Income and Wealth Concentration in Reunified Germany*

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Preliminary draft

Abstract

This paper presents series on income and wealth concentration in Germany after reunification in 1990 combining individual income tax returns with macroeconomic data. Top income shares are based on a consistent income definition which includes the imputation of capital income after 2009 when capital income was excluded from the income tax base. We estimate top wealth shares by capitalizing the incomes reported in income tax returns combined with macroeconomic household balance sheets.

JEL Classification: D31; H2
Keywords: Income Distribution, Inequality, Top Incomes, Taxation

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1 Introduction

Rising inequality of both income and wealth has been an issue of debate, especially regarding the very rich. We have seen sharp increases in income inequality in the US and the UK since the 1980s. By contrast, continental European countries like Germany and France as well as Scandinavian countries like Sweden do not seem to have witnessed a similarly steep increase.

Most studies on German income inequality have dealt with wage income only. Germany has been singled out as a country experiencing only small changes in inequality until the late 1990s; partially driven by the stability of wage inequality in (Prasad, 2004). Measured by the Gini coefficient, not much happened 1949 to 1990. After reunification the Gini coefficient of household income rose between 1999 and 2005 , and has been rather stable since then. Wage inequality also rose in the upper-tail in the 1990s (Dustmann et al, 2009).

Yet, these studies most likely underestimate the rise of upper-tail income inequality for two reasons. First, top income earners are not included. Survey data suffer from non-response at the top; social security data as used by Dustmann et al are right-censored. Second, income concepts used have been either restrictive or prone to measurement error. For example, studies on wage inequality miss out capital income which is more unequally distributed. But especially capital and business incomes increased sharply in light of globalization. In consequence, inequality when measured on tax register data have found increases in German income inequality since the 1990s (Bach et al., 2009, 2013, Jenderny, 2016).

As Germany does not display much income mobility at the top (Jenderny, 2016), we expect wealth concentration to be on the rise as well. For Germany, there is only scarce evidence on wealth inequality which is mostly explained by the scarcity of wealth data available. The existing studies are based on survey data solely (Grabka, 2015) or combined with rich lists to overcome the well-known shortcoming of survey data to underestimate wealth and income at the top-end of the distribution (Bach et al., 2015, Grabka and Westermeier, 2015, Vermeulen, 2016).The wealth tax in Germany has been suspended since 1997 and even before

that the data was problematic due to exemptions and valuation issues.

This paper challenges the view that Germany belongs to the group of countries experiencing only small changes in inequality (so-called L-countries). We compute top income and wealth shares using the whole universe of German income taxpayers. We provide new evidence of a sharp rise of income and wealth inequality at the top since German reunification in 1990. We find that income concentration at the top sharply increased in the first half of the 2000s. Regarding wealth, our preliminary results suggest a decline in concentration from 2001 and 2010. We are in the process of adding missing components and robustness checks.

An additional contribution of this paper is an exploration on how macroeconomic data can be used to ward off shortcomings of micro data. We provide a consistent series of income and wealth concentration at the top-end of the distribution in reunified Germany (tax reforms pose challenge for intertemporal comparability). For this purpose, we link macro- and microdata to overcome data shortcomings. For the estimation of top income shares, we use macroeconomic datasources to impute missing data in tax records. For the estimation of top wealth shares, we apply the capitalization method that relies on national wealth aggregates and microdata from personal income taxation and has recently received new attention through the studies of Saez and Zucman (2016) estimating the US wealth distribution and Lundberg and Waldenström (2016) evaluating the method for the Swedish wealth distribution.

This paper is organized as follows. Section 2 describes our data sources and outlines our estimation methods. In Section 3 we present and analyze the trends in top income shares since 1992 as well as the composition of top incomes. Section 4 focuses on top wealth shares and composition since 1992. Section 5 concludes.

2 Data and estimation strategy

Our main data source to estimate both income and wealth concentration in reunified Germany is administrative data from the German personal income tax (PIT). These data are provided by the German federal statistical office (Destatis) triennially for the years 1992, 1995, 1998 and annually since 2001. We draw on both microdata

encompassing the full sample of income taxpayers' tax returns until 2010 and on tabulated PIT statistics which become available earlier than microdata such that we can extend the top income share series to 2012.[1] The income concept reported in both microdata and tabulated statistics is the so-called total amount of income (*Gesamtbetrag der Einkünfte (GTI)*).[2] We compute top income shares for the years 1992–2012 and top wealth shares for the years 1995–2010.

We need several additional data sources. First, we need additional data sources to construct national aggregates of income, wealth and population. PIT data neither comprise the whole population, nor do they include total income due to numerous tax exemptions, a presumably high level of tax avoidance and tax units who do not file an income tax return. In the German PIT, tax units are either married couples or bachelors. As population total, we therefore use the sum of married couples and bachelors published in population statistics of Destatis. Following Dell (2007) we define adults as those aged 20 and above. In 2011, there are 47.164 million tax units out of 80.243 million German residents. I.e., the top 0.1% of the distribution consist of 47,164 tax units. We also follow Dell (2007) for the construction of the income total and use 90% of total primary household income less employers' social security contributions as published in national accounts. Dell (2007) argues that the bottom 30% not recorded in the tax statistics earns less than 5% of gross income such that the 10%-20% missing in the tax records from the total household income in national accounts is more likely to be non-taxable or hidden income of the tax filers.[3] Our

[1] From 2001 to 2011, PIT statistics exclude tax units who only paid payroll tax and did not file an income tax return. This is, however, of limited importance for the estimation of top income shares. Filing an income tax return is mandatory if a tax unit receives other income than wages above certain thresholds. In addition, filing a tax return is favorable for most high-income tax units, even when wages are the only income source. Accordingly, only 3.7% of the top decile did not file a tax return in 2007 in contrast to an overall share of 31.9%.

[2] The total amount of income is the sum of the seven income categories (agriculture and forestry, business, self-employment, employment, dividend and interest income, renting and leasing and other incomes mostly comprising the taxable share of pensions), plus tax-relevant capital gains less income type-specific income-related expenses, savings allowances, and losses. Old-age lump-sum allowance and exemptions for single parents are deducted, but not the more important personal allowances such as employee's standard allowance or child allowances. Figure **??** and Table A.10 depict the share of each of the seven income sources according to German tax law in aggregate taxable income over time.

[3] Results from a more comprehensive database seem to support this assumption: Using an integrated dataset containing PIT microdata and SOEP surveydata, Bach et al. (2009, 2013) find that gross income less transfers and capital gains does not account for more than 85% of national accounts' total household income.

wealth total is based on the German Financial Accounts (Destatis, 2015) that joins fixed assets reported by the Federal Statistical Office and financial assets reported by the Bundesbank. The construction of total population, total income and total wealth is described in Appendix C and reported in Tables C.1, 2 and 3, respectively.

Second, we use macrodata to impute dividends and interest income 2009–2011. These incomes are taxed separately since the introduction of dual income taxation in 2009 and, consequently, missing in PIT microdata since then. We discuss suitable proxies and test how they correlate with dividends and interest income observed in the PIT microdata 2001-2008 in Section 2.1.

2.1 Estimating Top Income Shares

Top income shares result from dividing the cumulative income above the income threshold of a fractile by an external total income. In PIT microdata, we can directly sort taxpayers by fractiles and cumulate their income. Using PIT statistics, we apply the Pareto interpolation method commonly used in the top income share literature since the seminal contribution of Piketty (2001, 2003) to obtain thresholds and average incomes of top fractiles.

Two major tax reforms in 2001/2002 and 2009 stepwisely excluded dividends and interest income from the income tax base. Until 2001, dividends from corporations were fully taxable in the PIT and the corporation tax could be credited against the taxable income when filing the income tax return. The reform in 2001/2002 defined dividend income as dividends net of the corporation tax (cash dividend, corresponds to 75% of gross dividend) and only half of this cash dividend was taxable. Consequently, only 37.5% of the dividend income remained visible in PIT statistics.[4] Since the introduction of dual income taxation in 2009, dividend and interest income is subject to a flat withholding tax and not systematically documented anymore in either PIT statistics or PIT microdata.[5] Tax regimes are described in details in

[4]The corporation tax rate was reduced to 25% in 2001. Taxable dividends were thus given as $0.5 \cdot (1 - 0.25) \cdot \text{dividends} = 0.375 \cdot \text{dividends}$. Even though this reform affected the visibility of dividend income in PIT statistics, it hardly changed the tax rate on gross dividends. It is thus unlikely to have induced sizable behavioral responses. See Appendix section D.2 for details.

[5]The dualization of the income tax schedules does not necessarily lead to a lack of data on top incomes: in Scandinavian countries, information on capital income and other income can be

Appendix D.

We employ two strategies to arrive at a top income share series based on a consistent income definition which is comparable over time. First, we use PIT microdata 2001–2008 to infer the full dividend income from the 37.5% share documented for the tax units in the data. Second, we extrapolate the capital income documented in 2001–2008 PIT microdata using the development of external proxies for dividends and interest income of private households.

Our imputation method relies on two assumptions: First, we assume that the distribution of total capital income over the fractiles since 2009 does not differ from the average of the eight preceding years. This assumption seems justified as this distribution remained quite stable over time (see Appendix Table A.11). Yet, the tax reform might have induced income shifting between sources, probably even to different degrees across the distribution. Then, the assumption would be challenged: if richer tax units shift more income towards dividend income, i.e. incorporate former unincorporated firms, our imputation would understate top income shares and our results would mark a lower bound. Second, we assume that the proxy development reflects the development of taxpayers' dividend and interest income in the PIT definition even though income concept or definition of recipients might deviate.

In particular, we test the following macrodata sources for dividend and interest income proxies: household sector dividends and interest income from national accounts (1), tax flow statistics on dividends and interest income (2), German stock market index (3).[6] The development of the five external aggregates for dividend and interest incomes over time is shown in Figure 1. Aggregated dividends are reported in the upper graphs and aggregated interest income is given in the lower graphs. Additionally, all graphs show the corresponding income aggregates from PIT microdata between 2001 and 2008. Dividends documented in PIT microdata follow the business cycle quite closely decreasing until 2003 and then rapidly increasing until

linked using the individual taxpayer-ID. In Germany, data linkage by taxpayer is not available. For some tax units it is beneficial to declare capital income in their income tax declaration despite the reform, e.g., if the flat rate exceeds their personal income tax rate. However, the size of capital income still documented in PIT microdata is negligible (see Appendix Table D.3).

[6]We also test lagged GDP (4) and capital income observed in German household survey SOEP (5), but they do not show similar trends and correlate much less. See Appendix Table A.1.

2008. The sharp increase between 2007 and 2008 is partly attributable to a one-time effect of a favourable tax treatment of profits of closely held orporations which increased dividends in 2008.[7] In the following, we briefly discuss the suitability of the potential proxies. Additional details on each of the proxies are provided in Appendix Section C. We opt for the proxy that best correlates with the corresponding income reported in PIT microdata 2001–2008.

(1) National accounts offer long-run series of aggregate dividend and interest income of the household sector based on European system of accounts (ESA) definitions. This carries the benefit that national accounts' income measures are independent from German tax law definitions. But different trends may arise because of two major discrepancies: First, non-profit institutions serving households (NPISH) are included in the national accounts' household sector. Second, the definition of dividends and interest income is much broader than the PIT definition. E.g., national accounts' dividends comprise distributed profits of both incorporated and unincorporated firms, whereas the German tax law only defines dividends from incorporated firms as dividends. Consequently, aggregate dividend and interest income of the household sector in the national accounts is much higher than PIT aggregates.

National accounts' dividends develop along a much more stable path than PIT dividends. They remain almost constant from 2001 to 2004, then increase and remain at the higher level after 2006. The exceptionally high dividend distribution observed in the PIT data in 2008 is expected to be smoothed out due to the national accounts' broader definition of dividends.

(2) Tax flow statistics report withheld tax revenues from taxes on dividends from corporations and on interest income. These withholding taxes were introduced in the 1990s and could be credited against the personal income tax when filing the income tax return. The tax base generating these tax flows can be calculated by dividing the tax flows by the respective tax rates. Dividends can then be grossed

[7]The tax advisor literature in 2008 recommended to distribute dividends in 2008 rather than in 2009, see for example Ott (2008).

up using the pre-year corporate tax rate in order to match our gross dividend definition. The calculated tax base is our tax flow aggregate. Trends between tax flow statistics and PIT may differ for two reasons: First, taxes on interest and dividends received by incorporated and unincorporated firms are included additionally to private households. Second, tax revenues from interest income cannot be distinguished from capital gains from stock shares since the introduction of the new flat withholding tax in 2009.

Tax flow dividends quite closely follow PIT dividends from 2001 to 2004, but then grow at a substantially lower rate.

Tax flow interest income evolves quite similar to PIT interest income. However, tax flow interest income grows at a faster rate since 2006 and surprisingly continues to rise until 2009 even though interest rates started to fall in 2009. To some extent, the postponement of taxable interest income to 2009 could serve as an explanation, as the final withholding tax substantially reduced the marginal tax rate on interest income for high-income tax units.[8]

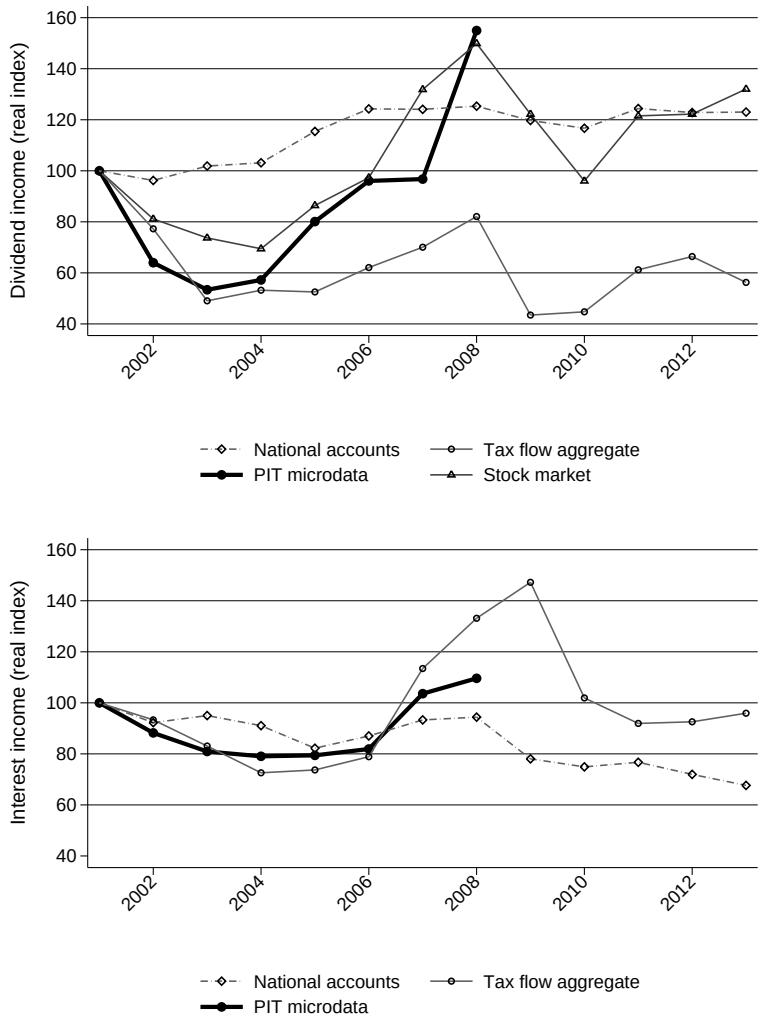
(3) German stock market index CDAX can be used to aggregate dividends from German stock companies. Its time series might be a good indicator for the dividend development of private stock market portfolios. Judging from Figure 1, stock market dividends and PIT dividends developed quite similarly from 2001 to 2008, even though not all CDAX dividends go to the household sector and not necessarily to German taxpayers.[9] Stock market dividends peak in 2008, decline in 2009 and 2010, and slightly recover thereafter. However, one should note that substantial changes of the ownership structure of the German stock companies, e.g., more foreign investors or shifts towards non-listed corporations not included in the index, could challenge the proxy's suitability in the future.

