Mobility of Top Incomes in Germany

Katharina Jenderny

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Abstract

Mobility of top incomes matters for both the openness of the income elite and the share of total income that this group receives. It is thus an important complement information to the growing snapshot literature on top income concentration. I use microlevel panel data of German income tax files that is highly representative for top income households. Top income mobility is assessed in four dimensions: (i) its stability over time, (ii) the degree of mobility between top income fractiles, (iii) the degree of mobility between equally sized groups and mobility in ranks, both of which do not depend on fractile sizes, and (iv) mobility's impact on distributional results. Mobility in terms of annual fractile changes is high between the richest top income fractiles, which is primarily due to tiny fractile sizes. When the fractiles' sizes are controlled for, top income recipients' mobility is lower than that of lower income tax units.

1 Introduction

Income mobility provides a short way from rags to riches. A highly mobile society can be seen as a goal in its own right, as it generates openness of society (at least in terms of income). A second,

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instrumental property of income mobility is that it reduces income inequality. The more mobile a society in terms of income ranks, the more equal it is, given the annual income distribution.

Top incomes have come into focus with rising income concentration in many industrial countries. Income concentration, defined as the share that top income fractiles receive, serves as an indicator of overall inequality. In the USA, the share of total gross income received by the richest one percent of the population rose from 8.9 % in 1979 to 23.5 % in 2007. Similar results have been found for many other countries.[1] While Anglo-American countries faced a steep increase in income concentration, concentration in Continental European countries is lower and increased to a lesser degree. For Germany, Bach *et al.* (2013) showed that annual concentration increased since the 1990s.[2]

Several arguments may prove income concentration harmful. Firstly, a large proportion of western countries' citizens seems to have preferences for an equal income distribution.[3] Secondly, rising income concentration goes along with rising relative deprivation.[4] Thirdly, a strong economic elite might gain concomitant political power that contrasts with a democratic ideal.[5] Finally, the share of economic growth that accrues to the richest persons impacts on how growth can be interpreted. If high macroeconomic growth does not correspond with better living conditions in the bottom 99 % of the population, growth is challenged as an indicator of welfare.[6] The strength of these arguments depends on the degree of income mobility. The equity argument loses power if the equalizing property of income mobility is strong. If families move between income ranks from one year to the other, medium- or longterm incomes are more equally dis-

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[1]See Atkinson *et al.* (2011), p. 6.

[2]A first glance at income concentration in the period analyzed in this paper gives figure A.1 in appendix A.

[3]See, e.g. Alesina & Giuliano (2009) who show that redistributive preferences are stronger when income height depends on luck rather than effort. Atkinson *et al.* (2011) argue, that this is precisely the case for top incomes.

[4]This originally sociological concept argues that the welfare loss induced by not having something rises with the number of persons who do have it. Yitzhaki (1979) introduced this concept into the economic research and showed that given average income, relative deprivation rises with rising inequality.

[5]One channel for this power can be the media. Besley & Prat (2006) show that media capture affects political outcomes. Their model of democratic politics allows for endogenous media capture by the government. Corneo (2006) shows that a media bias in favour of firms is more likely to occur when concentration in firm ownership rises.

[6]The crucial role of income concentration for distributional questions is mirrored in two recent OECD publications: Matthews (2011) summarises reseach on top incomes and tax policy implications. This study is reproduced and put into a wider distributional context in OECD (2011), that explores the driving forces of increasing income inequality.

tributed than annual incomes. As to the second argument, political power of an economic elite clearly depends on the persistency of that group. If society is mobile, economic power shifts between persons, and the individual's power is less harmful than the annual result would suggest. Thirdly, macroeconomic growth accrues to a larger fraction of households if income mobility is high. With sufficient income mobility, a steep concentration in annual incomes may thus go along with a relatively equal distribution of medium- and longterm income. If this is the case, high annual income concentration is less problematic from a normative perspective. The share of the richest fractiles' members then declines with the period over which income is measured, and the group of persons or households who form the annual rich over several years is larger than the annual fractile itself.[7]

This paper aims at assessing the degree of income mobility among top income recipients in Germany. Is the income elite open to newcomers? Does the economic power shift between persons, or is the richest group a persistent one? Is the German income distribution as unequal as annual results suggest, or is it set off by high income mobility?

Four main findings are obtained. First, German top incomes' mobility is stable for the analyzed period for most top income fractiles. The probability to stay in the top 0.1 % is comparable with results from Canada and France after one year. After three years, the German data shows less mobility than both Canada and France. Second, even though stable, mobility between annual fractiles is present and rises in higher income fractiles. Using three-year averages of incomes to construct the fractiles reduces mobility considerably. Third, high annual turnover of members in top income fractiles does not imply that income recipients at the very top are exceptionally mobility prone. It rather shows that the highest fractiles are tiny groups and therefore face a high exchange of members for statistical reasons. When mobility is assessed based on equally sized fractiles or based on absolute rank changes, mobility declines with higher incomes. Thus, the top income groups are rather closed. Fourth, top income mobility impacts on distributional results. Average incomes over the longest available period (six years) are less concentrated at the top

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[7]This argument has been an objection against the findings of growing income concentration. If mobility increased during the past decades, it might have offset the growing annual income concentration. Atkinson *et al.* (2011) discuss this objection and propose further research on income mobility at the top.

than annual incomes. The equalizing effect is especially high for the tiniest top fractiles above the 0.01 % treshold. Concentration results for average incomes in the top 1 % are far more robust and correspond quite closely to annual results. More than 94 % of annual concentration in the top 1 % fractile persists in six-year average incomes. Harmful properties of income concentration as described above may therefore well apply to Germany.

The remainder of the paper is organized as follows. Section 2 reviews the literature on top incomes and on income mobility. Section 3 describes (i) the database used to assess German income mobility at the top, (ii) the econonomic income concept derived from taxable income and (iii) the method of deriving income fractiles. It also gives (iv) some details on tax changes during the time period of the dataset. Section 4 presents the analysis of income mobility which includes (i) changes in mobility over time, (ii) transitions between fractiles, and (iii) measures of individual mobility that are not dependent on the fractile size. Section 5 shows the distributional impact of top income mobility. Section 6 concludes.

2 Literature

2.1 Snapshot Literature on Top Incomes

Literature on top incomes relies largely on repeated cross sections. The main branch of the literature uses long term time series of income shares of the richest fractiles, usually based on annual income tax records. Income concentration is defined as the share of taxable income that top income fractiles receive. In a seminal paper, Piketty & Saez (2003) showed that US top income shares followed a U-shaped pattern from 1913 to 1998, with high wage incomes driving the rising inequality during the last three decades of the century. Similar results are found by Saez & Veall (2005) for Canada. For Sweden, Roine & Waldenstrom (2008) showed that rising top income shares are primarily driven by capital gains. Atkinson & Salverda (2005) find a U-shaped pattern similar to the US case for the UK, but no recent increase in top income shares for the Netherlands. Dell (2005) constructs top income series for Germany and Switzerland. He does not find a recent increase in the German top percentile's share. However, that share has

been high throughout the second half of the 20th century. Long time series of top income shares have been constructed with a common methodology for 24 countries. The results are reviewed in Atkinson *et al.* (2011). They report rising shares of the top income fractiles since the 1980s in most of the countries, even though both the magnitude and the driving income sources of the rise differ substantially across countries. While the USA experienced the strongest rise in top income shares, lower increases of income concentration are found for Continental European countries.[8]

A second branch of top income research based on repeated cross sections tackles both income concentration and effective taxation based on individual tax data. Firstly, this data makes it possible to report income shares for smaller fractiles of the top income filers. Secondly, it is possible to construct a measure of gross income from the individual tax units' taxable income. This reconstructed gross income is less prone to changes in the tax law than taxable income. In turn, the time series provided by micro data are shorter than those based on tabulated tax records. For Germany, available microdata covers the period since 1991. Bach *et al.* (2013) construct gross incomes based on taxable incomes between 1992 and 2005. They report income shares of the richest fractiles up to the 0.0001 % richest tax filers, referred to as the super rich, and find rising income shares of top income tax filers. In particular, the share in gross market income of the richest 0.001 % fractile of tax units, referred to as the economic elite, grew by at least 50 %. The share of the super rich more than doubled. In contrast to Dell (2005), these results suggest a substantial rise in German income concentration since the early nineties. Landais (2008) shows that French income concentration also increased substantially during the first years of the current century. That increase is even more pronounced than the German one documented by Bach *et al.* (2013) and especially high in the last analyzed year, which is 2006.

2.2 Literature on Income Mobility

Research on income mobility covers a diverse and not coherent set of mobility definitions. Empirical studies on intragenerational income mobility have been carried out predominantly on the

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[8]Even though most of these long term series on top incomes rely on income tax data, other data sources and income definitions have been used. Recently, Atkinson & Voitchovsky (2011) constructed long term top earnings series for the UK based on survey data and found rising inequality in top earnings since the late 1970s.

basis of survey data which often consist of panel data over several decades and include detailed sociodemographic information. These surveys usually are representative for low and medium income households and have been used to analyze mobility in these income ranges.[9] For the intragenerational level, Burkhauser & Couch (2011) review both mobility measures and recent literature. Notably, they review the literature on the degree to which inequality is reduced by using average income. In the reviewed literature, most of this reduction takes place in the first few years. They also review literature on changes in mobility over time, which were low for most of the contributions.[10]

Research on income mobility of high incomes is comparably scarce, as panel data on high incomes is rare and often hard to obtain. On the intergenerational level, Björklund *et al.* (2012) show that the Swedish income elasticity between fathers and sons above the top 0.1 % income fractile is with 0.9 very high and likely to be driven by wealth transmission. On the intragenerational level, Saez & Veall (2005) use an extensive panel on canadian income tax files and find that top income mobility was moderate and stable in Canada since 1982. They find little differences in income concentration of annual income and averaged income over three and five years. Notably, they find that the intertemporal pattern of income concentration of annual and averaged incomes almost perfectly coincides. They thus conclude that the recent increase in income concentration was not offset by increased income mobility in Canada. They also find relatively stable drop-out rates out of the top 0.1 % fractile after one, two and three years (roughly 40 %, 50 % and 55 %, respectively). For France, Landais (2008) finds very similar and also stable drop-out rates out of the top 0.1 % fractile between 1998 and 2004. For the USA, Auten & Gee (2009) analyze micro level panel data of US income tax files between 1996 and 2005. For members of the richest percentile, the richest 0.1 % and the richest 0.01 %, they find drop-out rates after nine years of 64.7 %, 76.1 % and 76.6 %, respectively.[11] For Germany, the only study on income mobility of

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[9]Using the socioeconomic Information, surveys have also been used to estimate determinants of poverty. Jenkins (2011) provides a methodological overview and detailed results for Britain.

[10]Earlier reviews on the intragenerational level are Atkinson *et al.* (1992) and Fields & Ok (1999). Both review motivations and concomitant methods of the early literature. Atkinson *et al.* (1992) also include econometric models and compare empirical results. For the intergenerational level, Solon (1992) was methodically seminal. He measured the intergenerational income elasticity between fathers and sons in the US controlling for age profiles. Recent studies on the intergenerational level are reviewed by Lee & Solon (2009) and Black & Devereux (2011).

[11]Drop-out rates of the richest percentile and the richest 0.1 % refer to the fractile net of the next higher fractile

high incomes using tax data is Merz & Zwick (2008). They use panel data of individual tax files between 2001 and 2003 to analyze differences in mobility between self employed persons and wage earners. However, the richest analyzed fractile is the top decile, where they find a drop-out rate after two years of about 0.25 %. Mobility in top income fractiles is not analyzed.

