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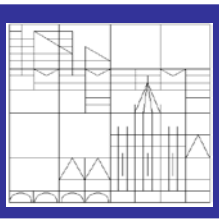

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Working Paper Series
2015-18

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Wealth Inequality and Homeownership in Europe*

Leo Kaas†, Georgi Kocharkov‡, and Edgar Preugschat§

August 27, 2015

Abstract

The recently published Household Finance and Consumption Survey has revealed large differences in wealth inequality between the countries of the Euro area. We find a strong negative correlation between wealth inequality and homeownership rates across countries. We use two decomposition methods to shed more light on this correlation. First, a Gini decomposition by homeownership status shows that the negative relationship is mostly driven by large between-group inequality across owners and renters. Second, to control for other observables, we conduct a detailed counterfactual decomposition of cross-country inequality differences. We confirm the major role for homeownership rates in accounting for the wealth inequality differences. Our analysis suggests that the cross-country variation is mostly driven by differences in the savings behavior of households in the bottom half of the wealth distribution and that those differences in savings are to a large extent channeled through housing wealth.

D31, E21, G11.

Keywords: Wealth Inequality, Homeownership, Housing, Euro Area.

*We thank Don Schlagenhauf and the audiences at the HFCS User Workshop in Frankfurt 2015 and the SFB 649 Workshop on "Interaction between Housing and the Economy" in Berlin 2015 for comments and useful suggestions.

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1 Introduction

The issues of wealth inequality, its determinants, and their international differences have re-entered the center-stage of discussion among academics and the general public with the publication of Piketty (2014). In this paper we take a comparative view on wealth inequality by examining the Household Finance and Consumption Survey (HFCS) recently published by the European Central Bank (2013). It is the first high-quality survey of household wealth data that is ex-ante harmonized across Euro area countries.[1] Focusing on the nine largest countries of the survey, we document significant differences in wealth inequality measured by the Gini coefficient, which ranges from 0.76 in Germany to 0.56 in Greece. At the same time, there are pronounced differences in homeownership rates, which are strongly negatively correlated with the Gini coefficients of net wealth.[2] To analyze the link between wealth inequality and homeownership rates we conduct two decomposition exercises. First, we decompose the Gini coefficient by homeownership status. Both the component of the homeowner group and the between-group component of this decomposition are quantitatively the most important ones in all of the countries. However, only the between-group component is relevant for the negative correlation. The negative correlation of the homeownership rate with the between-group component is based on the fact that the average renter is much poorer than the average owner. In countries, where the group of renters is relatively small, inequality is lower as that group has a relatively low weight in the overall population. That is, in all countries of the sample there are large wealth differences across owners and renters, but in countries with a large majority of homeowners this between-group inequality matters to a lesser extent.

To take other potential explanatory variables into account we then conduct a counterfactual decomposition of inequality differences based on a regression of the recentered influence function (RIF) of the Gini coefficient on observables. The regression coefficients on homeownership turn out to be the most important ones, showing a large negative effect on the Gini coefficient for all countries; they also have a similar magnitude across all countries. The counterfactual decomposition then confirms that the homeownership rate is the most important factor in accounting for the differences in the Gini coefficient across countries.

Furthermore, we argue that the savings behavior of households in the bottom half of the wealth distribution is crucial for understanding the differences across countries. The cross-country variation of wealth inequality is much higher for the poorer half than for the richer half. At the same time most of the differences in homeownership rates are found in the bottom half of the wealth distribution. In all countries, the portfolio of households below the median net wealth consists almost entirely of housing wealth. This suggests that differences in savings across countries are in part channeled through incentives to own a home and thereby affect differences in wealth inequality. This finding highlights that not only top percentiles are important to account for wealth inequality.

Our paper relates to the empirical literature concerned with cross-country comparisons of wealth accumulation and wealth inequality. First, Mathä *et al.* (2014) analyze HFCS data to examine cross-country variation in wealth holdings and point to the important role of homeownership. While they also look at different wealth quantiles, they do not explore the determinants of the cross-country inequality differences.[3] Bover (2010) compares the impact of the household structure on differences in the wealth distributions between the U.S. and Spain. Imposing the Spanish household structure on the U.S., she estimates a counterfactual wealth distribution, using the nonparametric approach of DiNardo *et al.* (1996) and finds small effects on the Gini coefficient. Fessler *et al.* (2014) confirm the relative small effect of household structure using HFCS data, but show that this masks strong effects in different segments of the overall wealth distri-

[1] The first cross-country data set is the Luxembourg Wealth Study, which is harmonized ex-post (see Sierminska *et al.* (2006)).

[2] See Tables 1 and 5 and Figure 1.

[3] See Bezrukovs (2013) for a related study.

bution. We therefore use detailed controls regarding household structure for our RIF regression. Christelis *et al.* (2013) evaluate comparable data from health and retirement surveys for the U.S. as well as for several European countries to examine the determinants of asset market participation and asset holdings. They also conduct a decomposition analysis for different quantiles of different portfolio components, but do not examine inequality differences of overall wealth.[4] Further, Davies *et al.* (2011) use different micro data sources for household wealth in 20 countries to construct a measure of global wealth inequality, while not addressing the underlying determinants of cross-country differences.

Finally, very few papers address the intricate issue of endogeneity in the context of estimating the determinants of wealth accumulation and inequality.[5] As it is difficult to find suitable instruments for the overall population, we do not to correct for potential endogeneity bias in our paper. However, in a companion study (Kaas *et al.* (2015)) we analyze the causal effect of homeownership on net wealth and its subcomponents, using inherited homes as an instrument.

The following section describes the data set and presents some important facts on wealth holdings and inequality as well as the negative correlation between wealth inequality and the homeownership rate. In Section 3 we decompose the Gini coefficient by homeownership status. Then, in Section 4 we present a cross-country decomposition based on a RIF regression of the Gini coefficient. Section 5 discusses the importance of the bottom half of the wealth distribution when accounting for the variation in both ownership rates and wealth inequality. Section 6 concludes.