[8]If interest income was postponed to 2009, the PIT aggregate should reflect this timing effect more than the tax flow aggregate, which partly includes interest income of corporations and of non-resident persons who were not subject to an equally large tax rate reduction. A second explanation for the tax flow aggregate's peak in 2009 could be the inclusion of capital gains from stock shares in the tax flow since the introduction of the withholding tax in 2009. However, as there were generous transitional rules, we expect this effect to be small in 2009.

[9]Stock market dividends and dividends in PIT microdata also nearly coincide in levels. But one should keep in mind that German stocks are not entirely owned by German private households.

We select CDAX dividends and the interest tax flow aggregate as our preferred proxies for dividend and interest income. Both proxies do not only correlate with the respective PIT aggregate shown by Figure 1, but also with the dividend and interest income of different top income fractiles (see Appendix Table A.1).

Figure 1: External proxies for dividend and interest income, 2001–2013



Source: Tax flow statistics, PIT microdata, stock market indices (CDAX), and German national accounts (household sector).

In order to obtain consistent income shares for years 2009 to 2012, we proceed as follows. We first compute the uncorrected income share, is^{uncor}, from microdata where available, i.e. 2009 and 2010, and from PIT statistics applying the Pareto interpolation method for 2011 and 2012. We then need to take account of a sorting effect, s, because the exclusion of dividend and interest income from the underlying

income tax data induces those taxpayers with low dividend and interest income to move to a higher rank in the distribution in comparison to those with a larger share of these income sources. The uncorrected share based on the distribution excluding dividends and interest income hence overestimates the income share of the very top and needs to be reduced by the sorting effect. Finally, we add imputed dividend and interest income, $is^{imp}_{d,i}$. The corrected income share, is^{cor}, for 2009 to 2012 is then given as

$$is^{cor} = is^{uncor} \cdot s + is^{imp}_{d,i} \tag{1}$$

We compute the sorting effect for the years 2001–2008 where we can construct both distributions, namely the distribution including dividends and interest income (100%-rule) and the distribution excluding dividends and interest income (0%-rule). The average sorting effect for 2001–2008 is almost negligible for the top decile (near 1), but gains importance towards the top. The average sorting effect for the top 0.01% is 0.94.[10] We compute the average sorting effect for 2001-2008 as

$$s = \frac{1}{T} \sum_{t=1}^{T=8} \frac{\text{0\%-rule share sorted by 100\%-rule income}_t}{\text{0\%-rule share sorted by 0\%-rule income}_t} \tag{2}$$

To add our proxy for dividend and interest income, we inflate each fractile's average dividend and interest income observed in the PIT microdata between 2001 and 2008 with the proxy growth rate. Our imputation assigns a share of the proxy to each fractile according to the fractile's average share in the proxy income in the period 2001–2008. Expressed in units of top income shares, the imputation for the year τ to be added is given as

[10] See Appendix Table A.9 for average sorting effects by fractile.

$$is_{d,i}^{imp} = \underbrace{\frac{1}{T}\sum_{t=1}^{T=8} \text{top x\% dividends/interest income}_t}_{\text{fractile's average capital income}} \cdot \frac{1}{\text{income total}_\tau} \cdot \underbrace{\frac{\text{proxy}_\tau}{\frac{1}{T}\sum_{t=1}^{T=8} \text{proxy}_t}}_{\text{proxy index}} \tag{3}$$

with $\tau = 2009, 2010, 2011, 2012$.

2.2 Estimating top wealth shares

In order to estimate the distribution of wealth in reunified Germany, we capitalize German taxpayers' incomes reported in PIT microdata 1995–2010. As mentioned before, PIT microdata are available 1992–2010, but data on total financial wealth to capitalize returns from financial assets are only available since 1995. Two recent studies by Saez and Zucman (2016) and Lundberg and Waldenström (2016) have applied the capitalization method to US and Swedish income tax data. Lundberg and Waldenström (2016) compare their estimates from capitalized income tax data with those based on wealth register data and find that even though both produce similar levels and trends of overall wealth concentration, the goodness-of-fit varies greatly across asset categories.

We first we compute capitalization factors for each capital income category. We assign each capital income category in the income tax data to a wealth category in the macroeconomic household balance sheet. E.g., dividends are assigned to corporate equity. German income tax law allows us to distinguish five asset income categories: rents from tenant-occupied housing, dividends from corporations, profits from partnerships, profits from sole proprietorships and interest income. We aggregate asset income over tax units and map each income sum to its corresponding wealth aggregate. For each asset category, the capitalization factor is the ratio of aggregate household wealth to tax income in a given year. E.g., in 2004, 1157 billion fixed income assets generated about 23 billion Euro taxable interest income reported in PIT microdata. The resulting capitalization factor is 50 which is equal

to a rate of return of 2%. The capitalization factor is higher for rental income (57 in 2004) and lower for business profits (20 in 2004) which is in line with the findings of Saez and Zucman (2016) for the US. As Saez and Zucman (2016), we assume the same capitalization factor for all tax units and we use positive income from business, renting and leasing and ignore losses.

We obtain tax units' wealth by multiplying their incomes with the respective capitalization factor. Aggregated wealth of a top fractile is then divided by total wealth to obtain the wealth share of the top fractile. Fractiles are defined with respect to the same population total as fractiles for top income shares.

Total wealth is the market value of private households' assets net of their debts, i.e., the sum of housing net of mortgages, corporate equity, partnerships, sole proprietorships and bank deposits reduced by non-mortgage debt. We rely on the German household balance sheets (Destatis, 2015) that joins fixed assets reported by the Federal Statistical Office and financial assets reported by the Bundesbank. We compute mid-year averages from year-end values. One should note, however, that the household sector includes non-profit institutions serving households (NPISH).[11]

We exclude insurance-type investment vehicles like life insurances and pensions (like Lundberg and Waldenström (2016)). We exclude pensions for several reasons: First, pensions are included in "other incomes" in tax data which accounts for less than 2% of income of all top fractiles throughout the entire period . Second, we cannot further distinguish between private pensions, company pensions, old-age and other types of social security pensions pension such as disability pensions and reduced-earnings capacity pensions .[12] Third, almost 80% of the working-age population is insured by PAYG social security pensions which is non-bequeathable and therefore not a perfect substitute for other types of assets... Including pensions would reduce wealth concentration because pension wealth is more equally distributed than other types of assets.[13] However, the relative importance of pension wealth declines

[11] According to Frick et al. (2010), 3 to 5% of net total household wealth in the Financial Accounts belongs to NPISH.

[12] Civil servant pensions are included in the tax income category wages.

[13] Bönke et al. (2016) find a sizeable reduction of about 25% in measured wealth inequality in Germany, if pension wealth is incorporated into individual net worth results: For 2012, the Gini of 0.785 declines 0.594 if augmented with pension wealth.

when moving to the top of the distribution (Bönke et al., 2016).

Housing German household balance sheets list both industrial and residential buildings as well as land (both underlying buildings and undeveloped). Industrial buildings is counted as wealth in sole proprietorships.[14] Housing wealth is the sum of residential buildings and a portion of land.[15] One should note, however, that housing in household balance sheets is computed using replacement values. As a consequence, housing increases between 2001 and 2010 even though real estate market values stagnated during this period and are only increasing since 2011 (*what do we do about this?*).

Housing and mortgages include both owner- and tenant-occupied housing. In order to compute the capitalization factor of housing, we assume that 44% of housing is tenant-occupied housing generating taxable income. This is equal to the share of actual rents in both imputed and actual rents of private households, which can be computed from National Accounts (see Statistisches Bundesamt, Fachserie 18, Reihe 1.4).

The income flow from (tenant-occupied) housing observed in the tax data is income from renting and leasing. We use the sum of positive incomes.

Business Business wealth encompasses three asset categories: corporate equity, noncorporate equity and sole proprietorships. We have to compute one capitalization factor for corporate and noncorporate equity since Financial Accounts only list the sum of non-listed corporations and particular forms of partnerships, so-called quasi-corporations. These quasi-corporations encompass general partnerships (*Offene Handelsgesellschaft - OHG*) and limited partnerships (*Kommanditgesellschaft - KG*). Due to these data constraints, we treat business equity as one asset category and assign taxable income from both corporated and unincorporated firms to this category. However, since only quasi-corporations are included in the Financial Accounts estimate and we miss the assets of other types of partnerships (e.g., civil

[14] **justify why residential buildings completely assigned to private households**

[15] The share of residential buildings in overall buildings of the household sector is about 90%. Accordingly, we assign 90% of land to housing.

law company (*Gesellschaft bürgerlichen Rechts - GbR*)), we underestimate business wealth. Additionally, assets of non-listed corporations and quasi-corporations are only a "very tentative" estimate of the Bundesbank which is of concern because a substantial part of German firms is in the form of quasi-corporations (Bundesbank, 2010). This may lead to an underestimation of the capitalization factor, or an overestimation of the rate of return, respectively. In sum, we might attribute too little wealth to those with large business incomes and underestimate wealth concentration at the top where business income is concentrated. The income flow from business observed in the tax data is the sum of gross dividends before corporate tax and business income from partnerships.

Assets of sole proprietorships are published as part of the fixed assets owned by the household sector and are the sum of cultivated assets, machinery and equipment, industrial buildings including underlying land as well as intellectual property products.[16] The income flow from sole proprietorships is directly observable in PIT microdata.

Bank deposits Bank deposits are the sum of time and saving deposits and debt securities reported in the Financial Accounts. The corresponding income flow observed in the tax data is interest income.

3 Income Concentration

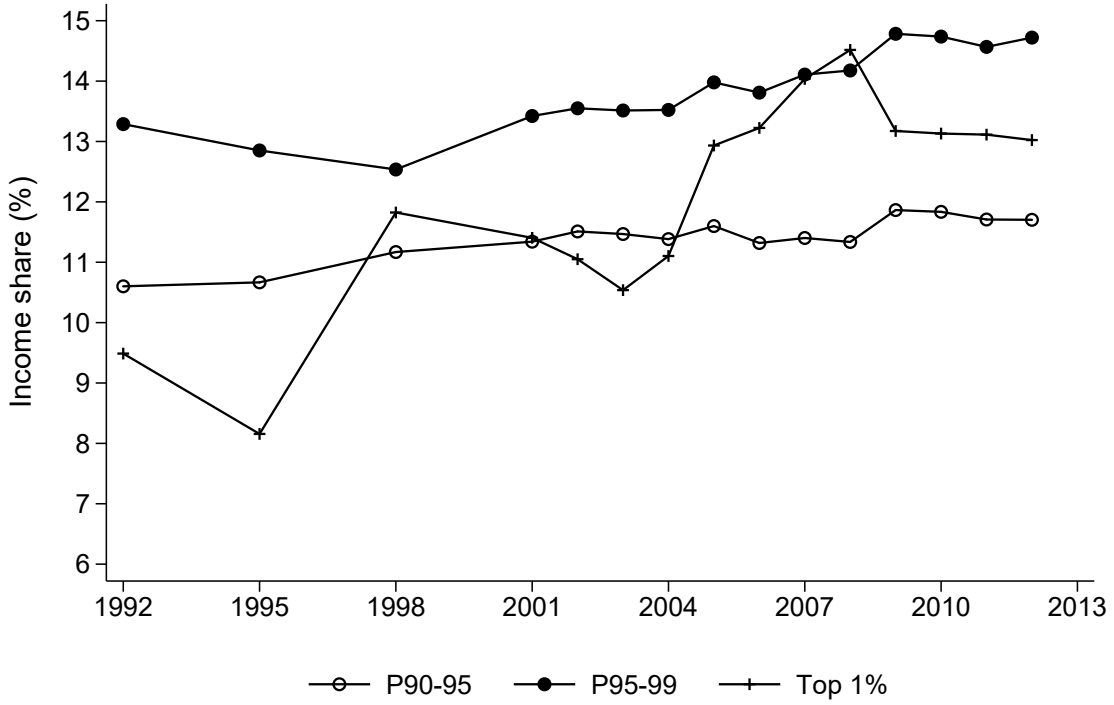
3.1 Top Income Shares

Income concentration increased in Germany since the reunification and particularly within the top percentile, as Figure 2 shows. While the bottom half of the top decile (P90-95) witnessed almost no increase in their income share, the top 1% income share increased from x% in 1992 to x% in 2012 with a peak at x% in the pre-crisis year 2008. In the wake of the biggest output drop of post-war Germany in 2009 when GDP declined by 5%, the economic elite lost disproportionately.

[16]Sole proprietorships also encompass independent professionals such as lawyers, doctors, and self-employed farmers.

Drop in the 1990s mostly West Germany (see Bach et al)

Figure 2: Income shares of P90-95, P95-99 and top 1% in Germany, 1992-2012



Notes: Imputed capital income 2009–2012 is based on CDAX dividends for dividend income and the interest tax flow aggregate for interest income. Uncorrected shares are based on tax law prevailing in the respective year. Tax units are sorted according to the scenario-specific taxable income definition.
Source: PIT microdata 2001-2010, PIT statistics 2011 and 2012, own calculations.