For Germany, the existing empirical literature on top income shares relies on cross sectional tax data.[12] I contribute to the current discussion by using panel data to explore the income mobility of top income recipients. I use top fractiles as defined by the top income literature in order to assess the extent and stability of income mobility between the fractiles, mobility between equally-sized subgroups, mobility in ranks, and mobility's impact on income concentration.

3 Database and Data Management

3.1 Database

The German taxpayer panel (TPP) is a six year panel of annual individual German income tax data on micro level. For each tax unit, all tax relevant informations are observed for each of the six years between 2001 and 2006. The dataset is a representative 5 % sample of a balanced panel of all German income tax filers in these six years. It is composed by the German federal statistical office (Destatis). A tax unit can either be a single person or a married couple. The sample contains mainly income filers with above median incomes, as filing is obligatory for entrepreneurs and self-employed persons, and it is not obligatory but favorable for other high and medium and some low income tax units.[13] Unlike the cross sectional income tax data, the panel data is balanced and thus contains only tax units that filed in all six years. Not included are thus tax filers who start filing after 2001 or stop filing before 2006. Amongst top taxpayers,

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(with the top 0.01 % being the highest). Drop out rates of the gross fractiles, that is P99-P100, P99.9-P100 instead of P99-P99.9 and P99.9-P99.99 would expected to be slightly lower.

[12]Bach *et al.* (2009) and Bach *et al.* (2013) provide cross sectional anayses based on individual tax data for Germany. Dell (2005) constructs long time series on top income shares in Germany and Switzerland.

[13]Tax units who obtain exclusively wage income usually do not file and are thus not included in the panel. In addition, households who do not pay income tax at all, like some pensioners or recipients of governmental transfers, are not included. Thus, the TPP is representative for high-income tax units, but it undersamples low-income households.

who usually have a significant share of capital income, the latter case is most likely to occur due to death or migration. Marriage may also play a role. If two single tax units marry, one of them loses his or her tax id, which then drops out of the panel completely. Out of that restricted population the sample contains 5 % of all income tax filers (928993 unweighted filers), who are weighted to match the panel population (about 18.5 million weighted filers). However, it contains 85 % of all high income filers, defined as tax units whose average annual gross taxable income (GTI) exceeds 150 000 €. This high income group includes 26 % of unweighted observations (243260) and 1.5 % of weighted observations (286199). Thus, high income tax units are highly oversampled, which provides a reliable basis for the analysis of income concentration. Sampling strata are regions (federal states), assessment type (single/married couple), main income source (business/wage/other), average annual GTI as well as GTI's coefficient of variation. As each filer is observed in all six years, each filer's sampling weight is constant for all years.

The TPP contains detailed information on seven income types: wage income, three types of entrepreneurial income, capital income, income from renting and leasing and pensions. Capital income below a year-specific allowance[14] is not liable and therefore not contained in the majority of the respective files. Capital gains are only partly included. Capital gains from selling an enterprise are tax exempted under certain circumstances, but nonetheless documented in the data. Capital gains from selling financial assets are excluded if they have been held for longer than a year and then are not documented in the data.

The period spanned by the TPP are the years 2001 to 2006. This was a period of several tax reforms and huge changes in overall inequality in Germany, both of which may have an impact on the obtained results. The top marginal tax rate was reduced from 51 % to 48.5 % in 2001, to 45 % in 2004 and to 42 % in 2005. In 2007, it was raised again to 45 %, combined with the introduction of a new highest tax bracket. For top income recipients, it was thus most favorable to realize incomes in 2005 and 2006. In both years, incomes are indeed more concentrated in the top fractiles (see table B.1 in annex B). During the period of observation, the year 2002 is the only year that is neither pre- nor postreform year. In addition to these tax rate changes, during the years 2000 to 2005, overall inequality of gross and net incomes in Germany has increased

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[14]The allowance amounts to between 1 370 € and 1 550 € per person during the analyzed period.

substantially, primarily due to growing inequality in labor incomes. This has been documented by several studies.[15] The data period is thus a period of growing labor income inequality and several tax reforms. Taxable incomes reported in the data are thus likely to reflect both processes.

3.2 Income Concept

This paper's mobility analysis is based on gross income, while the database reports taxable income. Mobility in taxable income does not necessarily mirror mobility in gross income. Taxable income depends on the annual tax schedule whose changes might have different impacts on different tax units. I therefore construct economic gross income (EGI) from taxable income. Similar to Bach *et al.* (2013), economic gross income is defined as gross income before taxes, including all tax exempted income as well as transfers. Tax exempted income includes all allowances, tax exempted dividends[16] and a fraction of pensions. Labor income is reported as gross income including employees' social security contributions, but not the employers' contributions. I use the reported labor income concept, but for civil servants, the employees' pension insurance payments are imputed.[17] Realized capital gains, although partly included in the dataset, are excluded for the mobility analysis. The available data on capital gains includes mainly capital gains due to retirement, when a business is sold or closed. These capital gains are a highly transitory income component, and they are observable in the annual tax data as such. Including capital gains in the mobility analysis between years would increase the observed income mobility, but it would not add information to the annual data. The interesting information that panel data can provide is the evolution of incomes that are not obviously transitory. However, for the distributional

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[15]Corneo (2013) shows that the Gini coefficient in West Germany rose by about 5 percentage points from 1999 to 2005 and even more in East Germany. He suggests growing unemployment, and, since 2003 the Hartz labor market reforms as main driving factors. Both have triggered low-pay employment which produced growing wage and income inequality at the bottom of the distribution. Biewen & Juhasz (2012) assess the relative importance of the main channels of the inequality increase by estimating conterfactual income distributions which hold some factors constant. They find that labor income inequality and changes in both employment outcomes and the tax system were the main driving forces.

[16]The data includes two kinds of dividends. The first kind is reported as gross dividends before firm-level taxation. The second kind is reported as dividends net of firm-level taxation. I adjust the latter kind and include gross dividends before firm-level taxation in EGI.

[17]Civil servants receive a pension after retirement, but do not pay pension insurance during their working life. The insurance payment is thus not included in the reported gross wage.

analysis, capital gains are included, as they reflect a considerable fraction of total income. All income components are deflated to 2001 prices using the German consumer price index in order to control for inflation.[18] Several issues cannot be adressed by this gross income definition. The direction of possible resulting biases is discussed below.

1. First, capital income below the annual allowance cannot be included. As this paper deals with incomes at the top of the distribution, this should not have an impact on the results.

2. Second, not realized capital gains, which would be a less transitory income component than realized capital gains, cannot be included. Imputed rents for homeowners also cannot be taken into account. Realized capital gains would most likely increase observed concentration. Imputed rents could be a more relevant income component in the middle of the income distribution.

3. Third, the gross income construction relies on taxable income and is thus sensitive to tax evasion and avoidance. This can be an issue in this analysis for at least two reasons:

   a) Firstly, because gross income cannot be fully measured and observed income concentration is thus biased. If relative risk aversion declines with income height, the top fractile members evade more and observed income concentration is too low.

   b) Secondly, taxable income's correlation with true gross income is likely to be unstable across the observed period because changes in the tax law may have provoked behavioral responses. On the one hand, the top tax rate changed during the analysis period, which probably induced taxable income responses. This might be a driving factor for higher income concentration in years with low top tax rates.[19] Annual income mobility should not be affected as long as the taxable income elasticity depends monotonely on the income level. In contrast, income concentration is likely to be affected if the taxable income elasticity is not constant for all income levels. The annual bias depends on the direction of the policy change. Using average incomes may mitigate this effect, but the equalizing effect of average incomes in comparison to annual

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[18]All federal statistics I use are provided by Destatis. For the consumer price index, see Destatis (2012b).

[19]See subsection 3 for details of the tax schedule changes.

incomes will be overstated. On the other hand, tax law concerning loopholes has changed. For example, losses from renting and leasing could always be offset against gains from other income sources and are likely to be used as a loophole. However, in the first three years of the available data, accounting rules on the deduction of losses were were more rigid than later on. Losses from renting and leasing are likely to be distorted by tax avoidance and the change therein. This might induce the overstatement of high incomes' mobility. I disregard these losses in the mobility analysis as they are likely to reflect tax planning rather than income mobility. However, I include them like realized capital gains in the distribution analysis.[20]

3.3 Definition of Fractiles

In this analysis, the following income fractiles are considered: the richest 10 %, 5 %, 1 %, 0.1 %, 0.01 %, 0.001 % and 0.0001 % of potential taxpayers.[21] The number of tax units that belong to each top income fractile is thus defined with respect to the aggregate population, not with respect to the sample population.[22] Top income fractile members are defined as the N richest tax units in the database whose aggregated weight adds up to the respective number of potential taxpayers. It is thus assumed that all taxpayers that belong to the top decile are included in the data. As the panel is balanced, this is not the case for reasons explained above. Therefore, on the one hand, the absolute size of incomes in each fractile is biased downwards, as in each fractile some tax units are not accounted for and the richest tax units from the next lower fractile are included instead. On the other hand, this procedure leads to the correct number of fractile members. As this paper primarily deals with income mobility by fractile rather than absolute income size, I

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[20]Disregarded are losses from direct investments in real estate that exceed 5000 € and losses from shareholdings that exceed 2500 €. This method is in accordance with Bach *et al.* (2009), who also discuss the issue. However, the effect of this correction on both observed mobility and income concentration, is small.

[21]Potential taxpayers are all singles or married couples between 20 and 65. The aggregate of potential taxpayers is computed based on population statistics published by Destatis (2009). As tax data usually does not include the whole population, fractile sizes have to be determined using an external population total. This procedure was first used by Piketty & Saez (2003) and has been widely used since then.

[22]Sample Observations are weighted to match the TPP aggregate. The TPP's population differs from all taxpayers because the panel is balanced. The weighted sample population as percentage of all filers (as reported in annual income tax statistics) is shown in figure A.2 in appendix A.

do not correct for this bias and rather keep the weighted group sizes close to the true size of the fractile. In contrast, in section 5, distributional effects are explored. In this section I correct for the missing cases by defining fractile membership by smaller group sizes than in section 4.[23]

In accordance with Bach *et al.* (2009) and (2011), I refer to the richest 0.001 %, a group of 460 tax units, as the economic elite, and to the richest 0.0001 % that consists of 46 tax units in each year as the super rich. Tax units whose income does not reach the top decile's minimum income are referred to as the bottom 90 %. As many potential tax payers do not file income tax returns, this group does not represent 90 % of the database population. Tax units with negative incomes are separately reported.[24] In order to assess mobility between top income fractiles by transition matrices (section 4.2), the above defined fractiles are used as separated groups. Each fractile starting from the top 10 % is defined net of the next richer fractile. In all other analyses, the fractiles are defined as gross fractiles and include all richer fractiles.

4 Mobility Analysis

4.1 Mobility Changes across Periods

This section analyses mobility between top income fractiles. It directly relates to the cross sectional literature on top income shares and explores in how far the fractiles used in that literature are stable in terms of member households. Mobility is an issue in this framework for two reasons.

