

# From Bottom to Top: The Entire Income Distribution in Germany, 1992 - 2003

by

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**Abstract:** We analyze the distribution of market income in Germany in the period 1992 to 2003 on the basis of an integrated data set that encompasses the whole spectrum of the population, from the very poor to the very rich. We find a modest increase of the Gini coefficient, a substantial drop of median income and a remarkable growth of the income share accruing to the economic elite, which we define as the richest 0.001 percent of persons in the population. While the elite mainly obtains its income from business and capital, the income share that it receives in form of wage income has been increasing. We also show that the dramatic decline of market income in the bottom half of the distribution is very much mitigated by income transfers within private households and by governmental redistribution.

**Keywords:** Income Distribution, Top Incomes, Inequality.

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# 1 Introduction

During the 1980s and the 1990s, the stability of the income distribution in continental Europe contrasted markedly with the rise of inequality in the U.S.. Since then, there has been much debate about the diverging fate of income inequality in the U.S. and continental Europe.<sup>1</sup> Germany, in particular, has been perceived as a “corporatistic” economy of continental Europe, where regulated labor markets and a generous welfare state prevent income disparities from growing.

Empirical studies on Germany after reunification<sup>2</sup> do suggest that inequality of disposable income has been basically kept in check. However, investigations of market incomes offer mixed results. Hauser (2003) and Becker and Hauser (2004) report that inequality of market incomes slightly increased in the 1990s, mainly because of an increase of income disparities in the regions of the former GDR during the first five years after reunification. According to the German Council of Economic Advisors (2007), this development continued after 2000, mainly because of rising unemployment. Dustmann *et al.* (2008), focusing on wage inequality, find that disparities increased in that period also in West Germany and argue that at the top half of the distribution, wage inequality was already on the rise in the FRG during the 1980s. Investigations of top incomes by Bach *et al.* (2005) and Dell (2005, 2007) indicate that the share of income accruing to the top 1 percent of the German income distribution increased from 1992 to 1995 and then declined in the following three years, so that its level in 1998 was only slightly above the 1992 level.

The above mentioned studies share the following weakness: they are based either on data sets that severely underrepresent the very high incomes or data sets that contain little information about bottom segments of the distribution. Studies based on the German Socio-Economic Panel or the German Income and Consumption Survey cannot assess the extent of income concentration at the top of the distribution, since the very rich do not participate in those surveys. Studies of wage inequality based on social security records cannot portray the top of the earnings distribution because mandatory contributions only apply to

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<sup>1</sup> Findings about earnings inequality in the U.S. are discussed by Gottschalk and Danziger (2005) and Autor, Katz and Kearsey (2005). Focusing on total market income, Piketty and Saez (2003, 2006) and Dew-Becker and Gordon (2005) show that income inequality in the U.S. has substantially increased over recent decades, and that this increase has mostly occurred at the very top of the income distribution. A similar but less pronounced picture is also observed for the United Kingdom, Canada, and other English speaking countries; see Leigh (2009). A comprehensive recent analysis of income inequality in OECD countries is provided by OECD (2008).

earnings below a threshold that in Germany equals approximately twice average earnings; this rule causes right-censoring of reported earnings. Studies based on income tax statistics have the opposite problem that the lower tail of the distribution cannot be observed because low-income households typically do not file a tax return. In both cases, the analysis offers a mutilated picture of the overall distribution of income.

This paper sheds light on the evolution of the whole income distribution in Germany from 1992 to 2003. In order to portray the entire distribution, we merge information from two data sources: the German Socio-Economic Panel and the official income tax statistics. The latter consists of individual tax returns that can be accessed to through the Research Data Centre of the Federal Statistical Office of Germany.<sup>3</sup> The tax data stem from stratified 10 percent samples of the total taxpayer population in Germany. Noticeably, all taxpayers that belong to the top percentile of the income distribution are included in our data set. As a result of exploiting those two data sources jointly, a reliable picture of the entire income distribution, from the very poor to the very rich, is obtained.<sup>4</sup>

The main focus of this paper is on the evolution of primary incomes, which is the result of a complex interaction of market forces, economic policies, and institutional change. A comprehensive assessment of primary incomes is crucial for economists as it can help to understand how markets, policies and institutions affect the distribution of income. Furthermore, we provide evidence on the extent to which those incomes are redistributed within families and by the government. In conjunction with the description of market incomes, assessing the distribution of net incomes may help to generate new insights into both positive and normative issues about governmental redistribution of income.<sup>5</sup>

In the next Section, we sketch the macroeconomic development in Germany during our observation period and provide some institutional background to set the scene for the subsequent empirical analysis. In Section 3, our integrated data set and the underlying methodology of this study are described. Sections 4 - 6 are devoted to the presentation and discussion of our main results. We find a modest in-

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<sup>2</sup> Unification of East and West Germany occurred on October 3, 1990.

<sup>3</sup> Scientific use files of stratified 10%- samples of the income tax statistics for the years 1998 and 2001 are also available for academic research (see <http://www.forschungsdatenzentrum.de/bestand/lest/index.asp>).

<sup>4</sup> Thus, our integrated data set conforms to the quality standards concerning coverage of the whole population recently suggested by Atkinson (2007).

crease in the overall inequality of market incomes in Germany during the period from 1992 to 2003. For instance, the Gini coefficient increased from 0.62 to 0.65. However, median market income substantially declined while top incomes markedly increased, both in real terms. We show that the income concentration process mainly benefited the economic elite, which we define as the richest 0.001 percent persons in the adult population. While most of those persons are firm owners, the presence of top managers in the German elite has increased over the last few years. We also show that the dramatic decline of market income in the bottom half of the distribution was very much mitigated by income transfers within private households and by the tax benefit system.

## 2 Macroeconomic and Institutional Background

Following unification of East and West Germany, a brief economic boom occurred, after which the German economy experienced a long period of slow economic growth.<sup>6</sup> As shown by Table 1, from 1992 to 2003, German national income increased by 3.8 percent in real terms; the average yearly growth rate of real national income thus amounted to a meagre 0.35 percent. Average productivity growth, i.e. the growth rate of real GDP per employed person, increased by about 14 percent between 1992 and 2003, or by an average of only 1.3 percent per year. In the period under investigation, Germany became the laggard in productivity growth in the EU and fell dramatically behind the U.S., where productivity increased by an average of more than 2 percent per year.<sup>7</sup> Labor's share in German national income declined by 1.4 percentage points; adjusting for the change in total hours worked, the share of wage income in national income increased by 0.3 percentage points between 1992 and 2003.

The weak productivity performance of the German economy was accompanied by a modest increase in overall employment by 1.5 percent in the period 1992 to 2003, from 38.0 to 38.6 million employed people. That increase was almost entirely due to a rising number of self-employed. Total hours worked declined by 6.5 percent. This decline was mainly caused by the strong increase of part-time work among women and by the proliferation of so-called 'marginal jobs', with low earnings and short hours,

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<sup>5</sup> Our companion paper, Bach *et al.* (2008), is devoted to the analysis of net incomes and effective income taxation. While that paper studies household incomes, the current one focuses on individual incomes.

<sup>6</sup> See e.g. Burda and Hunt (2001).

not covered by the social security system. The unemployment rate, as measured according to the harmonized OECD definition, increased from 6.2 percent in 1992 to 9.2 percent in 2003.

**Table 1: Macroeconomic indicators for Germany, 1992-2003**

	unit	1992	1995	1998	2001	2003	% change 1992- 2003
Real GDP	2000=100	87.3	90.5	95.0	101.2	101.0	15.8
Real GDP per employed person	Euro	47 279	49 736	51 778	53 255	53 932	14.1
Real national income <sup>1)</sup>	billion Euro	1 475	1 488	1 496	1 530	1 531	3.8
Nominal national income	billion Euro	1 270	1 397	1 466	1 561	1 600	26.0
Compensation of employees	billion Euro	917	997	1 032	1 121	1 132	23.4
Gross wages and salaries	billion Euro	750	805	830	902	908	21.1
Entrepreneurial and property income	billion Euro	353	400	434	440	468	32.6
Labor's share in national income	%	72.2	71.4	70.4	71.8	70.8	- 2.0
Labor's share at 1991 hours worked	%	72.4	72.4	72.1	73.6	72.7	0.3
Population	1 000	80 594	81 661	82 029	82 340	82 520	2.4
Labor Force	1 000	40 600	40 774	41 566	42 402	42 551	4.8
Employed persons (national concept)	1 000	38 066	37 546	37 834	39 209	38 633	1.5
Employees	1 000	34 489	33 797	33 969	35 226	34 560	0.2
Self-employed persons	1 000	3 577	3 749	3 865	3 983	4 073	13.9
Hours worked (domestic concept)	mill. hours	59 608	57 665	56 992	57 338	55 727	- 6.5
thereof: employees	mill. hours	51 613	49 326	48 298	48 590	47 128	- 8.7
Unemployed persons	1 000	2 534	3 228	3 732	3 193	3 918	54.6
Unemployment rate (% of labor force)	%	6.2	7.9	9.0	7.5	9.2	47.5
Unemployment rate (registered, national stat.)	%	9.8	11.5	11.7	10.8	11.7	19.3
Gross fixed capital at 2000 prices	billion Euro	8 320	9 055	9 714	10 390	10 762	29.4
Net fixed capital at current purchasers' prices	billion Euro	4 832	5 717	6 088	6 487	6 619	37.0
GDP deflator	2000=100	91.5	99.0	100.3	101.2	103.9	13.5
Consumer price index	2000=100	86.1	93.9	98.0	102.0	104.5	21.4
West Germany incl. Berlin	2000=100	87.0	94.1	97.9	102.0	104.5	20.1
East Germany excl. Berlin	2000=100	79.9	93.3	98.2	102.0	104.5	30.9
East-west ratios							
GDP per capita employed person	%	48.7	66.4	69.6	74.0	76.7	57.7
Gross wages and salaries per employee	%	62.0	74.5	75.6	77.0	77.3	24.7
Employed persons (domestic concept)	%	18.5	19.2	18.6	17.3	17.1	- 7.7
Unemployment rate (registered, nat. stat.)	%	225.0	162.6	186.7	234.9	215.8	- 4.1

1) Deflated by consumer price index.  
Source: National Accounts; Federal Employment Agency (BA).

