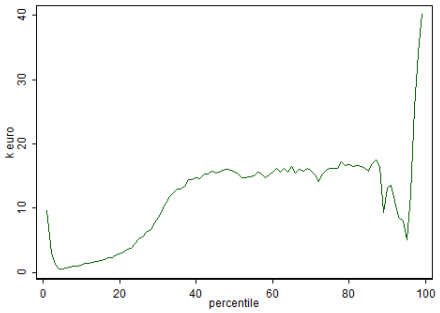

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



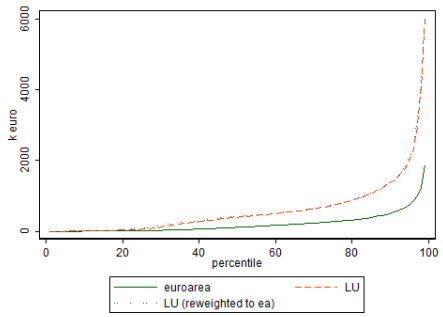

(d) Diff in Hyp. Pers. Dist.



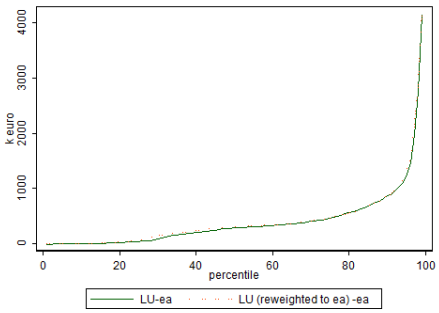

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Italy and the euro area as a whole, as well as a reweighted Italian net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Italy and the euro area as a whole as well as the differences of the reweighted Italian distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Italy and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.9: Luxembourgish net wealth distribution with relation to the euro area

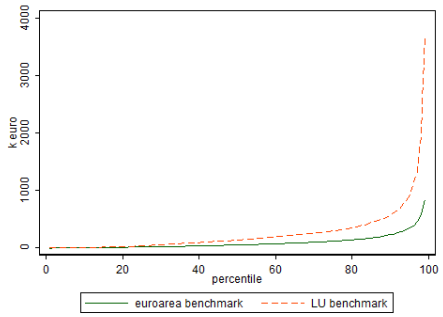
(a) (Reweighted) HH Dist.



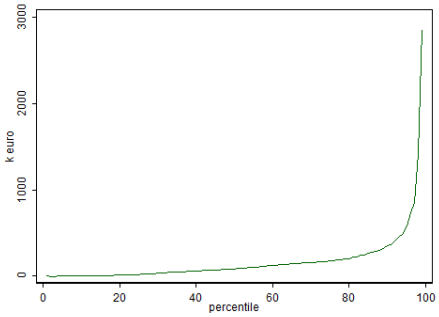

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



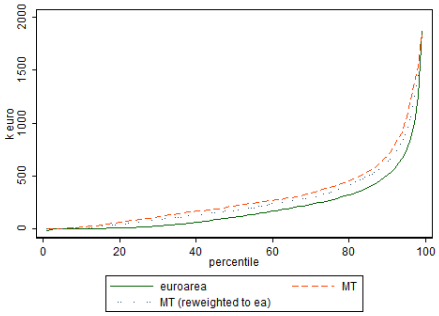

(d) Diff in Hyp. Pers. Dist.



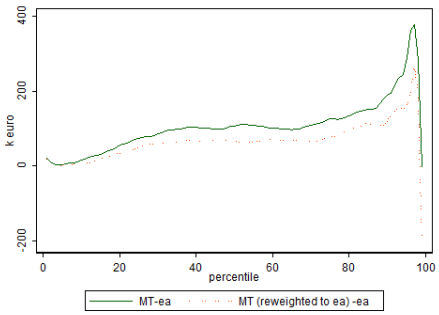

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Luxembourg and the euro area as a whole, as well as a reweighted Luxembourgish net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Luxembourg and the euro area as a whole as well as the differences of the reweighted Luxembourgish distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Luxembourg and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.10: Maltese net wealth distribution with relation to the euro area

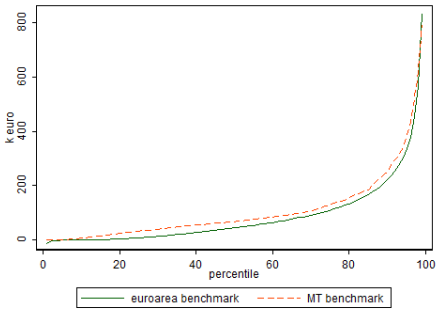
(a) (Reweighted) HH Dist.