Figure 3 shows the importance of a consistent income definition. Figure 3 contrasts the corrected series based on a consistent definition of capital income with the uncorrected series, where the definition of capital income changed over time. Three findings stand out contrasting the corrected series with the uncorrected: First, much of the reduced income concentration at the top between 2001 and 2002 disappears when including full dividend income in 2002 and the following years. The divergence between the corrected and the uncorrected shares in 2001 is explained by the fact, that in 2001 the reform only applied to dividends issued by non-German corporation and since 2002 to dividends from German corporations. Since German taxpayers' dividend income is largely from German corporations, most of the reform effect becomes visible in 2002.

Second, the growth of income concentration between 2004 and 2008 occurs at

a faster rate. This finding becomes even more evident for the top 0.01% who obtain most of their capital income through dividends and not through interest income: Their uncorrected share increased by about 42% between 2004 and 2008, whereas their corrected share increased by 56%.

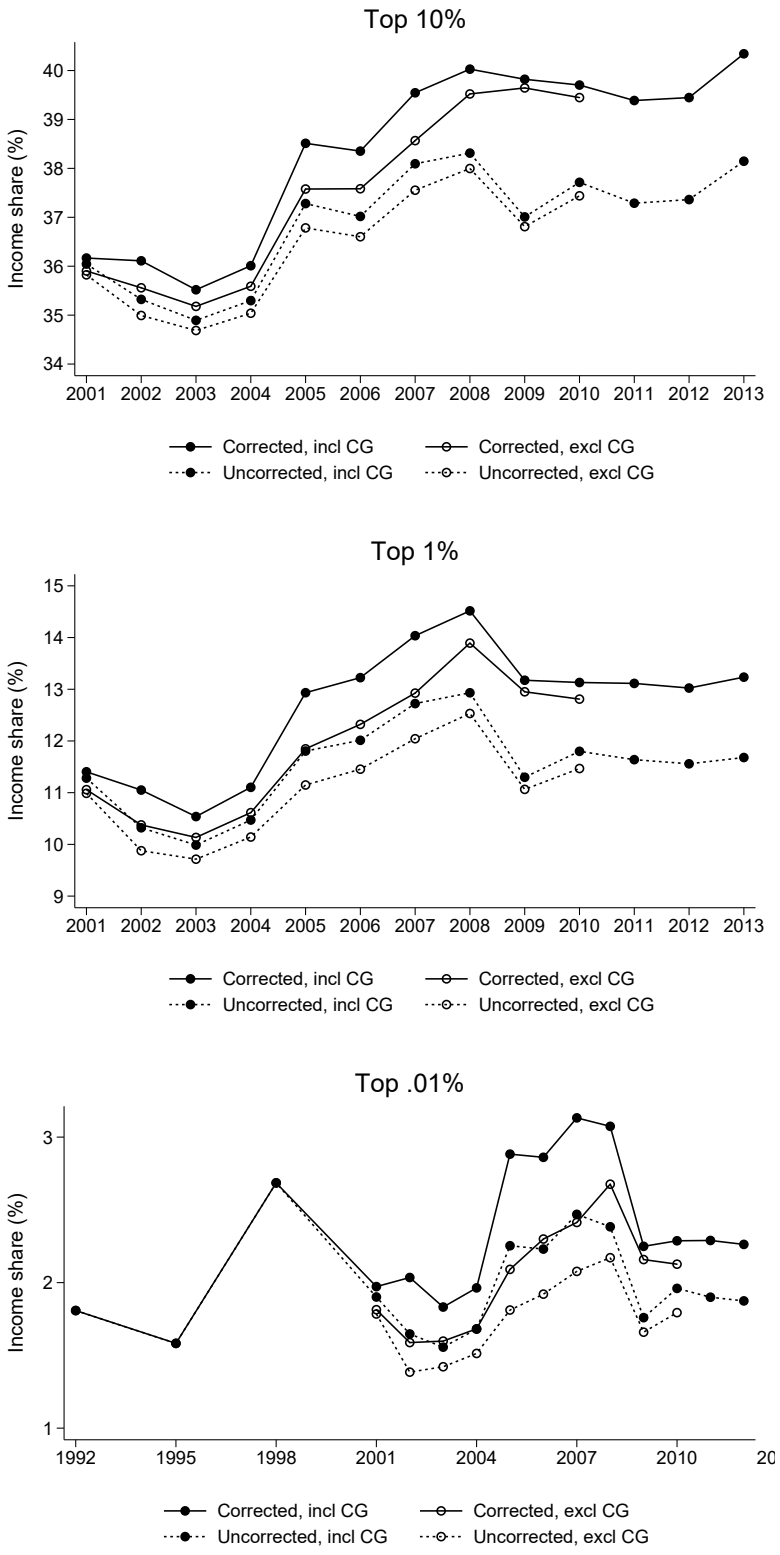
Third, the reduction in the wake of the recession in 2009 is smaller, even though the recession's impact grows moving further to the top. Almost all the drop in the top decile's share observed with the uncorrected data is attributable to the introduction of dual income taxation in that year. But the top 1% experience a loss of 10% in their income share and the top 0.01% a loss of 27%. A possible explanation is the high portion of business income from partnerships at very top that declined in total from 116 to 101 billion Euro between 2008 and 2009 (see Appendix Table A.10).

almost no increase in unemployment during the Great Recession, Germany's exports reached an all-time record of 1.738 trillion Dollar in 2011, which is roughly equal to half of Germany's GDP, or 7.7 percent of world exports. Even the euro crisis seems not to have been able to stop Germany's strengthening economy and employment (Dustmann et al., 2014).

Figure 3 also contrasts series including and excluding capital gains. Excluding capital gains is of minor importance up to the richest percentile in Germany since most realized capital gains were not taxable and thus not included in the income concept on which top income share series are based.[17] The exclusion of capital gains has a larger effect for the very top in both stabilizing the series over time and reducing their income share.

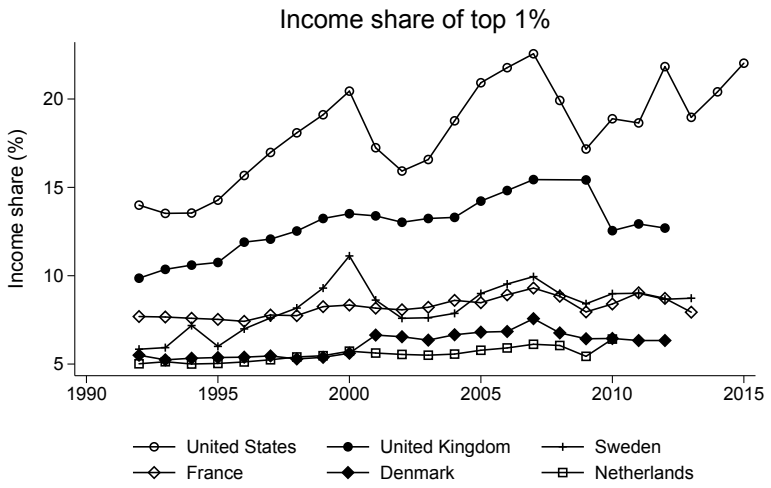
[17]Capital gains from stock shares and real estate were tax-exempt to a large part. Since 2009 capital gains from stock shares have been subject to the withholding tax and can thus not be observed in income tax data, either. See Appendix D.1 for details on German capital gains taxation and changes therein over our data period. In general, the German share of capital gains in total taxable income is low compared to other countries such as Sweden or the US (Roine and Waldenström, 2012). The impact of capital gains is somewhat higher if they are defined before income source-specific deductions (Bach et al., 2013). Even though the taxable share of capital gains is low in Germany, their importance for top incomes can be high: Roine and Waldenström (2012) show that in Sweden, capital gains are a substantial and reoccurring addition to top incomes and not just a transitory component.

Figure 3: Top income shares in Germany, 1992-2012



Notes: Imputed capital income 2009–2012 is based on CDAX dividends for dividend income and the interest tax flow aggregate for interest income. Uncorrected shares are based on tax law prevailing in the respective year. Tax units are sorted according to the scenario-specific taxable income definition.
Source: PIT microdata 2001-2010, PIT statistics 2011 and 2012, own calculations.

Figure 4: International comparison, Top 1%



Notes: bla
Source: WID

3.2 Income Composition

Tbw.

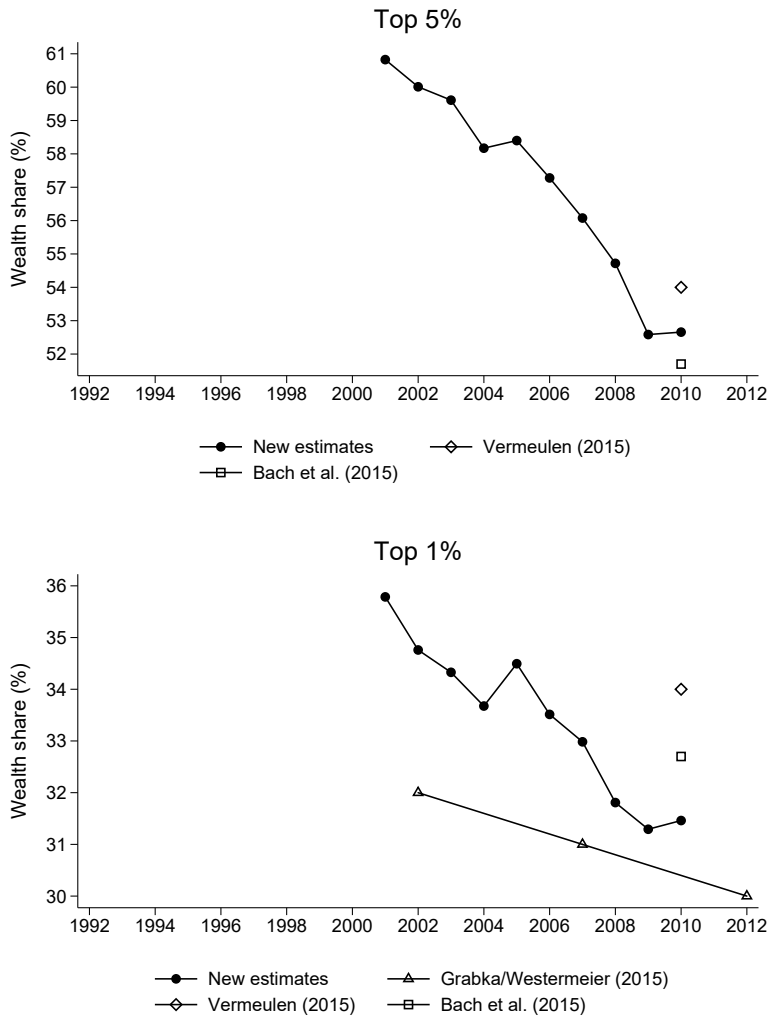
4 Wealth Concentration

4.1 Top Wealth Shares

In light of our results on German top income earners gaining their incomes mostly from businesses, dividends and interest, we might expect a rather high wealth concentration in Germany. Figure 5 displays our preliminary results top wealth shares estimated with the capitalization method based on income tax data. Interestingly, wealth concentration declined between 2001 and 2010. Yet, we are in the process of adding robustness checks regarding several wealth types that do not correspond to taxable income.

Tbc.

Figure 5: Top Wealth Shares in Germany, 2001-2010

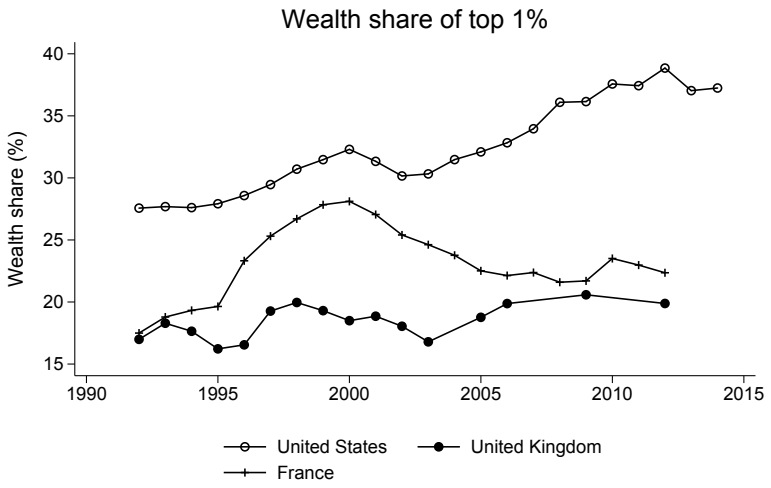


Notes: dududu
Source: PIT microdata 2001-2010, financial accounts, own calculations.