Starting from less than half of the western German level in 1992, real GDP per employed person in eastern Germany increased to almost 77 percent of it in 2003. The east-west ratio of gross average wage income increased from 62 to 77 percent, with most of this increase occurring between 1992 and 1995. Employment in eastern Germany declined relatively to employment in western Germany from 18.5 per-

<sup>7</sup> See Dew-Becker and Gordon (2005).

cent in 1992 to 17.1 percent in 2003. Throughout that period, the unemployment rate in East Germany was about twice its level in West Germany.

### 3 Data and Methodology

#### 3.1 Data sources

Our empirical investigation relies on the integration of individual-level data from the German Socio-Economic Panel and official income tax returns for re-unified Germany for the years 1992, 1995, 1998, 2001, and 2003.<sup>8</sup> We merge these data with individual level data for the same years to account for the fact that only a fraction of the overall population living in Germany is covered by the income tax statistics. As we describe below, this lack of representativeness does not only affect the bottom of the income distribution but also the middle of the distribution.

#### Income tax return (ITR) data

For each of the available years, the ITR data include a representative sample of about 3 million tax returns, i.e. roughly 10 percent of the entire taxpayer population. Samples are drawn by the German Federal Statistical Office from the set of all tax files of each year so as to build a stratified random sample. The sampling fraction for pre-defined cells according to gross taxable income and other tax-relevant characteristics is determined by minimizing the standard error with respect to taxable income.<sup>9</sup> Tax return samples include *all* taxpayers with high incomes or high income losses.

The original data set includes all assessed taxpayers, i.e. single persons or married couples who file a tax return in a given year. A tax unit may consist of a single taxpayer or a married couple. Single taxpayers are taxed according to the tax schedule for individuals (“*Grundtabelle*”). Nearly all married couples are subject to joint taxation (“*Splittingtabelle*”). Slightly more than fifty percent of all tax returns were joint files of married couples. In the case of joint filing, the couple’s tax liability equals twice the tax liability of a single taxpayer whose income is half of the couple’s income. In nearly all cases, joint

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<sup>8</sup> More recent data on individual tax returns are presently not available due to long-lasting assessment procedures of the tax return data. Until 2001, the income tax statistics was available in triennial intervals only. To save space we do not include the year 2002 here because the distribution of incomes has hardly changed between 2002 and 2003.

taxation with full income splitting is less onerous than individual taxation. Therefore the former procedure is used by default in tax assessment of married couples.

The ITR data set allows one to identify the various income components for each individual within a tax unit. Thus, we can scrutinize the distribution of market income at the level of individuals, before income is redistributed within couples and by the government.

Households living on social assistance or income replacement benefits (e.g. from social security or private insurance) do not file unless they have other, taxable, income. Approximately, more than two-thirds of all German retirees do not file a tax return. Typically, households with wage earnings file a tax return only if they want to claim itemized deductions that are not already taken into account by their wage tax, which is withheld at source by the employer. By international standards, the share of the German population that pays income tax is rather large. Assuming that one taxpayer corresponds to one household, more than three quarters of all German households pay income tax. Although the ITR data do not portray the lower tail of the income distribution in an accurate way, in the medium and especially upper range of the income distribution these data are very representative, as nearly all domestic residents who belong to those groups file a tax return.

### **German Socio-Economic Panel (SOEP)**

In order to get a comprehensive picture of the distribution of incomes in Germany, we merge the tax return data with data from the SOEP.<sup>10</sup> The latter is an annual survey of private households living in Germany. Detailed information on individual and household gross incomes as well as income components is collected retrospectively in each wave for the previous year. In 2003 about 12,000 households were interviewed. Unlike the ITR data, the SOEP also includes households who do not file; as a result, the SOEP is representative of a larger share of the German population than the ITR data. Differently from the German Income and Consumption Survey, which has been extensively used for distributional analyses, the SOEP is not top-coded. However, the SOEP contains only a relatively small number of

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<sup>9</sup> See Zwick (2001) for a description of the sampling scheme.

<sup>10</sup> A description of the SOEP can be downloaded from [www.diw.de/soep](http://www.diw.de/soep); see also Haisken-DeNew *et al.* (2005).

people with high incomes and cannot be considered as representative of the top percentile of the income distribution.<sup>11</sup>

### 3.2 Gross market income

We analyze the evolution of gross market income at the individual level for the entire population aged twenty or older. Since gross market income is closely related to national income, it seems the best measure to analyze the impact of economic factors on the evolution and composition of the income distribution.

Gross market income cannot directly be extracted from the ITR data and the SOEP. In principle, German tax law applies a comprehensive notion of income which includes all earned income and capital income. However, exemptions and various types of tax reliefs create a substantial gap between taxable income and gross market income. In order to cope with this problem and to derive a measure of gross market income more in line with its economic definition, we adjust taxable income by adding all tax-exempted incomes and tax reliefs as well as by accounting for several tax avoidance strategies. Since the SOEP uses a broader definition of income and contains detailed information on various income components, we are able to construct a measure of gross market income which is very close to the one we can derive from the ITR data.

We distinguish between three components of gross market income: wage income, business income, and capital income (see Appendix 1 for more details). Our measure of *wage income* consists of wages and salaries, including employers' social security contributions (SSC), calculated before deduction of allowable expenses. Since they are neither recorded in the ITR nor in the SOEP data, employers' SSC have been simulated on the basis of other information contained in both data sets. Since civil servants are not covered by the social security system but are also entitled to pensions and health insurance, we impute social security contributions to them, following the approach applied by the national accounts.

Income from *business activity* includes taxable income from agriculture and forestry, from unincorporated business enterprise and from self-employed activities, including professional services.

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<sup>11</sup> Since 2002 the SOEP includes a special high-income sample of over 1,200 households with monthly net incomes of at least 3,750 Euro. In that sample, about 300 individuals belong to the top 1 percent of the market in-



*Capital income* includes interest and dividends as well as incomes from renting and leasing. We do not include capital gains for the following reasons. First, a significant fraction of capital gains is exempted from the income tax, and there is no information on these exemptions in the ITR data. Second, taxed capital gains are predominantly capital gains that were realized from sale of an enterprise, parts of an enterprise, or shareholdings. They form a very volatile component of income since they do not stem from regular business and are realized by individuals in a lumpy way. An example is the abnormal increase in realized capital gains from business activity in 1998 (29.3 billion Euro, compared to 8.8 billion Euro in 1995 and 7.7 billion Euro in 2001) that was mainly triggered by the fear of a tax hike.

A relatively large share of the German adult population has no market income, as many persons live on transfers received from their family or the welfare state. A small share of the population reports negative incomes. This can often be observed in ITR data and it also arises in household surveys in the case of the self-employed. In some studies, negative incomes are disregarded because it is assumed that these are due to tax reasons only. Since we adjust taxable income for tax reliefs and tax avoidance strategies identifiable in the ITR data, we do not impose the condition that incomes be positive, especially because income losses in case of business income are likely to arise in certain years. However, we do disregard losses from *renting and leasing* exceeding some thresholds, since most of these losses are likely to be an artifact of tax avoidance.<sup>12</sup>

### **3.3 Data matching and integration**

We edit the SOEP at the level of taxpayers, i.e. married couples represent one taxpayer, while cohabiting couples represent two taxpayers. Other adult household members with own taxable income are treated as single taxpayers. Individuals who are younger than twenty without own market income and young adults eligible to the child benefit (students) are not included in the analysis. Our matching approach selects for each edited taxpayer record in the SOEP a certain number of records in the ITR data base, the number being determined by the relation of the respective weighting factors in the two data sets (see Appendix 2

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come distribution, but none of them would belong to the “economic elite” as defined in this paper.

<sup>12</sup> As described in Bach, Corneo and Steiner (2005), renting and leasing has been a vast loophole for tax-saving activities in Germany, especially in the 1990s. Depreciation allowances, tax reliefs and generous accounting rules in combination with tax-free capital gains led to massive budgetary losses that could be offset against in-

for the details). Given that the ITR data set is representative of a smaller share of the population than the SOEP, not all records observed in the SOEP can be matched to the appropriate number of “statistical twins” in the ITR. After all observations in the ITR data are exhausted by this matching algorithm, we are left with a number of unmatched records in the SOEP. These records are added to the ITR data set so as to build the integrated ITR-SOEP data set. In this way, not only individuals and couples with low income, and who therefore do not pay income tax, are added, but also those who, due to special rules of the German tax system, do not file tax returns. This holds in particular for many taxpayers who only receive wage income, which is taxed at the source in Germany, or low pension income.

