

Socioeconomic structures of the Austrian wealth distribution

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Abstract This paper provides first-time insights into the socioeconomic specifics of the Austrian wealth distribution. Based on data from the Household Finance and Consumption Survey 2010, we explore patterns of household characteristics associated with the wealth dispersion. Due to the pronounced nonlinear relationship of wealth, we incorporate the complex survey design in quantile regressions to analyze the joint distribution of specific attributes and households net wealth position. Our findings emphasize the role of age, education, the ownership of a main residence and company stakes in order to identify generic households across the distribution. Looking at the top, the results indicate a specific role of being self-employed or having received inheritances.

Keywords Wealth distribution · Quantile regression · Household structure

JEL Classification C31 · D31

1 Introduction

When the Household Finance and Consumption Survey (HFCS) 2010 was published in 2013, the reports of the European Central Bank caused considerable disconcertment in Austria. According to the novel data set, no other Eurozone member shows

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higher net wealth inequality than Austria. For the first time, the HFCS dataset provides comparable data on private household wealth across the Eurozone and offers profound insights into the wealth portfolios and the overall wealth distribution. In addition, the HFCS also improves our knowledge in the field of income inequality by providing thoroughly collected information on capital income. Finally, the possibility to investigate the joint distribution of wealth and a variety of socioeconomic characteristics marks a turning point in inequality research for Austria.

The distribution of wealth is important for economic activity in several aspects. First, accumulated assets provide means for inter-temporal smoothing of consumption possibilities in a classic framework of the life-cycle theory (Ando and Modigliani 1963). Specifically the housing wealth effect of consumption has been intensively discussed in the economic literature (Case et al. 2005; Lindner 2014). Additionally, wealth accumulation may be triggered by a precautionary motive of risk-averse households who face earnings risks and borrowing constraints during periods of fundamental uncertainty (Carroll and Samwick 1997). This is also the main motive of the European Central Bank, which conducts the HFCS survey to better understand the implications of macroeconomic shocks on households' financial stability.

In economic theory, wealth accumulation is a driving force of capitalist production itself and thus a fundamental motive of economic activity. However, the roles of accumulated wealth vary with its magnitude. For example, the precautionary motive and life-cycle consumption smoothing are elementary functions of wealth. Other purposes of wealth accumulation are restricted to higher wealth levels. For instance, a very large amount of capital may act as an instrument to preserve privileges or enhance social status (Veblen 1899; Van Long and Shimomura 2004). Eventually, very large fortunes could possibly exert an impact on political decision making processes or even influence public opinion (Stiglitz 2012). Given these crucial connections to social, economic and political issues, the distribution of wealth has been underrepresented in related research areas, mainly due to the lack of data.

The HFCS survey shows that the accumulation of wealth strongly depends on institutional and political set-ups between countries. The literature on welfare regimes suggests that institutional settings with well-developed public housing or pension systems reduce the need for households to build up private wealth. Consequently there are considerable differences in household main residence ownership rates according to the HFCS data. For instance, while the median household in Germany and Austria is a renter household, in other countries, like Spain, Portugal or Cyprus, it is a homeowner household (HFCN: Eurosystem Household Finance and Consumption Network 2013b). Furthermore, there may be country-specific personal preferences shaped by cultural and historical factors for owning specific types of assets and debts (Cowell et al. 2013). Thus, a comparison of absolute wealth levels across countries does not seem to be a reasonable undertaking.

The motives and possibilities for wealth accumulation may also vary across households based on their characteristics. Therefore it is crucial, to include the

household structure and attributes of single household members into a combined analysis of household wealth. A priori we suggest that the socioeconomic characteristics, that are correlated with a household's position in the wealth distribution, are similar to the factors that determine a household's income level. Thus the aim of this article is to identify generic households at specific points in the wealth distribution for a range of characteristics which have been shown to be relevant in both the wealth and income distribution literature.

The remainder of the paper is structured as follows. Section 2 provides a brief survey of empirical studies on the relation between household wealth and socioeconomic characteristics. In Sect. 3, we present the HFCS data and the choice of characteristics used for the empirical application. Section 4 provides descriptive univariate results, before we use quantile regressions to analyze the joint distribution of household characteristics and households position in the net wealth distribution in Sect. 5. Finally, Sect. 6 concludes.

2 Empirical evidence

Existing studies on the distribution of wealth have mainly focused on two areas. On the one hand, there is an exhaustive investigation of the concentration of wealth as such, wherever data is available. This is closely linked to the discussion about consequences of wealth inequality for social cohesion, as well as implications for tax policy and redistribution (see Keister 2000; Eckerstorfer et al. 2013; Vermeulen 2014). On the other hand, a subfield has addressed the composition of private wealth, i.e. the various kinds of assets that are held by households with certain characteristics at different positions of the wealth distribution (see Wolff 1998; Fessler et al. 2012; Deutsche Bundesbank 2013). However, this research field is even more restricted by the available data, since sociodemographic attributes are hardly present in wealth data.

As an exception, seminal studies focus on the United States: an early article of Radner (1989) estimates wealth data based on surveys and describes wealth inequality between *the Aged and the Nonaged*. More substantially, Avery and Kennickell (1991) investigate the net wealth of private households by socioeconomic characteristics like age, occupation, education, labor market position of the head of the household, family income, family structure, and ethnic background. Similarly, a methodological study by Juster et al. (1999) explores data from the Survey of Consumer Finances (SCF) with a special interest in the demographic structure and the education level of households. Wolff (1994, 2004) observe the evolution of US household wealth from the 1960ies on, where the author shows that the wealth gap between different ethnic backgrounds has widened in this period.

Studies for other regions depend on data availability and thus are mostly limited on the decomposition of wealth by age and education. Especially for the case of Australia, the Household, Income and Labour Dynamics in Australia (HILDA) data set is available for such analyses. Using these data Marks et al. (2005) and Headey et al. (2005) are able to investigate the distribution of different kinds of assets, as well as the socioeconomic structure of households by age, marital status, household

type and education. Besides descriptive statistics, the authors apply least squares regressions to assess the effect of these characteristics on the formation of capital. The results suggest that mainly households with a male reference person, some 55 years of age, are able to accumulate capital. Moreover, household heads with tertiary education exhibit up to 30 % higher wealth than their counterparts without university degrees. In contrast, single households, and especially single women, show below-average formation of capital.

