The older, the richer? – A decomposition of wealth inequality by age subgroups for Germany

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Abstract

The article investigates the quantitative contribution of wealth differences associated with age to overall wealth inequality in Germany, using individual wealth data for 2012 from the German Socio-Economic Panel. Employing the well-known Gini coefficient, we decompose wealth inequality in Germany by age subgroups. The results confirm that 35 percent of the overall wealth inequality in Germany can be explained by transitory life-time wealth differences due to age. Given that the amount of the within group inequality is not negligible, we further analyze the distinct age subgroups' wealth distributions using quantile regressions. The results show that the dispersion of wealth in Germany increases with age (conditional on education, region and family status), indicating that the major part of the within group inequality is due to older age groups.

JEL classification: D30, D31, D63

Key words: wealth, inequality decomposition by age subgroups, Germany

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1. Introduction

Recent research documents high wealth concentration in almost all industrialized countries. The Gini coefficient for OECD countries typically ranges between 0.6 and 0.8. Germany's wealth inequality is with a Gini coefficient of 0.77 one of the highest (Cowell et al, 2012, Cagetti and De Nardi, 2008, Grabka and Westermeier, 2014). The high wealth concentration in Germany is often seen as a source of sociopolitical problems leading to both a loss in economic growth and in welfare.

However, it should be considered that the finding of substantial wealth inequality in most of the studies relies on cross-section data. This is problematic because cross-population measures of inequality do not take population heterogeneity into account. A snapshot of the distribution of wealth in a cross-section runs the risk of overestimating inequality. Theoretical models of individual savings behavior and the life cycle hypothesis of saving suggest that wealth is accumulated during the earning span and dissaved during the time of retirement.[3] Hence, a major part of inequality may simply be explained by the fact that people are observed at different stages of their lifetime. Older people had more time to accumulate wealth than younger people, resulting in a – "natural" – large wealth concentration among the elderly (Piketty et al, 2006). Whereas wealth inequality between age groups may only reflect different stages of lifetime, inequality between individuals of the same age may reflect unequal opportunities, leading to different policy implications. Against this background, it seems important to distinguish between *within* and *between* age group inequalities.

Although the strong age-wealth relationship is highlighted in a number of studies, the literature dealing with the decomposition of wealth inequality by age subgroups is surprisingly scant.

Atkinson (1971) simulates a perfectly egalitarian society where everyone has the same age-wealth profile and is identical in every respect apart from age. He investigates the likely degree of inequality in such a society and compares the resulting "natural" inequality due to differences in age with the real observed inequality in the UK. Moreover, the author breaks wealth inequality down by age and sex groups. He demonstrates that, in Britain, wealth within age groups is still very unequally distributed and concludes therefore that life-cycle differences are not an important factor in explaining the observed inequality, at least for the upper tail of the wealth distribution.

[3] For a detailed description of the life cycle hypothesis of saving and the underlying base model see Modigliani and Brumberg (1954).

Paglin (1975) is the first who addresses the idea of an age-adjusted Gini index and defines the so called Paglin-Gini. The Paglin-Gini relies on a definition of equality such that differences of wealth due to age are allowed. In contrast to Atkinson, the author finds that age does explain a large part of the observed wealth inequality in the United States (in 1962): The traditional Gini coefficient that does not adjust for age effects overstates the degree of wealth inequality by about 52 percent. The author's proposal of an age-adjusted Gini index in cross-sectional distributions has been commented on and has been further developed by many authors.

Pudney (1993) isolates the life cycle effects of age on income and wealth for urban and rural Chinese households. The author constructs age-specific measures and compares them with the traditional inequality measures. He shows that only a small part of the observed income and wealth inequality in China can be explained by age effects.

Cowell et al. (2012) calculate the contribution of cross-country differences in the age structure to differences in wealth inequality for the UK, Italy, Finland, Sweden and the USA using data from the Luxembourg Wealth Study. They also find that a country's age structure does only explain a small part of its wealth distribution.

The rest of the existing literature on inequality decomposition by age (population) subgroups focuses on income and largely refers to the Anglo-American countries.

Soltow (1960) is the first to decompose income inequality using the Gini index. He analyses the effect of changes in education, age and occupation on the overall income inequality in the US during the first half of the 20th century. He finds that inequality increases with growing ageing of the population. A couple of years later, Fishlow (1972) decomposes overall income inequality in Brasilia by education, sector, age and region using the Theil entropy index. The results indicate, that age, sectoral, regional and educational differences together explain more than half of the overall observed income inequality.

Mokherjee and Shorrocks (1982) as well as Cowell (1984) also find that age does explain a part of the total income inequality: Whereas Mokherjee and Shorrocks (1987) consider the impact of the age structure on the time trend of income inequality in the distribution of UK household incomes for the period 1965 to 1980, Cowell (1984) investigates the impact of family size and age of household head on overall income inequality in the US.

There are several other studies that decompose income inequality by other than age subgroups, for example by region, family size or ethnic groups (Bhattacharya and Mahalanobis, 1967, Das and Parikh, 1982, Yitzhaki, 1987).

Given that Germany has one of the most concentrated wealth distributions but has relatively low income inequality, the results from income inequality decomposition cannot simply be transferred to wealth. Additionally, owing to the ageing of the German population and the resulting pressure on public social security systems, the role of private precaution for retirement in terms of pension plans or investments in real estate is becoming more and more important. Therefore, it is worth investigating wealth decompositions by age subgroups in general and for Germany in particular.

Different from previous research, we decompose wealth inequality by age subgroups for Germany. We calculate the part of wealth inequality that is due to differences in age and the part that is due to within group inequality. The analysis relies on survey data from the German Socio-Economic Panel (GSOEP) that, as one of a few datasets, contains information on *individual* wealth data for people aged at 17 years and older. Data from the GSOEP is especially suitable for the analysis because it takes into account that the information on wealth is sensitive and item-non responses are logically imputed. Moreover, we are able to connect the wealth information with a variety of socio-economic and demographic variables. In 2002, the wealth questionnaire is launched for the first time and is repeated every 5 years. In our analysis we use the newest wealth data of 2012.