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[23] In section 5, all top fractile sizes are reduced by 15 %. Fractiles' shares in primary household income are then defined with respect to the sample members and the missing observations, assuming (i) that drop-out rates are equally distributed across top fractiles and years, and (ii) that panel attrition at the top is independent of income height. Comparisons with two additional data sources suggest that both assumptions are reasonable. Missing tax units are distributed randomly over the fractiles. Destatis (2012a) reports the total number of taxpayers by gross taxable income (Gesamtbetrag der Einkünfte) which corresponds to the most comprehensive income measure of the tax statistic (Summe der Einkünfte), reduced by some allowances that are negligible for top incomes. The highest category, however, are taxable incomes above 5 million €, which corresponds to incomes in the upper top 0.01 % of taxpayers. The annual support of these taxable income categories in the weighted panel population is shown in figure A.2 in appendix A. Missing rates are generally the lowest for incomes above 50000 €. They are usually below 20 % for all high income classes. A more detailed idea of the missing percentage inside the income fractiles can be obtained by annual micro data. This however is only available in suitable detail for 2001. The comparison in shown in table A.1 in appendix A, which suggests that missing cases are randomly distributed over the fractiles.

[24]Table A.3 in annex A reports the weighted and unweighted sums of annual observations in these fractiles, as well as some income aggregates of the database, national accounts and tax statistics.
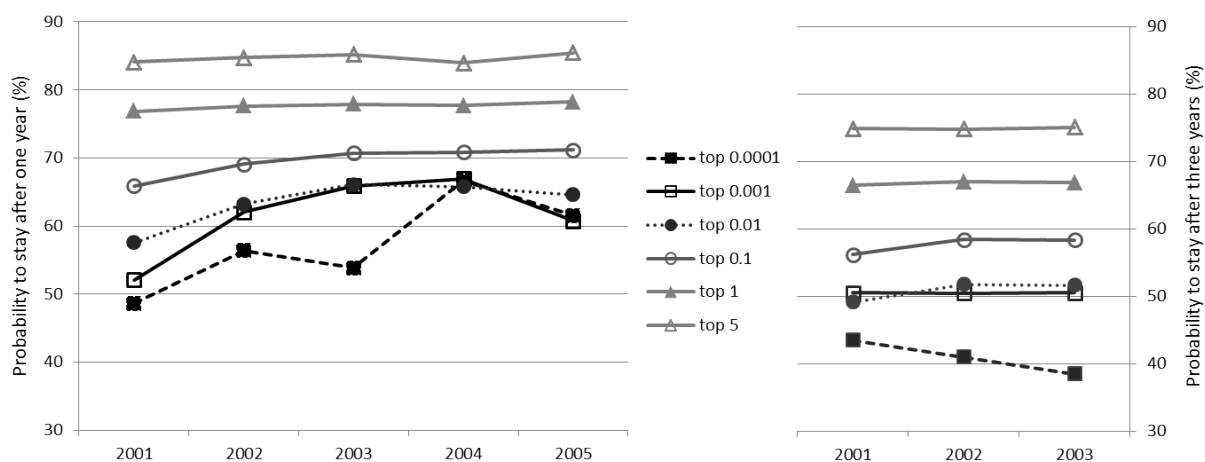
Figure 1: Probability to stay in fractile after 1 year (left) and three years[a] (right)

Notes: [a] The probability to stay after three years is unconditioned on fractile membership after one year and two years. Conditioning reduces the probability to between 45.1 % and 48.5 % for the top 0.1 %.
Source: own computation based on TPP 2001-2006.

First, if mobility is present, annual income concentration overstates actual income concentration. This overstatement rises with the number of mobile households and the distance across which they move. Both dimensions will be adressed in section 4.2. The impact on income concentration will be adressed in section 5. Second, mobility may have changed over time. Then, the top fractiles' rising income share may reflect rising income volatility rather than rising income concentration. This issue has been adressed in the literature by comparing the probability to stay in a given fractile after a fixed period of time for different starting periods.[25]

Figure 1 shows the probabilities to stay in a given top fractile in Germany after one year and after three years for all top income fractiles starting with the top 5 %. All fractiles up to the top 0.1 % show stable probabilities to stay for both time intervals. For the 1-year period, the highest three fractiles show less stable probabilites, and their annual members in 2001 have unusally low chances to stay in the fractile in the next year. For the three-year period, all but the highest fractile show stable probabilites. In the year 2001, all fractiles above the top 1 % show lower staying probabilities than in all other years. This might indicate responses to the 2001 tax reform. The figures for the top 0.1 % fractile can be compared to Canadian and French results. Saez &

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[25]This approach is used by Saez & Veall (2005) for Canada, and by Landais (2008) for France.

Veall (2005) use the same approach for the Canadian top 0.1 % fractile and find that top income mobility was moderate and stable since 1982. Staying probabilities in the top 0.1 % fractile after one, two, and three years are roughly 60 %, 50 % and between 40 % and 50 %, respectively. The Canadian mobility out of the top 0.1 % fractile is thus higher than the German figures for both the one-year and the three-year period.[26] For France, Landais (2008) finds very similar and also stable probabilities to stay for the top 0.1 % fractile between 1998 and 2004 (roughly between 65 % and 69 % after one year[27], 50 % after two years and 40 % after three years). The German figures for the top 0.1 % after one year are similar to the French results. After three years, the German top 0.1 % are clearly less mobile than the French top 0.1 %. The German data thus confirms the French and Canadian findings that mobility between top fractiles is generally stable. Stability declines in the highest three fractiles but increases with the length of the time period. This finding strengthens the finding by Bach *et al.* (2013) that income concentration increased in Germany since the 1990s, as the increase in annual concentration does not seem to be offset by an increase in income mobility.

4.2 Transitions between Fractiles: Frequency, Distance and Permanence

Mobility between fractiles will be described in more detail using transition matrices. These matrices show both the number of mobile households and the distance in terms of fractile tresholds that their movement spans. Both dimensions inform us about the persistence of the fractiles, and matter for the interpretation of annual income concentration.

Table 1 shows transition matrices for top income fractiles. The first two panels refer to the base year 2001 and show transitions to 2002 and 2006, respectively. The third panel uses averaged income over three years instead of annual income and therefore provides a more robust income measure. It shows transitions between fractiles of averaged income from the first three years (2001-2003) to the second three years (2004-2006). In each panel, fractile members are

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[26] The probability to stay after two and three years is unconditioned on fractile membership after one year and/or two years, as described in Saez & Veall (2007).

[27] The last available figure for France however relates to the year 2004 and is lower than 65 %. It amounts to roughly 59 %.

Table 1: Transitions between income fractiles
% of net fractile members in first period

	<0	bottom 90	top 10	top 5	top 1	top 0.1	top 0.01	top 0.001	top 0.0001
2001[a]					**2002[a]**				
<0	34.9	57.5	2.4	2.9	1.7	0.4	0.1	<0.1	
bottom 90	0.6	95.3	3.5	0.5	< 0.1	< 0.1	<0.1		
top 10	0.2	19.8	68.0	11.8	0.3	< 0.1	<0.1		/
top 5	0.2	5.6	12.6	76.7	4.8	< 0.1	< 0.1	/	/
top 1	0.7	3.2	2.1	18.9	71.9	3.2	0.1	< 0.1	/
top 0.1	1.8	2.3	0.7	3.2	28.3	60.1	3.5	0.1	< 0.1
top 0.01	3.0	1.6	0.4	1.4	8.5	29.8	51.6	3.5	0.2
top 0.001	6.0		/	2.0	2.9	10.8	28.8	46.7	2.8
top 0.0001		7.7				10.2	7.7	25.8	48.6
2001[a]					**2006[a]**				
<0	11.3	75.0	4.8	5.3	2.9	0.7	0.1	<0.1	
bottom 90	0.7	90.7	6.5	1.9	0.2	< 0.1	< 0.1	<0.1	
top 10	0.2	37.6	44.2	17.0	1.0	< 0.1	<0.1		/
top 5	0.3	16.1	19.3	57.3	6.9	0.2	<0.1		
top 1	0.7	8.3	5.3	29.6	52.0	3.9	0.1	<0.1	
top 0.1	1.5	4.4	1.7	7.8	38.2	42.5	3.8	0.1	
top 0.01	2.6	2.4	0.7	2.8	14.7	37.1	35.7	3.9	0.1
top 0.001	1.1	2.0			3.1	19.4	35.0	35.9	3.4
top 0.0001	/	/	/	/	20.7		7.7	33.3	38.4
2001/03[a]					**2004/06[a]**				
<0	22.0	69.1	2.9	3.3	2.1	0.6	0.1	< 0.1	/
bottom 90	0.3	94.0	4.8	0.8	0.1	< 0.1	< 0.1	< 0.1	/
top 10	0.1	27.9	57.2	14.5	0.4	< 0.1	< 0.1	/	/
top 5	0.1	7.5	16.7	70.1	5.6	0.1	< 0.1	< 0.1	/
top 1	0.3	3.2	2.5	23.8	66.9	3.3	0.1		/
top 0.1	0.8	1.3	0.5	2.8	32.3	58.6	3.5	0.1	/
top 0.01	1.7	0.6	0.3	0.8	5.6	34.9	52.7	3.1	0.3
top 0.001	1.1	0.9	/	0.9	0.9	7.4	31.6	54.7	2.6
top 0.0001	/	/	/	/	/	/	12.8	33.3	53.8

Left side rows labelled: "annual income" (first two panels), "3-year average income" (third panel).

Notes: [a]Fractile members are reported net of the next richer fractile. Fractiles are defined by the respective income definition. / indicates zero observations. Some figures span several columns due to data anonymization (coloured cells). These figures refer to the spanned fractiles combined. [b]Number of tax units in fractile in respective period. (Weighted number is constant by construction).

Source: own computation based on TPP 2001-2006, German consumer price index.

reported net of the next richer fractile. For example, any tax unit in the fourth row of the first and the second panel was a member of the annual top 5 % in 2001, but not of the annual top 1 %. Diagonal entries in the first panel show that persistence in the net income fractiles declines with higher income fractiles. While 76.7 % of the net top 5 % in 2001 remained in that group in the following year, only 46.7 % of the net economic elite (the richest 0.001 %) and 48.6 % of the super rich (the richest 0.0001 %) stayed in the respective group. The share of net fractile members who do not move downward and thus stay in their gross top fractile can be calculated as row sum of the diagonal entries and the figures on the right hand side of the diagonal. These persistence rates strictly decline in income fractiles above the top decile. The first panel also shows that some households cross several fractile tresholds. There are tax units who cross the whole scale of fractiles in both directions. With the exception of negative income recipients, members in higher fractiles face both a higher drop-out rate and a higher probability to cross several fractile borders. Both reduces the robustness of annual concentration measurement.

This basic pattern is repeated in the second panel of table 1 which shows the transition matrix for the five-year-distance from 2001 to 2006. Persistence rates are lower, but similarly decline in higher income fractiles. Notably, the share of members of the 2001 economic elite and the 2001 super rich, who range below the top 1 %, declines in the second panel. Many of those who lost income in 2002 had recovered by 2006. High income losses in this group thus do not seem to be permanent. These two annual transition matrices show that there is indeed mobility between the members of annual top income fractions and some tax units cross several fractiles. They also reveal that the mobility in annual transitions does not necessarily reflect social mobility, but rather transitory losses.

The third panel of table 1 shows that concentration measurement becomes more reliable if a more robust income measure is used. The panel shows transitions between fractiles of average incomes over three years. Average incomes are less distorted by transitory components and can be seen as a more reliable indicator for welfare than annual incomes. Mobility between these averages is therefore a more reliable measure for social mobility than annual transitions. Using average incomes reduces both drop-out rates and the distance of the movement out of the highest top fractiles. This shows firstly, that social mobility at the top is lower than annual transition rates.

Secondly, it suggests that using averaged income for concentration measurement can improve its normative significance. Notably, drop-out rates increase in the lower fractiles when compared to the one-year distance transition. Thus, the fractiles become more comparable in terms of drop-out rates and distance.

