The income distribution of voters: a case study from Germany

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Discussion Paper No. 586
ISSN 0949-9962
March 2017

Abstract

Although voter turnout in the 2013 general election to the German Bundestag differed considerably across income brackets, the income distribution of voters did not differ, in a statistically significant way, from that of the entire population. The non-uniform turnout, thus, is unlikely to affect the political support for, or the feasibility of, policies that are sensitive with respect to the income distribution.

JEL Codes: D72, H53, D31
Keywords: Majority Voting, Income Distribution, Redistribution.

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1 Introduction

In most democratic countries, voter turnout in elections and socio-economic status are positively correlated: individuals with higher incomes, greater wealth and better education are significantly more likely to cast their vote than less advantaged citizens (DeNardo, 1980; Gallego, 2010; Mueller and Stratmann, 2003; Powell Jr., 1980; Verba and Nie, 1972; Verba et al., 1978). This stylized fact calls into question the democratic ideal that all citizens have equal weight in the polity: systematic differences in the participation in elections across socio-economic groups may result in inequalities in representation and influence (Lijphart, 1997), potentially biasing policy outcomes in favor of more privileged citizens and against the interests of low socio-economic status individuals.

In fact, prominent models in political economy posit a link between participation in elections and policies. Median voter approaches, for example, predict that government expenditures, progressive taxation or redistribution in a democracy vary with the gap between the income of the median voter and the mean income in the population (Meltzer and Richard, 1981) or, more generally, with the concentration of incomes around the mean (Acemoglu et al., 2015). If – for example, due to differential participation in elections – the median voter shifts towards poorer [richer] segments of society, redistribution increases [is reduced].

Numerous empirical studies try to identify the relationship between voter turnout and distribution-sensitive policy variables such as post-tax inequality, the amount of redistribution or the size of the government (Galbraith and Hale, 2008; Lupu and Pontusson, 2011; Mahler, 2008; Mahler et al., 2014; Pontusson and Rueda, 2010; Rosema, 2007; Solt, 2010). Some studies run multiple-election regressions, relating turnout to policy outcomes. Other studies use (cross-sample) questionnaires to simulate individual and/or aggregate candidate or party choices that might have arisen with a higher or more uniform turnout (Lutz and Marsh, 2007). With either approach and notwithstanding some observations suggesting that a higher voter turnout goes along with a larger volume of government activities (Fumagalli and Narciso, 2012; Mueller and Stratmann, 2003), the overall evidence is mixed, inconsistent or weak (see, e.g., Acemoglu et al., 2015; Lutz and Marsh, 2007; Petterson and Rose, 2007; Rosema, 2007).

The lack of robust findings may indicate that, in the aggregate, voters and the general population (and, by implication, non-voters) actually do not differ that much from one another. In this note, we provide a small piece of evidence into that direction. Using the 2013 general election to the German Bundestag (the federal parliament in Germany) as an example, we compare the distribution of incomes among (self-reported) voters with the income distribution in the entire franchised population. In that election, as in many others, participation rates were monotonically increasing in income, suggesting a pro-rich, anti-poor bias for eventual policies. Still, the (normal and generalized) Lorenz curves as well as related inequality measures for the income distributions of voters and the population do not differ in a statistically significant way. To the extent that the income distribution in the population matters for actual policies, we do not detect any hint that the non-uniform election turnout distorts the majority will of society.

2 Population, voters and turnout

The calculation of income distributions is based on the 2013 wave of the German Socio-Economic Panel (G-SOEP). We use monthly net incomes (on household level), measured in Euro values of 2013 and equivalised according to the modified OECD scale. The G-SOEP is representative for the German income distribution up to the top one percent but lacks information on individuals at the very top (Jenderny and Bartels, 2015). Thus, we dropped the highest percentile and assume that 99%-percentile is the upper bound of the distribution. This truncation does not change results qualitatively (and even quantitative changes in differences are small).[1]

From the G-SOEP v31 sample, we select all 22,735 individuals, aged 18 or older, who provided information on their incomes and did not belong to the top one percent of income earners. By the "general income distribution" we denote the income distribution of this G-SOEP population, for brevity henceforth referred to as "the population". We compare the general income distribution to that of voters.[2]

As "voters" we refer to everybody in the population who said that they had voted in the 2013 Bundestag election. G-SOEP v31 contained a question on participation in the election. A total of 15,520 respondents answered it, with 12,994 (= 83.72%) claiming that they actually had voted. This turnout among respondents is higher than the official turnout of 71.5%, reflecting the well-known feature that voting is overestimated in population surveys with self-reporting (Blais, 2000).