Since the SOEP does not provide information on the filing status of individuals or households, we match conditionally on a number of variables, such as main income source, occupational status, marital status, age group, family type and the number of children. We also use our matching approach to impute capital income from the SOEP because income from interest or dividends below the savers allowance need not be stated in the income tax return and is thus under-reported in the ITR data.

Table 2 shows summary statistics for the total population, the number of taxpayers, gross market income, and relevant income components calculated from tax return statistics, our integrated data base and, for comparison, the national accounts. Total overall market income recorded in the integrated data base was about 1.3 trillion Euro in 2003. This represents almost 82 percent of total primary income of private households as reported by the national accounts. There is little difference in total wage income between our integrated data base and the national accounts. As revealed by Table 2, the discrepancy between gross income and income from national accounts is mainly due to incomes from business and capital. Unfortunately, German national accounts do not provide differentiated information on business and capital income according to the categories used for the income tax assessment, or recorded by the SOEP. Although we adjust the national accounts income aggregates so as to correct for various tax-exempt items reported in Table 2, a large gap remains. One of the likely causes for this discrepancy is that national accounts are not very reliable in case of business income because this is calculated as a residual. The discrepancy between our estimates and those from the national accounts may also be due to

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come from other sources to a large extent. In 1998, positive incomes from renting and leasing amounting to 20.1 billion Euro were offset against losses of 37.7 billion Euro.

the fact that some fraction of corporate income is received by individuals in form of capital gains, that we disregard, rather than dividends. In the case of large private shareholdings, families sometimes create foundations or holdings so that some of their property income is not recorded in the personal income tax returns. The same occurs in case of outright tax evasion of capital income. Furthermore, business income might be underestimated in our data set because we cannot correct for some tax avoidance strategies that are used to compute taxable profits.

**Table 2: Structure of the ITR-SOEP data base compared to the national accounts, 1992-2003**

	unit	1992	1995	1998	2001	2003
Income taxpayers (assessment)	1 000	29 479	29 676	28 673	29 104	27 300
Single assessment (singles)	1 000	13 961	14 299	13 789	14 595	13 551
Joint assessment (married couples) <sup>1)</sup>	1 000	15 518	15 377	14 884	14 509	13 749
Potential tax units total <sup>2)</sup>	1 000	42 990	43 644	44 528	45 160	45 963
Estimated non-filers	1 000	13 511	13 968	15 856	16 055	18 663
Taxpayers as percentage of potential tax units	%	68.6	68.0	64.4	64.4	59.4
Population of age >=20	1 000	63 806	64 088	64 425	65 025	65 579
Gross market income <sup>3)</sup> (integrated data base, less capital gains)	mill. Euro	1 071 999	1 156 930	1 227 134	1 293 991	1 322 244
Gross domestic product <sup>4)</sup>	mill. Euro	1 646 620	1 848 450	1 965 380	2 113 160	2 163 800
Primary income of private households <sup>4)</sup>	mill. Euro	1 270 240	1 402 200	1 466 590	1 599 320	1 614 980
Gross market income as percentage of primary income private households	%	84.4	82.5	83.7	80.9	81.9
Wage income (integrated data base) <sup>5)</sup>	mill. Euro	902 253	984 404	1 019 664	1 069 109	1 084 368
Compensation of employees (national accounts) <sup>5)</sup>	mill. Euro	917 170	997 020	1 032 250	1 120 610	1 132 080
Wage income from integrated data base as percentage of wages from national accounts	%	98.4	98.7	98.8	95.4	95.8
Income from business activities and capital income (integrated data base, less capital gains)	mill. Euro	169 746	172 526	207 470	224 882	237 876
Entrepreneurial and received property income of private households (national accounts)	mill. Euro	305 720	341 280	372 010	412 420	403 090
Entrepreneurial income <sup>6)</sup>	mill. Euro	124 050	133 790	131 770	121 630	123 260
Received property income <sup>7)</sup>	mill. Euro	181 670	207 490	240 240	290 790	279 830
Business and capital income from integrated data base as percentage of entrepreneurial and property income from national accounts	%	55.5	50.6	55.8	54.5	59.0
<small>1) Married couples living together are assessed as one tax payer. - 2) Derived from population census statistics: Entire population of 20 years and older, less young adults eligible for child benefit; married couples counted as one tax unit. - 3) Income from business activity, wage income, capital income, exclusive public and private pensions. - 4) At current prices, national accounts. - 5) Including employers' social security contributions and imputed social security contributions for civil servants. - 6) Less imputed rent of owner-occupied dwellings. - 7) Less primary income of non-profit institutions serving households (NPISHs), less financial intermediation services indirectly measured (FISIM), less attributed property income of insurance policy-holders. Source: Income tax statistics 1992-2001; ITR-SOEP data base; national accounts.</small>						

## 4 Evolution of Income Inequality

Table 3 presents our main results on the evolution of income inequality in Germany using several indicators (see, e.g., Cowell, 2008). The relative difference between mean and median income measures the

skewness of the distribution: a rise in this measure of inequality indicates that incomes in the upper half of the distribution have increased more than in the lower half. The Gini coefficient is relatively sensitive to changes in the middle of the distribution. We display three entropy measures: GE(0) (mean logarithmic deviation), which is “bottom sensitive”, the Theil index GE(1), and GE(2) (half the square of the coefficient of variation) that strongly responds to changes at the top of the distribution. In order to provide a more detailed picture of the evolution of overall inequality, we also show the distribution of incomes across deciles and smaller fractiles of the income distribution.

**Table 3: Distribution of gross market income in Germany, 1992-2003**

	Gross market income <sup>1)</sup> , capital gains excluded					1992 = 100			
	1992	1995	1998	2001	2003	1995	1998	2001	2003
Average income at 2000 prices <sup>2)</sup>									
Mean income (Euro)	19 963	19 712	19 826	19 824	19 826	98.7	99.3	99.3	99.3
Median income (Euro)	12 496	11 336	9 724	8 754	8 173	90.7	77.8	70.1	65.4
Relative difference <sup>3)</sup> (%)	46.8	55.3	71.2	81.7	88.6	118.1	152.1	174.5	189.2
Gini coefficient <sup>4)</sup>	0.6155	0.6209	0.6389	0.6509	0.6522	100.9	103.8	105.7	106.0
Generalized entropy measures <sup>4) 5)</sup>									
GE(0)	1.9406	2.0131	2.1834	2.2231	2.2062	103.7	112.5	114.6	113.7
GE(1)	0.7810	0.7868	0.8472	0.8811	0.8730	100.7	108.5	112.8	111.8
GE(2)	4.3527	5.4620	7.3885	8.6219	17.6771	125.5	169.7	198.1	406.1
Structure in % by income fractiles									
1 <sup>st</sup> decile	- 0.83	- 0.96	- 0.95	- 0.90	- 0.70	115.4	113.8	107.8	84.0
2 <sup>nd</sup> decile	0.05	0.04	0.03	0.03	0.03	86.9	69.7	66.5	72.1
3 <sup>rd</sup> decile	0.19	0.16	0.13	0.13	0.13	86.4	66.7	69.7	69.5
4 <sup>th</sup> decile	1.18	0.98	0.72	0.71	0.67	83.1	60.8	59.9	56.7
5 <sup>th</sup> decile	4.24	3.67	3.02	2.75	2.55	86.5	71.1	64.9	60.1
6 <sup>th</sup> decile	8.23	8.12	7.46	6.71	6.41	98.6	90.7	81.5	77.9
7 <sup>th</sup> decile	12.06	12.34	12.00	11.44	11.39	102.3	99.4	94.9	94.4
8 <sup>th</sup> decile	15.69	16.08	16.02	15.99	16.26	102.5	102.1	101.9	103.6
9 <sup>th</sup> decile	20.14	20.51	20.85	21.23	21.82	101.8	103.5	105.4	108.4
10 <sup>th</sup> decile	39.04	39.06	40.72	41.91	41.42	100.1	104.3	107.3	106.1
Top 1%	11.23	10.66	11.57	12.13	11.22	94.9	103.1	108.0	99.9
Top 0.1%	4.19	3.86	4.37	4.64	4.12	92.3	104.5	110.9	98.3
Top 0.01%	1.63	1.56	1.82	1.94	1.80	95.6	112.1	119.5	110.7
Top 0.001%	0.55	0.59	0.72	0.76	0.82	107.3	130.0	137.9	147.8
Top 0.0001%	0.16	0.20	0.24	0.24	0.36	125.5	151.8	154.5	231.5
Total	100.00	100.00	100.00	100.00	100.00	100.0	100.0	100.0	100.0

1) Income from business activity, wage income, capital income, exclusive public and private pensions; measured at the individual level.- 2) Deflated by consumer price index.- 3) Difference of ln(mean) and ln(median).- 4) In cases with zero or negative income this income is replaced by 1 Euro.- 5) GE(0) is the mean logarithmic deviation, GE(1) is the Theil index, and GE(2) is half the square of the coefficient of variation.  
Source: ITR-SOEP data base.

Since we include people with negative or zero market income in the distribution, both the mean and the median of yearly real gross market income are rather low: in 2003, the mean amounts to almost 20,000

Euro, whereas the median is just a little more than 8,000 Euro. Their ratio indicates that the distribution of market income is very skewed and income differences are large between its lower and upper part. Comparing the evolution of the mean and the median suggests that income inequality has markedly increased in the observation period. Whereas real mean income remained virtually constant between 1992 and 2003, median income fell by more than a third. This decline can mainly be ascribed to the increasing number of people with no or very little market income, which pulls down the median.