2 Data and Basic Facts

Our data source is the first wave of the Eurosystem Household Finance and Consumption Survey (HFCS) published by the European Central Bank in 2013, which provides household-level data in 15 Euro area countries. These data are collected in a harmonized way for a sample of about 62000 households in the period 2009/2010. We restrict the sample to the nine largest countries of the Euro area: Austria, Belgium, Germany, Greece, Italy, the Netherlands, Portugal, and Spain, which include about 46000 sample households.[6] While there are slight differences in the survey periods, all results in this paper are based on nominal values (in Euros).[7]

Our wealth measure of interest is total net wealth of a household. Net wealth is all household wealth, including financial assets, real estate, stakes or ownership in businesses, and valuables minus total debt. Net wealth includes voluntary pension plans, but excludes occupational pension plans and promised entitlements to public retirement payments; thus the HFCS mean net wealth is below the mean net wealth estimated from national accounts (see European Central Bank (2013)).[8] In Table 1 we present different statistics of net wealth for the 9 countries in our sample. Median net wealth differs considerably across countries, but the dispersion of mean net wealth is less pronounced. This relationship between median and mean reflects large

[4] Methodologically, their approach is based on conditional quantile regressions developed by Machado and Mata (2005).

[5] See Chernozhukov and Hansen (2004) for an exception. They analyze the effects of participation in a retirement savings program on wealth quantiles, using an instrumental quantile regression approach.

[6] The HFCS data come in five samples. Each sample contains a different realization of imputations for missing or incorrect values. We follow Rubin (1987) to produce point estimates from the data by averaging over the separate estimates from each implicate. Standard errors for the regressions in the later sections of this paper are obtained by computing bootstrapped variances for each implicate using 200 of the provided replicate weights and by combining the within and between implicate variances as shown in Rubin (1987).

[7] Given the minimal differences in survey periods and the relatively low inflation rates in 2009/2010, this is unlikely to change the results presented here as we focus on inequality measures.

[8] There is evidence that implicit public pension wealth differs considerably across countries. However, there are no reliable data sources to quantify the promised pensions for all countries in our sample. In addition, public pension wealth is only a promise that is not guaranteed. Thus, such uncertainty would need to be measured to account for the role of expected pension wealth.

Table 1: Summary statistics for household net wealth and measures of inequality.

Country	Obs.	Mean	Median	Mean/Med.	90/50	75/25	Gini
Austria (AT)	2380	265033	76445	3.47	7.13	24.34	0.76
Belgium (BE)	2327	338647	206249	1.64	3.42	10.39	0.61
Germany (DE)	3565	195170	51358	3.80	8.62	31.79	0.76
Spain (ES)	6197	291352	182725	1.59	3.33	4.25	0.58
France (FR)	15006	233529	115891	2.02	4.42	28.46	0.68
Greece (GR)	2971	147757	101934	1.45	3.25	6.44	0.56
Italy (IT)	7951	275205	173500	1.59	3.33	9.39	0.61
Netherlands (NL)	1301	171446	102099	1.64	4.22	18.94	0.66
Portugal (PT)	4404	152920	75209	2.03	3.95	8.72	0.67

differences in net wealth inequality across countries. The Gini coefficient ranges from 0.56 in Greece to 0.76 in Germany. While the focus here is on the Gini coefficient, other measures such as the ratios of the 90th to the 50th quantile and the 75th to the 25th quantile presented in Table 1 follow a similar pattern.[9]

Next, we look at the importance of housing wealth for the average household's portfolio and its impact on inequality. We divide wealth into the components of net own housing wealth, net financial wealth, net real wealth, and business wealth and compute their shares. The first component consists of the value of the house that is owned by the household and used as a primary residence minus the amount of mortgage debt for that house. Net financial wealth is all financial wealth minus all debt that is not in the form of mortgages. Net real wealth includes items such as cars and valuables and other real estate net of mortgage debt for these other houses. The last item, business wealth is the net value of a (self-employment) business. We have chosen these categories as they refer to different economic functions. For instance, own housing wealth is different from financial investments, as wealth in form of a primary residence also has a direct use value. Further, business wealth reflects an important economic choice individuals undertake, i.e. whether or not to become an entrepreneur. Table 2 shows for each country the portfolio shares of the four components. As these averages include households with non-positive wealth holding, we also report in the last column the share of households with zero or negative wealth.[10]

We see that the shares of net own housing wealth are strikingly high even for countries with low ownership rates, such as Austria and Germany. On average, own housing contributes around one half of all wealth, with the lowest share being slightly below 40%. The second most important component is net real wealth, partly reflecting the importance of other real estate holdings. Net financial wealth and business wealth play a smaller role. In Appendix B we show that the contributions of each portfolio item roughly reflects its contribution to the overall Gini coefficient of a given country. Specifically, we find that the housing component contributes on average 42% to the overall Gini coefficient.

While the analysis thus far has indicated that housing wealth is very important for overall wealth inequality, we now show that it might also help to understand the differences in wealth inequality between countries. Not only wealth inequality but also homeownership rates differ strongly across our sample of countries. Homeownership rates range from 44% in Germany to 82% in Spain. In Figure 1 we plot the ownership rates against the Gini coefficients across countries, showing a remarkably strong negative corre-

[9] Piketty (2014) argues that the differences in the top percentiles are more important measures of inequality than the Gini coefficient or the 90-50 decile ratio. While the HFCS does oversample rich households, it is likely that the sample becomes very imprecise for the top 1% and above. However, as we argue below, the impact of homeownership is much stronger for the lower than for the upper deciles.

[10] Note that the presence of households with negative wealth holdings affects the Gini coefficient, which in such a case can exceed the value of one.