In what follows, we collapse data from the individual level to the vingtile level (see Section 4 for results based on the individual level). Table 1 reports turnout rates in the 2013 election to Bundestag by vingtile as well as the number of respondents answering the election question (the $N_{respondents}$ sum up to 15,520). In line with observations from many other elections around the world, turnout rates do indeed increase with income.

We compare the income distributions (in vingtiles) of the population and of voters. For each vingtile we calculate the vingtile mean, based on the general income distribution. In the general income distribution, all vingtiles naturally have the same sample weight of $\frac{1}{20}$; for the voters' income distribution, sample weights are the probability to draw a certain income under the condition that it belongs to a voter. By Bayes' Rule,

$$P(Vingtile_i|Voter) = \frac{P(Voter|Vingtile_i) \cdot P(Vingtile_i)}{P(Voter)} = \frac{1}{20} \cdot \frac{\text{turnout in vingtile } i}{\text{overall turnout}}$$

for $i = 1, \ldots, 20$. We report these weights in column "weight voter" in Table A.1.

[1] As we ignore the top one percent and our calculation of inequality measures is based on classed data, our observations are conservative.

[2] Rather than the general income distribution one might prefer to use the income distribution of the electorate as a baseline. In Bundestag elections, every German citizen aged 18 years or more is eligible to vote (with very few exceptions for long-term non-residents). The G-SOEP asked about citizenship, but 8% of the respondents chose not to answer this question, leaving us with some imprecision when identifying the electorate. As a robustness check (available on request), we ran our analysis using (self-reported) German citizens as the population. This does not change our results qualitatively – and even the quantitative differences are quite tiny.

Table 1: Voter turnout by vingtile (election to Bundestag, 2013)

vingtile	voter turnout	$N_{respondents}$	vingtile	voter turnout	$N_{respondents}$
5%	0.615	569	55%	0.867	481
10%	0.658	730	60%	0.869	960
15%	0.683	543	65%	0.880	851
20%	0.745	891	70%	0.897	631
25%	0.752	418	75%	0.872	757
30%	0.738	768	80%	0.905	958
35%	0.825	830	85%	0.922	936
40%	0.820	1106	90%	0.932	876
45%	0.827	579	95%	0.937	933
50%	0.851	851	100%	0.947	852

3 Comparing general and voters' income distributions

3.1 Means, medians and their ratios

Table 2 reports the mean incomes, the median incomes (both in Euro) and the mean-to-median ratios for the population's and the voters' income distribution. The latter ratio plays a crucial role for the predictions in median-voter frameworks of (direct) democracy such as Meltzer and Richard (1981).

Table 2: Various mean-to-median ratios

mean income, general	1719
median income, general	1507
mean-to-median ratio, general	1.141
mean income, voters	1804
median income, voters	1573
mean-to-median ratio, voters	1.147
total mean to voters' median	1.093

Incomes in Euro. Source: Own calculations for 2013 based on SOEP v31.

On average, voters have higher incomes than the population. The difference in mean incomes is statistically significant at the 1% level (t-test). The (positive) difference in median incomes is, however, not statistically significant (Mann-Whitney test). The ratio between the incomes of the average income earner and the median does not differ between voters and the population either, implying, for this example, that a majority voting equilibrium in the model by Meltzer and Richard (1981) and its kindred would not be affected by income-differentiated turnouts.

3.2 Lorenz curves

The gap between mean and median incomes is a non-standard measure of income inequality. Common measures build on Lorenz curves. We therefore estimated Lorenz curves using linear interpolations within vingtiles, as proposed by Jann (2016). Estimation using sample survey data means that estimates reflect sampling variability. As Lorenz curves and other inequality measures are nonlinear functions of the observations, conventional methods for variance estimation cannot be applied (Kovacevic and Binder, 1997). Instead approximate (linear) estimation techniques can be used (Jann, 2016).

Graphs of the estimated Lorenz curves are presented in Figure 1. Estimated Lorenz curves and corresponding 95% confidence intervals are presented in Figure A.1 in the Appendix.