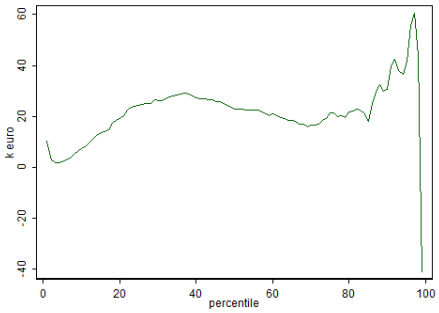

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



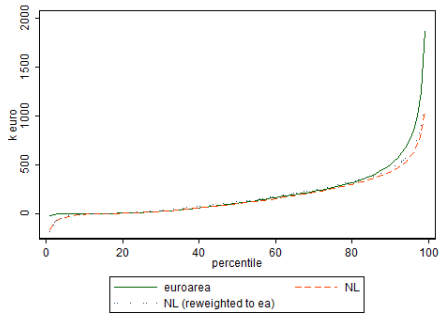

(d) Diff in Hyp. Pers. Dist.



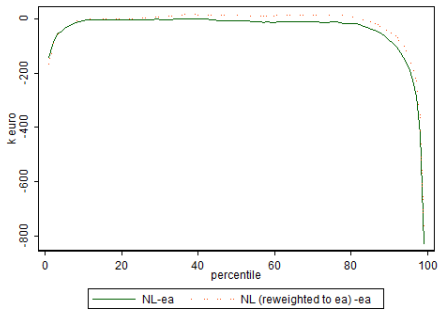

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Malta and the euro area as a whole, as well as a reweighted Maltese net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Malta and the euro area as a whole as well as the differences of the reweighted Maltese distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Malta and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.11: Dutch net wealth distribution with relation to the euro area

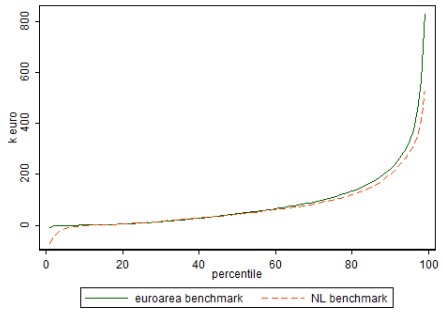
(a) (Reweighted) HH Dist.



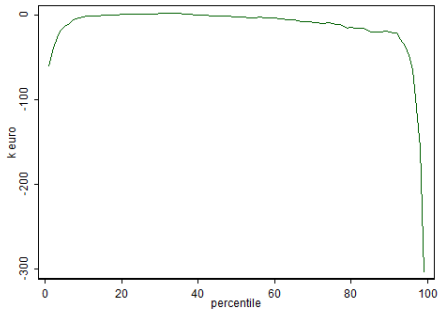

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.




(d) Diff in Hyp. Pers. Dist.




*Notes:*

(i) Graph (a) shows the net wealth distributions (99 percentiles) of the Netherlands and the euro area as a whole, as well as a reweighted Dutch net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).

(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of the Netherlands and the euro area as a whole as well as the differences of the reweighted Dutch distribution (see (i)).

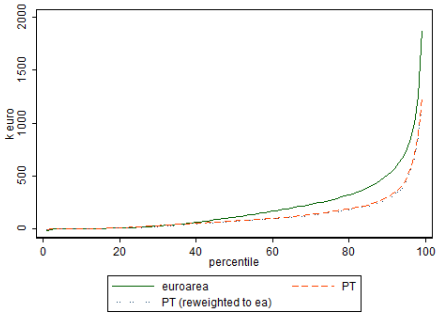
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of the Netherlands and the euro area as a whole under the assumption that household wealth is equally shared among all household members.

(iv) Graph (d) shows the differences between the hypothetical personal distributions.