Table 2: Portfolio shares

Country	Net own housing	Net financial	Net real	Net business	Net wealth≤0
Austria	0.43	0.17	0.16	0.25	0.06
Belgium	0.49	0.31	0.16	0.05	0.04
Germany	0.38	0.22	0.24	0.15	0.09
Spain	0.53	0.10	0.27	0.10	0.04
France	0.47	0.19	0.25	0.09	0.04
Greece	0.56	0.06	0.34	0.05	0.06
Italy	0.61	0.09	0.21	0.09	0.03
Netherlands	0.53	0.31	0.12	0.03	0.12
Portugal	0.44	0.13	0.30	0.13	0.04
Average	0.49	0.18	0.23	0.10	0.06

lation.[11] In the following sections we investigate this correlation both by means of a Gini decomposition by homeownership status and a counterfactual decomposition of cross-country differences of the Gini coefficient, where we also account for other potential explanatory variables.

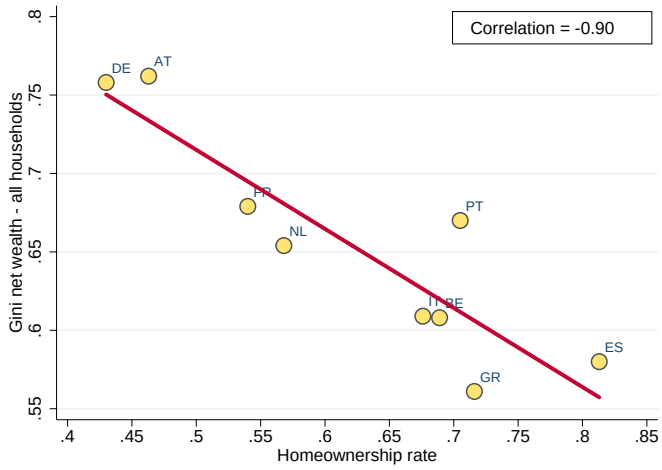


Figure 1: Wealth inequality and homeownership

3 Gini Decomposition by Homeownership Status

To better understand the correlation between the Gini coefficient and the homeownership rate, we conduct a decomposition of the Gini coefficient which accounts for the contributions of the subgroups of homeowners (o) and renters (r). The overall Gini coefficient of a given country can be decomposed in the following way (see e.g. Mookherjee and Shorrocks (1982)):

$$G = P_o S_o G_o + P_r S_r G_r + \bar{G} + \mathcal{R},$$

where G_i is the Gini coefficient within the group i, P_i is the population share and S_i the wealth share of group i. The term $\bar{G}$ is the Gini coefficient of between-group differences. It is based on the average wealth

[11] This fact is robust to including the smaller Euro area countries in the HFCS. The correlation is slightly reduced to -0.85.

Table 3: Relative contribution of subgroups to the overall Gini coefficient

Country	**Owners**	**Renters**	**Between**	**Residual**
Austria	0.31	0.08	0.51	0.09
Belgium	0.50	0.03	0.39	0.07
Germany	0.29	0.09	0.56	0.06
Spain	0.68	0.01	0.24	0.06
France	0.36	0.06	0.51	0.06
Greece	0.53	0.03	0.37	0.06
Italy	0.51	0.02	0.44	0.03
Netherlands	0.37	0.07	0.47	0.09
Portugal	0.57	0.03	0.32	0.08
Average	0.46	0.05	0.42	0.07

of the two groups taking into account the shares of each group of the total population. Finally, the last term $\mathcal{R}$ is a residual or so-called overlap term which is positive only if the wealth distributions of the two groups overlap and zero otherwise.[12] In Table 3 we report the relative contributions of the within-group components (owners and renters), the between-group component and the residual. The subgroup of owners contributes on average 46% and the between component accounts for about 42% of the overall Gini coefficient of net wealth. The other two components play only a minor role.

Next, we analyze the relationships between the levels of the two major components and the homeownership rate. First, in Figure 2(a) we look at the subgroup of owners. The overall contribution to the Gini coefficient is strongly positively correlated with the homeownership rate. While the subgroup Gini coefficient of owners is somewhat negatively correlated with the homeownership rate, the other factors, that is, the share of homeowners and their wealth share are strongly positively correlated with the ownership rate almost by construction. The overall effect is thus a positive correlation.[13]

If we compare the between-group component, $\bar{G}$, with the homeownership rates across countries, it turns out that there is a very strong negative correlation as shown in Figure 2(b). Table 3 and Figure 2 imply that the negative correlation between the Gini coefficient and the homeownership rate (see Figure 1) is largely driven by the between-group Gini coefficient.

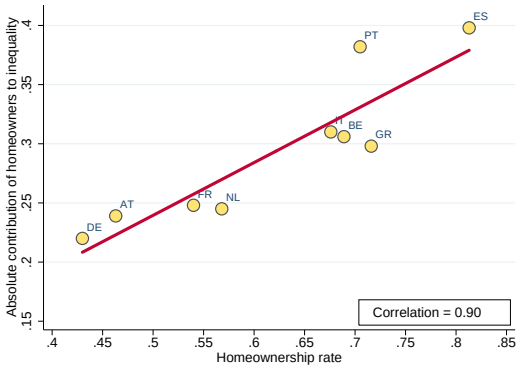
To better understand the relationship between the homeownership rate and $\bar{G}$, note that $\bar{G}$ can be expressed as

$$\bar{G}(h) = \frac{mh}{mh + 1 - h} - h, \tag{1}$$

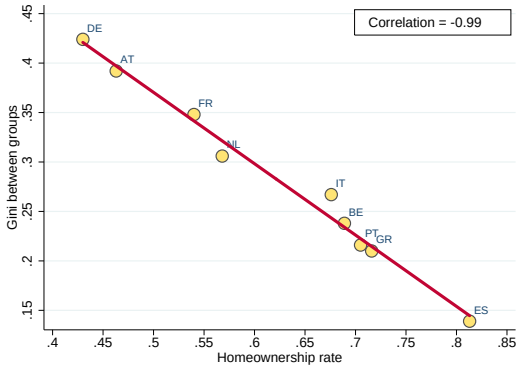
where $m \equiv \frac{\bar{w}^o}{\bar{w}^r}$ is the ratio of the mean wealth of owners over the mean wealth of renters, and h is the homeownership rate. For the range of ownership rates in our data, and the range of values for the wealth ratio m this implies a close to linearly declining function of h. In Figure 3, the function is plotted for the lowest and highest values of m in our data. All data points in Figure 2(b) must therefore lie between the red and the blue curves, implying a strong negative correlation for the observed homeownership rates (ranging