Figure: Taxable Capital Income Share

Figure: Top 10%-5%, Top 10%-5% and Top 1% in Germany, 1992-2011

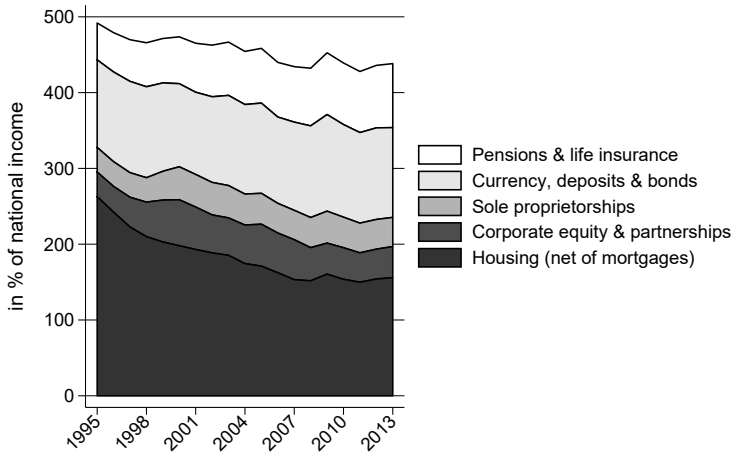
Figure 6: International comparison, Top 1%



Notes: bla
Source: WID

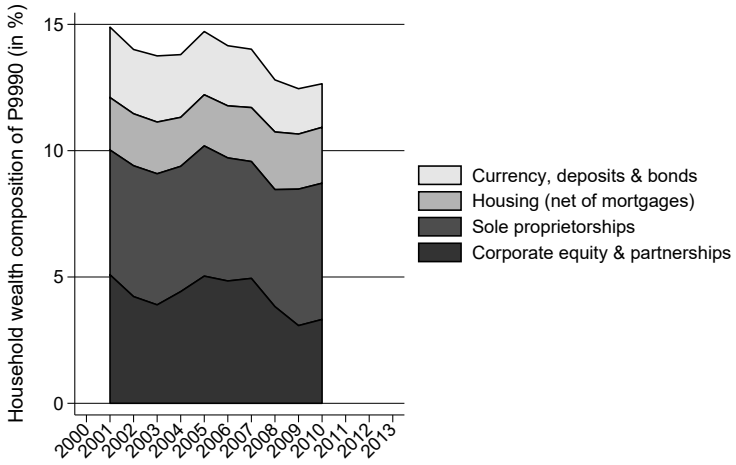
4.2 Wealth Composition

Figure 7: Aggregate German household wealth, 1995-2013



Notes: Housing includes owner- and tenant-occupied housing incl. underlying land net of mortgage debt of private households and non-profit institutions serving households (NPISH). Corporate equities include both publicly traded and closely held corporations' shares, investment fund shares and partnerships. Sole proprietorship assets include land, machinery and equipment, non-residential buildings and structures, land underlying buildings and structures or undeveloped and intellectual property products of sole proprietors, independent professionals, self-employed and NPISH. Fixed income assets include time and savings deposits and debt securities. Pensions cover pension entitlements (including claims of pension funds on pension managers and entitlements to non-pension benefits), life insurance and annuity entitlements and non-life insurance reserves, but claims on social security funds (state pensions) are excluded.
Source: own calculations

Figure 8: Top 0.1% wealth share and composition, 2001-2010



Notes: Housing includes owner- and tenant-occupied housing incl. underlying land net of mortgage debt of private households and non-profit institutions serving households (NPISH). Corporate equities include both publicly traded and closely held corporations' shares, investment fund shares and partnerships. Sole proprietorship assets include land, machinery and equipment, non-residential buildings and structures, land underlying buildings and structures or undeveloped and intellectual property products of sole proprietors, independent professionals, self-employed and NPISH. Fixed income assets include time and savings deposits and debt securities. Pensions cover pension entitlements (including claims of pension funds on pension managers and entitlements to non-pension benefits), life insurance and annuity entitlements and non-life insurance reserves, but claims on social security funds (state pensions) are excluded.
Source: own calculations

5 Conclusions

Tbw.

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Appendix A Tables

Table A.1 shows correlations between PIT fractiles' aggregates and external aggregates. The upper part of Table A.1 refers to dividends, while the lower part refers to interest income. The first column gives the correlation of the fractiles' aggregate with the PIT microdata total. Columns 2 to 6 give the fractiles' correlation with external aggregates. All fractiles' dividend or interest incomes show a high correlation with the corresponding PIT total which indicates stable fractile shares in total capital income.

The correlations with external totals confirm for both capital income sources that the findings of Figure 1 hold over different top income fractiles. Stock market dividends show the highest correlation with PIT dividend income for almost all top fractile groups with decreasing correlations towards the top: correlation coefficients exceed 90% for each of the top fractile groups. Lagged GDP and national accounts dividends exhibit a smaller correlation. For interest income, the tax flow aggregate shows the highest correlation, closely followed by lagged GDP. Correlation with SOEP capital income is comparatively low for both dividends and interest income, which might reflect the fact that we cannot distinguish dividends from interest income in SOEP data. Based on these correlations, we select CDAX dividends and the interest tax flow aggregate as our preferred proxies for dividend and interest income.[18]

The key results on top income shares based on both PIT statistics and PIT microdata are given in Tables A.2, and A.3, respectively. Thresholds and average income for various fractiles based on PIT statistics and PIT microdata are given in Tables A.4, **??** and A.5, respectively.

[18] As a robustness check, we also use the dividend tax flow and national accounts aggregates as well as the national accounts interest aggregate for extrapolation of the respective income type and derive capital income extrapolations for all combinations of sources for dividends and interest income. Furthermore, we use SOEP P90–99 average capital income and lagged GDP to extrapolate the sum of interest and dividend income. Appendix Figure **??** shows the development of potential capital income proxies for selected fractile groups between 2001 and 2013 in comparison to capital income recorded in microdata between 2001 and 2008. The range of all alternative capital income extrapolations is shown in Appendix Figure B.1.

Table A.1: Correlation between fractile capital income and proxies 2001–08

Dividends						
$DIV_{FRACTILE}$	DIV_{PIT}	DIV_{NA}	DIV_{TF}	DIV_{CDAX}	GDP_{LAG}	CAP_{SOEP}
<P90	91.9	59.2	71.4	86.6	56.7	47.5
P90–95	93.2	77.2	53.9	94.2	69.9	41.2
P95–99	96.0	66.3	65.0	93.4	70.1	43.9
P99–99.5	97.7	63.8	64.4	94.6	76.5	42.8
P99.5–99.9	99.0	66.4	58.0	94.9	82.9	38.9
P99.9–99.99	99.7	68.2	56.0	91.9	80.2	36.2
Top 0.01%	96.8	66.4	47.4	82.7	75.8	17.3
Interest						
$INT_{FRACTILE}$	INT_{PIT}	INT_{NA}	INT_{TF}	GDP	GDP_{LAG}	CAP_{SOEP}
<P90	99.2	60.3	98.6	72.8	77.5	53.6
P90-95	95.5	39.9	97.2	85.4	88.4	44.8
P95-99	98.8	50.8	97.6	79.5	80.2	49.3
P99-99.5	98.1	66.9	92.2	62.3	61.8	48.9
P99.5-99.9	93.8	72.2	84.6	52.1	47.2	49.7
P99.9-99.99	90.5	71.8	80.6	50.0	40.7	48.3
Top 0.01%	61.3	17.2	48.5	36.3	32.2	68.9

Notes: Correlations between aggregated dividends / aggregated interest income by disjoint fractile. Sorting sc1: fractiles defined including capital income (100% rule) $DIV_{FRACTILE}$/$INT_{FRACTILE}$: Aggregated dividend/interest income in (disjoint) fractile groups in PIT microdata DIV_{PIT}/INT_{PIT}: Total dividend/interest income in PIT microdata DIV_{NA}/INT_{NA}: Household sector dividends/interest income in national accounts DIV_{CDAX}: Aggregated dividends from German stock companies (CDAX index) GDP/GDP_{LAG}: (Lagged) GDP CAP_{SOEP}: Capital income of P90-99 from SOEP survey data. DIV_{TF}/INT_{TF}: Aggregated dividend/ interest income calculated from tax flow statistics
Source: Own calculations using PIT microdata, stock market indices (CDAX), SOEP, national accounts, and tax flow statistics.

Table A.2: Top income shares based on PIT statistics and Pareto interpolation

Year	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
including capital gains						
2001	35.91	24.48	11.19	8.34	4.47	1.90
2002	35.70	24.13	10.56	7.62	4.00	1.73
2003	34.97	23.55	10.05	7.17	3.64	1.58
2004	35.03	23.74	10.28	7.47	3.80	1.61
2005	37.41	25.80	11.87	8.87	4.84	2.26
2006	37.03	25.72	11.99	8.98	4.91	2.25
2007	38.11	26.73	12.67	9.55	5.30	2.48
2008	38.34	27.00	12.86	9.69	5.30	2.39
2009	37.04	25.48	11.26	8.17	4.12	1.75
2010	37.77	26.11	11.73	8.62	4.47	1.95

Notes: Figures include only income taxpayers 2001-2010. Fractile thresholds are obtained using the Pareto interpolation method.
Source: PIT statistics, own calculations.

Table A.3: Top income shares based on PIT microdata

Year	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
including capital gains						
2001	36.04	24.70	11.28	8.42	4.52	1.90
2002	35.32	23.83	10.32	7.51	3.86	1.65
2003	34.89	23.45	9.99	7.20	3.64	1.56
2004	35.30	23.93	10.47	7.63	3.92	1.68
2005	37.28	25.71	11.81	8.81	4.81	2.25
2006	37.02	25.73	12.01	9.00	4.92	2.23
2007	38.09	26.73	12.72	9.58	5.30	2.47
2008	38.31	27.01	12.93	9.73	5.31	2.38
excluding capital gains						
2001	35.82	24.44	10.99	8.13	4.29	1.78
2002	34.99	23.43	9.88	7.08	3.48	1.38
2003	34.69	23.20	9.71	6.94	3.42	1.42
2004	35.04	23.63	10.14	7.31	3.66	1.51
2005	36.78	25.13	11.15	8.16	4.22	1.81
2006	36.60	25.24	11.45	8.45	4.45	1.92
2007	37.55	26.11	12.04	8.92	4.72	2.08
2008	38.00	26.64	12.53	9.34	4.97	2.17
excluding capital gains, ranked including						
2001	35.72	24.33	10.87	8.01	4.17	1.69
2002	34.89	23.33	9.76	6.96	3.36	1.28
2003	34.59	23.10	9.61	6.83	3.32	1.35
2004	34.94	23.54	10.04	7.21	3.56	1.43
2005	36.70	25.04	11.06	8.07	4.13	1.73
2006	36.48	25.11	11.31	8.30	4.30	1.77
2007	37.49	26.04	11.96	8.83	4.62	1.98
2008	37.91	26.55	12.43	9.23	4.85	2.07

Notes: Figures include only income taxpayers 2001-2010.
Source: PIT microdata, own calculations.

Table A.4: Thresholds and average incomes based on PIT statistics and Pareto interpolation

Year	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
			including capital gains			
			thresholds			
2001	59,364	80,947	148,050	205,601	499,944	2,134,204
2002	58,674	79,314	144,231	208,280	446,100	1,810,919
2003	57,777	77,821	141,447	201,989	443,093	1,637,040
2004	58,623	79,468	148,116	200,929	450,476	1,759,486
2005	57,232	78,946	151,594	209,290	494,414	2,105,873
2006	57,451	79,815	157,831	219,754	524,485	2,246,380
2007	57,880	79,782	165,782	233,049	545,368	2,399,781
2008	57,637	80,441	169,936	240,399	572,489	2,450,380
2009	56,440	78,706	159,042	218,853	491,008	1,833,023
2010	57,046	80,206	163,848	226,290	517,426	2,014,588
			average incomes			
2001	107,425	146,483	334,844	499,122	1,338,381	5,678,063
2002	103,822	140,345	306,966	443,279	1,162,465	5,017,030
2003	101,304	136,449	291,050	415,624	1,054,842	4,585,641
2004	104,481	141,632	306,673	445,480	1,133,084	4,792,915
2005	106,785	147,300	338,742	506,291	1,382,262	6,462,495
2006	109,291	151,835	353,777	530,277	1,449,885	6,630,997
2007	112,999	158,498	375,630	566,494	1,570,799	7,353,360
2008	114,353	161,058	383,484	577,892	1,581,693	7,140,917
2009	106,663	146,734	324,088	470,754	1,185,629	5,045,014
2010	109,677	151,631	340,714	500,508	1,296,807	5,676,499

Notes: Tax statistics include only income taxpayers. All figures in 2010 prices. Fractile thresholds are obtained using the Pareto interpolation method.
Source: PIT statistics, own calculations.

Table A.5: Thresholds and average incomes based on PIT microdata

Year	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
			including capital gains			
			thresholds			
2001	59,219	78,524	147,133	205,219	498,301	2,238,996
2002	58,292	77,367	141,654	193,051	432,088	1,751,616
2003	57,626	76,795	140,275	189,490	413,570	1,604,844
2004	58,888	78,684	146,501	200,640	451,066	1,834,096
2005	57,314	77,330	147,448	204,569	478,436	2,062,078
2006	57,768	78,371	153,223	214,245	510,827	2,293,026
2007	58,181	79,463	159,104	225,108	541,863	2,454,649
2008	58,094	79,788	162,760	231,508	565,222	2,501,861
			average incomes			
2001	107,383	147,187	336,115	501,487	1,347,296	5,664,665
2002	102,298	138,009	298,920	435,160	1,118,084	4,770,883
2003	100,576	135,166	287,863	415,264	1,049,526	4,487,702
2004	104,853	142,201	311,058	453,407	1,164,894	4,993,472
2005	106,329	146,654	336,696	502,632	1,372,144	6,427,489
2006	109,373	152,058	354,936	531,646	1,454,856	6,590,898
2007	112,881	158,406	377,018	567,929	1,569,966	7,317,652
2008	114,233	161,038	385,586	580,295	1,581,931	7,108,534
			excluding capital gains			
			thresholds			
2001	59,155	78,403	146,231	202,880	482,610	2,097,889
2002	58,216	77,223	140,646	190,627	416,537	1,568,500
2003	57,555	76,663	139,425	187,433	401,060	1,503,807
2004	58,815	78,540	145,525	198,270	436,414	1,703,690
2005	57,221	77,149	146,157	201,440	459,131	1,854,054
2006	57,668	78,174	151,709	210,868	488,197	2,067,020
2007	58,083	79,265	157,479	221,164	517,330	2,175,782
2008	58,076	79,740	161,942	229,230	548,887	2,317,341
			average incomes			
2001	106,185	144,876	325,698	482,113	1,272,839	5,291,112
2002	100,632	134,779	284,069	407,018	1,000,168	3,983,845
2003	99,494	133,097	278,677	398,197	982,525	4,079,326
2004	103,540	139,674	299,705	432,244	1,080,645	4,472,641
2005	103,928	141,979	314,998	461,227	1,193,630	5,118,844
2006	107,159	147,763	335,337	494,685	1,302,461	5,623,890
2007	110,277	153,334	353,645	523,690	1,384,818	6,100,742
2008	112,783	158,167	371,961	554,388	1,474,699	6,445,920

Notes: Tax statistics include only income taxpayers. All figures in 2010 prices.
Source: PIT microdata, own calculations.