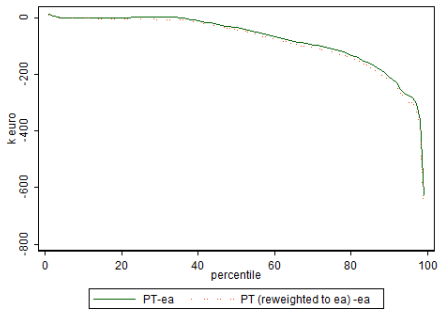
(v) *Source:* Eurosystem HFCS 2010.

Figure C.12: Portuguese net wealth distribution with relation to the euro area

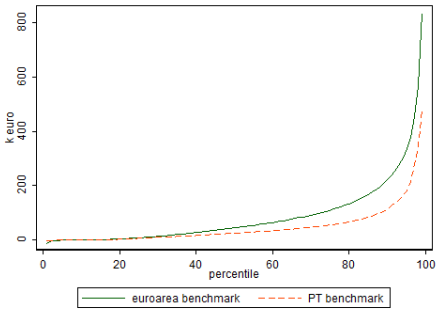
(a) (Reweighted) HH Dist.



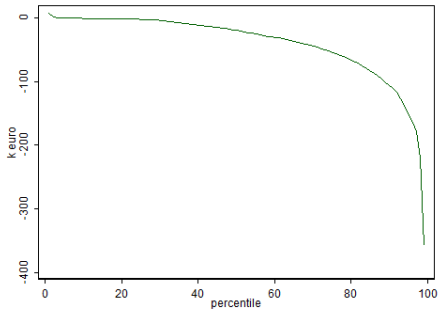

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



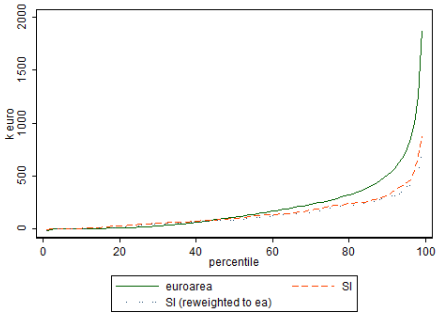

(d) Diff in Hyp. Pers. Dist.



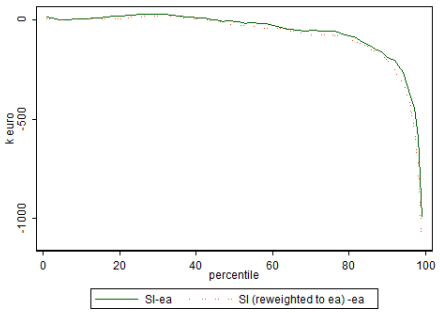

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Portugal and the euro area as a whole, as well as a reweighted Portuguese net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Portugal and the euro area as a whole as well as the differences of the reweighted Portuguese distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Portugal and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.13: Slovenian net wealth distribution with relation to the euro area

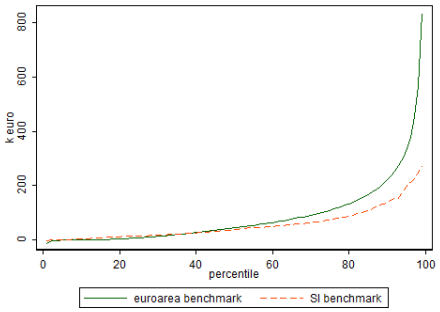
(a) (Reweighted) HH Dist.



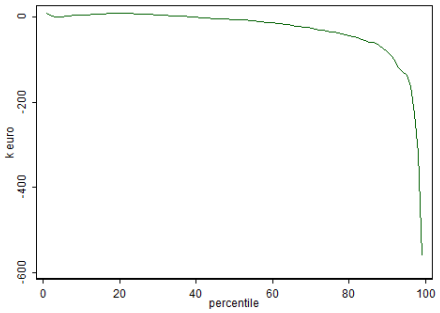

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.



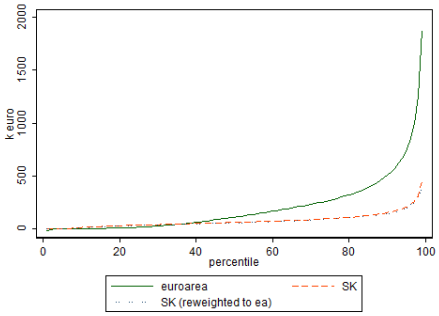

(d) Diff in Hyp. Pers. Dist.