[12] In general, the residual term makes the interpretation of the decomposition less clear-cut. As $\mathcal{R}$ turns out to be small and does not differ much across countries it is less of a concern in our case (see e.g. Lambert and Aronson (1993) for a discussion).

[13] For the subgroup of renters, this mechanical effect is reversed: both the renter share and their wealth share are negatively correlated with the ownership rate, leading to an overall negative correlation of -0.97. However, in relative terms the contribution to the correlation of the total Gini coefficient with the ownership rate is small (see Table 3).



(a) Owner contribution to the Gini coefficient and homeownership rate



(b) Between-group Gini coefficient and homeownership rate

Figure 2: Correlations of homeownership rate and Gini coefficient components.

between 44% and 82%) and $\bar{G}$. The decisive feature of the data for this negative correlation is the rather high ratio of mean wealth of owners and renters.

In summary, both the owner component and the between-group component are quantitatively important. However, only the latter one accounts for the negative correlation of the overall Gini coefficient with the homeownership rate. Between-group inequality is lower in countries where renters have only a low weight in the overall population. The important data fact that drives this negative correlation is that in all countries renters are on average much poorer than homeowners.

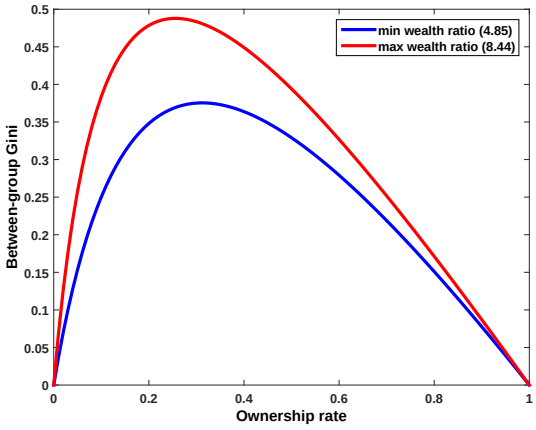


Figure 3: Between-group Gini coefficient and homeownership rate

4 Regression-based Cross-Country Decomposition

To take the potential impact of other observables on the differences in the Gini coefficient into account, we complement our analysis with a detailed cross-country decomposition based on recentered influence function (RIF) regressions. At the end of the section we comment on the conceptual differences to the previous approach.

4.1 RIF-Gini Regression

The RIF regression approach, developed by Firpo *et al.* (2009), allows to estimate the marginal effect of covariates on distributional statistics, such as quantiles or the Gini coefficient. The RIF regression is based on the influence function (IF) of a statistic, which gives the change of the statistic when there is a marginal increase in the probability mass of one particular element in the distribution.[14] Effectively, the RIF approach detects systematic (linear) relationships between the influence function and the covariates. Further details as well as the results table are given in Appendix C.

We regress $RIF^G(w)$ on a set of covariates using a standard OLS approach. In addition to ownership status we control for household income, household size, number of children of age less than or equal to 20 years, and the following attributes of the reference person (RP): age, self-employment status (conditional on having at least one employee), a dummy variable for tertiary education, and marital status. Table 5 in the appendix provides descriptive statistics about these variables. Our set of regressors resembles those used in the literature on wealth regressions. They are all potentially important for wealth accumulation and indirectly for wealth inequality.[15] Income clearly determines wealth, as savings are mostly taken from labor income.[16] A larger household can smooth income differences across individuals better than a smaller household. On the other hand, children can have ambiguous effects on wealth accumulation. They tend to reduce the resources left for savings, but can also give a motive for a higher savings rate. Our measure of self-employment mostly covers business owners. A higher share of entrepreneurs might increase inequality as entrepreneurship is a risky activity. Tertiary education might be important for wealth accumulation independent of income.

In Table 8 in the appendix we report the coefficient estimates. It is noteworthy that the coefficient estimates are fairly similar across countries. With only few exceptions, the signs of a given regressor are the same for all significant and near-significant estimates, and they are also of the same order of magnitude. In particular, the coefficients for homeownership are negative, (strongly) significant and similar across countries. It should be noted that the observables altogether have only limited explanatory power for the Gini coefficient which is similar to the results from other wealth regressions (see e.g. Christelis *et al.* (2013)).

To interpret the regression results, it is worth taking a closer look at the regressand, the recentered influence function of the Gini coefficient as a function of the wealth level, w. It turns out that this function is U-shaped in all countries. On average, the RIF is higher than the Gini coefficient for wealth levels below the 40th as well as above the 97th percentile, and below the Gini coefficient for wealth levels in between. Consequently, increasing the mass of households at low or very high wealth levels increases the Gini coefficient, whereas shifting mass to medium wealth levels tends to decrease the Gini coefficient. Covariates that are positively (negatively) correlated with net wealth within the lower/middle part of the support will decrease (increase) the Gini coefficient as the RIF is downward sloping in this region. Only for covariates that are mostly correlated with the upper tail of the wealth distribution, the signs are reversed, as

[14] That is, the IF gives the change of the statistic if the weight at one particular element within the support of the distribution is increased. The IF of a given statistic is recentered by adding the statistic itself, implying that the expectation of the RIF equals the statistic. A regression of the RIF on covariates gives the marginal effect of a marginal shift in the covariate distribution on the statistic. In the case of discrete variables, the RIF coefficients can be interpreted as "generalized average partial effects" (see Rothe (2009) and Rothe (2012)).