While there is only little evidence for the case of Europe, Brandolini et al. (2004) are able to exploit the Survey of Household Income and Wealth (SHIW) of the Italian central bank. The focus of this article lies on the time dimension, however the authors also explore the effects of age and household structure. Both Azpitarte (2010) and Bover (2010) inspect the wealth of Spanish households. The first author decomposes wealth inequality for variables like age, employment status and house ownership into within- and between-group effects. The results show that the bigger part of wealth inequality arises from the cohort of 45–54 years of age. Moreover, households with self-employed reference persons account for up to 95 % of total wealth inequality.

3 Data description

The HFCS 2010 was coordinated by the European Central Bank and collects household-level data on finances and consumption in most member states of the Eurozone. Its particular focus lies on the balance sheets of private households, including their wealth portfolio and liabilities. Moreover, the survey enfold important information on income and consumer behavior. While the sampling units are private households, several variables regarding personal characteristics of the household members are included. Based on a two-stage stratified probability sample, the survey obtains a representative selection of non-institutionalized households. For a detailed methodological and descriptive report of the Austrian HFCS data, see Albacete et al. (2012), HFCN: Eurosystem Household Finance and Consumption Network (2013a), Humer et al. (2013).

An important methodological aspect of the data is the use of multiple imputations to tackle the issue of item non-response. For the HFCS, all observations of a predetermined set of 130 variables, that cover the main components of household income, consumption and wealth, for which no valid response was received, were imputed during the preparation of the data (HFCN: Eurosystem Household Finance and Consumption Network 2013a). This approach closely follows the guidelines provided by Little and Rubin (2002). In order to account for the inherent uncertainty of this procedure, not only one single value is chosen to replace the missing information, but five values based on different random draws from the joint distribution of the collected data. This approach combines the advantage of providing a distribution of imputed values with the possibility to fully reflect the uncertainty of the imputation process. All figures and calculations reported in this paper were derived with the use of complex survey weights, all five multiple imputations, and the application of Rubin's rule. We further compute the

uncertainty of regression estimates based on the first 100 replicate weights provided in the HFCS.

This complex dataset revealed unknown levels of wealth inequality across the Eurozone. Accordingly, the median household in the Eurozone has a net wealth of around €109,000 while the mean net wealth is roughly €231,000. For the poorest 10 % of households, assets just barely exceed liabilities and their net wealth is below €1000, whereas the top 10 % start at €506,000. Due to the ex-ante harmonization of the HFCS survey design, the data are comparable across countries. However, a comparison of absolute wealth levels is associated with further issues. Especially the differing institutional and political environments between countries may affect the levels of private wealth accumulation (Arrondel et al. 2014). This could lead to different participation rates in specific wealth components. While such a comparison of wealth *levels* is problematic, the data is well-suited for cross-country comparisons of the wealth *distribution* between private households.

Sierminska and Medgyesi (2013) show that Austria exhibits the highest net wealth inequality among all Eurozone countries, followed by Germany, Cyprus, and France. The Gini coefficient for net wealth ranges from 0.45 (Slovakia) to 0.77 (Austria) and the top 10 % wealth share varies between 33 % (Slovakia) and 62 % (Austria). Since institutional settings may affect the wealth composition of households across countries, the contribution of different asset classes to the total wealth inequality provides valuable insights. Wealth may be decomposed into tangibles (properties including main residence, other properties, vehicles, the holding of a company stake, etc.) and financial assets (deposits, savings, funds, bonds and shares, etc.). For instance, the unequal distribution of financial assets is the main driver for wealth inequality in Belgium. In countries such as Luxembourg, Greece, or Slovakia the main contributor to net wealth inequality is the skewness of real estate. In Germany, Austria, France, or Portugal, the unequal distribution of business assets contributes the most to overall wealth inequality.

According to the HFCS 2010 data, the total wealth of private households in Austria amounts to 1000 bn. Euro, which is roughly 3.5 times the total economic activity. The wealth share of the bottom half of the distribution adds up to 3 %, while the wealthiest 5 % of households hold about half of all assets. Eckerstorfer et al. (2013) argue that these values underestimate the actual concentration since the most affluent households are underrepresented in the HFCS data for two reasons. First, the number of the so-called *super-rich* is small and the probability for these households to be part of a random sampling is minor. Second, the non-response rate of rich households is notably above average. By means of common statistical methods to identify the underlying distribution function, it is possible to augment the underrepresented upper tail. Both Vermeulen (2014) for the Eurozone countries and Eckerstorfer et al. (2013) for Austria address this underrepresentation by assuming that the upper tail of the distribution can be approximated by a Pareto distribution. However, such an approach cannot be trivially applied to subordinate wealth components. We therefore adhere to analyzing the original HFCS data in this paper.

The investigation of socioeconomic properties of households, conditional on their position in the net wealth distribution, entails substantial challenges. While

some characteristics like total wealth, household size, or household structure are bound to the household level, other attributes like age, educational attainment, or occupation are only available on the individual level. If these properties differ between household members, the identification of one single representative value is not straightforward. A common strategy in the literature is to determine a single reference person whose characteristics are used to classify the household. Such properties are often related to age, income or educational attainment. Some papers rely on a combination of these and other variables to determine the representative household member (Moser et al. 2013). Even though this approach has its legitimacy and several advantages, it reduces the available information on the household structure and may lead to an underestimation of household heterogeneity. Alternatively, the socioeconomic characteristics of all household members could simultaneously be regarded in a regression analysis (Bover 2010) or they could be incorporated via (re)weighting, especially if the aim is an international comparison (Fessler et al. 2014).

In the HFCS data, reference persons have to be constructed ex post based on the household information that has been collected during the interview (Albacete et al. 2012; HFCN: Eurosystem Household Finance and Consumption Network 2013a). Fessler et al. (2012) and Andreasch et al. (2012) suggest to nominate the Financially Knowledgeable Person (FKP) as reference person, since this is the person with the best insights into the financial situation of the household. We follow this suggestion, even though the authors emphasize that this selection criterion is arbitrary to some degree.¹

Our approach to analyze household wealth include the following household and individual characteristics²:

Household size The household size is directly derived from the number of persons who live in a household. The bulk of observations consists of single and two-person households, while the average size is 2.1 persons. The largest household in the HFCS data comprises 9 members.