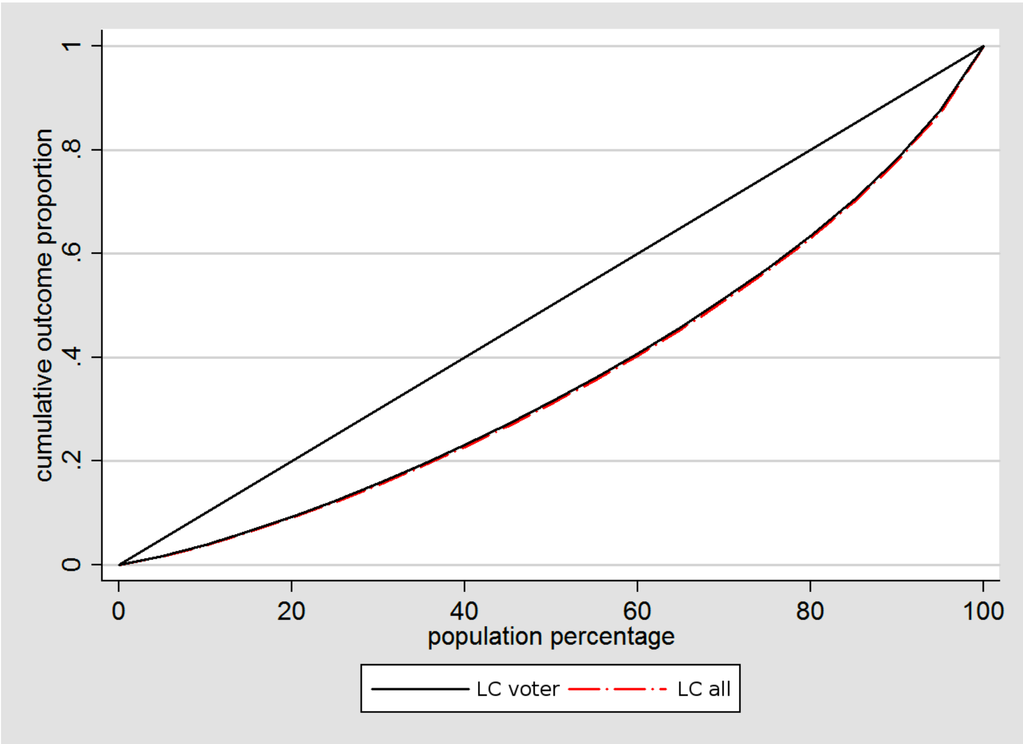

Figure 1: Lorenz curves, voters and general.

Though a bit difficult to visualize, the estimated Lorenz curve for voters' incomes entirely lies above of that of the population. Due to their overlapping confidence intervals (see Figure A.1) we still cannot rank the two distributions with respect to the criterion of Lorenz dominance in a statistically reliable way.

Despite the unequal means in the income distributions of voters and the population, the same holds for the Generalized Lorenz curves: neither distribution dominates the other; see Table A.2 in the Appendix. In summary, no clear-cut inequality ranking of voters and the population is possible.

3.3 Inequality measures

Various inequality measures are transformations of the Lorenz curve, allowing for restricted inequality comparisons even when Lorenz dominance does not prevail. Table 3 compares some measures for voters and the general German population in 2013.

Table 3: Comparison of different inequality measures.

	voters		general	
	coeff.	std. err.	coeff.	std. err.
Gini coefficient	0.270	0.041	0.276	0.042
$GE(-1)$: Gen. entropy with $\alpha = -1$	0.133	0.045	0.140	0.047
$GE(0)$: Mean log deviation	0.119	0.036	0.124	0.038
$GE(1)$: Theil index	0.118	0.036	0.125	0.038
$GE(2)$: half std. dev./mean	0.131	0.043	0.139	0.046
Atkinson index with $\varepsilon = 0.5$	0.058	0.017	0.060	0.018
Atkinson index with $\varepsilon = 1$	0.112	0.032	0.117	0.034
Atkinson index with $\varepsilon = 2$	0.210	0.056	0.218	0.058

$GE(\alpha)$ denotes the Generalized Entropy index with distance weight α; ε denotes the parameter of inequality aversion in the Atkinson index. Source: Own calculations for 2013 based on SOEP v31.

While all point measures suggest that inequality is lower among voters than in the general population, none of these differences is statistically significant (we applied t-tests, as recommended by Cowell and Flachaire (2015)). In sum, we do not detect statistically significant differences between the general income distribution and the distribution of voters' incomes.