We decompose wealth inequality employing the well-known Gini concentration ratio. The results of the Gini decomposition indicate that more than one third of the overall wealth inequality in Germany can be explained by wealth differences due to age. Thus, a simple comparison of individuals in a cross-section overestimates wealth inequality in Germany. However, the largest part (50 percent) of the total inequality is explained by the residual arising from the decomposition. Given that the interaction term measures the intensity of permutations which result from reranking the individual wealth shares, the large value of the interaction term points to a high degree of overlap of the age subgroups' distributions. The within group inequality accounts for the rest of the wealth inequality in Germany, i.e. for 15 percent. As this amount is not negligible, we are also interested in the factors influencing wealth within age subgroups. Therefore, we further analyze how the wealth distribution changes with increasing age using quantile regressions. Quantile regression results show, that the dispersion of wealth increases with age (conditional on education level, region and family status), indicating that the major part of within group inequality is due to older age groups. The wealth increasing effect of age is stronger in the upper points of the distribution. Hence, poor people or people with negative wealth are relatively equal across all age groups, whereas the richest people of the sample belong to older age groups.

The rest of the paper is structured as follows: The upcoming Section 2 gives a detailed overview of the survey data, we use in our analysis. Research methodology and empirical results of the decomposition and the quantile regression analysis are presented in Section 3 and 4 respectively. Finally, in Section 5 we discuss the findings and highlight open questions as well as directions for further research.

2. Data

The empirical analysis relies on data taken from the GSOEP, which has been conducted annually since 1984 and contains a variety of socio-economic characteristics both at the household as well as at the individual level. In 2002, for the first time, the panel additionally provides information on individual wealth of persons aged 17 years and older. Since then, the wealth module is demanded every 5 years, so that wealth data on the individual level are available for the years 2002, 2007 and 2012. In our analysis we use the newest dataset, the individual wealth data of 2012.

Analyses of wealth distributions often are problematic due to data limitations. The principal difficulty with sample surveys of the population is to ensure an adequate response rate, particularly amongst the rich. Given that the information on wealth is sensitive, item non-responses occur quite often. Especially high wealth is underrepresented, since rich people avoid reporting on their wealth, so that there is selection in the data and representativeness of the sample is not given. But the GSOEP accounts for this problem by multiple imputation of missing data values.[4]

Moreover, the GSOEP allows investigating wealth issues on the individual level and provides information over a large range of distinct wealth components[5]. However, the GSOEP also has some shortages. It does not provide information on contents like cars or furniture, nor on pension entitlements. Given that especially in Germany, public pension's schemes play an important role for the majority of the working population, a complete recording of wealth

[4] For a detailed description of the imputation process see Frick et al. (2007).
[5] The eight wealth components, that are demanded in the GSOEP, are owner-occupied property, other property (both including debts), financial assets, building loan contracts, private insurances, business assets, tangible assets and consumer debts.

should take these wealth components into account. Without pension rights, wealth is probably underestimated.

Our variable of interest is net wealth. Figure 1 shows the wealth shares for the deciles of the German wealth distribution. One can see that wealth is relatively unequally distributed: Whereas the poorest 90 percent of the population own less than 40 percent, the richest 10 percent own nearly 58 percent of total wealth. Table 1, which displays some important quantiles of the wealth distribution, also points to a rather high wealth inequality in Germany. About 25 percent of all wealth observations are zero or negative and the interquartile range[6] as well as the higher quantiles are quite large. In addition, the median is much smaller than the mean, which shows that the wealth distribution is right skewed with a long upper tail (Table 1 and 2).

[6] The interquartile range measures the difference between the first and the third quartile.

Figure 1: Wealth Shares

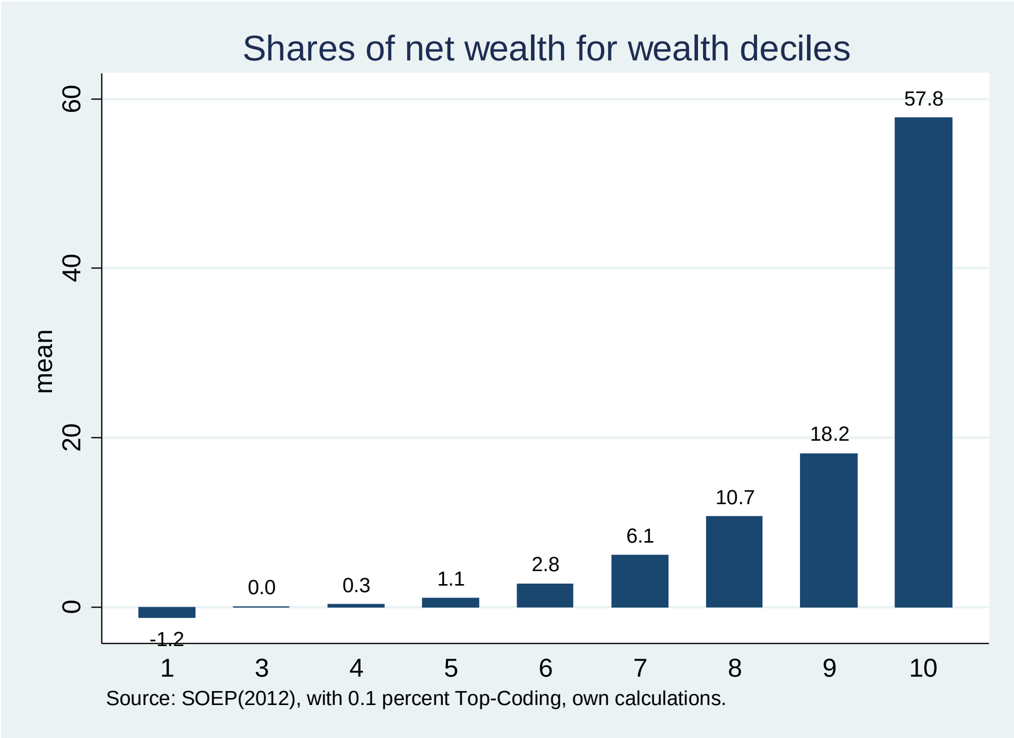


Table 1: Distributional Statistics

	Percentiles
1%	-22800
5%	-3000
10%	0
25%	0
50%	17181.2
75%	100000
90%	215500
95%	319950
99%	800000

Source: GSOEP (2012), with 0.1 percent Top-Coding, own calculations. 18356 observations.

Following Grabka and Westermeier (2014) we decompose total population into seven age groups[7] and consider the wealth distribution for each of these subgroups. Table 2 displays the most important descriptive as well as distributional statistics and reveals profound differences in the wealth distribution of the distinct age subgroups.