Table A.6: Consistent top income shares including capital gains

Year	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
100% rule, PIT microdata simulation						
2001	36.17	24.83	11.40	8.54	4.63	1.97
2002	36.11	24.60	11.05	8.21	4.45	2.04
2003	35.52	24.05	10.54	7.72	4.07	1.83
2004	36.01	24.63	11.10	8.23	4.40	1.96
2005	38.51	26.91	12.93	9.89	5.74	2.88
2006	38.35	27.03	13.22	10.15	5.90	2.86
2007	39.55	28.14	14.04	10.83	6.33	3.13
2008	40.03	28.69	14.52	11.23	6.51	3.07
100% rule, PIT statistics & imputed capital income						
2009	39.86	27.96	13.13	9.81	5.22	2.24
2010	39.76	27.86	13.07	9.78	5.23	2.28
50% rule, PIT microdata simulation						
2001	35.29	23.99	10.66	7.85	4.11	1.71
2002	35.28	23.79	10.29	7.48	3.84	1.64
2003	34.89	23.44	9.98	7.20	3.64	1.55
2004	35.30	23.93	10.47	7.63	3.92	1.68
2005	37.28	25.71	11.81	8.81	4.81	2.25
2006	37.02	25.73	12.01	9.00	4.92	2.23
2007	38.09	26.73	12.72	9.58	5.30	2.47
2008	38.31	27.01	12.93	9.73	5.31	2.38
0% rule, PIT microdata simulation						
2001	34.35	23.14	10.01	7.30	3.78	1.60
2002	34.58	23.18	9.84	7.10	3.61	1.56
2003	34.21	22.86	9.56	6.84	3.42	1.47
2004	34.60	23.33	10.02	7.25	3.69	1.58
2005	36.51	25.03	11.30	8.39	4.56	2.18
2006	36.21	25.02	11.49	8.56	4.68	2.18
2007	37.03	25.82	12.10	9.07	5.03	2.41
2008	37.05	25.90	12.13	9.06	4.92	2.25
0% rule, PIT statistics						
2009	37.04	25.48	11.26	8.17	4.12	1.75
2010	37.77	26.11	11.73	8.62	4.47	1.95

Notes: The 100%-rule includes capital income (interest & gross dividends) fully and corresponds to pre-2002 PIT legislation. The 50%-rule includes 37.5% of gross dividends and corresponds to PIT legislation from 2002 to 2008. The 0%-rule excludes capital income (interest & gross dividends) completely and corresponds to post-2008 PIT legislation.
Source: PIT microdata and PIT statistics, own calculations.

Table A.7: Consistent top income shares excluding capital gains

Year	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
100% rule, PIT microdata simulation						
2001	35.90	24.52	11.06	8.20	4.35	1.81
2002	35.56	23.98	10.38	7.54	3.84	1.59
2003	35.18	23.67	10.13	7.33	3.73	1.60
2004	35.59	24.16	10.61	7.75	3.99	1.68
2005	37.58	25.89	11.85	8.82	4.74	2.09
2006	37.58	26.19	12.32	9.27	5.11	2.30
2007	38.57	27.09	12.93	9.74	5.35	2.41
2008	39.52	28.13	13.89	10.61	5.94	2.68
50% rule, PIT microdata simulation						
2001	35.07	23.72	10.36	7.56	3.87	1.59
2002	34.95	23.39	9.85	7.05	3.46	1.38
2003	34.68	23.19	9.71	6.93	3.42	1.42
2004	35.04	23.63	10.14	7.31	3.66	1.51
2005	36.78	25.12	11.15	8.16	4.22	1.81
2006	36.60	25.24	11.45	8.45	4.45	1.92
2007	37.55	26.11	12.04	8.92	4.72	2.08
2008	38.00	26.64	12.53	9.34	4.97	2.17
0% rule, PIT microdata simulation						
2001	34.05	22.81	9.67	6.96	3.50	1.45
2002	34.15	22.69	9.31	6.59	3.16	1.25
2003	33.98	22.59	9.26	6.55	3.18	1.32
2004	34.32	23.01	9.67	6.91	3.40	1.40
2005	35.94	24.38	10.57	7.66	3.90	1.67
2006	35.74	24.48	10.88	7.96	4.15	1.82
2007	36.41	25.12	11.34	8.33	4.37	1.95
2008	36.53	25.36	11.58	8.53	4.47	1.97

Notes: The 100%-rule includes capital income (interest & gross dividends) fully and corresponds to pre-2002 PIT legislation. The 50%-rule includes 37.5% of gross dividends and corresponds to PIT legislation from 2002 to 2008. The 0%-rule excludes capital income (interest & gross dividends) completely and corresponds to post-2008 PIT legislation.
Source: PIT microdata and PIT statistics, own calculations.

Table A.8: Thresholds and average incomes (100%-rule)

Year	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
			including capital gains			
			thresholds			
2001	59,215	78,521	147,221	205,538	501,464	2,298,459
2002	58,352	77,497	142,781	196,034	454,624	2,009,571
2003	57,714	76,960	141,473	192,484	432,387	1,787,112
2004	58,983	78,867	147,957	204,238	475,373	2,065,177
2005	57,434	77,559	149,160	208,914	510,157	2,434,955
2006	57,917	78,647	155,309	219,561	549,753	2,777,135
2007	58,341	79,768	161,655	231,265	587,771	2,916,596
2008	58,213	80,053	165,672	239,832	630,374	3,106,838
			average incomes			
2001	107,748	147,922	339,748	508,594	1,378,991	5,876,776
2002	104,582	142,493	320,050	475,596	1,289,406	5,894,521
2003	102,379	138,652	303,752	445,188	1,171,779	5,281,754
2004	106,971	146,311	329,840	488,704	1,306,607	5,835,209
2005	109,841	153,516	368,875	564,293	1,636,373	8,223,341
2006	113,318	159,752	390,745	599,990	1,743,527	8,454,153
2007	117,181	166,791	415,910	641,772	1,876,316	9,282,352
2008	119,350	171,099	432,828	669,869	1,941,362	9,166,987
2009	114,736	160,948	378,022	564,843	1,503,082	6,455,928
2010	115,450	161,819	379,398	567,732	1,519,272	6,627,866
			excluding capital gains			
			thresholds			
2001	59,164	78,421	146,373	203,248	485,087	2,128,161
2002	58,291	77,374	141,786	193,524	436,678	1,746,086
2003	57,644	76,826	140,536	190,191	418,179	1,644,789
2004	58,912	78,725	146,835	201,577	458,316	1,873,993
2005	57,335	77,361	147,665	205,259	486,820	2,128,257
2006	57,809	78,429	153,641	215,448	522,324	2,402,005
2007	58,238	79,555	159,819	226,823	556,263	2,488,084
2008	58,246	80,089	165,158	237,909	612,523	2,827,034
			average incomes			
2001	106,420	145,333	327,802	486,089	1,288,976	5,378,064
2002	102,260	137,932	298,427	433,914	1,105,802	4,568,026
2003	100,908	135,807	290,752	420,617	1,069,730	4,584,455
2004	105,168	142,801	313,646	458,034	1,178,308	4,972,773
2005	106,174	146,319	334,769	498,363	1,340,656	5,908,803
2006	110,031	153,325	360,718	542,498	1,495,050	6,732,631
2007	113,255	159,082	379,572	571,946	1,570,159	7,088,053
2008	117,307	166,979	412,356	629,916	1,764,378	7,945,091

Notes: Tax statistics include only income taxpayers 2001-2010. All figures in 2010 prices. All figures are based on PIT microdata, with exception of the average incomes for 2009 and 2010 which stem from PIT statistics with added capital income extrapolation. 2009 and 2010 figures are only available including capital gains. Threshold incomes are not available for 2009 and 2010 as they would require distributional assumptions for the capital income.
Source: PIT microdata, PIT statistics, own calculations.

Table A.9: Sorting effect of capital income (including capital gains)

Year	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
non-capital income shares by sorting scheme						
1: 0% rule income, sorted by 0% rule income						
2001	34.35	23.14	10.01	7.30	3.78	1.60
2002	34.58	23.18	9.84	7.10	3.61	1.56
2003	34.21	22.86	9.56	6.84	3.42	1.47
2004	34.60	23.33	10.02	7.25	3.69	1.58
2005	36.51	25.03	11.30	8.39	4.56	2.18
2006	36.21	25.02	11.49	8.56	4.68	2.18
2007	37.03	25.82	12.10	9.07	5.03	2.41
2008	37.05	25.90	12.13	9.06	4.92	2.25
2: 0% rule income, sorted by 100% rule income						
2001	34.12	22.92	9.80	7.08	3.57	1.46
2002	34.42	23.03	9.70	6.97	3.48	1.47
2003	34.08	22.73	9.44	6.72	3.31	1.40
2004	34.48	23.21	9.91	7.13	3.57	1.51
2005	36.39	24.92	11.19	8.26	4.42	2.07
2006	36.07	24.89	11.36	8.42	4.52	2.06
2007	36.86	25.66	11.94	8.90	4.85	2.29
2008	36.84	25.70	11.92	8.82	4.66	2.08
Sorting effect (2 as % 1)						
annual						
2001	0.99	0.99	0.98	0.97	0.94	0.91
2002	1.00	0.99	0.99	0.98	0.96	0.94
2003	1.00	0.99	0.99	0.98	0.97	0.95
2004	1.00	0.99	0.99	0.98	0.97	0.95
2005	1.00	1.00	0.99	0.99	0.97	0.95
2006	1.00	0.99	0.99	0.98	0.97	0.94
2007	1.00	0.99	0.99	0.98	0.96	0.95
2008	0.99	0.99	0.98	0.97	0.95	0.92
Average sorting effect 2001–08 $\widehat{=}$ correction factor applied after 2009						
–	1.00	0.99	0.99	0.98	0.96	0.94

Notes: The sorting effect indicates the difference between the shares we observe in PIT statistics from 2009 onwards (0% rule income shares, tax units sorted by 0% rule income) and the shares that we need for extrapolation from 2009 onwards (0% rule income shares, tax units sorted by 100% rule income). We use the average difference between these two Scenarios to correct non-capital top income shares from PIT statistics before capital income extrapolation.
Source: PIT microdata, own calculations.

Table A.10: Composition of aggregate taxable income in billion Euro)

	GTI[a]	A & F[b]	Business[c]	Self-Empl.	Wage[d]	Capital[e]	R & L[f]	Other[g]
				pre 2001/2002				
1992	792.6	6.2 (0.8)	73.4 (9.2)	35.1 (4.4)	649.1 (81.6)	27.4 (3.4)	-5.5 (-0.7)	10.2 (1.3)
1995	843.7	6.3 (0.7)	69.9 (8.3)	39.4 (4.7)	711.3 (84.0)	16.9 (2.0)	-11.3 (-1.3)	14.2 (1.7)
1998	890.9	7.7 (0.9)	86.7 (9.7)	48.6 (5.4)	729.5 (81.6)	22.7 (2.5)	-16.5 (-1.8)	15.2 (1.7)
2001	959.2	7.8 (0.8)	71.4 (7.5)	51.9 (5.4)	775.6 (81.3)	32.2 (3.4)	-3.3 (-0.3)	18.9 (2.0)
				50% Rule				
2002	949.9	7.0 (0.7)	70.2 (7.4)	52.6 (5.6)	776.5 (82.3)	19.3 (2.0)	-1.3 (-0.1)	19.4 (2.1)
2003	934.9	6.8 (0.7)	71.8 (7.7)	52.4 (5.6)	765.3 (81.9)	17.0 (1.8)	0.9 (0.1)	20.0 (2.1)
2004	945.5	7.2 (0.8)	78.8 (8.3)	55.3 (5.8)	767.4 (80.7)	16.4 (1.7)	5.1 (0.5)	20.5 (2.2)
2005	990.1	7.7 (0.8)	93.9 (9.5)	58.9 (5.9)	768.6 (77.5)	19.0 (1.9)	7.1 (0.7)	37.1 (3.7)
2006	1008.2	8.2 (0.8)	104.7 (10.3)	60.9 (6.0)	772.8 (76.3)	20.2 (2.0)	8.5 (0.8)	38.0 (3.8)
2007	1061.4	9.2 (0.9)	113.8 (10.7)	65.8 (6.2)	797.3 (74.7)	29.1 (2.7)	10.9 (1.0)	41.0 (3.8)
2008	1092.3	8.9 (0.8)	118.0 (10.7)	69.6 (6.3)	811.9 (73.9)	35.9 (3.3)	12.0 (1.1)	41.8 (3.8)
				Dual Tariff				
2009a[h]	1054.8	7.9 (0.7)	101.0 (9.5)	68.9 (6.5)	812.5 (76.6)	11.9 (1.1)	14.5 (1.4)	43.7 (4.1)
2009b[h]	1074.9	7.9 (0.7)	101.0 (9.4)	68.9 (6.4)	812.5 (75.4)	29.7 (2.8)	14.5 (1.3)	43.7 (4.1)

Notes: Values are in current billion €. Values in parentheses are the share of each income source in total taxable income. Annual tax statistics do not include non-filers (filing is not mandatory for tax units who earn exclusively wage income). [a]GTI: gross taxable income. [b]A & F: Agriculture and Forestry. [c]Business: unincorporated business income. [d] Wage: includes pensions from civil servants (Beamte) [e]Capital income: taxable dividends and interest income. [f]R & L: Renting and Leasing. [g]Other: predominantly pensions and some taxable capital gains (from stock shares and real estate). [h]2009a and 2009b define capital income differently: 2009a shows figures for those capital incomes that are taxed with the personal tax rate, and the corresponding GTI (tax statistics definition). 2009b additionally includes those capital incomes, that are taxed at the withholding tax rate, but are nonetheless reported in the PIT files. Capital income shares in 2009b refer to a correspondingly corrected measure of GTI.
Source: own calculation based on Destatis (1996, 1998-2007, 2000, 2001-2010).