Household structure In order to account for the specifics that are associated with the household composition, we distinguish between singles, couples and single parents. An additional category of families subsumes traditional families as well as households where siblings or several generations live together.

Education The education variable in the HFCS data refers to the six-level ISCED classification which is aggregated to four groups for our study. The first class comprises ISCED levels 0 and 1 which represent primary education (elementary school and preschool education). Level 2 is lower secondary education (ISCED 2) and comprises the Austrian *Hauptschule* and *AHS-Unterstufe*. We sum up upper secondary degree and apprenticeship (ISCED 3 and 4) in level 3. All degrees of tertiary education (ISCED 5 and 6) are captured in level 4.

¹ In order to take this specific type of uncertainty into account, we robustified our analysis by using different reference person selection rules (i.e. based on age, income and education). Since results remain qualitatively robust with regard to the selection of the reference person, these scenarios are not reported in paper. Corresponding results and figures are available upon request.

² Table 4 in the “Appendix” provides a comprehensive summary of the definitions of these variables.

Labor market status and employment status Both labor market status and employment status provide information on the working lives of the respondents. The former variable consists of 9 different groups. For the sake of simplicity, we subsume unemployed, students, pupils, unpaid interns, individuals on maternity leaves, permanently disabled, and individuals in compulsory military service or equivalent social service in one category of transfer beneficiaries. The employment status variable indicates the type of employment for all economically active respondents. We merge both variables and derive five employment classifications that represent employees, self-employed, transfer beneficiaries, retirees and a small group of others (including, for instance, unpaid family workers).

Economic sector of company stakes According to the HFCS data, only few households own company stakes. The data include information on the economic sector of these assets based on the Austrian NACE classification (ÖNACE-08). We aggregate all economic sectors to the three main groups: The primary sector comprises the retrieval and production of raw materials corresponding to NACE codes A and B. The secondary sector enfoldes the transformation of raw or intermediate materials into goods corresponding to NACE codes C–F. Finally, the tertiary sector is the supply of services to consumers and businesses corresponding to NACE codes G–U.

4 Univariate analysis

Figure 1 shows the mean of the main wealth components for the percentiles of the net wealth distribution. The bottom 40 % do not own any noteworthy assets at all, which applies to both gross and net wealth. In the subsequent percentiles, wealth gradually increases. However, the biggest leap occurs for the top 1 % with an average net wealth of roughly €6 million. Tangibles like properties or company stakes (light grey) account for the major part of wealth across the distribution, while financial assets (dark grey) increasingly gain in importance at the upper tail. The numerical values for this illustration are provided in Table 1.

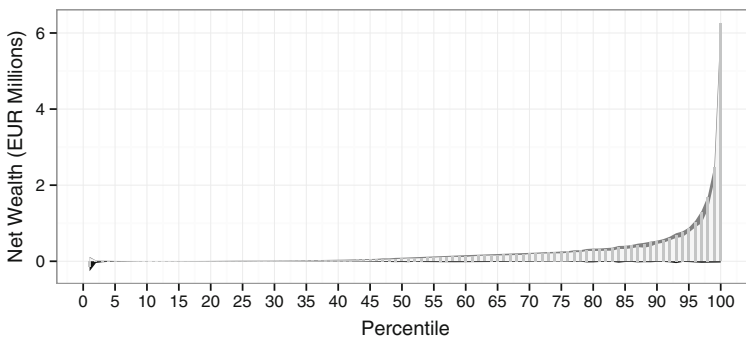


Fig. 1 Average of assets by percentiles. Grey bars: Net wealth, Black: Liabilities, Dark grey: Financial assets, Light grey: Tangibles

Table 1 Composition of the Austrian Wealth Distribution by net wealth vigintiles

	Real assets				Financial assets				Liabilities		Total assets			
	Residence	Estate	Vehicles	Business	Total	Safe	Risky	Others	Total	Mort.	Non-mort.	Total	Gross	Net
Average wealth (in 1000€)														
0–5	19.17	3.31	3.07	0.69	26.49	6.19	0.56	1.27	8.02	–46.74	–24.69	–71.43	34.51	–36.93
5–10	0.00	0.58	0.15	0.00	0.74	0.61	0.03	0.05	0.69	–0.78	–0.33	–1.11	1.44	0.32
10–15	0.20	0.62	0.92	0.01	1.85	2.06	0.04	0.13	2.23	–1.04	–1.15	–2.19	4.08	1.89
15–20	0.04	0.40	2.16	0.00	2.91	3.32	0.02	0.12	3.46	–0.53	–1.28	–1.81	6.37	4.56
20–25	2.24	0.10	2.93	0.00	5.58	5.38	0.11	0.27	5.77	–2.28	–0.98	–3.25	11.35	8.10
25–30	1.02	0.17	4.23	0.02	6.25	8.01	0.04	0.27	8.33	–1.00	–1.17	–2.18	14.58	12.40
30–35	1.91	0.16	6.42	0.41	9.63	11.21	0.39	0.52	12.12	–1.55	–1.58	–3.13	21.75	18.62
35–40	5.26	0.56	8.57	0.42	16.25	15.41	0.55	1.15	17.12	–4.31	–0.60	–4.91	33.37	28.46
40–45	11.96	2.81	9.32	0.69	27.19	21.16	1.22	1.49	23.87	–7.49	–1.65	–9.14	51.06	41.91
45–50	34.08	5.36	7.31	0.34	50.14	27.16	1.29	0.82	29.27	–15.65	–1.49	–17.15	79.41	62.27
50–55	67.19	5.12	7.21	2.11	83.80	24.80	2.11	0.68	27.60	–17.26	–2.32	–19.59	111.40	91.81
55–60	95.74	6.59	7.93	1.00	113.15	28.77	3.19	1.26	33.22	–22.38	–1.51	–23.89	146.37	122.48
60–65	116.18	16.18	8.24	2.28	145.39	28.06	3.94	2.17	34.16	–18.44	–3.34	–21.78	179.55	157.77
65–70	143.53	6.58	10.92	3.55	167.19	34.37	4.89	0.39	39.65	–14.77	–1.21	–15.98	206.84	190.86
70–75	176.36	12.58	10.16	2.06	203.58	34.98	2.59	0.18	37.75	–11.60	–1.04	–12.64	241.33	228.69
75–80	208.31	22.73	12.27	3.94	249.52	41.68	5.45	3.18	50.31	–15.66	–4.18	–19.85	299.83	279.98
80–85	225.90	39.56	15.66	8.56	294.58	61.51	7.87	5.66	75.03	–20.49	–1.28	–21.77	369.62	347.85
85–90	301.09	33.81	19.32	25.11	383.07	85.03	10.43	7.79	103.25	–20.51	–2.00	–22.52	486.32	463.80
90–95	388.06	88.94	23.50	102.12	608.90	88.64	25.79	1.76	116.20	–24.42	–2.08	–26.50	725.10	698.60
95–100	661.79	364.64	35.65	1211.16	2295.45	140.29	140.09	24.06	304.45	–34.05	–0.91	–34.97	2599.89	2564.93