[15] Our experiments with other sets of regressors do not show significant improvements or changes. In particular, we included the first 24 of the household structure dummies given in Table 3 of Fessler *et al.* (2014). These are mostly insignificant and have only minor effects on the coefficients. However, one important exception is the inclusion of the value of an inherited main residence. Since this correlates with homeownership, it reduces the effect of ownership on the Gini coefficient. Since not all countries report inherited wealth information, we decided not to include it.

[16] We have experimented with a proxy for worklife income using household work years and current income, to better capture the income history. The results do not change much, but we need to drop Italy from the sample due to data limitations.

the RIF is upward sloping in that region.

We now turn to the regression estimates given in Appendix C. The coefficients for homeownership are large and negative. That is, an increase in the probability of homeownership for each individual in the distribution has a strong negative effect on wealth inequality measured by the Gini coefficient.[17] Next, current household income has a positive effect on the Gini coefficient, with the exception of Greece. The positive sign is likely to come from a strong positive correlation between income and wealth for the upper wealth deciles. Further, household size has a negative effect, which is due to a positive correlation between household size and net wealth. Self-employment status has mostly positive coefficients, which is due to the fact that self-employed households with employees are concentrated in the upper percentiles of the net wealth distribution. The number of children has a positive effect in most cases, whilst age of the reference person has a relatively small and ambiguous impact. Tertiary education tends to reduce inequality. Finally, marriage has a negative effect, which could be due to additional insurance and income stability.

4.2 Decomposition of Cross-Country Differences

We now turn to the cross-country decomposition. The RIF regression allows us to perform a decomposition of between-country Gini coefficient differences similar to the standard Oaxaca-Blinder decomposition of earnings differences.[18] The decomposition groups the individual effects for each covariate into three effects, which are called the endowment effect, the coefficient effect, and the interaction effect. Formally, the overall effect is given by

$$\overline{RIF}_A^G - \overline{RIF}_B^G = (\bar{X}_A - \bar{X}_B)'\beta_B + \bar{X}_B'(\beta_A - \beta_B) + (\bar{X}_A - \bar{X}_B)'(\beta_A - \beta_B),$$

where $\overline{RIF}_i^G$ is the predicted Gini coefficient for country i, $\bar{X}_i$ is the vector of averages of covariates in country i, and β_i is the vector of coefficient estimates for country i. The three summands represent the endowment, coefficient, and interaction effect, respectively. Here we focus on the endowment effect, which is often referred to as the "explained" part of the decomposition. Note, we cannot easily correct for potential endogeneity bias. However, as long as we maintain a "ignorability" assumption that any such bias is similar across the countries of our sample, the cross-country comparison remains meaningful.

As the reference country we choose Germany, which attains the highest value for the Gini coefficient. The results are shown in Table 4. The first two rows show the predicted Gini coefficients of the reference country and the comparison country.[19] The next set of rows gives the total difference and the totals of the endowment, coefficient, and interaction effects. For almost all countries the endowment effect is the most important one and is highly significant. The next block of rows shows the detailed endowment effects for each covariate. Ownership is by far the largest effect and also the one with the highest significance levels. The magnitude of the ownership endowment contributions is also quite high relative to the difference of the Gini coefficients, often exceeding 50% of the overall difference.

As a result, the RIF-based decomposition shows that the negative relationship between homeownership rates and the net wealth Gini coefficient in the raw data holds true even if we control for other observables. Further, we can compare this decomposition to the decomposition by subgroups in Section 3. There, we have shown that the driving force for the overall negative correlation is the negative correlation between the homeownership rate and the between-group Gini coefficient. That is, the overall correlation is based on

[17] In Appendix D we take another perspective on this effect and conduct a RIF regression of wealth quantiles. The relative effect of ownership is higher for lower quantiles meaning that ownership lowers inequality by lifting up wealth levels of the poorer households.

[18] See Firpo *et al.* (2007) and the references therein). For a critical discussion of this approach see Rothe (forthcoming).

[19] These values differ from the sample Gini coefficients given in Table 1 due to approximation errors of the RIF.

Table 4: Decomposition of explained population effects.