The other summary inequality measures reported in Table 3 confirm that income disparities have grown.<sup>13</sup> The Gini coefficient increased from 0.62 to 0.65, i.e. by 6 percent, the GE(0) and GE(1) measures increased by 14 and 12 percent, respectively.<sup>14</sup> Strikingly, the GE(2) measure increased by 300 percent; this finding indicates that the rise in income inequality was driven by changes at the very top of the distribution.

As documented in Appendix 3, calculations based on SOEP data alone (and not including the “high-income” sample mentioned in Section 3.1) yield a similar picture on the evolution of income inequality when measured by the Gini coefficient and other summary measures of inequality. The much higher level of the top-sensitive GE(2) measure derived on the basis of our integrated data base is due to the fact that top incomes are under-represented in the SOEP data. Consequently, the income share absorbed by the top percentile as measured in the SOEP is significantly smaller than the corresponding share in our integrated data base. Note, however, that the percentage increase in the income share going to the top decile between 1992 and 2003 has been similar in the two data sets.

The distribution of market incomes across deciles reveals that one third of the adult population receives almost no market income. In other words, a large share of the German adult population lives more or less completely either on public or private transfers. This group includes the retired, housewives, the unemployed, and the disabled. Conversely, more than 40 percent of total market income accrues to the top decile. While the share of the top decile has increased in the observation period, the income share

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<sup>13</sup> Negative or zero incomes are replaced by 1 Euro in the calculation of these measures.

<sup>14</sup> The increase of the Gini coefficient is statistically significant. For example, the 95 percent-confidence interval for the 2003 Gini coefficient of 0.6521 is [0.6477; 0.6566], where this confidence interval is bootstrapped using 100 replications. Assuming that incomes are normally distributed and using the approximation formula for the standard error of the Gini coefficient (see, e.g., Cowell 2008), we get a rather tight confidence bands of [0.6520; 0.6523] by virtue of the fairly large size of our integrated data base.

going to the middle of the distribution declined: for example, the share received by the 5<sup>th</sup> decile fell from 4.2 to 2.6 percent. Similar developments can also be observed for other deciles in the middle of the income distribution, i.e. the 4<sup>th</sup> and the 6<sup>th</sup> decile. This substantial fall in the share of market income going to the middle deciles suggests that compositional effects are at work; as mentioned in Section 2, unemployment significantly increased between 1992 and 2003.

Turning to changes at the top of the distribution, the bottom part of Table 3 reveals some marked differences across the various percentiles. The share of the top 1 percent group in overall market income remained virtually stable between 1992 and 2003. As our integrated data base contains *all* people in the top percentile, we can break it down into very small fractiles without sampling error. For instance, we can look at the 0.001% top fractile, which we take as representing the *economic elite* in Germany. This group's share in overall market income increased by almost 50 percent during the observation period. At the same time, the top 0.0001% group more than doubled its income share.

Although the percentage increase in the share absorbed by the top decile in the observation period has been very similar in the SOEP and our integrated data base, the two data sets give completely different results regarding income changes *within* the top percentile of the distribution (see Appendix 3). Given the fact that the increase in market income is strongly concentrated at the very top of the income distribution, we will look at this relatively small group of people in much greater detail in the next Section.

Studies for the U.S. found evidence of an increasing concentration of income at the top of the distribution. For example, Piketty and Saez (2006) report an increase in the top decile income share from 40 percent in 1992 to 43 percent in 2000, which is almost the same as the increase that we observe for Germany.<sup>15</sup> Dew-Becker and Gordon (2005) show that the top 10 percent of the income distribution gained almost half of the increase in real incomes during the recent years of strong productivity growth in the U.S.. Both studies also report a remarkable income increase for the top 1 percent of the distribution; that increase clearly outpaces the increase that we observe for Germany in approximately the same period.<sup>16</sup>

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<sup>15</sup> Notice, however, that average income of the top decile is much higher in the U.S. than in Germany.

<sup>16</sup> For broader international evidence, see the country studies collected in the volume by Atkinson and Piketty (2007) and Leigh (2009).

**Table 4: Distribution of gross market income in West and East Germany, 1992-2003**

Gross market income <sup>1)</sup> , capital gains excluded	West Germany (1992: incl. West Berlin; 1995-2003 excl. Berlin)					East Germany (1992: incl. East Berlin; 1995-2003 incl. Berlin)				
	1992	1995	1998	2001	2003	1992	1995	1998	2001	2003
Average income at 2000 prices <sup>2)</sup>										
Mean income (Euro)	21 217	20 717	20 972	21 035	21 046	14 835	14 502	14 263	13 817	13 985
Median income (Euro)	12 686	11 579	10 118	9 412	8 731	12 511	10 475	8 380	5 921	4 746
Relative difference <sup>3)</sup> (%)	51.4	58.2	72.9	80.4	88.0	17.0	32.5	53.2	84.7	108.1
Gini coefficient <sup>4)</sup>	0.6177	0.6215	0.6386	0.6479	0.6479	0.5522	0.5879	0.6142	0.6427	0.6540
Generalized entropy measures <sup>4) 5)</sup>										
GE(0)	1.9769	2.0117	2.1957	2.1970	2.1693	1.7161	1.9691	2.0671	2.2848	2.3188
GE(1)	0.7962	0.7935	0.8540	0.8808	0.8688	0.5867	0.6739	0.7274	0.7948	0.8210
GE(2)	4.5903	5.6826	7.8418	9.0780	18.8262	0.7048	2.1775	1.1827	1.2352	1.2771
Structure in % by income fractiles										
1 <sup>st</sup> decile	- 0.84	- 0.95	- 0.97	- 0.93	- 0.73	- 0.76	- 1.02	- 0.80	- 0.62	- 0.51
2 <sup>nd</sup> decile	0.04	0.04	0.03	0.03	0.03	0.07	0.05	0.05	0.03	0.03
3 <sup>rd</sup> decile	0.19	0.18	0.13	0.14	0.15	0.21	0.12	0.11	0.10	0.10
4 <sup>th</sup> decile	1.08	1.01	0.76	0.81	0.80	2.07	0.73	0.49	0.38	0.30
5 <sup>th</sup> decile	3.85	3.53	2.96	2.82	2.67	6.68	4.68	3.41	2.23	1.63
6 <sup>th</sup> decile	8.30	8.08	7.47	6.79	6.52	10.20	9.51	8.49	6.98	6.39
7 <sup>th</sup> decile	12.54	12.44	12.14	11.60	11.59	13.21	13.57	13.05	12.28	11.98
8 <sup>th</sup> decile	15.80	16.12	16.02	15.97	16.26	16.11	17.11	16.93	16.93	16.99
9 <sup>th</sup> decile	20.01	20.42	20.79	21.00	21.57	19.64	20.90	21.58	22.56	23.23
10 <sup>th</sup> decile	39.05	39.12	40.65	41.76	41.13	32.57	34.34	36.70	39.14	39.86
Top 1%	11.61	10.92	11.89	12.41	11.45	6.71	7.59	8.07	8.67	8.42
Top 0.1%	4.41	4.04	4.60	4.86	4.32	1.67	1.98	2.05	2.20	2.06
Top 0.01%	1.71	1.63	1.93	2.04	1.91	0.40	0.53	0.55	0.59	0.56
Top 0.001%	0.57	0.62	0.75	0.80	0.87	0.09	0.18	0.15	0.16	0.16
Top 0.0001%	0.16	0.20	0.24	0.25	0.39	.	.	.	.	.
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

1) Income from business activity, wage income, capital income, exclusive public and private pensions; measured at the individual level.- 2) Deflated by consumer price index.- 3) Difference of ln(mean) and ln(median).- 4) In cases with zero or negative income this income is replaced by 1 Euro.- 5) GE(0) is the mean logarithmic deviation, GE(1) is the Theil index, and GE(2) is half the square of the coefficient of variation.  
Source: ITR-SOEP data base.

As shown by Table 4, the evolution of the distribution of market incomes in eastern Germany differed from the evolution in western Germany.<sup>17</sup> In eastern Germany, both the mean and the median of real market income have declined relative to their 1992 levels. The extreme drop in median market income was largely driven by the dramatic decline in the level of employment and the substantial increase in unemployment. As shown by the development of the relative difference of the mean and the median, the skewness of the income distribution in eastern Germany increased much more than in the west. The share of income accruing to the top decile also increased in the east much more rapidly than in the west. How-

<sup>17</sup> Since prices behaved quite differently in the two regions during the first few years after reunification (see Table 1), we use separate consumer price indices to calculate real incomes.

ever, the top percentile in the east still receives a significantly smaller share of regional income than it does in the west.

## 5 The Evolution and Composition of Top Incomes

In the decade following reunification, there has been an overall increase in income inequality in Germany that was mainly driven by income gains accruing to the top income decile, especially the economic elite. Therefore, we analyze the evolution of top incomes more in depth, looking in particular at their composition and at compositional changes over time.

### 5.1 Top income levels

In contrast to the analysis in Section 4, here we focus on the evolution of top incomes in absolute rather than relative terms. We show the amounts of market income that various top fractiles of the population received and how those incomes changed during the observation period.