As theory tells us, the data show the inverse u-shape relationship between age and wealth holdings. For the younger age groups, wealth is low and increases with age until a threshold

[7] The age subgroups are decomposed as follows: 17-25, 26-35, 36-45, 46-55, 56-65, 66-75 and >75.

that lies between 60 and 70 years. Afterwards, wealth is decreasing, reflecting the theoretical concept of dissaving in retirement.

It can also be seen that the degree of wealth concentration varies significantly between the subgroups and tends to be higher for younger people.

Table 2: Wealth descriptive statistics by age subgroups

Age Subgroup	Sample Size	Mean	Median	Minimum	Maximum	GINI
17-25	1693	5129	0	-36400	371500	0.94
26-35	2085	21196	3760	-371100	2405000	0.93
36-45	2696	66334	21433	-260820	3367653	0.76
46-55	3593	104088	40000	-400000	4310000	0.73
56-65	3269	117577	65000	-4000000	5135705	0.68
66-75	2915	132183	68700	-218000	4250000	0.66
>75	1715	110298	40000	-20000	3611060	0.70
missings	390					
Total	18356	81595	17181	-4000000	5135705	0.75

Source: GSOEP (2012), with 0.1 percent Top-Coding, own calculations. 18356 observations.

3. Decomposition Analysis – Methodologies and Results

The methodological problems of inequality decomposition by population subgroups have been discussed in a variety of studies. There evolved two important strands of the literature. Triggered by the influential paper by Theil (1967), who introduces a new measure of income inequality, the first group of researchers focuses on the class of decomposable inequality measures. In the context of inequality decomposition by population subgroups the advantages of attractive decomposition properties, in particular additive decomposability, are often mentioned. Substantial research effort has been devoted to axiomatically derive inequality indices which could be decomposed into the sum of between and within groups' components (Bourguignon, 1979; Shorrocks, 1980, 1984). The class of additive decomposable measures[8], at least its members with the most satisfying properties (Mean Logarithmic Deviation and the

[8] The class of additive decomposable inequality measures contains the Generalized Entropy family and monotonic transformations of its members. For a detailed description of the formulas and the properties of these measures see Shorrocks (1980).

Theil coefficient), are defined for positive values only. Given that in our data we have negative net wealth, these measures cannot be used in the analysis.

Instead, we employ the Gini concentration ratio which has been the focus of the second group of researchers in the field of inequality decomposition by population subgroups (Bhattacharya and Mahalanobis, 1967, Rao, 1969, Pyatt, 1976, Silber, 1989).

Following Silber (1989) we use a decomposition method based on matrix algebra which greatly simplifies the computations. Moreover, it allows for an appealing intuitive interpretation of the interaction term as a result of the individuals' ranking in the income parade. The author shows that the overall Gini index can be written as $I_G = (e'Gs)$, where e' is a row vector of n elements all equal to $1/n$, s is a column vector of n elements which are equal to the individual income shares s_i, ranked by decreasing values of the individual income y_i $(s_1 \geq s_2 \geq \cdots \geq s_i \geq \cdots s_n)$ and G is an n by n matrix whose elements g_{ij} are equal to 0 if $i = j$, to +1 if $i > j$ and to -1 if $j > i$. Hereby, j is the index for the rank of individual i in the income distribution.

In the case of overlapping subgroup distributions, the overall Gini index can be decomposed into three contributions, a within-groups inequality term I_W, a between-groups inequality term I_B and an interaction term I_o: $I_G = I_W + I_B + I_O$. The interaction term must not be considered as a shortcoming. On the contrary, some studies (Pyatt, 1976, Silber 1989, Lambert and Aronson, 1993, Yitzhaki, 1994) show that it provides useful information on the degree of the overlapping between the subgroups' income distributions.

Let us define the income share s_{ij} such that i refers to the income and j to the rank of the individual. Whenever these subindices refer to individuals, they take the value one. Hence, $i = 1$ stands for the individual income and $j = 1$ means that the income is ranked by individual income. Whenever the subindices refer to the subgroups, they take the value zero. Then, $i = 0$ means the average income of the group the individual belongs to and $j = 0$ means that individuals firstly are ranked by the size of the average group incomes and then, within each subgroup, by decreasing individual incomes. Now, let us partition the population into k subgroups and as it is the tradition in economic inequality literature (Bhattacharya and Mahalanobis, 1967; Fei, Ranis and Kuo, 1979; Shorrocks, 1984; Lambert and Aronson, 1993) let us define the within group inequality as residual. Then, the total Gini index can be written as $I_G = e'Gs_{11}$.

The between group inequality depends on the differences between the mean incomes of the subgroups and is defined as the one which is obtained if every individual income is replaced by the mean income of the subgroup the individual belongs to. It is given by $I_B = e'Gs_{00}$.
The ranking according to s_{00} bases the definition of the between-inequality on the relative economic performance of the group and is insensitive to transfers in the within group distribution.
The within group inequality is a weighted average of the Gini indices for every subgroup and is given by $I_W = e'Gs_{10} - e'Gs_{00}$.
The interaction term which is positive if the income ranges of the subgroups overlap and zero otherwise, is given by $I_O = e'Gs_{11} - e'Gs_{10}$.
We apply the presented statistical approach of income inequality decomposition by population subgroups to wealth data for Germany.

The results of the decomposition of the Gini index are displayed in Table 3.[9] The overall Gini ratio is equal to 0.752. Given that the Gini index is zero when there is no inequality and that it is one if one individual has all the wealth, this result points to a considerable overall wealth inequality in Germany in 2012. The between groups Gini coefficient is 0.261 and does explain 35 percent of the overall wealth inequality in Germany. That is, more than one third of the wealth inequality is due to differences in age. A simple comparison of individuals in a cross-section thus significantly overestimates wealth inequality in Germany. The within groups inequality is a bit lower: The within Gini amounts to 0.115, so that it accounts for 15 percent of total wealth inequality in Germany. The within groups inequality can further be split off into the contribution of the different within age groups inequality. Table 4 shows that the greatest part (80 percent) of the within age groups inequality results from the inequality among the middle and older age groups (46-55, 56-65, 66-75). The two youngest age groups (17-25, 26-35) do not significantly contribute to the “overall” within inequality. According to these results, wealth in Germany seems to be more equally distributed within the youngest and the oldest age groups, than in the whole population.
The greatest part of the total inequality results from the “permutation” component. It amounts to 0,375 and does explain 50 percent of the overall wealth inequality in Germany, so that its contribution to total wealth inequality is as large as that of the within group and the between group components together. Following Silber (1989), the interaction term can be interpreted

[9] The results are comparable to those resulting from a Gini decomposition based on Pyatt (1976). Notice, however, that for the application of Pyatt’s decomposition method, in STATA it is necessary to eliminate negative values. Therefore, we set all values smaller than 1 percent of the mean wealth on this value.

as the intensity of permutations which result from re-ranking the individual wealth shares. The large value of the interaction term thus points to a high degree of overlap of the age subgroups' distributions. That means that there are many young people who already have high wealth holdings and are richer than older people. The same applies inversely: There are many old Germans who are relatively poor in comparison to younger Germans.