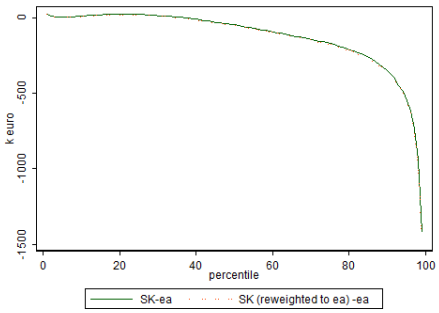

*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Slovenia and the euro area as a whole, as well as a reweighted Slovenian net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Slovenia and the euro area as a whole as well as the differences of the reweighted Slovenian distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Slovenia and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Figure C.14: Slovakian net wealth distribution with relation to the euro area

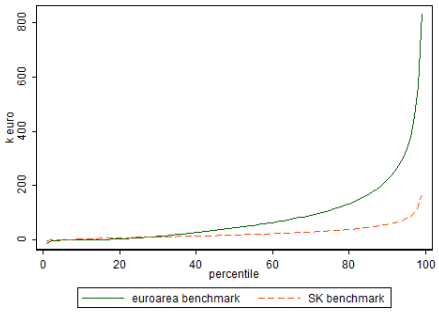
(a) (Reweighted) HH Dist.



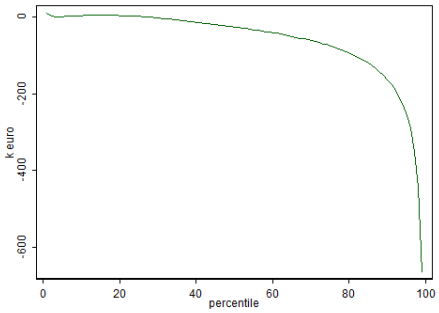

(b) Diff in (reweighted) HH Dist.




(c) Hyp. Personal Dist.




(d) Diff in Hyp. Pers. Dist.




*Notes:*
(i) Graph (a) shows the net wealth distributions (99 percentiles) of Slovakia and the euro area as a whole, as well as a reweighted Slovakian net wealth distribution to match euro area household structure (using non-parametric reweighting as described in section 2.2).
(ii) Graph (b) shows the differences between the net wealth distributions (99 percentiles) of Slovakia and the euro area as a whole as well as the differences of the reweighted Slovakian distribution (see (i)).
(iii) Graph (c) shows a hypothetical personal net wealth distributions (99 percentiles) of Slovakia and the euro area as a whole under the assumption that household wealth is equally shared among all household members.
(iv) Graph (d) shows the differences between the hypothetical personal distributions.
(v) *Source:* Eurosystem HFCS 2010.

Table C.1: Effects of household structure differences across countries on extensive margin