This first glance on top income mobility by means of transition matrices shows that the annual economic elite and the annual super rich are indeed not a rigid group. Annual concentration thus does not accrue to the same group of persons in each year. The richer the top income fractile, the higher the turnover of its members and the more far the expected distance in terms of number of fractiles. However, high income losses seem less permanent for members of the economic elite than for members of lower income fractiles. Both the relatively high turnover of the richest three fractiles and their proneness to fall down several fractiles are considerably reduced when income fractiles are defined by three-year EGI averages.

4.3 Persistence in Top Income Fractiles

The transition matrices shown above cannot show if the tax units in the diagonal elements are the same for different periods. Clearly, if the tax units remaining in their fractile are the same in each year, the group is less mobile. As complementary measure to assess how permanently tax units belong to their annual income fractiles I present two indicators that are shown in table 2. The first indicator is the amount of years that tax units spend in a given top income fractile. Tax units can be members of the fractile only once, twice, three times, and so on until six times. The first panel of table 2 reports the share of pooled annual observations that belong to those six categories of tax units for each top income fractile. A tax unit that is only observed in one year counts once in the pooled observations, a tax unit that is observed six times in the respective fractile counts six times. The percentages thus correspond the chance of a random annual observation in the respective fractile to belong to that fractile in the indicated number of years. While fractile members were reported net of the next richer fractile in the transition matrices, table 2 reports membership of gross fractiles, which include all richer fractiles. Tax units therefore only drop out of their fractile, if they move downwards.

Table 2: Years spent in annual top income fractiles

fractile[c]	total years in fractile						N^a	sumwgt[b]
	1	≥ 2	≥ 3	≥ 4	≥ 5	6		
top 10	3.6	96.4	91.0	84.3	75.4	62.9	2,539,489	27,599,945
top 5	5.0	95.0	88.6	80.8	70.7	56.9	2,053,829	13,799,845
top 1	8.7	91.3	82.6	72.8	61.1	45.3	1,432,889	2,759,931
top 0.1	13.3	86.7	75.3	63.3	50.1	34.3	230,717	275,997
top 0.01	18.1	81.9	68.4	55.4	43.4	28.3	23,419	27,597
top 0.001	19.3	80.7	66.6	54.4	42.8	26.1	2,340	2,755
top 0.0001	25.3	74.7	61.9	42.7	34.2	25.6	234	276

fractile[c]	survival years after 2001						N^f	sumwgt[g]
	1	2	3	4	5	uc[e]		
top 10	87.3	79.2	73.0	67.2	62.9	73.7	421,230	4,599,994
top 5	84.1	74.6	67.7	61.6	56.9	68.7	341,502	2,299,976
top 10	76.8	65.2	57.1	50.6	45.3	59.0	231,602	459,973
top 0.1	65.9	53.1	45.1	39.1	34.3	49.7	38,323	46,000
top 0.01	57.6	45.6	38.4	32.8	28.3	43.3	3,907	4,599
top 0.001	52.1	41.5	36.7	30.8	26.1	42.6	390	459
top 0.0001	48.6	33.3	30.7	28.2	25.6	38.4	39	46

Notes: [a]unweighted/ [b]weighted total of pooled annual observations in income fractile. [c]Fractiles are gross fractiles, they include all richer fractiles.[d]cumulated % of pooled annual observations in fractile [e] unconditional probability to stay after 5 years [f]unweighted/ [g]weighted observations in gross annual fractile 2001.
Source: own computation based on TPP 2001-2006, German consumer price index.

The first column reports the share of pooled annual observations, whose tax units belong to that fractile in only one year and are below the fractiles' income treshold in all other years. In the richest 5 %, 5.0 % of annual observations belong to these short term members of that fractile, while for the super rich over one quarter of observations are short term members. The second column reports the cumulated share of observations whose tax units belong to the observed fractile in at least two years, and so on. Each column reports the percentage of tax units who belong to the annual fractile at least the indicated amount of years. The chance for a random observation to belong to a rather non-permanent member of the fractile increases in higher fractiles. while less than a fifth of all top 5 % observations and less than a third of all top 1 % observations belong to households who spend not more than three years in that fractile, the same is true for more than half of the super rich observations. This indicator confirms the finding that the top fractiles are the least stable ones in terms of member households.

The second panel of table 2 shows survival rates from 2001 to the following years. Each rate refers to the fractile's population in 2001 and is conditioned on survival in the previous years. The combination of both panels show the extent of drop-outs and reentries in the fractiles. While 52.1 % of the economic elite survive from 2001 to 2002, the probability of a random observation in the annual economic elite of some year to spend at least two years in the economic elite is 80.7 %. We thus expect half of those households who dropped out of the fractile to return within the next five years for at least one year. The last column of the second panel shows the unconditioned survival rate from 2001 to 2006. 42.6 % of the initial members of the economic elite were back in the annual fractile 2006, but only 26.1 % had been members throughout all six years. Mobility between annual fractiles is thus even higher than we would expect from annual transition matrices, because there are high drop-out rates and reentry-rates.

4.4 Mobility and Openness of the Income Elite

The mobility analysis until here showed that the highest fractiles have a higher share of transitory members and that, therefore, annual income concentration measures are likely to overstate income concentration. However, this result cannot be interpreted in a normative way and does not imply that the highest income groups consist of households who are especially mobility prone, because these topmost fractiles are tiny groups. We might expect a member of the top 46 tax units to leave that group in some years, without questioning its economic and political power. Thus, high exchange between the richest 46, 460 and 4600 households compared to lower exchange between groups of several ten thousand members cannot be interpreted as openness of the income elite. To judge the openness of the richest groups, we have to compare their mobility to mobility in lower income groups of comparable size. Table 3 divides the top 0.1 %, the top 0.01 % and the top 0.001 % into deciles. The tenth decile of each fractile equals the whole next higher fractile. The first column refers to deciles of the annual top 0.1 % in 2001. It reports the share of decile members who did not move below their decile treshold between 2001 and 2006. Clearly, members of the highest decile are less likely to move downwards than the remaining members of the top 0.1 % fractile. The second and the third column report the same figures for

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Table 3: Mobility between equal group sizes
% of decile members who do not move downwards

	top income fractiles					
deciles of	annual 2001 - 2006			3 year averages 2001/03 - 2004/06		
fractiles[a]	top 0.1	top 0.01	top 0.001	top 0.1	top 0.01	top 0.001
1	27.5	22.5	20.5	35.2	29.2	28.2
2	28.9	21.5	25.6	36.6	30.4	28.2
3	27.2	22.6	20.5	36.1	30.4	30.8
4	27.8	20.0	35.9	37.1	32.1	25.6
5	27.5	26.1	17.9	35.6	34.0	43.6
6	28.8	25.6	20.5	37.6	32.5	33.3
7	28.4	30.0	41.0	38.5	32.8	35.9
8	29.1	27.4	25.6	40.5	42.7	48.7
9	32.1	32.2	28.2	46.1	45.3	38.4
10[b]	43.3***	42.6**	38.4	59.5***	60.2***	53.8
	size of decile			size of decile		
N[c] min	3,677	390	39	3,829	390	39
N[c] max	3,907	391	39	3,907	391	39
sumwgt[d]	4,600	460	46	4,600	460	46

Notes: [a]deciles of the respective top income group members, defined by the indicated income definition. [b]Statistical significance is only shown for the tenth decile group and refers to the difference to all other decile groups.*** indicates 99 %-level,** indicates 95 %-level, [c]unweighted/ [d]weighted observations in decile of annual fractile. The unweighted number may differ between years.
Source: own computation based on TPP 2001-2006, German consumer price index.

deciles of the top 0.01 % and the top 0.001 % in 2001, for which the result carries through, with exception of the seventh decile of the top 0.001 % group. The fourth, fifth and sixth column of table 3 show the same analysis for three-year averages of EGI. As in the annual case, the richest deciles are less likely to move downwards than the rest of the respective fractiles. However, in both specifications the result for the top 0.001 % is less clear than in the two lower groups. This is also reflected in the statistical significance. In the two lower fractile groups, the tenth deciles' lower mobilities are significant at (at least) the 95 % level, but the super rich are not significantly less mobile than the other deciles of the economic elite.

If we account for group sizes, the top of the distribution is thus clearly less mobile than comparable groups with lower incomes. Hence, annual changes of top income fractile members do

not show openness of the groups in terms of equality of chances, but are due to the small sizes of the top fractile groups reported in the literature.

4.5 Rank Volatility

A complement to the mobility analysis based on fractile transitions are rank statistics. A given rank change impacts differently on transitions between top income fractiles of different size, as it might induce mobility across several top income fractiles, while it would not induce any fractile change in a lower income range. For two points in time, the degree of rank changes for each tax unit could be measured by the coefficient of correlation between the two ranks. As the panel data provides six annual distributions, I assess the degree of rank changes for each tax unit using its individual standard deviation of annual ranks (ir-std):[28]

$$(ir - std)_i = \sqrt{\frac{\sum_{t=1}^{6} (r_{i,t} - \overline{r_i})^2}{5}}$$

For each tax unit, the standard deviation of its annual income ranks $r_{i,t}$ is constructed. Ranks are defined with respect to the annual panel population, using the panel weights. This standard deviation serves as an individual distance measure to describe the rank movement of a given individual. Like annual transition matrices, the ir-std measures individual mobility by rank changes. In contrast to annual transition matrices, it does not depend on the fractile size and includes the rank changes over all six periods.[29] Figure 2 shows the distribution of this measure of individual rank changes by top income fractile. Boxes show the P25, P50 and P75 percentile points of ir-std. Whiskers correspond to the P5 and P95 percentile points (for the top 0.0001 %, these are

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[28]In a two-period framework, the spearman correlation coefficient is widely used as a measure of rank correlation. D'Agostino & Dardanoni (2009) axiomatically derive a rank mobility index that provides a complete preorder of rank mobility between subgroups of a population. Their index coincides with the spearman correlation coefficient up to a monotonic transformation when applied to the whole population. In a two-period framework, the general form of their index would apply to the ir-std used in this paper. The ir-std would then measure the individual contribution to overall mobility.