	AT	BE	ES	FR	GR	IT	NL	PT
OVERALL								
Predicted Gini	0.783***	0.622***	0.582***	0.679***	0.622***	0.610***	0.665***	0.702***
	(0.0694)	(0.0130)	(0.0111)	(0.00729)	(0.00483)	(0.00965)	(0.0141)	(0.0113)
Difference	0.0231	-0.138***	-0.178***	-0.0805***	-0.138***	-0.150***	-0.0954***	-0.0578**
	(0.0714)	(0.0205)	(0.0194)	(0.0173)	(0.0167)	(0.0185)	(0.0209)	(0.0196)
Endowments	0.0155	-0.0933***	-0.151**	-0.0498**	-0.150**	-0.110***	-0.0603***	-0.156**
	(0.0175)	(0.0127)	(0.0477)	(0.0171)	(0.0438)	(0.0269)	(0.0123)	(0.0520)
Coefficients	-0.000866	-0.0294	0.101	0.0270	-0.0443*	0.00874	-0.0569**	0.264
	(0.0564)	(0.0204)	(0.0527)	(0.0232)	(0.0199)	(0.0257)	(0.0219)	(0.168)
Interaction	0.00843	-0.0150	-0.127	-0.0577**	0.0563	-0.0495	0.0219	-0.166
	(0.0301)	(0.0145)	(0.0653)	(0.0218)	(0.0462)	(0.0310)	(0.0157)	(0.169)
ENDOWMENTS								
Ownership	-0.0118*	-0.0872***	-0.130***	-0.0379***	-0.0972***	-0.0835***	-0.0459***	-0.0937***
	(0.00480)	(0.00937)	(0.0130)	(0.00423)	(0.00946)	(0.00851)	(0.00448)	(0.0102)
HH Income	0.000945	0.0190	-0.0387	-0.0210	-0.0503	-0.0291	0.00744	-0.0736
	(0.0115)	(0.0116)	(0.0200)	(0.0110)	(0.0257)	(0.0151)	(0.00626)	(0.0375)
HH Size	-0.00621	-0.0202	-0.0485	-0.0151	-0.0453	-0.0371	-0.0131	-0.0503
	(0.00401)	(0.0116)	(0.0279)	(0.00865)	(0.0259)	(0.0213)	(0.00749)	(0.0288)
N^o Children	0.00192	0.0121	0.0121	0.0157	0.00910	0.0109	0.0138	0.0162
	(0.00210)	(0.00780)	(0.00799)	(0.0101)	(0.00589)	(0.00703)	(0.00889)	(0.0104)
Age RP	0.000630	-0.000219	-0.000506	-0.000128	0.00134	-0.00267	-0.00000996	-0.00218
	(0.000546)	(0.000229)	(0.000461)	(0.000134)	(0.000990)	(0.00194)	(0.000178)	(0.00159)
Selfemp. RP	0.00612	-0.00410	0.0500	-0.000901	0.0197	0.00618	-0.0168	0.0186
	(0.00628)	(0.00432)	(0.0270)	(0.00271)	(0.0115)	(0.00461)	(0.00916)	(0.0107)
Tert. ed. RP	0.0236*	-0.0131*	0.00524	0.00880*	0.0135*	0.0271*	-0.00666*	0.0306*
	(0.00975)	(0.00584)	(0.00307)	(0.00392)	(0.00578)	(0.0111)	(0.00336)	(0.0124)
Married RP	0.000288	0.000341	-0.00102	0.000655	-0.00133	-0.00129	0.000852	-0.00164
	(0.00107)	(0.00125)	(0.00366)	(0.00237)	(0.00478)	(0.00464)	(0.00309)	(0.00590)
COEFFICIENTS								
Ownership	0.0219	-0.0343	-0.0447*	-0.0556**	-0.00929	-0.0485**	0.0105	0.000980
	(0.0532)	(0.0181)	(0.0186)	(0.0170)	(0.0157)	(0.0157)	(0.0212)	(0.0191)
INTERACTION								
Ownership	0.00174	-0.0199	-0.0388*	-0.0140**	-0.00602	-0.0270**	0.00320	0.000612
	(0.00446)	(0.0106)	(0.0162)	(0.00436)	(0.0101)	(0.00877)	(0.00648)	(0.0119)

Standard errors in parentheses: $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Notes: Reference country is Germany. RP refers to reference person. Variances of a given implicate are computed following Jann (2008). Overall variances are computed using Rubin's formula. Predicted Gini coefficient of Germany is 0.760. Coefficients and Interaction estimates only shown for homeownership.

marked inequality *between* the groups of owners and renters. The RIF-based decomposition on the other hand attributes differences in the Gini coefficients to ownership rate differences because of large negative regression coefficients for homeownership. As we argued above, these negative regression coefficients reflect strong differences in *within*-group inequality between owners and renters.

5 Discussion: Homeownership and Inequality of the Bottom Half

The focus of the recent discussion on wealth inequality has been on top wealth inequality, i.e. the upper 1% and above (e.g. Piketty (2014)). While the survey data of the HFCS do not allow us to precisely estimate the contribution of the very top wealth holders to inequality, it is important to emphasize that overall wealth inequality is also driven by inequality between households below the median of net wealth. In the following we highlight several facts indicating that cross-country differences in wealth inequality are largely accounted for by the bottom half of the wealth distribution and that these differences seem to be channeled through homeownership.

First, wealth inequality is higher for the bottom half. The average of the Gini coefficients across the nine countries for the below-median group is 0.78, whereas it is 0.44 for the upper half. Second, also the cross-country variation in wealth inequality is higher for households below the median of net wealth. The coefficient of variation is 0.49 for the bottom half, and 0.19 for the upper half.

Now, our first exercise in Section 3 has shown that the cross-country correlation between the homeownership rate and the overall Gini coefficient is based on large wealth differences between owners and renters. Renters are on average much poorer than homeowners and thus are predominantly located in the bottom half of the wealth distribution. Clearly, it is not surprising that richer households tend to be homeowners as they can better afford it. The striking fact, however, is the large cross-country variation of homeownership rates and inequality in the bottom half. Homeownership rates for households below the median vary strongly across countries, with a coefficient of variation of 0.57. In contrast, the homeownership rates for the 50% richest households are very similar, with a coefficient of variation of 0.07. These higher differences in ownership rates are also reflected in wealth levels. Average net wealth is much more varied in the lower half, mostly reflecting higher variance in the wealth pertaining to the household's main residence (the coefficient of variation across countries for housing wealth is 0.95 for the bottom half, and 0.31 for the upper half).

In countries with high ownership rates, a much larger fraction of the households in the bottom half own houses. The variance in ownership rates for the bottom half does not simply translate into different portfolio compositions across countries. In countries with high ownership rates, the average wealth holding of the poorer half relative to the upper half is in fact larger. Thus, there seem to be different savings incentives across countries, which are channeled through homeownership. One possible explanation is that the social safety net (in particular redistributive policies and public pensions) differs across countries, leading to different (precautionary) savings levels. These savings are then invested in housing, perhaps due to the lack of other suitable savings vehicles. Another, complementary possibility is that countries differ by their incentives to invest into housing and which thereby explains different savings levels. In particular, many countries provide explicit or implicit subsidies to owning the house that is used as a main residence.[20] These subsidies then not only affect ownership rates but at the same time might lead to implicit redistribution of wealth. Exploring this channel is left to future research.