4 Robustness check: individual-level data

As an alternative to using vingtile-level sample weights for approximating the income distribution of voters we also calculated the distribution based on individual-level data. In the voter sample, individuals are weighed such that the share of every income vingtile equals the actual share of voters from our sample in that vingtile. Changing from vingtiles to individual observations increases the number of observations drastically, causing the estimated variances of coefficients to decrease correspondingly. Again, we truncate the distribution at the top percentile.

Lorenz curves of voters and the population are presented in Figure 2. Again, one cannot rank the two distributions with respect to Lorenz dominance.

Table A.3 in the Appendix reports the means, the medians and their ratio in the income distributions of population and voters.[3] The differences in the mean and median incomes between voters' and the population are nearly the same. The difference in mean incomes is statistically highly significant at the 1%-level.

[3]The differences between Table A.3 and Table 2 in the values for the total population are due to the fact that values in Table 2 refer to vingtile mean incomes and not to individual-level data.

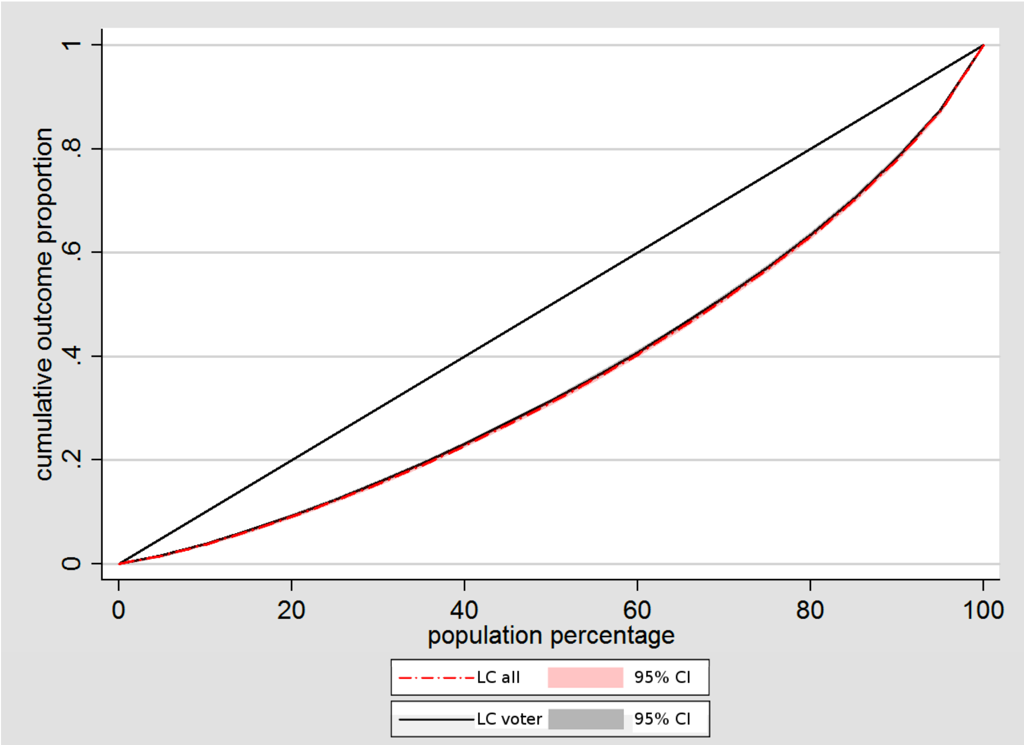

Figure 2: Both Lorenz curves (individual-level weights).

Remarkably, the mean income in the population and the median voter's income is close to parity – which, in the Meltzer-Richard framework, would indicate that there is no majority support for (additional) redistribution.

Table A.4 reports inequality measures; it is the individual-level equivalent to Table 3. Again, none of the differences in inequality measures is statistically significant different from zero.

All in all, also with individual-level data we do not find statistically significant differences between voters' and the population's income distributions or their inequality measures.

5 Conclusions

Differences in turnout across socio-economic groups may be problematic for the democratic legitimacy and representativeness of parliaments and governments. However, differential turnouts do not necessarily matter materially in the sense that election outcomes or implemented policies would be different with more uniform participation. Recent evidence seems to point precisely into such direction of "irrelevance" (Rosema, 2007).