Table A.11: Taxable income composition by fractile

Fractile	GTI (€)	Composition of GTI (% of GTI)								CG (% of GTI)	
		GTI	a&f	bus	self	wage	cap	r&l	other	business	private
						2001					
0.01	5,740,096	100.00	0.30	60.67	2.38	9.22	23.81	0.37	0.75	11.96	-0.17
P99.9–99.99	873,837	100.00	0.83	32.22	15.92	27.15	19.84	1.22	0.70	6.19	-0.50
P99.5–99.9	291,011	100.00	0.85	15.45	27.33	42.79	9.96	0.21	0.69	2.25	-0.27
P99–99.5	171,040	100.00	0.89	11.53	22.07	58.52	5.26	-0.38	0.68	0.80	-0.17
P95–99	100,026	100.00	0.83	7.59	8.38	80.59	2.28	-0.45	0.53	0.27	-0.04
P90–95	67,605	100.00	0.68	5.05	2.95	89.87	1.27	-0.35	0.48	0.11	-0.04
						2002					
0.01	4,879,585	100.00	0.53	72.17	4.05	9.66	11.05	1.03	0.89	23.14	0.14
P99.9–99.99	717,663	100.00	0.91	29.60	21.51	30.90	9.88	2.28	0.78	7.03	-0.07
P99.5–99.9	265,366	100.00	0.79	16.16	29.26	46.14	5.14	0.75	0.68	2.08	0.06
P99–99.5	162,995	100.00	0.83	11.42	21.49	61.96	2.92	0.10	0.66	0.82	0.05
P95–99	97,855	100.00	0.73	7.12	7.87	82.37	1.44	-0.20	0.52	0.24	0.03
P90–95	66,615	100.00	0.62	4.87	2.93	90.35	0.94	-0.21	0.49	0.10	0.01
						2003					
0.01	4,566,071	100.00	0.49	73.56	4.05	9.33	9.32	1.36	1.31	13.11	0.46
P99.9–99.99	672,551	100.00	0.91	33.66	23.06	29.42	8.32	2.76	0.95	5.45	0.41
P99.5–99.9	257,612	100.00	0.79	16.58	29.19	46.47	4.39	1.22	0.74	1.70	0.21
P99–99.5	160,766	100.00	0.84	11.67	20.96	62.56	2.62	0.33	0.71	0.62	0.15
P95–99	97,069	100.00	0.71	7.09	7.72	82.52	1.30	0.03	0.55	0.21	0.08
P90–95	66,016	100.00	0.62	4.90	2.93	90.23	0.87	-0.06	0.53	0.07	0.04
						2004					
0.01	5,060,803	100.00	0.30	75.46	3.42	9.16	9.09	1.42	1.09	14.60	0.50
P99.9–99.99	746,177	100.00	0.91	37.35	21.74	28.36	7.60	3.20	0.88	5.26	0.48
P99.5–99.9	276,635	100.00	0.89	18.50	29.80	44.00	4.28	1.91	0.73	1.80	0.25
P99–99.5	169,073	100.00	0.95	12.99	22.07	59.86	2.54	1.02	0.70	0.62	0.17
P95–99	100,078	100.00	0.82	7.74	8.29	80.99	1.28	0.45	0.56	0.23	0.09
P90–95	67,539	100.00	0.68	5.26	3.12	89.46	0.84	0.26	0.53	0.08	0.04
						2005					
0.01	6,613,365	100.00	0.24	77.93	2.95	9.15	8.30	0.74	0.67	24.33	0.53
P99.9–99.99	817,761	100.00	0.81	38.07	19.93	28.72	8.38	3.05	1.10	6.29	0.65
P99.5–99.9	286,471	100.00	0.88	19.50	28.66	43.62	4.47	2.01	0.96	2.15	0.37
P99–99.5	171,157	100.00	0.99	13.50	21.85	58.93	2.52	1.34	1.00	0.80	0.27
P95–99	99,245	100.00	0.89	7.95	8.30	80.15	1.30	0.69	0.86	0.24	0.14
P90–95	66,041	100.00	0.75	5.41	3.09	88.67	0.88	0.46	0.94	0.09	0.07
						2006					
0.01	6,766,318	100.00	0.33	77.89	2.83	9.84	7.03	0.57	1.51	20.71	1.25
P99.9–99.99	892,534	100.00	0.89	40.66	17.45	28.01	8.86	2.76	1.42	6.24	0.94
P99.5–99.9	302,308	100.00	0.98	21.18	26.82	43.12	4.75	2.17	1.08	2.12	0.48
P99–99.5	178,713	100.00	1.05	14.78	21.77	57.18	2.77	1.54	1.04	0.78	0.30
5P95–99	101,462	100.00	0.99	8.97	8.80	78.20	1.43	0.85	0.89	0.24	0.15
P90–95	66,735	100.00	0.80	5.98	3.28	87.70	0.94	0.55	0.95	0.08	0.08
						2007					
0.01	7,416,255	100.00	0.36	78.21	3.04	8.79	7.75	0.53	1.30	19.66	0.98
P99.9–99.99	940,272	100.00	0.95	41.28	17.00	27.45	9.38	2.42	1.57	6.61	1.03
P99.5–99.9	318,904	100.00	1.16	21.13	26.36	42.08	5.94	2.31	1.12	2.19	0.48
P99–99.5	186,618	100.00	1.29	14.95	22.71	54.64	3.74	1.76	1.05	0.83	0.25
P95–99	103,895	100.00	1.18	9.24	9.12	76.46	2.11	1.10	0.93	0.26	0.14
P90–95	67,406	100.00	0.88	6.17	3.37	86.58	1.45	0.76	0.99	0.09	0.07
						2008					
0.01	7,261,580	100.00	0.35	74.92	2.93	8.75	11.46	0.66	0.93	13.33	-0.12
P99.9–99.99	976,117	100.00	0.92	41.87	15.94	25.85	11.96	2.52	0.99	5.80	-0.46
P99.5–99.9	331,312	100.00	1.07	22.69	26.18	39.59	7.30	2.38	0.90	2.01	-0.38
P99–99.5	191,375	100.00	1.18	16.41	22.95	52.39	4.47	1.76	0.97	0.74	-0.24
P95–99	105,034	100.00	1.09	9.79	9.42	75.33	2.43	1.19	0.90	0.23	-0.13
P90–95	67,475	100.00	0.81	6.11	3.44	86.35	1.65	0.82	1.02	0.08	-0.08

Notes: Fractiles defined including capital gains. Average GTI in prices of 2010.
Source: PIT microdata, own calculations.

Table A.12: Wealth shares, thresholds and averages

Year	Top 10%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
			wealth shares			
2001	65.2	56.1	33.0	25.3	13.7	5.7
2002	64.7	55.4	32.1	24.4	12.9	5.4
2003	64.5	55.2	31.8	24.1	12.7	5.4
2004	63.5	54.0	31.3	23.9	12.8	5.5
2005	63.6	54.4	32.1	24.8	13.7	6.1
2006	62.8	53.5	31.3	24.1	13.2	5.8
2007	61.7	52.7	31.0	23.9	13.2	5.9
2008	60.4	51.6	30.0	22.8	12.1	5.1
2009	47.3	41.7	23.9	17.7	8.5	3.2
2010	48.2	42.6	24.7	18.4	9.1	3.5
			wealth thresholds			
2001	181,394	509,521	2,094,607	3,329,456	8,746,447	39,009,411
2002	178,143	507,656	2,052,804	3,255,430	8,305,595	34,844,460
2003	179,688	511,948	2,058,884	3,250,928	8,191,494	33,640,894
2004	198,116	529,670	2,085,283	3,295,797	8,426,402	35,768,566
2005	185,872	495,874	1,991,093	3,165,770	8,316,679	36,720,095
2006	193,974	504,119	1,998,587	3,157,567	8,239,617	36,563,446
2007	192,295	496,878	1,993,824	3,157,813	8,242,995	36,084,561
2008	188,450	483,137	1,982,870	3,146,390	8,058,698	32,802,048
2009	83,085	361,102	1,711,091	2,727,160	6,639,569	22,185,360
2010	84,840	363,135	1,736,119	2,776,817	6,848,605	24,089,686
			average wealth			
2001	1,113,752	1,915,652	5,635,265	8,662,477	23,449,853	98,235,853
2002	1,079,738	1,850,094	5,358,090	8,161,322	21,589,169	90,444,450
2003	1,079,184	1,845,989	5,315,232	8,074,735	21,293,131	90,441,044
2004	1,114,348	1,897,017	5,491,041	8,392,748	22,504,436	97,173,697
2005	1,078,478	1,846,678	5,453,770	8,430,117	23,269,152	103,964,099
2006	1,079,843	1,841,638	5,387,743	8,297,198	22,754,966	99,976,840
2007	1,077,145	1,840,481	5,412,743	8,348,255	23,002,369	102,931,689
2008	1,042,475	1,778,984	5,170,743	7,872,742	20,810,532	87,397,497
2009	817,992	1,442,720	4,130,942	6,126,957	14,744,796	55,078,925
2010	837,592	1,480,678	4,289,513	6,410,740	15,828,181	61,028,072

Notes: Wealth imputation based on positive taxable income. Wealth concept contains corporate equities and partnerships, sole proprietorships, tenant-occupied real estate (privately owned), and fixed income assets. In 2009 and 2010, corporate dividends and fixed income assets are not included Thresholds and average wealth in constant prices, base year 2010

Source: PIT microdata, PIT statistics, own calculations.

Table A.13: Wealth composition by fractile

Wealth category	P90–95	P95–99	P99–99.5	P99.5–99.9	P99.9–99.99	Top 0.01
			2001			
Business	9.9	11.0	11.7	15.5	34.2	62.2
Sole Proprietorships	34.8	53.1	58.2	55.3	33.2	10.1
Tenant Housing	16.7	17.0	16.4	15.3	13.9	6.7
Interest	38.6	18.9	13.6	13.9	18.7	21.0
			2002			
Business	8.9	10.3	10.8	13.8	30.1	59.1
Sole Proprietorships	34.1	52.4	58.5	57.4	37.0	9.8
Tenant Housing	16.7	16.9	16.4	15.1	14.7	8.1
Interest	40.2	20.3	14.2	13.7	18.2	23.0
			2003			
Business	8.7	10.0	10.5	13.2	28.3	58.8
Sole Proprietorships	34.5	51.8	58.0	57.6	37.7	10.8
Tenant Housing	16.8	16.8	16.3	14.8	14.9	7.5
Interest	40.1	21.4	15.1	14.5	19.1	22.9
			2004			
Business	8.6	10.2	11.3	14.7	32.0	60.2
Sole Proprietorships	36.9	52.2	58.1	56.8	35.9	8.2
Tenant Housing	17.1	17.3	16.1	14.6	14.0	6.8
Interest	37.4	20.3	14.5	13.9	18.0	24.8
			2005			
Business	8.5	10.3	11.5	15.6	34.2	63.1
Sole Proprietorships	36.7	52.2	58.0	56.0	35.0	8.1
Tenant Housing	17.5	17.6	16.6	15.0	13.7	5.9
Interest	37.3	19.9	13.9	13.4	17.0	22.9
			2006			
Business	8.6	9.9	11.0	15.4	34.2	65.5
Sole Proprietorships	37.9	53.6	58.8	55.8	34.4	8.4
Tenant Housing	17.6	17.9	17.0	15.8	14.6	5.9
Interest	35.9	18.7	13.2	13.0	16.8	20.2
			2007			
Business	8.7	10.4	11.9	16.7	35.3	61.5
Sole Proprietorships	38.1	53.4	57.9	54.2	33.0	12.6
Tenant Housing	18.9	19.0	17.9	16.7	15.2	5.5
Interest	34.3	17.3	12.3	12.4	16.5	20.4
			2008			
Business	7.6	8.4	9.8	14.0	29.9	57.0
Sole Proprietorships	37.7	53.1	58.8	55.6	36.2	12.5
Tenant Housing	19.5	20.4	19.1	18.1	17.8	7.5
Interest	35.2	18.1	12.3	12.2	16.1	23.0

continued...

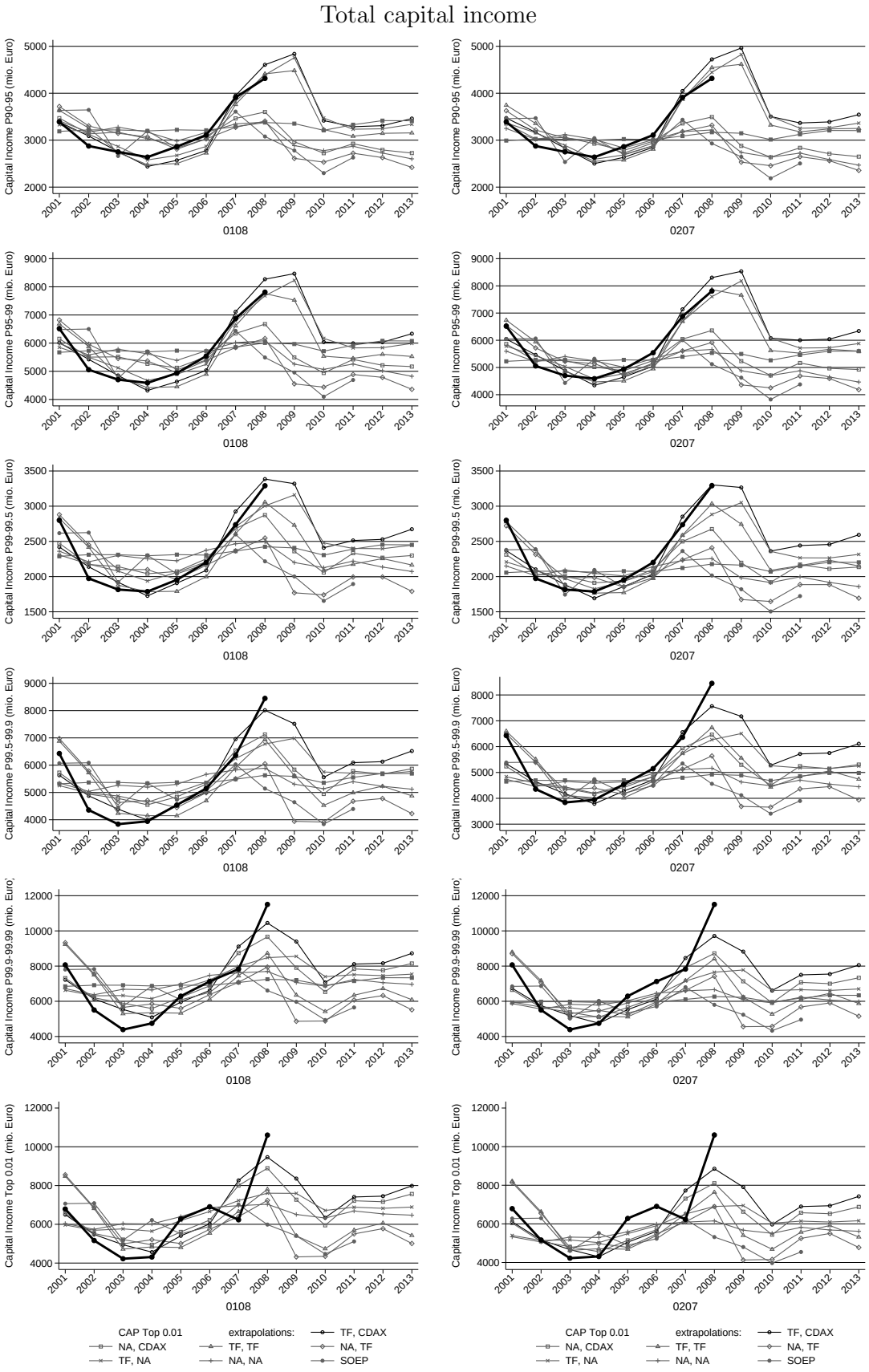
Wealth composition by fractile (continued)

Wealth category	P90–95	P95–99	P99–99.5	P99.5–99.9	P99.9–99.99	Top 0.01
			2009			
Business	8.7	8.2	7.6	9.2	19.1	60.1
Sole Proprietorships	52.5	65.7	69.6	69.5	57.6	24.1
Tenant Housing	38.8	26.1	22.8	21.2	23.2	15.8
Interest	0.0	0.0	0.0	0.0	0.0	0.0
			2010			
Business	8.5	8.8	8.6	10.7	23.1	64.9
Sole Proprietorships	52.1	65.2	69.1	68.5	54.5	21.2
Tenant Housing	39.4	25.9	22.4	20.8	22.4	13.9
Interest	0.0	0.0	0.0	0.0	0.0	0.0

Notes: Fractiles defined by total imputed wealth.
Source: PIT microdata, own calculations.