Table 5 presents results for our breakdown of the top percentile into fractiles for the years 1992 to 2003. In addition to average real income, we also report the lowest income in each fractile of the top percentile. In the first part of the table, income levels for each quantile are given for each year within our observation period. Income changes are shown in the second part of the table with the respective value for 1992 as the base year. For comparison we also report levels and changes of market incomes within the top decile as well as, at the top of the table, the mean and median incomes (*cf.* Table 3).

The top decile is made up of a very heterogeneous group of people including both the middle class and the very rich. In 2003, the lower income threshold for the top decile was about 51,000 Euro (in 2000 prices), the average income in the top decile amounted to about 82,000 Euro in that year. This average income is still relatively close to a widely held notion of middle class. To become a member of the top 1 percent, you had to earn a yearly income of 109,000 Euro. In that year, members of the top percentile had an average income of about 223,000 Euro. To make it into the top 0.01 percent – about 6,500 people in Germany – you had to earn a market income of more than 1.2 million Euro, while the average income of these millionaires amounted to about 3.6 million Euro.

We defined the group of people who make up the top 0.001 percent of the income distribution as the *economic elite* of Germany. To become a member of this group of about 650 persons, your market



income had to exceed 5.6 million Euro in 2003. On average, a member of the elite made 16 million Euro in that year, which is almost 2,000 times the median income and about 320 times the lowest income in the top decile. The 65 individuals at the very top of the German income distribution had an average income of almost 73 million Euro in 2003; together they earned nearly 5 billion Euro. Real market incomes have evolved quite differently within the top percentile. Whereas average income stagnated between 1992 and 2003, the income level of the economic elite increased by 46.6 percent. Recall that capital gains are not included in our definition of market income, so that these very high incomes do not reflect exceptional gains from the sale of assets.

**Table 5: Top average real market incomes in Germany, 1992-2003**

Gross market income <sup>1)</sup> , capital gains excluded	1992	1995	1998	2001	2003	1995	1998	2001	2003
	1 000 Euro at 2000 prices <sup>2)</sup>					1992 = 100			
Mean income	20.0	19.7	19.8	19.8	19.8	98.7	99.3	99.3	99.3
Median income	12.5	11.3	9.7	8.8	8.2	90.7	77.8	70.1	65.4
Average income									
Top 10%	77.9	77.0	80.7	83.1	82.1	98.8	103.6	106.7	105.4
Top 1%	224.2	210.2	229.5	240.4	222.5	93.7	102.3	107.2	99.2
Top 0.1%	836.0	761.5	867.4	920.4	816.5	91.1	103.7	110.1	97.7
Top 0.01%	3 246.6	3 065.8	3 614.6	3 850.9	3 567.4	94.4	111.3	118.6	109.9
Top 0.001%	11 064.6	11 721.3	14 267.5	15 161.2	16 223.9	105.9	128.9	137.0	146.6
Top 0.0001%	31 437.4	39 051.3	47 230.2	48 697.1	72 793.4	124.2	150.2	154.9	231.6
Lowest income									
Top 10%	46.8	46.9	48.7	49.6	50.8	100.1	103.9	105.8	108.4
Top 1%	103.9	101.5	107.4	111.4	109.0	97.7	103.4	107.3	105.0
Top 0.1%	340.7	312.2	337.9	352.7	316.4	91.6	99.2	103.5	92.9
Top 0.01%	1 397.8	1 211.5	1 384.2	1 478.8	1 227.2	86.7	99.0	105.8	87.8
Top 0.001%	5 501.6	5 257.7	6 175.9	6 558.0	5 576.8	95.6	112.3	119.2	101.4
Top 0.0001%	18 360.4	19 696.6	25 456.4	27 164.4	25 383.8	107.3	138.6	148.0	138.3

1) Income from business activity, wage income, capital income, exclusive public and private pensions; measured at the individual level.- 2) Deflated by consumer price index.  
Source: ITR-SOEP data base.

## 5.2 The composition of top incomes

The rich are not only special because of their income levels but also because of their income sources. This is shown in Table 6, which presents findings for the top percentile, up to the group of the 0.001 percent richest individuals.<sup>18</sup> For comparison, we also report the composition of mean market incomes

<sup>18</sup> The income composition of the 0.0001 percent top-group, consisting of 64 persons, cannot be reported because of provisions to protect privacy.

and the composition of incomes in the top decile. To save space, we only report results for 1992, 1998 and 2003.

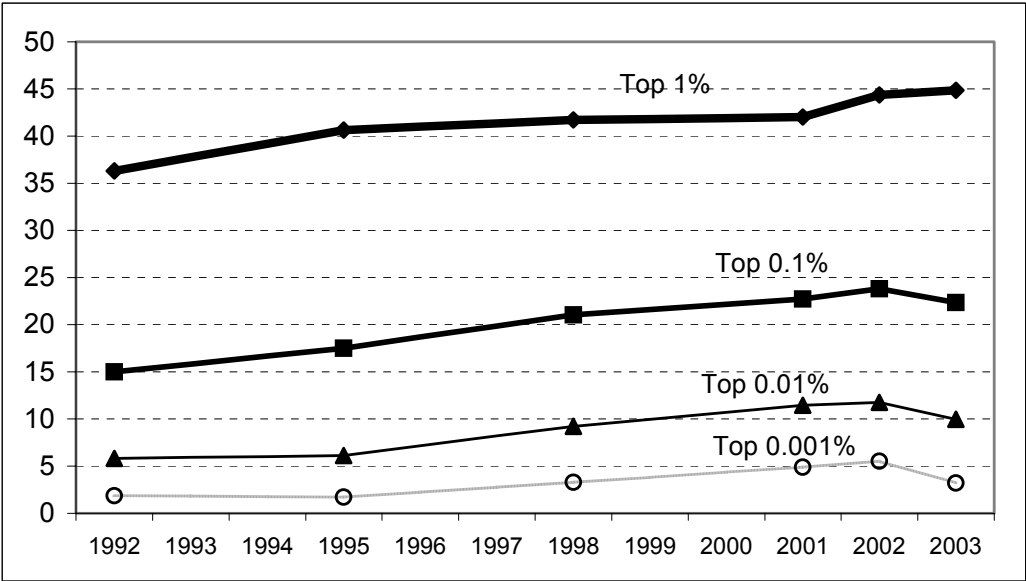
**Table 6: Composition of top market incomes by income component (in %), 1992, 1998, and 2003**

Gross market income <sup>1)</sup> , capital gains excluded	Gross market income <sup>1)</sup> less capital gains	Income from business activity less capital gains			Wage income <sup>2)</sup>	Capital income less capital gains		
		Total	business enterprise	profess. services		Total	Interest, dividends	Renting and leasing
2003								
Mean income	100.0	12.3	7.8	4.6	82.0	5.6	3.8	1.8
Top 10%	100.0	20.5	12.0	8.6	73.8	5.6	3.8	1.8
Top 1%	100.0	42.8	24.6	18.3	44.9	12.3	8.9	3.5
Top 0.1%	100.0	58.5	44.8	13.7	22.4	19.2	15.5	3.7
Top 0.01%	100.0	68.7	64.7	4.0	10.0	21.3	18.9	2.4
Top 0.001%	100.0	79.8	78.6	1.2	3.2	17.0	15.8	1.2
Top 0.0001%	.	.	.	.	.	.	.	.
1998								
Mean income	100.0	11.7	7.5	4.2	83.1	5.2	3.7	1.4
Top 10%	100.0	20.1	12.0	8.1	73.6	6.3	4.8	1.5
Top 1%	100.0	43.9	25.8	18.1	41.7	14.4	11.4	3.0
Top 0.1%	100.0	57.3	44.4	12.8	21.0	21.7	18.7	3.0
Top 0.01%	100.0	66.7	63.2	3.6	9.2	24.0	22.0	2.0
Top 0.001%	100.0	72.6	71.7	0.9	3.3	24.2	22.9	1.3
Top 0.0001%	.	.	.	.	.	.	.	.
1992								
Mean income	100.0	11.1	7.4	3.7	84.2	4.8	3.5	1.2
Top 10%	100.0	21.1	13.2	7.9	72.9	6.0	4.6	1.4
Top 1%	100.0	49.5	31.2	18.3	36.3	14.2	11.3	2.9
Top 0.1%	100.0	64.1	50.1	14.0	15.0	20.9	18.1	2.8
Top 0.01%	100.0	71.3	67.1	4.2	5.8	22.8	21.0	1.9
Top 0.001%	100.0	76.5	75.6	0.8	1.9	21.7	20.8	0.8
Top 0.0001%	.	.	.	.	.	.	.	.
1) Income from business activity, wage income, capital income, exclusive public and private pensions; measured at the individual level.-								
2) Including employers' social security contributions and imputed social security contributions for civil servants.								
Source: ITR-SOEP data base.								

In 2003, wage income represented more than 80 percent of the entire market income, the remainder being made up of income from business activity and capital income. While the top decile still receives more than 70 percent of market income in form of wages and salaries, for the top percentile this share drops to about 45 percent. Within the top percentile, the share of wages on total income monotonically declines with income. For the German economic elite, wages and salaries only represent about 3 percent of its income.

Compared to France and the U.S., the share of wage income at the top of the distribution is quite small. In the U.S., about 45 percent of all income accruing to the top 0.01 percent consisted of wage income in 1998, for the corresponding group in France the share was about 22 percent.<sup>19</sup> In Germany, the comparable share of wage income amounts to meager 9 percent. Thus, our analysis adds a novel aspect to the comparison of Germany with the U.S. and France, as developed by Dell (2005, 2007). He found that, with respect to the concentration of income, Germany is a middle case between the highly concentrated U.S. income distribution and the less concentrated one in France. With respect to the income composition pattern, our analysis shows that it is France which lies between the U.S. and Germany. The German affluent rely much less on wages and salaries for their incomes than their counterparts in France and the U.S..