Table 3: Gini decomposition by age subgroups

	Gini Index	Contribution in %
Between age group inequality	0.261	35%
Within age groups inequality	0.115	15%
"Permutation" component	0.375	50%
Total inequality	0.752	100%

Source: GSOEP (2012), with 0.1 percent Top-Coding, own calculations. 17966 observations.

Table 4: Contribution of the within age groups inequality

17-25	0.00044	0%
26-35	0.0029	3%
36-35	0.0126	11%
46-55	0.0344	30%
56-65	0.0329	29%
66-75	0.0244	21%
> 75	0.0078	7%
Total	0.115	100%

Source: GSOEP (2012), with 0.1 percent Top-Coding, own calculations. 17966 observations.

4. Quantile Regression – Methodology and Results

Although differences in age group means are high, the amount of the within group inequality is not negligible. Hence, we are interested in how the distribution and dispersion of wealth changes with age or age groups and what other factors influence wealth within age groups. Therefore, we use quantile regression analysis.

Quantile regression is a useful tool if one is interested rather in the distribution of the outcome variable than in its mean. Because we record a lot of observations with zero wealth and, on the opposite, with extreme high wealth values, only a few values occur in the neighborhood of the mean. Hence, an ordinary least squared regression on the conditional mean is of little interest, since it is not representative for the whole distribution (Conley and Galenson, 1998).

An additional advantage of quantile regression is its robustness against outliers (Koenker, 2005). The estimated coefficients of, for example, the median regression, are not affected by high wealth values, as long as these values lie above the estimated regression line. In our estimated wealth distribution, outliers appear especially in the upper tail of the distribution.

Like in general literature on distribution economics, income or wage are the mostly analyzed outcome variables in quantile regression literature (see for example Gosling et al, 2000).

There are only a few studies applying this method on wealth. Conley and Galenson (1998) examine the effect of nativity on wealth in four American cities in the 19th Century. Their main argument for using quantile regression instead of ordinary least squares regression is, that in the 19th Century census data, censoring occurs for low values, leading to biased results of mean regression coefficients, but not affecting quantile regression estimates for at least upper quantiles. Chernozhukow and Hansen (2004) use survey data of the United States to examine the impact of the participation in pension plans on wealth. In this study, data is not censored, but the focus lies on the question, whether pension plans affect rather the upper or the lower tails of the wealth distribution. Using pension plan eligibility as an instrument for participation, they find a positive effect, which is higher in the upper tail of the distribution.

To the best of our knowledge, there is no study that analyzes the age effect using quantile regression for Germany.

Quantiles can be calculated by solving an optimization problem[10]:

$$\underset{q}{\operatorname{argmin}}\, E(\rho_\tau(y_i - q)), \qquad (1)$$

[10] Presentation of formulas leaned on Koenker (2005).

with $\rho_\tau(u) = u(\tau - 1(u < 0))$, which is called loss or "check" function. y is the wealth of person i and τ can take values between 0 and 1. Minimizing yields to $q = F^{-1}(\tau) = Q_\tau(y)$, which is the τ-th quantile of the distribution of y.

Similar, conditional quantiles can be estimated by solving

$$\arg\min_\beta E(\rho_\tau(y_i - X_i'\beta)). \tag{2}$$

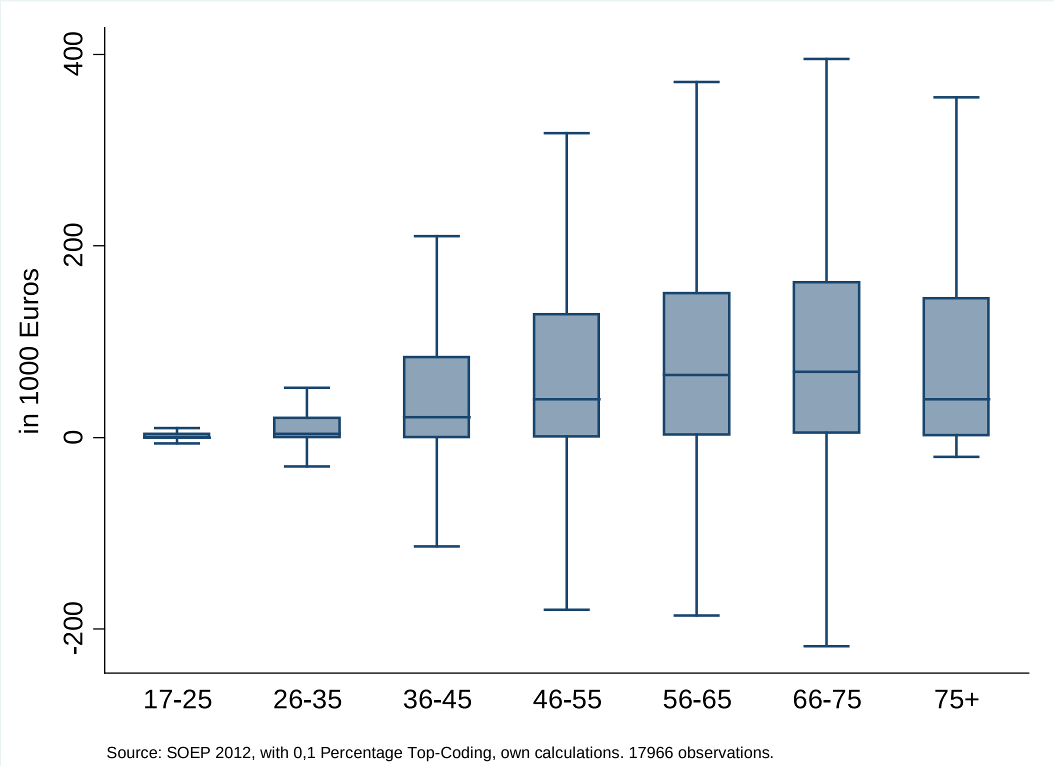
The estimated coefficients represent the impact of x on the (conditional) τ-th quantile. If τ is for example 0.5 and x measures age, β (>0) describes how the wealth of the poorest 50 percent increases with age. Interpretation on an individual level is not allowed, since the rank of people in the distribution may change with age. A 17 years old individual ranked in the middle of the distribution (what means, that his wealth equals the median value) does not necessarily be at the same rank if he turns 18. Hence, a positive β shows that those who belong to the poorest 50 percent at, e.g. the age of 60, are better off than the poorest 50 percent at the age of 20[11].