Appendix B Figures

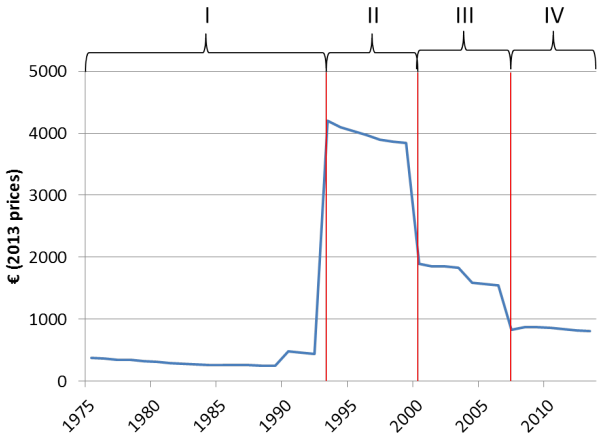
Figure B.1: PIT Fractile Totals and Extrapolations



Notes: Real values in 2010 prices. Extrapolations combine the sources given in Figure **??**. Sources give interest income source first and dividends source second. In addition, total capital income is extrapolated using SOEP survey data (capital income of P90–99 fractile) and lagged GDP.

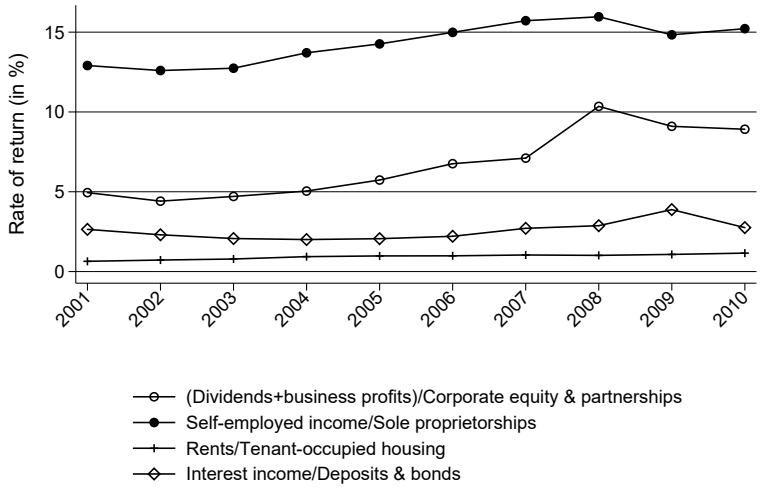
Source: Own calculations using PIT Microdata, tax flow statistics, PIT Statistics, stock market indices (CDAX), and German national accounts.

Figure B.2: Evolution of Real Saver's Allowance, 1975–2013



Notes: All figures in real prices 2013. Phases I to IV separate phases of comparable levels of the savers' allowance
Source: Own calculations using German income tax law and German consumer price index.

Figure B.3: Rate of return by wealth category, 2001-2010



Notes: Housing includes owner- and tenant-occupied housing net of mortgage debt of private households and non-profit institutions serving households (NPISH). Corporate equities include both publicly traded and closely held corporations' shares, investment fund shares and partnerships. Sole proprietorship assets include land, machinery and equipment, non-residential buildings and structures, land underlying buildings and structures or undeveloped and intellectual property products of sole proprietors, independent professionals, self-employed and NPISH. Fixed income assets include time and savings deposits and debt securities. Pensions cover pension entitlements (including claims of pension funds on pension managers and entitlements to non-pension benefits), life insurance and annuity entitlements and non-life insurance reserves, but claims on social security funds (state pensions) are excluded.
Source: own calculations

Appendix C Data

Total population

The control total for population is the number of individuals aged 20+ using population statistics from the statistical yearbooks following Dell (2007). E.g., numbers for the year 2008 are published in the Statistical Yearbook of 2010 (*Statistisches Jahrbuch 2010*). The number of tax units is computed using the following formula:

Tax Units = Married Couples/2 + Bachelors - Children (up to 19 years)

Table C.1: Control total for population, Germany, 1992-2012

Year	Total tax units in 1000	Total recorded in tax statistics in 1000
1992	43,951	27,556
1995	44,602	27,683
1998	45,156	28,293
2001	46,247	27,413
2002	46,650	27,294
2003	47,000	26,647
2004	47,293	26,155
2005	47,613	26,264
2006	47,941	25,934
2007	48,297	26,327
2008	48,578	26,128
2009	48,823	26,062
2010	49,183	26,411
2011	47,210	26,672
2012	47,573	26,470

Notes: Total recorded in tax statistics refers to income and payroll tax 1992-1998, 2012 and to only income tax 2001-2011.
Source: Statistical yearbooks, various years, PIT statistics, own calculations.

Total income

The income total is based on the national accounts published in *Fachserie 18 Reihe 1.5 Volkswirtschaftliche Gesamtrechnungen. Inlandsproduktberechnung, Lange Reihen ab 1970*. Total household income is the sum of

Compensation of employees (Residents) (*Arbeitnehmerentgelt (Inländer)*) (Table 1.3)

+ Operation surplus (*Betriebsüberschuss*) (Table 1.10)

+ Income of self-employed (*Selbständigeneinkommen*) (Table 1.10)

+ Property income (*Vermögenseinkommen*) (Table 1.10)

- Employers' actual social contributions (*Sozialbeiträge der Arbeitgeber*) (Table 1.8).

= Total household income

Total household income, total income recorded in income tax statistics and our control total is given in Table 2. Control total is 90% of total household income following Dell (2007). For top income shares excluding capital gains, we deduct the sum of capital gains observed in the microdata from the control total. This is a pragmatic approach to prevent that our shares excluding capital gains are mechanically lower than shares including capital gains. One should note, however, that the income total in the national accounts does not include capital gains.

Total wealth

Total household wealth is the sum of housing (net of mortgages), corporate equities and partnerships, sole proprietorships and bank deposits net of liabilities. The household sector includes private households and non-profit institutions serving households (NPISH). Housing includes owner- and tenant-occupied housing as well as underlying land net of mortgage debt. Corporate equities include both publicly traded and closely held corporations' shares, investment fund shares and quasi-coporations (most forms of partnerships). Sole proprietorship assets include land, machinery and equipment, non-residential buildings and structures, land underlying buildings and structures or undeveloped and intellectual property products of sole proprietors, independent professionals, self-employed. Bank deposits are the sum of time and saving deposits and debt securities as well as non-interest bearing deposits and currency.

National Accounts

National accounts offer information on dividends and interest income whose magnitude by far exceeds the PIT statistics. This occurs for two main reasons. (1) Dividends comprise distributed profits of both incorporated and unincorporated firms, whereas the tax statistics only include payout from incorporated firms as dividends (profits from unincorporated

Table 2: Control total for income, Germany, 1992-2012

Year	Total household income (mio. €)	Control total (mio. €)	Total income recorded in tax statistics (mio. €)
1992	1,107,530	996,777	792,623
1995	1,212,850	1,091,565	843,722
1998	1,263,660	1,137,294	902,992
2001	1,354,030	1,218,627	973,885
2002	1,356,670	1,221,003	949,966
2003	1,375,290	1,237,761	938,398
2004	1,391,820	1,252,638	962,175
2005	1,423,870	1,281,483	993,566
2006	1,477,880	1,330,092	1,013,694
2007	1,528,140	1,375,326	1,067,377
2008	1,586,810	1,428,129	1,099,228
2009	1,544,410	1,389,969	1,061,489
2010	1,587,170	1,428,453	1,101,833
2011	1,671,340	1,504,206	1,156,461
2012	1,725,210	1,552,689	1,197,571

Notes: Values are in current Euro. Total income recorded in PIT statistics refers to income and payroll tax 1992-1998, 2012 and to only income tax 2001-2011.
Source: National accounts (*Volkswirtschaftliche Gesamtrechnungen*) and income tax statistics, various years, own calculations.

firms are classified as business income, self-employed income or agricultural income). (2) Private non-profit organizations are included in the national accounts' household sector.

Differing dividend definitions may lead to differing time trends if tax reforms induced income shifting: If, for example, profits from unincorporated firms (which are still subject to the personal PIT tax rate) are shifted towards interest income via changes in the leverage of firms, national accounts report more interest, less dividends, and unchanged total capital income. However, dividends according to the PIT definition would remain unchanged, therefore our proxy would be too low: we would double-count the reduction in unincorporated firm profits, as it would already show up in top incomes as reported in PIT statistics. Using national accounts would thus underestimate dividend income and suggest too low top income shares. For interest income, the national accounts aggregate seems less problematic from the income shifting perspective, as each increase in interest income would show up in the national accounts aggregate. See Eurostat, 2013, Schwarz, 2008 for more details.

Tax Flow Statistics

Tax flow statistics are provided annually by Destatis and report aggregated tax flows by tax type. These types comprise the withholding tax on dividend income (since 1992) and on interest income (since 1993) which could be counted against both PIT and corporation tax liability by the end of the year until 2008. Tax bases correspond to taxable income on

Table 3: Control total for wealth, Germany, 1992-2012

Year	Total household net wealth (bio. €)
2000	6,380.91
2001	6,441.30
2002	6,498.68
2003	6,649.07
2004	6,875.66
2005	7,103.97
2006	7,237.05
2007	7,616.56
2008	7,786.13
2009	7,874.82
2010	8,077.29
2011	8,323.46
2012	8,628.24

Notes: Values are in current Euro.
Source: Bundesbank, Financial Accounts ESA 2010; Destatis (2015): Balance sheets for institutional sectors and the total economy

the personal and on the corporate level. In 2009, it was replaced by the final withholding tax which since then has been reported by income source as well. However, the tax flow on interest has since been reported jointly with the tax flow on capital gains from stock shares.

Like national accounts aggregates, the tax flow aggregates do not perfectly correlate with the PIT tax base: First, their aggregate level depends on the level of the saver's allowance which varied greatly between 2000 and 2007 (see Appendix Figure B.2). Since 2007, the allowance is lower than in previous years, which might induce a mechanical increase of the proxy, yielding too high extrapolated capital income. (weil wir in PIT vor Abzug des Sparerfreibetrags haben!) Second, the interest tax base does not include private loans. Third, aggregates include interest and dividends received by corporations and unincorporated businesses. This composition of the recipients groups may have two effects: First, the aggregate does not fully reflect income timing, if it solely occurs on the household level. As in the case of national accounts dividends, this difference in the definition of the recipients compared to the PIT could have an impact on the quality of the proxy in the case of shifting: Shifting capital income from the firm level to the private level would leave the proxy unchanged, while private capital income in the PIT definition would increase (with a concomitant decrease in business income, which is still visible in the PIT statistics). Imputed private capital income would thus be too low.[19]

[19]It is, however unclear which direction of shifting would dominate: business to private shifting is more plausible in the case of unincorporated business income (which is subject to the high PIT tax rate). Private to business shifting might be favorable in the case of corporations, as the corporate tax rate (15%) is even lower than the private capital income tax rate (25%) which yields an accumulation effect in the long run. Furthermore, deductions can only be claimed at the firm level. See Jenderny (2015) for a detailed discussion of plausible shifting directions.

Last, the tax base definition for interest income was broadened in 2009 and includes capital gains from stock shares since then. Although the effect of this additional tax base is expected to be small in 2009 as transitional rules are quite generous, the broader tax base will become apparent in the long-term, inducing comparatively high extrapolated values for interest income. Consequently, extrapolated capital income using tax flow statistics might lose quality as a proxy for the PIT definition of capital income. Both level and direction of the error depends on the extent and direction of income shifting and on the size of capital gains from stock shares.

Tax flow aggregates are thus a promising proxy for household capital income, as they reflect the aggregate income that was taxed with the final withholding tax. Yet, imputed dividend income will be too low if business income is shifted to private capital income. By contrast, changes in the saver's allowance are more likely to generate too high imputations. Last, the interest tax aggregate will reflect an increasing tax base of stock market capital gains.

Stock Market Indices

The most comprehensive German stock market index (CDAX) includes all German stocks that are traded on the Frankfurt stock exchange. There are two CDAX time series: the performance index describes the value of the market portfolio with reinvested dividends. The course index describes the value of the market portfolio without reinvested dividends. Both are corrected for events that have no impact on portfolio values, such as the issuing of new stocks. The dividend sum can be computed by multiplying the difference between the two indices' monthly growth rates by the market capitalization. Both indices are published as a monthly time series by the German Central Bank (*Bundesbank*) since 1994. Time series nos. are BBK01.WU001A (CDAX course index), BBK01.WU018A (CDAX performance index), and BBK01.WU080U (CDAX market capitalization, since 1999). For details on index computation see Deutsche Börse AG (2014). For the general method of deriving dividend yields and capital gain yields from stock market indices, see Dimson et al. (2002).

GDP

might also serve as a proxy for capital income, as it reflects economic activity in general. We use lagged GDP, as dividends are usually distributed profits of the preceding year. Interest income also turns out to correlate stronger with lagged GDP than with GDP in the same year. As in the case of national accounts dividends, the share of personal dividend and interest income in GDP will change after the reform if income is shifted towards these income sources. Then, the extrapolated capital income will be too low.

SOEP

is a representative panel study containing individual and household data in Germany from 1984 onwards and was expanded to the New German Laender after reunification in 1990. SOEP reports gross household income by component including the sum of dividend and interest income. Like most population surveys, SOEP lacks information on individuals at the top of the income distribution. In general, households up to the top 1% are well

represented.[20] We use capital income from the top 10% without the top 1% of households (P90–99).[21]

[20]Bartels/Metzing (mimeo) show that the gap between PIT and SOEP based top income shares increases moving further to the top of the distribution indicating that SOEP underestimates incomes above the 99th percentile.

[21]From 2009 onwards, it is also possible to use the German data of the Euro Area Household Finance and Consumption Survey (HFCS). The drawback of this survey is its recent availability. So far, we can only check capital income in 2009 reported in the first wave in 2010. The advantage of the survey lies in its focus on wealth. Like SOEP it reports income from financial assets, but provides additional wealth information such as the stock market portfolio.