**Figure 1: Share of wage income in top market incomes in Germany, 1992-2003**



Note: Values between observation years are linearly interpolated.  
 Source: ITR-SOEP data base.

From 1992 to 2003, the share of salary and wages in mean market income for the whole population in Germany declined by 2.2 percentage points. In contrast with that decline, the wage share increased in the top decile and in all smaller top fractiles of the distribution (see Figure 1). This pattern parallels a recent development in the U.S. where increasing income inequality was apparently driven by an increasing

<sup>19</sup> See Piketty and Saez (2003), Piketty (2003) and Bach *et al.* (2005).

share of wage income in the top percentile of the income distribution.<sup>20</sup> Notice, however, that the German development is much less accentuated than the one in the U.S..

A distinctive feature of the German affluent is their strong reliance on income from business activity rather than income from interests and dividends. This finding can be explained by the large share of unincorporated firms in Germany, where even firms of considerable size are often unincorporated. Furthermore, some very rich German families accumulate parts of their capital income in private foundations or holdings, thus reporting only the distributed income in their personal income tax returns.

In order to shed more light on the composition of the groups at the top of the income distribution, in Table 7 we present the concentration of income by source at the individual level. We do this in the left part of Table 7 by ordering order all taxpayers in the top percentile according to their income share stemming from the three main income sources: wages and salaries, business activity, and capital income. For 2003, we find that almost half of the people in the top percentile can clearly be identified as employees or managers since their personal income stemmed by more than 90 percent from wage income. Almost 30 percent in this group can be identified as entrepreneurs and professionals, since more than 90 percent of their personal income stemmed from business activity. Only about 3 percent of the top percentile can be identified as rentiers, whose income is mainly generated by interests, dividends, and rents. About one fourth of the top percentile consists of people with an income mix. Compared to 1992, the share of employees within the top percentile has increased by almost 10 percentage points.

The right-hand side of Table 7 summarizes the results of the same analysis for the German economic elite. Two thirds of this group consists of entrepreneurs. One member of the elite out of ten can clearly be identified as a rentier. Whereas the German economic elite of 1992 did not include any employee or manager, in 2003 this professional group made about 3 percent of that elite.<sup>21</sup>

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<sup>20</sup> See e.g. Dew-Becker and Gordon (2005).

<sup>21</sup> Another difference between the affluent and the rest of the population concerns gender: while women represented in 2003 more than half of the total population, their share in the top decile of the income distribution was about one fifth and their share in the economic elite was about one sixth. From 1992 to 2003 those shares have increased, respectively, from 14.5 to 20.1 percent and from 15.2 to 16.6 percent.

**Table 7: Distribution within the top 1% and the top 0.001%, by share of income type, 1992 and 2003**

Share of income type in gross market income <sup>1)</sup>	Top 1%			Top 0.001%		
	Persons by share of			Persons by share of		
from ... to ...	Wage income <sup>2)</sup>	Income fr. business activity	Capital income less capital gains	Wage income <sup>2)</sup>	Income fr. business activity	Capital income less capital gains
	% of total			% of total		
2003						
0 - 10 %	34.3	57.3	82.9	92.9	14.3	74.1
10 - 20 %	1.3	2.8	5.6	1.9	1.1	6.6
20 - 30 %	1.5	2.2	2.7	0.3	0.8	1.9
30 - 40 %	1.6	1.9	1.8	} 1.1	0.8	2.7
40 - 50 %	1.9	1.6	1.3		0.9	1.6
50 - 60 %	2.3	1.4	1.0		1.6	0.6
60 - 70 %	2.8	1.4	0.7	} 0.5	2.4	0.8
70 - 80 %	3.3	1.6	0.6		3.0	0.9
80 - 90 %	4.7	2.7	0.6	0.5	7.7	1.1
90 - 100 %	46.2	27.1	2.9	3.3	67.6	9.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
1992						
0 - 10 %	40.6	50.0	77.5	94.4	13.6	58.1
10 - 20 %	1.9	2.7	7.0	3.5	} 1.1	15.4
20 - 30 %	2.0	2.2	4.5	1.0		6.7
30 - 40 %	2.3	2.0	2.4	} 1.1	1.1	2.6
40 - 50 %	2.4	1.8	1.7		1.1	1.3
50 - 60 %	2.8	1.8	1.3		0.8	1.1
60 - 70 %	3.1	2.0	1.0	} 1.1	3.2	1.1
70 - 80 %	3.6	3.2	0.8		8.2	1.0
80 - 90 %	4.5	4.1	0.6	} 17.2	17.2	2.1
90 - 100 %	36.9	30.2	3.1		53.6	10.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
1) Income from business activity, wage income, capital income, exclusive public and private pensions; measured at the individual level. -2) Including employers' social security contributions and imputed social security contributions for civil servants. Source: ITR-SOEP data base.						

## 6 From gross market income to net income

The very unequal distribution of market income at the individual level does not correspond to the way in which disposable income and purchasing power are distributed across individuals. Market incomes are redistributed within the families and across the families by the government. Our integrated dataset offers a unique opportunity to quantify the effects from those types of intra-family and inter-family redistributions for the entire adult population in Germany.

## 6.1 Within-family redistribution

Table 8 shows the equalizing effect generated by income sharing within married couples upon the distribution of income at the individual level. The left part of Table 8 replicates our results about the distribution of individual market incomes from Table 3. The right part of Table 8 portrays the distribution of income at the individual level that would result if income were equally shared inside each married couple. This means that married individuals are not assigned their individual income but half of the joint income earned by the couple.

The distribution of gross market income after the assumed redistribution within families exhibits a markedly higher median income. Whereas the median of individual incomes without redistribution is only a little more than 8,000 Euro in 2003, median income after within-family redistribution amounts to more than 14,000 Euro.

The overall equalizing effect from intra-family redistribution is sizeable. For example, it reduces the Gini coefficient from 0.65 to 0.58 in 2003, i.e. by 11 percent. This is also confirmed if inequality is measured by shares of income fractiles: for the bottom half of the population, the intra-familiiy redistribution effect raises the income share from 2.7 percent to more than 15 percent, whereas the income share accruing to the top of the distribution is reduced by this effect; for the economic elite, the top 0.001 percent, it is reduced from 0.8 to 0.6 percent.

Has the equalizing effect from income pooling by spouses increased or decreased over time? Comparing the evolution of the relative difference between mean and median income before and after family redistribution suggests that the equalizing effect became more powerful during the 1992-2003 period: whereas the median of individual market income dropped by more than a third in the observation period, the decline of median income amounts to only 15 percent if redistribution within families is taken into account. However, the opposite conclusion is suggested by a comparison of the Gini coefficients: the Gini coefficient increased much more rapidly in the case of income measured after family redistribution.

**Table 8: Distribution of gross market income for individual and pooled income of spouses, 1992-2003**

Gross market income <sup>1)</sup> , capital gains excluded	Separated income of spouses					Pooled income of spouses <sup>2)</sup>				
	1992	1995	1998	2001	2003	1992	1995	1998	2001	2003
Average income at 2000 prices <sup>3)</sup>										
Mean income (Euro)	19 963	19 712	19 826	19 824	19 826	19 963	19 712	19 826	19 824	19 826
Median income (Euro)	12 496	11 336	9 724	8 754	8 173	17 117	16 802	16 190	14 964	14 664
Relative difference <sup>4)</sup> (%)	46.8	55.3	71.2	81.7	88.6	15.4	16.0	20.3	28.1	30.2
	Summary measures of inequality					Summary measures of inequality				
Gini coefficient <sup>5)</sup>	0.6155	0.6209	0.6389	0.6509	0.6522	0.5213	0.5347	0.5570	0.5760	0.5790
Generalized entropy measures <sup>5) 6)</sup>										
GE(0)	1.9406	2.0131	2.1834	2.2231	2.2062	1.3656	1.4786	1.6547	1.7262	1.7528
GE(1)	0.7810	0.7868	0.8472	0.8811	0.8730	0.5672	0.5862	0.6451	0.6872	0.6860
GE(2)	4.3527	5.4620	7.3885	8.6219	17.6771	2.7407	3.5291	4.9548	5.5643	11.5770
	Structure by income fractiles <sup>7)</sup> in percent					Structure by income fractiles <sup>7)</sup> in percent				
1 <sup>st</sup> - 5 <sup>th</sup> decile	4.83	3.89	2.95	2.73	2.68	20.12	18.28	16.98	15.67	15.14
6 <sup>th</sup> - 9 <sup>th</sup> decile	56.13	57.04	56.34	55.37	55.89	51.83	53.16	53.06	52.99	53.78
10 <sup>th</sup> decile	39.04	39.06	40.72	41.91	41.42	28.05	28.56	29.95	31.34	31.09
Top 1%	11.23	10.66	11.57	12.13	11.22	7.40	7.07	7.76	8.27	7.65
Top 0.1%	4.19	3.86	4.37	4.64	4.12	2.75	2.57	2.96	3.20	2.84
Top 0.01%	1.63	1.56	1.82	1.94	1.80	1.07	1.05	1.26	1.35	1.27
Top 0.001%	0.55	0.59	0.72	0.76	0.82	0.36	0.40	0.50	0.54	0.59
Top 0.0001%	0.16	0.20	0.24	0.24	0.36	0.10	0.13	0.16	0.16	0.26
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

1) Income from business activity, wage income, capital income, exclusive public and private pensions; measured at the individual level.- 2) Married couples: half of the joint income is assigned to each spouse.- 3) Deflated by consumer price index.- 4) Difference of ln(mean) and ln(median).- 5) In cases with zero or negative income this income is replaced by 1 Euro.- 6) GE(0) is the mean logarithmic deviation, GE(1) is the Theil index, and GE(2) is half the square of the coefficient of variation.- 7) Ranking according to gross market income, separated income of spouses.  
Source: ITR-SOEP data base.