[29]Note that a given absolute rank change is interpreted as the same change in social status by this measure, independent of the density of the income distribution at the respective income. This however is the property that complements the analysis using transition matrices in section 4.2. There, a given rank change is more likely to cause a fractile change in high income fractiles.
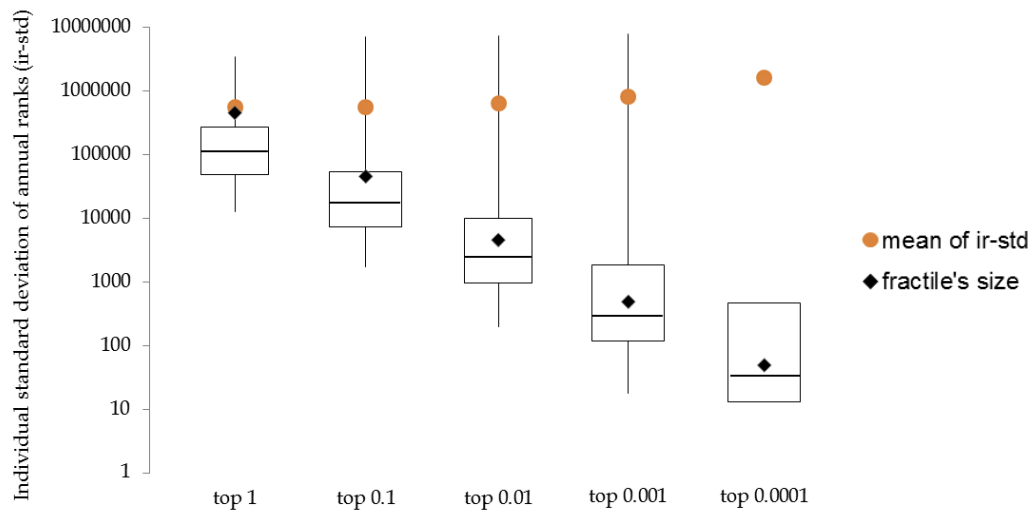
Figure 2: Distribution of standard deviations of individual annual ranks by top fractile

Notes: Boxes correspond to P25, P50, and P75 percentile points of individual standard deviations of annual ranks (ir-std). Whiskers correspond to P5 and P95 percentile points. For the top 0.0001 % fractile, P5 and P95 percentile points are not available due to data anonymization. Fractiles defined by average EGI 2001-2006.
Source: TPP 2001-2006.

not available due to data anonymization). Black lozenges show the fractile's size. Dots show the mean value of ir-std. Table 4 shows the corresponding figures. Fractiles are defined by average income over all six years. While the mean of individual standard deviations exceeds 500,000 ranks in all reported fractiles and amounts to more than three times that size for the super rich, P50 and P75 decline sharply with the height of the top fractile. The standard deviation of three thirds of the economic elite members did not exceed 1,717 ranks. The standard deviation of half of the economic elite members did not exceed 274 ranks, which is well below the fractile's size. Thus, the rank volatility that drives the mean of the standard deviation is concentrated on few fractile members. Results are similar for the other two top fractiles. P50 is clearly lower than the fractiles' size for all reported top fractiles. P75 reaches 10,024 ranks for the top 0.01 %, and 442 ranks for the super rich. Thus, rank volatility clearly decreases with income and is low for the vast majority of tax units at the top. Even if tax units happen to cross the fractile treshold, most of them do not permanently leave the next lower fractile.

Income mobility was analyzed in three dimensions: the change of staying probabilities over

Table 4: Standard deviation of individual annual ranks
statistics

	top 1[a]	top 0.1[a]	top 0.01[a]	top 0.001[a]	top 0.0001[a]
	top 1	top 0.1	top 0.01	top 0.001	top 0.0001
mean	571,348	556,235	638,751	772,185	1,555,840
P75	274,526	53,419	10,024	1,717	442
P50	109,123	17,832	2,445	274	32
P25	48,190	7,448	982	110	12
N	256,906	38,868	3,907	390	39
sumwgt	459,990	46,000	4,600	459	46

Notes: [a]top fractiles of the respective top income group members, defined by average EGI over six years. Fractiles include the next higher group.
Source: own computation based on TPP 2001-2006, German consumer price index.

time, the percentage of mobile households and the distance of mobility between top income fractiles, and the scale of their rank changes. The first dimension shows that staying probabilities are generally stable and of comparable magnitude to Canada (Saez & Veall (2005)) and France (Landais (2008)) for the top 0.1 % fractile, although slightly higher. The second dimension shows high annual mobility of tax units between annual top income fractiles, which is reduced when fractiles are defined more robustly by three-year income averages. The annual transitions also show that tax units drop out of their initial fractile and return in later periods. This high turnover at the top is driven by the tiny fractile sizes. As soon as group sizes are taken into account, mobility is lower at the top than in lower income groups of the same size. The third dimension shows that the majority of tax units above the 0.01 % treshold, defined on six-year-average incomes, suffer only moderate annual rank changes.

Mobility thus seems to be driven primarily by the tiny size of top income fractiles, where small rank changes can induce large mobility between the fractiles. If group size is eliminated as driving factor, members of top fractiles are less mobile in terms of relative ranks than members of lower income fractiles. The top income groups are rather closed towards newcomers from the bottom of the income distribution. The observed mobility reflects tiny sizes of top fractiles rather than openness of the income and power elite. However, looking at the annual share of top in-

come fractiles might still be misleading because top fractiles do consist of different persons each year. How does the observed exchange between fractiles impact on the instrumental property of income mobility, the distributional results?

5 Distribution Analysis

Mobile incomes are likely to impact income concentration which is assessed by top income fractiles' shares of aggregate primary household income. It was shown in 4.2 that using average income over three years reduces income mobility at the top and therefore provides a more reliable income concept than annual income to measure income concentration. In this section, the distributional results of using average income instead of annual income are explored.[30] Concentration is measured for two income concepts: an annual income concept that does not capture mobility, and a six-year average income concept that takes account of income mobility. The effect of income mobility is defined as the difference in observed concentration between these two concepts. The annual income concept does not use the panel structure and thus conducts a cross sectional analysis for each of the six years. Cross sectional income fractiles are defined by annual EGI. A given tax unit may, in this specification, belong to different income fractiles in different years. This method results in six concentration measurements based on annual EGI, which are then averaged. The average income concept takes account of the the panel structure. For each tax unit, average EGI over the six available years is constructed. Average income fractiles are then defined by average EGI. A given tax unit in this specification belongs to one income fractile of average EGI. This method results in one concentration measurement based on six-year average EGI.

The impact of income mobility on income concentration is thus assessed by the difference between annual top income shares that neglect income mobility and top income shares of average incomes that do account for income mobility. Table 5 reports results on top income fractiles' incomes in the annual and the average income concept. Note that capital gains were excluded in

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[30]Due to a certain panel attrition as compared to annual tax statistics, in this section I correct for missing cases by reducing top fractiles sizes by 15 %. This is necessary to obtain comparable distributional results. Income shares are also corrected for the missing filers. See footnote 23 for details.

the mobility analysis of the previous sections, as they are a volatile income component that can be corrected for in annual data. The distributional analysis in this chapter reports results for EGI including and excluding realized taxable capital gains. For convenience, I will refer to realized taxable capital gains as capital gains. Income fractiles are defined according to the respective EGI specification. The first part of table 5 shows income tresholds for top income fractiles. Tresholds for the average income fractiles must be lower than the mean of annual tresholds. The difference between annual and average income concept rises with income height up to the economic elite, in both EGI specification (including and excluding capital gains). To be a member of the economic elite in the average income concept without capital gains, a tax unit's average EGI had to exceed 7 million €. To be a member of each year's annual cross section, annual EGI has to exceed each year's treshold, which is impossible with an average EGI below 7.9 million €. Mobile incomes thus cause the fractile treshold of the economic elite to rise by 0.9 million €. At least those tax units with average EGI between these two values have to leave the annual economic elite at least in one year. Even if average EGI exceeds 7.9 million €, annual EGI may fall below the annual economic elite's treshold in one ore more years.[31]

The second part of table 5 shows EGI means for top income fractiles. The first two colums refer to EGI without capital gains. The first column shows EGI means when fractiles are defined by average income. The second column shows the annual fractiles' mean EGI. The third and fourth colums show the same two concepts including capital gains. All fractiles are defined as gross fractiles and include all observations above the fractile's income treshold. Again, with the average concept, top income recipients are less rich than the annual perspective suggests. The difference between the two concepts is higher than the treshholds' difference for all fractiles and both EGI specifications. It rises with rising EGI and is higher when capital gains are included.

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[31]Bach *et al.* (2013) (BCS) use a similar income concept (including and excluding taxable capital gains) and find similar figures (the years 2001, 2004 and 2005 can be compared to this paper's annual results in the appendix table B.1). Findings differ strongly for the top 10 %. Here, BCS find higher tresholds (about 70,000 €including capital gains) and mean incomes (about 115,000 €). This is due to the restriction of this dataset on tax filers, while BCS use an integrated dataset that is matched with survey data and thus better represents wage earners. Another difference worth mentioning are differences in the datasets at the top (>150,000 €). BCS use a stratified 10 % sample of the entire taxfiler population, while this paper uses a 85 % sample of all tax units who filed each of the six years. Thus, the BCS data is better stratified, while the TPP sample includes more observations at the top. For the super rich, some annual results correspond well, others differ by more than 10 %. For further details on the panel population see section 3 and appendix A.

Table 5: Distributional results

	lowest EGI in fractile[a] (1000 € in 2001 prices)					
	capital gains excluded			capital gains included		
fractile[c]	avg. 2001/06[d]	annual[e]	% diff[f]	avg. 2001/06[d]	annual[e]	% diff[f]
top 10	58	58	1.1	58	58	1.0
top 5	75	77	1.5	76	77	1.4
top 1	137	141	2.6	139	142	2.4
top 0.1	422	440	4.2	442	458	3.5
top 0.01	1,641	1,807	9.2	1,829	2009	8.9
top 0.001	7,056	7,932	11.0	8,233	9,529	13.6
top 0.0001	33,076	35,295	6.3	38,382	42,546	9.8

	EGI means (1000 € in 2001 prices)					
	capital gains excluded			capital gains included[b]		
fractile[c]	avg. 2001/06[d]	annual[e]	% diff[f]	avg. 2001/06[d]	annual[e]	% diff[f]
top 10	99	102	2.6	101	104	2.7
top 5	133	138	3.3	137	142	3.4
top 1	287	301	4.9	303	320	5.3
top 0.1	1,053	1,142	7.8	1,172	1,287	8.9
top 0.01	4,301	4,818	10.7	5,024	5,826	13.8
top 0.001	17,453	19,905	12.3	21,324	25,864	17.6
top 0.0001	59,840	72,553	17.5	77,182	103,625	25.5

	EGI shares (% of adjusted primary household income[g])					
	capital gains excluded			capital gains included[b]		
fractile[c]	avg. 2001/06[d]	annual[e]	% diff[f]	avg. 2001/06[d]	annual[e]	% diff[f]
top 10	27.65	28.40	2.6	28.18	28.97	2.7
top 5	18.55	19.17	3.3	19.06	19.73	3.4
top 1	7.99	8.40	4.9	8.44	8.91	5.3
top 0.1	2.93	3.18	7.8	3.27	3.59	8.9
top 0.01	1.20	1.34	10.7	1.40	1.62	13.8
top 0.001	0.49	0.55	12.2	0.59	0.72	17.6
top 0.0001	0.17	0.20	17.2	0.21	0.29	25.5

Notes: [a]average of three (unweighted) lowest observations in fractile due to data anonymization. [b] realized taxable capital gains [c]fractiles are defined by the reported income concept [d]each tax unit's average income 2001-2006 [e]average value for six annual results. See appendix B for annual results. [f]difference between annual and averaged result (%), percentage defined with respect to annual results. All differences in mean income are statistically significant at the 0.99 level. [g]PHI as reported in German national accounts, net of employers' ssc and including social transfers.
Source: own computation based on TPP 2001-2006, German consumer price index, German national accounts.

Up to the top 1 % fractile, the difference is moderate and capital gains hardly make a difference. In contrast, for the super rich, the difference reaches 25.5 % of the annual income mean when capital gains are included. Assessed by the annual concept, the super riches' mean EGI exceeds 100 million €. Taking account of mobility between fractiles lowers this result by a quarter to roughly 77 million €. Without capital gains, the difference amounts to more than a sixth of the annual income mean.