This note adds a piece of evidence from Germany. Although *prima facie* looking different, the income distributions of voters and the population in the 2013 federal elections do not differ in a statistically significant way. Provided that the income distribution in the entire population matters for actual policies, we do not find any indication that the election turnout distorts the “true” majority will of society.

Several caveats must be mentioned. We studied just one election in Germany, limiting the generality of our observation. We only looked at differences in the distributions of incomes between voters and non-voters. All potential implications for (counter-factual) policy outcomes thus, depend, on how politically relevant citizens’ incomes or their inequality are. The (ir-)relevance of other characteristics (such as education, ethnicity, ideology, age etc.) also needs to be scrutinized. We implicitly hypothesized that turnout shapes policies; the causality might, however, also run the other way round. Finally, as suffrage in German federal elections is for German citizens only, the income distribution in the population need not fully reflect that of the entire society.

Acknowledgments

The authors wish to thank Stephen Jenkins for helpful advice. They are very grateful to Linus Zander for his excellent research assistance.

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Appendix

A.1 Vingtile-level data

Table A.1: Comparison of sample weights

vingtile	mean income	equal weight	cum. equal weight	weight voter	cum. weight voter
1	530	0.05	0.05	0.037	0.037
2	753	0.05	0.1	0.040	0.077
3	863	0.05	0.15	0.041	0.118
4	971	0.05	0.2	0.045	0.163
5	1047	0.05	0.25	0.045	0.209
6	1122	0.05	0.3	0.045	0.253
7	1210	0.05	0.35	0.050	0.303
8	1308	0.05	0.4	0.050	0.353
9	1385	0.05	0.45	0.050	0.403
10	1475	0.05	0.5	0.051	0.454
11	1539	0.05	0.55	0.052	0.507
12	1632	0.05	0.6	0.053	0.559
13	1755	0.05	0.65	0.053	0.612
14	1883	0.05	0.7	0.054	0.667
15	1995	0.05	0.75	0.053	0.719
16	2153	0.05	0.8	0.055	0.774
17	2398	0.05	0.85	0.056	0.830
18	2703	0.05	0.9	0.056	0.886
19	3192	0.05	0.95	0.057	0.943
20	4451	0.05	1	0.057	1.000

Notes: A χ^2-test for equality of distributions shows no statistically significant difference between the distribution of weight_voter and the uniform distribution with weight $1/20$ of each vingtile.

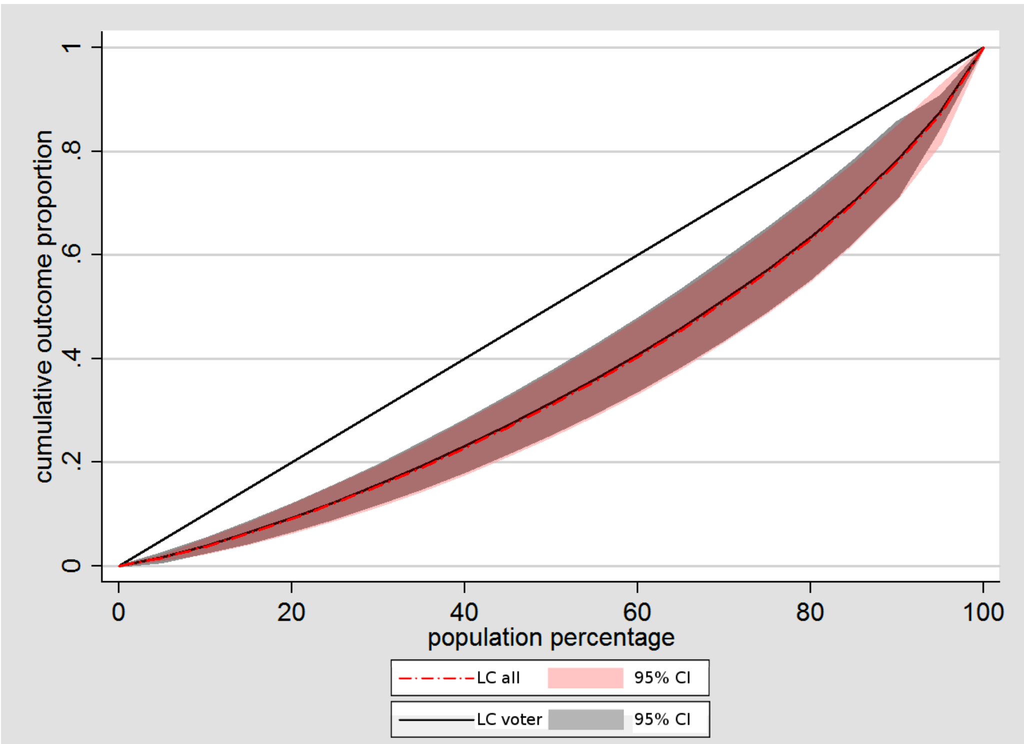

Figure A.1: Both Lorenz curves with 95% confidence intervalls.