Table 1 continued

	Real assets				Financial assets				Liabilities		Total assets			
	Residence	Estate	Vehicles	Business	Total	Financial assets			Liabilities		Gross	Net		
						Safe	Risky	Others	Total	Mort.			Non-mort.	
Participation rates														
0–5	12.1	4.4	53.8	0.7	57.2	78.2	7.4	24.7	80.7	12.6	91.2	100.0	88.4	100.0
5–10	0.0	0.7	9.2	0.0	11.4	85.4	0.5	5.4	86.9	0.5	18.1	18.1	90.9	91.6
10–15	0.4	0.5	39.1	0.2	47.1	96.3	1.1	9.5	96.4	0.8	32.8	33.3	100.0	100.0
15–20	0.1	0.3	52.9	0.0	63.4	96.0	0.9	7.8	96.2	0.3	28.2	28.4	100.0	100.0
20–25	1.9	1.8	64.2	0.0	75.6	98.5	3.0	8.8	99.0	2.0	14.6	16.1	100.0	100.0
25–30	1.6	1.5	65.1	0.5	77.2	99.1	2.1	11.6	100.0	1.0	17.3	17.9	100.0	100.0
30–35	3.8	1.4	74.9	4.3	87.3	98.3	5.8	13.2	99.2	1.3	25.8	26.7	100.0	100.0
35–40	8.2	2.8	82.5	2.3	88.5	98.4	6.8	13.3	98.5	5.8	14.2	18.9	100.0	100.0
40–45	17.2	7.7	79.6	2.5	91.9	97.7	10.7	12.8	97.8	8.5	21.6	27.8	100.0	100.0
45–50	41.7	9.4	77.4	3.7	97.6	98.1	12.8	15.6	98.1	17.1	21.8	31.4	100.0	100.0
50–55	68.9	9.3	75.6	2.8	98.1	97.3	12.8	8.9	98.1	31.1	21.9	43.3	100.0	100.0
55–60	79.5	10.0	84.6	2.6	98.9	97.7	18.8	12.1	99.2	32.3	15.0	38.6	100.0	100.0
60–65	80.6	20.2	85.6	5.4	99.8	99.0	18.3	12.4	99.0	28.9	13.2	34.6	100.0	100.0
65–70	86.4	11.0	89.4	8.6	100.0	100.0	23.1	7.4	100.0	32.7	15.5	43.0	100.0	100.0
70–75	92.4	13.8	93.6	4.2	99.9	100.0	12.0	3.4	100.0	32.0	13.1	38.9	100.0	100.0
75–80	93.0	27.1	93.1	4.2	99.4	99.7	20.5	7.8	99.7	31.4	10.2	38.0	100.0	100.0
80–85	87.3	29.1	91.9	9.3	99.4	98.0	23.1	9.7	99.1	27.8	10.5	34.6	100.0	100.0
85–90	94.2	29.7	93.0	21.3	99.4	98.5	30.4	8.9	99.2	33.0	13.0	40.4	100.0	100.0
90–95	94.5	37.0	96.3	39.9	100.0	99.7	42.3	11.0	99.7	30.1	19.6	39.8	100.0	100.0
95–100	90.2	50.9	96.7	67.3	99.9	98.6	39.0	24.0	98.6	38.5	11.6	44.0	100.0	100.0

Source: HFCS, own calculations. Safe financial asset: Deposits and voluntary pension plans or whole life insurance. Risky financial assets: Mutual funds, bonds and publicly traded shares. Other financial assets: Managed accounts, non-self employment private businesses, money owed to other households and all other assets

Furthermore, the bottom 5 % of the net wealth distribution differ substantially from the following four deciles. These households have an asset structure similar to the median household, however their liabilities considerably exceed their possessions. Mortgages are the predominant type of liabilities of these households, which indicates recent purchases or constructions of housing, while the remaining part of the bottom half does not own its main residence. Hence, the bottom 5 % of households exhibit characteristics that in fact correspond to the middle of the distribution rather than to the bottom half. As a consequence, this group of households needs specific attention in all our results.

In the subsequent deciles, the average value of the main residence is remarkably small. According to the participation rates in Table 1, the number of households owning assets in this wealth component is vanishingly low at the bottom of the distribution. The share of property owners increases not until the 5th and 6th decile and further levels off somewhere at the 90th percentile. Company stakes are even more concentrated, so that the bottom 80 % hardly own any business assets while one in two households in the top 10 % does. In addition, business ownership in agriculture and forestry³ is particularly concentrated at the upper tail. More specifically, only the richest decile, whereof 27 % own such businesses, participates in this wealth category.

In a next step, we analyze the univariate distribution of net wealth and a variety of household characteristics which are shown in Table 2. The table contains values for selected percentiles in relation to the overall value for an attribute. Therefore, if the value in a certain percentile equals exactly the figure of the whole sample, the value in the table yields 1. Values below 1 signal that the respective share is smaller than the overall average, values above 1 imply an overrepresentation at a certain position of the distribution.