| Variable Names | Euro Area | AT | BE | DE | ES | FI | FR | GR | IT | LU | MT | NL | PT | SI | SK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Real Ass Part | 0.911 | 0.848 | 0.898 | 0.802 | 0.953 | 0.848 | 1.000 | 0.922 | 0.977 | 0.936 | 0.948 | 0.898 | 0.901 | 0.962 | 0.960 |
| Real Ass Count | . | 0.863 | 0.898 | 0.824 | 0.937 | 0.876 | 1.000 | 0.907 | 0.974 | 0.941 | 0.924 | 0.911 | 0.875 | 0.953 | 0.951 |
| HMR Part | 0.601 | 0.477 | 0.696 | 0.442 | 0.827 | 0.692 | 0.553 | 0.724 | 0.687 | 0.671 | 0.777 | 0.571 | 0.715 | 0.818 | 0.899 |
| HMR Count | . | 0.502 | 0.704 | 0.468 | 0.800 | 0.740 | 0.582 | 0.695 | 0.651 | 0.695 | 0.741 | 0.623 | 0.674 | 0.774 | 0.883 |
| FRE Part | 0.238 | 0.134 | 0.164 | 0.178 | 0.362 | 0.298 | 0.285 | 0.379 | 0.249 | 0.282 | 0.314 | 0.061 | 0.271 | 0.232 | 0.153 |
| FRE Count | . | 0.140 | 0.165 | 0.193 | 0.335 | 0.339 | 0.301 | 0.344 | 0.225 | 0.281 | 0.285 | 0.076 | 0.256 | 0.205 | 0.133 |
| BUS Part | 0.110 | 0.094 | 0.066 | 0.091 | 0.142 | 0.138 | 0.089 | 0.098 | 0.180 | 0.052 | 0.115 | 0.048 | 0.077 | 0.116 | 0.107 |
| BUS Count | . | 0.090 | 0.069 | 0.100 | 0.122 | 0.157 | 0.093 | 0.083 | 0.179 | 0.048 | 0.093 | 0.043 | 0.071 | 0.097 | 0.099 |
| Rest Real Part | 0.841 | 0.799 | 0.802 | 0.732 | 0.799 | 0.679 | 1.000 | 0.735 | 0.951 | 0.884 | 0.875 | 0.826 | 0.741 | 0.804 | 0.685 |
| Rest Real Count | . | 0.815 | 0.803 | 0.756 | 0.753 | 0.717 | 1.000 | 0.678 | 0.946 | 0.875 | 0.833 | 0.834 | 0.694 | 0.806 | 0.632 |
| Fin Ass Part | 0.969 | 0.995 | 0.980 | 0.993 | 0.983 | 1.000 | 0.996 | 0.745 | 0.920 | 0.984 | 0.972 | 0.978 | 0.945 | 0.939 | 0.917 |
| Fin Ass Count | . | 0.995 | 0.978 | 0.995 | 0.984 | 1.000 | 0.996 | 0.735 | 0.917 | 0.984 | 0.959 | 0.977 | 0.935 | 0.937 | 0.888 |
| Safe Fin Part | 0.967 | 0.994 | 0.979 | 0.991 | 0.982 | 1.000 | 0.996 | 0.739 | 0.919 | 0.984 | 0.969 | 0.973 | 0.943 | 0.936 | 0.915 |
| Safe Fin Count | . | 0.994 | 0.977 | 0.992 | 0.983 | 1.000 | 0.996 | 0.729 | 0.916 | 0.984 | 0.958 | 0.975 | 0.932 | 0.935 | 0.885 |
| Risky Fin Part | 0.201 | 0.146 | 0.307 | 0.230 | 0.140 | 0.387 | 0.217 | 0.040 | 0.198 | 0.258 | 0.337 | 0.239 | 0.065 | 0.203 | 0.041 |
| Risky Fin Count | . | 0.152 | 0.318 | 0.232 | 0.138 | 0.408 | 0.222 | 0.034 | 0.189 | 0.259 | 0.291 | 0.243 | 0.070 | 0.179 | 0.043 |
| Rest Fin Part | 0.125 | 0.114 | 0.106 | 0.223 | 0.080 | 0.000 | 0.121 | 0.041 | 0.049 | 0.088 | 0.060 | 0.107 | 0.085 | 0.067 | 0.103 |
| Rest Fin Count | . | 0.106 | 0.107 | 0.222 | 0.078 | 0.000 | 0.121 | 0.039 | 0.050 | 0.084 | 0.056 | 0.101 | 0.085 | 0.062 | 0.097 |
| Mortgage Part | 0.231 | 0.184 | 0.305 | 0.215 | 0.325 | 0.328 | 0.244 | 0.175 | 0.108 | 0.388 | 0.156 | 0.447 | 0.267 | 0.141 | 0.096 |
| Mortgage Count | . | 0.203 | 0.309 | 0.239 | 0.305 | 0.345 | 0.245 | 0.154 | 0.109 | 0.357 | 0.158 | 0.492 | 0.256 | 0.119 | 0.102 |
| Non-Mort Part | 0.297 | 0.214 | 0.242 | 0.346 | 0.307 | 0.512 | 0.328 | 0.261 | 0.178 | 0.369 | 0.252 | 0.373 | 0.183 | 0.389 | 0.199 |
| Non-Mort Count | . | 0.212 | 0.238 | 0.353 | 0.280 | 0.523 | 0.325 | 0.241 | 0.176 | 0.337 | 0.224 | 0.364 | 0.171 | 0.345 | 0.164 |
| Loan Tot Part | 0.437 | 0.356 | 0.448 | 0.474 | 0.500 | 0.598 | 0.469 | 0.366 | 0.252 | 0.583 | 0.341 | 0.657 | 0.377 | 0.445 | 0.268 |
| Loan Tot Count | . | 0.369 | 0.445 | 0.494 | 0.467 | 0.608 | 0.467 | 0.338 | 0.251 | 0.541 | 0.327 | 0.676 | 0.358 | 0.393 | 0.240 |