A.2 Generalized Lorenz curves

Table A.2: Estimated Generalized Lorenz curves

	general				voters			
pop. share	Coef.	std. err.	95% Conf. Int.		Coef.	std. err.	95% Conf. Int.	
0	0	.	.	.	0	.	.	.
5	26.5397	.	.	.	29.3999	6.7228	15.3289	43.4709
10	64.2332	11.1538	40.8879	87.5784	69.6233	11.1865	46.2097	93.0369
15	107.4157	17.2482	71.3148	143.5166	116.2165	17.2306	80.1525	152.2805
20	155.9684	24.2403	105.2329	206.7039	167.5603	22.6161	120.2243	214.8964
25	208.3219	29.6825	146.1958	270.4480	223.0201	28.1504	164.1006	281.9395
30	264.4397	35.4211	190.3025	338.5770	283.2631	34.6139	210.8153	355.7109
35	324.9795	42.5679	235.8838	414.0752	348.3770	42.3294	259.7805	436.9736
40	390.4091	50.8690	283.9390	496.8792	417.4500	48.7904	315.3304	519.5695
45	459.6981	57.5450	339.2551	580.1411	490.9689	56.1422	373.4619	608.4759
50	533.4673	65.3167	396.7579	670.1767	567.6647	61.5373	438.8658	696.4637
55	610.4341	70.7636	462.3242	758.5440	648.6669	68.7747	504.7198	792.6141
60	692.0553	78.4977	527.7579	856.3528	735.2957	78.2701	571.4746	899.1169
65	779.8107	88.5245	594.5269	965.0945	827.8926	88.3864	642.8978	1012.8870
70	874.0009	98.7249	667.3673	1080.6340	925.8082	97.4201	721.9056	1129.7110
75	973.7691	107.0080	749.7988	1197.390	1030.4230	107.8508	804.6886	1256.1570
80	1081.4360	117.7713	834.9375	1327.9340	1144.4600	122.3115	888.4592	1400.4610
85	1201.3680	132.9974	923.0009	1479.7340	1270.5560	140.1038	977.3152	1563.7970
90	1336.5320	149.4641	1023.7000	1649.3640	1412.5220	163.6479	1070.0030	1755.0410
95	1496.1790	170.6649	1138.9730	1853.3840	1581.2920	217.1728	1126.7440	2035.8400
100	1718.7570	208.0124	1283.3820	2154.1320	1803.8700	217.1728	1349.3220	2258.4180

A.3 Individual-level data

Table A.3: Mean-to-median ratios (individual data)

mean income, general	1715
median income, general	1500
mean-to-median ratio, general	1.143
mean income, voters	1800
median income, voters	1565
mean-to-median ratio, voters	1.150
total mean to voters' median	1.096

Source: Own calculations for 2013 based on SOEP v31.

Table A.4: Inequality measures (individual-level data).

	voters		general	
	coeff.	std. err.	coeff.	std. err.
Gini coefficient	0.270	0.0013	0.276	0.0014
$GE(-1)$: Gen. entropy with $\alpha = -1$	0.136	0.0015	0.144	0.0016
$GE(0)$: Mean log deviation	0.119	0.0012	0.125	0.0012
$GE(1)$: Theil index	0.119	0.0012	0.125	0.0013
Atkinson index with $\varepsilon = 0.5$	0.058	0.0006	0.061	0.0006
Atkinson index with $\varepsilon = 1$	0.113	0.0010	0.118	0.0011
Atkinson index with $\varepsilon = 2$	0.214	0.0019	0.223	0.0020

$GE(\alpha)$ denotes the Generalized Entropy index with distance weight α; ε denotes the parameter of inequality aversion in the Atkinson index. Source: Own calculations for 2013 based on SOEP v31.