The first attribute of interest is household size. The HFCS 2010 survey comprises 2380 successful household interviews representing about 3.77 million households in Austria. In the survey sample, roughly one third are single households and another third are two-person households. The data show that the amount of wealth owned by a household increases notably with its size (see Fessler et al. 2012). The average household size at the bottom of the distribution is below the overall average, while households at the top are bigger. Furthermore, the share of single households decreases strongly from the 10th to the 90th percentile. In contrast, the share of two-person households increases along the distribution and reaches its maximum in the 7th decile. In the upper half, families become increasingly dominant and account for 45 % of all households at the top decile point. Compared to their overall share of 27 %, they are considerably overrepresented. Single parents are mostly found at the lower tail of the distribution. For example, the share of single parents at the 10th quantile of the net wealth distribution is 2.5 times higher than in the overall sample. Additionally, 56 % of all reference persons in the HFCS 2010 data are women. Our results show that households with a female reference person dominate up to the 75th

³ The respondents are asked to assess the market value or current price of these wealth component in the HFCS. Fessler et al. (2012) emphasize that it is more difficult to estimate the value of the main residence, other properties or business assets than gather the current bank account balance. For this reason, the self-estimated current value is a hypothetical figure.

Table 2 Household characteristics at different points of the wealth distribution

	Overall	Quantile				
		10 %	25 %	50 %	75 %	90 %
Gender						
Female	0.56	1.18	1.13	1.34	1.06	0.84
Age						
Age	50.98	0.88	0.99	1.02	1.14	1.07
Education						
Primary	0.00			8.10		
Secondary I	0.18	1.88	1.17	1.24	1.54	0.54
Secondary II	0.68	0.89	1.02	0.99	0.85	1.07
Tertiary	0.14	0.54	0.72	0.72	1.09	1.27
Type						
Singles	0.39	1.46	1.52	1.27	0.59	0.41
Couples	0.29	0.29	0.61	0.63	1.26	1.26
Single parent	0.06	2.50	1.37	1.04	2.05	0.67
Families	0.27	0.75	0.64	1.00	1.08	1.68
Size						
All members	2.12	0.94	0.80	0.98	1.08	1.28
Children	0.30	1.80	0.96	1.45	0.85	1.64
Income flows						
Wages	€23,545	0.45	0.78	0.92	1.01	1.05
Income self-emp.	€ 4,736	0.07	0.10	0.15	0.32	2.03
Pensions	€11,065	0.46	0.68	0.70	2.22	1.44
Transfers	€ 1,740	1.61	1.52	1.47	0.63	1.04
Main residence						
Owner	0.48		0.08	1.13	1.95	2.01
Inheritances						
Money and more (I)	0.20	0.49	0.87	1.26	0.99	1.39
Main residence (II)	0.13			1.54	2.02	2.08
Main residence and more (I + II)	0.02			1.84	1.33	4.59
None	0.65	1.46	1.28	0.81	0.80	0.53

The table shows several socioeconomic characteristics of household main respondents at different positions of the distribution of net wealth among private households. Cells of the first column indicate the share of households with a specific characteristic or its mean in case of numeric variables. All other values are expressed in relation to the overall mean value

Source: HFCS 2010, own calculation

percentile. However, women are underrepresented at the top of the wealth distribution.

Furthermore, an analysis of educational attainments provides interesting patterns in the distribution of wealth. As anticipated, wealth and education levels share a positive relationship, boosted by the nexus between education and income (see Fessler et al. 2012). There is almost no observation with only primary school in the

HFCS sample. The share of households with upper secondary education along the net wealth distribution oscillates more or less around the total share in the sample. In contrast, the share of households with tertiary education increases from 7 % at the 10th percentile up to 17 % at the 90th percentile compared to 14 % in the total sample. We observe a reverse trend for lower secondary education where the share is disproportionally high at the bottom of the distribution. At the 90th percentile only 9 % of the reference persons have a lower secondary degree.

Figure 2 presents shares for the employment status categories by percentiles of net wealth.⁴ Again, the bottom 5 % of the distribution show remarkable peculiarities. The households with net debt are predominantly economically active while the following percentiles with almost no assets are not. Moreover, only few self-employed households are among this indebted group. It can be clearly seen, that households with employed or retired reference persons prevail throughout the distribution since they are the biggest social classes. Households with transfer beneficiaries as reference persons are mostly found in the bottom third of the net wealth distribution. Self-employed households start to dominate and displace employees and retirees not until the 90th percentile of the net wealth distribution. As a result their share amounts to about 50 % in the top 5 %. In contrast, the portion of employed households strictly decreases in the top decile and equals roughly 10 % in the top percentile.

It has been highlighted, that business ownership is very skewed at the top, where two out of three households among the richest 5 % hold business stakes. Roughly 10 % of all households participate in this wealth component. Figure 3 reveals that business ownership predominantly matters for the top decile. The agriculture and service sectors prevail, while there are in contrast few company stakes in the industrial sector. Additionally a remarkable increase of primary sector businesses can be found at the top of the distribution. In the top 5 %, more than a fourth of all households own such assets. This is particularly important, since the skewness of business ownership is the main trigger of total wealth inequality in Austria.

An obvious nexus exists between annual incomes and the stock of wealth. The annual mean wage in the sample amounts to some €23,500. Clearly, low-income households are found at the bottom of the wealth distribution and the richest earn above-average. This is also true for the income of self-employed households and for pension incomes. Furthermore, inheritances and gifts are strongly associated with the accumulation of wealth in Austria. Table 2 depicts the share of households, that have already received wealth transmissions in terms of inheritances or gifts according to the HFCS 2010 data. In Austria, the inheritance of the main residence is of particular importance (Fessler et al. 2010). Therefore, we distinguish between the transmission of the main residence alone, the transmission of the main residence and additional wealth components and the transmission of any wealth components except the main residence. In general, a strong link between the amount of wealth and its transmission can be found: the wealthier a household, the higher the probability of having received inheritances or gifts. Two thirds of households in the richest quintile have benefitted from at least one wealth transfer. Since the bottom

⁴ Percentile plots for all other socioeconomic attributes under investigation are available on request.