*Notes:*

(i) This table shows the participations rates of the portfolio components of net wealth in the euro area. For each statistic, one can see the estimate based on original weights and the counterfactual estimates using the re-weighted households weights controlling for the differences of the household structure.

(ii) The household portfolio is separated in real assets [Real Ass] (comprising the households' main residence [HMR], further real estate [FRE], self-employment business participation [BUS], and other real assets [Rest Real]), financial assets [Fin Ass] (comprising safe financial assets [Safe Fin], risky financial assets [Risky Fin], and other financial assets [Rest Fin]), and liabilities [Loan Tot] (comprising mortgage [Mortgage] and non-mortgage [Non-Mort] loans).

(iii) For the euro area there is no counterfactual estimate by definition, thus cells are denoted with a dot.

(iv) *Source:* Eurosystem HFCS 2010.

Table C.2: Effects of household structure differences across countries on intensive margin

| Variable Names | Euro Area | AT | BE | DE | ES | FI | FR | GR | IT | LU | MT | NL | PT | SI | SK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Real Ass Median | 144.60 | 106.99 | 220.00 | 89.20 | 201.74 | 143.68 | 124.14 | 114.26 | 176.00 | 470.49 | 201.06 | 198.79 | 91.88 | 105.90 | 61.79 |
| Real Ass Count | . | 118.83 | 222.90 | 100.84 | 192.41 | 160.15 | 138.68 | 105.00 | 161.00 | 470.60 | 181.59 | 213.98 | 89.00 | 96.92 | 58.33 |
| HMR Median | 180.30 | 200.00 | 250.00 | 168.00 | 180.30 | 127.79 | 193.82 | 100.00 | 200.00 | 500.00 | 186.64 | 240.00 | 90.00 | 110.92 | 55.90 |
| HMR Count | . | 200.00 | 250.00 | 180.00 | 180.30 | 135.50 | 196.73 | 100.00 | 200.00 | 500.00 | 180.84 | 240.00 | 89.96 | 101.99 | 52.43 |
| FRE Median | 100.00 | 94.03 | 174.00 | 115.00 | 120.20 | 107.57 | 96.06 | 61.93 | 100.00 | 300.00 | 120.12 | 165.53 | 53.46 | 52.35 | 16.40 |
| FRE Count | . | 89.29 | 178.50 | 120.00 | 120.20 | 109.40 | 98.98 | 60.00 | 90.00 | 300.00 | 110.47 | 157.75 | 53.37 | 44.21 | 17.80 |
| BUS Median | 30.00 | 180.60 | 50.00 | 19.40 | 50.84 | 0.90 | 53.14 | 36.18 | 15.00 | 97.60 | 136.51 | 51.69 | 47.13 | 25.48 | 4.60 |
| BUS Count | . | 198.90 | 50.00 | 20.40 | 50.42 | 0.90 | 54.05 | 45.14 | 10.00 | 97.60 | 169.68 | 50.00 | 46.38 | 25.54 | 5.21 |
| Rest Real Median | 7.00 | 8.57 | 7.50 | 7.78 | 7.19 | 9.32 | 4.32 | 6.00 | 9.50 | 18.74 | 7.08 | 6.51 | 5.00 | 3.31 | 4.50 |
| Rest Real Count | . | 9.05 | 7.50 | 8.00 | 6.01 | 10.05 | 4.53 | 6.00 | 9.00 | 18.20 | 6.44 | 7.00 | 5.00 | 3.00 | 4.00 |
| Fin Ass Median | 11.35 | 13.47 | 26.48 | 17.11 | 6.00 | 7.36 | 10.67 | 4.37 | 10.00 | 27.91 | 26.23 | 34.72 | 4.27 | 1.72 | 2.54 |