Figure 3 shows a boxplot diagram. Net wealth in 1000 Euros is plotted as a function of age groups. As in section 3 we divide age groups into seven classes. The horizontal line in the middle of each box is the median net wealth for each age group, and the lower and upper edges of the boxes represent the first and third quartiles. The height of the box is the interquartile range. The bars represent the full range of net wealth, whereas outliers are excluded.

There is a tendency of net wealth to rise with age groups until the age of 75. But from figure 3 we can additionally observe that dispersion, represented by the interquartile range, also increases with age group. The age effect seems to be stronger for higher quantiles than for the lower part of the distribution, indicating that the age wealth relationship differs at different points of the wealth distribution.

[11] For the interpretation of quantile regression coefficients see Angrist and Pischke (2009).

Figure 3: Wealth distribution by age groups



Our quantile regression analysis is also based on the 2012 GSOEP data. The outcome variable is net wealth. Although it is usual in regression estimations with highly skewed distributions (like income and wealth), we forbear from taking the logarithm of net wealth, so that it is possible to include negative and zero wealth observations in our analysis.

Age is included as a quadratic effect, instead of a categorical variable, so that we can estimate the effect of an increase in one year of life on wealth. Further explanatory variables are gender, region (living in East or West Germany), family status and education. Family status is divided into three groups: "married" (reference group), "unmarried" and "divorced or widowed." Education is measured as the highest degree obtained, with "general elementary" as the reference group. The other education classes are summarized in "vocational and middle vocational" and "higher vocational and higher education." Our sample includes 17096 observations.

Figure 4 and 5 present the estimated effects of age and age squared for a set of quantiles. The horizontal black line represents the OLS estimates of the mean effect. The dashed lines show respectively the 95 percent confidence intervals. Wealth increases on average by about 6000 Euros with a one year change in age. Up to the 80 percentage quantile, the age effect on quantiles lies below the mean effect, indicating that age is a stronger wealth determinant in the upper part of the distribution. Age squared has a negative impact on nearly all quantiles of the distribution, showing that the positive effect of age is diminishing with increasing age (Figure 5). The impact on upper quantiles again is stronger. Both effects indicate that age has an inverse u-shape impact on wealth, whereas the diminishing effect is quite small. The results show that wealth dispersion increases with age, while this dispersion is mainly due to the increase of upper quantiles. The high share of within group inequality on total inequality is probably driven by older age groups.

The effects of gender, region, family status and education are illustrated in the Appendix.

Figure 4: Quantile regression results for age

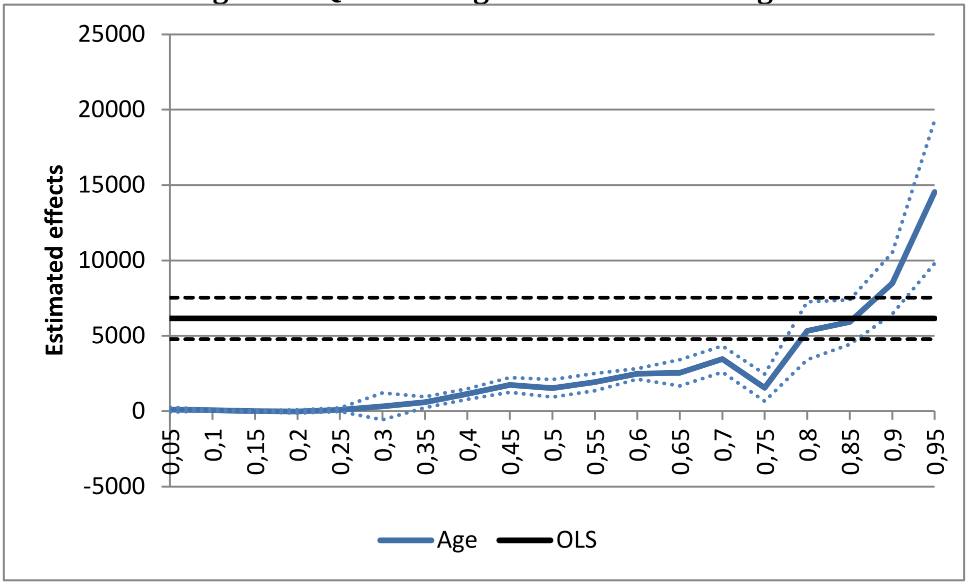
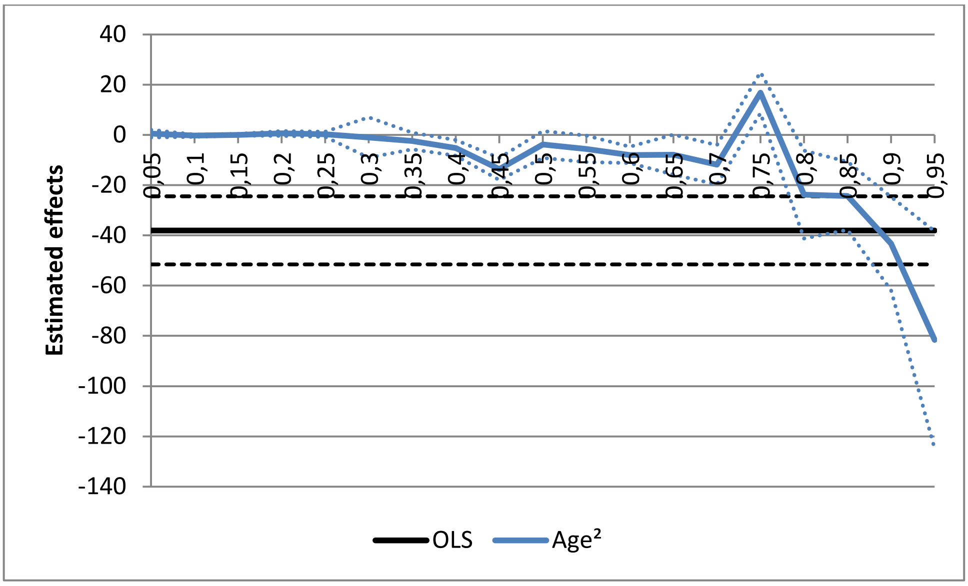