Fractiles' shares of adjusted primary household income[32] follow a similar pattern, shown in the third part of table 5. The proportional decline in income shares between the annual concept and the medium term concept equals the decline in EGI means. The absolute income shares are directly comparable between the fractiles, as all shares relate to the same aggregate. The annual members of the economic elite including capital gains, for example, receive an average of 0.72 % of adjusted primary household income. The annual super rich receive 0.29 %. As the economic elite includes the super rich, the difference of these figures, 0.43 % of primary household income, accrues to the annual economic elite members without the annual super rich. The super rich according to average EGI received 0.21 %. Thus, compared to the annual super riches' share, income mobility lowers the observed income share of the super rich by 0.08 % of the aggregate primary household income. The share of the economic elite including capital gains is reduced by 0.13 % of the aggregate primary household income. As the economic elite includes the super rich, the decline of the economic elite's share is almost equally distributed between the super rich on the one hand and the rest of the economic elite on the other hand. The rising proportional effect for higher incomes indicates that the richest top income fractiles consist to a larger part of mobile tax units than the less rich fractiles. The extent of this mobility increases with income, which leads to the largest effect for the super rich.

To compare the equalizing effect for different period lenths and across time, the same analysis was conducted for rolling averages of all three-year subperiods (2001 to 2003, 2002 to 2004, 2003 to 2005, and 2004 to 2006). Figure 3 shows the top fractiles' income shares for several periods. Again, results are reported for EGI including (right) and excluding (left) capital gains. In

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[32]as reported in German national accounts (see Destatis (2012c)), net of employers' ssc and including social transfers to match the EGI definition in section 3.2
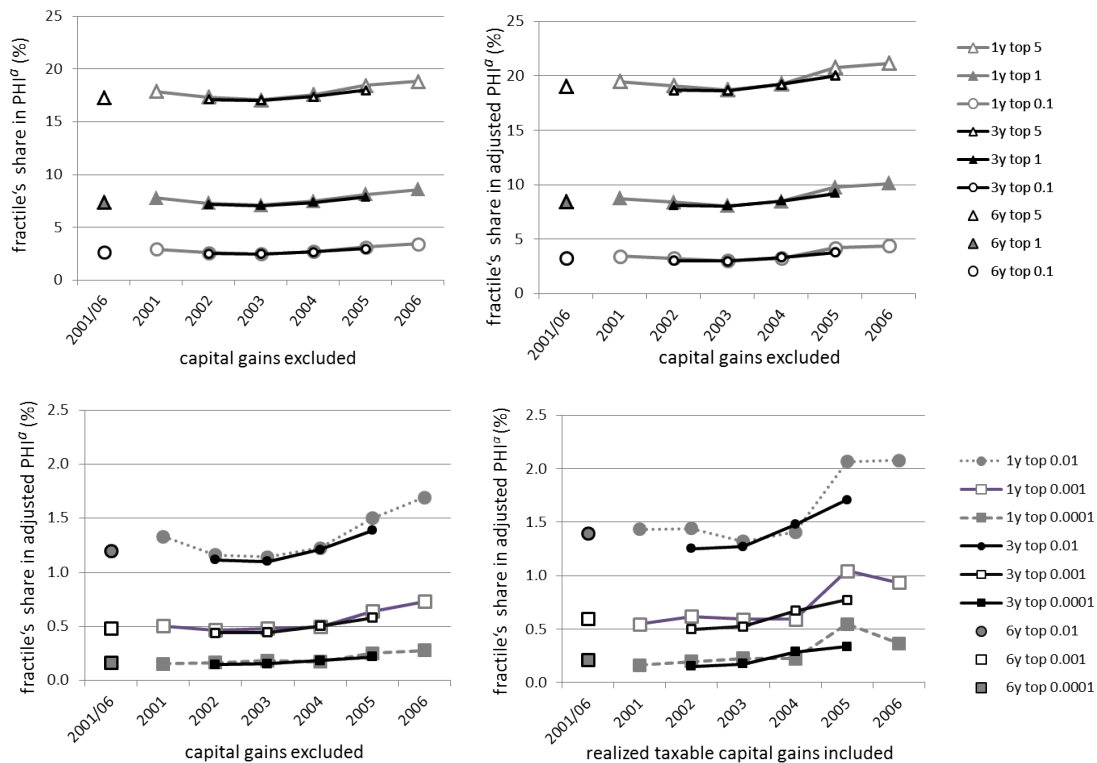
Figure 3: comparison of concentration between subperiods of different length

each of the four figures, the first category shows concentration in average income over six years. The other categories show annual concentration and concentration in rolling 3-year averages. Annual concentration is stable for fractiles up to the top 0.1 %, while the higher fractiles show a pronounced rise in annual concentration in 2005 and 2006. This rise may reflect responses to tax policies, as in 2005 and 2006 the marginal top tax rate was the lowest throughout the decade.[33] Up to the top 0.01, concentration of rolling three-year averages almost perfectly coincides with annual concentration, for EGI including and excluding capital gains. In these fractiles annual concentration is also a good predictor for concentration of the six-year average income. In the highest three fractiles, concentration in average incomes is clearly lower than annual concen-

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[33]See subsection 3.

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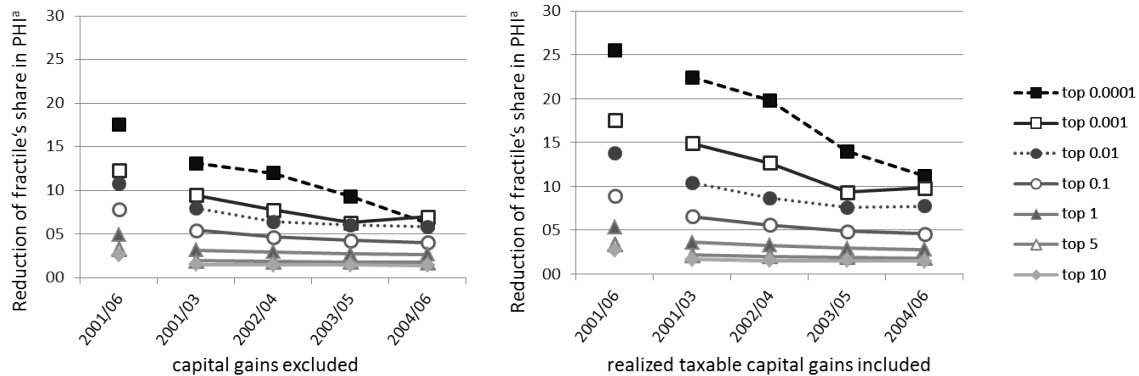
Figure 4: Equalizing effect of average income over subperiods of different length

Notes: [a]adjusted PHI: primary household income as reported in German national accounts, net of employers' ssc and including social transfers. Source: own computation based on TPP 2001-2006 , German consumer price index, Destatis (2012c).

tration, due to the sharp rise in annual conentration towards the end of the period. This rise is more pronounced when capital gains are included. However, annual concentration is a suitable indicator for the three-year average concentration when capital gains are excluded.

The difference in the fractiles's income shares in the annual and the average income concept is shown in figure 4. The first category shows the figures from table 5 when all six years are included. The following four categories show the same figures for the four rolling subperiods. They show the percentage reduction in the fractiles' income shares between the share of average incomes over three years and the average of annual shares in the same three-year period. Like in section 4.1, we see that the effect of mobility is low and quite stable in top income fractiles up to the top 0.1 %. Using three year average incomes reduces their income share by a stable percentage, which is around 2 % for the top decile and the top 5 %, and 3 % for the top 1 %. The richest fractiles show a clear downward trend across the subperiods, that is much stronger when capital gains are included. Using the average three-year income has a much stronger equalizing effect in the first subperiod than in the last. The share of the super rich is reduced by 21.8 % in the subperiod from 2001 to 2003, and by 10.4 % in the subperiod from 2004 to 2006 (capital gains included). This result suggests that the steep increase in annual concentration in this last subperiod shown in figure 3 does not coincide with less stable top income fractiles. Using six years instead of three adds a considerable additional reduction in income concentration in the

higher fractiles, while the reduction for the top 1 % and lower fractiles is generally low.[34]

Income concentration in average incomes is lower than in annual incomes, primarily in the three highest fractiles. The effect of averaging income is even stronger when capital gains are included. The bulk of this equalizing effect is due to a steep increase in those fractiles' income shares during the years 2005 and 2006 in both EGI specifications. In all other years and for all other fractiles, annual income concentration is similar to concentration in income averages and can be seen as a good concentration indicator.

6 Conclusion

This paper has analyzed income mobility among top income recipients and its effect on income concentration in Germany. A comprehensive gross income measure (EGI) was constructed from income tax panel data. The extent of income mobility was analyzed with respect to three dimensions. First, the development of staying probabilities over time, second, the percentage of mobile households and the distance of mobility between top income fractiles, and third, the scale of their rank changes. Then, the impact of top income mobility on income concentration was assessed.

The first mobility dimension was the development of mobility over time. Staying probabilities in top income fractiles are generally stable across the observed period and of comparable magnitude to those observed in Canada and France for the top 0.1 %, although the German probability to stay seems to be higher in the long run. Rising income concentration thus does not seem to be offset by rising income mobility.

The second mobility dimension was analyzed in a persistance analysis. A majority of annual top income recipients changes income fractiles between the years. The richer the fractile, the higher are both the share of mobile tax units and the distance across which they move. Using a more robust income measure however increases persistance in top fractiles. The analysis of years spent in annual top income fractiles also shows a comparatively high turnover of tax units. However, the high turnover at the top is driven by the tiny fractile sizes. Given the fractile size, members of the top fractiles are less mobile than other tax units. The top of the income

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[34]Detailed results for subperiods are shown in table B.2 in appendix B.

distribution is thus rather persistant.

A third mobility dimension was assessed by rank analysis. For each tax unit, the standard deviation of its individual annual ranks (ir-std) was computed as an individual distance measure of the changes between the six annual ranks. The distribution of ir-std was then evaluated by income fractiles defined by six-year average incomes. The bulk of the top income fractiles' members have stable ranks across the years. Half of the economic elite members' standard deviations are below the fractile's size. The median fractile member in terms of rank mobility thus never moves far away, even if the fractile treshold is crossed.

The distributional impact of top income mobility was assessed by comparing annual and six-year average income concentration. The effect of income mobility on income concentration was measured by the relative reduction in the fractiles' shares in aggregate primary household income when average income is used. Results including and excluding capital gains were shown. Income concentration decreases if average EGI is used instead of annual EGI. The size of this effect increases with the size of income. The observed income share of the super rich (the top 0.0001 %) decreases by more than a quarter in the series with capital gains. In contrast, for the top 1 % the effect hardly exceeds 5 %.

Breaking down the distributional results by single years and rolling three-year subperiods shows different patterns for fractiles up to the top 0.1 % and higher fractiles. Up to the top 0.1 % annual concentration and the concentration in three year subperiods are both rather stable and closely correspond. Annual concentration is a good predictor for concentration in longer subperiods. For the top 0.01 % and richer fractiles, annual concentration was not stable, but rose considerably in the last two years. However, the equalizing effect of using average incomes was comparably low for the very top in the last three-year subperiod, which corresponds to comparably high annual persistance in the richest fractiles in this period. For the topmost fractiles, annual concentration is thus a less reliable indicator for concentration in longer periods. I annual concentration in these fractiles is used as an indicatior for concentration in longer periods, the series without capital gains is more suitable.

In this paper, it was shown that even though members of annual top income fractiles change over time, the degree of mobility is stable for most fractiles. High income fractiles show a

higher annual exchange of members due to the tiny fractile sizes that top income fractiles have by definition. When group size is taken into account, members of top income fractiles are clearly less mobile than other taxpayers and never move far away from their fractile tresholds. Even though individual rank mobility is low at the top, observed income concentration in the topmost fractiles is considerably reduced when average incomes are used. Without capital gains, annual concentration is a better indicator for concentration in medium term incomes. In the lower top fractiles up to the top 1 %, the averaging effect is rather small and annual income concentration is a good indicator for concentration in medium tern incomes. The top 1 % fractiles share is reduced by less than 6 % even when capital gains are included.