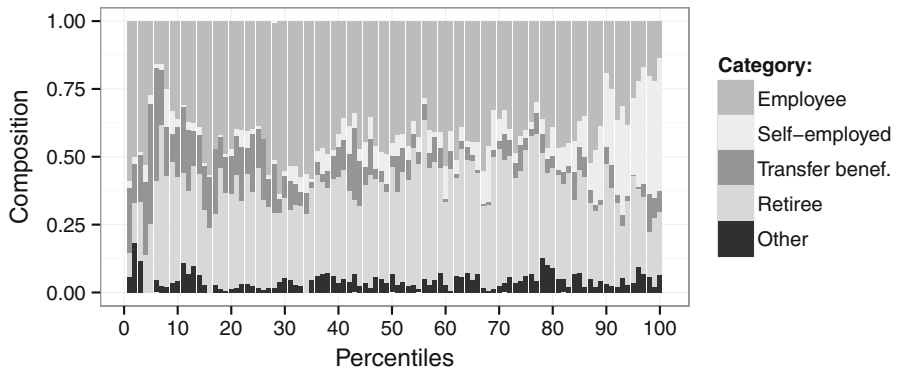


Fig. 2 Relative wealth position with regard to employment status

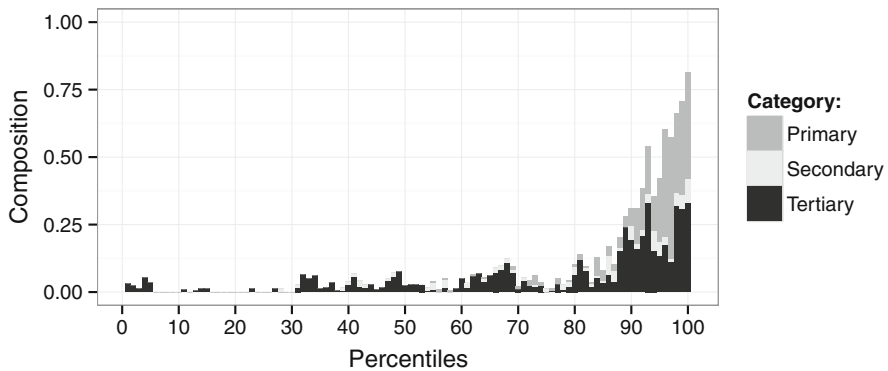


Fig. 3 Relative wealth position with regard to economic sectors of business wealth

half of the wealth distribution does not own its main residence, there are no inheritances evident in that part of the distribution. The correlation between the position in the net wealth distribution and the receipt of inheritances is strongly positive.

5 Joint distribution of household characteristics and wealth position

The descriptive statistics in the previous chapter provide insights into the univariate relationship between socioeconomic characteristics and a household's position in the net wealth distribution. A multivariate approach can be used to analyze the joint distribution of socioeconomic attributes and wealth. Ordinary least squares regression is a common tool to assess the relationship between several covariates and a dependent variable. However, the univariate analysis has shown that the composition of household characteristics changes significantly with respect to the wealth position. We therefore expect to find a pronounced non-linear relationship

between the socioeconomic parameters and a household's rank in the wealth distribution. A linear regression would average out these effects and therefore is not an adequate tool for this kind of analysis. As an alternative we apply quantile regressions (Koenker and Bassett 1978; Koenker and Hallock 2001). In this setting, quantiles of the conditional distribution of the response variable are expressed as functions of observed covariates. Hence, we are able to measure the correlation of the socioeconomic characteristics with the household's relative wealth conditional on the position in the wealth distribution.

Given a random variable Y with the cumulative distribution function

$$F(y) = P(Y \leq y)$$

the empirical quantile function for a quantile $\tau \in [0, 1]$ is defined as an inverse function

$$Q(\tau) = F^{-1}(\tau) = \inf(y : F(y) \geq \tau)$$

According to Koenker and Bassett (1978), the τ th quantile of the random sample $\{y_1, y_2, \dots, y_n\}$ can be calculated by

$$\min_{\xi \in \mathbb{R}} \sum_{i=1}^n \rho_{\tau}(y_i - \xi) \quad (1)$$

where $\rho_{\tau}(\cdot)$ is a so-called *check function*. This function is based on the absolute deviations of the residuals $|y_i - \xi|$ which are weighted by τ if the term is positive and by $(1 - \tau)$ if it is negative. Hence $\rho_{\tau} = \tau \cdot I(y_i > \xi) + (1 - \tau) \cdot I(y_i < \xi)$. Analogue to the estimation of the unconditional mean for a random sample which minimizes the sum of squared residuals, this applies to the linear conditional mean function $E(Y|X = x) = x'\beta$ by solving

$$\hat{\beta} = \arg \min_{\beta \in \mathbb{R}^p} \sum_{i=1}^n (y_i - x_i'\beta)^2. \quad (2)$$

Given the linear conditional quantile function $Q(\tau|X = x) = x'_i\beta(\tau)$, we estimate

$$\hat{\beta}(\tau) = \arg \min_{\beta \in \mathbb{R}^p} \sum_{i=1}^n \rho_{\tau}(y_i - x_i'\beta). \quad (3)$$

We focus on the relative net wealth position of Austrian households. Consequently, the dependent variable is the household position in the net wealth distribution evaluated from the weighted empirical distribution function. A positive side effect of this approach is that our analysis is less vulnerable to measurement errors since we look only at the ranking of households and not at their absolute wealth levels. The observed variation of this variable is set into relation to the socioeconomic characteristics as described in the univariate analysis above. The primary specification for the following results is described by

$$\begin{aligned}
 \text{CDF}_{\text{net}} = & \beta_0 + \beta_1 \text{Female} + \beta_2 \text{Age} + \beta_3 \text{Tert. Edu.} + \beta_4 \text{Couples} + \beta_5 \text{Single par.} \\
 & + \beta_6 \text{Families} + \beta_7 \text{Manager} + \beta_8 \text{Services} + \beta_9 \text{Agric.} + \beta_{10} \text{Size} \\
 & + \beta_{11} \text{Children} + \beta_{12} \text{Liabilities} + \beta_{13} \text{Inc}_{\text{empl}} + \beta_{14} \text{Inc}_{\text{self}} + \beta_{15} \text{Inc}_{\text{pens}} \\
 & + \beta_{16} \text{Inc}_{\text{trans}} + \beta_{17} \text{Main residence} + \beta_{18} \text{Business} + \beta_{19} \text{Inheritance} + \epsilon.
 \end{aligned}
 \tag{4}$$

Many of the included regressors are dummies with the exception of age, household size, number of children, liabilities and the income variables which are measured in levels. The dummy variables *main residence*, *business* and *inheritance* indicate a household's *participation* in the respective wealth component.