Figure 5: Quantile regression results for age squared



5. Conclusion

Recent studies indicate that wealth inequality in Germany is quite high, yielding to a lively discussion about its economic, political and social consequences as well as to the development of policy instruments to limit inequality. This papers' contribution to recent research is to explain wealth inequality and to expose its sources with a special focus on age. The decomposition of the Gini coefficient into a within, a between and an interaction component shows that 35 percent of the overall inequality can be explained by age differences. Since the results partly depend on the classification of age groups, it can be assumed that by reducing the size of age groups, the between age groups component is even higher.

50 percent of overall inequality can be attributed to the interaction term, which reflects both within and between group inequalities, and additionally represents the degree of overlapping of the age groups wealth values.

Quantile regression results show that the dispersion of wealth rises with age. People with high wealth are more unequal across age groups than poor people. The lower (conditional) quantiles do only change slightly, which results in an overlapping of lower wealth values across age groups. Inequality is mainly driven by high wealth values and older age groups. Nevertheless, nearly one third can be explained by age heterogeneity and by the fact that observed individuals are at different stages of their age-wealth profile. This leads to a somehow less dramatic picture of wealth inequality in Germany.

Inequality decomposition by other socio-demographic or geographic subgroups can be valuable to gain a clearer picture of the driving factors of German wealth inequality. It would also be interesting to decompose wealth inequality for example by education-age cells. Amongst individual factors like age and income, inheritances play a major role in explaining wealth inequality. Our paper focuses on life cycle factors that abstract from inheritances. Given the result that inequality is mainly driven by the older age groups' extremely high wealth holdings, it seems important to analyze the effects of inheritances on wealth inequality in more detail. Studies that are available to date that focus on this topic are mostly restricted to the Anglo-American regions, whereas for Germany there is a need for further research concerning the characteristics of the top-wealth holders.

References

Angrist, J. and Pischke (2009), *Mostly Harmless Econometrics. An Empiricist's Companion,* Princeton University Press.

Atkinson, A.B. (1971), The Distribution of Wealth and the Individual Life-Cycle, *Oxford Economics Papers 23(2)*, 239-254.

Bhattacharya, N. and B. Mahalanobis (1967), Regional Disparities in Consumption in India, *Journal of the American Statistical Association 62(317)*, 143-161.

Bourguignon, F. (1979), Decomposable Income Inequality Measures, *Econometrica 47(4),* 901-920.

Cagetti, M. and M De Nardi (2008), Wealth Inequality: Data and Models, *Macroeconomic Dynamics 12 (Supplement 2)*, 285-313.

Chernozhukow, V. and S. Hansen (2004), The Effects of 401(k) Participation on the Wealth Distribution: An Instrumental Quantile Regression Analysis, *The Review of Economics and Statistics 86 (3)*, 735-751.

Conley, T. and D.W. Galenson (1998), Nativity and Wealth in Mid-Ninteenth-Century Cities, *The Journal of Economic History 58 (2)*, 468-493.

Cowell, F.A. (1984), The Structure of American Income Inequality, *Review of Income and Wealth, 30*, 351-375.

Cowell, F., E. Karagiannaki und A. McKnight (2012), Accounting for Cross-Country Differences in Wealth Inequality, *LWS Working Paper Series No.13*.

Das, T. and A. Parikh (1982), Decomposition of Inequality Measures and a Comparative Analysis, *Empirical Economics, 7*, 23-48.

Fei, J.C.H., G. Ranis and S.W:Y. Kuo (1979), Growth with Equity – The Taiwan Case, Oxford: Oxford University Press.

Fishlow, A. (1972), Brazilian Size Distribution of Income, *American Economic Review, 62(20)*, 391-402.

Frick, J., M. Grabka and J. Marcus (2007), Editing and Multiple Imputation of Item-Non-Response in the 2002 Wealth Module of German Socio-Economic Panel (SOEP), *SOEP Papers 18*.

Gosling, A., S. Machin and C. Meghir (2000), The Changing Distribution of Male Wage in the U.K., *The Review of Economic Studies 67 (4),* 635-666.

Grabka, M. and C. Westermeier (2014), Anhaltend hohe Vermögensungleichheit in Deutschland, *DIW Wochenbericht 9/2014*, 151-164.

Koenker, R. (2005), *Quantile Regression*, Cambridge University Press.

Lambert, P.J. and J.R. Aronson (1993), Inequality Decomposition Analysis and the Gini Coefficient Revisited, *Economic Journal 103, Issue 420*, 1221-1227.

Modigliani, F. and R. Brumberg (1954), Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data, *Post-Keynesian Economics, Rutgers Universtiy Press, New Brunswick, NJ.*

Mokherjee, D. and A.F. Shorrocks (1987), A Decomposition Analysis of the Trend in U.K. Income Inequality, *Economic Journal, 92(368)*, 886-902.

Paglin, M. (1975), The Measurement and Trend of Inequality: A Basic Revision, *American Economic Review 65 (4)*, 598-609.

Piketty, T, G. Postel-Vinay and J. Rosenthal (2006), Wealth Concentration in a Developing Economy: Paris and France, 1807-1994, *The American Economic Review 96(1)*, 236-256.

Pudney, S. (1993), Income and Wealth Inequality and the Life Cycle: A Non-Parametric Analysis for China, *Journal of Applied Econometrics 8 (3)*, 249-276.

Pyatt, G. (1976), On the Interpretation and Disaggregation of Gini Coefficients, *Economic Journal 86(432)*, 243-255.

Rao, V.M. (1969), Two Decompositions of Concentration Ratio, *Journal of the Royal Statistical Society, Series A, 132(3)*, 418-425.

Shorrocks, A. F. (1980), The Class of Additively Decomposable Inequality Measures, *Econometrica 48(3)*, 613-625.