## 6.2 Governmental redistribution

The impact of governmental redistribution on disposable income can be decomposed into a transfer effect and a tax effect. In Table 9, the left part shows the distribution of income after adding public transfers to the individual market incomes. Both market incomes and transfers received by married couples are supposed to be equally shared by the members of the couple.

Adding monetary transfers from the government to gross market incomes increases gross household incomes substantially. In 2003, those transfers amounted to about 22 percent of gross household incomes, on average, compared to 17 percent in 1992. Governmental transfers have largely compensated for the decline of market incomes at the household level: median gross income accounting for within-family redistribution and public transfers has, in real terms, slightly increased in the observation period, compared to a decline of 14 percent if transfers from the government were neglected.

**Table 9: Distribution of gross income and net income, pooled income of spouses, 1992-2003**

Gross market income <sup>1)</sup> , capital gains excluded	Gross income <sup>2)</sup> , pooled income of spouses <sup>3)</sup>					Net income <sup>4)</sup> , pooled income of spouses <sup>3)</sup>				
	1992	1995	1998	2001	2003	1992	1995	1998	2001	2003
Average income at 2000 prices <sup>5)</sup>										
Mean income (Euro)	23 965	24 188	24 807	25 186	25 518	15 880	15 770	16 120	16 676	16 810
Median income (Euro)	20 051	20 062	20 143	19 961	20 438	13 750	13 586	13 734	14 251	14 417
Relative difference <sup>6)</sup> (%)	17.8	18.7	20.8	23.3	22.2	14.4	14.9	16.0	15.7	15.4
	Summary measures of inequality					Summary measures of inequality				
Gini coefficient <sup>7)</sup>	0.3831	0.3838	0.3942	0.4045	0.4038	0.3404	0.3401	0.3454	0.3505	0.3496
Generalized entropy measures <sup>7) 8)</sup>										
GE(0)	0.3264	0.3426	0.3603	0.3646	0.3792	0.2745	0.2889	0.2949	0.2935	0.3045
GE(1)	0.3122	0.3053	0.3307	0.3474	0.3371	0.2561	0.2626	0.2798	0.2832	0.2774
GE(2)	1.8552	2.2965	3.1315	3.4034	6.9571	1.3182	2.3984	2.5392	3.2343	7.9412
	Structure by income fractiles <sup>8)</sup> in percent					Structure by income fractiles <sup>8)</sup> in percent				
1 <sup>st</sup> - 5 <sup>th</sup> decile	30.81	30.33	29.97	29.38	29.34	34.86	34.95	35.43	34.86	34.97
6 <sup>th</sup> - 9 <sup>th</sup> decile	45.37	45.91	45.48	45.28	45.77	42.98	42.83	42.26	42.50	42.88
10 <sup>th</sup> decile	23.82	23.76	24.55	25.33	24.89	22.16	22.22	22.31	22.64	22.15
Top 1%	6.25	5.85	6.31	6.61	6.06	5.76	5.73	6.05	6.13	5.65
Top 0.1%	2.30	2.11	2.38	2.54	2.23	1.95	1.99	2.21	2.31	2.10
Top 0.01%	0.89	0.86	1.01	1.07	0.99	0.73	0.80	0.92	0.98	0.95
Top 0.001%	0.30	0.32	0.40	0.42	0.46	0.24	0.30	0.36	0.40	0.45
Top 0.0001%	0.08	0.11	0.13	0.13	0.20	0.07	0.10	0.11	0.12	0.20
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

1) Income from business activity, wage income, capital income, exclusive public and private pensions; measured at the individual level.- 2) Gross market income plus transfer income.- 3) Married couples: half of the joint income is assigned to each spouse.- 4) Gross income less social security contributions, income tax and solidarity surcharge.- 5) Deflated by consumer price index.- 6) Difference of ln(mean) and ln(median).- 7) In cases with zero or negative income this income is replaced by 1 Euro.- 8) GE(0) is the mean logarithmic deviation, GE(1) is the Theil index, and GE(2) is half the square of the coefficient of variation.- 8) Ranking according to gross marked income, separated income of spouses.  
Source: ITR-SOEP data base.

Public transfers have a strong equalizing effect. For instance, they reduce the Gini coefficient for the year 2003 from 0.58 to 0.40, when family redistribution is taken into account. The income share received by the bottom half of the adult population increases from about 15 to almost 30 percent. While, in the period 1992-2003, within-family redistribution alone could not prevent the income share of the bottom half of the population from falling, the joint effect from family redistribution and public transfers was to virtually stabilize that income share.

The right part of Table 9 exhibits net incomes, calculated by deducting from gross income the personal income tax and social security contributions, where net incomes of couples are again assumed to be equally shared by their members. Average net income amounts to about two thirds of average gross income, and this ratio has changed little during the period 1992-2003.

Accounting for the personal income tax, solidarity surcharge, and social security contributions, reduces the Gini coefficient by about 5 percentage points, from 0.4 to 0.35 in 2003. The income share received by the bottom half of the distribution increases from 29 to 35 percent. Whilst gross income ine-



quality, as measured by the Gini coefficient, has slightly increased in the observation period, net income inequality was almost constant.

All in all, family and governmental redistribution substantially contribute to make the distribution of purchasing power among individuals more egalitarian. As compared to market incomes, in 2003 family redistribution reduces the Gini coefficient from 0.65 to 0.58 and the government reduces it further to 0.35. From 1992 to 2003, the key joint effect from those two forms of redistribution has been to protect the bottom half of the population: its share in total net income remained virtually stable despite the fact that its share in total market income dramatically fell by 45 percent. However, family and governmental redistribution were not successful at harnessing the increasing concentration of income in the hands of the very rich. Quite on the contrary, the share of net income accruing to the economic elite increased by 90 percent, while its share in market income only increased by 48 percent.<sup>22</sup>

## 7 Summary and Conclusion

This paper has provided an empirical analysis of the evolution of the income distribution in Germany on the basis of an integrated micro database representing its entire adult population. Whereas previous research has either analyzed household surveys containing little information on very high incomes or, in a few cases, data from income tax returns that severely under-represent the bottom segments of the distribution, we have employed an integrated ITR-SOEP data base that allows one to jointly analyze the upper and the lower tail of the income distribution in the period 1992-2003. In particular, all taxpayers that belong to the top percentile of the income distribution are included in our integrated data base, so that sampling errors are completely avoided for that group. Exploiting this feature, we have, for the first time, provided a detailed analysis of the top 0.001 percent fractile of the income distribution, the *economic elite* of Germany. Furthermore, on the basis of this integrated data base we were also able to analyze the distribution of gross incomes including government transfers and accounting for within-family redistribution and the impact of the personal income tax and social security contributions on the distribution of net incomes.

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<sup>22</sup> This effect can mainly be ascribed to a reduction of personal income taxation of very high incomes. For more details on the distributive effects of income taxation in Germany, see Corneo (2005) and Bach *et al.* (2008).

Inequality of market incomes in Germany, as measured by standard summary indicators such as the Gini coefficient, moderately increased in the period from 1992 to 2003. This finding is consistent with those reported in previous studies that failed to incorporate both tails of the income distribution. However, we have found that standard summary measures of inequality disguise important changes in the distribution of market incomes. On the one hand, a third of the German population receives almost no market income, and the share of market income going to the middle deciles sharply declined since the early 1990s. Consequently, median market income declined substantially, both in absolute terms and relative to mean income. Inequality of market incomes in eastern Germany increased much more than in the rest of the country and the decline in median market income was especially severe in the east.

On the other hand, average market income of the top decile significantly increased in Germany, relative to overall mean market income. In 2003, about 41 percent of market income accrued to the top decile, while this share was just 39 percent in 1992. Within the top decile, the economic elite is the group that displays the largest relative gain. In 2003, this group was formed by about 640 individuals, with an average income of 16 million Euro, excluding capital gains. Thus, an average member of the German economic elite earned as much as 2,000 individuals with median income. While real mean income stagnated from 1992 to 2003, real average market income of the German elite increased by almost 50 percent.

At the top of the income hierarchy the composition of income according to its sources is very different from that of the rest of the German population. While wage income is by far the quantitatively most important income source for the vast majority of income earners, only 3 percent of the members of the German economic elite may be identified as managers. The rest of it is, by and large, formed by entrepreneurs and rentiers. Interestingly, the predominance of capitalists within top income groups seems to be much stronger in Germany than in the U.S. or France.

Moving from individual market incomes to net incomes has shown that both within-family and government redistribution substantially contribute to reduce income disparities across individuals in Germany. As a result of these redistributive effects, the income share of the bottom half of the adult population enormously increases. Overall income inequality, as measured by the Gini coefficient, is markedly reduced, and these effects have greatly mitigated the increase in inequality during the period 1992 to 2003. However, at the level of the economic elite, the income concentration process was not

brought to a halt by redistribution. Quite on the contrary, the net income of the economic elite grew even faster than its market income. Keeping income concentration in check may thus become an important policy issue in Germany in the coming years.