| Fin Ass Count | . | 14.81 | 27.62 | 18.54 | 6.00 | 8.53 | 11.43 | 4.00 | 8.84 | 28.60 | 23.62 | 39.61 | 4.08 | 1.72 | 2.39 |
| Safe Fin Median | 9.14 | 11.88 | 20.68 | 13.16 | 5.06 | 5.66 | 8.91 | 3.95 | 7.40 | 23.06 | 17.71 | 30.38 | 3.83 | 1.13 | 2.33 |
| Safe Fin Count | . | 13.39 | 21.78 | 14.77 | 4.96 | 6.63 | 9.67 | 3.63 | 7.00 | 23.38 | 16.61 | 32.62 | 3.74 | 0.99 | 2.25 |
| Risky Fin Median | 12.21 | 12.25 | 20.14 | 12.08 | 12.00 | 3.72 | 8.14 | 7.34 | 22.44 | 28.48 | 21.65 | 8.22 | 8.85 | 3.42 | 1.11 |
| Risky Fin Count | . | 12.62 | 20.00 | 12.88 | 12.00 | 3.81 | 8.42 | 5.26 | 20.68 | 31.08 | 22.05 | 10.22 | 8.75 | 3.25 | 1.00 |
| Rest Fin Median | 3.25 | 3.39 | 4.40 | 2.63 | 7.00 | . | 4.00 | 3.00 | 10.00 | 5.00 | 8.75 | 2.23 | 4.30 | 4.00 | 1.29 |
| Rest Fin Count | . | 4.20 | 5.00 | 2.86 | 6.01 | . | 4.02 | 2.00 | 7.43 | 5.80 | 7.00 | 3.06 | 4.00 | 7.00 | 1.11 |
| Mortgage Median | 68.24 | 37.55 | 69.25 | 80.00 | 60.00 | 64.40 | 55.88 | 40.96 | 60.00 | 127.33 | 35.00 | 130.97 | 48.76 | 6.63 | 25.04 |
| Mortgage Count | . | 42.73 | 68.55 | 80.00 | 60.06 | 62.43 | 52.60 | 43.30 | 65.00 | 129.13 | 38.00 | 129.20 | 53.06 | 8.83 | 25.99 |
| Non-Mort Median | 4.98 | 3.02 | 5.16 | 3.17 | 7.19 | 6.78 | 5.19 | 4.32 | 5.70 | 10.02 | 4.00 | 13.71 | 3.31 | 3.07 | 1.05 |
| Non-Mort Count | . | 3.32 | 5.13 | 3.30 | 6.00 | 7.22 | 5.36 | 4.00 | 5.40 | 10.01 | 3.34 | 12.56 | 3.00 | 2.54 | 1.00 |
| Loan Tot Median | 21.37 | 13.78 | 39.30 | 12.62 | 36.00 | 29.45 | 18.38 | 14.57 | 15.00 | 73.44 | 15.67 | 89.13 | 31.69 | 4.34 | 3.20 |
| Loan Tot Count | . | 17.04 | 40.89 | 15.00 | 36.31 | 33.56 | 17.97 | 12.96 | 15.00 | 71.84 | 13.80 | 97.14 | 34.98 | 3.56 | 5.00 |

*Notes:*

(i) This table shows (in thousand Euro) the median of the portfolio components of net wealth in the euro area. For each statistic, one can see the estimate based on original weights and the counterfactual estimates using the re-weighted households weights controlling for the differences of the household structure.

(ii) The household portfolio is separated in real assets [Real Ass] (comprising the households' main residence [HMR], further real estate [FRE], self-employment business participation [BUS], and other real assets [Rest Real]), financial assets [Fin Ass] (comprising safe financial assets [Safe Fin], risky financial assets [Risky Fin], and other financial assets [Rest Fin]), and liabilities [Loan Tot] (comprising mortgage [Mortgage] and non-mortgage [Non-Mort] loans).

(iii) For the euro area there is no counterfactual estimate by definition, thus cells are denoted with a dot.

(iv) *Source:* Eurosystem HFCS 2010.