The increase in income concentration since the 1990s documented by Bach *et al.* (2009) is thus unlikely to be set off by high or even rising income mobility. Instead, it reflects a true rise in the income share of the top income groups, which may impact on society in several ways. The rise in inequality contrasts with preferences for an equal income distribution and rises relative deprivation. If high incomes go along with political power, this power is likely to rise. Finally, a rising income share at the top reduces the benefits of economic growth to the remaining population. Taxation of income and wealth at the top is likely to be a a driving factor of income concentration. Since top tax rates are low compared with the late 1990s and the wealth tax was abolished, income concentration is likely to keep rising. Its impacts on society may therefore gain urgency in the future.

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Appendix A Observation Numbers and Comparisons
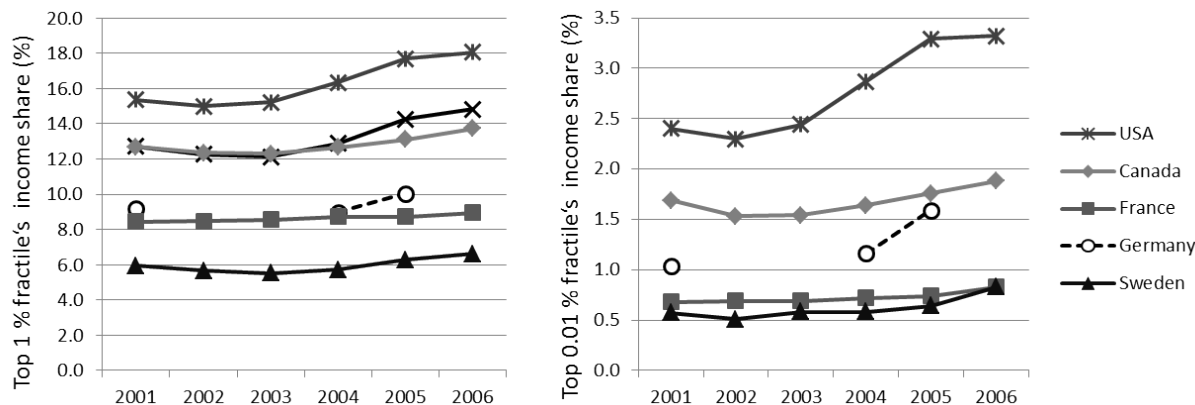
Figure A.1: concentration measurements in selected countries

Notes: Income / population definitions: US: tax units, total income excluding capital gains. UK: adults, total income. Canada: tax units, total income excluding capital gains, LAD-Longitudinal Administrative Database. Germany: tax units, total income including taxable capital gains, ITR database (includes tax return data). France:tax units, total income excluding capital gains, tax return data. Sweden: tax units, total income excluding capital gains.
Sources: Top Income Database (Alvaredo *et al.* (2012), including data from Piketty & Saez (2007), Atkinson (2007), Saez & Veall (2005), Landais (2008) and Roine & Waldenström (2010)), Bach *et al.* (2013).

Table A.1: comparison: panel data with annual micro data for 2001

	number of households[a]			mean income[b]		
fractile	TPP[c]	FAST[d]	% missing[e]	TPP[c]	FAST[d]	%diff[e]
top 10	2299979	2740492	16.1	56	56	-0.1
top 5	1839988	2130517	13.6	83	83	0.0
top 10	413999	483699	14.4	180	180	0.1
top 0.1	41400	49021	15.5	672	675	0.4
top 0.01	4140	5001	17.2	3051	3049	-0.1
top 0.001	413	483	14.5	13082	13285	1.5
top 0.0001	46	53	13.4	48621	47709	-1.9

Notes:[a]Weighted number of households who by their gross taxable income (GDE) belong to the fractile according to this paper's analysis. [b]Mean income of households described in [a], 1000 €. [c]Taxpayer panel 2001-2006, dataset used in this paper's analysis. [d]Annual microdata (scientific use file 2001, 10 % stratified sample of triannual tax statistics, Faktisch Anonymisierte Lohn- und Einkommensteuerstatistik)
Source: own computation based on TPP 2001-2006 and scientific-use file FAST 2001.
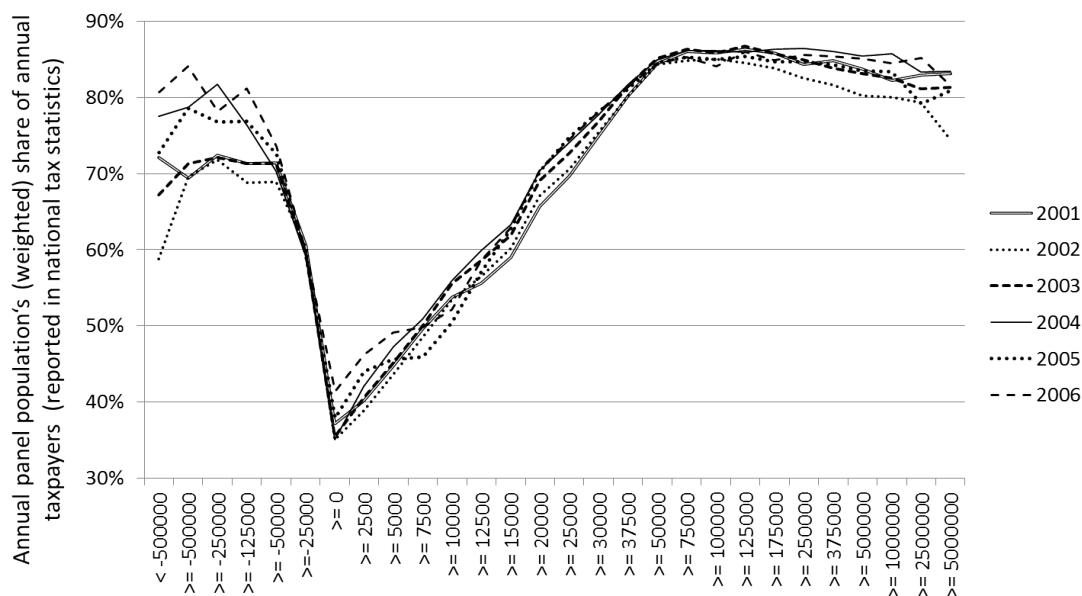
Figure A.2: comparison: panel data with annual tax statistics
(TPP filers as % of all annual income tax filers as reported in national tax statistics, by classes of gross taxable income (Gesamtbetrag der Einkünfte))
Source: own computation based on TPP 2001-2006, Destatis (2012a)

Table A.2: Income Aggregates

income	income aggregates[a]					
	2001	2002	2003	2004	2005	2006
GNP[b]	2102	2101	2094	2107	2102	2152
PHI[c]	1572	1554	1558	1549	1549	1581
PHI$_{Adj}$[d]	1657	1647	1653	1642	1641	1661
EGI[e]	851	843	841	844	867	877
%	51.3	51.2	50.8	51.4	52.8	52.8
GTI$_{Agg}$[f]	959	940	912	908	933	938
GTI$_{Panel}$[g]	744	738	738	755	784	803
%	77.5	78.5	81.0	83.2	84.0	85.6

Notes: [a]All income aggregates in billion €, prices 2001. [b]gross national product [c]primary household income [d]primary household income adjusted: net of ssc, including social transfers [e]economic gross income in dataset used in this paper (capital gains excluded) [f]gross taxable income (Gesamtbetrag der Einkünfte) in annual tax statistics / [g]in dataset.
Source: own computation based on TPP 2001-2006, Destatis (2012b), Destatis (2012c), Destatis (2012a).

Table A.3: Number of observations

unweighted observations

fractile[a]	section 4 (no adjustment for panel attrition at the top)[b]						section 5 (adjustment for panel attrition at the top)[c]					
	2001	2002	2003	2004	2005	2006	2001	2002	2003	2004	2005	2006
<0	26537	29030	28220	26249	24661	20336	26537	29030	28220	26249	24661	20336
bottom 90	481226	481092	480319	479866	476698	480235	503587	503494	502956	502359	500195	503823
top 10	79728	79354	80062	80423	82725	83368	71027	70565	70995	71759	73207	74053
top 5	109900	102858	100179	98403	101906	107694	109904	101141	97656	94965	98908	105498
top 1	193279	198402	201719	205564	204328	198880	185159	192118	196360	200920	199076	192517
top 0.1	34416	34351	34590	34581	34768	34592	29458	29324	29485	29420	29625	29465
top 0.01	3517	3516	3514	3517	3517	3498	2989	2989	2989	2989	2989	2969
top 0.001	351	351	351	351	351	351	299	299	299	299	299	299
top 0.0001	39	39	39	39	39	39	33	33	33	33	33	33
all	928993	928993	928993	928993	928993	928993	928993	928993	928993	928993	928993	928993

weighted observations

fractile[c]	section 4 (no adjustment for panel attrition at the top)[b]						section 5 (adjustment for panel attrition at the top)[c]					
	2001	2002	2003	2004	2005	2006	2001	2002	2003	2004	2005	2006
<0	127339	136995	137367	129073	133266	120450	127339	136995	137367	129072	133266	120450
bottom 90	13852537	13842881	13842525	13850815	13846605	13859420	14542547	14532891	14532534	14540814	14536622	14549435
top 10	2300018	2300042	2299993	2300013	2300003	2300030	1954999	1955012	1954974	1954984	1955003	1954996
top 5	1840003	1839974	1839993	1839978	1839996	1839970	1563986	1563979	1563997	1564014	1563988	1564036
top 1	413973	413978	413992	413991	414000	414000	351898	351890	351896	351886	351891	351853
top 0.1	41401	41400	41401	41400	41399	41399	35189	35190	35190	35190	35190	35190
top 0.01	4140	4140	4140	4141	4141	4141	3518	3518	3519	3519	3519	3518
top 0.001	413	413	413	413	413	413	351	352	352	352	352	352
top 0.0001	46	46	46	46	46	46	38	39	39	39	39	39
all	18579870	18579870	18579870	18579870	18579870	18579870	18579870	18579870	18579870	18579870	18579870	18579870

Notes: [a] fractiles net of the next richer group, here defined without capital gains [b] weighted number of observations in fractile coincides with true fractile size, defined with respect to potential taxpayers. [b] weighted number of observations in fractile is 15 % smaller than true fractile size, which corrects for panel attrition and leads to better estimates of treshold and mean incomes. See footnote 23.

Source: own computation based on TPP 2001-2006, German consumer price index, German national accounts.