[20] See Drudi *et al.* (2009) for a descriptive overview and Chiuri and Jappelli (2003) for a comparative study regarding mortgage interest deductions.

6 Conclusions

In this paper we provide and analyze the evidence for a strong negative relationship between homeownership rates and wealth inequality across the nine largest Euro area countries. A Gini decomposition across ownership status attributes this correlation mainly to between-group wealth inequality. By employing a cross-country decomposition based on a RIF regression we confirm the role of homeownership rates for accounting for the cross-country differences by taking other observables into account. The variation of both ownership rates and wealth inequality across countries is most pronounced for the group of households below the median of net wealth. Buying the main residence seems to be an important way of saving for the poorer half of households. Thus, differences in incentives for homeownership might account for differences in wealth inequality across Euro area countries.

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A Descriptive Statistics

Table 5: Descriptive Statistics by country - all households

Country	Net Wealth	Ownership (%)	HH Inc	HH size	N^o Children	Age RP	Self-emp.(%)	Tert. ed. RP (%)	Married RP (%)
AT	265033	47	43929	2.1	0.4	51.0	5	14	47
BE	338647	69	49536	2.3	0.6	52.2	3	38	47
DE	195170	44	43531	2.0	0.4	51.9	4	29	50
ES	291352	82	31329	2.7	0.6	52.7	12	26	60
FR	233399	55	36918	2.2	0.6	52.1	4	23	44
GR	147757	72	27661	2.6	0.5	49.9	7	20	63
IT	275205	68	34344	2.5	0.5	55.9	5	11	62
NL	170244	57	45792	2.2	0.6	51.9	1	34	42
PT	152920	71	20310	2.7	0.6	55.1	7	9	66

Table 6: Descriptive Statistics by country - owners vs. renters

	Country	Net Wealth	HH Inc	HH size	Children	Age RP	Self-emp. (%)	Tert. ed.RP (%)	Married RP (%)
Owners									
	AT	487008	54378	2.4	0.5	54.4	7	14	64
	BE	455415	57116	2.4	0.6	55.2	3	42	56
	DE	384331	57899	2.3	0.5	56.4	6	35	67
	ES	341022	32931	2.7	0.6	53.9	12	26	63
	FR	381878	44964	2.4	0.6	56.0	5	26	57
	GR	190789	29448	2.8	0.5	53.2	7	19	69
	IT	383138	38111	2.6	0.5	58.1	5	13	66
	NL	261507	52044	2.6	0.7	51.8	1	38	57
	PT	199446	22031	2.8	0.6	56.5	8	9	71
Renters									
	AT	66908	34602	1.9	0.4	48.0	3	14	33
	BE	77384	32578	2.0	0.5	45.6	2	28	26
	DE	48198	32368	1.8	0.4	48.4	2	25	37
	ES	70358	24198	2.6	0.6	47.0	10	24	46
	FR	53587	27173	2.1	0.6	47.4	2	20	27
	GR	36936	23057	2.4	0.6	41.7	6	23	47
	IT	45392	26322	2.5	0.6	51.0	4	9	55
	NL	48841	37476	1.7	0.4	52.1	1	27	21
	PT	38979	16094	2.6	0.7	51.9	3	9	52

B Gini Decomposition by Portfolio Components

To gauge the importance of these portfolio components for wealth inequality, we decompose the Gini coefficient into contributions coming from each component: $w = w_h + w_f + w_r + w_b$, where h, f, r, and b denote housing, financial, real and business wealth, respectively. Following the methodology developed by Lerman and Yitzhaki (1985) the Gini coefficient (G) can be decomposed as:

$$G = \sum_k G_k S_k R_k,$$

with $k \in \{h, f, r, b\}$. G_k is the Gini coefficient for wealth component k, and S_k is the k-component share out of total net wealth. Given the overall net wealth distribution $F(w)$ and component-specific distributions $F_k(w_k)$, $R_k \equiv cov(w_k, F)/cov(w_k, F_k)$ is the "Gini correlation" between wealth component k and the total net wealth.[21] We decompose the total Gini coefficient for each country accordingly and report the relative

[21]The correlation R_k takes on the value 1 (-1) if the wealth component k monotonically increases (decreases) with total net wealth. At the other extreme, if the wealth component does not change at all with net wealth, then $R_k = 0$ and this particular source does not contribute to inequality.

contribution of each component, i.e. $R_k G_k S_k / G$, in Table 7.

Table 7: Relative contribution of wealth positions to overall inequality.

Country	Net own housing	Net financial	Net real	Business
Austria	0.39	0.15	0.16	0.31
Belgium	0.39	0.36	0.18	0.07
Germany	0.36	0.19	0.26	0.19
Spain	0.39	0.13	0.33	0.15
France	0.40	0.20	0.28	0.12
Greece	0.46	0.07	0.41	0.06
Italy	0.54	0.09	0.24	0.12
Netherlands	0.54	0.32	0.11	0.03
Portugal	0.34	0.13	0.35	0.19
Average	0.42	0.18	0.26	0.14

The decomposition provides a clear message. Net own housing is by far the most important contribution to overall inequality, accounting on average for about 42%. The second most important source is net real wealth, with an average contribution of 26%. While the relative contributions partly reflect the portfolio shares, also the two other factors, namely the within-component Gini coefficient (G_k) and the Gini correlation (R_k) are quantitatively important for this result.

C RIF Gini Regression

The RIF of the Gini coefficient (G) is given by:

$$RIF^G(w) \equiv 1 + \frac{w}{\mu_w}(1-G) - \frac{2}{\mu_w}[w(1-F_w(w)) + GL(w;F_w)] \ ,$$

where $F_w(w)$ is the cumulative probability of net wealth, μ_w is the average wealth level, and $GL(w;F_w)$ is the generalized Lorenz ordinate defined by $GL(w;F_w) \equiv \int_{-\infty}^{w} z dF_w(z)$.[22] The RIF values can easily be approximated using our data on net wealth.