Shorrocks, A. F. (1984), Inequality Decomposition by Population Subgroups, *Econometrica 52(6)*, 1369-1385.

Silber, J. (1989), Factor Components, Population Subgroups and the Computation of the Gini Index of Inequality, *The Review of Economics and Statistics, 71(1)*, 107-115.

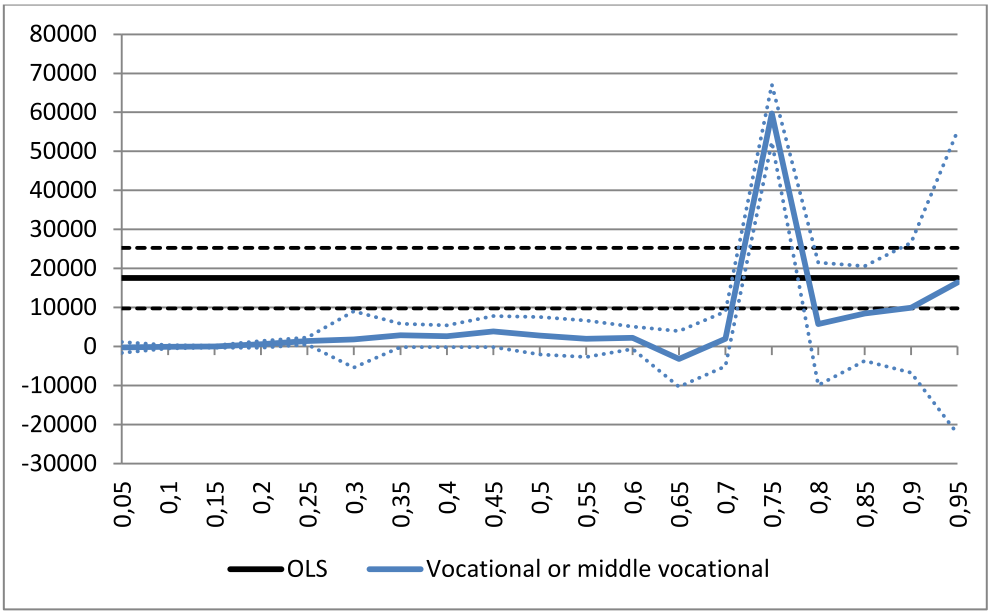
Soltow, L. (1960), The Distribution of Income Related to Changes in the Distribution of Education, Age and Occupation, *Review of Economics and Statistics, 42(4)*, 450-453.

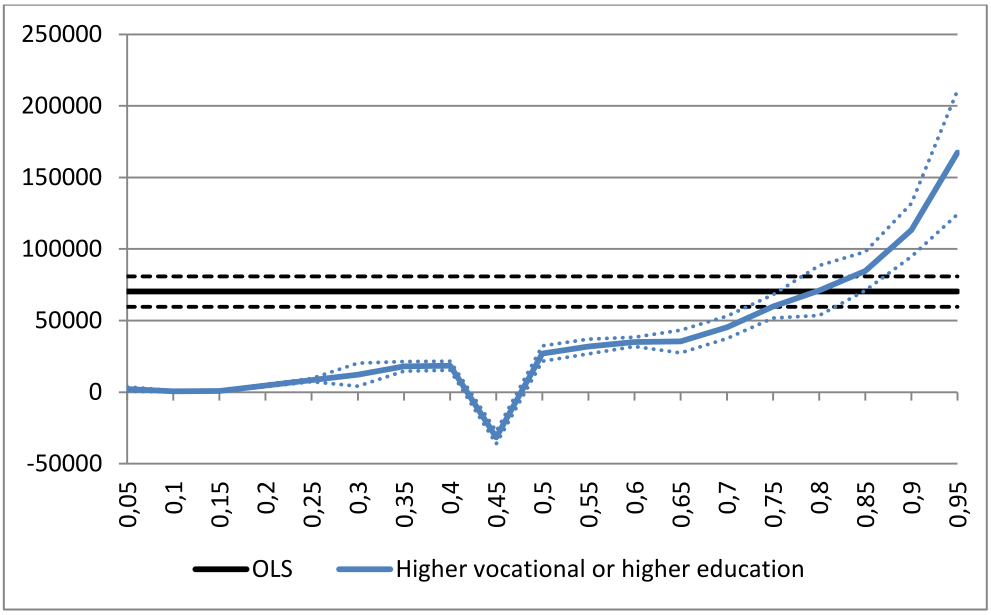
Theil, H. (1967), Economics and Information Theory, Amsterdam: North-Holland.

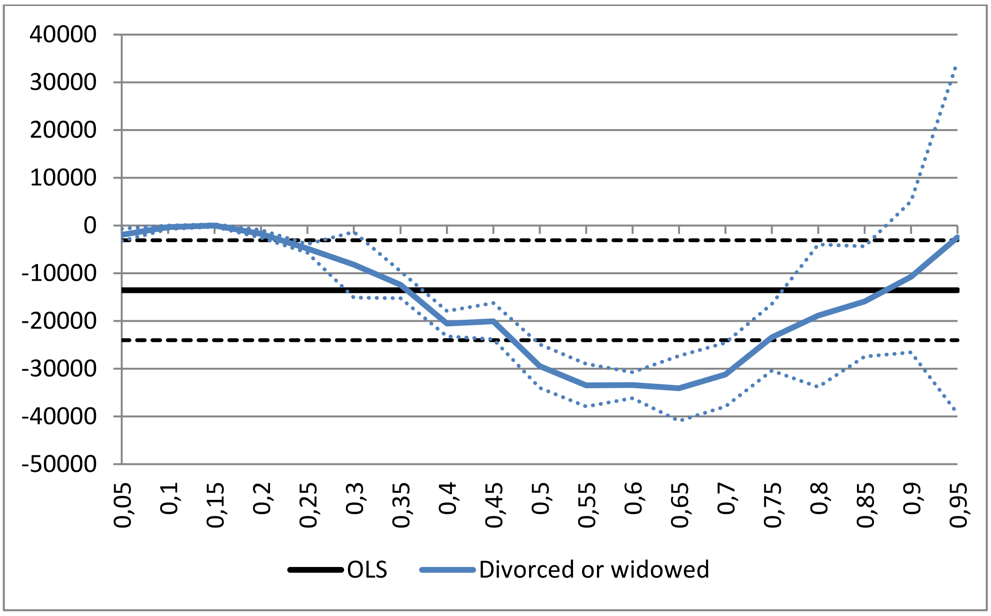
Yitzhaki, S. (1994), Economic Distance and Overlapping of Distributions, *Journal of Econometrics, 61*, 147-159.