Appendix B Distribution Analysis for Subperiods

Table B.1: Annual Distributional results

lowest EGI in fractile[a] (1000 € in 2001 prices)

fractile[c]	capital gains excluded						capital gains included					
	2001	2002	2003	2004	2005	2006	2001	2002	2003	2004	2005	2006
top 10	59	58	58	58	59	59	59	58	58	58	59	59
top 5	77	76	76	76	77	77	77	76	76	76	77	78
top 1	141	137	137	139	143	147	142	138	138	140	145	149
top 0.1	452	414	399	424	463	490	465	429	413	439	486	518
top 0.01	1,910	1,609	1,518	1,669	1,951	2,184	2,026	1,827	1,646	1,823	2,204	2,525
top 0.001	8,131	6,770	6,658	7,216	8,840	9,978	9,005	8,788	7,684	8,640	10,736	12,323
top 0.0001	31,517	30,861	30,633	31,321	38,879	48,558	33,906	39,339	38,758	33,713	53,305	56,256

EGI means (1000 € in 2001 prices)

fractile[c]	capital gains excluded						capital gains included					
	2001	2002	2003	2004	2005	2006	2001	2002	2003	2004	2005	2006
top 10	102	99	99	100	104	107	103	101	100	102	107	110
top 5	138	133	131	135	141	147	140	137	134	137	148	153
top 1	305	283	276	289	317	339	314	300	289	302	348	365
top 0.1	1,166	1,022	987	1,060	1,240	1,377	1,231	1,165	1,082	1,159	1,500	1,585
top 0.01	4,800	4,152	4,101	4,380	5,357	6,115	5,156	5,162	4,741	5,022	7,376	7,502
top 0.001	18,332	16,742	17,331	17,767	22,864	26,393	19,661	22,117	21,243	21,152	37,280	33,730
top 0.0001	56,957	58,919	66,622	61,845	90,401	100,571	59,303	70,598	82,277	80,193	196,188	133,193

EGI shares (% of adjusted primary household income[d])

fractile[c]	capital gains excluded						capital gains included					
	2001	2002	2003	2004	2005	2006	2001	2002	2003	2004	2005	2006
top 10	28.39	27.76	27.45	28.02	29.16	29.57	28.69	28.29	27.87	28.44	30.11	30.41
top 5	19.19	18.56	18.29	18.84	19.83	20.33	19.49	19.08	18.69	19.24	20.75	21.13
top 1	8.47	7.90	7.68	8.10	8.89	9.38	8.73	8.38	8.03	8.47	9.75	10.11
top 0.1	3.24	2.86	2.75	2.97	3.48	3.81	3.42	3.25	3.01	3.24	4.21	4.39
top 0.01	1.33	1.16	1.14	1.23	1.50	1.69	1.43	1.44	1.32	1.41	2.07	2.08
top 0.001	0.51	0.47	0.48	0.50	0.64	0.73	0.55	0.62	0.59	0.59	1.04	0.93
top 0.0001	0.15	0.16	0.18	0.17	0.25	0.28	0.16	0.20	0.23	0.22	0.55	0.37

Notes: [a]average of three (unweighted) lowest observations in fractile due to data anonymization. [c]fractiles are defined by the reported income concept [d]PHI as reported in German national accounts, net of employers' ssc and including social transfers.
Source: own computation based on TPP 2001-2006, German consumer price index, German national accounts.

Table B.2: Distributional results for subperiods
(capital gains excluded)

lowest EGI in fractile[a] (1000 € in 2001 prices)

fractile[c]	2001/06 avg.[d]	annual[e]	diff[f]	2001/03 avg.[d]	annual[e]	diff[f]	2002/04 avg.[d]	annual[e]	diff[f]	2003/05 avg.[d]	annual[e]	diff[f]	2004/06 avg.[d]	annual[e]	diff[f]
top 10	58	58	1.1	58	58	0.6	58	58	0.6	58	58	0.7	58	58	0.6
top 5	75	77	1.5	76	76	0.8	75	76	0.8	76	76	0.7	76	77	0.7
top 1	137	141	2.6	136	138	1.4	136	138	1.4	137	140	1.6	141	143	1.6
top 0.1	422	440	4.2	410	422	2.6	402	412	2.5	419	428	2.1	450	459	2.0
top 0.01	1,641	1,807	9.2	1,573	1,679	6.3	1,504	1,598	5.9	1,639	1,712	4.3	1,862	1,935	3.7
top 0.001	7,056	7,932	11.0	6,636	7,187	7.7	6,552	6,881	4.8	7,185	7,571	5.1	8,327	8,678	4.0
top 0.0001	33,076	35,295	6.3	31,013	31,004	0.0	30,220	30939	2.3	32,931	33,611	2.0	37,196	39,586	6.0

EGI means (1000 € in 2001 prices)

fractile[c]	2001/06 avg.[d]	annual[e]	diff[f]	2001/03 avg.[d]	annual[e]	diff[f]	2002/04 avg.[d]	annual[e]	diff[f]	2003/05 avg.[d]	annual[e]	diff[f]	2004/06 avg.[d]	annual[e]	diff[f]
top 10	99	102	2.6	99	100	1.5	98	99	1.5	99	101	1.5	102	104	1.4
top 5	133	138	3.3	132	134	2.0	130	133	1.9	133	136	1.8	138	141	1.8
top 1	287	301	4.9	279	288	3.2	274	283	3.0	286	294	2.7	307	315	2.7
top 0.1	1,053	1,142	7.8	1,001	1,059	5.4	975	1,023	4.7	1,049	1,096	4.3	1,176	1,226	4.1
top 0.01	4,301	4,818	10.7	4,005	4,351	8.0	3,941	4,211	6.4	4,335	4,613	6.0	4,975	5,284	5.8
top 0.001	17,453	19,905	12.3	15,813	17,469	9.5	15,938	17,280	7.8	18,101	19,320	6.3	20,774	22,341	7.0
top 0.0001	59,840	72,553	17.5	52,849	60,833	13.1	54,975	62,462	12.0	66,150	72,956	9.3	78,987	84,273	6.3

EGI shares (% of primary household income)

fractile[c]	2001/06 avg.[d]	annual[e]	diff[f]	2001/03 avg.[d]	annual[e]	diff[f]	2002/04 avg.[d]	annual[e]	diff[f]	2003/05 avg.[d]	annual[e]	diff[f]	2004/06 avg.[d]	annual[e]	diff[f]
top 10	27.65	28.40	2.6	27.44	27.87	1.5	27.34	27.75	1.5	27.80	28.21	1.5	28.52	28.92	1.4
top 5	18.55	19.17	3.3	18.31	18.68	2.0	18.21	18.56	1.9	18.64	18.98	1.8	19.32	19.67	1.8
top 1	7.99	8.40	4.9	7.76	8.02	3.2	7.66	7.89	3.0	8.00	8.22	2.7	8.56	8.79	2.7
top 0.1	2.93	3.18	7.8	2.79	2.95	5.4	2.72	2.86	4.7	2.93	3.06	4.3	3.28	3.42	4.1
top 0.01	1.20	1.34	10.7	1.11	1.21	7.9	1.10	1.18	6.4	1.21	1.29	6.0	1.39	1.47	5.8
top 0.001	0.49	0.55	12.2	0.44	0.49	9.3	0.44	0.48	7.8	0.51	0.54	6.3	0.58	0.62	7.0
top 0.0001	0.17	0.20	17.2	0.15	0.17	12.4	0.15	0.17	12.0	0.18	0.20	9.3	0.22	0.23	6.3

Notes: [a] average of three (unweighted) lowest observations in fractile due to data anonymization. [c] fractiles are defined by the reported income concept [d] each tax unit's average income in the respective period [e] average value of annual results in the respective period. See appendix B for annual results. [f] difference between annual and averaged result (%), percentage defined with respect to averaged result. All differences in mean income are statistically significant at the 0.99 level.

Source: own computation based on TPP 2001-2006, German consumer price index, German national accounts.

Table B.3: Distributional results for subperiods
(capital gains included)

lowest EGI in fractile^a (1000 € in 2001 prices)

fractile^c	2001/06 avg^d	annual^e	diff^f	2001/03 avg^d	annual^e	diff^f	2002/04 avg^d	annual^e	diff^f	2003/05 avg^d	annual^e	diff^f	2004/06 avg^d	annual^e	diff^f
top 10	58	58	1.0	58	58	0.5	58	58	0.6	58	58	0.7	58	59	0.6
top 5	76	77	1.4	76	76	0.8	76	76	0.8	76	77	0.7	76	77	0.7
top 1	139	142	2.4	137	139	1.4	137	139	1.3	139	141	1.5	143	145	1.5
top 0.1	442	458	3.5	425	436	2.4	417	427	2.2	437	446	2.0	474	481	1.4
top 0.01	1,829	2,009	8.9	1,710	1,833	6.7	1,656	1,765	6.2	1,806	1,891	4.5	2,090	2,184	4.3
top 0.001	8,233	9,529	13.6	7,739	8,492	8.9	7,934	8,371	5.2	8,419	9,020	6.7	9,431	10,566	10.7
top 0.0001	38,382	42,546	9.8	31,281	37,334	16.2	32,646	37,270	12.4	42,887	41,926	-2.3	53,000	47,758	-11.0

EGI means (1000 € in 2001 prices)

fractile^c	2001/06 avg^d	annual^e	diff^f	2001/03 avg^d	annual^e	diff^f	2002/04 avg^d	annual^e	diff^f	2003/05 avg^d	annual^e	diff^f	2004/06 avg^d	annual^e	diff^f
top 10	101	104	2.7	100	102	1.6	99	101	1.5	101	103	1.5	105	106	1.4
top 5	137	142	3.4	134	137	2.1	133	136	2.0	137	140	1.9	143	146	1.8
top 1	303	320	5.3	290	301	3.6	287	297	3.2	304	313	2.9	329	338	2.8
top 0.1	1,172	1,287	8.9	1,083	1,159	6.5	1,072	1,135	5.6	1,186	1,247	4.9	1,350	1,415	4.6
top 0.01	5,024	5,826	13.8	4,497	5,020	10.4	4,546	4,975	8.6	5,280	5,713	7.6	6,122	6,633	7.7
top 0.001	21,324	25,864	17.6	17,878	21,007	14.9	18,780	21,504	12.7	24,085	26,558	9.3	27,701	30,720	9.8
top 0.0001	77,182	103,625	25.5	54,862	70,726	22.4	62,290	77,689	19.8	102,833	119,553	14.0	121,300	136,525	11.2

EGI shares (% of primary household income)

fractile^c	2001/06 avg^d	annual^e	diff^f	2001/03 avg^d	annual^e	diff^f	2002/04 avg^d	annual^e	diff^f	2003/05 avg^d	annual^e	diff^f	2004/06 avg^d	annual^e	diff^f
top 10	28.18	28.97	2.7	27.82	28.28	1.6	27.77	28.20	1.5	28.37	28.81	1.5	29.23	29.66	1.4
top 5	19.06	19.73	3.4	18.67	19.08	2.1	18.62	19.00	2.0	19.19	19.56	1.9	20.01	20.38	1.8
top 1	8.44	8.91	5.3	8.08	8.38	3.6	8.02	8.29	3.3	8.49	8.75	2.9	9.18	9.45	2.8
top 0.1	3.27	3.59	8.9	3.02	3.23	6.5	2.99	3.17	5.6	3.32	3.49	4.9	3.77	3.95	4.6
top 0.01	1.40	1.62	13.8	1.25	1.40	10.4	1.27	1.39	8.6	1.48	1.60	7.6	1.71	1.85	7.7
top 0.001	0.59	0.72	17.6	0.50	0.58	14.9	0.52	0.60	12.7	0.67	0.74	9.3	0.77	0.86	9.8
top 0.0001	0.21	0.29	25.5	0.15	0.20	22.5	0.17	0.22	19.8	0.29	0.33	14.0	0.34	0.38	11.2

Notes: ^{a}average of three (unweighted) lowest observations in fractile due to data anonymization. ^{c}fractiles are defined by the reported income concept ^{d}each tax unit's average income in the respective period ^{e}average value of annual results in the respective period. See appendix B for annual results. ^{f}difference between annual and averaged result (%), percentage defined with respect to averaged result. All differences in mean income are statistically significant at the 0.99 level.
Source: own computation based on TPP 2001-2006, German consumer price index, German national accounts.

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