Since our primary aim is to identify structures in the joint distribution of wealth and socioeconomic characteristics, we employ regression techniques to simultaneously consider a set of regressors and not to derive causal inference. Therefore, it should be seen as a logical extension to the univariate analysis in Sect. 4 which allows us to additionally take the dependency patterns between the single socioeconomic parameters into account. In this respect, the downside of including potentially endogenous variables is outweighed by the possibility to control for otherwise unexplained heterogeneity between households. Particularly, the inclusion of liabilities into the set of control variables seems to be important as they are

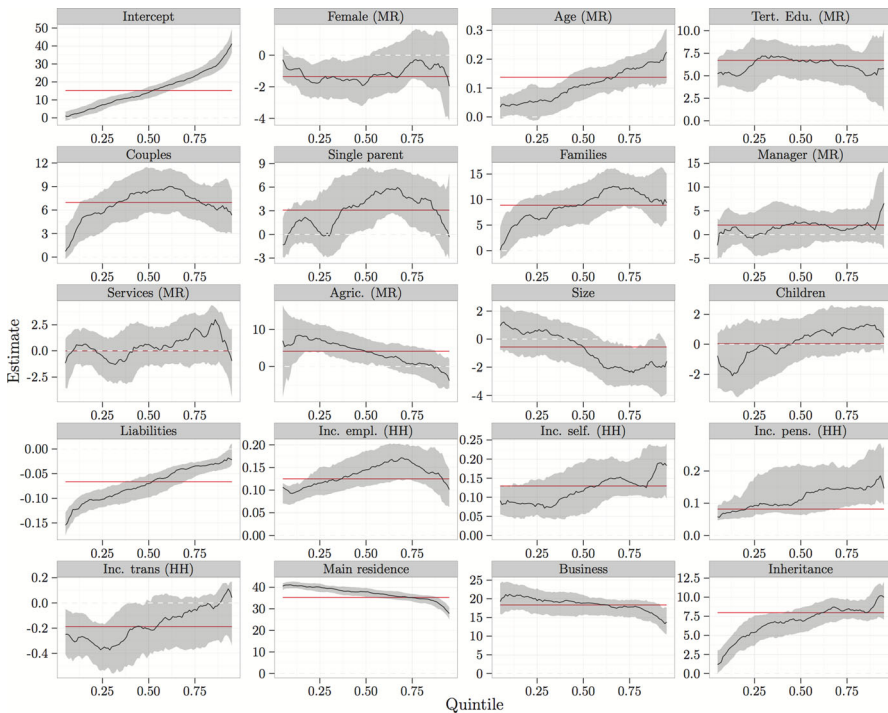


Fig. 4 Quantile regression estimates—socioeconomic determinants of relative net wealth (OLS estimates indicated by horizontal solid lines)

associated with a pronounced discontinuity at the bottom of the wealth distribution. While the households with the lowest net wealth are highly indebted, their household balance sheets show that they own a considerable amount of assets, so that they are actually more representative of households around the median.

Following similar empirical applications, we estimate the model based on the whole sample but do not report results for the top and bottom five percentiles in Fig. 4 due to the already mentioned specifics in the data for these extreme groups. The corresponding estimates for the OLS specification and the quantile regression are reported in Table 3. Ninety percent confidence intervals are based on the first one hundred replicate weights in the dataset. While the test statistics and significance levels in the table are calculated according to the methodological guidelines (HFCN: Eurosystem Household Finance and Consumption Network 2013a), the confidence intervals in the figure are based on the corresponding quantiles of the 5×100 replicate weight regressions. As described in Sect. 3, we have to further account for the complex survey design of the HFCS. Therefore, we

Table 3 Regression estimates

	OLS	Quantile regression				
	Mean	P10	P25	P50	P75	P90
Intercept	15.30	2.30	7.35	14.14	23.29	33.09
Female (MR)	−1.35	−0.92	−1.71	−1.77	−0.47	−0.79
Age (MR)	0.14	0.04	0.05	0.11	0.17	0.19
Tert. edu. (MR)	6.71	5.31	6.57	6.61	6.16	5.37
Couples	6.98	3.00	5.60	8.36	7.49	6.57
Single parent	3.08	0.83	0.30	4.38	4.54	2.38
Families	8.88	3.72	6.29	9.07	12.30	10.08
Manager (MR)	2.00	0.92	−0.22	2.41	1.24	1.00
Services (MR)	−0.01	0.24	−0.49	0.62	2.18	0.85
Agric. (MR)	4.09	5.90	7.49	3.97	0.78	−1.15
Size	−0.56	0.88	0.56	−0.56	−2.33	−2.01
Children	0.04	−1.65	−0.38	0.38	1.04	1.29
Liabilities	−0.07	−0.12	−0.10	−0.07	−0.03	−0.03
Inc. empl. (HH)	0.12	0.09	0.12	0.14	0.16	0.13
Inc. self. (HH)	0.13	0.09	0.08	0.12	0.14	0.19
Inc. pens. (HH)	0.08	0.07	0.09	0.11	0.15	0.16
Inc. trans (HH)	−0.19	−0.31	−0.36	−0.21	−0.05	0.04
Main residence	35.30	40.98	40.12	37.87	35.20	32.06
Business	18.34	21.17	19.49	18.87	17.80	15.22
Inheritance	7.96	2.78	5.37	7.02	8.41	9.03

Source: HFCS, own calculations. The table shows the parameter estimates of OLS and quantile regressions at the 10th, 25th, 50th, 75th and 90th percentile. Estimates with an associated p value below 1 % are depicted in bold, values below 10 % in italics

conducted the estimations on each implicate separately and subsequently combined them using Rubin's rule.