Appendix

Quantile regression results



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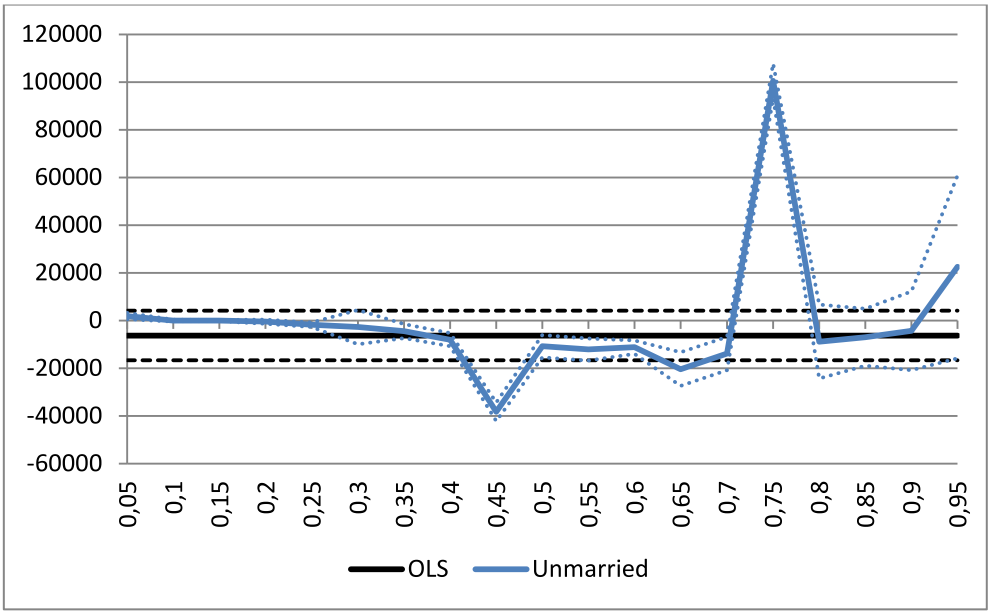
OLS
Divorced or widowed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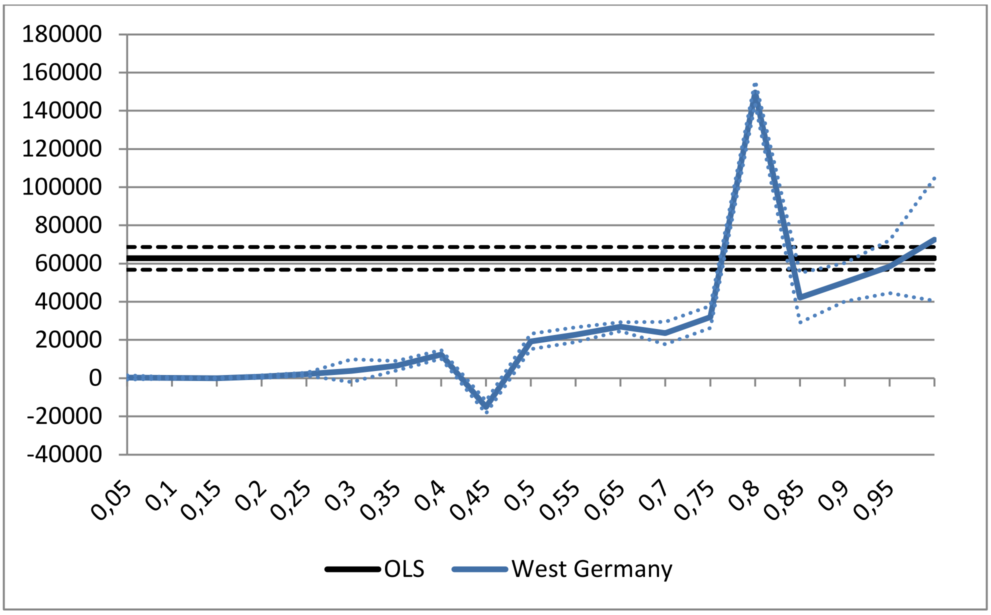
OLS
Unmarried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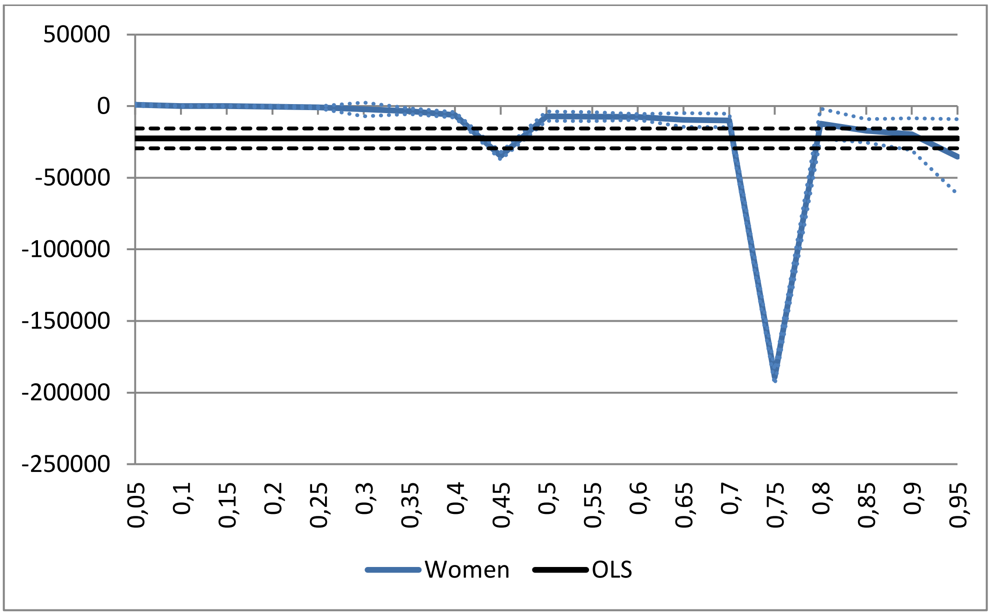
OLS
West Germany



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Women
OLS