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## Appendix

### Appendix 1: From Taxable Gross Income to Gross Market Income

Based on the individual tax returns, we obtain (economic) gross income by adding all tax-exempted incomes as well as tax reliefs that can be identified within the tax file information. Specifically, the various income categories are computed as follows:

- Income from *business activity* includes taxable income from agriculture and forestry, from unincorporated business enterprise and from self-employed activities (professional services). Tax reliefs are taken into account as far as they are identifiable, just as the tax-exempted profits from outbound business investments. Capital gains from business activity could be identified separately. Unfortunately, German income tax statistics do not provide information from financial accounting of firms (tax balance sheet, profit and loss statement). Therefore, we do not know to what extent firms exploit depreciations according to the declining balance method or provisions for impending losses or pension reserves. German tax law was deemed to be quite generous in this field up to the end of the 1990s. A fortiori we cannot quantify the extent to which the self-employed avoid taxation by disguising private expenses as operating expenditures or transferring part of their profits abroad via a manipulation of transfer prices.
- Our measure of *wage income* is calculated before deduction of allowable expenses. Taxable pensions from former employment, which are part of the statutory income from employment, are accounted as transfer income (see below). Tax-exempted foreign wage income is added.
- *Capital income* includes all capital income from private investments, except income from business activities. Especially in this field we face difficult measurement issues.

First, *interest and dividend* income was granted in the 1990s a rather high savers allowance of 6,000 DM / 3,070 Euro per year (double this amount for married couples). We compute those allowances as part of gross income whenever tax units claim them. However, many taxpayers with financial income did not claim them since their financial income was lower. Second, the bank secrecy law might have encouraged tax evasion of financial income to some extent. By definition, evaded income is not recorded by tax returns and is therefore neglected by our study. Third, in Germany, capital gains from financial investments are taxable solely if they are classified as “speculation gains”, i.e. if sale of the asset closely follows acquisition of that asset. In 1998, this meant that the time lapse between buying and selling had to be less than two years in the case of real estate and less than six month in the case of other assets (e.g. securities) for the capital gain to be legally counted as taxable income.

For decades, taxable income from *renting and leasing* has been a vast loophole for tax-saving activities in Germany. Depreciation allowances, tax reliefs and generous accounting rules in combination with tax-free capital gains led to massive budgetary losses that could be offset against income from other sources to a large extent. In 1998, positive incomes from renting and leasing amounting to 20.1 billion Euro were offset against losses of 37.7 billion Euro. Since most of this activities are likely to be motivated by tax avoidance, we ignore losses exceeding some thresholds: Losses of more than 5,000 Euro from direct investments in real estate and of more than 2,500 Euro from shareholdings (closed property funds, property developer partnerships, etc.) are disregarded in calculating gross income.

## Appendix 2: Data Matching and Integration – Methodology

The merging of the ITR data and the SOEP is performed by a constrained matching approach: The constraints are set in such a way that each observation (record) contained in the SOEP is matched to a certain number of records in the ITR. The number of records matched depends on the sample weights for the two data sets, i.e. for each data set records are used proportional to their original weights. The main advantage of this approach, relative to alternative data integration strategies, such as mean imputation by regression or propensity score matching (see, e.g., O’Hare, 2000), is that the correlation structure between the variables only observed in one of the two data sets and the common matching variables is maintained in the integrated data set. Matching of the two data sets under these constraints is analogous to the standard transportation problem in linear programming and can thus be performed using standard optimization routines.<sup>23</sup>

The analogy to the classical transportation problem in linear programming becomes apparent if we define records of data set A (B) as supply (demand) nodes, the survey weights,  $w_{ij}$ , of A and B as volumes supplied (demanded) by each A (B) record, and the mathematical distance between two records from A and B,  $d_{ij}$ , as the costs of shipped goods between A and B. The mathematical problem then is to minimize the weighted costs over all data records ( $n_A$ ,  $n_B$ ) under the restrictions that, for each record, the weighted number of cases matched from A to B equals the sum of weights in the respective data set:

$$\begin{aligned} & \min \sum_{i=1}^{n_A} \sum_{j=1}^{n_B} d_{ij} w_{ij} \\ \text{s.t. } & \sum_{j=1}^{n_B} w_{ij} = w_i, \forall i, \quad \sum_{i=1}^{n_A} w_{ij} = w_j, \forall j, \quad w_{ij} \geq 0, \forall i, j \end{aligned}$$

To proceed, one has to choose a distance measure, such as the absolute deviation between variables, the Euclidian, or the Mahalanobis distance. Here, we choose the absolute deviation after normalizing all variables, i.e.  $d_{ij} = \sum_{k=1}^K |z_{ik} - z_{jk}|$ , with  $z :=$  normalized variable.

Since, for each data set, records are used proportionally to the original weights, the distribution of all variables in the integrated data set will replicate the source distributions. There are, however, also disadvantages of constrained matching. First, due to the constraints, not each record in A might be matched to its closest B record. We check this by comparing the distribution of observable variables between matched records from the two data sets. Second, the very large number of constraints, equal to the number of records to be matched, renders constrained matching computationally very demanding in our case. We tackle this by splitting up the original data sets into subsets defined by a number of matching variables observed in both data sets, such as income group and marital status. Within these subsets, the distance between the records in both datasets is measured by income, type of household/family, occupational status, age group, region (east and west Germany) and the predominant source of income. Of course, the basic Conditional Independence Assumption (CIA), which states that conditional on the matching variables,  $M$ , which are contained in A and B, the set of variables  $X$  from A and  $Y$  from B are independent, has to hold for constrained matching as well.

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<sup>23</sup> We use the network simplex algorithm performed by CPLEX and implemented in AMPL, provided by [www.ilog.com](http://www.ilog.com).

**Appendix 3: Distribution of market income in Germany, 1992-2003,  
SOEP data only (sample A-F)**

	Gross market income <sup>1)</sup> , capital gains excluded					1992 = 100			
	1992	1995	1998	2001	2003	1995	1998	2001	2003
Average income at 2000 prices <sup>2)</sup>									
Mean income (Euro)	18 456	18 606	18 559	19 010	18 842	100.8	100.6	103.0	102.1
Median income (Euro)	11 797	10 491	9 157	8 685	7 688	88.9	77.6	73.6	65.2
Relative difference <sup>3)</sup> (%)	44.8	57.3	70.6	78.3	89.6	128.0	157.8	175.0	200.3
Gini coefficient <sup>4)</sup>	0.5964	0.6097	0.6191	0.6308	0.6383	102.2	103.8	105.8	107.0
Generalized entropy measures <sup>4) 5)</sup>									
GE(0)	1.9479	2.0616	2.1829	2.2136	2.2377	105.8	112.1	113.6	114.9
GE(1)	0.6649	0.6981	0.7135	0.7390	0.7569	105.0	107.3	111.2	113.8
GE(2)	0.7440	0.7941	0.7526	0.8189	0.8383	106.7	101.2	110.1	112.7
Structure in % by income fractiles									
1 <sup>st</sup> decile	- 0.13	- 0.18	- 0.09	- 0.27	- 0.35	140.1	72.1	208.6	269.5
2 <sup>nd</sup> decile	0.04	0.04	0.03	0.03	0.03	83.8	70.2	66.9	66.9
3 <sup>rd</sup> decile	0.17	0.13	0.11	0.12	0.11	77.6	66.2	70.5	65.3
4 <sup>th</sup> decile	1.06	0.81	0.65	0.68	0.60	76.6	61.5	64.5	57.0
5 <sup>th</sup> decile	4.35	3.50	3.01	2.77	2.47	80.5	69.2	63.7	56.9
6 <sup>th</sup> decile	8.59	8.29	7.84	7.10	6.57	96.4	91.3	82.7	76.5
7 <sup>th</sup> decile	12.82	12.86	12.81	12.14	11.96	100.3	99.9	94.7	93.3
8 <sup>th</sup> decile	16.63	16.97	16.91	16.90	17.15	102.0	101.7	101.6	103.1
9 <sup>th</sup> decile	21.26	21.44	22.04	22.70	23.17	100.8	103.7	106.8	109.0
10 <sup>th</sup> decile	35.21	36.16	36.69	37.83	38.29	102.7	104.2	107.4	108.7
Top 1%	21.33	22.03	22.23	23.07	23.24	103.3	104.2	108.2	109.0
Top 0.1%	6.64	6.88	6.03	7.01	6.84	103.6	90.7	105.5	102.9
Top 0.01%	1.54	1.27	1.02	1.22	1.08	82.2	66.2	78.8	69.9
Top 0.001%	.	.	.	.	.	.	.	.	.
Top 0.0001%	.	.	.	.	.	.	.	.	.
Total	100.00	100.00	100.00	100.00	100.00	100.0	100.0	100.0	100.0

1) Income from business activity, wage income, capital income, exclusive public and private pensions; measured at the individual level.- 2) Deflated by consumer price index.- 3) Difference of ln(mean) and ln(median).- 4) In cases with zero or negative income this income is replaced by 1 Euro.- 5) GE(0) is the mean logarithmic deviation, GE(1) is the Theil index, and GE(2) is half the square of the coefficient of variation.  
Source: SOEP, sample A-F (high income sample excluded).