[22] The underyling definition of the Gini coefficient here is: $G \equiv 1 - \frac{2}{\mu_w}\int_0^1 GL(z;F_w)dz$. See e.g. Monti (1991) for a derivation of the influence function of the Gini coefficient.

Table 8: RIF regression of the Gini coefficient

	AT	BE	DE	ES	FR	GR	IT	NL	PT
Ownership	-0.293*	-0.422***	-0.343***	-0.446***	-0.470***	-0.365***	-0.454***	-0.319***	-0.341***
	(0.120)	(0.0238)	(0.0329)	(0.0292)	(0.0235)	(0.0137)	(0.0128)	(0.0364)	(0.0286)
HH Income	0.160	0.0637	0.317	0.691**	0.907***	-0.120*	0.450***	0.0571	1.138
	(0.119)	(0.0450)	(0.176)	(0.258)	(0.195)	(0.0470)	(0.0955)	(0.0631)	(0.746)
HH Size	0.0484	-0.0480	-0.0760	-0.0677*	-0.112***	-0.0175*	-0.0302	-0.0122	-0.0736
	(0.0775)	(0.0260)	(0.0451)	(0.0284)	(0.0286)	(0.00747)	(0.0239)	(0.0385)	(0.0412)
No Children	0.00439	0.0617*	0.0846	0.0686*	0.0809**	0.00617	0.0172	-0.0123	0.0805*
	(0.0651)	(0.0304)	(0.0495)	(0.0302)	(0.0309)	(0.00878)	(0.0266)	(0.0427)	(0.0342)
Age RP	-0.000903	0.00110	-0.000678	0.00183	-0.00161**	0.000517	0.00202***	-0.00729***	0.00149
	(0.00173)	(0.000727)	(0.000476)	(0.000993)	(0.000501)	(0.000357)	(0.000501)	(0.00137)	(0.000835)
Selfemployed RP	0.547	0.320	0.622*	0.121**	0.200	-0.0669**	0.204	-0.0407	0.164
	(0.827)	(0.178)	(0.311)	(0.0416)	(0.187)	(0.0221)	(0.112)	(0.162)	(0.0991)
Tert edu RP	-0.137	0.0238	-0.152*	-0.0452	-0.152**	-0.0638***	0.0116	0.0453	-0.348
	(0.0849)	(0.0295)	(0.0643)	(0.0549)	(0.0482)	(0.0145)	(0.0350)	(0.0302)	(0.230)
Married RP	-0.101	0.0415	-0.0104	-0.0496*	-0.0565**	-0.0217*	-0.0209	-0.0487	-0.0712**
	(0.0986)	(0.0417)	(0.0365)	(0.0227)	(0.0189)	(0.0101)	(0.0194)	(0.0498)	(0.0270)
Constant	0.834***	0.863***	0.954***	0.803***	0.943***	0.966***	0.720***	1.239***	0.848***
	(0.164)	(0.0529)	(0.0385)	(0.0614)	(0.0520)	(0.0207)	(0.0424)	(0.102)	(0.0597)
R^2	0.066	0.112	0.085	0.044	0.144	0.453	0.149	0.257	0.140
Observations	2380	2327	3565	6197	15006	2971	7951	1301	4404

Dependent variable: RIF of the Gini coefficient. Bootstrapped standard errors in parentheses. Inheritance and income in 100000s. Standard errors are computed using replicate weights and by accounting for imputation variance using Rubin's formula.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

D Quantile Effects of Homeownership

To explore the impact of ownership on different parts of the wealth distribution, we here look at specific quantiles.We run a RIF regression using the same regressors but estimate the effect on the RIF of different net wealth quantiles instead of the Gini coefficient.[23] We then divide the marginal quantile coefficient by the level of the corresponding wealth quantile. This ratio is akin to a semi-elasticity. In Figure 4 we plot the ratios for the 10th to 90th quantile fore each country.[24] The figure exhibits a clear pattern of positive but declining relative effects across quantiles for each country. That is, the effect of homeownership on wealth relative to the current wealth level is much higher for lower quantiles than for higher quantiles. Thus, homeownership equalizes the wealth distribution by lifting up the wealth of the lower percentiles.

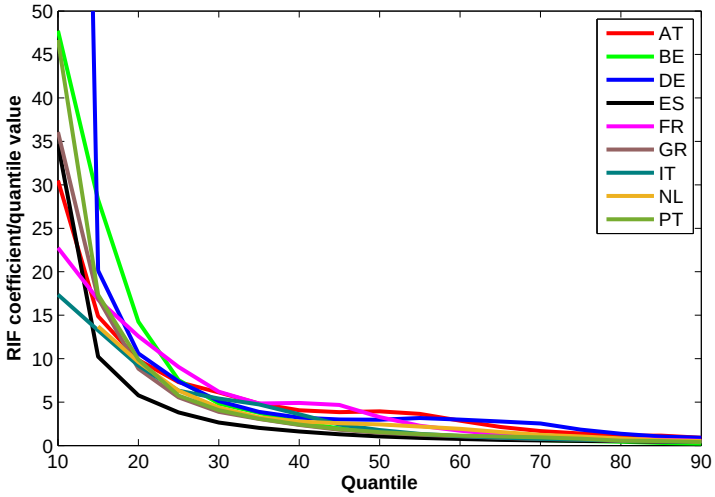

Figure 4: RIF quantile coefficients relative to quantile values

[23] Again see Firpo *et al.* (2009) for details. As a robustness check we also estimate the quantile coefficients using the standard quantile regression. The pattern of coefficients is then strictly increasing in the level of the quantile, but the ratio exhibits a very similar pattern as with the RIF regression.

[24] For the case of the Netherlands the value at the 10th quantile is omitted as the quantile value is negative. The other denominators are all positive.

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