D Income tax reforms in Germany, 1992-2011

Capital income consisting of interest income and dividends gradually disappeared from the progressive PIT base over the past 15 years in Germany. Reforms since 2001 most frequently modified the taxation of dividends, but also the taxation of interest income and capital gains. Finally in 2009, the introduction of a flat tax on capital income (*Abgeltungsteuer*) removed this income source from the PIT base completely and consequently from income tax statistics as well. In the following, we describe regulatory changes to the taxation of capital gains and capital income and their impact on income tax data as a data source for the estimation of top income shares. Since we use both PIT statistics and PIT microdata, we focus on the reforms' impact on both gross taxable income as reported in the PIT statistics and the PIT microdata quality with respect to top incomes.

D.1 Taxation of Capital Gains

German tax law distinguishes five types of capital gains: capital gains from financial assets (i), capital gains from real estate (ii), capital gains from selling a not incorporated business (iii), capital gains from selling shares of a closely held corporation (iv) and capital gains realized inside the unincorporated business sphere (v).[22] In post-war Germany, a large portion of these capital gains has always been tax exempt. As a consequence, private capital gains reported in German tax statistics are fairly low[23] and can only be reconstructed partly by using PIT microdata.

Capital gains from financial assets (i) and real estate (ii) were tax exempt if held longer than a certain time period. We therefore observe them only to a limited degree in microdata. For those capital gains from stock shares that were reported, only 50% were taxable between 2002 and 2008. For capital gains from financial assets, this exemption ended in 2009: since then, they have been excluded from the PIT and instead fully subject to the flat tax on capital income.[24]

Capital gains from selling an unincorporated business (iii) are only taxable if exceeding a quite elevated threshold. But if these capital gains exceed the threshold, the taxable share is reported quite consistently in PIT files over time. Capital gains from selling shares of a corporation (iv) are taxable if the tax unit's share exceeds

[22]None of the five types of capital gains was ever part of the PIT's definition of capital income until 2009. Type (i) and (ii) were classified as "other" income, and type (iii) to (v) accrue to agriculture and forestry, self-employed, or business income. Only type (i) has been classified as capital income since 2009, if it is reported in the PIT file.

[23]In some years, capital gains reported in tax statistics were even negative in sum, as losses were deductible from other income sources under certain conditions.

[24]For financial assets (i), this period was six months until 1998 and one year from 1999 to 2008. For real estate, the period was two years until 1998 and since then ten years.

a certain threshold.[25] Capital gains of this type typically stem from closely held companies, but apply to stock company shares as well, if the tax unit's capital share is high enough. Capital gains (iv) have thus always been included in PIT files, and their size is reconstructible from micro data. Their taxable share, however, changed from 100% before 2002 to 50% in 2002, and 60% in 2009. Their contribution to gross taxable income in PIT statistics is thus mechanically reduced in 2002 and slightly increases again after 2009.

Last, capital gains can also be realized inside the business sphere (v) as part of the business profit. In these cases, we do not observe capital gains as such in the microdata, but it is included in the business profit and therefore in gross taxable income. This might be relevant after 2009, as it has become more attractive to shift capital income to the business sphere.

As capital gains from financial assets and real estate have been mostly tax exempt, capital gains in German PIT files predominantly stem from selling unincorporated businesses (iii) and corporation shares (iv) where the tax unit holds a considerable share.

D.2 Taxation of Capital Income

In the last two decades, two tax reforms (2001/02, 2009) reduced the level of taxable capital income and hence reduced the level of gross taxable income (GTI) (*Gesamtbetrag der Einkünfte*) reported in PIT files. As capital income is concentrated at the top of the income distribution, top income shares based on PIT statistics are also reduced mechanically. Reforms mainly changed the taxation of dividends. Legislative changes to the taxation of capital income are summarized in Table D.2.

Table D.1: Changes in the Definition of Taxable Capital Income

		GTI Definition in PIT
pre 2001		$Y_{non\text{-}cap} + (INT - Deduct_{INT}) + (D_{gross} - Deduct_{D_{gross}})$
2001/02–2008		$Y_{non\text{-}cap} + (INT - Deduct_{INT}) + (D_{gross} \cdot (1 - t_{corp}) - Deduct_{D_{gross}}) \cdot 0.5$
since 2009	(i)	$Y_{non\text{-}cap} + INT + (D_{gross} \cdot (1 - t_{corp})$
	(ii)	$Y_{non\text{-}cap}$
	(iii)	$Y_{non\text{-}cap} + Y_{shifted}$

Notes: $Y_{non\text{-}cap}$: personal income other than capital income (not affected by reforms) D_{gross}: gross dividend before corporate taxation; INT: interest income; Deduct: deductions always refer to expenses that directly relate to the tax base. t_{corp}: corporation tax rate applied to dividends
Source: German income tax law (ESTG).

[25]The threshold for corporation shares was 1% until 1995, 25% from 1996 to 1998, 10% from 1999 to 2001, and since then 1% again.

Table D.2: Changes in Capital Income Taxation

	pre 2001	2001/02–2008	since 2009
	Gross Dividends (D_{gross})		
tax base	100%	$(1 - tcorp) * 50\%$	$(1 - tcorp) * 100\%$
deductions	100%	50%	–
tax rate	PIT	PIT	$min(W, PIT)$
corp. tax credit	*yes*	*no*	*no*
income source	*capital*	*capital*	*capital*
	Interest (INT)		
tax base	100%	100%	100%
deductions	100%	100%	–
tax rate	PIT	PIT	$min(W, PIT)$
income source	*capital*	*capital*	*capital*
	Cap. Gains from Stock Shares (GC I)		
tax base	100%	50%	100%
deductions	100%	50%	–
tax rate	PIT	PIT	$min(W, PIT)$
definition	$specific\ cases^a$	$specific\ cases^a$	$comprehensive^b$
income source	*other*	*other*	*capital*
	Cap. Gains from Closely Held Corporations (GC II) & Dividends / CG I in Private Business Sphere		
tax base	100%	50%	60%
deductions	100%	50%	60%
tax rate	PIT	PIT	PIT
income source	*business*	*business*	*business*
tcorp(%)	30%	25%	15%

Notes: D_{gross}: gross dividend before corporate taxation; INT: interest income; CG I: capital gains from stock shares; CG II: capital gains from closely held corporations; deductions always refer to expenses that directly relate to the tax base. [a]specific cases: CG I were only taxable if the assets had been held less than one year. [b]comprehensive: all CG I are taxable if the assets were acquired in 2009 or later. Otherwise, CG I are still tax exempt.
Source: German income tax law (ESTG)

Pre 2001

- Dividends from German corporations are subject to the corporation tax. Before 2001, the corporation tax on distributed dividends was a pure pre-tax to the PIT. The gross dividend, say, e.g., 100 €, was subject to the corporation tax of 30%. The shareholder received the cash dividend of 70 €. However, the shareholder's GTI comprised the full gross dividend of 100 €, which was then taxed at the personal tax rate. The corporation tax could be credited against the resulting PIT tax claim. GTI before 2001 thus included gross dividends before taxes on

the corporation level.

- Interest income was also fully taxable at the personal PIT rate.
- Capital income related expenses[26] could be fully deducted and therefore reduced GTI.

2001/2002-2008: 50% Rule

- The definition of taxable dividend income in the PIT changed in 2001/2002.[27] Instead of gross dividends, the new taxable income definition was half the cash dividend (50% rule; 35 € in the example above). At the same time, the corporate level taxes could not be credited against the PIT any more. The resulting effective tax rate on the gross dividend was comparable to the tax rate before 2001/2002, but GTI observed in the income tax data was considerably reduced. In addition, the 50% rule also applied to capital gains from corporation shares (if taxable), which similarly reduced GTI if capital gains were positive (see section 2.1).
- Interest income remained fully taxable at the personal PIT rate.
- Only half of the capital income related expenses could be deducted, as far as the expenses were related to dividends. Capital income related expenses that stemmed from interest income remained fully deductible.

Post 2009: Dual Tariff

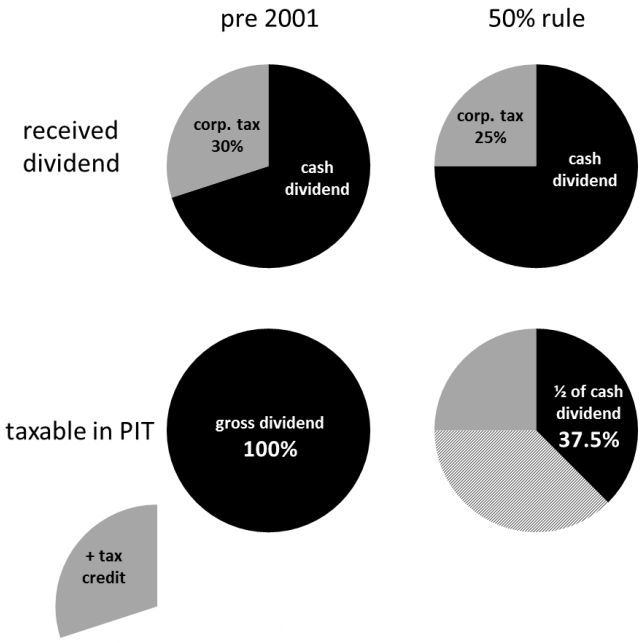
Since 2009, capital income is not included in the PIT schedule any more and thus in PIT files neither. Capital income from dividends, interest income, and capital gains from stock shares are taxed at a flat withholding tax rate of 25% instead (see Jenderny, 2015 for a detailed description of the reform components).[28] At the same time, negative capital income and capital income related expenses cannot be deducted from taxable income any more. However, it is still possible to report capital income in the PIT and is favorable for the tax unit in the following cases:

[26] These are, e.g., capital costs, travel expenses related to general meetings, etc.

[27] For dividends issued by German corporations, legislative changes started to apply in 2002 in most cases. This was the case for the largest share of dividends.

[28] This reform also broadened the tax base, since capital gains from stock shares were typically not taxable before 2008. Before 2008, capital gains from stock shares were only taxable if the shares had been held less than one year. However, the base broadening only applies to stock shares that have been obtained after 2008. We therefore do not expect any effect of the tax base broadening in 2009, but an increasing effect on taxable capital income since 2010.

Figure D.1: Changes in definition of taxable dividends



Notes: Pre 2001: 100% of the gross dividend before corporate taxation entered GTI. The 50% rule reduced the share to 37.5%. Effective tax rate changed only to a little extent, as the tax credit was abolished at the same time.
Source: German income tax law.

(i) If the personal tax rate undercuts the withholding tax rate, the personal tax rate is applied. In these cases, the reported capital income is also included in the tax units' GTI.

(ii) Capital income is only taxable as far as it exceeds the saver's allowance of 810 €. Some tax units do not claim the full allowance towards the institutions that withhold the tax (e.g. banks, corporations). Then, the allowance can be obtained by reporting capital income in the PIT file. Capital income above the allowance is then taxed at the withholding tax rate (or with the personal tax rate in case (i)). In these cases, the reported capital income is not included in the tax units' GTI.

(iii) If capital income is realized in the private business sphere instead of the private sphere, the former 50% rule is changed to a new 60% rule: 60% of cash dividends and capital gains from stocks are taxable at the personal PIT rate, and 100% of interest income. In turn, the same share (60% or 100%) of capital related expenses is deductable again. Therefore, shifting capital income from the private to the business sphere is favorable for tax units with high capital related expenses. Before the introduction of the reform, this type of shifting was indeed recommended by the tax adviser literature (Maier and Wengenroth, 2007, Worgulla and Söffing, 2007). The 60% rule also applies (in any case) to

capital gains from closely held corporations' shares (see Section 2.1). If capital income has been shifted to the business sphere, it is reported in the PIT records again, albeit only 60% of dividends and capital gains from corporation shares enter the GTI definition. In addition, this capital income is reported as business income.

The tariff dualization reduced the capital income observed in the PIT to zero in most cases. Only capital income that is taxed at the personal tax rate is still included in GTI and reported in tax statistics (case (i)). If the savers' allowance was not fully claimed, capital income is still reported, but not included in GTI and not necessarily reported in income tax statistics (case (ii)). Last, a portion of capital income is likely to have been realized in the private business sphere reported as business income in the PIT files. Consequently, in the first post-reform year 2009, the capital income share in positive GTI as reported in tax statistics dropped from 3.3% in 2008 to 1.1% in 2009.[29]

[29]Table A.11 shows the share of capital incomes in GTI since 1992.

Table D.3: Capital income in PIT data (including base broadening), after 2009

	Share of predicted capital income		Share of GTI		
	reported	taxable	reported	taxable	predicted
fractile		2009			
0.01	46.0	4.0	15.7	1.4	34.2
P99.9–99.99	55.9	4.6	15.9	1.3	28.5
P99.5–99.9	83.2	5.1	11.1	0.7	13.3
P99–99.5	95.0	5.4	7.3	0.4	7.7
P95–99	88.0	6.3	3.8	0.3	4.3
P90–95	86.6	13.0	2.6	0.4	3.0
below P90	78.8	35.9	3.6	1.6	4.6
fractile		2010			
0.01	54.9	4.5	12.4	1.0	22.6
P99.9–99.99	88.7	6.9	17.4	1.4	19.6
P99.5–99.9	138.5	7.2	12.9	0.7	9.3
P99–99.5	159.0	8.3	8.5	0.4	5.4
P95–99	140.6	8.8	4.2	0.3	3.0
P90–95	134.1	15.7	2.8	0.3	2.1
below P90	121.1	40.7	3.8	1.3	3.1

Notes: Fractiles defined based on uncorrected annual gross taxable income. The table displays capital income that is subject to the PIT, capital income that is reported in the PIT, and capital income as predicted by proxies. Capital income taxable in PIT is part of GTI and therefore adds to our imputation. Capital income can be taxable in the PIT due to (i) type of income (e.g. dividend from closely held company, by choice taxable in PIT), or (ii) personal marginal tax rate undercutting the withholding tax rate on capital income. (i) is more relevant at the top, where the total capital income share is higher. (ii) is only relevant at lower income ranges. Reported capital income exceeds taxable capital income due to (i) deductions and (ii) income that is subject to the withholding tax (i.e. not subject to PIT) but is reported in order to claim the saver's allowance or to deduct losses. Reporting might be favorable or not, it is not mandatory and the aggregate is therefore not comprehensive. From 2010, reported capital income contains capital gains from stocks (acquired from 2009 onwards), which can cause predicted capital income to exceed reported capital income
Source: PIT microdata, own calculations.