Among the household characteristics in Fig. 4, tertiary education shows a particularly strong and consistently positive relationship with the wealth position. The correlation tends to be moderately lower at both tails of the distribution but it is stable at the level of a regular OLS fit (6–7 additional percentiles) in the middle of the distribution. The strong interrelation between education and wealth has already been indicated by the descriptive analysis. It can also be seen, that there is a robust positive nexus between the net wealth position and the major mechanisms of wealth accumulation, income and inheritances. The correlation of income and wealth is consistent for both employees and self-employed. However, a movement in opposite directions at the top can be stated. This is consistent with the observation that self-employed households are overrepresented in the upmost decile. Receiving transfer income corresponds to a downgrade in the net wealth position which is significant for the bottom half.

While inheriting is generally positive for a household's net wealth position, the effect varies across the distribution. More specifically, the relation between the receipt of inheritances and the size of wealth is strengthening along the distribution and is significantly stronger for affluent households than for their poorer counterparts. This is closely linked to empirical findings of wealth persistence, where richer households receive higher inheritances and at the same time poorer households inherit less frequent and smaller amounts (Piketty 2014). Further variables with a strong and stable connection to wealth include the ownership of main residence and businesses. Owning a main residence corresponds to roughly 30–40 additional percentile points depending on the net wealth position. Similarly, households with business stakes are about 15–20 percentiles above their counterparts without businesses.

Other household characteristics seem to correlate with the wealth position as well, while they are only partially significant across the distribution, as can be seen in Table 3. For instance, households with female reference persons have significant disadvantages concerning the net wealth position particularly in the bottom half. Regarding the household structure a number of distinct patterns can be highlighted. When controlling for all attributes, couples and families obtain higher positions in the wealth distribution than single households who act as reference group. Surprisingly, even lone parents seem to be better-off in the upper half. Furthermore, working as a manager has no significant relationship throughout the whole wealth distribution. Still, a sharp increase for this category is notable at the very top.

Finally, liabilities have a negative effect on net wealth by definition. This can also be observed in the regression estimates where €10,000 in liabilities are associated with a maximum of 1.5 percentile loss of a household's position in the distribution. The correlation varies across the quantiles such that households at the lower tail are much more affected than households at the other end of the spectrum.

6 Conclusions

The distribution of private wealth has recently become a subject of intensive economic research. New data sources have opened a broad field for investigation and enable policy makers to take private household wealth into account for policy propositions. However, analyzing the wealth distribution often disregards the underlying sociodemographic structure, since additional household variables are hardly available in wealth survey data. For the case of Austria, the HFCS 2010 data for the first time allow the observation of household characteristics related to the wealth distribution. We extend previous work that has dealt with the skewness of the wealth dispersion and focus on the joint distribution of wealth and socioeconomic attributes in order to identify generic households at certain positions in the net wealth distribution.

A univariate approach shows a positive relationship between household size and net wealth. Single households and in particular single parents can hardly be found among the richest in the distribution, whereas households with three members or more—mainly multi-generation families—dominate the upper tail. Furthermore we find a distinct tendency that higher educational attainments correlate with a higher position in the wealth distribution.

Based on the results of the descriptive approach, it is evident that the socioeconomic patterns in the wealth distribution are anything but linear. We therefore rely on quantile regressions to analyze the skewed joint distribution of wealth and household characteristics. A number of household variables, for example tertiary education, show a stable positive relation with the net wealth position. Others, like the value of main residence, business ownership or receipt of inheritances, show strictly positive but non-linear effects.

There are no archetypal rich or poor households that serve as representative examples for certain wealth levels. However, there are certain parameters that are more common in one segment of the distribution than in another. We have shown that self-employed households and households with business stakes in the primary sector tend to dominate in the richest decile. On the other hand, this article provides evidence that the bottom 5 % of the net wealth distribution show characteristics similar to households found in the middle of the distribution rather than in the subsequent four deciles. All these findings should be considered with regard to economic policies affecting the distribution of wealth.

Since the HFCS 2010 survey was conducted by the European Central Bank in all member states of the European Monetary Union, future research may reveal different socioeconomic patterns of the wealth distribution across countries. We emphasize the important role of different household structures across Europe that must be taken into consideration for the comparison of wealth distributions. However, the identification of generic households across the wealth distribution is a decisive precondition to assess the social target groups of economic policies concerning the redistribution of wealth.

Appendix

See Table 4.

Table 4 Description of variables

Household size	The number of household members at the main residence. A main residence is defined as the dwelling where the member of a household usually live
Household structure	We distinguish between singles, couples, single parents and families. The household types are derived from the relationship of each household member to the reference person. The categories are 1: Reference person (RP); 2: Spouse or Partner; 3: Son/daughter; 4: Parent; 5: Parent in law; 6: Grandparent; 7: Grandchild; 8: Brother/sister; 9: Another relative; 10: Other household member
Education	This variable captures the highest level of completed education. The four categories based on the ISECD-97 classification are 1: primary or below (ISCED 0 and ISCED 1); 2: lower secondary (ISCED 2); 3: upper secondary (ISCED 3 and ISCED 4); 4: tertiary (ISCED 5 and ISCED 6)
Labor market status	The labor market status comprises nine categories which are 1: Doing regular work for pay (also self-employed and working in family business); 2: On sick, maternity or other leave (except holidays); 3: Unemployed; 4: Student, pupil or unpaid intern; 5: Retiree or early retiree; 6: Permanently disabled; 7: Compulsory military service or equivalent social service; 8: Fulfilling domestic tasks; 9: Other not working for pay. We subsume the categories 2–7 into on category of transfer beneficiaries
Employment status	The first category of the labor market status is divided into 4 groups. 1: Employee; 2: Self-employed with employees; 3: Self-employed without employees; 4: Unpaid family worker
Occupation	This variable refers to the current main job. If multiple jobs were held, the main job should be the one with the greatest number of hours usually worked. The variable relies on the ISCO-08 classification. We concentrate on ISCO codes 1 (managers), 5 (service sector) and 6 (agriculture)
Economic sector of company stakes	The main activity of the business owned by the household is captured by the NACE 2008 classification. We combine NACE codes A and B into the agricultural, codes C to F into the industrial and codes G to U into the service sector
Income variables	All income variables show the gross value of income received in the last calendar year
Inheritances	This variables subsumes inheritances and gifts received by the household. Inheritances include transfer of assets in connection with death of a decedent. Gifts are transfers of assets made during the life of a donor, not connected to the death of that person

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